

Appendix I

Supplemental Information Inquiries and Responses

To: Scott O’Konek
Summit Carbon Solutions

Sent via email to sokonek@summitcarbon.com

From: Andrew Levi
Energy Environmental Review and Analysis

Date: October 5, 2023

Project: Otter Tail to Wilkin CO₂ Pipeline Project
IP 7093/PPL-22-422

Respond: Preferably no later than October 15, 2023

Please respond to the following questions or provide the requested data or information. Staff will use the information provided to develop the environmental document for the project, which is a public document. Your response, in its entirety, will be included in the environmental document as an appendix; therefore, **responses will be publicly available** unless otherwise designated by the respondent as “nonpublic information” pursuant to Minnesota Statute § 13.02, subdivision 12.

Directions: Responses to questions should be contained within this form to the greatest extent possible (**11-point Calibri, plain text font, RGB 192, 0, 0**). Attach supporting documentation as necessary. While data and information requests, for example, shapefiles or draft plans, will not be contained within this form, document their submittal using this form as follows: “*Requested information sent to whom by what means on date.*” Co-applicants please consolidate your reply into a single response.

Do not eFile your response. Return the completed form, as a PDF, along with necessary supporting documentation, and/or requested data or information to andrew.levi@state.mn.us. Contact me at (651) 539-1840 with questions.

1. Provide the following documents: **1) Midwest Carbon Express Project, Minnesota Conventional Archaeological Reconnaissance (Phase I) Survey (2021). Volume 1: MNL-303 (Chippewa, Renville, Yellow Medicine, and Redwood Counties); MNL-304 (Redwood, Cottonwood, and Jackson Counties); MNL-305 (Faribault and Martin Counties); MNL-321 (Ottertail and Wilkin Counties), 2021. Completed by Merjent, Inc. for Summit Carbon Solutions; 2) Minnesota Conventional Archaeological Resources Survey (Phase I). Volume 2: Fieldwork Report (2022). Michael Madson, et al. August 2022**

Summit Carbon Solutions, LLC (Summit) has uploaded both of the requested cultural reports to Andrew Levi of the Minnesota Department of Commerce – Energy Environmental Review and Analysis (DOC-EERA) via a link to an Otter Tail to Wilkin Project (Project) SharePoint site.

In accordance with Minnesota Rules, part 7829.0500 and Minnesota Statutes Chapter 13, Summit has designated portions of both cultural reports as NONPUBLIC DATA – NOT FOR PUBLIC DISCLOSURE because they contain sensitive cultural resource location information. The Minnesota State Historic Preservation Office Manual for Archaeological Projects in Minnesota provides for restricted access to sensitive cultural resource location information. For each of the reports, the following two versions have been provided.

- “Non-Public” version – full report that contains all sensitive and confidential data; and

- “Public” version – all sensitive and confidential data has been redacted.

Note that for Volume 2, Summit has labeled the report with a DRAFT watermark. Summit is presently responding to comments from the Minnesota State Historic Preservation Office (MN SHPO) on the more recent *Minnesota Conventional Archaeological Resources Survey (Phase I), Volume 4*, which will modify Volume 2. Typically, these reports are maintained in draft stage until they address all comments received during the MN SHPO review process; therefore, the watermark is appropriate.

2. Provide an engineering cost estimate associated with the project to include planning/permitting; acquisition/permits; design; procurement; construction/restoration; and closeout. Provide separate estimates for the capture facility and another for the pipeline facilities. Provide the margin of error.

Summit has prepared the following cost estimates for the Project pipeline and capture facility.

Engineering Cost Estimate		Engineering Cost Estimate	
4 Inch MNL-321 Pipeline (28 miles)		Otter Tail Capture Facility	
Work Item	Cost	Work Item	Cost
Planning / Permitting	\$ 2,500,000	Planning / Permitting	\$ 500,000
ROW Acquisition	\$ 8,500,000	ROW Acquisition	\$ -
Engineering	\$ 500,000	Engineering	\$ 1,750,000
Procurement	\$ 2,500,000	Procurement	\$ 10,000,000
Construction	\$ 21,500,000	Construction	\$ 16,500,000
Closeout	\$ 1,500,000	Closeout	\$ 1,000,000
Total	\$ 37,000,000	Total	\$ 29,750,000
Estimate Accuracy: +/- 15%		Estimate Accuracy: +/- 15%	

3. Given the current permitting schedule, provide a revised construction schedule in as much detail as possible. Indicate whether winter construction will occur.

Summit has prepared the following revised construction schedule. These dates do not include a winter construction season, and, at this time, Summit does not plan to construct the Project during the winter.

- Pipeline Construction - March to July 2025
- Capture Facility Construction - May to August 2025

To: Scott O’Konek
Summit Carbon Solutions

Sent via email to sokonek@summitcarbon.com

From: Andrew Levi
Energy Environmental Review and Analysis

Date: October 17, 2023

Project: Otter Tail to Wilkin CO₂ Pipeline Project
IP 7093/PPL-22-422

Respond: Preferably no later than October 31, 2023

Please respond to the following questions or provide the requested data or information. Staff will use the information provided to develop the environmental document for the project, which is a public document. Your response, in its entirety, will be included in the environmental document as an appendix; therefore, **responses will be publicly available** unless otherwise designated by the respondent as “nonpublic information” pursuant to Minnesota Statute § 13.02, subdivision 12.

Directions: Responses to questions should be contained within this form to the greatest extent possible (**11-point Calibri, plain text font, RGB 192, 0, 0**). Attach supporting documentation as necessary. While data and information requests, for example, shapefiles or draft plans, will not be contained within this form, document their submittal using this form as follows: *“Requested information sent to whom by what means on date.”*

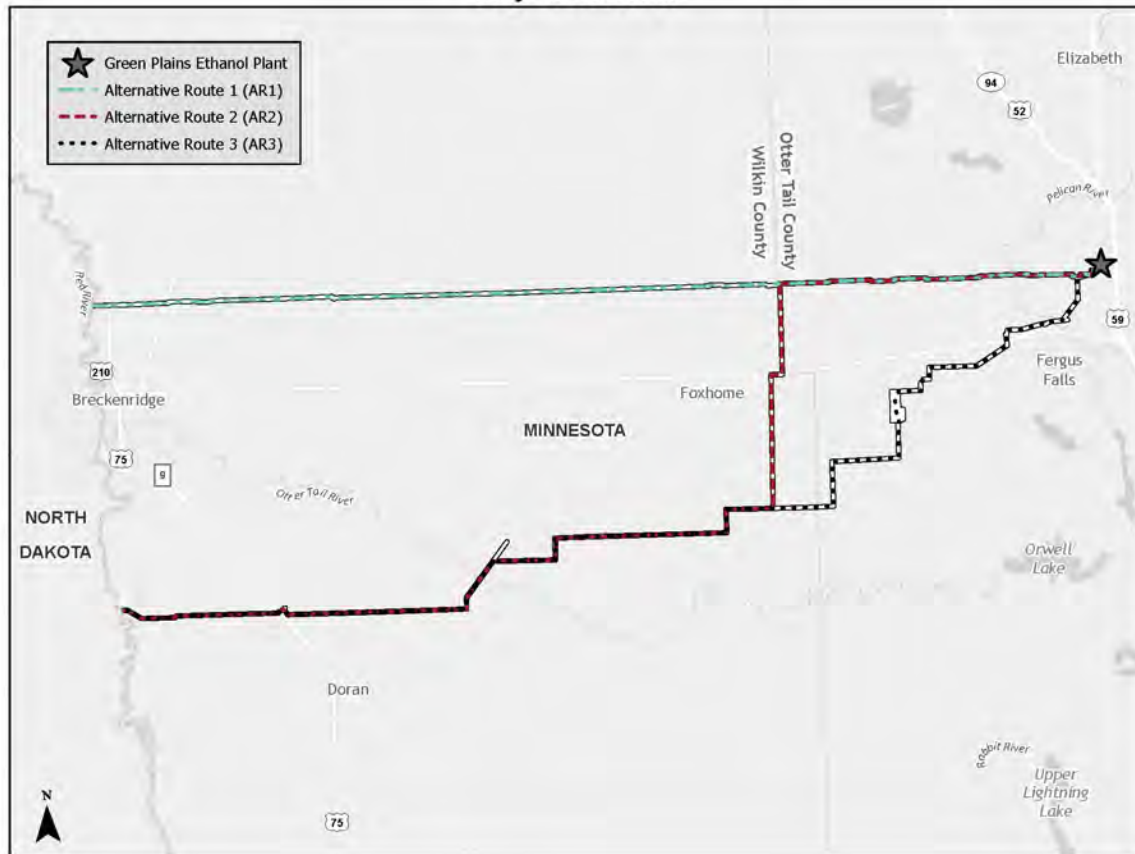
Do not eFile your response. Return the completed form, as a PDF, along with necessary supporting documentation, and/or requested data or information to andrew.levi@state.mn.us. Contact me at (651) 539-1840 with questions.

1. Provide update on any additional cultural resources work (file review, field studies, etc.) that has not been previously provided or indicate when this information will be available.

Summit Carbon Solutions, LLC (Summit) submitted the draft addendum report titled: *“Minnesota Conventional Archaeological Resources Survey (Phase I). Volume 4: Fieldwork Report Addendum (MNL-305 and MNL-321) For Work Completed Between July 2, 2022, and November 14, 2022, on MNL-321 in Otter Tail County and MNL-305 in Martin County, and Since December 3, 2021, for the Eliminated Segment of MNL-305 in Faribault County”* to the Minnesota State Historic Preservation Office (MNSHPO) on April 6, 2023. MNSHPO provided comment to Summit on July 13, 2023. Summit is presently working to address MNSHPO’s comments on the draft Volume 4 and will provide a copy of the final report once available.

2. Provide a shape file and a listing (similar to Appendix J of the Scoping EAW) of noise sensitive receptors within 1,600 feet of the route width for Alternative Route 1 (previously referred to as CURE alternative route 2) and Alternative Route 2 (previously CURE alternative route 3) and Alternative Route 3 (Summit’s proposed route), see map below.

Project Overview



For this analysis, Summit first applied a 500-foot-wide route width to the Alternative Route 1 (previously referred to as CURE Alternative Route 2) and Alternative Route 2 (previously CURE Alternative Route 3) centerlines. For Alternative Route 3 (Summit's proposed route), Summit utilized the presently requested route width, which is a 500- to 1,808-foot-wide route width centered on the Project centerline.

Summit has posted a zipped folder of shapefiles to the Project Sharepoint site that contains centerlines for Alternatives 1, 2 and 3 (with mileposts); route widths for Alternatives 1, 2 and 3, and Noise Sensitive Receptors (NSRs) within 1,600 feet of either side of each route width (see zip file titled "Inquiry 2-2 Otter Tail to Wilkin Alternative Route NSAs_20231025").

Tables that show NSRs within 1,600 feet of the route widths for Alternative Routes 1, 2, and 3 are included in Attachment 2-2 of this response.

3. Provide a high-resolution map, similar to Figure 6-1 in the Scoping EAW, showing an overview of the Midwest Carbon Express Project for inclusion in the EIS. Label the project as Midwest Carbon Express rather than Summit Carbon Solutions Project. No figure number is needed.

Summit has posted a .jpg file to the Project Sharepoint site showing an overview of the Midwest Carbon Express (MCE) Project (see file titled "Inquiry 2-3 Midwest Carbon Express Project Map_20231025").

4. The Scoping EAW states that a 50-foot-wide construction workspace would be needed for HDDs” (Section 6.c, page 21) and “For HDDs and bores of waterbodies where there would not be a travel lane within the ROW (i.e., no use of a bridge) there would be no clearing over the HDD path” (pages 12 and 61). Clarify why a 50-foot-wide construction workspace is needed for HDDs. Describe if and where there would be any travel lanes or other disturbance (aside from hand trimming for guidewire placement) between HDD entry and exits.

Summit is obtaining a standard 50-foot-wide permanent easement over the pipeline so that Summit may construct, own, operate and maintain the proposed pipeline. At HDDs, this 50-foot-wide permanent easement will also serve as temporary construction workspace; however, no ground disturbance will occur here. Within this construction workspace, Summit’s Contractor may trim vegetation using hand tools where necessary to access a water source to withdraw or water for HDD operations and/or hydrostatic testing of the pipeline and/or to place the HDD guidewires along the surface of the drill path within the entry and exit points. Summit’s Contractor would not clear vegetation between the HDD drill entry and exit points during construction. Summit will not use travel lanes on any of the HDDs planned for the Project (the Pelican, Otter Tail, and Bois de Sioux Rivers). Therefore, disturbance within all HDD entry and exit points will be limited to that noted above.

5. Clarify if vegetation maintenance, such as mowing or tree and shrub removal, would be done across the full width of the permanent ROW.

After the pipeline is constructed, Summit would maintain the 50-foot-wide permanent easement for the purposes of pipeline operation, integrity, maintenance, and safety. The 50-foot-wide permanent easement would be maintained free of woody vegetation over 15 feet tall as part of SCS’s vegetation maintenance program. This would involve mowing or tree/shrub removal in non-cultivated areas.

However, there are some exceptions. As outlined in Section 4.8 of the Minnesota Environmental Construction Plan (Minnesota ECP), “post-construction vegetation maintenance will be limited adjacent to waterbodies to promote the growth of the riparian filter strip (buffer)...vegetation along a 10-foot-wide corridor centered over the pipeline will be maintained to facilitate visual inspection of the pipeline and allow corrosion and leak surveys to occur.” In these areas near waterbodies, Summit will limit its standard 50-foot-wide permanent easement maintenance area to a 10-foot-wide area over the pipeline. In addition, as stated in Section 4.8 of the Minnesota ECP, during the operational term, “Vegetation between HDD entry and exit points will not be routinely cleared or mowed.” Summit’s response to Inquiry Number 2.4 above notes that there will be no clearing between HDD exit and exit points during construction. This would also extend to the operational term.

6. Describe chemicals or other additives, if any, that would be added to the hydrostatic test water.

Summit does not plan to add chemicals or other additives to hydrostatic test water. In the unlikely event that hydrostatic test discharge must occur in the winter, Summit may consider adding an anti-freeze additive, such as glycol, to prevent freezing. All additives would be subject to review and approval by relevant regulatory agencies.

7. Indicate when geotechnical studies for the HDD locations would be completed. Provide a preliminary assessment of HDD feasibility for each HDD location based on currently available geologic information.

- Pelican River HDD – The geotechnical study has not been completed. It will be completed prior to construction once approval is received from the landowner.
 - Otter Tail River HDD – The geotechnical investigation has been completed. The results confirm that HDD is a feasible method of crossing the Otter Tail River.
 - Bois De Sioux River HDD – The geotechnical investigation has been completed. The results confirm that HDD is a feasible method of crossing the Bois De Sioux River.
8. The RPA states that the applicant will develop a contingency plan to address the unintended release of drilling mud to the environment during the execution of each HDD. Indicate whether this plan will include: (1) a contingency for the waterbody crossing in the event the drill is unsuccessful or proves infeasible, (2) measures to reduce the risk for an inadvertent return to occur, and (3) procedures to monitor for inadvertent returns during drilling.

Yes.

9. RPA Section 6.14.2 states “Where feasible, the Applicant narrowed the construction workspace width from 100 feet to 75 feet at wetland crossings to reduce wetland impacts from the Project.” Describe the locations in wetlands where the construction workspace width would be greater than 75 feet.

Summit actively updates its Project construction workspace as new wetland field data becomes available. Presently, there are no locations where the construction workspace is greater than 75 feet in delineated wetlands. It is Summit’s intention to reduce the width of the construction workspace to 75 feet in all delineated wetlands.

10. Provide an update on consultation with the USFWS Region 3 office regarding federally listed species.

Consultation with the U.S. Fish and Wildlife Service (USFWS) Region 3 office regarding federal species is ongoing. Summit is preparing a Biological Assessment for the MCE Project that will cover the potential impacts to federally listed threatened and endangered species. Summit anticipates submitting the Biological Assessment to the U.S. Army Corps of Engineers for their use in Section 7 consultation with the USFWS regarding the MCE Project during Q2 of 2024.

11. Explain why dry waterbody crossing methods are described as part of the project (Scoping EAW Section 12.b.iv.b) but are not proposed for any of the waterbodies that would be crossed by the project (Table 12-2 of the Scoping EAW).

Summit has included dry waterbody crossing methods for flowing waterbodies in the Minnesota ECP and the Route Permit Application (and reflected in the Scoping EAW) as an option that may be applied to specific streams where a dry crossing method is preferred or required based on agency input or regulatory requirements. At this point in time, Summit has proposed to utilize the waterbody crossing methods as presented in Table 12-2 of the Scoping EAW.

12. Provide a width, estimated if necessary, for the perennial stream that would be crossed at MP 6.6 and the three intermittent streams at MPs 4.7, 5.0, and 5.5 (Scoping EAW Table 34).

- MP 4.7 – Summit surveyed this feature in 2023. The surveyed width of the Ordinary High Water Mark (OHWM) is 4.0 feet.
- MP 5.0 – Summit surveyed this feature in 2023. The surveyed width of the OHWM is 3.5 feet.
- MP 5.5 – Summit surveyed this area in 2023. There was no evidence of a waterbody at this location. Therefore, this feature, once considered a “desktop” waterbody, will no longer be considered as a waterbody feature.
- MP 6.6 – Summit has not surveyed the waterbody at this location (note that it is presently closer to MP 6.5). Survey will occur once the landowner grants permission. However, Summit surveyed this feature on an adjacent property to the southeast. In that location, the width of the OHWM is 15.0 feet.

Attachment 2-2
Noise Sensitive Receptor Tables

Noise Sensitive Receptors Within 1,600 Feet of Alternative Route 1 Route Width			
Approximate Milepost ^a	Description ^b	Distance From Alternative Route 1 Centerline (feet)	Direction from Alternative Route 1
0.01	Garage/Barn *	1,383	SE
0.01	Garage/Barn *	1,607	SE
0.01	Garage/Barn *	1,317	SE
0.01	Residence *	1,491	SE
0.07	Industrial *	752	N
0.07	Industrial *	545	N
0.08	Industrial *	330	N
0.08	Industrial *	662	N
0.10	Industrial *	475	N
0.15	Business *	245	N
0.23	Industrial *	700	N
0.24	Garage/Barn *	835	NW
0.24	Garage/Barn *	817	NW
0.24	Garage/Barn *	979	NW
0.24	Residence *	930	NW
0.41	Garage/Barn *	781	S
0.41	Garage/Barn *	715	S
0.41	Garage/Barn *	846	S
0.42	Residence *	721	S
0.75	Industrial *	296	N
0.75	Industrial *	256	N
0.96	Garage/Barn *	475	S
0.97	Residence *	417	S
0.99	Garage/Barn *	520	S
1.06	Residence *	267	N
1.07	Garage/Barn *	312	N
1.10	Garage/Barn *	572	N
1.10	Residence *	420	N
1.11	Garage/Barn *	439	N
1.11	Garage/Barn *	500	N
1.11	Garage/Barn *	309	N
1.12	Residence *	262	N
1.21	Residence *	1,044	S
1.23	Garage/Barn *	1,107	S

Noise Sensitive Receptors Within 1,600 Feet of Alternative Route 1 Route Width			
Approximate Milepost ^a	Description ^b	Distance From Alternative Route 1 Centerline (feet)	Direction from Alternative Route 1
1.23	Garage/Barn *	1,141	S
1.86	Garage/Barn *	378	SW
1.89	Garage/Barn *	437	NE
1.89	Residence *	295	NE
1.96	Residence *	279	S
1.97	Garage/Barn *	476	S
1.97	Garage/Barn *	398	S
1.98	Garage/Barn *	592	S
2.01	Garage/Barn *	391	S
2.01	Garage/Barn *	483	S
2.04	Garage/Barn *	912	N
2.06	Garage/Barn *	973	N
2.07	Garage/Barn *	1,142	N
2.07	Garage/Barn *	1,096	N
2.08	Garage/Barn *	305	S
2.09	Garage/Barn *	1,018	N
2.09	Residence *	920	N
2.09	Garage/Barn *	350	S
2.09	Garage/Barn *	1,071	N
2.09	Garage/Barn *	196	S
2.10	Garage/Barn *	446	S
2.10	Garage/Barn *	1,117	N
2.11	Garage/Barn *	286	S
2.11	Residence *	382	S
2.97	Garage/Barn *	595	NW
2.97	Residence *	381	NW
3.09	Garage/Barn *	681	N
3.09	Garage/Barn *	473	N
3.10	Garage/Barn *	757	N
3.11	Garage/Barn *	505	N
3.57	Residence *	1,542	S
3.59	Garage/Barn *	1,496	S
3.60	Garage/Barn *	1,539	S
3.61	Garage/Barn *	1,652	S

Noise Sensitive Receptors Within 1,600 Feet of Alternative Route 1 Route Width			
Approximate Milepost ^a	Description ^b	Distance From Alternative Route 1 Centerline (feet)	Direction from Alternative Route 1
3.98	Garage/Barn *	877	N
4.00	Garage/Barn *	807	N
4.05	Residence *	468	N
4.05	Garage/Barn *	724	N
4.06	Garage/Barn *	538	N
4.07	Garage/Barn *	709	N
4.89	Industrial *	144	S
5.27	Industrial *	966	N
5.30	Residence *	976	N
5.31	Industrial *	796	N
5.32	Industrial *	981	N
5.34	Industrial *	888	N
5.35	Industrial *	935	N
5.36	Industrial *	873	N
5.67	Garage/Barn *	1,248	N
5.69	Garage/Barn *	1,190	N
5.69	Residence *	1,008	N
5.69	Residence *	353	S
5.70	Garage/Barn *	448	S
5.71	Garage/Barn *	1,342	N
5.71	Garage/Barn *	1,094	N
5.71	Garage/Barn *	215	S
5.71	Garage/Barn *	421	S
5.75	Garage/Barn *	362	S
5.75	Garage/Barn *	422	S
5.75	Garage/Barn *	257	S
6.21	Garage/Barn *	434	N
6.23	Garage/Barn *	506	N
6.24	Garage/Barn *	568	N
6.24	Residence *	367	N
6.25	Garage/Barn *	382	N
6.25	Garage/Barn *	494	N
6.26	Garage/Barn *	390	N
6.26	Garage/Barn *	445	N

Noise Sensitive Receptors Within 1,600 Feet of Alternative Route 1 Route Width			
Approximate Milepost ^a	Description ^b	Distance From Alternative Route 1 Centerline (feet)	Direction from Alternative Route 1
9.89	Garage/Barn	478	N
9.92	Residence	306	N
9.94	Garage/Barn	391	N
10.82	Residence	1,164	N
10.84	Garage/Barn	1,435	N
10.84	Garage/Barn	1,118	N
10.86	Garage/Barn	1,161	N
10.89	Garage/Barn	1,031	N
12.31	Residence	299	N
12.32	Garage/Barn	341	N
12.33	Garage/Barn	406	N
12.34	Garage/Barn	357	N
12.35	Garage/Barn	416	N
13.59	Garage/Barn	634	N
13.60	Garage/Barn	275	N
13.61	Residence	402	N
17.72	Residence	553	S
17.73	Garage/Barn	486	S
17.74	Garage/Barn	396	S
17.74	Garage/Barn	557	S
20.42	Garage/Barn	330	N
20.43	Garage/Barn	350	N
20.44	Residence	182	N
20.45	Garage/Barn	289	N
20.87	Garage/Barn	496	S
20.87	Garage/Barn	347	S
20.90	Garage/Barn	475	S
21.39	Garage/Barn	311	S
21.39	Business	700	S
21.39	Garage/Barn	672	S
21.49	Garage/Barn	462	N
21.50	Garage/Barn	445	N
21.53	Residence	285	N
21.60	Residence	1,824	S

Noise Sensitive Receptors Within 1,600 Feet of Alternative Route 1 Route Width			
Approximate Milepost ^a	Description ^b	Distance From Alternative Route 1 Centerline (feet)	Direction from Alternative Route 1
21.62	Garage/Barn	369	N
21.63	Residence	258	N
21.64	Garage/Barn	252	N
21.64	Garage/Barn	377	N
22.66	Garage/Barn	741	N
22.66	Garage/Barn	374	N
22.67	Garage/Barn	450	N
22.67	Garage/Barn	665	N
22.68	Residence	831	N
22.68	Residence	516	N
22.69	Residence	305	N
23.02	Residence	823	NW
23.02	Garage/Barn	981	NW
23.02	Garage/Barn	800	NW
23.02	Garage/Barn	1,360	S
23.02	Garage/Barn	1,343	S
23.02	Garage/Barn	1,149	S
23.02	Garage/Barn	1,089	S
23.02	Residence	1,244	S
23.02	Garage/Barn	972	S
23.02	Garage/Barn	1,062	S
23.02	Garage/Barn	1,116	S
23.02	Garage/Barn	1,499	NW
^a	Mileposts for Alternative Route 1 are unofficial distances along the centerline from the Green Plains Ethanol Plant and are included here to help describe the location of noise sensitive receptors (NSR).		
^b	An asterisk (*) indicates an NSR that is within 1,600 feet of both Alternative Route 1 and Alternative Route 2.		

Noise Sensitive Receptors Within 1,600 Feet of Alternative Route 2 Route Width			
Approximate Milepost ^a	Description ^b	Distance From Alternative Route 2 Centerline (feet)	Direction from Alternative Route 2
0.01	Garage/Barn *	1,383	SE
0.01	Garage/Barn *	1,607	SE
0.01	Garage/Barn *	1,317	SE
0.01	Residence *	1,491	SE
0.07	Industrial *	752	N
0.07	Industrial *	545	N
0.08	Industrial *	330	N
0.08	Industrial *	662	N
0.10	Industrial *	475	N
0.15	Business *	245	N
0.23	Industrial *	700	N
0.24	Garage/Barn *	835	NW
0.24	Garage/Barn *	817	NW
0.24	Garage/Barn *	979	NW
0.24	Residence *	930	NW
0.41	Garage/Barn *	781	S
0.41	Garage/Barn *	715	S
0.41	Garage/Barn *	846	S
0.42	Residence *	721	S
0.75	Industrial *	296	N
0.75	Industrial *	256	N
0.96	Garage/Barn *	475	S
0.97	Residence *	417	S
0.99	Garage/Barn *	520	S
1.06	Residence *	267	N
1.07	Garage/Barn *	312	N
1.10	Garage/Barn *	572	N
1.10	Residence *	420	N
1.11	Garage/Barn *	439	N
1.11	Garage/Barn *	500	N
1.11	Garage/Barn *	309	N
1.12	Residence *	262	N
1.21	Residence *	1,044	S
1.23	Garage/Barn *	1,107	S

Noise Sensitive Receptors Within 1,600 Feet of Alternative Route 2 Route Width			
Approximate Milepost ^a	Description ^b	Distance From Alternative Route 2 Centerline (feet)	Direction from Alternative Route 2
1.23	Garage/Barn *	1,141	S
1.86	Garage/Barn *	378	SW
1.89	Garage/Barn *	437	NE
1.89	Residence *	295	NE
1.96	Residence *	279	S
1.97	Garage/Barn *	476	S
1.97	Garage/Barn *	398	S
1.98	Garage/Barn *	592	S
2.01	Garage/Barn *	391	S
2.01	Garage/Barn *	483	S
2.04	Garage/Barn *	912	N
2.06	Garage/Barn *	973	N
2.07	Garage/Barn *	1,142	N
2.07	Garage/Barn *	1,096	N
2.08	Garage/Barn *	305	S
2.09	Garage/Barn *	1,018	N
2.09	Residence *	920	N
2.09	Garage/Barn *	350	S
2.09	Garage/Barn *	1,071	N
2.09	Garage/Barn *	196	S
2.10	Garage/Barn *	446	S
2.10	Garage/Barn *	1,117	N
2.11	Garage/Barn *	286	S
2.11	Residence *	382	S
2.97	Garage/Barn *	595	NW
2.97	Residence *	381	NW
3.09	Garage/Barn *	681	N
3.09	Garage/Barn *	473	N
3.10	Garage/Barn *	757	N
3.11	Garage/Barn *	505	N
3.57	Residence *	1,542	S
3.59	Garage/Barn *	1,496	S
3.60	Garage/Barn *	1,539	S
3.61	Garage/Barn *	1,652	S

Noise Sensitive Receptors Within 1,600 Feet of Alternative Route 2 Route Width			
Approximate Milepost ^a	Description ^b	Distance From Alternative Route 2 Centerline (feet)	Direction from Alternative Route 2
3.98	Garage/Barn *	877	N
4.00	Garage/Barn *	807	N
4.05	Residence *	468	N
4.05	Garage/Barn *	724	N
4.06	Garage/Barn *	538	N
4.07	Garage/Barn *	709	N
4.89	Industrial *	144	S
5.27	Industrial *	966	N
5.30	Residence *	976	N
5.31	Industrial *	796	N
5.32	Industrial *	981	N
5.34	Industrial *	888	N
5.35	Industrial *	935	N
5.36	Industrial *	873	N
5.67	Garage/Barn *	1,248	N
5.69	Garage/Barn *	1,190	N
5.69	Residence *	1,008	N
5.69	Residence *	353	S
5.70	Garage/Barn *	448	S
5.71	Garage/Barn *	1,342	N
5.71	Garage/Barn *	1,094	N
5.71	Garage/Barn *	215	S
5.71	Garage/Barn *	421	S
5.75	Garage/Barn *	362	S
5.75	Garage/Barn *	422	S
5.75	Garage/Barn *	257	S
6.21	Garage/Barn *	434	N
6.23	Garage/Barn *	506	N
6.24	Garage/Barn *	568	N
6.24	Residence *	367	N
6.25	Garage/Barn *	382	N
6.25	Garage/Barn *	494	N
6.26	Garage/Barn *	390	N
6.26	Garage/Barn *	445	N

Noise Sensitive Receptors Within 1,600 Feet of Alternative Route 2 Route Width			
Approximate Milepost ^a	Description ^b	Distance From Alternative Route 2 Centerline (feet)	Direction from Alternative Route 2
8.54	Garage/Barn	1,036	E
8.54	Garage/Barn	873	E
8.56	Residence	995	E
10.08	Industrial	165	W
14.58	Garage/Barn	1,571	S
14.60	Residence	1,147	S
14.61	Garage/Barn	1,392	S
14.63	Garage/Barn	1,270	S
15.36	Garage/Barn	1,126	S
15.39	Garage/Barn	966	S
15.39	Garage/Barn	1,202	S
15.40	Residence	1,054	S
19.81	Residence	1,542	S
19.83	Garage/Barn	1,704	S
19.83	Garage/Barn	1,638	S
21.02	Residence	971	NW
21.03	Garage/Barn	1,113	NW
23.45	Garage/Barn	1,321	S
23.45	Garage/Barn	1,226	S
23.45	Residence	1,054	S
24.43	Garage/Barn	150	N
24.48	Residence	236	N
25.28	Garage/Barn	516	N
25.30	Garage/Barn	557	N
25.48	Residence	493	NE
26.23	Garage/Barn	325	S
26.24	Garage/Barn	614	S
26.25	Residence	586	S
26.26	Garage/Barn	312	S
26.29	Garage/Barn	745	S
26.31	Residence	351	S
26.67	Garage/Barn	1,206	S
26.69	Residence	1,403	S
26.71	Garage/Barn	1,209	S

Noise Sensitive Receptors Within 1,600 Feet of Alternative Route 2 Route Width			
Approximate Milepost ^a	Description ^b	Distance From Alternative Route 2 Centerline (feet)	Direction from Alternative Route 2
27.95	Garage/Barn	1,189	N
27.96	Residence	1,113	N
27.97	Garage/Barn	918	N
27.97	Garage/Barn	1,036	N
27.97	Garage/Barn	1,071	N
27.97	Garage/Barn	1,138	N
28.35	Garage/Barn	1,637	N
28.35	Garage/Barn	1,719	N
28.36	Garage/Barn	1,661	N
28.37	Garage/Barn	1,400	N
28.38	Residence	1,581	N
28.44	Garage/Barn	1,602	N
28.78	Garage/Barn	1,458	SW
28.80	Residence	1,458	SW
28.81	Garage/Barn	1,639	SW
29.22	Residence	1,513	S
29.22	Residence	1,457	S
29.22	Residence	560	SW
29.22	Garage/Barn	555	SW
29.22	Garage/Barn	409	SW
29.22	Garage/Barn	449	SW
^a	Mileposts for Alternative Route 2 are unofficial distances along the centerline from the Green Plains Ethanol Plant and are included here to help describe the location of noise sensitive receptors (NSR).		
^b	An asterisk (*) indicates an NSR that is within 1,600 feet of both Alternative Route 1 and Alternative Route 2.		

Noise Sensitive Receptors Within 1,600 Feet of Alternative Route 3 Route Width			
Approximate Milepost	Description	Distance From Alternative Route 3 Centerline (feet)	Direction from Alternative Route 3
0.01	Garage/Barn	1,607	SE
0.01	Garage/Barn	1,383	SE
0.01	Residence	1,491	SE
0.01	Garage/Barn	1,317	SE
0.07	Industrial	545	N
0.07	Industrial	752	N
0.08	Industrial	330	N
0.08	Industrial	662	N
0.10	Industrial	475	N
0.15	Business	245	N
0.24	Industrial	672	N
0.28	Garage/Barn	669	NW
0.28	Residence	800	NW
0.28	Garage/Barn	734	N
0.28	Garage/Barn	878	N
0.46	Garage/Barn	799	S
0.47	Garage/Barn	710	S
0.47	Garage/Barn	633	S
0.49	Residence	571	S
0.68	Garage/Barn	1,050	W
0.68	Residence	1,082	W
0.68	Industrial	498	NW
0.68	Industrial	519	N
0.68	Residence	1,726	NW
0.68	Garage/Barn	1,803	NW
0.68	Garage/Barn	1,179	W
1.15	Garage/Barn	1,198	SE
1.15	Residence	1,779	E
1.15	Garage/Barn	1,748	E
1.18	Garage/Barn	1,341	SE
1.33	Industrial	1,821	SE
1.74	Garage/Barn	1,206	S
1.74	Residence	1,259	SE
1.74	Garage/Barn	1,174	SE

Noise Sensitive Receptors Within 1,600 Feet of Alternative Route 3 Route Width			
Approximate Milepost	Description	Distance From Alternative Route 3 Centerline (feet)	Direction from Alternative Route 3
1.74	Garage/Barn	644	SE
2.14	Garage/Barn	1,176	S
2.14	Business	555	SW
2.24	Residence	367	N
2.26	Garage/Barn	525	S
2.28	Residence	491	N
2.28	Garage/Barn	1,186	S
2.32	Residence	375	N
2.33	Garage/Barn	1,079	S
2.37	Garage/Barn	1,846	N
3.01	Garage/Barn	1,584	NW
3.16	Garage/Barn	791	W
3.35	Garage/Barn	1,244	E
3.35	Garage/Barn	955	SE
3.35	Residence	1,120	E
4.81	Industrial	1,801	N
4.85	Industrial	1,477	N
4.86	Industrial	1,812	N
4.92	Industrial	1,740	N
4.98	Garage/Barn	1,010	S
4.98	Garage/Barn	927	S
4.98	Residence	1,193	S
4.98	Industrial	1,413	N
4.99	Garage/Barn	1,109	S
4.99	Garage/Barn	1,051	S
5.49	Garage/Barn	1,234	E
5.49	Residence	1,312	E
6.94	Residence	229	NE
6.97	Residence	179	SW
7.03	Garage/Barn	186	W
13.46	Garage/Barn	1,571	S
13.48	Residence	1,147	S
13.49	Garage/Barn	1,392	S
13.51	Garage/Barn	1,270	S

Noise Sensitive Receptors Within 1,600 Feet of Alternative Route 3 Route Width			
Approximate Milepost	Description	Distance From Alternative Route 3 Centerline (feet)	Direction from Alternative Route 3
14.25	Garage/Barn	1,126	S
14.27	Garage/Barn	966	S
14.28	Garage/Barn	1,202	S
14.28	Residence	1,054	S
18.57	Garage/Barn	2,626	N
18.57	Garage/Barn	2,725	N
18.60	Garage/Barn	2,929	N
18.62	Residence	2,574	N
18.70	Residence	3,837	N
18.71	Residence	1,542	S
18.72	Garage/Barn	3,945	N
18.73	Garage/Barn	1,704	S
18.73	Garage/Barn	1,638	S
18.73	Garage/Barn	4,082	N
19.91	Residence	973	NW
19.93	Garage/Barn	1,115	NW
22.35	Residence	1,047	S
22.36	Garage/Barn	1,315	S
22.36	Garage/Barn	1,219	S
23.33	Garage/Barn	183	N
23.38	Residence	262	N
24.18	Garage/Barn	542	N
24.20	Garage/Barn	583	N
24.38	Residence	493	NE
25.14	Garage/Barn	325	S
25.14	Garage/Barn	614	S
25.16	Residence	586	S
25.17	Garage/Barn	312	S
25.20	Garage/Barn	745	S
25.22	Residence	351	S
25.57	Garage/Barn	1,206	S
25.59	Residence	1,403	S
25.61	Garage/Barn	1,209	S
26.81	Garage/Barn	1,271	N

Noise Sensitive Receptors Within 1,600 Feet of Alternative Route 3 Route Width			
Approximate Milepost	Description	Distance From Alternative Route 3 Centerline (feet)	Direction from Alternative Route 3
26.82	Residence	1,202	N
26.83	Garage/Barn	1,019	N
26.84	Garage/Barn	1,183	N
26.85	Garage/Barn	1,151	N
26.85	Garage/Barn	1,254	N
27.21	Garage/Barn	1,623	N
27.21	Garage/Barn	1,706	N
27.22	Garage/Barn	1,651	N
27.22	Garage/Barn	1,392	N
27.25	Residence	1,581	N
27.32	Garage/Barn	1,602	N
27.65	Garage/Barn	1,458	SW
27.68	Residence	1,458	SW
27.69	Garage/Barn	1,639	SW
27.93	Residence	1,758	SW
28.10	Residence	1,825	S
28.10	Residence	866	SW
28.10	Garage/Barn	836	SW
28.10	Garage/Barn	701	SW
28.10	Garage/Barn	702	SW
28.10	Garage/Barn	1,615	N
28.10	Garage/Barn	1,678	N
28.10	Residence	1,742	N
28.10	Garage/Barn	1,835	N

To: Scott O’Konek
Summit Carbon Solutions

Sent via email to sokonek@summitcarbon.com

From: Andrew Levi
Energy Environmental Review and Analysis

Date: October 17, 2023

Project: Otter Tail to Wilkin CO₂ Pipeline Project
IP 7093/PPL-22-422

Respond: Preferably no later than October 31, 2023

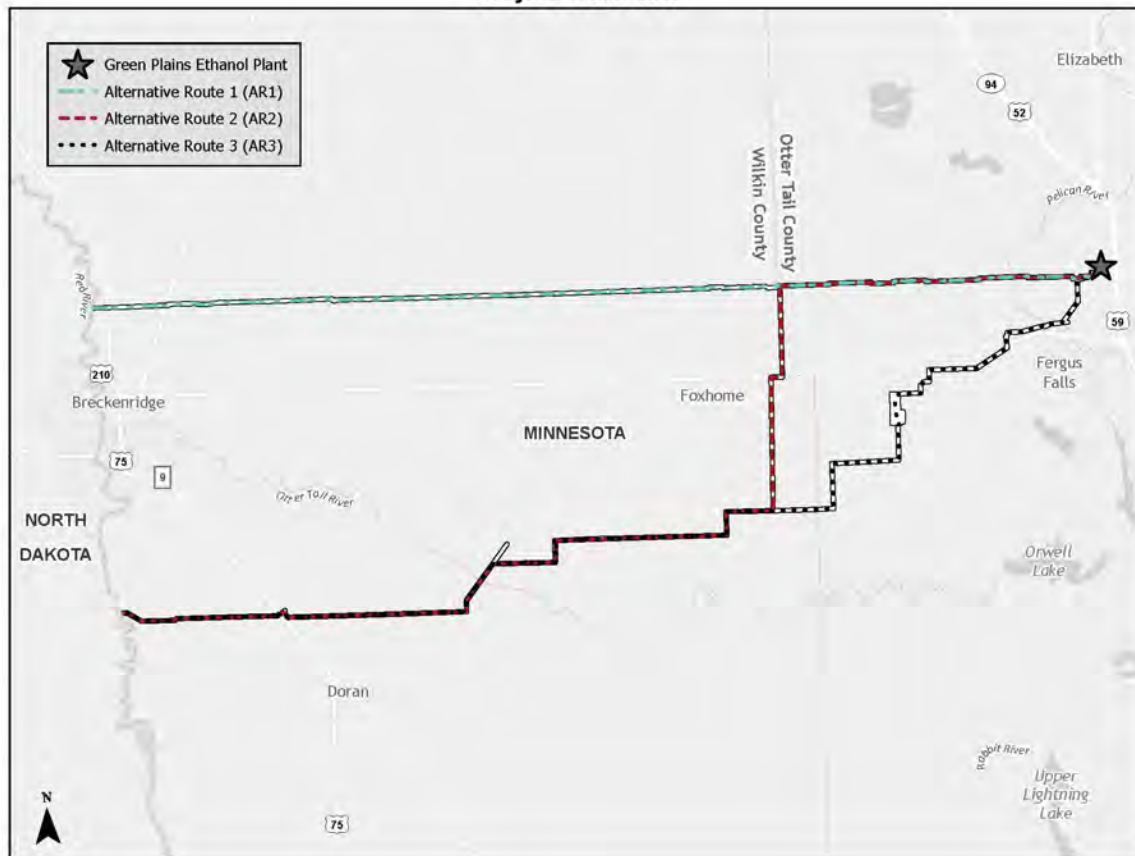
Please respond to the following questions or provide the requested data or information. Staff will use the information provided to develop the environmental document for the project, which is a public document. Your response, in its entirety, will be included in the environmental document as an appendix; therefore, **responses will be publicly available** unless otherwise designated by the respondent as “nonpublic information” pursuant to Minnesota Statute § 13.02, subdivision 12.

Directions: Responses to questions should be contained within this form to the greatest extent possible (**11-point Calibri, plain text font, RGB 192, 0, 0**). Attach supporting documentation as necessary. While data and information requests, for example, shapefiles or draft plans, will not be contained within this form, document their submittal using this form as follows: “*Requested information sent to whom by what means on date.*”

Do not eFile your response. Return the completed form, as a PDF, along with necessary supporting documentation, and/or requested data or information to andrew.levi@state.mn.us. Contact me at (651) 539-1840 with questions.

2. Provide a shape file and a listing (similar to Appendix J of the Scoping EAW) of noise sensitive receptors within 1,600 feet of the route width for Alternative Route 1 (previously referred to as CURE alternative route 2) and Alternative Route 2 (previously CURE alternative route 3) and Alternative Route 3 (Summit’s proposed route), see map below.

Project Overview



On October 31, 2023, Minnesota Department of Commerce, Energy Environment Review and Analysis (DOC-EERA) requested that Summit update data previously provided on October 27, 2023 in response to Information Inquiry Number 2 to reflect an Alternative Route 2 centerline prepared by DOC-EERA and provided to Summit on October 19, 2023 as part of Information Inquiry Number 4.

Summit has posted a folder of shapefiles to the Project Sharepoint site to replace the files provided on October 27, 2023. The new file is titled "Inquiry 2-2 Otter Tail to Wilkin Route Alternative NSAs_Rev1_20231031". The new files are intended to replace the previously provided files. The updated centerline caused a change in the Alternative 2 500-foot-wide route width, updated mileposts, as well as recalculation of distance from some previously reported noise sensitive receptors (NSRs).

A revised table that shows NSRs within 1,600 feet of the route width for Alternative Route 2 is included in Attachment 2-2 of this response. Changes are noted in bold text. During this re-review of Alternative 2, Summit determined that some NSAs within 1,600 feet of Alternative 2 where it is collocated with Alternative 3 were excluded from the table. Those are added in bold as well.

Attachment 2-2
Revised Noise Sensitive Receptor Table for Alternative Route 2

Noise Sensitive Receptors Within 1,600 Feet of Alternative Route 2 Route Width Revision 1			
Approximate Milepost ^a	Description ^b	Distance From Alternative Route 2 Centerline (feet)	Direction from Alternative Route 2
0.01	Garage/Barn *	1,383	SE
0.01	Garage/Barn *	1,607	SE
0.01	Garage/Barn *	1,317	SE
0.01	Residence *	1,491	SE
0.07	Industrial *	752	N
0.07	Industrial *	545	N
0.08	Industrial *	330	N
0.08	Industrial *	662	N
0.10	Industrial *	475	N
0.15	Business *	245	N
0.23	Industrial *	700	N
0.24	Garage/Barn *	835	NW
0.24	Garage/Barn *	817	NW
0.24	Garage/Barn *	979	NW
0.24	Residence *	930	NW
0.41	Garage/Barn *	781	S
0.41	Garage/Barn *	715	S
0.41	Garage/Barn *	846	S
0.42	Residence *	721	S
0.75	Industrial *	296	N
0.75	Industrial *	256	N
0.96	Garage/Barn *	475	S
0.97	Residence *	417	S
0.99	Garage/Barn *	520	S
1.06	Residence *	267	N
1.07	Garage/Barn *	312	N
1.10	Garage/Barn *	572	N
1.10	Residence *	420	N
1.11	Garage/Barn *	439	N
1.11	Garage/Barn *	500	N
1.11	Garage/Barn *	309	N
1.12	Residence *	262	N
1.21	Residence *	1,044	S

Noise Sensitive Receptors Within 1,600 Feet of Alternative Route 2 Route Width Revision 1			
Approximate Milepost ^a	Description ^b	Distance From Alternative Route 2 Centerline (feet)	Direction from Alternative Route 2
1.23	Garage/Barn *	1,107	S
1.23	Garage/Barn *	1,141	S
1.86	Garage/Barn *	378	SW
1.89	Garage/Barn *	437	NE
1.89	Residence *	295	NE
1.96	Residence *	279	S
1.97	Garage/Barn *	476	S
1.97	Garage/Barn *	398	S
1.98	Garage/Barn *	592	S
2.01	Garage/Barn *	391	S
2.01	Garage/Barn *	483	S
2.04	Garage/Barn *	912	N
2.06	Garage/Barn *	973	N
2.07	Garage/Barn *	1,142	N
2.07	Garage/Barn *	1,096	N
2.08	Garage/Barn *	305	S
2.09	Garage/Barn *	1,018	N
2.09	Residence *	920	N
2.09	Garage/Barn *	350	S
2.09	Garage/Barn *	1,071	N
2.09	Garage/Barn *	196	S
2.10	Garage/Barn *	446	S
2.10	Garage/Barn *	1,117	N
2.11	Garage/Barn *	286	S
2.11	Residence *	382	S
2.97	Garage/Barn *	595	NW
2.97	Residence *	381	NW
3.09	Garage/Barn *	681	N
3.09	Garage/Barn *	473	N
3.10	Garage/Barn *	757	N
3.11	Garage/Barn *	505	N
3.57	Residence *	1,542	S
3.59	Garage/Barn *	1,496	S

Noise Sensitive Receptors Within 1,600 Feet of Alternative Route 2 Route Width Revision 1			
Approximate Milepost ^a	Description ^b	Distance From Alternative Route 2 Centerline (feet)	Direction from Alternative Route 2
3.60	Garage/Barn *	1,539	S
3.61	Garage/Barn *	1,652	S
3.98	Garage/Barn *	877	N
4.00	Garage/Barn *	807	N
4.05	Residence *	468	N
4.05	Garage/Barn *	724	N
4.06	Garage/Barn *	538	N
4.07	Garage/Barn *	709	N
4.89	Industrial *	144	S
5.27	Industrial *	966	N
5.30	Residence *	976	N
5.31	Industrial *	796	N
5.32	Industrial *	981	N
5.34	Industrial *	888	N
5.35	Industrial *	935	N
5.36	Industrial *	873	N
5.67	Garage/Barn *	1,248	N
5.69	Garage/Barn *	1,190	N
5.69	Residence *	1,008	N
5.69	Residence *	353	S
5.70	Garage/Barn *	448	S
5.71	Garage/Barn *	1,342	N
5.71	Garage/Barn *	1,094	N
5.71	Garage/Barn *	215	S
5.71	Garage/Barn *	421	S
5.75	Garage/Barn *	362	S
5.75	Garage/Barn *	422	S
5.75	Garage/Barn *	257	S
6.21	Garage/Barn *	434	N
6.23	Garage/Barn *	506	N
6.24	Garage/Barn *	568	N
6.24	Residence *	367	N
6.25	Garage/Barn *	382	N

Noise Sensitive Receptors Within 1,600 Feet of Alternative Route 2 Route Width Revision 1			
Approximate Milepost ^a	Description ^b	Distance From Alternative Route 2 Centerline (feet)	Direction from Alternative Route 2
6.25	Garage/Barn *	494	N
6.26	Garage/Barn *	390	N
6.26	Garage/Barn *	445	N
8.54	Garage/Barn	806	E
8.54	Garage/Barn	643	E
8.56	Residence	765	E
10.08	Industrial	408	W
14.58	Garage/Barn	1,571	S
14.60	Residence	1,147	S
14.61	Garage/Barn	1,392	S
14.63	Garage/Barn	1,270	S
15.36	Garage/Barn	1,126	S
15.39	Garage/Barn	966	S
15.39	Garage/Barn	1,202	S
15.40	Residence	1,054	S
18.57	Garage/Barn	2,626	N
18.57	Garage/Barn	2,725	N
18.60	Garage/Barn	2,929	N
18.62	Residence	2,574	N
18.70	Residence	3,837	N
18.72	Garage/Barn	3,945	N
18.73	Garage/Barn	4,082	N
19.81	Residence	1,542	S
19.83	Garage/Barn	1,704	S
19.83	Garage/Barn	1,638	S
21.02	Residence	971	NW
21.03	Garage/Barn	1,113	NW
23.45	Garage/Barn	1,321	S
23.45	Garage/Barn	1,226	S
23.45	Residence	1,054	S
24.43	Garage/Barn	150	N
24.48	Residence	236	N

Noise Sensitive Receptors Within 1,600 Feet of Alternative Route 2 Route Width Revision 1			
Approximate Milepost ^a	Description ^b	Distance From Alternative Route 2 Centerline (feet)	Direction from Alternative Route 2
25.28	Garage/Barn	516	N
25.30	Garage/Barn	557	N
25.48	Residence	493	NE
26.23	Garage/Barn	325	S
26.24	Garage/Barn	614	S
26.25	Residence	586	S
26.26	Garage/Barn	312	S
26.29	Garage/Barn	745	S
26.31	Residence	351	S
26.67	Garage/Barn	1,206	S
26.69	Residence	1,403	S
26.71	Garage/Barn	1,209	S
27.95	Garage/Barn	1,189	N
27.96	Residence	1,113	N
27.97	Garage/Barn	918	N
27.97	Garage/Barn	1,036	N
27.97	Garage/Barn	1,071	N
27.97	Garage/Barn	1,138	N
28.35	Garage/Barn	1,637	N
28.35	Garage/Barn	1,719	N
28.36	Garage/Barn	1,661	N
28.37	Garage/Barn	1,400	N
28.38	Residence	1,581	N
28.44	Garage/Barn	1,602	N
28.78	Garage/Barn	1,458	SW
28.80	Residence	1,458	SW
28.81	Garage/Barn	1,639	SW
29.22	Residence	1,513	S
29.22	Residence	1,457	S
29.22	Residence	560	SW
29.22	Garage/Barn	555	SW
29.22	Garage/Barn	409	SW
29.22	Garage/Barn	449	SW

Noise Sensitive Receptors Within 1,600 Feet of Alternative Route 2 Route Width Revision 1			
Approximate Milepost ^a	Description ^b	Distance From Alternative Route 2 Centerline (feet)	Direction from Alternative Route 2
^a	Mileposts for Alternative Route 2 are unofficial distances along the centerline from the Green Plains Ethanol Plant and are included here to help describe the location of noise sensitive receptors (NSR).		
^b	An asterisk (*) indicates an NSR that is within 1,600 feet of both Alternative Route 1 and Alternative Route 2.		

To: Scott O’Konek
Summit Carbon Solutions

Sent via email to sokonek@summitcarbon.com

From: Andrew Levi
Energy Environmental Review and Analysis

Date: October 17, 2023

Project: Otter Tail to Wilkin CO₂ Pipeline Project
IP 7093/PPL-22-422

Respond: Preferably no later than October 31, 2023

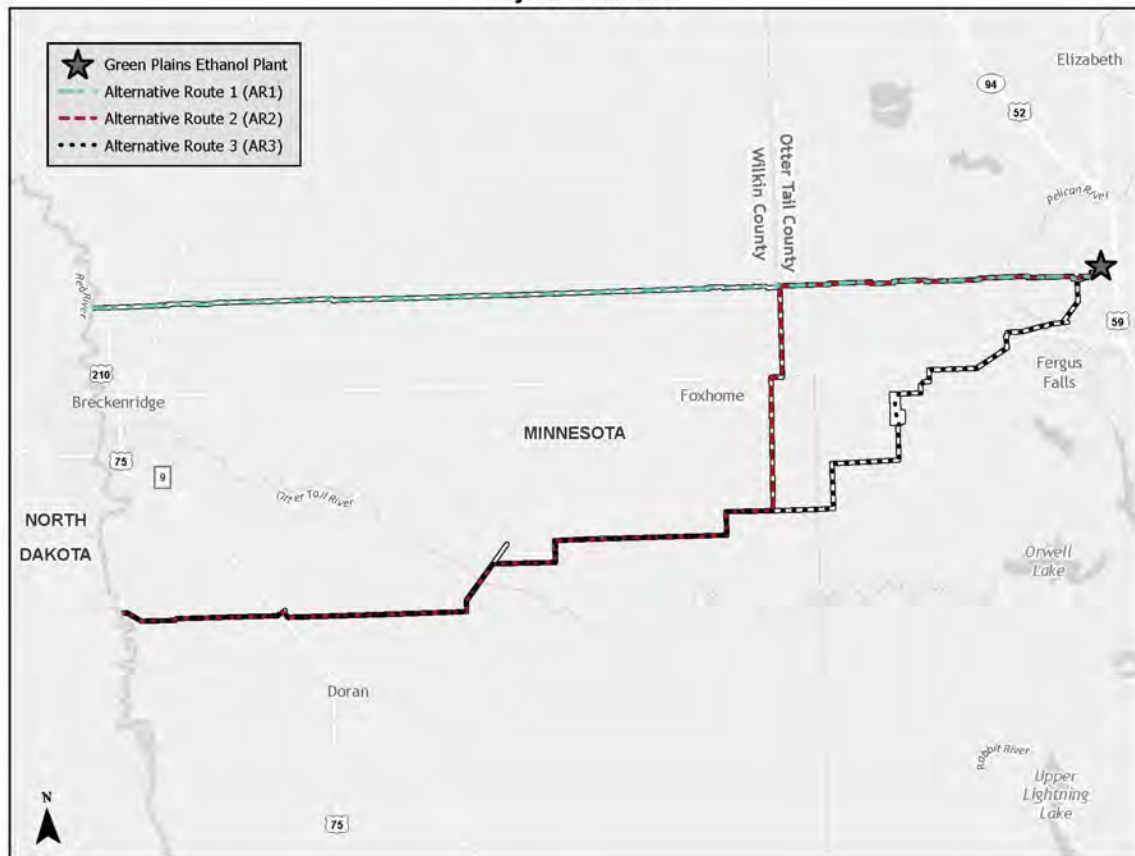
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Directions: Responses to questions should be contained within this form to the greatest extent possible (**11-point Calibri, plain text font, RGB 192, 0, 0**). Attach supporting documentation as necessary. While data and information requests, for example, shapefiles or draft plans, will not be contained within this form, document their submittal using this form as follows: “*Requested information sent to whom by what means on date.*”

Do not eFile your response. Return the completed form, as a PDF, along with necessary supporting documentation, and/or requested data or information to andrew.levi@state.mn.us. Contact me at (651) 539-1840 with questions.

2. Provide a shape file and a listing (similar to Appendix J of the Scoping EAW) of noise sensitive receptors within 1,600 feet of the route width for Alternative Route 1 (previously referred to as CURE alternative route 2) and Alternative Route 2 (previously CURE alternative route 3) and Alternative Route 3 (Summit’s proposed route), see map below.

Project Overview



Summit has posted a folder of shapefiles to the Project Sharepoint site to replace the files provided on October 31, 2023. The new file is titled "Inquiry 2-2 Otter Tail to Wilkin Route Alternative NSRs_Rev2_20231115". The new files are intended to replace the previously provided files. Alternative 2 has been updated to address questions regarding distance to NSRs posed by EERA on November 14, 2023. A revised table that shows NSRs within 1,600 feet of the route width for Alternative Route 2 is included in Attachment 2-2 of this response.

Attachment 2-2
Revised Noise Sensitive Receptor Table for Alternative Route 2

Noise Sensitive Receptors Within 1,600 Feet of Alternative Route 2 Route Width Revision 2			
Approximate Milepost ^a	Description	Distance From Alternative Route 2 Centerline (feet)	Direction from Alternative Route 2
0.01	Garage/Barn	1,607	SE
0.01	Garage/Barn	1,383	SE
0.01	Residence	1,491	SE
0.01	Garage/Barn	1,317	SE
0.07	Industrial	545	N
0.07	Industrial	752	N
0.08	Industrial	330	N
0.08	Industrial	662	N
0.10	Industrial	475	N
0.15	Business	245	N
0.23	Industrial	700	N
0.24	Garage/Barn	817	NW
0.24	Residence	930	NW
0.24	Garage/Barn	835	NW
0.24	Garage/Barn	979	NW
0.41	Garage/Barn	846	S
0.41	Garage/Barn	781	S
0.41	Garage/Barn	715	S
0.42	Residence	721	S
0.75	Industrial	296	N
0.75	Industrial	256	N
0.96	Garage/Barn	475	S
0.97	Residence	417	S
0.99	Garage/Barn	520	S
1.06	Residence	267	N
1.07	Garage/Barn	312	N
1.10	Garage/Barn	572	N
1.10	Residence	420	N
1.11	Garage/Barn	439	N
1.11	Garage/Barn	500	N
1.11	Garage/Barn	309	N
1.12	Residence	262	N
1.21	Residence	1,044	S
1.23	Garage/Barn	1,107	S
1.23	Garage/Barn	1,141	S
1.86	Garage/Barn	378	SW
1.89	Residence	295	NE

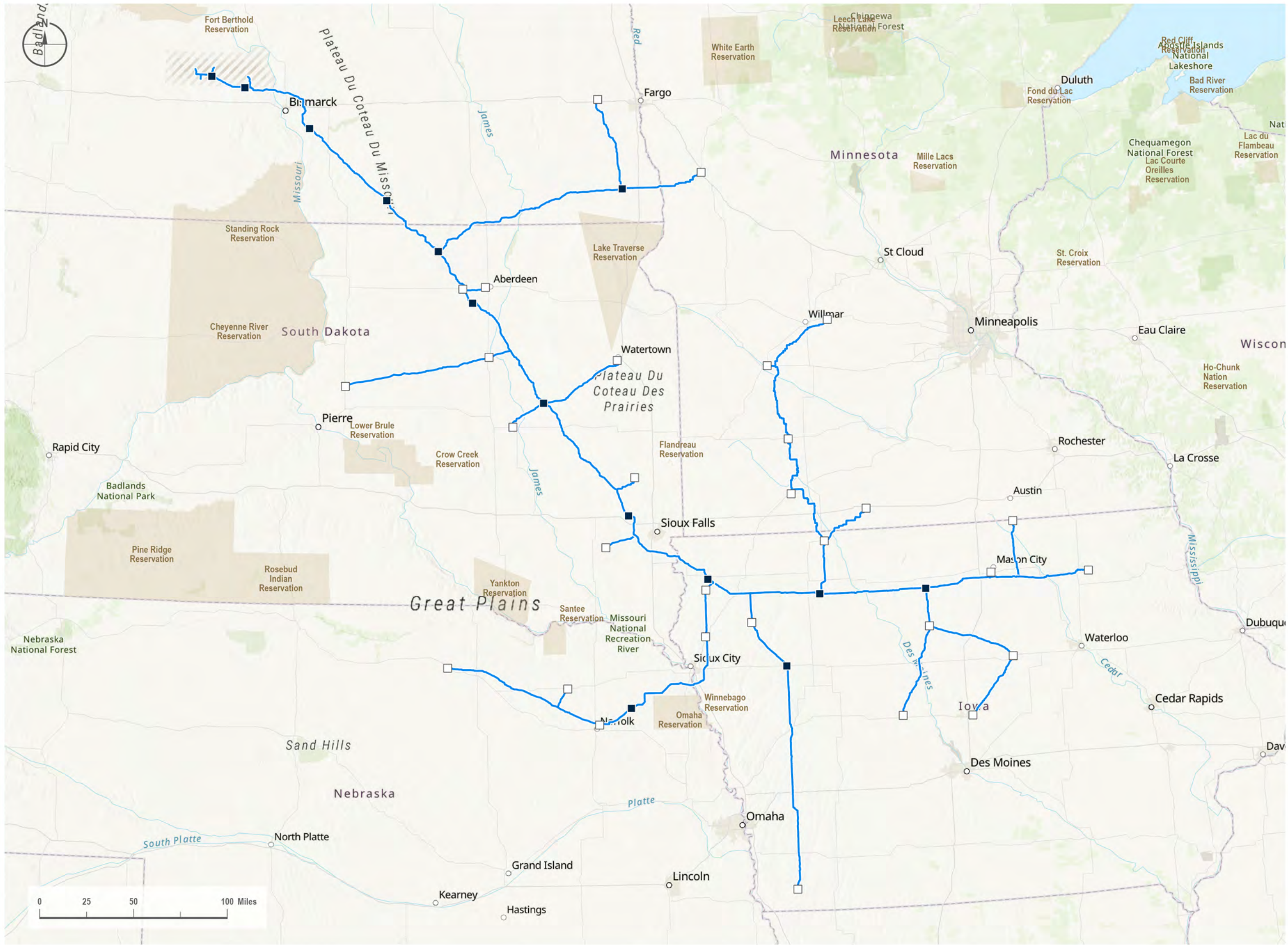
1.89	Garage/Barn	437	NE
1.96	Residence	279	S
1.97	Garage/Barn	476	S
1.97	Garage/Barn	398	S
1.98	Garage/Barn	592	S
2.01	Garage/Barn	391	S
2.01	Garage/Barn	483	S
2.04	Garage/Barn	912	N
2.06	Garage/Barn	973	N
2.07	Garage/Barn	1,142	N
2.07	Garage/Barn	1,096	N
2.08	Garage/Barn	305	S
2.09	Garage/Barn	1,018	N
2.09	Residence	920	N
2.09	Garage/Barn	350	S
2.09	Garage/Barn	1,071	N
2.09	Garage/Barn	196	S
2.10	Garage/Barn	446	S
2.10	Garage/Barn	1,117	N
2.11	Garage/Barn	286	S
2.11	Residence	382	S
2.97	Residence	381	NW
2.97	Garage/Barn	595	NW
3.09	Garage/Barn	681	N
3.09	Garage/Barn	473	N
3.10	Garage/Barn	757	N
3.11	Garage/Barn	505	N
3.57	Residence	1,542	S
3.59	Garage/Barn	1,496	S
3.60	Garage/Barn	1,539	S
3.61	Garage/Barn	1,652	S
3.98	Garage/Barn	877	N
4.00	Garage/Barn	807	N
4.05	Residence	468	N
4.05	Garage/Barn	724	N
4.06	Garage/Barn	538	N
4.07	Garage/Barn	709	N
4.89	Industrial	144	S
5.27	Industrial	966	N
5.30	Residence	976	N
5.31	Industrial	796	N
5.32	Industrial	981	N
5.34	Industrial	888	N

5.35	Industrial	935	N
5.36	Industrial	873	N
5.67	Garage/Barn	1,248	N
5.69	Garage/Barn	1,190	N
5.69	Residence	1,008	N
5.69	Residence	353	S
5.70	Garage/Barn	448	S
5.71	Garage/Barn	1,342	N
5.71	Garage/Barn	1,094	N
5.71	Garage/Barn	215	S
5.71	Garage/Barn	421	S
5.75	Garage/Barn	362	S
5.75	Garage/Barn	422	S
5.75	Garage/Barn	257	S
6.21	Garage/Barn	434	N
6.23	Garage/Barn	506	N
6.24	Garage/Barn	568	N
6.24	Residence	367	N
6.25	Garage/Barn	382	N
6.25	Garage/Barn	494	N
6.26	Garage/Barn	390	N
6.26	Garage/Barn	445	N
8.49	Garage/Barn	806	E
8.49	Garage/Barn	643	E
8.51	Residence	765	E
10.01	Industrial	408	W
14.51	Garage/Barn	1,571	S
14.53	Residence	1,147	S
14.54	Garage/Barn	1,392	S
14.56	Garage/Barn	1,270	S
15.30	Garage/Barn	1,126	S
15.32	Garage/Barn	966	S
15.33	Garage/Barn	1,202	S
15.33	Residence	1,054	S
19.62	Garage/Barn	2,626	N
19.62	Garage/Barn	2,725	N
19.65	Garage/Barn	2,929	N
19.67	Residence	2,574	N
19.75	Residence	3,837	N
19.76	Residence	1,542	S
19.77	Garage/Barn	3,945	N
19.78	Garage/Barn	1,704	S
19.78	Garage/Barn	1,638	S

19.78	Garage/Barn	4,082	N
20.96	Residence	973	NW
20.98	Garage/Barn	1,115	NW
23.40	Residence	1,047	S
23.41	Garage/Barn	1,315	S
23.41	Garage/Barn	1,219	S
24.38	Garage/Barn	183	N
24.43	Residence	262	N
25.23	Garage/Barn	542	N
25.25	Garage/Barn	583	N
25.43	Residence	493	NE
26.19	Garage/Barn	325	S
26.19	Garage/Barn	614	S
26.21	Residence	586	S
26.22	Garage/Barn	312	S
26.25	Garage/Barn	745	S
26.27	Residence	351	S
26.62	Garage/Barn	1,206	S
26.64	Residence	1,403	S
26.66	Garage/Barn	1,209	S
27.86	Garage/Barn	1,271	N
27.87	Residence	1,202	N
27.88	Garage/Barn	1,019	N
27.89	Garage/Barn	1,183	N
27.90	Garage/Barn	1,151	N
27.90	Garage/Barn	1,254	N
28.26	Garage/Barn	1,623	N
28.26	Garage/Barn	1,706	N
28.27	Garage/Barn	1,651	N
28.27	Garage/Barn	1,392	N
28.30	Residence	1,581	N
28.37	Garage/Barn	1,602	N
28.70	Garage/Barn	1,458	SW
28.73	Residence	1,458	SW
28.74	Garage/Barn	1,639	SW
28.98	Residence	1,758	SW
29.15	Residence	1,825	S
29.15	Residence	866	SW
29.15	Garage/Barn	836	SW
29.15	Garage/Barn	701	SW
29.15	Garage/Barn	702	SW
29.15	Garage/Barn	1,615	N
29.15	Garage/Barn	1,678	N

29.15	Residence	1,742	N
29.15	Garage/Barn	1,835	N
^a Mileposts for Alternative Route 2 are unofficial distances along the centerline from the Green Plains Ethanol Plant and are included here to help describe the location of noise sensitive receptors (NSR).			

OVERVIEW FIGURE FOR MIDWEST CARBON EXPRESS PROJECT



Disclaimer:

VICINITY MAP



LEGEND

- Proposed Project
- Capture Facility
- Pump Station
- Tribal Reservation
- Sequestration Area

REVISIONS

Date: 2023-10-25 Revised by: PD Checked by: JS

0 - Issued for Use

Issued figure for inclusion in EIS.

Date: Revised by: Checked by:

Date: Revised by: Checked by:

PREPARED BY

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SUMMIT CARBON
SOLUTIONS

MIDWEST CARBON EXPRESS PROJECT

Figure Title:
Overview Figure
for the Midwest Carbon Express Project

Figure Number:

Scale:
1 : 3,250,000
1 inch equals 51.29 miles

Projection:
Transverse Mercator
NAD 1983 UTM Zone 14N FT

Sheet:
1
1 of 1

Drawing Number:
1002-06-027
Revision 0

To: Scott O’Konek
Summit Carbon Solutions

Sent via email to sokonek@summitcarbon.com

From: Andrew Levi
Energy Environmental Review and Analysis

Date: October 18, 2023

Project: Otter Tail to Wilkin CO₂ Pipeline Project
IP 7093/PPL-22-422

Respond: Preferably no later than October 31, 2023

Please respond to the following questions or provide the requested data or information. Staff will use the information provided to develop the environmental document for the project, which is a public document. Your response, in its entirety, will be included in the environmental document as an appendix; therefore, **responses will be publicly available** unless otherwise designated by the respondent as “nonpublic information” pursuant to Minnesota Statute § 13.02, subdivision 12.

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Do not eFile your response. Return the completed form, as a PDF, along with necessary supporting documentation, and/or requested data or information to andrew.levi@state.mn.us. Contact me at (651) 539-1840 with questions.

1. Consistent with the October 12 meeting between EERA staff, HDR staff, and Summit staff, please provide a discussion of the human and environmental impacts of constructing a 3-inch instead of a 4-inch pipeline. This discussion should include a description of any construction and operational changes that might occur. Mitigation should be discussed. A discussion of operational characteristics, for example, operating pressure, should also be included.

The human and environmental impacts of constructing a 3-inch pipeline will be the same as the impacts associated with constructing the proposed 4-inch pipeline as described in Sections 10 through 22 of the Environmental Assessment Worksheet (EAW). The construction workspace required for the construction of a 3-inch pipeline and a 4-inch pipeline would be nearly identical. The only potential difference is the length of the horizontal directional drills (HDDs), as a slightly shorter drill could be used for a 3-inch pipeline versus a 4-inch pipeline. Additionally, the construction duration would not change between the installation of a 3-inch versus a 4-inch pipeline. Summit would secure the same width for the permanent easement (50 feet) for a 3-inch or 4-inch pipeline.

Operational parameters of a 3-inch pipeline will be substantially different than a 4-inch pipeline. At the current design pressure (2,183 pounds per square inch [psi]), a 3-inch pipeline would not be capable of transporting the volume of carbon dioxide (CO₂) that will be captured at the Green Plains Ethanol Plant. To transport the same volume of CO₂ from the Green Plains Ethanol Plant, the design pressure would have

to be greater than 3,200 psi for a 3-inch pipeline than a 4-inch pipe. The time required for a 3-inch pipeline to vent from operating pressure to zero pounds would be shorter than for a 4-inch pipeline. In addition, In-Line-Inspection (ILI) technology (such as maintenance and smart tools) is not well developed for pipelines less than 4-inches in diameter, and is not as proven within the industry. Conversely, ILI technology for 4-inch diameter pipelines is well proven within the pipeline industry. Generally, the smaller the diameter of the pipeline, the greater the challenges and risks are associated with successfully passing ILI devices through the pipeline. As the pipeline diameter decreases, the likelihood of a tool becoming stuck increases due to the geometry of the fittings and internal diameter changes associated with fittings, valves, and heavier walled pipe. Generally, when a tool becomes stuck in a pipeline, that segment of the pipeline may need to be evacuated of product so that the pipeline can be excavated, the pipeline cut, and the tool cut out of the pipeline.

2. Consistent with the October 12 meeting between EERA staff, HDR staff, and Summit staff, please provide a discussion of the human and environmental impacts of constructing a 6-inch pipeline instead of a 4-inch pipeline. This discussion should include a description of any construction and operational changes that might occur. Mitigation should be discussed. A discussion of operational characteristics, for example, operating pressure, should also be included.

The human and environmental impacts of constructing a 6-inch pipeline will be the same as the impacts associated with constructing the proposed 4-inch pipeline as described in Sections 10 through 22 of the Environmental Assessment Worksheet (EAW). The construction workspace required for the construction of a 6-inch pipeline and a 4-inch pipeline would be nearly identical. The only potential difference is the length of the horizontal directional drills (HDDs), as a slightly longer drill could be used for a 6-inch pipeline versus a 4-inch pipeline. Additionally, the construction duration would not change between the installation of a 6-inch versus a 4-inch pipeline. Summit would secure the same width for the permanent easement (50 feet) for a 6-inch or 4-inch pipeline.

Operational parameters of a 6-inch pipeline will be substantially different than a 4-inch pipeline; however, the normal operating procedures will be the same. The design pressure (2,183 psi) would remain the same, but for a 6-inch pipeline the operating pressure will be approximately 1,320 psi, compared to approximately 1,750 psi for a 4-inch pipeline. The time required for a 6-inch pipeline to vent from operating pressure to zero pounds would be longer than for a 4-inch pipeline.

3. Consistent with the October 12 meeting between EERA staff, HDR staff, and Summit staff, please provide a discussion of the human and environmental impacts of reducing the throughput on the pipeline. This discussion should include a description of any construction and operational changes that might occur. A discussion of operational characteristics, for example, operating pressure, should also be included.

Reductions in throughput will not have any effect on construction activities.

During operation of the Project, there may be times when there is a temporary reduction in throughput on the pipeline based on fluctuations in operations at the Green Plains Ethanol Plant (e.g., temporary shutdowns for maintenance). When the throughput volume is reduced, but still high enough for operation of the pumps, the operating pressure and product velocity will be lower than when the throughput is higher. When the throughput volume is reduced below the required volume for safe operation of the pumps, then the pipeline segment will be shut-in, or isolated. When the pipeline is shut-in due to the

throughput volume being too low, the mainline valve (MLV) at the capture facility will be closed. During this shut-in period, there will still be CO₂ within the pipeline at a pressure typically above 1,200 psi.

The pipeline and associated equipment have been designed and sized to operate within optimized parameters. Permanent reductions in throughput would result in changes in operational parameters that may impact the ability to safely operate the pipeline. Permanent reductions in throughput may also hamper the ability to perform ILIs for pipeline integrity purposes. Reduced throughput will not allow ILI tool to move at its designed rate to optimally inspect the pipeline.

4. Please provide, to the extent possible, the average energy use of the ethanol plant. A range of years is preferred. List any energy efficiencies currently in place at the facility such as combined heat and power systems, co-generation, and use of renewable energy.

In 2021, the Green Plains Ethanol Plant ethanol production process was converted to a vacuum distillation process, which resulted in a significant reduction in natural gas consumption per gallon of ethanol. The vacuum distillation project resulted in an approximate 10% reduction in natural gas consumption per gallon of ethanol. The Green Plains Ethanol Plant has used an average of 134,620 million British thermal units (MMBtu) of natural gas per month and 3,171,885 kilowatt hours (kWh) of electricity per month over the past 24 months.

To: Scott O’Konek
Summit Carbon Solutions *Sent via email to sokonek@summitcarbon.com*

From: Andrew Levi
Energy Environmental Review and Analysis

Date: October 19, 2023

Project: Otter Tail to Wilkin CO₂ Pipeline Project
IP 7093/PPL-22-422

Respond: Preferably no later than October 31, 2023 (Please prioritize question 7 and provide when available.)

Please respond to the following questions or provide the requested data or information. Staff will use the information provided to develop the environmental document for the project, which is a public document. Your response, in its entirety, will be included in the environmental document as an appendix; therefore, **responses will be publicly available** unless otherwise designated by the respondent as “nonpublic information” pursuant to Minnesota Statute § 13.02, subdivision 12.

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1. Please provide, to the extent possible, information about the grain used at the ethanol plant. How much grain, on average, does the ethanol plant use per year? Does the ethanol plant calculate the carbon intensity (CI) score of the grain used? If so, how? If so, what is the range, mean, and median CI score of the grain used? Are premiums paid for deliveries of a lower CI grain? List any farming practices that might be required or encouraged by the ethanol plant of its producers. Provide any other information the applicant or Green Plains might find relevant.

The Green Plains Ethanol Plant in Fergus Falls can produce up to 65 million gallons of undenatured ethanol per year (MGY) under its air permit from the Minnesota Pollution Control Agency (MPCA). 65 million gallons per year translates into approximately 22.4 million bushels of corn per year (using an average conversion factor of 2.9 gallons per bushel).

Under the federal Renewable Fuels Standard (RFS) statute, all corn for use in ethanol production must be grown on cropland that has not been converted from forests or grasslands. Green Plains calculates the carbon intensity (CI) of its ethanol based on the Argonne Greenhouse Gases, Regulated Emissions, and Energy Use in Transportation (GREET) model, the California Air Resources Board (CARB) GREET model, the Washington State GREET model, and Canada’s recently introduced Clean Fuel Regulations (CFR). Most of these models use a “plug” value for corn CI. However, when available, Green Plains has been gathering additional data on the farms from which its corn is sourced, so as to represent its CI more accurately.

Many of the Green Plains Ethanol Plant's farmer customers already utilize regenerative agricultural practices such as cover crops, conservation tillage, no till, and precision fertilizer application. The corn CI from the CARB Tier1 calculator is 6,442.02 grams of carbon dioxide equivalent per bushel of grain (gCO₂e/bu) and in the case of the Green Plains Ethanol Plant, this is equivalent to 21.44 grams of carbon dioxide equivalent per megajoule (gCO₂e/MJ). The Canadian CFR corn CI score for the Green Plains Ethanol Plant is 17.16 gCO₂e/MJ.

2. Does Green Plains have a fact sheet describing the ethanol production process? If yes, please provide a pdf version.

No.

3. The 2019 Air Permit (11100077-101) held by Green Plains for the ethanol plant requires certain rolling limits. Please describe Section 5.1.1; 5.1.2; and 5.1.4 and how they relate to ethanol production limits.

The Green Plains Ethanol Plant's total undenatured ethanol production is limited to 65 MGY on a rolling 12-month basis as described in the Air Permit, Section 5.1.1. Section 5.1.4 describes the denaturant volume in addition to the undenatured ethanol volume. Denaturant is a petroleum product, typically pentanes or conventional motor gasoline, which is added in small amounts (typically 2 to 5 volume percent) to the ethanol produced by an ethanol facility to make it unfit for human consumption. Therefore, the total denatured ethanol volume on a rolling 12-month basis is limited to the sum of the Section 5.1.1 (undenatured ethanol) and 5.1.4 (denaturant) limits, or 66.660 MGY of denatured ethanol volume. The grain receiving limit in Section 5.1.2 does not restrict ethanol volumes as it was derived using expected ethanol yield data per ton or bushel of corn.

4. What is the maximum amount of ethanol that can be produced at the facility per year? Is it 65 million gallons as indicated in Section 5.1.1 of the Air Permit?

As stated above, undenatured ethanol production is limited to 65 MGY. Total denatured ethanol (undenatured ethanol, plus denaturant) production is limited to 66.660 MGY.

5. Does the handling of dried distiller grains (DDG) impact the CI score of the ethanol produced? If so, how? What can be done to reduce the CI score related to DDG should it be a part of the CI score?

The CI of the Green Plains Ethanol Plant's ethanol is impacted by the volume of distillers grains that the Green Plains Ethanol Plant dries utilizing natural gas. The Green Plains Ethanol Plant can choose to produce wet distillers grains, modified distillers dried grains with solubles (DDGS), and/or dried DDGS, and the amount of each depends on the need in the local, regional, domestic, and international markets. Wet and modified DDGS is shipped locally via truck to livestock producers, and dry DDGS can be shipped via rail to meet regional, domestic, and international demand.

6. Approximately how much grain is needed to make 1,000 gallons of ethanol?

Generally, 2.9 gallons of ethanol can be produced from a bushel of corn, along with the other valuable co-products like DDGS, renewable corn oil, and CO₂. It takes approximately 355 bushels of corn (9 metric tonnes) to produce 1,000 gallons of ethanol.

7. Review Route Alternative 1 and Route Alternative 2 (shapefiles provided). Based on the company's familiarity with the project area, design expertise, and construction requirements associated with a proposed 4-inch pipeline, provide estimated valve locations along with locations of potential additional temporary workspace that is highlighted in Table 5 of the route permit application. Provide this information as a separate shapefile for each alternative, and include a written description of the spatial data provided. The information provided is not expected to be a detailed engineering, but rather a means to appropriately compare alternatives with the applicant's proposed route.

Route Alternative 1 and Route Alternative 2 shapefiles have been uploaded to the Otter Tail to Wilkin Project (Project) SharePoint site. Shapefiles include centerline, mile postings, permanent and temporary workspaces, temporary and permanent access roads, mainline valve (MLV) locations, and NWI wetland data.

8. Provide an assessment of anticipated noise levels at residences within 1,600 feet of HDDs. Describe mitigation measures (for example, barriers) that would be implemented to reduce noise.

Noise attenuation will vary per horizontal directional drill (HDD) location due to topography and weather conditions, but based on field measurements collected on active HDD operations, the noise level for a 4-inch pipeline HDD is expected to be less than 60 decibels (dB) at 1,320 feet (¼ mile), less than 55 dB at 2,640 feet (½ mile), and not audible at 5,280 feet (1 mile). If noise mitigation is required, temporary sound dampening barrier walls will be placed around the equipment.

9. Provide noise levels of capture facility equipment with and without mitigation (dBA at 50 feet) as well as the overall noise level of the capture facility with and without mitigation (dBA at 50 feet).

The predicted noise level of the compressors is 95 A-weighted decibels (dBA) at 3 feet. Compressors will be in an insulated building, which will serve as mitigation. Noise from capture equipment will comply with all local and state requirements.

10. Construction is expected to occur during daylight hours. Please define daylight hours. Is it based on actual sunrise and sunset or the times listed in the state noise standards?

Daytime hours are based on the MPCA's State Noise Standard – 7:00 a.m. to 10:00 p.m.

To: Scott O’Konek
Summit Carbon Solutions

Sent via email to sokonek@summitcarbon.com

From: Andrew Levi
Energy Environmental Review and Analysis

Date: October 19, 2023

Project: Otter Tail to Wilkin CO₂ Pipeline Project
IP 7093/PPL-22-422

Respond: Preferably no later than October 31, 2023 (Please prioritize question 7 and provide when available.)

Please respond to the following questions or provide the requested data or information. Staff will use the information provided to develop the environmental document for the project, which is a public document. Your response, in its entirety, will be included in the environmental document as an appendix; therefore, **responses will be publicly available** unless otherwise designated by the respondent as “nonpublic information” pursuant to Minnesota Statute § 13.02, subdivision 12.

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Do not eFile your response. Return the completed form, as a PDF, along with necessary supporting documentation, and/or requested data or information to andrew.levi@state.mn.us. Contact me at (651) 539-1840 with questions.

7. Review Route Alternative 1 and Route Alternative 2 (shapefiles provided). Based on the company’s familiarity with the project area, design expertise, and construction requirements associated with a proposed 4-inch pipeline, provide estimated valve locations along with locations of potential additional temporary workspace that is highlighted in Table 5 of the route permit application. Provide this information as a separate shapefile for each alternative, and include a written description of the spatial data provided. The information provided is not expected to be a detailed engineering, but rather a means to appropriately compare alternatives with the applicant’s proposed route.

Revised Route Alternative 1 and Route Alternative 2 shapefiles have been uploaded to the Otter Tail to Wilkin Project SharePoint site. Shapefiles include centerline, mile postings, permanent and temporary workspaces, temporary and permanent access roads, mainline valve locations, and National Wetlands Inventory wetland data.

To: Scott O'Konek
Summit Carbon Solutions

Sent via email to sokonek@summitcarbon.com

From: Andrew Levi
Energy Environmental Review and Analysis

Date: October 27, 2023

Project: Otter Tail to Wilkin CO₂ Pipeline Project
IP 7093/PPL-22-422

Respond: Preferably no later than November 10, 2023

Please respond to the following questions or provide the requested data or information. Staff will use the information provided to develop the environmental document for the project, which is a public document. Your response, in its entirety, will be included in the environmental document as an appendix; therefore, **responses will be publicly available** unless otherwise designated by the respondent as "nonpublic information" pursuant to Minnesota Statute § 13.02, subdivision 12.

Directions: Responses to questions should be contained within this form to the greatest extent possible (**11-point Calibri, plain text font, RGB 192, 0, 0**). Attach supporting documentation as necessary. While data and information requests, for example, shapefiles or draft plans, will not be contained within this form, document their submittal using this form as follows: *"Requested information sent to whom by what means on date."*

Do not eFile your response. Return the completed form, as a PDF, along with necessary supporting documentation, and/or requested data or information to andrew.levi@state.mn.us. Contact me at (651) 539-1840 with questions.

1. Provide the temperature of the pipeline during normal operating conditions.

During normal operating conditions, the pipeline will operate at between 115 degrees Fahrenheit (high) to 30 degrees Fahrenheit (low). The carbon dioxide (CO₂) captured from the ethanol fermentation process at the Green Plains Ethanol Plant will be near ambient air temperature. The CO₂ will then be compressed and dehydrated into a supercritical state. During this process, the temperature will be between 90 degrees Fahrenheit to 115 degrees Fahrenheit. Then the CO₂, once in a supercritical state, will be sent into the pipeline where it will then cool to the ground ambient temperature.

2. Provide information concerning the potential effects of frost-heaving (freeze and thaw cycle) on the pipeline and any proposed mitigation measures.

Frost heave is the result of the formation of ice lenses by segregation of water from the soil as the ground freezes. Ice lenses are lens-shaped masses of almost pure ice that form in frozen soil or rock. Lens formation takes place at, or a short distance behind, the freezing front at any depth where conditions are favorable and continues until those conditions change. The amount of vertical displacement (heave) is roughly equal to the combined thicknesses of the underlying ice lenses. This results in greater displacement at the surface when compared to areas of greater depth.

Three conditions must be met to create the possibility of frost heave to the extent that it could impact a pipeline's integrity:

- 1 The soil must contain a significant amount of silt (i.e., Silty Clay, Clayey Silt, Sandy Silt, Silty Sand, or Silt), to promote upward groundwater movement, via capillary action, to the freezing front;
- 2 There must be a source of groundwater near (immediately below) the freezing front; and
- 3 Soil freezing and ice lensing both need to occur at a depth below the bottom of the pipe.

If any of the three conditions listed above are not met, frost heave should not occur.

If these conditions were met, then frost heave could potentially lead to movement of the pipe, stress on the pipe, or deformation of the pipe. Welded carbon steel pipe is not as susceptible to failures due to frost heave, like water or sewer lines. Moreover, there is a long history of hydrocarbon pipelines installed throughout the frost-prone, northern tier of the United States that have operated without frost-related damage at the burial depths set out in the 49 CFR Part 195 regulations.

The applicable 49 CFR Part 195 pipeline safety regulations in the U.S. require a minimum of 30 inches of cover over a pipeline in rural areas and three feet in other locations unless the pipeline is in rock. This is for pipelines in all climates, including Minnesota. In Minnesota, and for the Project, Summit has committed to install the pipeline with a minimum depth of 54 inches (4.5 feet) as outlined in Section 3.2 of the Minnesota Environmental Construction Plan (Minnesota ECP). The minimum depth of cover over the pipeline will be increased to 60 inches at waterbody and drainage ditch crossings as well as private road crossings (as measured at the bottom of the road ditch, with a minimum of 60 inches of cover below the road surface). Additional conditions may be implemented if requested by local, state, or federal agencies in areas adjacent to wetlands or waterbodies or in sensitive habitat. Civil surveys will occur post-installation of the pipeline to ensure that the depth of cover meets state and federal requirements.

In addition to these depth of cover commitments, which will be consistent or exceed US Pipeline and Hazardous Materials Safety Administration (PHMSA) guidance, Summit will use geotechnical engineers during the design, construction, and ongoing operation of the pipeline system to ensure that sufficient information is available to avoid or minimize the impact of frost heave on the integrity of the pipeline system.

Summit is also providing a Frost Heave Study it previously provided to the North Dakota Public Service Commission. This study is included as Attachment 5-02 on the Otter Tail to Wilkin Project Sharepoint Site.

3. Provide a brief description of the steps for constructing the CO₂ capture facility. Include simplified figures of this process and capture facility that could be included in the EIS (8.5x11 portrait).

First, civil work occurs, consisting of dirt work, pilings, and concrete. Approximately one month after civil works begins, steel work, pipe spooling, and electrical work begins. These items are fabricated and installed at the capture facility. Major equipment is then brought in and set in place. Building contractors then begin erecting the compressor and pump buildings, creating a weather-tight working environment. At this time, the construction site will see the greatest number of employees on site. Upon completion of steel work, piping, and electrical work, commissioning activities will start with a planned duration of one month, followed by start-up of the capture facility. Overall, construction duration of the capture facility

(mobilization to demobilization) is anticipated to be 6-7 months. A simplified Capture Facility Construction Plan is included in Attachment 5-03 on the Otter Tail to Wilkin Project Sharepoint Site.

4. Similar to the information provided for the proposed route, provide an engineering cost estimate associated with the two pipeline route alternatives, to include planning/permitting; acquisition/permits; design; procurement; construction/restoration; and closeout. Provide the margin of error.

Engineering Cost Estimate		Engineering Cost Estimate	
North Route (23 miles MN, 10 miles ND)		Hybrid Route (29.1 miles)	
Work Item	Cost	Work Item	Cost
Planning / Permitting*	\$ 4,875,000	Planning / Permitting*	\$ 3,100,000
ROW Acquisition*	\$ 16,600,000	ROW Acquisition*	\$ 10,000,000
Engineering*	\$ 975,000	Engineering*	\$ 615,000
Procurement	\$ 3,000,000	Procurement	\$ 2,600,000
Construction	\$ 25,500,000	Construction	\$ 22,500,000
Closeout	\$ 1,750,000	Closeout	\$ 1,550,000
Total	\$ 52,700,000	Total	\$ 40,365,000
Estimate Accuracy: +/- 15%		Estimate Accuracy: +/- 15%	
* The estimate Includes realized costs to date, plus the estimated cost to complete work items for the 22.2 miles of alternative route proposed in MN and the 10.0 miles of new route that would be required in ND.		* The estimate Includes realized costs to date, plus the estimated cost to complete work items for the 11.5 miles of alternative route proposed in MN	

5. Provide an update on the status of the Midwest Carbon Express Project.

The Midwest Carbon Express Project is in the permitting phase across the 5-state footprint. In Iowa, hearings before the Iowa Utilities Board (IUB) are nearing completion, and a final decision is expected in Q1 2024. In South Dakota, Summit plans to submit a permit application to the South Dakota Public Utility Commission (SDPUC) by the end of the year. South Dakota's permitting process is anticipated to take up to one year to complete. In North Dakota, Summit is working to submit supplemental information and preparing for additional hearings as part of the reconsideration process before the North Dakota Public Service Commission (NDPSC). In Nebraska, permitting is underway and occurs at the county level. In Minnesota, a route permit application is pending before the Minnesota Public Utilities Commission (MPUC) for the Otter Tail to Wilkin Project, and Summit expects to submit additional route permit applications in the future. Summit submitted Pre-Construction Notifications to the United States Army Corps of Engineers (USACE) under Nationwide Permit (NWP) 58 in North Dakota, South Dakota, Nebraska, and Iowa, and Utility Regional General in Minnesota, and anticipates receiving authorization from the USACE in Q4 2024. Summit anticipates having permits for all pending applications in hand to facilitate a start of construction for portions of the project by Q4 2024 and plans to be operational by early 2026.

6. Confirm the estimate of the amount of electricity needed for operation of the project (39,297,350 kWh) and confirm the service provider. Additionally, how much electricity does the ethanol plant use on an annual basis?

Summit's present modeling indicates that its electricity needs are approximately 38,501,733 kilowatt hours (kWh) per year. The service provider is Lake Region Electric Cooperative. The electricity use of the Green Plains Ethanol Plant is 3,171,885 kWh of electricity per month over the past 24 months, or 38,062,620 kWh per year.

7. Section 6.2.2.1 of the RPA states that “Operational electrical service requirements for the Project will use existing service lines. The operational needs of the Project are not anticipated to require the addition of power generation capacity” and “Adequate power supplies exist to support the Project; therefore, there will be no impact from new infrastructure.” Provide a summary of any coordination with the Lake Region Electric Cooperative, Otter Tail Power Company, or other utilities regarding the ability of the utility to provide the amount of electricity needed for the operation of the project.

Lake Region Electric Cooperative intends to install fans on an existing transformer or install an additional transformer within the existing substation footprint to support the Project load without issue.

8. Provide a discussion of potential subsidence along the pipeline alignment following restoration and mitigation measures that would be implemented in case of subsidence. Detail should be provided in for preventing excessive crowning or subsidence above the restored centerline, and for addressing excessive crowning or subsidence if it is discovered during post-construction monitoring.

In agricultural lands, as stated in Section 6.11 of the Minnesota Agricultural Protection Plan (Minnesota APP), following completion of construction, Summit will restore the construction workspace to as close to the original pre-construction contours as practicable. If uneven settling occurs or surface drainage problems develop as a result of pipeline construction, Summit will provide additional land leveling services after receiving a landowner's written notice, weather and soil conditions permitting. Alternatively, Summit will negotiate with the landowner for reasonable compensation in lieu of restoration.

Normal Conditions in Agricultural Lands

Section 6.5 of the Minnesota APP states that backfilling will follow lowering the pipe into the trench. During trench backfilling, subsoil material will be replaced first, followed by topsoil. To prevent subsidence, subsoil will be backfilled and compacted. Compaction by operating construction equipment along the trench is acceptable.

Frozen Conditions in Agricultural Lands

Section 6.3 of the Minnesota APP states that Summit will minimize final clean-up activities in frozen conditions. Frozen conditions can preclude effective topsoil replacement, removal of construction debris, removal of excess rock, decompaction of soil as required, final grading, and installation of permanent erosion control structures. If seasonal or other weather conditions preclude Final Clean-up activities, the trench will be backfilled, stabilized, and temporary erosion control measures will be installed until restoration can be completed. Frozen topsoil would not be placed back into the trench until thawing has occurred to prevent settlement of soil in the trench. If topsoil/spoil piles remain throughout the winter, the topsoil/spoil piles will be stabilized methods approved by the regulatory authority. To prevent subsidence, backfill operations will resume when the ground is thawed, and the subsoil will be compacted (as needed) prior to final clean-up activities. The construction contractor must monitor these areas until final restoration is complete.

Through the implementation of the mitigation measure describe above, Summit does not anticipate that crowning or subsidence will be an issue across the majority of the Project, as most of the land impacted by construction is regularly tilled/plowed as it is in annual agricultural production.

For non-agricultural lands, Summit will monitor areas where stabilization and restoration methods are implemented in accordance with requirements in state permits and landowner agreements as stated in

Section 8.2 of the Minnesota ECP. Monitoring will identify areas where remedial measures are required to establish a stable surface for reclamation to be successful. This may include regrading, re-seeding, re-mulching, and additional monitoring.

9. Provide an updated permit table incorporating information from MPCA in its comment letter of May 16, 2023, and any other new information as applicable.

Summit has updated Table 9-1 and Table 9-2 from the Scoping EAW which state the permits and approvals needed for the pipeline and for the capture facility, respectively. Updates are shown in bold.

Updated Table 9-1
Permits and Approvals Required – Pipeline

Unit of Government/Agency	Type of Application	Status
USACE – St. Paul District	Section 10/404 – Utility Regional General Permit (RGP)	Ongoing; Updated materials submitted March 2023
	Section 408 Permission	Ongoing; Updated materials submitted October 2022
USDOT	Highway Crossing Permit	To be submitted
USFWS	Section 7 ESA Consultation for federally listed threatened or endangered species	Ongoing; Biological Assessment to be submitted to USACE for MCE Project
MPUC	Pipeline Route Permit	EIS in preparation
MDNR	Work in Public Waters Permit – Public Water Wetlands on Private Lands	To be submitted
	Utility License to Cross Public Waters	To be submitted
	Water Appropriation Permit for Trench Dewatering	To be submitted
	Water Appropriation Permit for HDD/Hydrostatic Testing	To be submitted
	Water Appropriation Permit for Dust Suppression	To be submitted
	NHIS Consultation, NHIS Review and Avoidance Plan	NHIS update letter submitted May 2023 MDNR response received August 2023
MDA	Minnesota APP	Met with MDA September 2023; no Minnesota APP edits expected
MnDOT	Road Crossing Permits	To be submitted
MPCA	Section 401 Water Quality Certification	Coverage granted under Section 404/10 USACE Utility RGP
	Individual NPDES/SDS Permit – Hydrostatic Testing	To be submitted
	Construction Stormwater NPDES/SDS Permit – Pipeline (General Permit MNR100001)	To be submitted
Minnesota SHPO	Section 106 Consultation	Ongoing

Unit of Government/Agency	Type of Application	Status
Minnesota Department of Labor and Industry	Electrical Permitting	Pending applicability at the capture facility and remote operated valve sites
Bois de Sioux and Buffalo Red River Watershed Districts	Watershed District/Drainage Permits	To be submitted
WCA LGUs and BWSR	Notification of Intent to Use Federal Utilities Exemption	Notice of intent to use Federal Utilities Exemption provided October 2022
Wilkin County	Floodplain Permit	To be submitted
Otter Tail County	Ditch Crossing Permit	To be submitted
County and Township	Road Crossing Coordination	Ongoing

Updated Table 9-2
Permits and Approvals Required – Capture Facility

Unit of Government/Agency	Type of Application	Status
MPCA	Air Quality Permit Applicability Determination	Response Received December 2022
	Air Quality Permit – Option D Registration Permit	Submitted February 2023
	Construction Stormwater NPDES General Permit (MNR10000)	To be submitted
	Coverage under Industrial Stormwater NPDES General Permit MNR050000 (new standalone General Permit coverage) or modification of existing Green Plains Ethanol Plant Individual NPDES Permit which includes stormwater	Ongoing Review of Permitting Approach
	Individual Industrial Wastewater NPDES Permit (stand-alone new permit separate from the Green Plains Ethanol Plant NPDES permit)	Ongoing Review of Permitting Approach
MDNR	Water Appropriation Permit	Ongoing Review of Permitting Approach
Minnesota Department of Labor and Industry	Electrical Permitting	Pending applicability at the capture facility and remote operated valve sites
Otter Tail County	Building/Structure Permit	To be submitted

10. As noted by MPCA, please confirm that the project crosses five impaired waters, not four, to include the intersection of Judicial Ditch 2 at mile post 10.9 and immediately at the start of the impaired reach as indicated above. Provide the proposed crossing method for Judicial Ditch 2.

The Project crosses the following four impaired waterbodies when the Project is intersected with the MPCA Impaired Waters data layer. These are the:

- Pelican River at MP 1.9
- Otter Tail River at MP 19.5
- Unnamed Creek (Doran Slough) at MP 25.0
- Bois de Sioux River at MP 28.1

Regarding Judicial Ditch 2, as stated by the MPCA on page 3 of its May 16, 2023 letter, “Milepost 10.8 (#MAJ-09023556) and MP 10.9 (#MAJ-09022356) are both separate reaches of Judicial Ditch 2. The “reaches” are intersected by 190th Street and now the Project centerline. South of the centerline is the impaired reach AUID 09020103-764 [extending] from 190th Street [south] to the Otter Tail River.” The centerline crosses north of a reach not presently designated as impaired. However, Summit has incorporated the information regarding this crossing in an updated waterbody crossing table, with a relevant footnote as part of Summit’s response to 5-17, below. The proposed crossing method for this feature is open cut.

As required by the MPCA’s Section 401 Authorization as part of the USACE Section 404 Utility Regional General Permit, Summit will ensure that the authorized activities do not exacerbate any existing impairments of a CWA 303(d) listed impaired water. Prior to beginning any authorized activities, Summit will first identify whether the Project area is in, or near, any impaired waters and waters with the USEPA-approved TMDLs. When working in, or near, impaired waters, Summit will deploy redundant best management practices (BMPs) as necessary to ensure the authorized construction activities will not exacerbate existing impairments.

11. Address MPCA’s comments on open trench crossings of waterbodies:

- Please clarify how it is determined when flow is unlikely between disturbance and stabilization of nonflowing open cut crossings and when flowing open cut crossings should be used instead.
- Please explain how open cut crossings are allowed when flowing, if they are expected to result in an increase in sediment loading and negative impacts to downstream habitat. Discuss feasibility of alternate methods to be used instead of flowing (and nonflowing) open cuts such as such as the flume or dam and pump dry crossing methods.

Waterbodies where open cuts are planned are generally small ephemeral, intermittent, or low-flow perennial features where field survey has confirmed there is a high likelihood that the stream will have little to no flow at the time of construction. Prior to execution of the crossing, Summit’s Environmental Inspector (EI), in coordination with the Contractor, will review the crossing to confirm conditions and review upcoming weather patterns. If a dry period appears to hold, work will move forward as planned. In-stream construction activities (specifically trenching, pipeline installation, backfill, and restoration of the streambed contours) at waterbodies 0-10 feet in width are generally completed in under 24 hours as

outlined in Section 4.4 of the Minnesota ECP. Intermediate waterbodies 10-100 feet in width are generally completed in under 48 hours.

If sufficient flow appears during the time of construction of the crossing, or where water flow is expected during construction across the waterbody, the flowing open cut construction method would be used. Even in these instances, the work would be planned during a time of low stream flow (i.e., it would not occur during periods of high flow). This method entails pre-work to stage the crossing equipment outside the waterbody, weld the pipe segment for the crossing in adjacent uplands, trenching across the waterbody, carrying the made-up pipe into the trench, and then backfilling the trench and restoring the stream banks. Summit's Contractor would complete in-stream construction activities as expediently as practicable. Because this line is a small diameter line that will be placed into a trench dug with a single backhoe bucket, the time working to create the trench within the stream will be minimized. Work will be completed per the time windows outlined in Section 4.4 of the Minnesota ECP.

Temporary impacts from in-stream trenching during a flowing open cut can include an increase in the sediment load downstream of crossing locations. To help mitigate the flow and deposition of sediments into waterbodies, Summit's Contractor would properly install and maintain redundant sediment control measures immediately after clearing and prior to initial ground disturbance at waterbodies located within 50 feet of the Project and where stormwater flows to a waterbody. Soft trench plugs would be installed at the edge of stream banks to control water flow and prevent trench sloughing as shown on Figure 10 of the Minnesota ECP. Additional measures are included in Section 12.b.iv.b of the Scoping EAW. These actions would minimize sediment loading and negative impacts to downstream habitat.

Alternative methods include the flume or dam and pump dry crossing methods (Sections 4.5.4 and 4.5.5 of the Minnesota ECP, respectively). These are both feasible methods for similar sized streams. The flume method presents benefits as compared to the dam and pump as it will not require the use of sheet piling to create a dam. However, each method has an increased time for set-up, execution, and cleanup at the waterbody as compared to the nonflowing or flowing open cut, and additional workspace impacts to accommodate the materials and equipment necessary to execute the crossing.

12. Address the following comment from MPCA: Text at the top of page 65 in Scoping EAW states, "In most circumstances, SCS's Contractor would contain and clean up a release. However, when mud releases to a waterbody, it quickly disperses into the water and can migrate downstream." This does not seem to be compliant with Minnesota Statute 115.061 subpart (a) which requires immediate notification of a discharge which "may cause pollution of waters of the state" and the subsequent recovery "as rapidly and thoroughly as possible such substance or material."

This statement, in context of the larger discussion from which it was pulled, was intended to acknowledge that, while infrequent, releases can occur in water or in upland or wetland locations in the vicinity of the drill. If the release occurs on land (which is most common, or, as stated in the Scoping EAW, "in most circumstances"), the Contractor would be able to contain and clean up the release. Regarding the next sentence, "However, when mud releases to a waterbody, it quickly disperses into the water and can migrate downstream", this was intended to disclose in the Scoping EAW that in between the time a release within a waterbody occurs, is identified, and a response action is taken, there will inevitably be some dispersion of drilling mud into the waterbody. The magnitude of this release is dependent on several factors, including but not limited to the size and location of the release and the flow rate of the waterbody. If a release of drilling mud into a waterbody occurs, Summit will immediately mobilize a response to such a waterbody release "as rapidly and thoroughly as possible." Indeed, as the next paragraph after the

subject sentence states, “SCS’s Contractor would develop a contingency plan to address inadvertent return or release of drilling fluid within wetlands, waterbodies, and areas immediately adjacent to wetlands and waterbodies, such as stream banks or steep slopes, where drilling fluid releases can quickly reach surface waters. Containment, response, and clean-up equipment would be available at both sides of an HDD crossing location and one side of a bore prior to commencement to assure a timely response in the event of an inadvertent release of drilling fluid.” This would also include notification to the Minnesota Duty Officer as outlined in Section 9.1.3 of the Minnesota ECP and Section 8.2 of the Minnesota Winter Construction Plan (see response to Inquiry No. 5-13). Additional information on contingency planning is included in response to Inquiry No. 5-23.

13. While we understand the company does not intend to construct the project during frozen conditions, potential impacts could be substantially different than during non-frozen conditions. Please discuss potential differences.

Summit has prepared a Winter Construction Plan for Minnesota and has included it in Attachment 5-13.

14. Provide additional details for the approved disposal locations and methods for excess subsoil and Horizontal Directional Drill (HDD) fluids. Also, clarify who is responsible for tracking or regulating the disposal of waste materials from the construction workspace.

If any excess subsoil remains after the backfilling process, it will be removed and disposed of at a Summit-approved waste management facility or recycling center that accepts dirt. Given the small diameter of pipe proposed on the Project, Summit does not expect that there will be excess subsoil that would need to be disposed.

Excess uncontaminated HDD fluids consisting of soil and water (drilling mud) that have not been mixed with an additive may be land-applied, or spread, over the construction right-of-way in upland locations (see response for Inquiry No. 5-15) with landowner permission. This activity does not require a permit or approval from MPCA. Land application of drilling mud mixed with additives that are approved by the Minnesota Department of Health (MDH) or that meet ANSI/NSF Standard 60 (Drinking Water Well Material Standards) also does not require an MPCA permit or approval. Drilling mud mixed with additives that are not on the MDH approved additive list and/or do not meet ANSI/NSF Standard 60 must be disposed of as a solid waste at an approved facility or Summit must obtain a land application permit from MPCA.

In all cases, the Contractor may choose to contain and then transfer drilling mud off the construction right-of-way and dispose of the drilling mud at a waste management facility that is authorized to accept drilling mud and is approved by Summit.

These waste management facilities and recycling centers have yet to be identified or approved by Summit and will be determined based on need closer to the time of construction. The Contractor is responsible for tracking and disposing of waste material from the construction workspace.

15. Explain how drill cuttings and drilling mud would be spread over the construction right-of-way and what constitutes “approved” as described in section 4.5.6 of the Environmental Control Plan.

The response to Inquiry No. 5-14, above, outlines how Summit will manage excess drilling mud based on the contents of the mud. Considering that response, in Section 4.5.6 of the Minnesota ECP, an “approved

upland location” is a location approved by Summit and the landowner where drilling mud without additives or drilling mud with additives that are approved by the MDH or that meet ANSI/NSF Standard 60 can be land-applied. Once the location is identified, drill cuttings and drilling mud would be spread over the construction right-of-way at an extent and depth so that the material can be reincorporated into the soil such that no material would migrate off the workspace and the soil remained suitable for restoration and revegetation. If these conditions could not be met, the Contractor will contain the materials and transfer the materials off the construction right-of way and dispose of them at a solid waste management facility that accepts drill cuttings and drilling mud and is approved by Summit.

16. Figure 12 of the Environmental Control Plan is incorrect. Provide the corrected figure.

An updated version of the Minnesota Environmental Control Plan (Rev 1) is included as Attachment 5-16. It contains requested revision (added Figure 12), added the correct corresponding *Notes* page for Figure 11, and one minor edit in Section 7.2.1.

17. MPCA listed 11 bullets in its comment of May 16, 2023, identifying inconsistencies in Table 12-2 (Waterbody Crossings) in Scoping EAW and Appendix F (Impaired Waterbodies and Receiving Waterbodies within One Mile. Provide a detailed response to each of the 11 inconsistencies identified by MPCA.

Attachment 5-17 and the included revised tables provide the requested responses.

18. Provide an analysis of the risks to animal health from high concentrations of CO₂ in the event of a rupture. Is there information available on CO₂ concentration levels for wildlife?

There is limited information specifically pertaining to the potential impact of concentrations of CO₂ on wildlife or organisms, specifically in the region of this Project. Animals exposed to elevated CO₂ concentrations would likely experience similar effects as humans, such as hypercapnia and asphyxiation resulting in respiratory distress, narcosis, and mortality. The impacts would be different across species, depending on behavior (e.g., ability to evacuate area, hibernation) and size (DNV, 2020). In the recent study investigating CO₂ tolerability and toxicity in rats and men that was mentioned above, van der Schrier et al. (2022) concluded that rats were able to tolerate concentrations of 30% and higher, but were associated with CO₂ narcosis, epilepsy, poor oxygenation and, at 50% CO₂, spontaneous death. Lung hemorrhage and edema were observed in the rats at inhaled concentrations of 30% and higher. Euthanasia using CO₂ has been studied in feral swine (18% chamber volume per minute for 5 minutes; Kinsey et al., 2016), rabbits (30-60%, but typically 45% for at least 1 hour; Hayward and Lisson, 1978), and birds (%CO₂ not measured; Tidemann and King, 2009), thus underpinning the fact that when exposed to high concentrations of CO₂, some mortality among these species would be expected. In the 1986 Lake Nyos incident, where approximately 1.6 million tonnes of CO₂ were released into the atmosphere from a volcanic CO₂ seep that had been dissolving into a stratified lake that underwent a rapid overturning, fatalities were noted to have included mammals, birds, amphibians, and reptiles (Tuttle et al., 1987).

References:

DNV, 2020. Guidance on CCS CO₂ Safety and Environment Major Accident Hazard Risk Management – Level 3. Partners in CO₂RISKMAN Joint Industry Project. Date of issue 30 January 2013 (Reissued 15 June 2020, Rev 2). Project No. PP018465. Report No. I3IJLJW-2, Rev. 2

Hayward JS and Lisson PA (1978). Carbon Dioxide Tolerance of Rabbits and Its Relation to Burrow Fumigation. *Wildlife Research* 5, 253-261.

Kinsey JC, Foster JA, and Reitz RL. Development of a self-contained carbon dioxide euthanasia trailer for large-scale euthanasia of feral swine. *Wildl Soc Bull.* 2016; 40:316-320. [doi:10.1002/wsb.664](https://doi.org/10.1002/wsb.664)

Tidemann Christopher R., King Daryl H. (2009) Practicality and humaneness of euthanasia of pest birds with compressed carbon dioxide (CO₂) and carbon monoxide (CO) from petrol engine exhaust. *Wildlife Research* 36, 522-527 <https://doi.org/10.1071/WR09039>

Tuttle, Michele L., Clark, Michael A., Compton, Harry R., Devine, Joseph D., Evans, William C., Humphrey, Alan M., Kling, George W., Koenigsberg, Edward J., Lockwood, John P., and Glenn N. Wagner. (1987). The 21 August 1986 Lake Nyos Gas Disaster, Cameroon. Final Report of the United States Scientific Team to the Office of U.S. Foreign Disaster Assistance of the Agency for International Development

van der Schrier R., M. van Velzen, M. Roozkrans, E. Sarton, E. Olofsen, M. Niesters, C. Smulders, A. Dahan., 2022. Carbon dioxide tolerability and toxicity in rat and man: A translational study. *Frontiers in Toxicology*. Volume 4, 13 October, 2022. <https://doi.org/10.3389/ftox.2022.1001709>

19. Provide information on the Doran Creek Rehabilitation Project, planned by the Bois de Sioux Watershed District.

Following a discussion with the Bois de Sioux Watershed District on November 6, 2023, the Doran Creek Rehabilitation Project will be subject to a Minnesota Environmental Assessment Worksheet (EAW) and the MDNR will be the Responsible Governmental Unit. The project proposer has not yet initiated the EAW process. The Bois de Sioux Watershed District stated that the information on their website regarding the project scope is still accurate:

<http://www.bds wd.com/PDF/2023.01.26%20Doran%20Creek%20Presentation.pdf>

20. Please describe measures to prevent French drain effects via the pipeline trench. Does the company utilize Pennsylvania standards for trench breaker placement? If not, why?

Permanent trench breaker placement is discussed in Section 2.9.1 of the Minnesota ECP. As committed to the MDNR in Enclosure 2 of its September 1, 2022 Project introduction letter (see Route Permit Application, Appendix 8), Summit is presently proposing to install trench breakers at the entry and exit from every public water crossing, except for at HDD crossings. In addition, as outlined Section 5.5 of the Minnesota ECP, trench breakers will be installed at wetland boundaries where the pipeline trench may cause a wetland to drain, or the trench bottom will be sealed to maintain wetland hydrology.

Summit plans to select the location of trench breakers across the Project based on field conditions at the time of construction and will consider the degree and length of slope, presence of down-slope sensitive resource areas such as wetlands and waterbodies, and proximity to other features such as roads and/or railroads. Generally, slopes are higher in the eastern portion of the Project, while the majority of the Project, and particularly the western portion of the Project, is located in areas where slope is not a concern (0.001-6.71 degree slope; see Figure 11-3 of the Scoping EAW).

Trench breakers do not need to be installed at waterbodies crossed by the HDD method. The HDD method is a trenchless method that involves no direct excavation of the features crossed. Furthermore, at the point that the HDD crosses the waterbody feature, it is generally located between 30 to 40 feet below the stream bed. Here, installation of a trench breaker is not necessary and would be impractical.

Use of this field condition review will ensure that Summit will not install trench breakers where they would not provide the intended benefit (i.e., on steep slopes where trench line erosion has the risk of occurring and at slopes adjacent to wetlands and waterbodies).

The “Pennsylvania standards” for trench breaker (plug) placement can be found in the Pennsylvania Department of Environmental Protection (DEP)’s “Erosion and Sediment Pollution Control Program Manual” (DEP Manual)¹ in Standard Construction Detail #13-4, and as shown below in Table 13.1 of the Manual.

PA DEP

TABLE 13.1
Maximum Spacing and Materials for Trench Plugs

Trench Slope (%)	Spacing L (FT)	Plug Material
< 5	1,000	* Clay, Bentonite, or Concrete Filled Sacks
5 - 15	500	* Clay, Bentonite, or Concrete Filled Sacks
15 - 25	300	* Clay, Bentonite, or Concrete Filled Sacks
25 - 35	200	* Clay, Bentonite, or Concrete Filled Sacks
35 - 100	100	* Clay, Bentonite, or Concrete Filled Sacks
> 100	50	Cement Filled Bags (Wetted) or Mortared Stone

***TOPSOIL MAY NOT BE USED TO FILL SACKS.**

Impervious trench plugs are required for all stream, river, wetland, or other water body crossings.

The Manual describes the materials within as BMPs and design standards to minimize accelerated erosion and sediment pollution associated with construction activities in Pennsylvania, and to ensure compliance with Pennsylvania regulations found at 25 Pa. Code Chapter 102 (DEP Manual, p. i and ii). The policies and procedures in the Manual are “not an adjudication or a regulation. There is no intent by DEP to give the rules in these policies that weight or deference” (DEP Manual, p. i). The DEP Manual offers Pennsylvania users the options to utilize alternate BMPs that are not listed in this manual but that provide the same (or greater) level of protection (DEP Manual, p. i).

When describing the occurrence of the “French Drain” effect, DEP noted that the backfill considered was “usually permeable aggregate” (DEP Manual, p. 286). The Project will not backfill the trench with permeable aggregate but with native material, which on the Project will be subsoil and topsoil soil free from rocks or other materials that would damage the pipeline. There are no locations in which the Project would use permeable aggregate to backfill the Project, although this practice is used in other parts of the United States where rocky, stony, or bedrock trenches are excavated and filled with coarse material that would be more likely to cause the “French Drain” effect.

¹ <https://www.depgreenport.state.pa.us/elibrary/GetFolder?FolderID=4680>

It is not practical, nor would it provide any additional protection, to install of trench breakers at “all stream, river, wetland, or other waterbody crossings” as suggested in the DEP Manual. Summit’s commitment to installation of trench breakers in specific locations as outlined in the Minnesota ECP, and additional site review considering slope and other conditions, will adequately prevent “French Drain” effects via the pipeline trench. Prior to construction, Summit will identify the general location of trench breakers on construction alignment sheets with a note to “Field Verify” the precise location through coordination between Summit’s EIs and the Contractor. The trench breaker may be moved short distances in either direction from the location identified on the construction alignment sheets to more stable soils, or to accommodate other site-specific conditions. Additional trench breakers may also be added depending on site-specific conditions. Summit will require the Contractor to have additional materials on hand to install additional trench breakers as needed.

21. Describe plans for wildlife escape routes from the pipe trench and for removing wildlife from the open trench.

As described in Section 3.2 of the Minnesota ECP, to allow the passage of wildlife, livestock, and to facilitate the natural drainage pattern, spoil piles will have gaps that align with the breaks of the strung pipe. Plugs of subsoil in the ditch will be left or bridges may also be constructed to allow the passage of wildlife and livestock.

If a large mammal such as a deer or bear becomes entrapped in the trench, Summit will contact U.S. Department of Agriculture, Animal and Plant Health Inspection Service (USDA APHIS), Wildlife Service Minnesota State Office to assist with removal (1-866-4USDAWS or 651-224-6027). Summit will also notify the MDNR through its 24-hour hotline (1-888-646-6367).

22. Provide any information on other raptor nests (e.g., osprey) that was collected during the bald eagle survey. Discuss the potential for raptor nest removal.

The species targeted by the aerial raptor nest survey conducted in April 2022 included (but were not limited to) bald eagles, ospreys, red-tailed hawks, and great horned owls. Aside from the two active bald eagle nests (located beyond the disturbance buffer distance of 0.125 mile for active bald eagle nests in Minnesota, as described in the Scoping EAW), no other raptor nests were documented within one mile of the Project centerline and associated facilities. Aerial raptor nest surveys will be conducted again prior to construction.

An active (“in-use”) nest (as defined in the Bald and Golden Eagle Protection Act (BGEPA), 50 CFR 22.6) is a nest characterized by the presence of one or more eggs, dependent young, or adult eagles on the nest in the preceding ten days during the breeding season. An inactive (“alternate”) nest is defined as one of potentially several nests within a nesting territory that is not an in-use nest at the current time. When there is no in-use nest, all nests in the territory are alternate nests. If an additional bald eagle nest is found in pre-construction surveys, Summit would not plan to remove it, whether active or inactive.

Similarly, Summit does not anticipate removing osprey nests if one is found in pre-construction surveys. Osprey nests are regulated in the State by Minnesota’s Nongame Wildlife Nest Removal Permit program, which prohibits removal of both occupied and unoccupied osprey nests without a permit.²

² <https://files.dnr.state.mn.us/wildlife/research/permits/nest-removal-permit-application.pdf>

If any non-eagle, non-osprey raptor nest is found in pre-construction surveys, Summit may consider removing it, if inactive. All occupied nests of migratory birds are protected by the federal Migratory Bird Treaty Act (MBTA) and in Minnesota by the Nongame Wildlife Nest Removal Permit program. Removal of an inactive, non-eagle, non-osprey raptor nest is legal under the MBTA and Minnesota's regulations. Summit would plan the removal, in coordination with the landowner or land management agency, for the fall of the year ahead of construction, such that removal would avoid the Minnesota bird nesting season (April 1 to August 31). Summit would ensure that inactive nests are dismantled so as to prevent possession of nest materials, which is illegal under the MBTA.

23. Describe how a possible release of pressurized drilling mud during HDD crossings would impact threatened fluted-shell mussels and any proposed mitigation measures to reduce impacts of a potential release.

Summit provided MDNR with an updated Natural Heritage Information System review on May 19, 2023. MDNR responded on August 23, 2023. These letters are included as Attachment 5-23. Because the letters contain nonpublic, sensitive Natural Heritage information, public and NONPUBLIC versions of the letters have been provided. The documented occurrences of fluted-shell mussels are discussed in both Summit's letter and MDNR's response.

In the May 19, 2023 letter, Summit noted the presence of fluted-shell mussel element occurrences near the Project. The occurrences are from 1991 and 2004. The potential for impact to this species is low because Summit will use the HDD method at the relevant crossing locations. In their letter from August 23, 2023, MDNR identified the main threats to fluted-shell mussel as stream crossings, including crushing from rip rap, stranding from dewatering, and smothering from sediment loading. MDNR recommended effective erosion and sediment control practices near the rivers and tributaries. To further protect the mussels, MDNR recommended directionally boring these rivers, placing bore pits away from the water's edge, and erosion control measures to prevent material from entering the water. Summit has incorporated MDNR's recommendations in crossing design as well as implementation of construction measures in its Minnesota ECP to prevent sedimentation in the rivers.

In the event that an inadvertent release was to occur within an aquatic resource Summit will notify all appropriate agencies according to the respective agency's regulatory requirements and its Contractor will implement the mitigation measures outlined in the Minnesota ECP, as well as all applicable federal and state permits and authorizations, to quickly identify, stop, and contain the release. As stated in response to Inquiry 2-2, Summit will develop a contingency plan to address the unintended release of drilling mud to the environment during the execution of each HDD. This plan will include, among other things, measures to reduce the risk for an inadvertent return to occur and procedures to monitor for inadvertent returns during drilling. The Contractor will develop a contingency plan to address an inadvertent return during a directional drill; these plans will identify BMPs for an inadvertent return and requirements following the incident. Section 12.b.iv.b of the Scoping EAW also states that the contingency plan would outline containment, response, and clean-up equipment that would be available at both sides of an HDD crossing location prior to commencement to assure a timely response in the event of an inadvertent release of drilling fluid.

The use of the HDD method is a preferred method of the MDNR to minimize the impacts of construction on the fluted-shell mussel. The Contractor's contingency plans would further ensure that in the unlikely event of an inadvertent release within a waterbody, the impacts would be minimized and responded to effectively so as to prevent impacts to aquatic resources, including the fluted-shell mussel.

24. Discuss potential impacts to fish and other aquatic organisms from a release of CO₂ into a river or other waterbody. Include possible quantities of CO₂ released and the corresponding magnitude of effect for the waterbody and mortality of fish and other aquatic organisms. In your response consider proposed valve placements and assess if additional shut-off valves can reduce the magnitude of fish or aquatic organism mortality associated with a CO₂ release into a waterbody, as well as the likelihood of release, the amount of CO₂ likely to be released, and distance of stream affected by a release under different flow/temperature conditions.

The potential for accidental release of CO₂ into the aquatic environment from a pipeline rupture is very low based on the frequency of pipeline ruptures in general and the fact that open water habitats represent a small percent of the Project, but such a release, were it to occur, could have some impacts on the aquatic communities. The magnitude of the impacts of a release will be contingent upon the volume of the release and the size and flow of the waterbody (dilution), but in general will be expected to be low. The release of CO₂ will cause the concentration of dissolved CO₂ in the water column to increase with consequent decreases in pH. Fish appear to be less sensitive to the physiological impacts of acidification than invertebrates with carbonate shells, and adult fish less sensitive than eggs and juvenile fish. Motile adult fish will also likely move away from the release (Suzuki 2020) but CO₂ concentrations near the source could increase to toxic levels and result in morbidity or mortality on fish that do not move away and on sessile invertebrates. Most impacts will be short-term, ameliorating soon after the release is stopped, but re-colonization by invertebrates could take a year or longer.

The most probable adverse effect of a CO₂ release into a flowing stream is a lowering of pH and direct toxicity effects. According to Henry's Law, at 25 ° C, an equilibrium concentration of CO₂ and water would approach 0.55 parts per million which would not constitute a significant adverse impact to most fish species. Oversaturation could occur adjacent to the leak site with CO₂ concentration levels potentially going as high as 1,500 parts per million. While CO₂ concentrations at these levels would be extremely toxic to fish, the possibility of many fish being killed would still be remote or virtually nonexistent because (1) fish are mobile and most waterbodies crossed will move the CO₂ downstream as well as dilute it, (2) a bubble stream from a leak would cause fish to avoid the area, (3) a CO₂ leak would be short term because of block valve safety precautions, and (4) a leak or blowout is unlikely to occur at all. Sessile species (e.g., mollusks) would be more vulnerable to increases in CO₂ levels in the water column because of their inability to move locations. The CO₂ increases would have to occur consistently over a long period of time (months) for impacts to be seen. In addition, when CO₂ dissolves in water, about one percent of it forms carbonic acid (H₂CO₃), which almost immediately dissociates to bicarbonate anions and protons (HCO₃⁻). This produces a solution of bicarbonate. Because surface waters are in equilibrium with atmospheric CO₂ there is a constant concentration of H₂CO₃ in the water. The presence of limestone and other calcium carbonate rock in lakes and streams helps to maintain a constant pH because the minerals react with the excess acid. When water is in equilibrium with both CO₂ and carbonate containing rock, the pH of the water is buffered to a pH of 8.3, close to the pKa of the weak acid bicarbonate HCO₃⁻ (pKa = 8.4). Due to the presence of alkaline soils and limestone bedrock, South Dakota surface waters average a pH of 8.2. The solubility of CO₂ in water is a function of both the temperature and the salinity of the water, where CO₂ is more soluble in freshwater than seawater, and solubility decreases with increasing temperature.

25. The project would be connected to the Operations Control Center (OCC) in Ames, Iowa through the best available public communications network." Clarify what the "best available public communications network" would be.

Summit will utilize the fastest, most reliable communication methods available in the area. Summit is considering the following communication method: Fiber Optic, Cellular, T1, and VSAT. Summit intends to have redundant communication methods, utilizing the best option for primary communications, and the next best option will be utilized for secondary communications.

26. For the final hydrostatic testing of the completed pipeline, clarify whether the entire 28.1-mile-long pipeline would be hydrostatically tested at once or in smaller sections.

The pipeline will be tested in two sections.

27. Provide the estimated peak number of construction workers that would be working at the capture facilities and on the pipeline. Please estimate the number of these workers who would be hired locally (i.e., within commuting distance of the project). Provide discussion of plans to use union labor.

Approximately 80-100 construction workers will be used to build the capture facility at the peak construction phase. Approximately 150 construction workers will be used to build the pipeline at the peak construction phase. For the construction of the Project, 100% of the workforce will be union employees with 50% of the personnel sourced from the local union halls.

28. Provide information on the casing that would be used for piping under MnDOT right-of-way.

Summit is currently proposing to cross Minnesota TH 210 and US Highway 75 via HDD. Summit does not recommend requiring the use of cased crossings at Minnesota TH 210 and US Highway 75. Requiring cased crossings at these locations will result in greater impacts to privately owned land during and after construction, increased installation times, increased risk to pipeline integrity, and actually less depth of cover over the pipeline with the road ROWs. Additional justification is provided below.

Greater impacts to privately owned land during and after construction

- In order to install the casing pipe with a minimum depth of cover of 10 feet below the lowest point within the road ROWs (as recommended by Minnesota Department of Transportation (MNDOT), bell holes approximately 15-20 feet deep by 10-20 feet wide by 20-40 feet long will need to be excavated on both sides of the roadways, on privately owned agricultural land. The bell holes are required to accommodate the equipment and installation of the casing pipe. The large volume of excavated soils will have to be stored onsite during construction.
- In addition to the bell hole excavations, tail ditches will have to be excavated on both sides to gradually slope the pipeline up from the casing depth to the normal pipeline depth of 4.5 feet. Due to MNDOT's recommendation to require the casing maintain a minimum of 10 feet of cover under the lowest point within the road ROW, the casings will be 12-16 feet deep at the edges of the road ROW.
- Larger construction workspace may be needed to accommodate excavation spoils and equipment during installation.

Increased installation times

- The items described above will also lead to longer installation time, increasing the impacts to private landowners.

Increased risk to pipeline integrity

- Casing pipe shields carrier pipe from the induced current cathodic protection system by eliminating contact between the carrier pipe and the electrolyte (soil). This means that the pipeline's cathodic protection system will not protect the pipe within the casing.
- Metallic shorts between the casing pipe and the carrier pipe are also common, especially within longer casings. This occurs when the casing pipe comes into contact with the carrier piping and can be caused by earth movement or settlement over time. This situation can lead to additional corrosion and stress on the carrier pipe.
 - Due to railroad ROW abutting the road ROW for both Minnesota TH 210 and US Highway 75, the cased crossings will be approximately 250-270 feet long each.
- There would be increased maintenance requirements associated with casings over the life of the pipeline in order to ensure integrity. Vent pipes, end seals and centralizers may require maintenance (excavation required) to ensure integrity of the casing and carrier pipe throughout the life of the pipeline system.
- Encasement of pipelines is an outdated technique that was utilized prior to the introduction of trenchless technologies. Modern pipeline design and corrosion guidelines such as *ASME B 31.4 – Pipeline Transportation Systems for Liquids and Slurries* and *NACE RP0200 Steel-Cased Pipeline Practices* recommend avoiding pipeline casings.

Less depth of cover over the pipeline with the road ROWs

- MNDOT is recommending requiring 10 feet of cover for the casing, which far exceeds the minimum requirements in the MNDOT Utility Accommodation and Coordination Manual Table II – Utility Facilities on Minnesota Highway Rights of Way – Minimum Depths (requires 5 feet of cover below the pavement and 3 feet of cover below the ditch). See image below.

AUGUST 2016

UTILITY ACCOMMODATION

31

Table II

UTILITY FACILITIES ON MINNESOTA HIGHWAY RIGHT OF WAY

MINIMUM DEPTHS

Crossings

	Under Pavement Surface	Under Original Ditch Grade
All Underground, except Power (Cased and Uncased)	5'	3'
Power (Cased and Uncased)	5'	3.5'

In summary, Summit's preliminary HDD designs for these crossings have been designed to provide a minimum depth of cover of 20 feet below the lowest points within the road ROWs, would result in less impact to the private landowners, and would allow for the protection afforded by the cathodic protection

system. Per the MNDOT Utility Accommodation and Coordination Manual Section VIII(D)(3)(c)(ii), pipelines placed by trenchless technologies may be approved on a case-by-case basis if certain criteria are met. Summit's preliminary HDD designs meet and exceed all the criteria laid out in the MNDOT Utility Accommodation and Coordination Manual. Summit intends to continue to work with MNDOT regarding the crossing methodology at these locations.

29. Confirm that Summit would comply with the requirements for depth and setbacks stated in MnDOT's letter of May 18, 2023. Confirm Figure 13 of the Minnesota ECP complies with these requirements.

The MNDOT's letter states the following regarding depths and setbacks (p. 2):

Boring pits should be located outside of MnDOT rights-of-way. Bore depth will be required to be at a minimum of 10 feet under the lowest existing elevation of the road profile. The CO₂ line will need to be at full depth under the entire right-of-way. The CO₂ line should be located no less than 3 feet from existing buried utilities in the area(s) and located no less than 15 feet from any drainage pipe or structure within MnDOT right-of-way. The CO₂ line should avoid being placed near the intersection of other roads and MnDOT rights-of-way.

Summit will comply with these depth and setback requirements. Figure 13 of the ECP (Guided Bore Detail) is intended to be a general "typical" drawing. As stated in the Notes sections, Crossing Permit Packages for each road will include additional notes, details, dimensions, construction requirements, and conditions. Federal, state, and local agencies having more stringent regulations will supersede the materials in the Minnesota ECP, including typicals (see Minnesota ECP, Section 1.0). Summit intends to continue to work with MNDOT regarding road crossings under its jurisdiction.

30. Confirm that Summit would conduct all coordination with MnDOT that is described in MnDOT's letter of May 18, 2023.

Summit will continue to coordinate with MNDOT regarding the Project, including as outlined in MNDOT's May 18, 2023 letter.

31. Provide a shapefile or kmz file that shows the proposed pipeline route centerline from the capture facility west to the first MLV in North Dakota.

A kmz file that shows the proposed pipeline route centerline from the capture facility west to the first MLV in North Dakota has been uploaded to the Otter Tail to Wilkin Project Sharepoint Site.

32. Provide the pipe diameter and wall thickness of the pipe west up to the first MLV in North Dakota.

- Pipe Size (outside diameter): 4.5-inch outside diameter
- Pipe Type: High-strength carbon steel (API 5L)
- Nominal Wall Thickness in Inches: 0.189 inch
- Pipe Design Factor: 0.72
- Longitudinal or Seam Joint Factor: 1.00

33. Provide a copy of the IRR file (Internal Case Input File) used to determine rupture dispersion.

Summit has placed a copy of the requested dispersion model internal case input file on the Otter Tail to Wilkin Sharepoint site as NONPUBLIC Attachment 5-33. Given the nature of this file, there is no public version, as it contains modeling inputs used in the CANARY dispersion model. The data was created by Summit and its consultant, Audubon Field Solutions. In accordance with Minn. R. 7829.0500 and Minn. Stat. Ch. 13, Summit has classified the file as NON-PUBLIC DATA – SECURITY INFORMATION under the Minnesota Data Practices Act (“Act”) definition in Minn. Stat. §13.37, subd. 1(a).

The Act provides that “security information” is nonpublic data, defining “security information” as “government data the disclosure of which the responsible authority determines would be likely to substantially jeopardize the security of information, possessions, individuals or property against theft, tampering, improper use, attempted escape, illegal disclosure, trespass, or physical injury.” Summit requests that the above-referenced attachment be classified as security information under the Act because the attachment contains detailed and specific location, facility information, and model inputs, the disclosure of which would substantially jeopardize the security of Summit’s proposed facilities against tampering or physical injury.

Summit regularly protects this information from public disclosure because of potential safety and security risks, and Summit’s practices are consistent with its treatment under federal law. Specifically, Summit created this file to comply with the Emergency Response Plan (“ERP”) and Integrity Management Plan (“IMP”) requirements of the Pipeline and Hazardous Materials Safety Administration (“PHMSA”). See 49 C.F.R. §§ 195.402(e), 195.408 and 195.452. PHMSA is directed by Congress to establish safety standards for, namely, the design, construction, testing, operation, and maintenance of carbon dioxide pipelines, and is responsible for administering a compliance and enforcement program over these standards. See 49 U.S.C. § 60101 et seq.

As part of its submittal of the modeling assumptions to PHMSA, Summit will seek protections for these materials, including under the Freedom of Information Act (“FOIA”) and other authorities. Specifically, the modeling assumptions qualify for protection under FOIA Exemptions 4 and 7(F). See 5 U.S.C. §§ 552(b)(4) and 552(b)(7)(F). Exemption 4 protects confidential commercial information that is customarily kept private. Exemption 7(F) protects information that could reasonably be expected to endanger the life or physical safety of any individual. This modeling data is also subject to protection under a U.S. Department of Homeland Security (“DHS”) program for protection of transportation-related Sensitive Security Information (“SSI”). See 49 C.F.R. Part 1520. When submitted to PHMSA, these materials may qualify as part of a vulnerability assessment under DHS regulations. In addition, they contain certain attribute information that PHMSA and DHS have jointly agreed require confidential treatment and special handling in an SSI-compliant environment, including identification of which segments could affect High Consequence Areas under PHMSA’s safety standards, as well as the location of critical pipeline components, such as mainline and block valves. See 49 CFR §§ 1520.5(b)(5) and 1520.9; 80 Fed. Reg. 52,084, 52,092 (August 27, 2015). Given the confidential commercial nature of the modeling data, and, more importantly, the utility of such materials to those who may wish to damage to pipeline facilities, Summit expects to receive federal protections against public release of these materials.

There is a substantial threat that providing this information publicly could put Summit’s pipeline and facilities, and the surrounding environments, at risk of tampering, trespass, or physical injury from individuals intent on doing harm to the pipeline and associated facilities. A determination that this

information constitutes nonpublic security information is likewise consistent with other interpretations of the Act.

For the reasons set forth above, Summit considers the modeling data to be sensitive security information and, therefore, requests that it be classified as security information under the Act.

34. Provide a copy of the aerial dispersion analysis report that discusses inputs, assumptions, and considerations, and results.

This study has been uploaded to the Otter Tail to Wilkin Project Sharepoint Site as NONPUBLIC Attachment 5-34. Because the Report contains nonpublic, security information, public and nonpublic versions of the report have been provided.

35. Provide an update regarding any coordination with local emergency first responders.

Summit has recently met with the Otter Tail and Wilkin County Commissioners and Emergency Managers to discuss planning for emergencies and scheduling training of first responders in their respective areas. These meetings occurred on September 12, 2023 for Wilkin County and September 25, 2023 for Otter Tail County.

Summit will work with the county Emergency Managers to plan for training of first responders around the time of MPUC route permit issuance, prior to, and during construction so that emergency responders will be prepared once the project goes into operation. Training will include discussions of CO₂ pipeline operations, use of monitoring equipment, potential response actions, and will incorporate tabletop exercises and drills. Handheld CO₂ and oxygen (O₂) monitors will be necessary to safely respond to a CO₂ incident. Additional needs for each county will be discussed on a case-by-case basis.

36. Could an odorant be added to the CO₂ transported in the pipeline? Explain why or why not.

Summit does not currently plan to add an odorant to the pipeline. 49 CFR Part 195 does not identify a requirement for the use of odorant in hazardous liquid or carbon dioxide pipelines. Odorant requirements typically apply to low pressure natural gas distribution pipelines and are primarily intended to alert occupants of a gas leak occurring inside of a residence or structure. If federal regulations are amended in the future to require the use of an odorant in CO₂ pipelines, Summit believes that mandate will be preceded by research establishing whether the combination of CO₂ and commercially available odorants will compromise the integrity of pipeline systems and sequestration facility components.

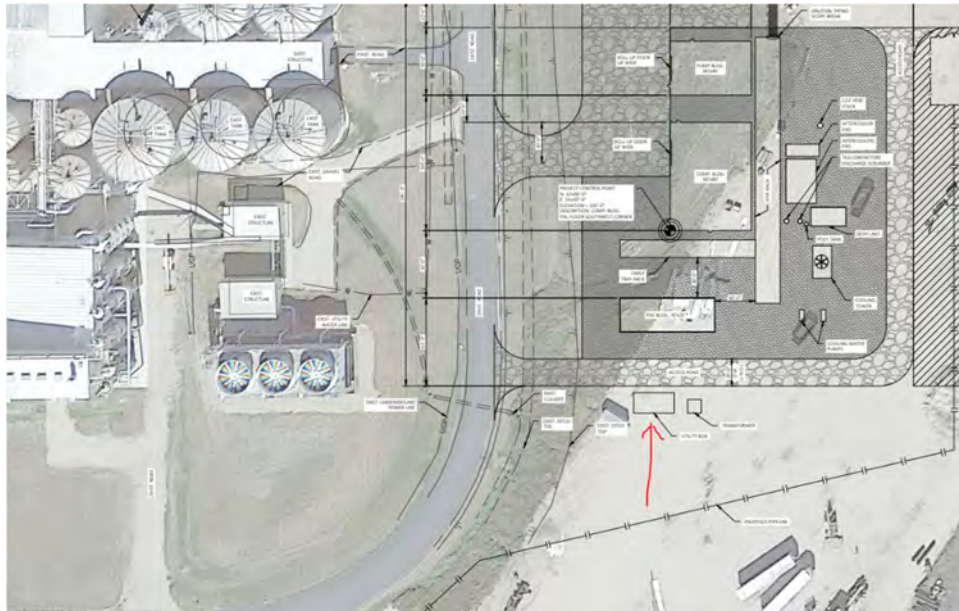
Presently, the primary component in many odorants is concentrated Methyl Mercaptan. This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200). Odorizing a pipeline system would require multiple injection facilities and would introduce additional logistic and design changes needed for the safe storage and overland transport of concentrated Methyl Mercaptan.

37. Would aboveground cathodic protection components be fenced? If so, please describe the fence.

Cathodic protection components will be located within mainline valve (MLV) sites. MLV sites will have a 6-foot-tall security fence around the perimeter with a locked gate.

38. Please describe how electricity will reach the capture facility from the existing substation adjacent to the facility.

Summit is not aware that Lake Region Electric Cooperative has finalized its plans, but generally, they intend to bring 12.47kV power from the substation approximately 850 feet to the area designated as “Utility Box” on the south part of the image below. Power will be supplied from the substation via buried cable. A disconnect will likely be placed at the area designated as “Utility Box”, and Summit will distribute the power for the Capture Facility from that location.



39. Can the ethanol plant process material (crops) other than corn?

The Green Plains Ethanol Plant is designed to process USDA #2 Yellow Corn (field corn), but in theory, it could process sorghum (milo) and other grains.

40. Please summarize corn deliveries. For example, does corn arrive by truck and rail? How “local” is the corn used at the ethanol plant?

Nearly all corn arrives at the Green Plains Ethanol Plant by truck, the majority by semi (tractor and trailer) with some arriving via straight truck. All of this trucked corn comes from local farmers and grain elevators/ farmer co-ops within trucking distance (approximately 40 miles). It is rare for corn to be delivered by rail to the Green Plains Ethanol Plant, but when it is, it also comes from local co-ops within 25 miles of the Plant. Approximately 12 rail cars are delivered per year, which equates to 48 truckloads (48,000 bushels). This is approximately 0.2% of annual corn purchases.



SUMMIT CARBON SOLUTION PIPELINE PROJECT

GULF PROJECT NUMBER: 1927

FROST HEAVE STUDY



GULF DOCUMENT NO.: 1927-000-PL-STY-0004

SCS DOCUMENT NO.: GPLUS-GENL-ENG-STY-GIE-0004

Revision	Date	Revision Description	Prepared By	Reviewing Engineer	Project Manager	Client Approval
0	04/17/2023	Issued for Information	David Ammerman	Lance Thomas	David Ammerman	
GULF INTERSTATE ENGINEERING			REVISION LOG			



PROJECT: MIDWEST CARBON EXPRESS PROJECT

REPORT NUMBER:

GPLUS-GENL-ENG-STY-GIE-0004

GULF PROJECT NO.:

1927

TITLE:

Frost Heave Study

Provide a brief description of changes for all revisions following Rev. 0

Filename: GPLUS-GENL-ENG-STY-GIE-0004-E-Frost Heave-23-04-06

REV.	DATE	REVISION DESCRIPTION



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1 PURPOSE

The purpose of this Frost Heave Study is to address Summit Carbon Solutions Pipeline Project objectives involving pipeline integrity when installing and operating pipelines in regions where frozen soil and frost depths may require additional consideration.

2 PROJECT DESCRIPTION AND SCOPE OF STUDY

Summit Carbon Solutions (SCS) plans to develop a new interstate CO₂ capture, transportation, and sequestration project. The Project will capture CO₂ from multiple sources throughout Iowa, Minnesota, Nebraska, South Dakota, and North Dakota and deliver the CO₂ to injection sites in North Dakota for permanent geological sequestration.

The main objectives of this Study are to assess potential impacts to the proposed pipeline from permafrost and frost heave across the five-state footprint.

3 PERMAFROST POTENTIAL IMPACTS

Permafrost is rock or soil that remains completely frozen for at least two straight years. Areas shaded in blue in Figure 3-1 are underlain by permafrost. As Figure 3-1 shows, the SCS pipeline system does not traverse any areas underlain by either continuous or discontinuous permafrost.

Therefore, permafrost is not an issue that needs to be addressed by this project and will not be discussed further in this study.

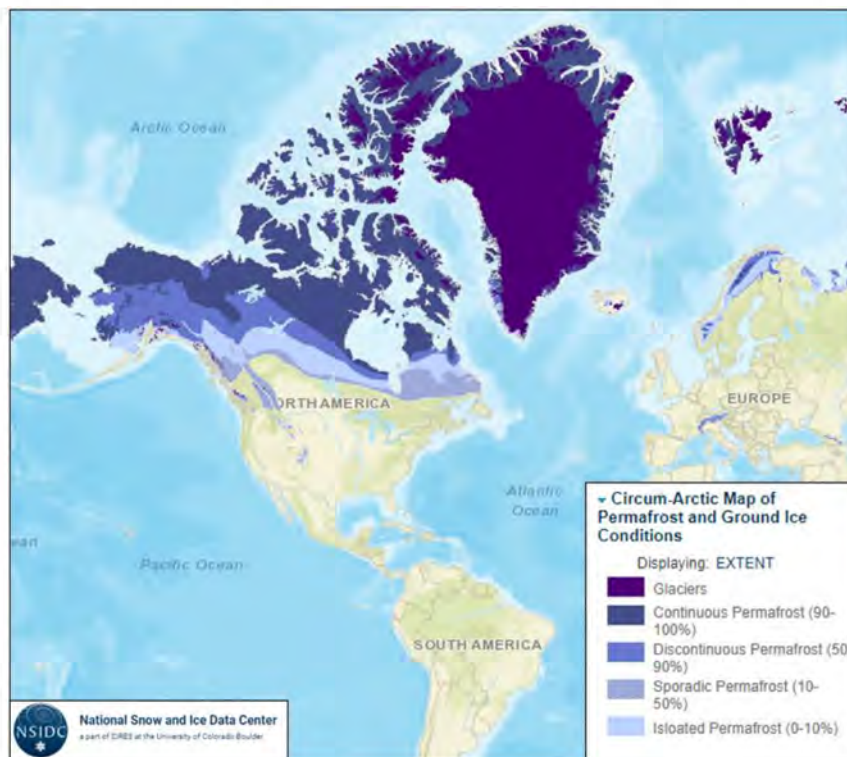


Figure 3-1: Arctic Map of Permafrost and Ground Ice Conditions

4 FROST HEAVE

4.1 Description

Frost heave is the result of the formation of ice lenses by segregation of water from the soil as the ground freezes¹. Ice lenses are lens-shaped masses of almost pure ice that form in frozen soil or rock. Lens formation takes place at, or a short distance behind, the freezing front at any depth where conditions are favorable and continues until those conditions change.² Lens growth may be sustained by the addition of groundwater drawn from warmer zones below the freezing front. The amount of vertical displacement (heave) is roughly equal to the combined thicknesses of the underlying ice lenses. This results in greater displacement at the surface when compared to areas of greater depth.

4.2 Frost Heave Conditions

Three conditions must be met to create the possibility of frost heave to the extent that it would threaten the pipelines integrity:

1. The soil must contain a significant amount of silt (i.e. Silty Clay, Clayey Silt, Sandy Silt, Silty Sand, or Silt), to promote upward groundwater movement, via capillary action, to the freezing front;
2. There must be a source of groundwater near (immediately below) the freezing front; and
3. Soil freezing and ice lensing both need to occur at a depth below the bottom of the pipe.

If any of the three conditions listed above are not met, frost heave should not occur.

4.3 Frost Penetration

Several factors influence seasonal frost penetration depth:

1. Vegetation cover (vegetation tends to insulate and retard frost penetration);
2. Snow cover (snow cover tends to insulate and retard frost penetration);
3. The number of degree days below freezing;
4. Soil grain size (coarse grained soils are more conductive, allowing greater frost penetration than fine grained soils); and
5. Moisture content (the higher the moisture content, the more time it takes for a given soil to freeze).

The United States Department of Agriculture records soil temperature at various depths at monitoring stations located throughout the US³. Five USDA locations spread throughout the project footprint were utilized to gather ground temperature data. Each location was reviewed, but the Mandan location was selected for this report as it is the furthest north and most likely to see the greatest frost depth.

This station records soil moisture and temperature to a depth of 40-inches.

Figure 4-2 depicts daily soil temperature at a depth of 40-inches over the last decade. As the graph shows, the soil approaches freezing conditions in most years but does not drop below the freezing point for any extended duration.



Figure 4-1: USDA's Mandan Station

¹ Taber, S., 1929, Frost heaving: Journal of Geology, v. 37, p. 428-461.

² Manz, L., July 2011, Frost Heave, Geo News, p. 18-24

³ <https://www.nrcs.usda.gov/resources/data-and-reports/soil-climate-analysis-network>



Mandan #1 (2020) North Dakota SCAN Site - 1930 ft Reporting Frequency: Daily; Date Range: 2013-04-01 to 2023-04-11

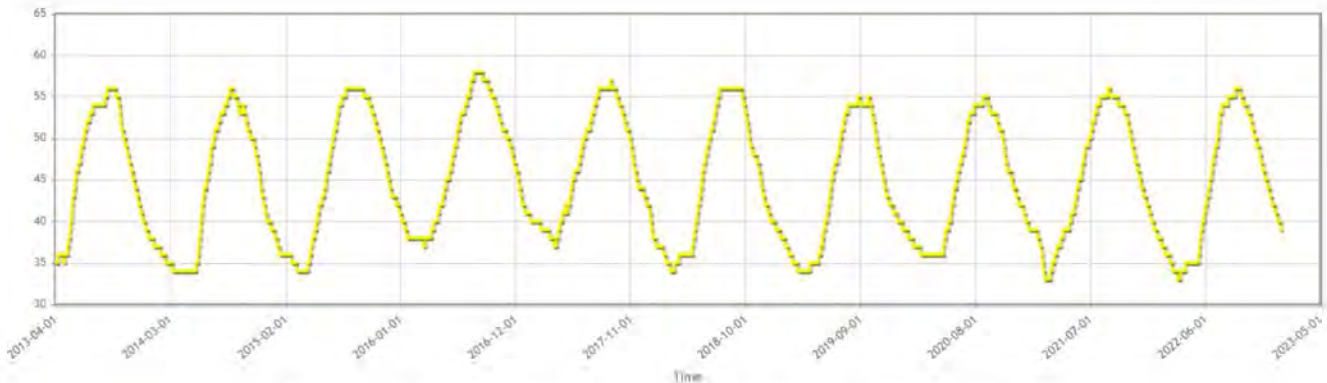


Figure 4-2: Soil Temperature at 40-inches Depth During Last Decade

5 Frost Heave Considerations

5.1 Soil Types and Ground Water

Based on the USDA Soil Survey Geographic Database, there are soils that could be classified as frost susceptible where 10% or more particles pass through a No. 200 sieve⁴.

Ground water heights can range significantly across the pipeline route and can also fluctuate seasonally. Geotechnical reports reviewed show ground water ranging from 6.5 to over 100 feet below ground surface⁵.

5.2 Pipeline Depth of Cover

SCS will be installing the pipelines with a minimum depth of cover of 48 inches from top of pipe. The bottom of the pipelines will range from 51 inches to 72 inches minimum dependent upon the diameter of the pipe installed. This depth of cover significantly reduces the risk of multiple underlying ice lenses forming beneath the pipeline and resulting frost heave. As shown by the USDA monitoring station data, the historical data for each of the five monitoring stations across the project footprint shows that the soil temperatures necessary to create frost to a depth greater than 51 inches is not probable. At the Mandan location, which is the most likely to see the greatest frost depths, the soil temperature nears the freezing point at 40 inches of soil depth over some of the years reviewed but not for extended durations that would indicate frost penetration beyond 51 inches.

5.3 Construction Practices and Operating History

While vintage pipelines operating in similar areas and conditions have a proven track record of reliability, the implementation of modern pipeline materials, welding practice and installation procedures only further increase the starting integrity of modern pipeline systems. SCS pipe materials all meet specific ductility requirements, and the installed pipeline welds will be fully evaluated by non-destructive testing. Due to the advancement of material testing and construction requirements, the ability of a pipeline to withstand deformation (plastic strain) due to external loads such as frost heave is increased due to better ductility of the pipe material and better welding practices.

6 Conclusion

For frost heave to occur three conditions must be met. The soil needs to contain a significant amount of silt, groundwater needs to be present, and the depth of freezing must occur below the pipe. Due to the depth of

⁴ <https://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm>

⁵ Professional Service Industries, Inc., Geotechnical Data Report, PSI Project No. 599103-1



burial alone, the likelihood of frost heave on any buried portion of the SCS system is highly unlikely. Where conditions may allow frost to reach beyond 51 inches, the likelihood of the soil being susceptible to frost heave (silt) is also unlikely given that frost penetration occurs more slowly with fine-grained soils of high moisture content.

Water table depths vary from location to location across the pipeline from over a hundred feet below the pipe to depths above assumed trench bottom. The likelihood of frost depths significantly beyond 51 inches with a water table slightly below is probabilistically small. In a situation where frost could reach beyond 51 inches, the amount of movement expected at such a depth would be very small given the relation to the thickness of any underlying ice lenses and the unconstrained expansion that would occur above.

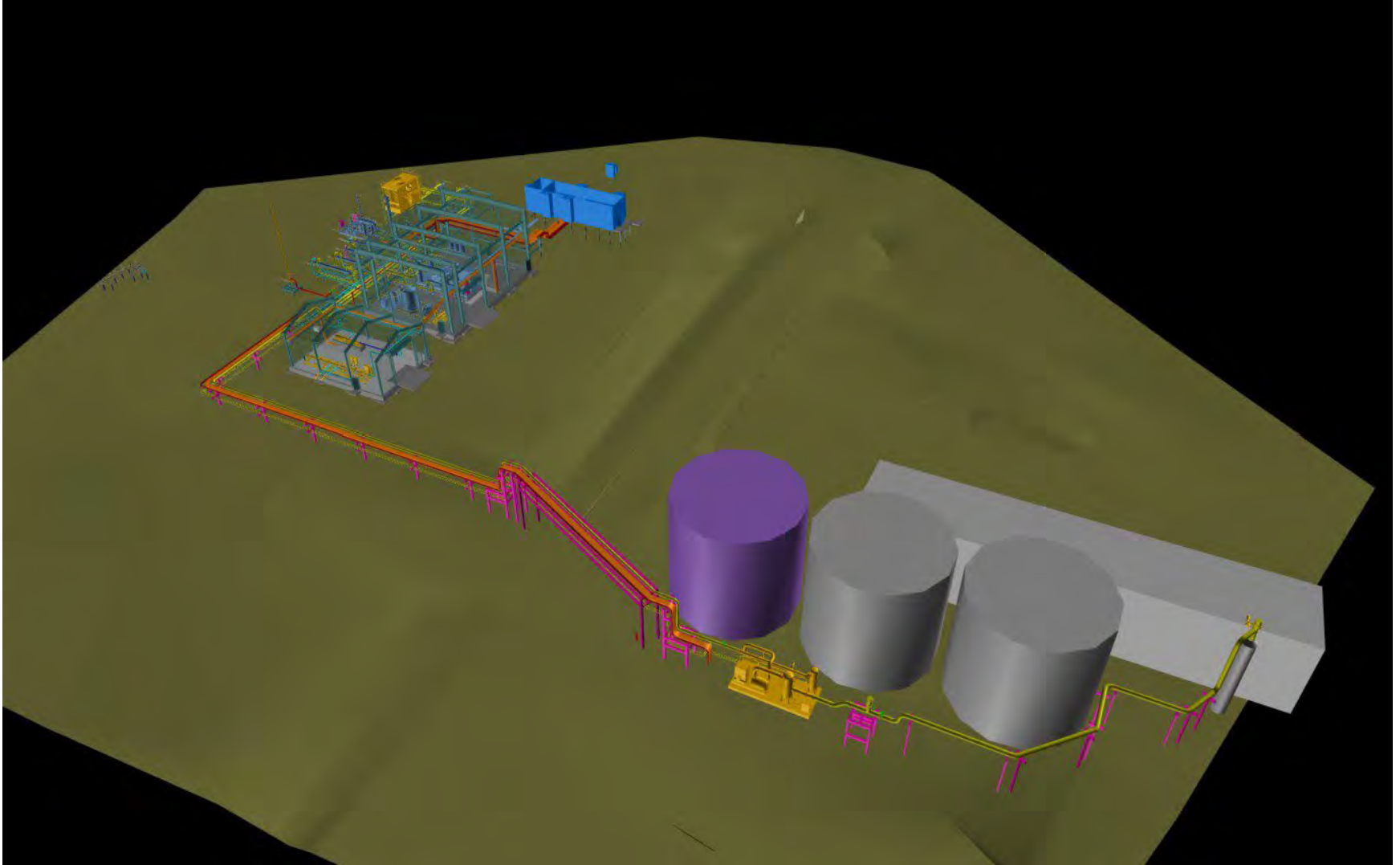
Today's materials and construction practices have evolved including the introduction of more ductile steels allowing greater allowable deformation (strain) due to external loads (frost heave) thus further preventing any likelihood of frost heave creating a pipeline integrity issue.



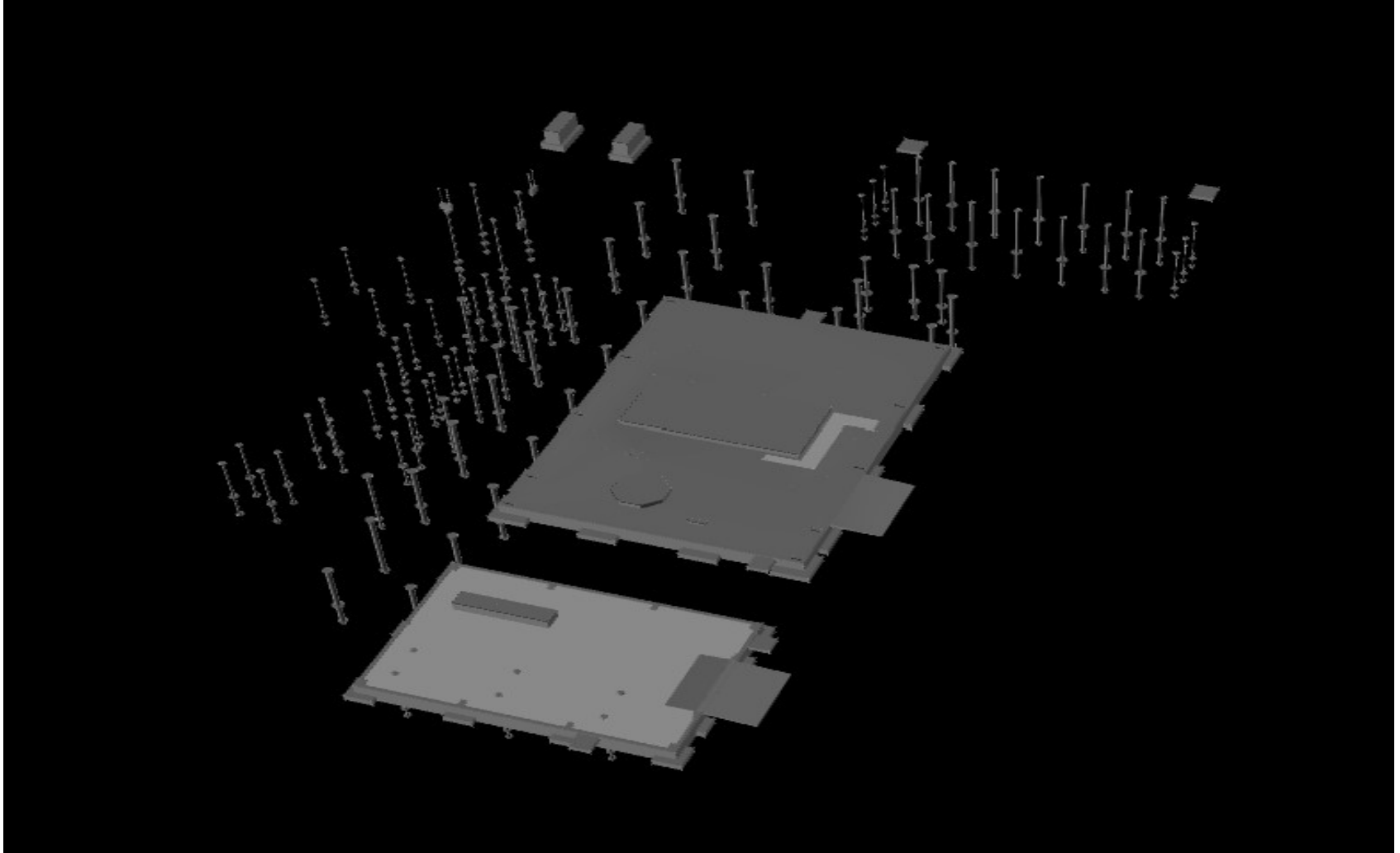
SUMMIT CARBON
SOLUTIONS

Otter Tail Construction Plan
November 2023

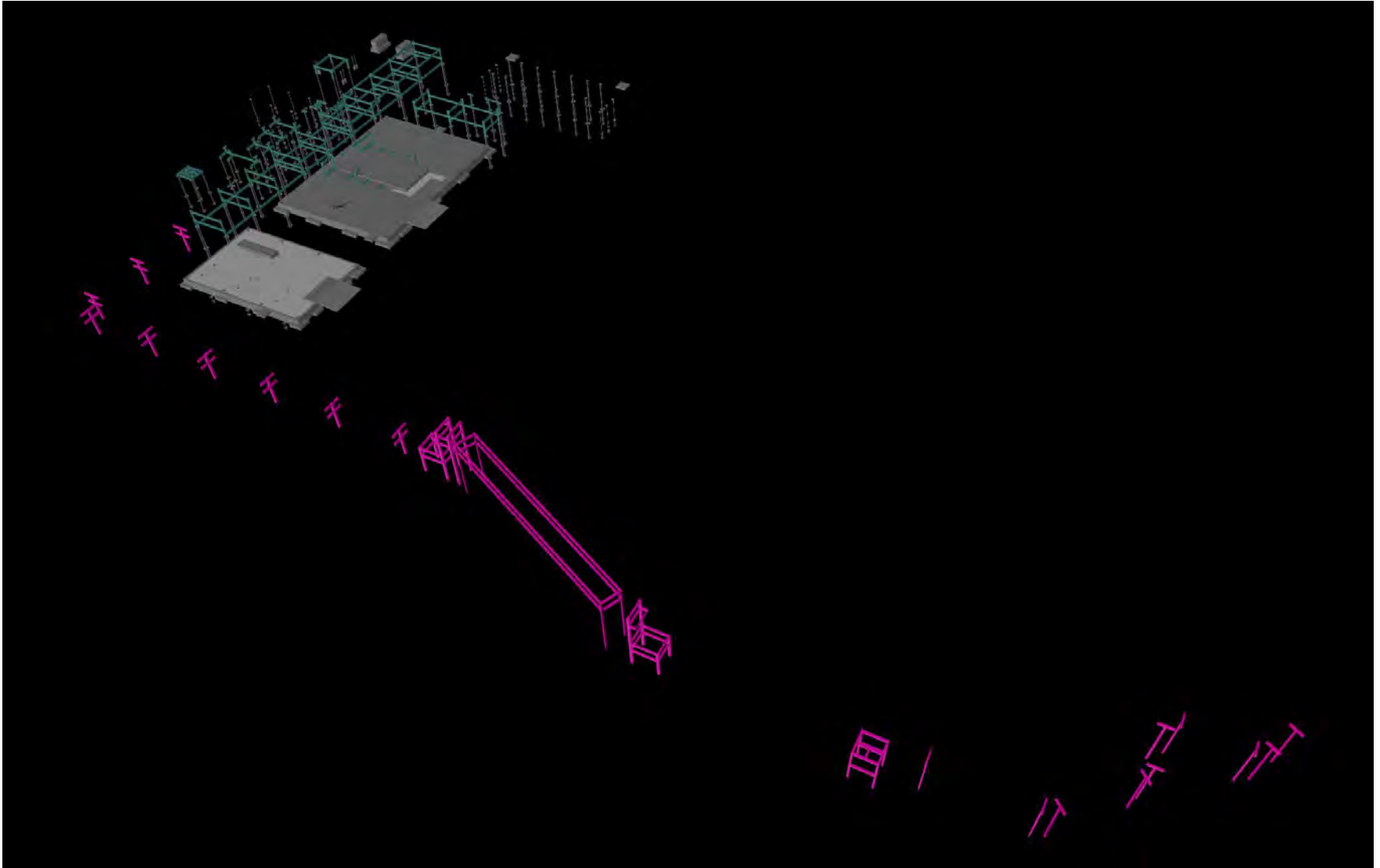
Overall Capture Design



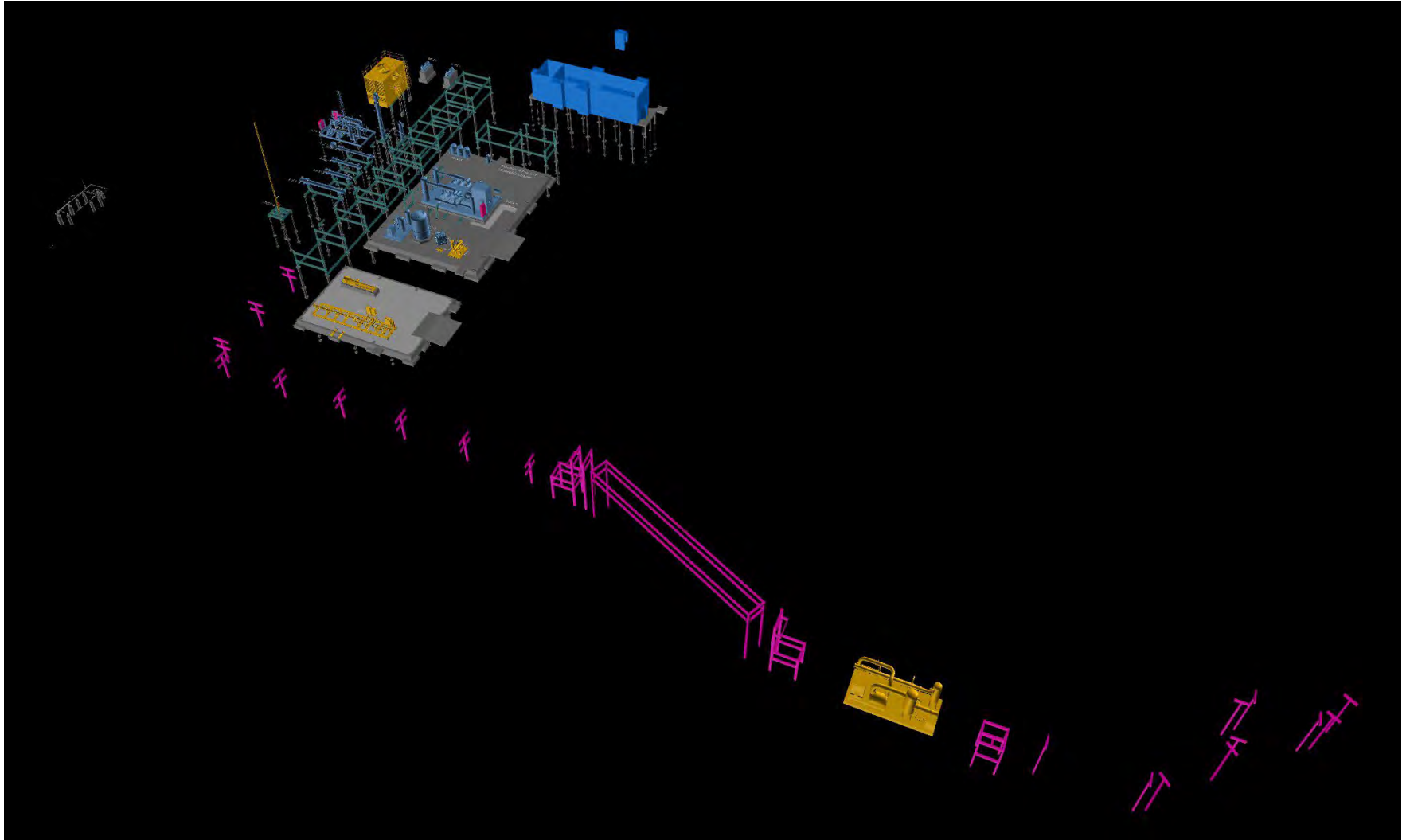
Concrete and Piling Work Plan



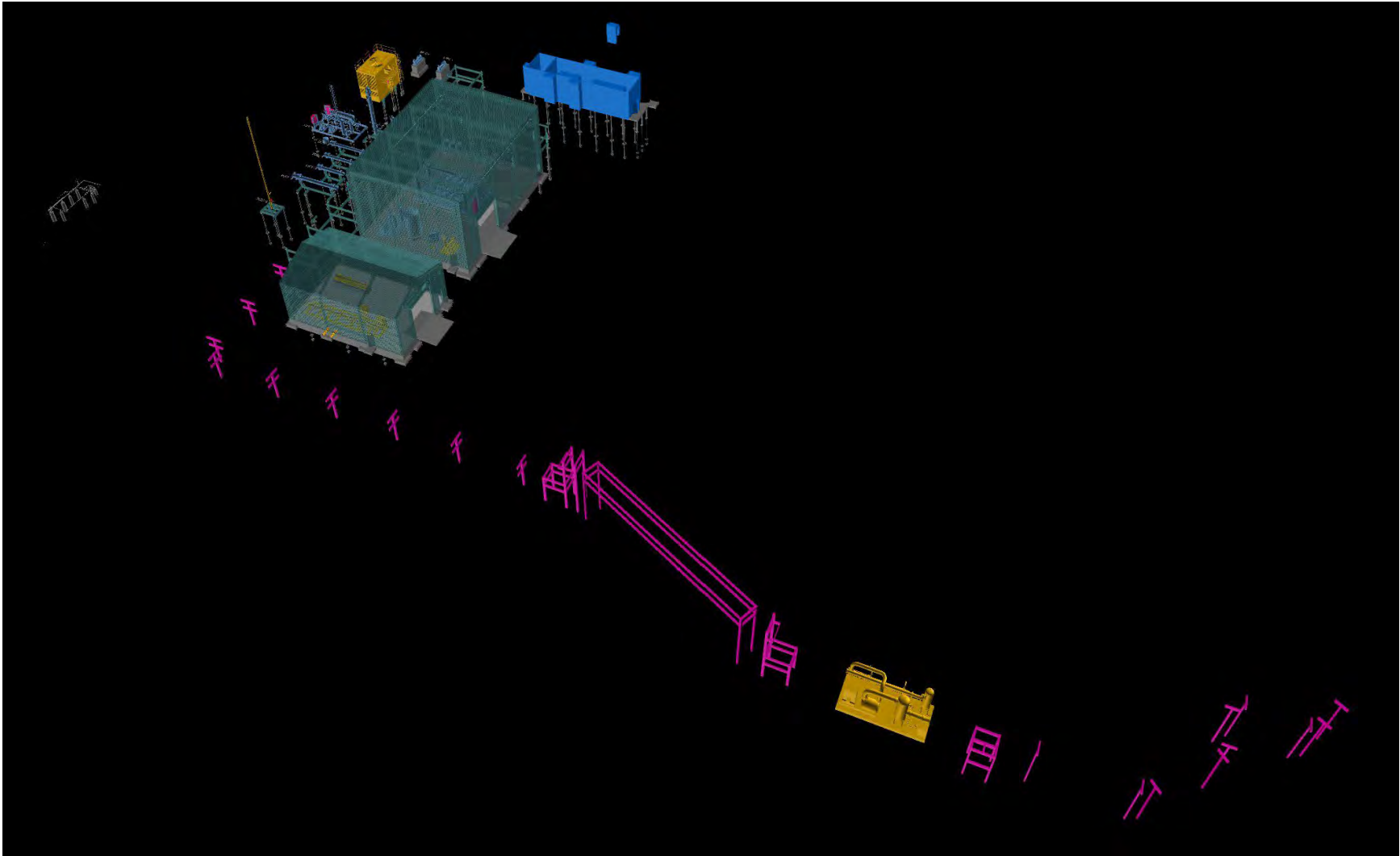
Structural Work Plan



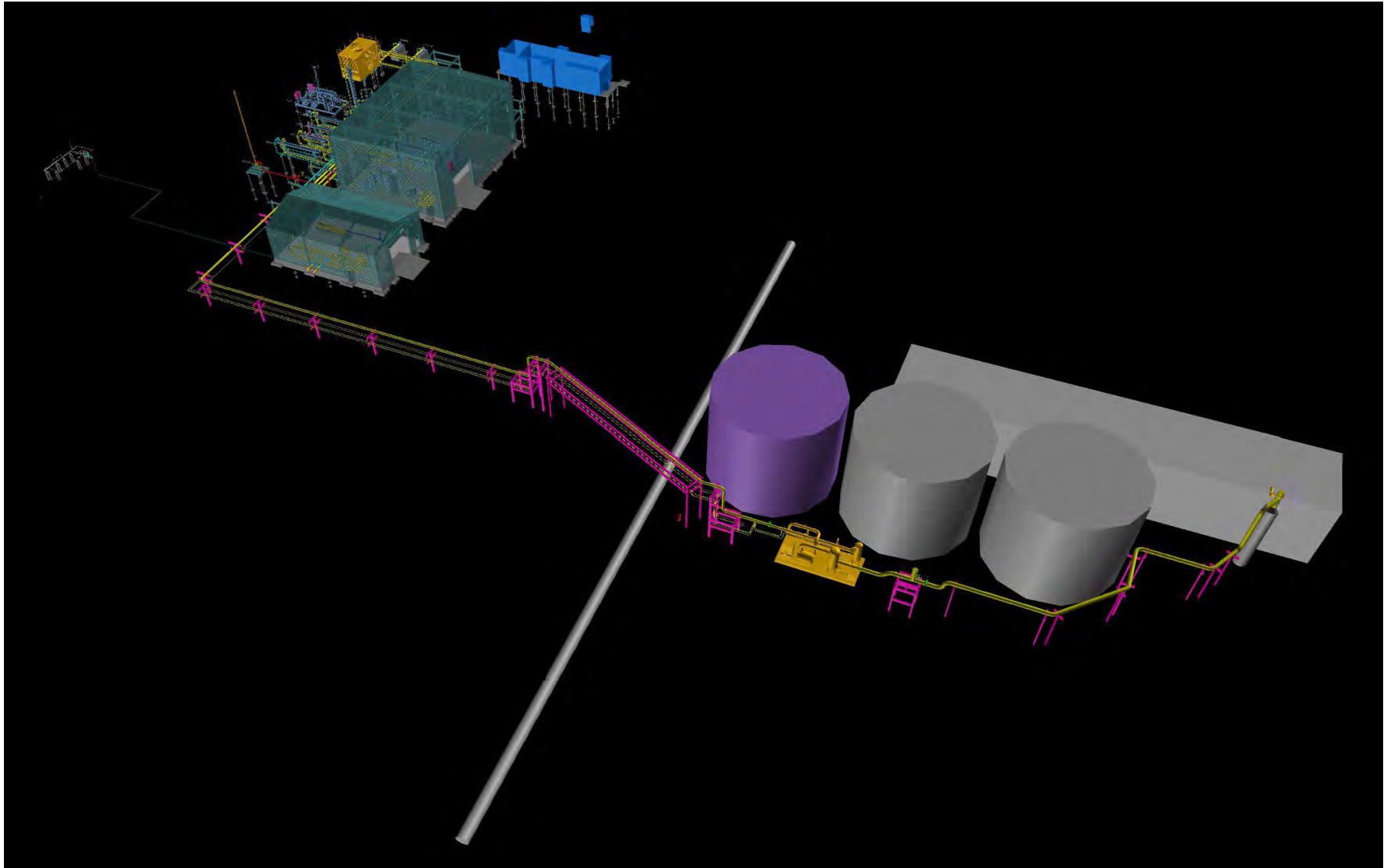
Equipment Work Plan



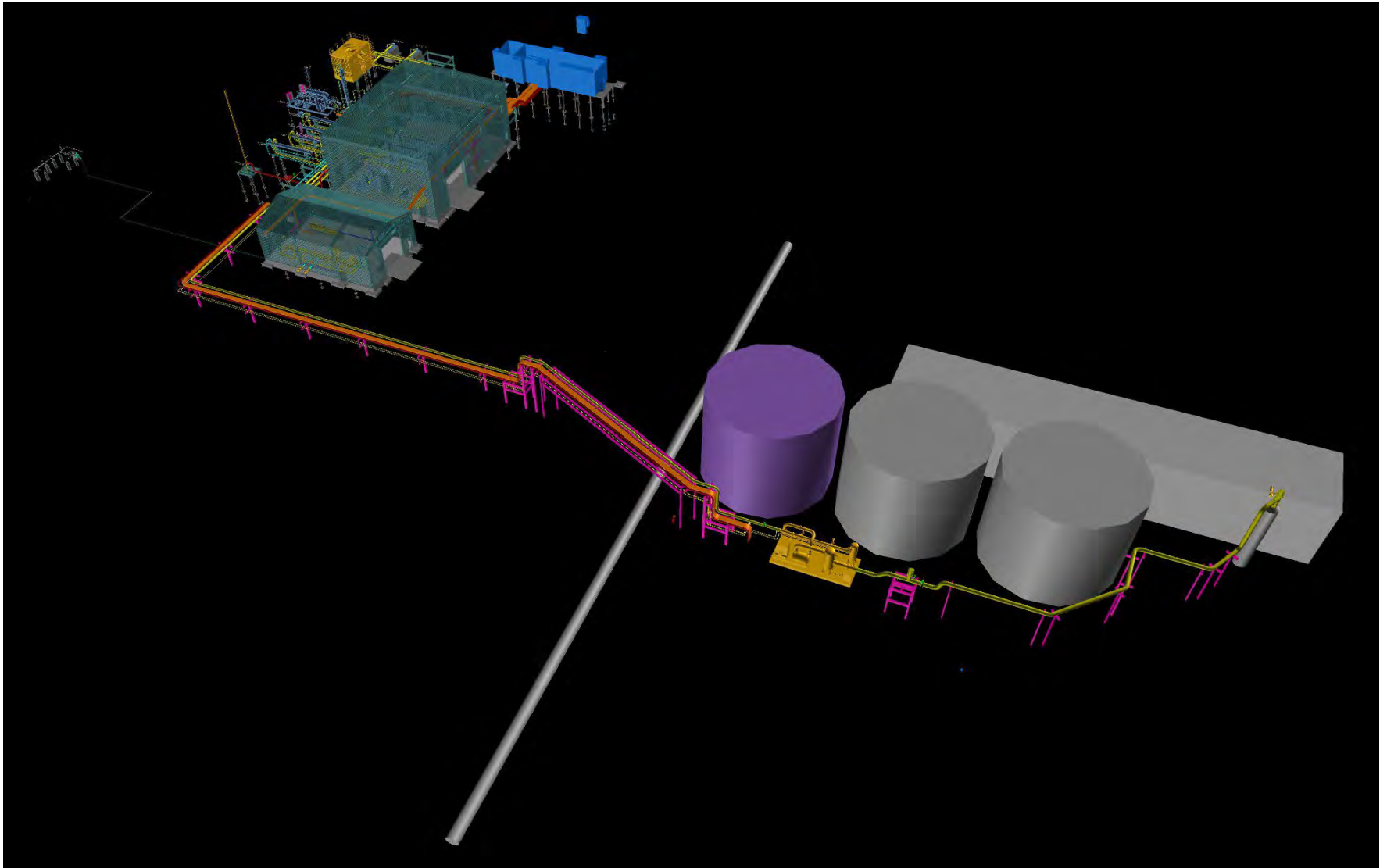
Buildings Work Plan



Piping Work Plan



Electrical Work Plan





SUMMIT CARBON
SOLUTIONS

See Appendix F
Winter Construction Plan

See Appendix D

Minnesota Environmental Construction Plan

Detailed response to MPCA’s 11 Inconsistencies in Table 12-2 (Waterbody Crossings) in Scoping EAW and Appendix F (Impaired Waterbodies and Receiving Waterbodies within One Mile) from May 16, 2023 comment letter:

1. Several waterbodies are indicated as intersecting the centerline in Appendix F but are not indicated with proposed crossing methods in Table 12-2. Please clarify why all waterbodies intersected by the project centerline are not included on Table 12-2.

The data presented in Table 12-2 was intended to show waterbodies crossed by the Project centerline using Summit’s surveyed or desktop waterbody locations. Therefore, the mileposts (MPs) in this table were/are true representations of crossing locations.

The EAW Appendix F - Receiving Waters table was intended to be a “list of receiving waterbodies within 1 mile of the Project route that could potentially receive runoff.” The EAW Appendix F – Impaired Waters table was intended to show “waterbodies that are included on the Impaired Waters list and are within 1 mile of the Project.”

Because Summit did not complete field delineations or a desktop waterbody inventory for all features within a mile on either side of the Project (a 2-mile-wide area) and did not want to use multiple datasets, Summit relied wholly on MDNR’s Hydrography dataset for Appendix F – Receiving Waters, and on the MPCA’s Impaired Waters dataset for Appendix F – Impaired Waters, which are not the same as the field or desktop data used in Table 12-2 and will not return the same locational results in all instances. Also, because the Appendix F tables were not intended to be centerline analyses (as was done in Table 12-2) and the intent was to indicate waterbodies within a large 2-mile-wide area around the centerline, the mileposts in Appendix F did not always show points of crossing (as were shown in Table 12-2) because some waterbodies within the area of analysis did not cross the pipeline, and some which did meandered within the 2-mile-wide area. In these cases, a general MP location (nearest location within the 2-mile wide area) was given.

To clarify the data presented, Summit has compared Table 12-2 (included below as “Revised Table 12-2”) to the original Appendix F tables.

- The included “Revised Filtered Appendix F – MDNR Hydrography Receiving Waters”, below, presents these receiving waters filtered to only include features crossed by the Project, with updated MPs where the feature crosses the centerline using field or desktop location, not the MDNR Hydrography line location (similar to how the data is presented in Table 12-2). Refer to the Revised Filtered Appendix F – MDNR Hydrography Receiving Waters table, below, for the requested clarification.
- The Revised Appendix F – Impaired Waters table was also updated to include MPs where the feature crosses the centerline using field or desktop location, not the MPCA Impaired Waters line location (similar to how the data is presented in Table 12-2). Refer to the Revised Appendix F – Impaired Waters table, below, for the requested clarification.

Note that on May 19, 2023, the USACE St. Paul District reviewed Summit’s wetland and waterbody survey data and provided a list of specific locations state-wide where potential wet signatures appeared to be present and asked that Summit review those locations. Along this Project, one additional historical wetland was flagged as needing to be added to the wetland crossing table. Where applicable, USACE

review information is included in the Revised Filtered Appendix F – MDNR Hydrography Receiving Waters table.

2. Mile post 14.3 with identification # MAJ-09022827 is an unnamed intermittent stream with MPCA Assessment Unit Identifier (AUID) 09020103-626 and which should also be included on Table 12-2.

The MDNR Hydrography feature at MP 14.3 was surveyed on 6/1/2022 and delineated as a wetland (ID: W1016WI002), not a waterbody/intermittent stream due to the lack of a defined ordinary high-water mark. However, to address the comment from MPCA, Summit included footnote “d” in the Revised Table 12-2.

3. Two waterbodies at mile posts 4.2 and 4.7 are indicated as not intersecting the centerline in Appendix F but these mile posts are indicated as open cut crossings in Table 12-2.

To clarify the data in response to Inquiry No. 1, above, the mileposts in the included Revised Filtered Appendix F – MDNR Hydrography Receiving Waters table were updated to present the milepost where the feature crosses the centerline (similar to how the data is presented in Table 12-2).

4. Two waterbodies at mile posts 6.5 and 6.7 are indicated as not intersecting the centerline in Appendix F with no indication of a crossing at mile post 6.6, but mile post 6.6 is indicated as an open cut crossing on Table 12-2.

To clarify the data in response to Inquiry No. 1, above, the mileposts in the included Revised Filtered Appendix F – MDNR Hydrography Receiving Waters table were updated to present the milepost where the feature crosses the centerline (similar to how the data is presented in Table 12-2). Also, the feature referenced at the Inquiry as located at MP 6.6 is now located at the latest Project milepost 6.5.

5. Appendix F lists an intermittent stream at mile post 7.9 as not intersecting the centerline with the next listed crossing at mile post 9.0, while Table 12-2 lists mile post 8.0 as an ephemeral stream with an open cut crossing.

The data presented in Table 12-2 is field and/or desktop verified data and won’t always align with the location of a feature within the MDNR Hydrography Dataset. Summit confirmed the presence of the unnamed ephemeral stream referenced in this Inquiry as located at MP 8.0 is correct. Note that this is now located at the latest Project milepost 7.9.

6. Milepost 10.8 (#MAJ-09023556) and MP 10.9 (#MAJ-09022356) are both separate reaches of Judicial Ditch 2. The “reaches” are intersected by 190th street and now the project centerline. South of the centerline is the impaired reach AUID 09020103-764 from 190th Street to the Otter Tail River. Table 12-2 should include the *E. coli*, DO, and FishesBio impairments for Judicial Ditch 2. Appendix F, impaired waterbodies within 1 mile, should be corrected to include the AQL affected use impairments of Dissolved Oxygen and FishesBio as category 5 with TMDLs required, and the *E. coli* impairment is category 4A with a TMDL completed and approved.

As stated by MPCA, the centerline crosses north of the reach not presently designated as impaired. However, as requested by MPCA, Summit has made note of the adjacent impairment in the Revised Table

12-2 with a note as footnote “c,” and has included this information in a Revised Appendix F – Impaired Waters table with a note as footnote “b”, below.

7. Milepost 17.2 is indicated as not intersecting the centerline in Appendix F, but mile post 17.2 is indicated as an open cut crossing on Table 12-2.

To clarify the data in response to Inquiry No. 1, above, the mileposts in the included Revised Filtered Appendix F – Receiving Waters table were updated to include the milepost where the feature crosses the centerline (similar to how the data is presented in Table 12-2).

8. The Otter Tail River is indicated at three different mile posts in three different tables: MP 19.3 in the impaired waterbodies table, MP 19.4 in the receiving waterbodies table, and MP 19.5 in Table 12-2.

The receiving waterbodies table and impaired waterbodies tables used different datasets for their analysis. The surveyed centerline crossing of the Otter Tail River is at MP 19.5. The mileposts in the Revised Filtered Appendix F – MDNR Hydrography Receiving Waters table and the Revised Appendix F – Impaired Waters table (where applicable) were updated to include the milepost where the feature crosses the centerline (similar to how the data is presented in Table 12-2).

9. Approximate milepost 23.3 is start of County Ditch 35 (AUIDs 09020101-531/-532) running adjacent to proposed centerline. Please describe how the two will be co-located. Please clarify if the County Ditch is on one side of the road and the project centerline is on the other side of the road.

County Ditch 35 is located along the north edge of Summit’s construction right-of-way. As required by the Minnesota NPDES/SDS Construction Stormwater General Permit (MNR100001), Summit will install and maintain sediment controls immediately after clearing and prior to initial ground disturbance where the Project is co-located with the county ditch. The county ditch is located adjacent to the non-working side of the construction right-of-way (25 feet from the Project centerline). Note that this county ditch was surveyed on 5/9/2022 and delineated as a wetland (ID: W1019WI002), not a waterbody/intermittent drainage ditch due to the lack of a defined ordinary high-water mark.

10. Milepost 26.1 (Unnamed Creek (Doran Slough)) in Appendix F, impaired waterbodies, should include the AQL affected use impairment Dissolved Oxygen as category 5 with a TMDL required, and the *E. coli* impairment is category 4A with a TMDL completed and approved. Table 12-2 has this crossing as milepost 25.0 instead of 26.1.

The impairment data in the Revised Appendix F – Impaired Waters table has been updated accordingly. As noted above, where applicable, the mileposts in the Revised Appendix F – Impaired Waters table were updated to include the milepost where the feature crosses the centerline (similar to how the data is presented in Table 12-2).

11. Milepost 28.1 (Bois de Sioux River) in Appendix F, impaired waterbodies, should show all listed impairments as category 4A with a TMDL completed and approved, and should also include an AQR impairment of *E. coli* as category 5 with a TMDL required.

The requested updates have been made to the Revised Appendix F – Impaired Waters table.

Revised Table 12-2						
Waterbody Crossings						
County	Milepost ^d	Waterbody Name	Flow Regime	Agency Designation	303(d) Impairment ^a	Proposed Crossing Method
Otter Tail	1.9	Pelican River	Perennial	Public Water (H-026-081-012); 303(d) Impaired; Infested water (zebra mussel)	E. coli	HDD
Otter Tail	4.2	Unnamed Stream	Intermittent	--	--	Open Cut (Nonflowing/Flowing)
Otter Tail	4.7	Unnamed Stream	Intermittent	--	--	Open Cut (Nonflowing/Flowing)
Otter Tail	5.0	Unnamed Stream	Intermittent	--	--	Open Cut (Nonflowing/Flowing)
Otter Tail	5.5^b	Unnamed Stream	Intermittent	—	—	Open Cut (Nonflowing/Flowing)
Otter Tail	6.5 ^e	Unnamed Stream	Perennial	--	--	Open Cut (Nonflowing/Flowing)
Otter Tail	7.9 ^e	Unnamed Stream	Ephemeral	--	--	Open Cut (Nonflowing/Flowing)
Otter Tail	10.8	Judicial Ditch L 2	Perennial	County Ditch; 303 (d) Impaired ^c	DO; E.coli; FishesBio	Open Cut (Nonflowing/Flowing)
Wilkin	17.2	Unnamed Stream	Intermittent	--	--	Open Cut (Nonflowing/Flowing)
Wilkin	19.5	Otter Tail River	Perennial	Public Water (H-026-081); 303(d) Impaired; Infested water (zebra mussel); Section 408, State Water Trail	InvertBio; T	HDD
Wilkin	25.0	Unnamed Creek	Intermittent	Public Water (H-026-082); 303(d) Impaired	DO; E. coli	Bore
Wilkin	28.1	Bois de Sioux River	Perennial	Public Water (H-026); 303(d) Impaired; Section 10	DO; E. coli; FishesBio; Hg-F; Nutrients; T	HDD
^a Impairment: DO – dissolved oxygen; E. coli – Escherichia coli; FishesBio – fish bioassessments; Hg-F: mercury in fish tissue; InvertBio – benthic macroinvertebrate bioassessments; Nutrients – nutrients; T – Turbidity ^b Summit surveyed this area in 2023. There was no evidence of a waterbody at this location. Therefore, this feature, once considered a “desktop” waterbody, will no longer be considered as a waterbody feature. Refer to Summit’s response to Supplemental Inquiry #2. ^c As stated by the MPCA on page 3 of its May 16, 2023 letter, “Milepost 10.8 (#MAJ-09023556) and MP 10.9 (#MAJ-09022356) are both separate reaches of Judicial Ditch 2. The “reaches” are intersected by 190th Street and now the project centerline. South of the centerline is the impaired reach AUID 09020103-764 from 190th Street to the Otter Tail River.” The centerline crosses north of the reach not presently designated as impaired. However, as requested by MPCA, Summit has included the adjacent impairment. ^d MPCA Assessment Unit Identifier (AUID) 09020103-626 was noted by MPCA to occur at MP 14.3. This feature was delineated in the field as a wetland and was listed in Appendix 10 (Wetland Crossing Table) of the Route Permit Application. It was treated as a wetland in the USACE Section 404 application. ^e The feature presented at MP 6.6 in the Route Permit application is now located closer to Project MP 6.5. The feature presented at MP 8.0 in the Route Permit application is now located closer to Project MP 7.9. Note: Revisions compared to the Scoping EAW Table 12-2 are in bold.						

Revised Filtered Appendix F – MDNR Hydrography Receiving Waters MDNR Hydrography Receiving Waters within 1 Mile of the Project (filtered to only include MDNR Hydrography features crossed by the Project)				
County	MDNR Unique ID or Kittle No.	MDNR Basin or Kittle Name	Crossing Milepost ^a	Notes
Otter Tail	MAJ-09023305	Stream (Intermittent)	1.6	Summit surveyed this area in 2022. There was no evidence of a waterbody. Furthermore, USACE did not flag this area in its review
Otter Tail	H-026-081-012	Pelican River	1.9	This waterbody is listed in Table 12-2
Otter Tail	MAJ-09023534	Stream (Intermittent)	3.6	Summit surveyed this area in 2021. There was no evidence of a waterbody. Furthermore, USACE did not flag this area in its review
Otter Tail	MAJ-09023534	Drainage Ditch (Intermittent)	4.2 and 4.7	This feature intersects the Project centerline twice (MP 4.2 and 4.7). Both crossings of this waterbody are listed in Table 12-2
Otter Tail	MAJ-09022525	Stream (Intermittent)	5.0 and 5.3	The MDNR Hydrography Dataset feature intersects the Project centerline twice (MP 5.0 and 5.3). Summit surveyed this area in 2023. Waterbody signatures were documented during survey at MP 5.0. This waterbody is listed in Table 12-2. Wetland signatures were documented during survey at MP 5.3 (see Appendix 10 (Wetland Crossing Table) of the Route Permit).
Otter Tail	MAJ-09023593	Stream (Intermittent)	5.7	Wetland signatures were documented during survey (see Appendix 10 (Wetland Crossing Table) of the Route Permit Application)
Otter Tail	MAJ-09023571	Stream (Intermittent)	6.5^b	This waterbody is listed in Table 12-2
Otter Tail	MAJ-09023619	Stream (Intermittent)	9.8	Summit surveyed this area in 2022. There was no evidence of a waterbody. Furthermore, USACE did not flag this area in its review
Otter Tail	MAJ-09023556	Drainage Ditch (Intermittent)	10.8	This waterbody is listed in Table 12-2
Wilkin	MAJ-09022982	Drainage Ditch (Intermittent)	12.8	Wetland signatures were documented during survey (see Appendix 10 (Wetland Crossing Table) of the Route Permit Application)
Wilkin	MAJ-09022827	Drainage Ditch (Intermittent)	14.3	Wetland signatures were documented during survey (see Appendix 10 (Wetland Crossing Table) of the Route Permit Application)
Wilkin	MAJ-09022943	Stream (Intermittent)	15.3	Summit surveyed this area in 2022. There was no evidence of a waterbody. Furthermore, USACE did not flag this area in its review
Wilkin	MAJ-09022585	Drainage Ditch (Intermittent)	15.8	Summit surveyed this area in 2022. There was no evidence of a waterbody. Furthermore, USACE did not flag this area in its review

Revised Filtered Appendix F – MDNR Hydrography Receiving Waters MDNR Hydrography Receiving Waters within 1 Mile of the Project (filtered to only include MDNR Hydrography features crossed by the Project)				
County	MDNR Unique ID or Kittle No.	MDNR Basin or Kittle Name	Crossing Milepost ^a	Notes
Wilkin	MAJ-09022807	Drainage Ditch (Intermittent)	17.2	This waterbody is listed in Table 12-2
Wilkin	MAJ-09022834	Stream (Intermittent)	18.1	Summit surveyed this area in 2022. There was no evidence of a waterbody. Furthermore, USACE did not flag this area in its review
Wilkin	H-026-081	Otter Tail River	19.5	This waterbody is listed in Table 12-2
Wilkin	MAJ-0902439	Drainage Ditch (Intermittent)	22.8	Wetland signatures were documented during survey (see Appendix 10 (Wetland Crossing Table) of the Route Permit Application). The milepost in Appendix 10 is approximate as this wetland also runs parallel to the Project design.
Wilkin	MAJ-0902316	Drainage Ditch (Intermittent)	23.3	Wetland signatures were documented during survey (see Appendix 10 (Wetland Crossing Table) of the Route Permit Application). The milepost in Appendix 10 is approximate as this wetland also runs parallel to the Project design.
Wilkin	MAJ-0902388/ MAJ-0902329	Drainage Ditch (Intermittent)	23.5	Multiple MDNR Hydrography Dataset features run adjacent to the Project from MP 21.5 to MP 24.3. As stated by the MPCA on page 3 of its May 16, 2023 letter, approximate milepost 23.3 is start of County Ditch 35 (AUIDs 09020101-531/-532) running adjacent to the proposed centerline. The county ditch was surveyed in 2022 and delineated as a wetland, not a waterbody/intermittent drainage ditch due to the lack of a defined ordinary high-water mark. The Project doesn't cross the county ditch until MP 24.3 (refer to that MP crossing).
Wilkin	MAJ-0902461	Drainage Ditch (Intermittent)	23.8	Summit surveyed this area in 2022. There was no evidence of a waterbody. Furthermore, USACE did not flag this area in its review
Wilkin	MAJ-0902329/ MAJ-0902336	Drainage Ditch (Intermittent)	24.3	As stated by the MPCA on page 3 of its May 16, 2023 letter, approximate milepost 23.3 is start of County Ditch 35 (AUIDs 09020101-531/-532) running adjacent to the proposed centerline. Note that this segment of the county ditch was surveyed on 5/9/2022 and delineated as a wetland (ID: W1019WI002), not a waterbody/intermittent drainage ditch due to the lack of a defined ordinary high-water mark (see Appendix 10 (Wetland Crossing Table) of the Route Permit Application). The milepost in Appendix 10 is approximate as this wetland runs parallel to the Project design.
Wilkin	H-026-082	Unnamed Creek	25.0	This waterbody is listed in Table 12-2
Wilkin	H-026	Bois de Sioux River	28.1	This waterbody is listed in Table 12-2

Revised Filtered Appendix F – MDNR Hydrography Receiving Waters MDNR Hydrography Receiving Waters within 1 Mile of the Project (filtered to only include MDNR Hydrography features crossed by the Project)				
County	MDNR Unique ID or Kittle No.	MDNR Basin or Kittle Name	Crossing Milepost ^a	Notes
Source: https://gisdata.mn.gov/dataset/water-dnr-hydrography ^a Revisions compared to the Scoping EAW Appendix F are bold. Crossing mileposts have been updated to reflect where the feature crosses the Project centerline based on survey or desktop data. ^b The feature presented at MP 6.6 in the Route Permit application is now located closer to Project MP 6.5.				

Revised Appendix F - Impaired Waters Impaired Waters within 1 Mile of the Project									
County	Name	Reach Description	Use Classification	Category	Affected Use	Approved TMDL Plan	Impairments	Crosses Centerline (Y/N)	Milepost ^a
Otter Tail	Otter Tail River	Unnamed lk (56-0821-00) to Pelican R	1C, 2Bdg	4A	AQR	E.coli	E.coli	N	1.7
Otter Tail	Pelican River	Reed Cr to Otter Tail R	2Bg	4A	AQR	E.coli	E.coli	Y	1.9
Wilkin	Judicial Ditch 2	Unnamed ditch along 190th St to Otter Tail R	2Bg	4A 5	AQR AQL	E.coli N/A	E.coli; DO; FishesBio	Y ^b	10.8
Wilkin	Otter Tail River	JD 2 to Breckenridge Lk	1C, 2Bdg	4A	AQL	InvertBio; T	InvertBio; T	Y	19.5
Wilkin	Unnamed Creek (Doran Slough)	Headwaters to Bois de Sioux R	2Bg	4A 5	AQR AQL	E.coli Required	E.coli DO	Y	25.0
Wilkin	Bois de Sioux River	Rabbit R to Otter Tail R	2Bg	5 4A	AQR AQC,AQL	Required DO; FishesBio; Hg-F; Nutrients; T	E.coli DO; FishesBio; Hg-F; Nutrients; T	Y	28.1
Source: https://www.pca.state.mn.us/air-water-land-climate/minnesotas-impaired-waters-list ^a Revisions compared to the Scoping EAW Appendix F are bold. Crossing mileposts have been updated to reflect where the feature crosses the centerline based on survey or desktop data. ^b As stated by the MPCA on page 3 of its May 16, 2023 letter, "Milepost 10.8 (#MAJ-09023556) and MP 10.9 (#MAJ-09022356) are both separate reaches of Judicial Ditch 2. The "reaches" are intersected by 190th Street and now the project centerline. South of the centerline is the impaired reach AUID 09020103-764 from 190th Street to the Otter Tail River." The centerline crosses north of the reach not presently designated as impaired. However, as requested by MPCA, Summit has included the adjacent impairment.									



Minnesota Department of Natural Resources
Division of Ecological & Water Resources
500 Lafayette Road, Box 25
St. Paul, MN 55155-4025

August 23, 2023

Correspondence # MCE 2023-00306

Sarah Stai
Merjent, Inc.

RE: Natural Heritage Review of the proposed SCS – Otter Tail to Wilkin Project,
Otter Tail and Wilkin Counties

Dear Sarah Stai,

As requested, the [Minnesota Natural Heritage Information System](#) has been reviewed to determine if the proposed project has the potential to impact any rare species or other significant natural features. Based on the project details provided with the request, the following rare features may be impacted by the proposed project:

Ecologically Significant Areas

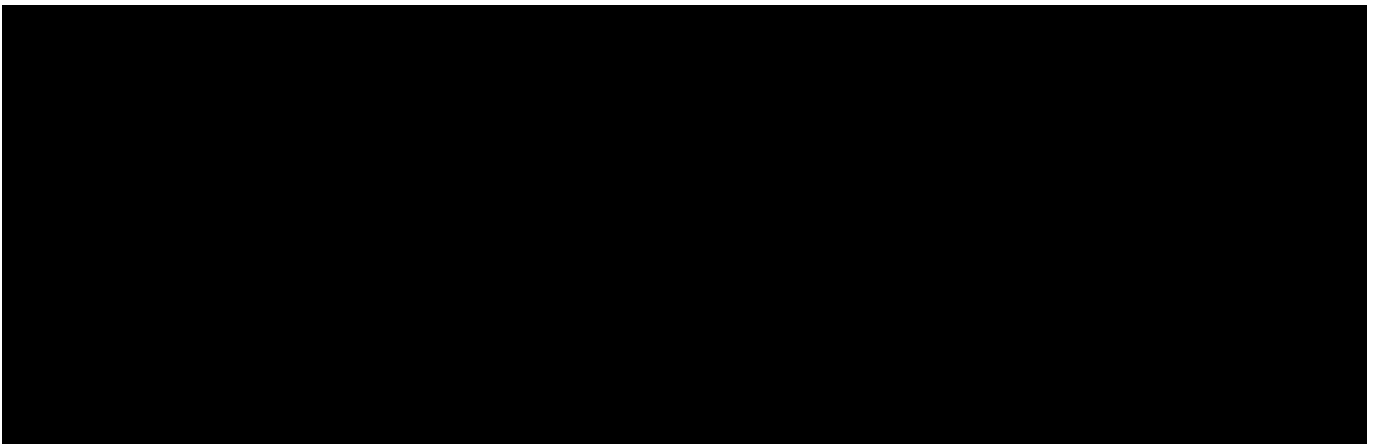
- The Minnesota Biological Survey (MBS) has identified two Sites of *Moderate* Biodiversity Significance adjacent to the proposed project. These are in T132N R44W Sections 8 and 9. Sites of Biodiversity Significance have varying levels of native biodiversity and are ranked based on the relative significance of this biodiversity at a statewide level. Sites ranked as *Moderate* contain occurrences of rare species and/or moderately disturbed native plant communities, and/or landscapes that have a strong potential for recovery. The MBS Site in Section 9 has a mapped example of UPn23b – Mesic Prairie (Northern), which has a state conservation rank of S2: Imperiled and a rare [REDACTED] a species of special concern that is often found in mesic prairies. More than 99% of the prairie that was present in the state before settlement has been destroyed, and more than one-third of Minnesota's endangered, threatened, and special concern species are now dependent on the remaining small fragments of Minnesota's prairie ecosystem. Therefore, we feel that all prairie remnants merit protection. We encourage you to consider project alternatives that would avoid or minimize disturbance to these ecologically significant areas.

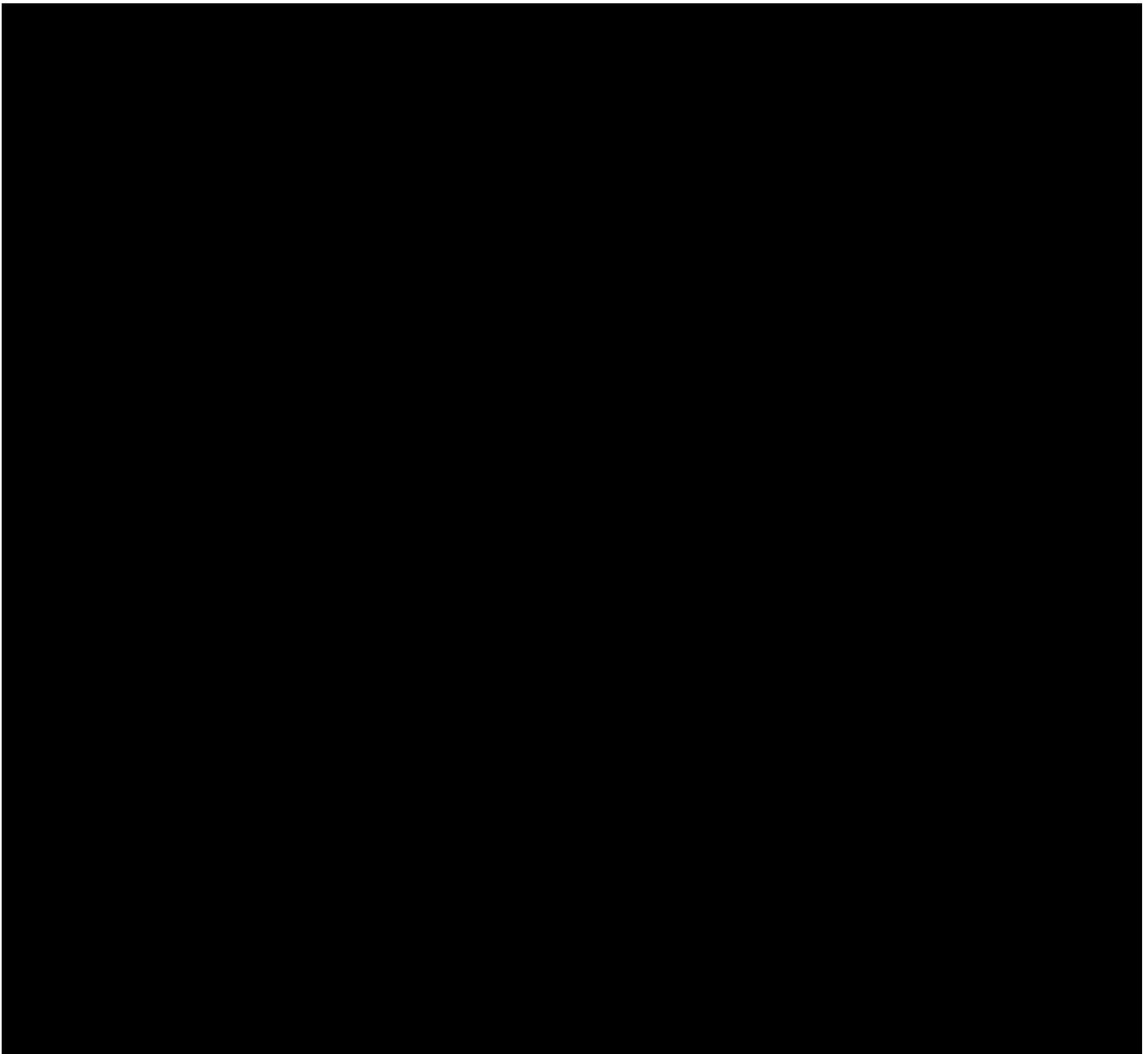
- As much as possible, operate within already-disturbed areas;
- Retain a buffer between proposed activities and the MBS Site;
- Minimize vehicular disturbance in the area (allow only vehicles necessary for the proposed work);
- Do not park equipment or stockpile supplies in the area;
- Do not place spoil within MBS Sites or other sensitive areas;
- Inspect and clean all equipment prior to bringing it to the site to prevent the introduction and spread of invasive species;
- If possible, conduct the work under frozen ground conditions;
- Use effective erosion prevention and sediment control measures;
- Revegetate disturbed soil with [native species suitable to the local habitat](#) as soon after construction as possible; and
- Use only weed-free mulches, topsoils, and seed mixes. Of particular concern is birdsfoot trefoil (*Lotus corniculatus*) and crown vetch (*Coronilla varia*), two invasive species that are sold commercially and are problematic in prairies and disturbed open areas, such as roadsides.

MBS Sites of Biodiversity Significance and DNR Native Plant Communities can be viewed using the [Minnesota Conservation Explorer](#) or their GIS shapefiles can be downloaded from the [MN Geospatial Commons](#). Please contact the [NH Review Team](#) if you need assistance accessing the data. Reference the [MBS Site Biodiversity Significance](#) and [Native Plant Community](#) websites for information on interpreting the data.

- Approximately the eastern half of the proposed project is within an area identified as *Prairie Corridor* in the [Minnesota Prairie Conservation Plan](#), a twenty-five year strategy for accelerating prairie conservation in the state. To meet the Plan's goals, areas within *Prairie Corridor* Areas will need to include restoration. As such, any efforts toward [prairie or grassland restoration](#) after project construction are encouraged.

State-listed Species





- Please visit the [DNR Rare Species Guide](#) for more information on the habitat use of these species and recommended measures to avoid or minimize impacts. For further assistance with these species, please contact the appropriate [DNR Regional Nongame Specialist](#) or [Regional Ecologist](#).

Federally Protected Species

- To ensure compliance with federal law, conduct a federal regulatory review using the U.S. Fish and Wildlife Service's (USFWS) online [Information for Planning and Consultation \(IPaC\) tool](#).

Environmental Review and Permitting

- Please include a copy of this letter and the MCE-generated Final Project Report in any state or local license or permit application. Please note that measures to avoid or minimize disturbance

to the above rare features may be included as restrictions or conditions in any required permits or licenses.

The Natural Heritage Information System (NHIS), a collection of databases that contains information about Minnesota's rare natural features, is maintained by the Division of Ecological and Water Resources, Department of Natural Resources. The NHIS is continually updated as new information becomes available, and is the most complete source of data on Minnesota's rare or otherwise significant species, native plant communities, and other natural features. However, the NHIS is not an exhaustive inventory and thus does not represent all of the occurrences of rare features within the state. Therefore, ecologically significant features for which we have no records may exist within the project area. If additional information becomes available regarding rare features in the vicinity of the project, further review may be necessary.

For environmental review purposes, the results of this Natural Heritage Review are valid for one year; the results are only valid for the project location and project description provided with the request. If project details change or the project has not occurred within one year, please resubmit the project for review within one year of initiating project activities.

The Natural Heritage Review does not constitute project approval by the Department of Natural Resources. Instead, it identifies issues regarding known occurrences of rare features and potential impacts to these rare features. Visit the [Natural Heritage Review website](#) for additional information regarding this process, survey guidance, and other related information. For information on the environmental review process or other natural resource concerns, you may contact your [DNR Regional Environmental Assessment Ecologist](#).

Thank you for consulting us on this matter and for your interest in preserving Minnesota's rare natural resources.

Sincerely,

A handwritten signature in black ink that reads "James Drake". The signature is written in a cursive, flowing style.

James Drake
Natural Heritage Review Specialist
James.F.Drake@state.mn.us

Cc: Owen Baird



SUMMIT CARBON
SOLUTIONS

May 19, 2023

Ms. Lisa Joyal
Endangered Species Review Coordinator
NHIS Data Distribution Coordinator
Division of Ecological and Water Resources
Minnesota Department of Natural Resources
500 Lafayette Road, Box 25
St. Paul, MN 55155

Subject: Summit Carbon Solutions Otter Tail to Wilkin Project
Review of NHIS and Sensitive Biological Resource Data and Request for Concurrence
Minnesota Conservation Explorer #2023-00306

Dear Ms. Joyal:

Summit Carbon Solutions (SCS) is proposing to build a new carbon capture, pipeline, and storage project referred to as the Midwest Carbon Express (MCE) Project. The MCE Project will capture and transport carbon dioxide (CO₂) from industrial facilities located across Minnesota, Iowa, Nebraska, North Dakota, and South Dakota and transport the CO₂ to a sequestration area in North Dakota, where the CO₂ will be safely and permanently stored. Once operational, the MCE Project will include approximately 2,000 miles of pipeline.

In Minnesota, as part of the larger MCE Project, SCS is proposing five pipeline laterals. One of these laterals is referred to as the Otter Tail to Wilkin Project (the Project, also referred to as lateral "MNL-321"). The Project will capture and transport CO₂ from the existing Green Plains Otter Tail Ethanol Plant near Fergus Falls, Minnesota, to the Minnesota and North Dakota border, where it will connect to SCS infrastructure in North Dakota. The Project includes construction of approximately 28.1 miles of 4-inch diameter carbon steel pipeline, a CO₂ capture facility located at the Green Plains Ethanol Plant, mainline valves, and access roads (Figure 1).

SCS submitted a Route Permit Application to the Minnesota Public Utilities Commission (MPUC) in September 2022 and will submit state permit applications later in 2023. SCS proposes to construct the Project between the third quarter of 2024 and the fourth quarter of 2024. Construction timing is contingent on receipt of all required permits and authorizations. Construction of the pipeline would take approximately 3 months.

SCS has contracted Merjent, Inc. (Merjent) to conduct environmental surveys and permitting related to the Project. SCS and Merjent first met with representatives of the Minnesota Department of Natural Resources (MDNR) regarding the larger MCE Project on September 30, 2021. SCS submitted a letter to MDNR on April 5, 2022, requesting consultation for Natural Heritage Information System (NHIS) data for the larger MCE Project as well as approval of a survey protocol for sensitive [REDACTED] species. MDNR responded to the letter on May 13, 2022, providing a response to SCS's NHIS review and approving SCS's



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survey protocol (Correspondence # MCE 2022-00341). SCS then completed sensitive [REDACTED] surveys in 2022 under the MDNR-approved protocol.

SCS is pursuing separate permitting paths for the Minnesota laterals due to distinct construction timelines and geographic areas. In early 2023, Merjent and SCS advised MDNR that they would be providing an updated Project footprint from which MDNR could update its review of the Project, as the Project design had changed since MDNR's initial review. The updated Project footprint was provided on May 19, 2023, and the same design was used in the analysis contained herein.

The purpose of this letter is to update Merjent's review, completed on behalf of SCS, of state-listed species¹ and other sensitive biological resources that may be found in the Project area. This letter includes a review of the MDNR data sources listed in Table 1. This review was also informed by sensitive [REDACTED] surveys completed by SCS in 2022 under the MDNR-approved survey protocol. SCS requests MDNR concurrence with the results of this review and input on the impact avoidance and minimization approach outlined in this letter.

Table 1 Sensitive Biological Resource Data Sources		
MDNR Data	Source	Content Date
NHIS	License Agreement 1066 (Merjent)	2/15/2022
Minnesota Biological Survey (MBS) Sites	Minnesota Geospatial Commons	2/16/2023
Native Plant Community (NPC)		2/10/2023
Railroad Rights-of-Way (RR ROW) Prairie		7/27/2017
Calcareous Fens	Minnesota Geospatial Commons and MDNR List of Known Calcareous Fens ^a	3/22/2023
^a http://files.dnr.state.mn.us/eco/wetlands/calcareous_fen_list.pdf - Last Update 10/2021		

Merjent also reviewed the Project in the Minnesota Conservation Explorer on April 14, 2023. The NHIS occurrences in Minnesota Conservation Explorer within 1 mile of the Project were consistent with the NHIS features listed in Table 2 below. The Project was assigned ID #2023-00306.

The Conservation Planning Report generated by Minnesota Conservation Explorer on the same date was consistent with the MBS site and NPCs summarized below in Tables 4 and 5. The report also noted the presence of two Minnesota Prairie Conservation Plan areas within 330 feet of the Project. Regarding other ecologically sensitive areas within the automated search distances, there were no MDNR Old Growth Stands or Lakes of Biological Significance within 330 feet, no Important Bird Areas within 1 mile, and no Calcareous Fens within 5 miles. According to the U.S. Fish and Wildlife Service Regulatory Layers section of the report, there were no Rusty Patched Bumblebee High Potential Zones within the search area.

Project Construction and Operations

The width of the construction workspace will range from 25 to 100 feet wide. Generally, a 100-foot-wide construction workspace will be used when crossing uplands, and a 75-foot-wide construction workspace will be used when crossing wetlands and waterbodies, plus additional temporary workspace (ATWS) as

¹ The status of state-listed species is based on http://files.dnr.state.mn.us/natural_resources/ets/endlist.pdf, dated August 19, 2013.

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needed. The construction workspace will be further reduced to 50 feet wide at horizontal directional drill (HDD) or bore crossings of waterbodies, roads, and railroads if a travel lane is not needed across the feature. For HDDs and bores of waterbodies where there will not be a travel lane within the right-of-way (ROW) (i.e., use of a bridge), there will be no clearing over the HDD path. SCS may trim vegetation using hand tools where necessary to access a water source to withdraw water for HDD operations and/or hydrostatic testing of the pipeline and/or to place the HDD guidewires. Temporary access roads will be used to access the construction workspace from adjacent roads.

Following construction, the permanent ROW will be 25-50 feet wide, centered on the pipeline, and will be wholly contained within the construction workspace. SCS will maintain permanent access roads to access valve sites. During operations, SCS will maintain an herbaceous corridor within the permanent ROW along the pipeline by removing woody shrubs and trimming branches that obscure visual inspection of the pipeline approximately every 3 to 5 years. Adjacent to waterbodies, post-construction vegetation maintenance will be limited to promote the growth of the riparian buffer. Only vegetation within a 10-foot-wide corridor centered over the pipeline will be maintained in an herbaceous state. Vegetation between HDD or bore entry and exit points where there is no travel lane will not be routinely cleared or mowed.

Review of NHIS and Sensitive Biological Resource Data

The next several paragraphs and tables summarize the following five components of the sensitive resources review.

- 1) The NHIS records within 1 mile on either side of the construction footprint (i.e., the construction workspace [including ATWS] and access roads) are listed in Table 2.
- 2) The results of 2022 Project-specific surveys for state-listed [REDACTED] are provided in Table 3.
- 3) The MBS sites, NPCs, and RR ROW Prairies within 330 feet on either side of the construction footprint are in Tables 4, 5, and 6, respectively.
- 4) The results of review of calcareous fens within 5 miles of the construction footprint are stated.
- 5) The Minnesota Prairie Conservation Plan areas are addressed in the last paragraph before the *Impact Avoidance and Minimization Approach* section of this letter.

Following the summary of the data review is an outline of SCS's approach for avoiding and minimizing Project construction impacts on sensitive features. SCS requests MDNR concurrence with the results of this review and the impact avoidance and minimization approaches outlined in this letter.

1) NHIS Review

There are NHIS records for [REDACTED] species within 1 mile of the construction footprint. The species are listed in Table 2, in order by the nearest milepost (MP) for each species.



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Table 2 NHIS Records of State-listed Species Within 1 Mile of the Project			
Nearest MP	MN Species State Status County (Last Observed Year) ^a	Location Relative to Project	Potential for Impact
[REDACTED]	[REDACTED]	[REDACTED]	Avoided
	Special Concern Otter Tail County (2017)		Avoided
			Avoided
			Avoided
			Avoided
			Avoided
			Avoided
	[REDACTED]		Avoided
	Threatened [REDACTED] Otter Tail County (1991) [REDACTED] Wilkin County (2004)		Avoided
	[REDACTED]		Avoided
	Special Concern Otter Tail County (2000)		Avoided
			Avoided
	[REDACTED] Special Concern Otter Tail County (2004)		Avoided
[REDACTED] Special Concern Wilkin County (2012)	Avoided		
^a For species with more than one NHIS occurrence within 1 mile, the most recent of the last observed years is given. Survey Implication: ^b The presence of [REDACTED] within 1 mile prompted the selection of three survey sites within the environmental survey area in 2022 (see Table 3). ^c No survey is planned because the [REDACTED] will be crossed with a trenchless method. ^d MDNR has not requested surveys for these species.			

2) 202 [REDACTED] Survey Findings

Merjen [REDACTED] surveyed for state-listed [REDACTED] using a protocol with which MDNR concurred on May 13, 2022. As part of the same effort [REDACTED] assessed potential habitat for the [REDACTED] a species for which SCS is consulting



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with the U.S. Fish and Wildlife Service because of the federal status of this species. Merjent submitted a report of the 2022 survey results to MDNR on February 28, 2023.

Table 3 Findings of 2022 State-listed [REDACTED] Surveys				
Nearest MP	Species or <u>Habitat</u>	Status	Result	Potential for Impact
[REDACTED]	Habitat only: [REDACTED]	Threatened (Federal), Endangered (State)	Wet prairie/sedge meadow and mesic prairie habitats were located [REDACTED] [REDACTED] habitats overlap the construction workspace. No individuals were observed.	Habitat Crossed
[REDACTED]	[REDACTED]	Special Concern (State)	[REDACTED]	Individuals Avoided

3) Sensitive Ecological Communities

There is one MBS site within 330 feet on either side of the construction footprint (Table 4), a portion of which is crossed by the construction footprint.

Table 4 MBS Sites Within 330 Feet of the Project					
Nearest MP	Site Name	Biodiversity Significance	MDNR Status	Location Relative to Project	Potential for Impact
7.1-7.9	Orwell 9	Moderate	Final	The MBS site occurs in two parts relative to the Project. MPs 7.1-7.5: The west side of the Project construction workspace is adjacent to the MBS site, with ~200 feet of overlap near MP 7.5 and otherwise 0-200 feet apart. MPs 7.5-7.9: The east side of the Project construction workspace is adjacent to the MBS site, ~40-90 feet apart.	Crossed in One Area

There are two NPCs of the same type within 330 feet on either side of the construction footprint (Table 5). This type is designated as Native Prairie and has a State Conservation Status Rank (s-rank) of S2. The NPCs are located within the portion of the MBS site listed in Table 4 that is not crossed by the construction footprint.

Table 5 NPCs Within 330 Feet of the Project				
Nearest MP	Related MBS Site	NPC Type	Location Relative to Project	Potential for Impact
7.5-7.9	Orwell 9	UPn23b - Mesic Prairie (Northern)	The NPC has the same boundaries as the Orwell 9 MBS site that is east of the Project construction workspace; therefore, it is ~40-90 feet away from the construction workspace.	Avoided



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There are two RR ROW Prairies within 330 feet of the Project (Table 6); both are crossed by the construction footprint.

Table 6 RR ROW Prairie Within 330 Feet of the Project				
Nearest MP	Related MBS Site	Railroad, Prairie Type, Quality (Year)	Location Relative to Project	Potential for Impact
3.3	None	Ottertail Valley Railroad, Wet Mesic Prairie, Fair (1998)	Crossed by the Project construction workspace.	Avoided with Construction Method
24.5	None	Burlington Northern and Santa Fe Railroad, Mesic Prairie, Good (1998)	Crossed by the Project construction workspace.	Avoided with Construction Method

4) Calcareous Fens

There are no Calcareous Fens within 5 miles of the construction footprint.

5) Minnesota Prairie Conservation Plan Areas

According to the Conservation Planning Report from Minnesota Conservation Explorer, the Prairie Conservation Plan is a 25-year strategy for accelerating prairie conservation in Minnesota. The Plan identifies Corridors in which to focus protection, enhancement, and restoration efforts for grassland and wetland habitat, with the goal of providing small “stepping stones” of habitat between larger areas of habitat called Corridor Complexes and Core Areas.

There were two Corridors overlapping the Project, one designated as Alexandria Moraine (approximate MPs 0.3-4.4) and the other as Agassiz Beach Ridges (approximate MPs 4.4-11.9). The Project generally crosses agricultural land where it overlaps the Alexandria Moraine Corridor, except for potential grassland and wetland habitat where the Project crosses the Pelican River at MP 1.9. The Project also crosses agricultural land where it overlaps the Agassiz Beach Ridges Corridor, except where the route is associated with the Orwell 9 MBS site (MPs 7.1-7.9).

Impact Avoidance and Minimization Approach

SCS will seek to avoid and minimize impacts from construction of the Project on state-listed species, the MBS site, its associated NPCs, and the RR ROW Prairies. The MBS site and the RR ROW Prairies represent the areas most likely to play a role in conservation efforts associated with the Minnesota Prairie Conservation Plan.

Generally, impacts on ecologically sensitive features will be avoided and minimized by clear marking in the field of construction workspace boundaries; the short duration of construction activities in any given area; restoration to pre-construction conditions after construction; and restriction of operational activities to the 50-foot-wide permanent easement.

More specific impact avoidance and minimization and measures are discussed below, first for the four locations where features identified above overlap the Project construction workspace [REDACTED] and then to address the remaining features (from Table 2).



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MP 1.9

Minnesota Prairie Conservation Plan Alexandria Moraine Corridor

There is potential grassland and wetland habitat where the Project intersects [REDACTED] within the Alexandria Moraine Corridor. SCS will cross the [REDACTED] with a trenchless HDD method, and construction vehicles will not travel between the HDD [REDACTED] exit points. Because any potential grassland and wetland habitat is located between the HDD entry and exit points, there will be no habitat impacts.

MP 3.3

Ottertail Valley Railroad

[REDACTED] CS will cross the railroad and the RR ROW Prairie habitat with a trenchless HDD method, and construction vehicles will not travel over the operating railroad and the adjacent habitat. Therefore, there will be no impacts on the RR ROW Prairie habitat.

MP [REDACTED]

Orwell 9 MBS site, NPC UPn23b [REDACTED]

[REDACTED] and Minnesota Prairie Conservation Plan Agassiz Beach Ridges Corridor

Between MPs [REDACTED] which is within the Agassiz Beach Ridges Corridor, the construction workspace overlaps the MBS site, including the [REDACTED] between MPs [REDACTED] and the NPC is within about 40 feet [REDACTED]

[REDACTED] The likelihood and magnitude of impact on these resources is limited. The overlap between the MBS site and the construction workspace extends only for approximately 200 feet [REDACTED]

The likelihood and magnitude of impact on the MBS site and [REDACTED] between MPs [REDACTED] is also limited because of best management practices (BMPs) to which SCS has committed in its Route Permit Application as well as in its Minnesota Environmental Construction Plan (Minnesota ECP). These BMPs, proposed for MBS sites and NPCs by MDNR in feedback provided on May 13, 2022, include the following.

- Do not park equipment, stockpile supplies, or place spoil within the MBS sites.
- Inspect and clean all equipment prior to bringing it to the site to prevent the introduction and spread of invasive species.
- Use effective erosion prevention and sediment control measures.
- Revegetate disturbed soil with native species suitable to the local habitat as soon after construction as possible.
- Use only weed-free mulches and seed mixes.



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Given the [REDACTED] in the vicinity of the Project, it is possible that individuals of this species could be impacted during construction, depending on the timing. Wildlife such as [REDACTED] may be temporarily displaced by the noise and disturbance of [REDACTED] co [REDACTED] o species mobility, the impacts would likely be small, highly localized, and short-term. Also, as requested by MDNR in the feedback provided on May 13, 2022, SCS has committed to the use of wildlife-friendly erosion and sediment control BMPs that contain biodegradable netting (Category 3N or 4N natural fibers) and to avoid the use of plastic mesh. Both BMPs help to minimize wildlife mortality resulting from the use of erosion and sediment control materials.

MP 24.5

Burlington Northern and Santa Fe Railroad

[REDACTED] CS will cross the railroad and the RR ROW Prairie habitat with a trenchless HDD method, and construction vehicles will not travel over the operating railroad and the adjacent habitat. Therefore, there will be no impacts on the RR ROW Prairie habitat.

Other Features From Table 2

The potential for impacts on these species is generally low due to the predominance of agricultural land within the construction footprint and thus the overall lack of suitable habitat for sensitive [REDACTED] species. Additionally, as discussed for [REDACTED] above, any impacts would depend on construction timing (and if they did occur, would likely be small, highly localized, and short-term) and would be limited by implementing the wildlife-friendly BMPs recommended by MDNR.

[REDACTED]

The potential for impacts on this species is also low, because SCS will use a trenchless HDD method to cross the [REDACTED] HDD entry and exit points will be placed away from the water's edge, and SCS will follow its Minnesota ECP and Stormwater Pollution Prevention Plan to prevent sediment from entering waterbodies and to prevent spills. SCS will restore these areas following construction as outlined in its Minnesota ECP. In its NHIS comments from May 13, 2022, MDNR stated that the potential impacts from the release of CO₂ into waterbodies should be studied in the Environmental Assessment Worksheet for the Project. Potential impacts from a release of CO₂ in waterbodies are presented in the Minnesota Department of Commerce, Energy and Environmental Review and Analysis (DOC-EERA) April 2023 Scoping Environmental Assessment Worksheet² and have been proposed for additional study in the Environmental Impact Statement for the Project, as stated in the April 2023 Draft Scoping Decision Document.³

² <https://efiling.web.commerce.state.mn.us/edockets/searchDocuments.do?method=showPoup&documentId={001E6D87-0000-CE10-B0F1-200C8EC9747A}&documentTitle=20234-194669-01>

³ <https://efiling.web.commerce.state.mn.us/edockets/searchDocuments.do?method=showPoup&documentId={20FA7087-0000-C910-A654-35B08E623FA9}&documentTitle=20234-194680-01>



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Conclusion

SCS reviewed the Project using Minnesota Conservation Explorer; reviewed NHIS occurrences of state-listed species within 1 mile of the Project construction footprint; conducted Project-specific field surveys in 2022; evaluated occurrences of MBS sites, NPCs, RR ROW Prairies, and other ecologically sensitive areas within 330 feet of the construction footprint; and checked for Calcareous Fens within 5 miles of the construction footprint. This letter provides a summary of that review and an outline of SCS's approach to avoid and minimize potential impacts. SCS requests MDNR concurrence with the results of this review and input on the impact avoidance and minimization approach outlined in this letter. Please contact Jason Zoller at 515-384-0958 or JZoller@summitcarbon.com should you have any questions regarding the Project.

Thank you for your consideration.

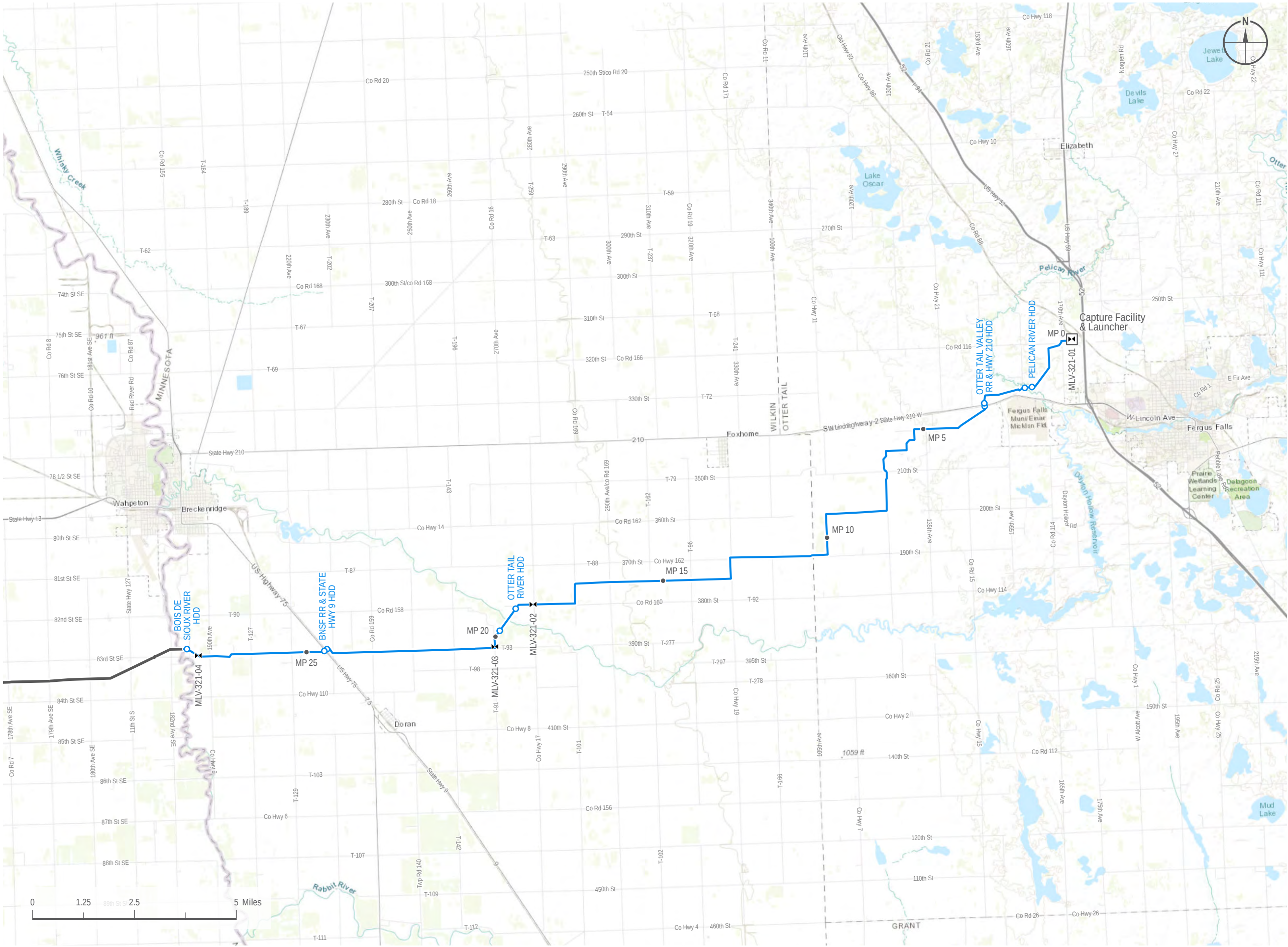
Sincerely,

John Satterfield
Summit Carbon Solutions

Enclosure: Figure 1 – Project Overview

Cc (email): Cynthia Warzecha, MDNR
Owen Baird, MDNR
Sarah Stai, Merjent
Britta Bergland, Merjent
Jason Zoller, SCS
Eric Lindeen, SCS

OVERVIEW FIGURE FOR THE SUMMIT CARBON SOLUTIONS OTTER TAIL TO WILKIN PROJECT



VICINITY MAP

LEGEND

- Horizontal Directional Drill (HDD) Entry/Exit
- Valve
- Capture Facility
- Milepost
- Proposed Otter Tail to Wilkin Project
- Other Proposed SCS Pipeline

REVISIONS

Date: 2022-09-01	Revised by: GS	Checked by: JS
0 - Issued for Use		
Issued figure for use in MNPUC.		
Date: 2023-03-29	Revised by: PD	Checked by: JS
1 - Issued for Use		
Revised figure for use in MDNR permit application.		
Date:	Revised by:	Checked by:

PREPARED BY

Summit Carbon Solutions

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Ames, Iowa 50010
United States of America

www.summitcarbonsolutions.com

SUMMIT CARBON SOLUTIONS PROJECT

Figure Title: Overview Figure for the Summit Carbon Solutions Otter Tail to Wilkin Project

Figure Number: Figure 1

Scale: 1 : 150,000 1 inch equals 2.37 miles	Projection: Transverse Mercator NAD 1983 UTM Zone 14N Ft
Sheet: 1 1 of 1	Drawing Number: 1002-06-005 Revision 1

To: Scott O’Konek
Summit Carbon Solutions

Sent via email to sokonek@summitcarbon.com

From: Andrew Levi
Energy Environmental Review and Analysis

Date: November 9, 2023

Project: Otter Tail to Wilkin CO₂ Pipeline Project
IP 7093/PPL-22-422

Respond: Preferably no later than November 17, 2023

Please respond to the following questions or provide the requested data or information. Staff will use the information provided to develop the environmental document for the project, which is a public document. Your response, in its entirety, will be included in the environmental document as an appendix; therefore, **responses will be publicly available** unless otherwise designated by the respondent as “nonpublic information” pursuant to Minnesota Statute § 13.02, subdivision 12.

Directions: Responses to questions should be contained within this form to the greatest extent possible (**11-point Calibri, plain text font, RGB 192, 0, 0**). Attach supporting documentation as necessary. While data and information requests, for example, shapefiles or draft plans, will not be contained within this form, document their submittal using this form as follows: *“Requested information sent to whom by what means on date.”*

Do not eFile your response. Return the completed form, as a PDF, along with necessary supporting documentation, and/or requested data or information to andrew.levi@state.mn.us. Contact me at (651) 539-1840 with questions.

1. Please provide the anticipated depth of each proposed HDD.

Pending completion of all studies and final design, the anticipated depths of each proposed HDD are as follows:

- **BNSF Railroad & Highway 75** – the HDD will provide for a minimum of 20 feet of cover below the railroad and roadway.
- **Bois De Sioux River** – the HDD will provide for a minimum of 25 feet of cover at the deepest point of the river.
- **Otter Tail River** – the HDD will provide for a minimum of 25 feet of cover at the deepest point of the river.
- **Otter Tail Valley Railroad & Highway 210** – the HDD will provide for a minimum of 20 feet of cover below the railroad and roadway.
- **Pelican River** – the HDD will provide for a minimum of 25 feet of cover at the deepest point of the river.

2. Provide results of the geotechnical investigations (reports) conducted for the Otter Tail River and Bois de Sioux River HDD crossings. Provide a description of the subsurface geology at the Pelican River HDD and a preliminary assessment of feasibility and likely depth of the HDD based on available literature.

The geotechnical reports for the Bois de Sioux and Otter Tail River crossings have been posted to the Otter Tail to Wilkin Project Sharepoint site Attachment 6-02.

According to the USDA Web Soil Survey, the soils in the area of the proposed Pelican River crossing consist of loam and silty to sandy loam from 0-60 feet deep. Based on soil data and professional knowledge/experience of this area, Summit does not have any constructability concerns for the proposed HDD crossing of the Pelican River. The depth of the HDD at the Pelican River crossing will be a minimum of 25 feet below the deepest point of the river. Summit's drilling contractor will prepare the final design of the HDD once geotechnical data is collected at the site.

3. Provide information on any equipment or training to be provided to local emergency responders. Also provide information on any reimbursement for training or equipment costs that would be offered to local emergency responders. Identify the distance from the pipeline any equipment, training, or reimbursement would be offered.

Summit will provide CO₂ air monitoring equipment to ensure the safety of first responders. Preparedness training will be focused on responders' duties to protect the public. Initial response tactics will be developed and exercised with Summit operations staff. All costs associated with CO₂ training and air monitoring equipment will be paid by Summit. The distance to which the equipment, training, and reimbursement would be provided will be discussed and decided with Emergency Managers and first responders during preparedness training, based on the location of nearest residents and the capabilities of the first responders.

4. Provide a summary of coordination with PHMSA. This summary should include a detailed description of the process for completing PHMSA review of design, engineering, and operational safety. Provide a summary of the data the company will provide PHMSA and a listing of any data/information the company has received from PHMSA. List necessary PHMSA approvals. Describe what process steps still remain to complete necessary PHMSA approvals.

PHMSA will audit a variety of tasks throughout manufacturing, construction, and operation to ensure compliance with federal regulations. PHMSA has stated they plan to be involved in Summit's pipe manufacturing process, including inspecting the pipe mills and validating that the pipe manufacturers are following the specifications that Summit has outlined. PHMSA will also be heavily involved during construction. Summit has included the PHMSA Form 7 link attached below, which is used for construction inspection.

<https://www.phmsa.dot.gov/sites/phmsa.dot.gov/files/docs/Evaluation%20Report%20of%20Liquid%20Pipeline%20Construction.pdf>

Some of the design, engineering, and operational safety items PHMSA may audit include: welding; coating; Material Test Reports; inspection (e.g., ensuring they meet construction specs); Nondestructive Examination (NDE); hydrotest documentation; survey data (e.g., depth of cover under foreign utilities); procedural manual for operations, maintenance, and emergencies; emergency response training; maps

and records; maximum operating pressure; communications; line markers; valve maintenance; pipeline repairs; pipe movement; overpressure safety devices and overfill protection systems; signs; security of facilities; public education; damage prevention program; Computational Pipeline Monitoring (CPM) leak detection; control room management; qualification of pipeline personnel; and corrosion control. This list is not exhaustive as PHMSA has broad audit authority.

Summit met with PHMSA on September 15, 2022 to discuss Summit's Fracture Control Plan. Summit, plus Summit's metallurgists, met with PHMSA employees. The meeting focused on reviewing Summit's Fracture Control Plan, and Summit answered questions posed by PHMSA about how the Fracture Control Plan was developed. No action, approval, or documents were exchanged. The Control Room Manager met with PHMSA as well.

Summit received correspondence from Alan K. Mayberry with PHMSA on September 15, 2023. The letter has been saved to the Otter Tail To Wilkin SharePoint site at Attachment 6-04.

PHMSA requires reporting under subpart B—Annual, Accident, and Safety-Related Condition Reporting; operators must report as follows:

- 195.49 Annual report.
- 195.50 Reporting accidents.
- 195.52 Immediate notice of certain accidents.
- 195.54 Accident reports.
- 195.55 Reporting safety-related conditions.
- 195.56 Filing safety-related condition reports.
- 195.440 Public awareness plan.

Operators must submit their completed programs to PHMSA upon request. The operator's program documentation and evaluation results must be available for periodic review by appropriate regulatory agencies.

5. Provide the Excel spreadsheet(s), data, equations and calculations included in analysis of Air Quality and GHG Operating and Construction Emissions used to create Appendix 12 in the route permit application. To the extent not already provided in Appendix 12 tables, this should include the numbers and types of construction vehicles included, construction rate, emissions data, roadway data to calculate emissions, hours used, power, load, handling time, average exposed area, emission factors, and other applicable required data to complete the emissions calculations, assumptions used in calculating the emissions, and name of model or equation used for calculating the emissions.

Summit has provided the requested information on the Otter Tail to Wilkin Project Sharepoint Site at Attachment 6-05.

6. During the process of separating CO₂, are any of the remaining byproducts greenhouse gases? If so, how are they being managed?

The separating process will remove water from the gas stream. After separation, the remaining gas (99% pure CO₂) will be compressed into a supercritical phase and then injected into the pipeline for transportation. A small portion of the CO₂ may be released to the atmosphere during the separation

process. This release of CO₂ will be minimized by proper operations and routine maintenance of the equipment at the capture facility. There are no other byproducts of this process that are considered greenhouse gases.

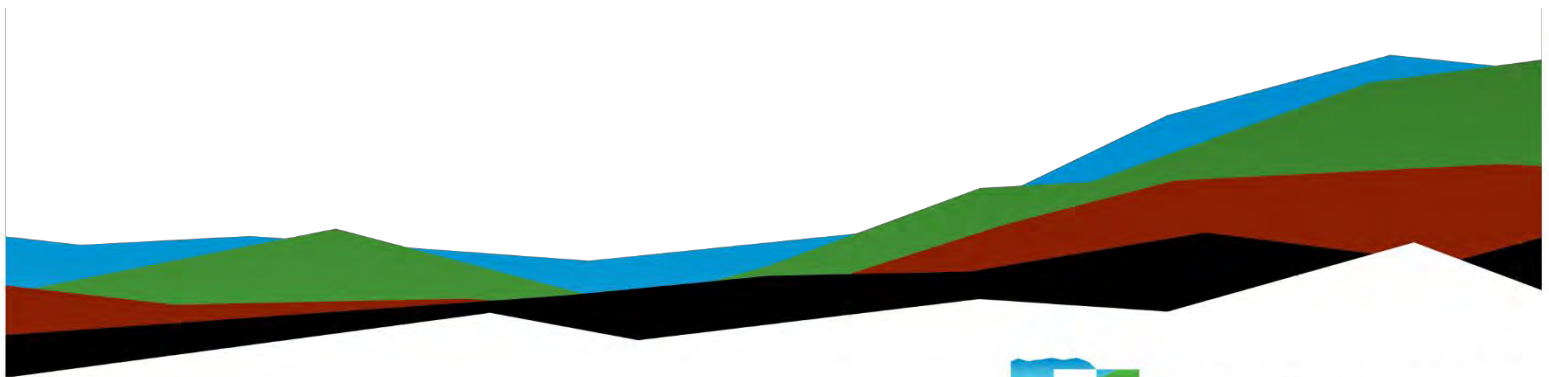
SCS Carbon Transport Pipeline – Bois de Sioux River MP 27

Geotechnical Data Report

April 26, 2023 | Terracon Project No. 13225068.25

Prepared for:

SCS Carbon Transport
2321 North Loop Drive, Suite 221
Ames, IA 50010



Nationwide
[Terracon.com](https://www.terracon.com)

- Facilities
- Environmental
- Geotechnical
- Materials



3105 Capital Way, Suite 5
Cedar Falls, IA 50613
P (319) 277-4016
Terracon.com

April 26, 2023

SCS Carbon Transport
2321 North Loop Drive, Suite 221
Ames, IA 50010

Attn: Brady Greer
P: (515)-203-3212
E: bgreer@summitcarbon.com

Re: Geotechnical Data Report
SCS Carbon Transport Pipeline – Bois de Sioux River MP 27
83rd Street SE
Richland County, North Dakota and Wilkin Co., MN
Terracon Project No. 13225068.25

Dear Mr. Greer:

We have completed the scope of Geotechnical Data services for the Bois de Sioux River MP 27 site in general accordance with Terracon Proposal No. PT225007Rev1, dated August 31, 2022. This report presents the findings of the subsurface exploration and results of the laboratory testing for the proposed project.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning this report or if we may be of further service, please contact us.

Sincerely,

Terracon

Gregory M. Decker
Staff Engineer

Jason P. Heinz
Principal

Table of Contents

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Site Conditions	1
Geotechnical Characterization	2
General Site Geology.....	2
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Groundwater Observations	5
Corrosivity	5
General Comments	6

Attachments

Exploration and Testing Procedures

Site Location and Exploration Plans

Exploration and Laboratory Results

Supporting Information

Note: This report was originally delivered in a web-based format. **Blue Bold** text in the report indicates a referenced section heading. The PDF version also includes hyperlinks which direct the reader to that section and clicking on the  logo will bring you back to this page. For more interactive features, please view your project online at client.terracon.com.

Refer to each individual Attachment for a listing of contents.

Introduction

This report presents the results of our subsurface exploration and Geotechnical Data services performed for the Bois de Sioux River pipeline crossing planned crossing the Red River northeast of the intersection of 83rd Street SE and 182nd Avenue SE from Richland County, North Dakota to Wilkin County, Minnesota. The purpose of Terracon's services is to provide information and geotechnical data relative to:

- Subsurface soil conditions
- Groundwater conditions

The geotechnical scope of services requested for this project included the advancement of two test borings, laboratory soil testing, and preparation of this geotechnical data report. Plans showing the site and boring location are shown on the attached [Site Location](#) and [Exploration Plan](#). The results of the laboratory testing performed on soil samples obtained from the site during our subsurface exploration are included on the boring logs and as a separate graph in the attached [Exploration and Laboratory Results](#).

Project Description

Item	Description
Project Description	A carbon dioxide pipeline crossing is planned beneath the Red River via horizontal directional drilling.

Site Conditions

The following description of site conditions is derived from our site visit in association with the field exploration and our review of publicly available geologic and topographic mapping.

Item	Description
Site Location	A pipeline crossing is planned at the Bois de Sioux River, northeast of the intersection of 83rd Street SE and 182 nd Avenue SE crossing from Richland County, North Dakota to Wilkin County, Minnesota Refer to the Site Location .

Item	Description
Tract IDs	■ ND-RI-321-078.000 ■ MN-WI-321-077.000
Existing Improvements	None known
Current Ground Cover	Cropland, various vegetation, and the Bois de Sioux River
Existing Topography	Based on the ground surface elevations that were estimated from LiDAR at the boring locations, the grades are relatively flat.

Geotechnical Characterization

General Site Geology

Based on a publication by John Bluemle presented in 1977 that is entitled “The Face of North Dakota”, the project site is located in the Red River Valley physiographic region of North Dakota. The origin of the Red River Valley extends beyond the Red River itself and is believed to be about 9,000 years in age. United States Geological Survey (USGS) mapping indicates that under the glacial drift and lake sediments is a deep cut valley within the bedrock where bedrock changes from the Belle Fourche-Skull Creek Undivided of the Lower to Upper Cretaceous to the Precambrian Bedrock all within about 5 miles within this general area. The project site area has been mapped by the USGS within the Belle Fourche-Skull Creek Undivided. The Belle Fourche-Skull Creek Undivided of the Lower to Upper Cretaceous generally consists of gray shale with interbedded sandstone layers with depth.

The project site lies within the Red River Valley geomorphic physiographic region. The Red River Valley physiographic region lies within what geologists believe was the footprint of the former Lake Agassiz. This region extends inward from the eastern border of North Dakota about 40 miles and is characterized by vast plains with localized relief of less than 25 feet within the plains and deeper reliefs occurring within stream and river channels. The subsurface soils are similar to lake deposits, consisting of silt in calm areas and sands in turbulent areas. It is stated that low-lying residual glacial lake clay may still be present in the area.

The project site is located in the Red River Valley physiographic region as shown in Figure 1.

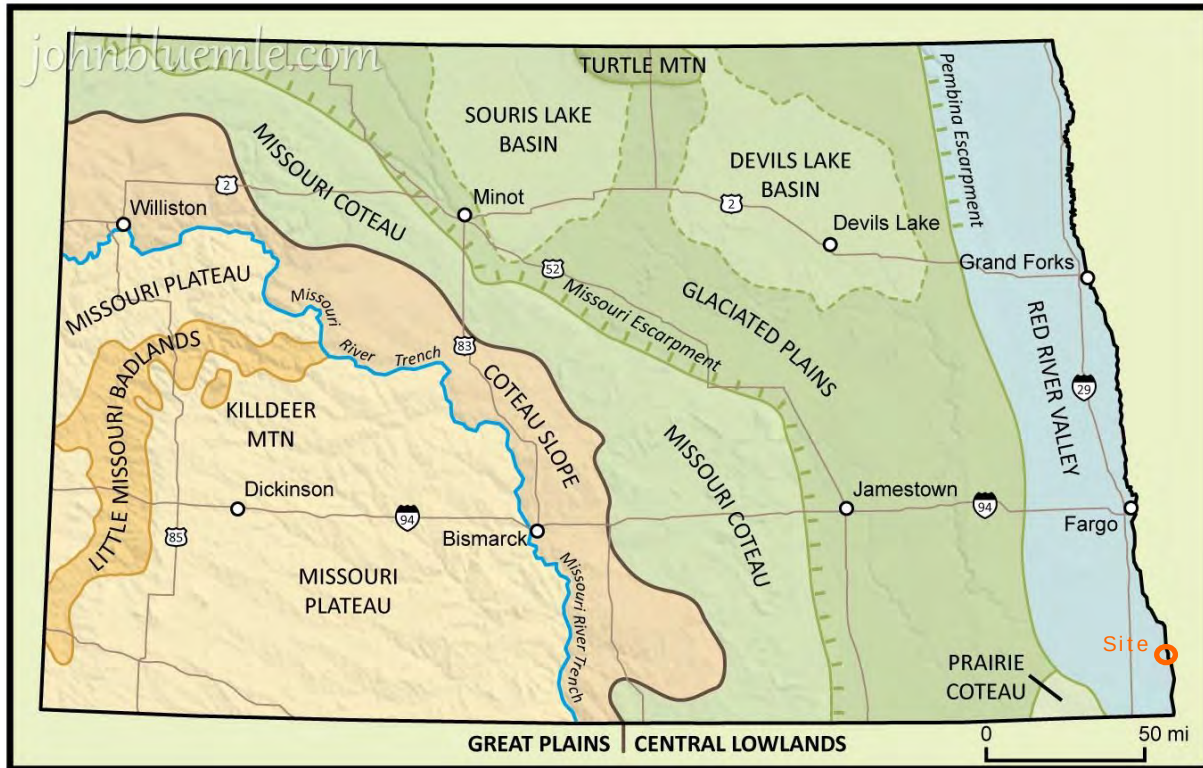


Figure 1. Physiographic Regions within North Dakota (Bluemle 2015)

The most recent glacial advancements into the area are Early Wisconsinan, believed to be 70,000 to 90,000 years ago, and Late Wisconsinan, 11,500 to 30,000 years ago. Geologists believe the early glacial advancements resulted in the formation of a glacial dam near the southern end of the Red River Valley physiographic region forming Lake Agassiz. The lake covered, in various stages, an area from northeast South Dakota, eastern North Dakota, western Minnesota, and southeast Manitoba and southwest Ontario, Canada. Lake Agassiz drained and refilled numerous times during subsequent glacial advances and recessions. It is believed that in early glacial episodes Lake Agassiz drained via the River Warren to the south and in the final drain about 9,000 years ago, drained into Lake Winnipeg via the Red River.

Geology References

Harris, Kenneth L. *Surficial Geologic Map*, USGS, 1995

Bluemle, John P. *The Face of North Dakota, Educational Series II, North Dakota Geological Survey*, Washburn Printing Center, 1977

Bluemle, John P. *North Dakota Geology, The work of John Bluemle PhD.*, May 26, 2015, <http://johnbluemle.com>

Subsurface Profile

Conditions encountered at the boring locations are indicated on the individual boring logs in the attached [Exploration and Laboratory Results](#). Stratification boundaries on the boring logs and the depths in the following table represent the approximate location of changes in material types; in situ, the transition between materials may be gradual. As noted in the [General Comments](#) section, variations are likely between and beyond the borings performed for this project. The following table provides a summary of the subsurface conditions encountered in the borings requested for this project.

Stratum	Depth to Bottom of Stratum (feet)	Material Description	Consistency / Relative Density
Surface	1.5	Topsoil	N/A
1	6.5 to 12	Lean Clay, with sand and occasional sand and silt layers (desiccated)	Very Stiff to Stiff
2	38 (BH1)	Sandy Lean to Fat Clay and Fat Clay, trace gravel with occasional sand and silt seams	Medium Stiff to Stiff
3	49.5 (Bottom of Borings)	Sandy Lean Clay and Sandy Lean to Fat Clay, Fat Clay, trace gravel, with occasional sand and silt seams Clayey Sand, with clay layers Sand, with clay layers	Stiff to Hard / Medium Dense to Dense

1. The depths to bottom of stratum are approximate and are in reference to the grade existing at the boring locations at the time of our exploration.
2. The standard penetration test (N) value within Stratum 1 ranged from 13 to 14.
3. N-values within Stratum 2 were 4.
4. N-values within Stratum 3 ranged from 5 to 33.

A Central Mine Equipment brand automatic hammer was used to drive the split barrel sampling spoon into the base of the borehole for this project. The percentage of theoretical potential energy transferred to the drilling rod string and the split spoon using an automatic hammer is usually higher than a 'safety' hammer (i.e., a hammer raised and dropped using a 'cathead' and rope) that is still used on some rotary drill rigs. The energy measured for the hammer used for this project in 2022, is at least 80 percent of the theoretical potential energy. The N-values shown on the boring logs can be considered N80 values. Conversion to N60 values may be made by using the following equation: $N_{60} = (ER/60) * N$, where ER for Terracon's hammer equals 80, and N equals the N-value shown on the boring logs. Further corrections/modifications to the N-values, such as modifications to account for in-situ effective stress and/or borehole size, may be prudent for use in geotechnical calculations/correlations.

Groundwater Observations

The boreholes were observed during drilling/sampling for the presence and level of groundwater. Water levels observations made during drilling/sampling of the borings are included on the boring logs. During sampling, groundwater was observed in Boring BH1 at an approximate depth of 12.5 feet below the existing grade. It is important to note that a relatively long period is necessary for a groundwater level to develop and stabilize in a borehole within clay soils due to the relatively low 'permeability' of fine-grained soils. Long-term observations in piezometers or groundwater observation wells, sealed from the influence of surface water, would be required to provide a better evaluation of groundwater levels in materials of this type.

Groundwater level fluctuations can occur due to seasonal variations in the amount of rainfall, runoff, the level of the Bois de Sioux River, and other factors not evident at the time the boring was performed. Perched (trapped) water can also develop with more 'permeable' soils/materials within and/or above lower 'permeability' soils/materials. Therefore, groundwater levels during construction or at other times during the life of the pipeline may be higher or lower than the level indicated on the boring log. The possibility of groundwater level fluctuations should be considered when developing the design and construction plans for the project.

Corrosivity

The table below lists the results of laboratory testing. The values may be used to estimate potential corrosive characteristics of the on-site soils with respect to contact with the various underground materials that will be used for project construction.

Corrosivity Test Results Summary

Boring	Sample Depth (feet)	pH	Soluble Sulfides (mg / kg)	Soluble Sulfate (mg / kg)	Soluble Chloride (mg / kg)	Total Salts (mg / kg)	Red-Ox (mV)	Electrical Resistivity (Ω -cm)
BH1	4.0-5.5	8.45	Nil	3.23	Nil	1039.45	+591	1340
BH1	19.0-21.0	8.46	Nil	41.14	Nil	1974	+513	973
BH1	29.0-31.0	8.41	Nil	52.09	Nil	2566.2	+499.6	752
BH2	6.5-8.0	8.86	Nil	27.38	Nil	1460.76	+495.9	1100
BH2	23.5-25.5	8.64	Nil	160.47	Nil	2673.36	+502.9	727

General Comments

This report presents the data obtained from the borings performed at the indicated locations and from other information discussed in this report. This report does not reflect variations that may occur beyond the boring, across the site, or due to the modifying effects of construction or weather. The nature and extent of such variations may not become evident until during or after construction.

The scope of services for this project does not include either specifically or by implication any environmental or biological (e.g., mold, fungi, bacteria) assessment of the site or identification or prevention of pollutants, hazardous materials or conditions. If the owner is concerned about the potential for such contamination or pollution, other studies should be undertaken.

Our services and any correspondence or collaboration are intended for the sole benefit and exclusive use of our client for specific application to the project discussed and are accomplished in accordance with generally accepted geotechnical engineering practices with no third-party beneficiaries intended. Any third-party access to services or correspondence is solely for information purposes to support the services provided by Terracon to our client. Reliance upon the services and any work product is limited to our client, and is not intended for third parties. Any use or reliance of the provided information by third parties is done solely at their own risk. No warranties, either express or implied, are intended or made. Site safety, excavation support, and dewatering requirements are the responsibility of others.

Site characteristics, as provided, are for design purposes and are not to estimate excavation/drilling cost. Any use of our report in that regard is done at the sole risk of the cost estimator as there may be variations on the site that are not apparent in the data that could significantly impact excavation/construction cost. Any parties charged with estimating excavation/construction costs should seek their own site characterization for specific purposes to obtain the specific level of detail necessary for costing. Site safety, and cost estimating including, excavation support, and dewatering requirements/design are the responsibility of others. If changes in the nature, design, or location of the project are planned, our data may not be valid and additional exploration and testing should be given consideration.

Any information Terracon personnel conveyed prior to completion of this report was for informational purposes only and should not be used for decision-making purposes or final design.

Terracon has not been asked to interpret the data to make design and construction recommendations for the referenced project. Therefore, we cannot assume any responsibility or liability for interpretation of this subsurface data by others.



Attachments

Exploration and Testing Procedures

Field Exploration

Number of Borings	Approximate Boring Depth (feet)	Location
2	49.5	Pipeline Alignment

Boring Layout and Elevation: SCS Carbon Transport personnel determined the subsurface exploration layout, and the borings were staked in the field by others/surveyors. The latitude and longitude of the boring locations that is indicated on the boring logs was provided by the surveyors. The ground surface elevation at the boring locations was estimated using the ND LiDAR Dissemination MapService and reported to the nearest foot on the boring logs. If a more accurate elevation is desired, we recommend a surveyor provide the surface elevation at the boring locations.

Subsurface Exploration Procedures: We advanced the borings with an ATV-mounted rotary drill rig using continuous flight, hollow-stem augers and mud-rotary techniques. Sampling was performed at intervals of about 2.5 feet in the upper 10 feet of the borings and at intervals of 5 feet thereafter. Soil sampling was performed using the split-barrel procedure. In the split-barrel sampling procedure, a standard 2-inch outer diameter split-barrel sampling spoon was driven into the ground by a 140-pound automatic hammer falling a distance of 30 inches. The number of blows required to advance the sampling spoon the last 12 inches of a normal 18-inch penetration is recorded as the Standard Penetration Test (SPT) resistance value. The SPT resistance values, also referred to as N-values, are indicated on the boring log at the test depths.

We observed and recorded groundwater levels during drilling and sampling. For safety purposes, the boreholes were backfilled with auger cuttings, bentonite chips, and bentonite-cement grout after completion.

Terracon's exploration team prepared a field boring log as part of the drilling operations that included sampling depth intervals, penetration resistances, groundwater level observations, and other drilling and sampling information. This field log included visual classifications of the materials observed during drilling and our interpretation of the subsurface conditions between samples. The samples were containerized and transported to our soil laboratory.

Laboratory Testing

Terracon's geotechnical personnel reviewed the soil samples and field data and assigned laboratory tests. The laboratory testing program included the following tests for this site:

- Moisture Content
- Dry Unit Weight
- Unconfined Compression
- Atterberg Limits
- Washed sieve
- Combined Sieve and Hydrometer
- Corrosivity Suite:
 - pH
 - soluble sulfide
 - soluble sulfate
 - soluble chloride
 - electrical resistivity
 - total salts
 - red-ox

The laboratory testing program also included examination of soil samples by a geologist and an engineer. Based on the results of our field and laboratory programs, we described and classified the soil samples in general accordance with the Unified Soil Classification System (USCS). The boring logs in this report include interpretations of the field logs by our geotechnical personnel and include modifications based on observations and tests of the samples in our laboratory.

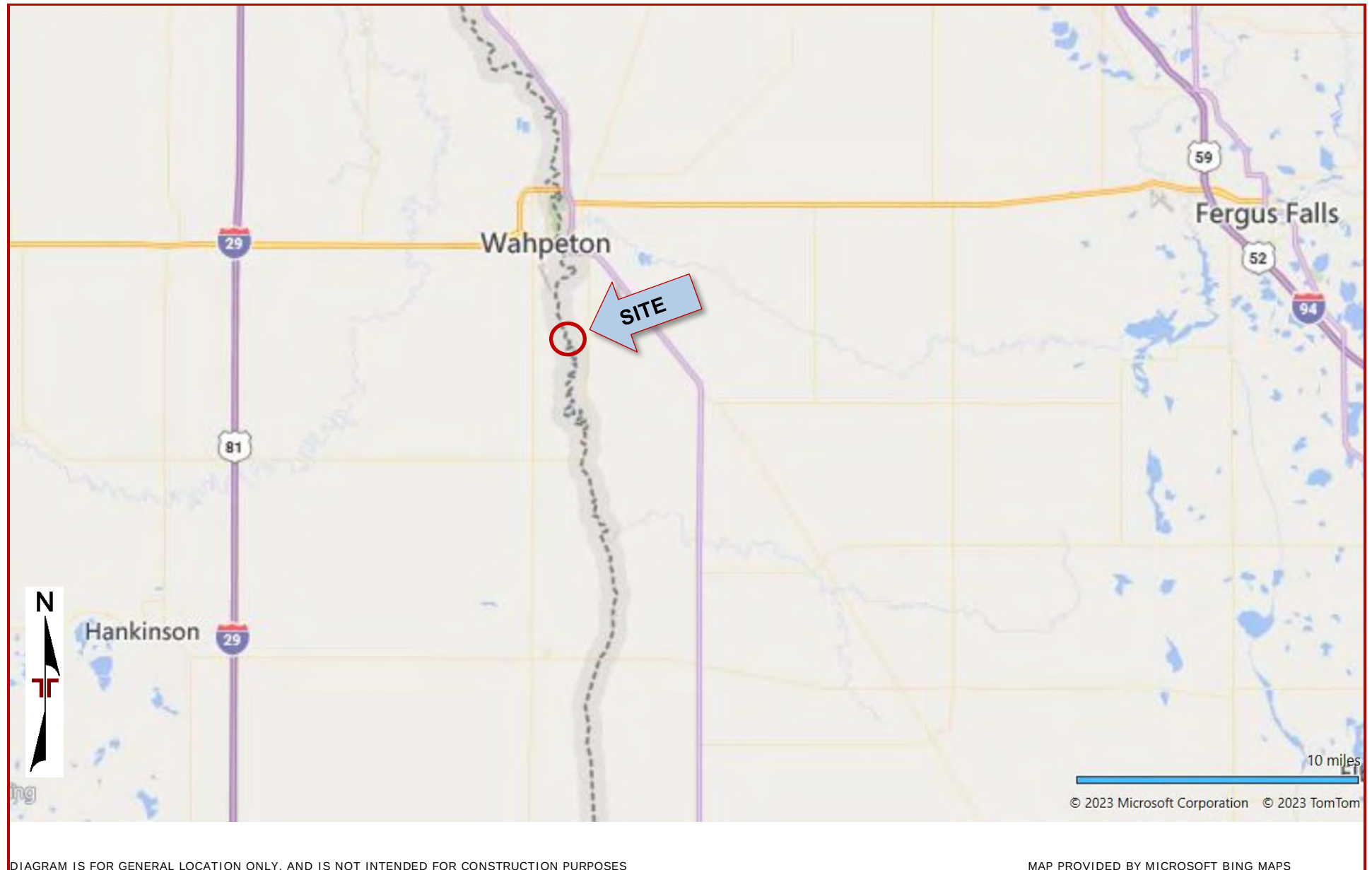
Site Location and Exploration Plans

Contents:

Site Location Plan
Exploration Plan

Note: All attachments are one page unless noted above.

Site Location



Exploration Plan



DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

MAP PROVIDED BY MICROSOFT BING MAPS

Exploration and Laboratory Results

Contents:

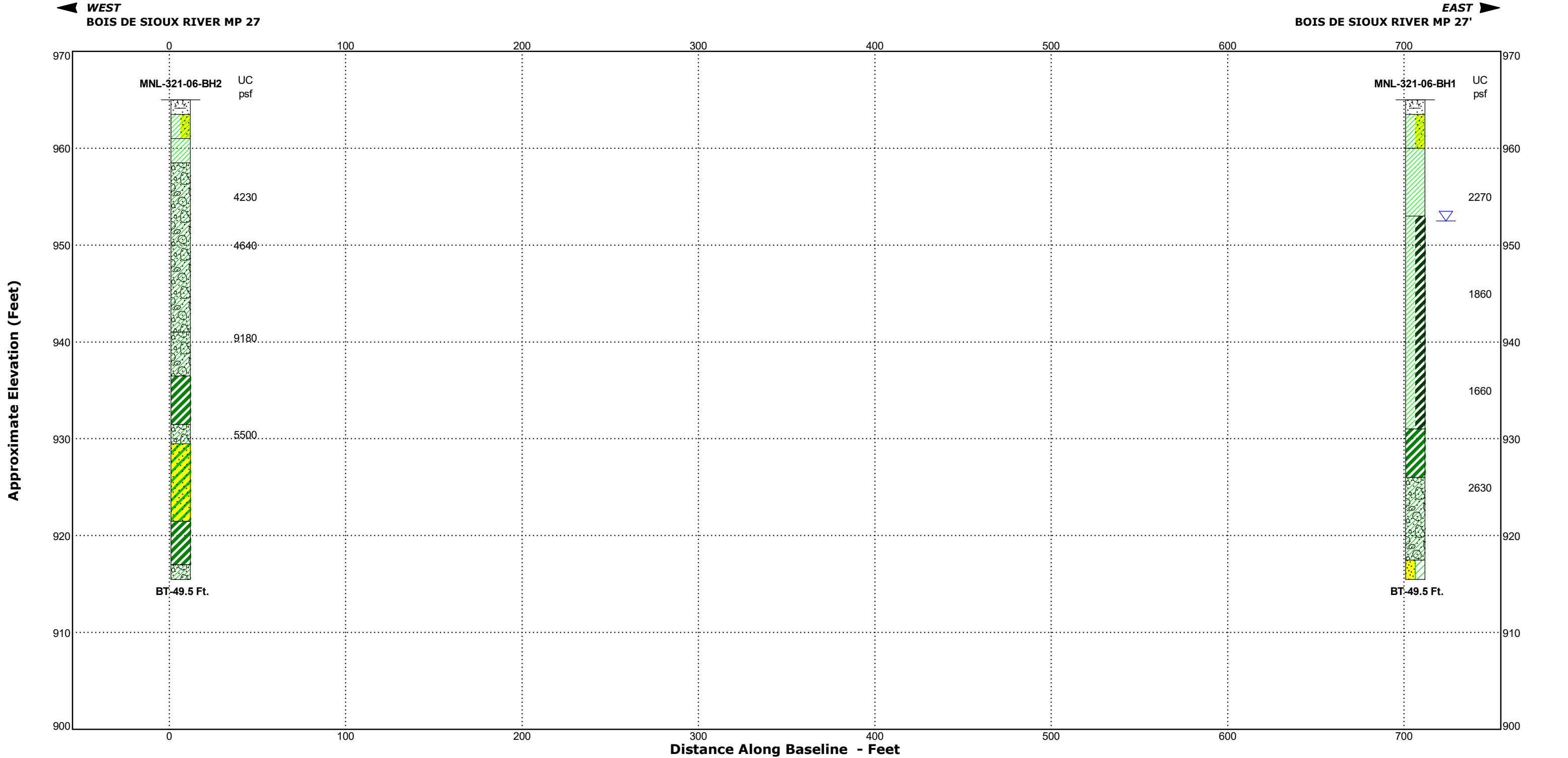
Subsurface Profile

Boring Log (MNL-321-06-BH1 and BH2) (4 pages)

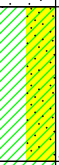
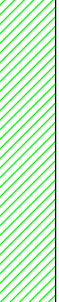
Grain Size Distribution (2 pages)

Note: Attachments are one page unless noted above.

Subsurface Profile
BOIS DE SIOUX RIVER MP 27



Boring Log No. MNL-321-06-BH1

Model Layer	Graphic Log	Location: See Exploration Plan Latitude: 46.212162° Longitude: -96.587411° Station: MN; Bois de Sioux River; MP 27 Depth (Ft.) Elevation: 965 (Ft.) +/-	Depth (Ft.)	Water Level Observations	Sample Type	Recovery (In.)	Field Test Results	HP (psf)	Strength Test			Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits		Percent Fines	
									Test Type	Compressive Strength (psf)	Strain (%)			LL-PL-PI			
1		<u>TOPSOIL</u>	1.5 963.5														
		<u>LEAN CLAY (CL)</u> , with sand, dark gray and brown, desiccated, very stiff to stiff			X	6	6-7-7 N=14					21.7					
			5.0 960			X	8	3-3-3 N=6					20.4				
		<u>LEAN CLAY (CL)</u> , trace sand, with occasional sand and silt layers, brown and gray, stiff															
						X	10	2-3-3 N=6 3000 (HP)					25.4				
			10														
2		<u>SANDY LEAN TO FAT CLAY (CL/CH)</u> , trace gravel, with occasional sand and silt seams, gray, medium stiff	12.0 953														

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (If any).

See [Supporting Information](#) for explanation of symbols and abbreviations.

Notes

Elevation Reference: Elevations were determined using ND LiDAR Dissemination MapService.

Water Level Observations

12.5' observed while drilling

Drill Rig
603

Hammer Type
Automatic

Driller
SZ

Logged by
ES

Boring Started
10-20-2022

Boring Completed
10-20-2022

Advancement Method

3 1/4" Hollow stem auger

Abandonment Method

Boring backfilled with soil cuttings, bentonite chips, and grout upon completion.

Boring Log No. MNL-321-06-BH1

Model Layer	Graphic Log	Location: See Exploration Plan Latitude: 46.212162° Longitude: -96.587411° Station: MN; Bois de Sioux River; MP 27 Depth (Ft.) Elevation: 965 (Ft.) +/-	Depth (Ft.)	Water Level Observations	Sample Type	Recovery (In.)	Field Test Results	HP (psf)	Strength Test			Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits	Percent Fines
									Test Type	Compressive Strength (psf)	Strain (%)			LL-PL-PI	
2		SANDY LEAN TO FAT CLAY (CL/CH) , trace gravel, with occasional sand and silt seams, gray, medium stiff (<i>continued</i>) 34.0													

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (If any).
See [Supporting Information](#) for explanation of symbols and abbreviations.

Notes

Elevation Reference: Elevations were determined using ND LiDAR Dissemination MapService.

Water Level Observations

12.5' observed while drilling

Drill Rig
603

Hammer Type
Automatic

Driller
SZ

Logged by
ES

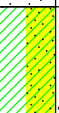
Advancement Method
3 1/4" Hollow stem auger

Abandonment Method
Boring backfilled with soil cuttings, bentonite chips, and grout upon completion.

Boring Started
10-20-2022

Boring Completed
10-20-2022

Boring Log No. MNL-321-06-BH2

Model Layer	Graphic Log	Location: See Exploration Plan Latitude: 46.212219° Longitude: -96.589949° Station: ND; Bois de Sioux River; MP 27 Depth (Ft.) Elevation: 965 (Ft.) +/-	Depth (Ft.)	Water Level Observations	Sample Type	Recovery (In.)	Field Test Results	HP (psf)	Strength Test			Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits		Percent Fines
									Test Type	Compressive Strength (psf)	Strain (%)			LL-PL-PI		
		TOPSOIL														
1		1.5														

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (If any).

See [Supporting Information](#) for explanation of symbols and abbreviations.

Notes

Elevation Reference: Elevations were determined using ND LiDAR Dissemination MapService.

Water Level Observations

None observed while drilling

Drill Rig
603

Hammer Type
Automatic

Driller
SZ

Logged by
ES

Advancement Method

3 1/4" Hollow stem auger to 18.5 feet then mud rotary to boring termination.

Abandonment Method

Boring backfilled with soil cuttings, bentonite chips, and grout upon completion.

Boring Started
10-20-2022

Boring Completed
10-20-2022

Boring Log No. MNL-321-06-BH2

Model Layer	Graphic Log	Location: See Exploration Plan Latitude: 46.212219° Longitude: -96.589949° Station: ND; Bois de Sioux River; MP 27 Depth (Ft.) Elevation: 965 (Ft.) +/-	Depth (Ft.)	Water Level Observations	Sample Type	Recovery (In.)	Field Test Results	HP (psf)	Strength Test			Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits	
									Test Type	Compressive Strength (psf)	Strain (%)			LL-PL-PI	Percent Fines
3		FAT CLAY (CH) , trace sand, gray, stiff (<i>continued</i>)	33.5 931.5				3000 (HP)								
		SANDY LEAN CLAY (CL) , trace gravel, with occasional sand and silt seams, gray, very stiff	35.5 929.5		12				UC	5498	11.5	19.7	115		54
		CLAYEY SAND (SC) , wiith clay layers, fine to medium grained, gray, dense													
		FAT CLAY (CH) , trace sand, gray, stiff	43.5 921.5		17		13-19-14 N=33					16.4			
		FAT CLAY (CH) , trace sand, gray, stiff	48.0 917		18		2-2-3 N=5 2000 (HP)					36.0			
		SANDY LEAN CLAY (CL) , trace gravel, with occasional sand and silt layers, gray, very stiff	49.5 915.5		15		6-8-10 N=18 8000 (HP)					17.7			
		Boring Terminated at 49.5 Feet													

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (If any).

See [Supporting Information](#) for explanation of symbols and abbreviations.

Notes

Elevation Reference: Elevations were determined using ND LiDAR Dissemination MapService.

Water Level Observations

None observed while drilling

Drill Rig
603

Hammer Type
Automatic

Driller
SZ

Logged by
ES

Advancement Method

3 1/4" Hollow stem auger to 18.5 feet then mud rotary to boring termination.

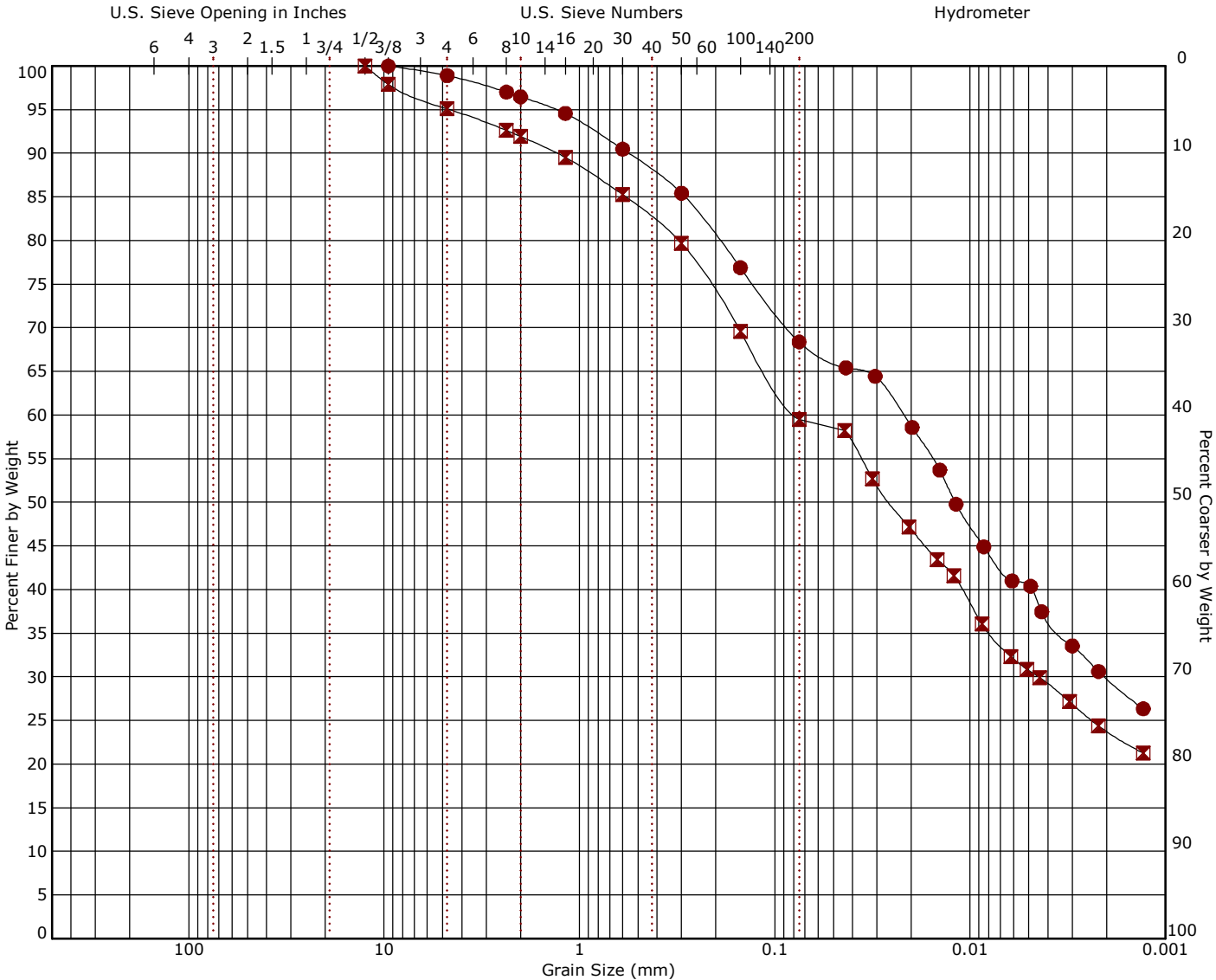
Abandonment Method

Boring backfilled with soil cuttings, bentonite chips, and grout upon completion.

Boring Started
10-20-2022

Boring Completed
10-20-2022

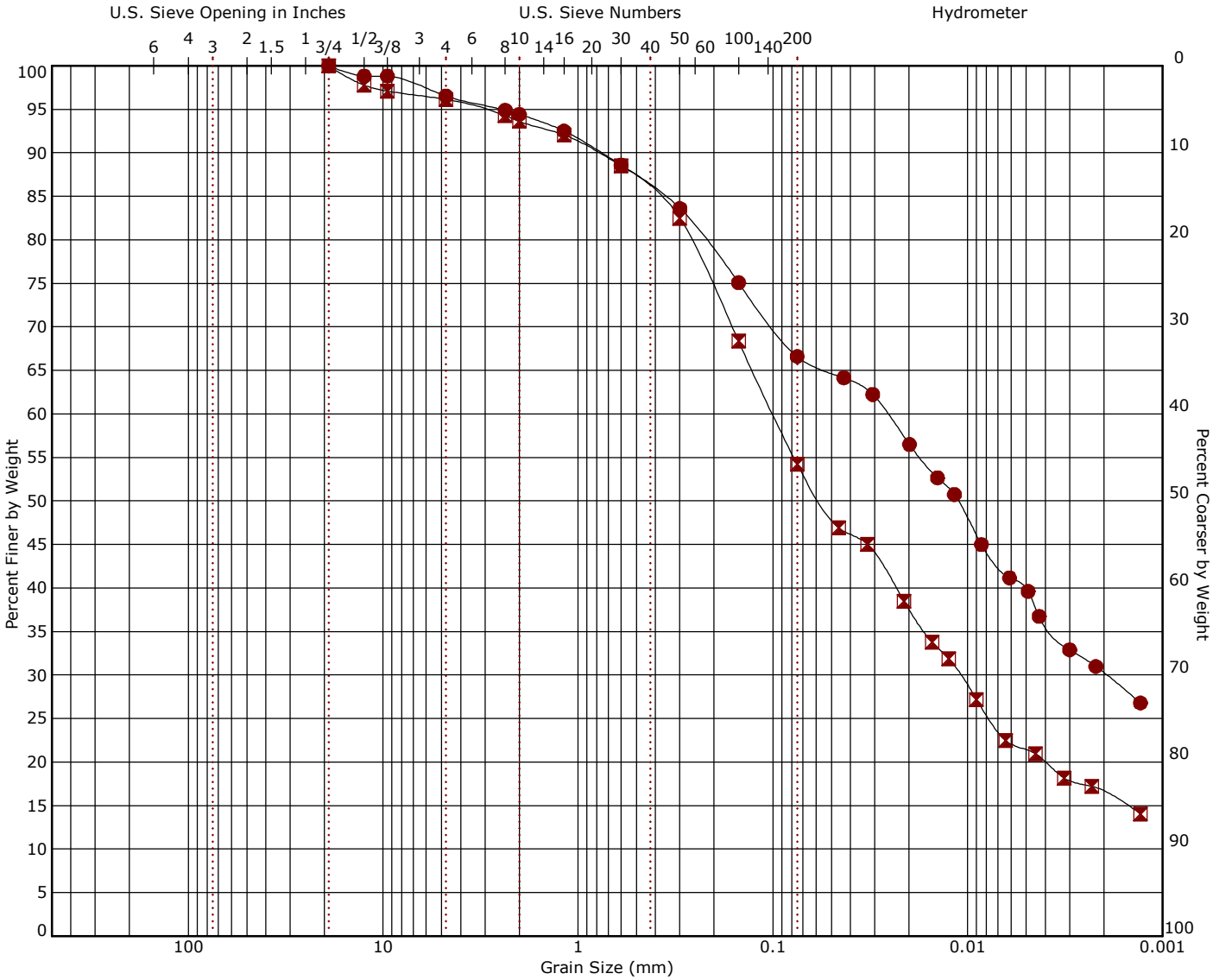
Grain Size Distribution
ASTM D422 / ASTM C136



Boring ID	Depth (Ft)	Description	USCS	LL	PL	PI	Cc	Cu
MNL-321-06-BH1	19 - 21	SANDY LEAN TO FAT CLAY	CL/CH					
MNL-321-06-BH1	39 - 41	SANDY LEAN CLAY	CL					

Boring ID	Depth (Ft)	D ₁₀₀	D ₆₀	D ₃₀	D ₁₀	%Cobbles	%Gravel	%Sand	%Fines	%Silt	%Clay
MNL-321-06-BH1	19 - 21	9.5	0.022	0.002		0.0	1.1	30.5		27.9	40.4
MNL-321-06-BH1	39 - 41	12.5	0.078	0.004		0.0	4.9	35.6		28.8	30.7

Grain Size Distribution
ASTM D422 / ASTM C136



Cobbles		Gravel		Sand			Silt or Clay						
		coarse	fine	coarse	medium	fine							
Boring ID	Depth (Ft)	Description						USCS	LL	PL	PI	Cc	Cu
MNL-321-06-BH2	9 - 11	SANDY LEAN CLAY						CL					
MNL-321-06-BH2	33.5 - 35.5	SANDY LEAN CLAY						CL					
Boring ID	Depth (Ft)	D ₁₀₀	D ₆₀	D ₃₀	D ₁₀	%Cobbles	%Gravel	%Sand	%Fines	%Silt	%Clay		
MNL-321-06-BH2	9 - 11	19	0.026	0.002		0.0	3.5	29.9		26.9	39.8		
MNL-321-06-BH2	33.5 - 35.5	19	0.099	0.011		0.0	3.9	41.9		32.8	21.4		

Supporting Information

Contents:

General Notes

Unified Soil Classification System

Note: Attachments are one page unless noted above.

General Notes

Sampling	Water Level	Field Tests
 Rock Core  Shelby Tube  Split Spoon	 Water Initially Encountered  Water Level After a Specified Period of Time  Water Level After a Specified Period of Time  Cave In Encountered Water levels indicated on the soil boring logs are the levels measured in the borehole at the times indicated. Groundwater level variations will occur over time. In low permeability soils, accurate determination of groundwater levels is not possible with short term water level observations.	N Standard Penetration Test Resistance (Blows/Ft.) (HP) Hand Penetrometer (T) Torvane (DCP) Dynamic Cone Penetrometer UC Unconfined Compressive Strength (PID) Photo-Ionization Detector (OVA) Organic Vapor Analyzer

Descriptive Soil Classification

Soil classification as noted on the soil boring logs is based Unified Soil Classification System. Where sufficient laboratory data exist to classify the soils consistent with ASTM D2487 "Classification of Soils for Engineering Purposes" this procedure is used. ASTM D2488 "Description and Identification of Soils (Visual-Manual Procedure)" is also used to classify the soils, particularly where insufficient laboratory data exist to classify the soils in accordance with ASTM D2487. In addition to USCS classification, coarse grained soils are classified on the basis of their in-place relative density, and fine-grained soils are classified on the basis of their consistency. See "Strength Terms" table below for details. The ASTM standards noted above are for reference to methodology in general. In some cases, variations to methods are applied as a result of local practice or professional judgment.

Location And Elevation Notes

Exploration point locations as shown on the Exploration Plan and as noted on the soil boring logs in the form of Latitude and Longitude are approximate. See Exploration and Testing Procedures in the report for the methods used to locate the exploration points for this project. Surface elevation data annotated with +/- indicates that no actual topographical survey was conducted to confirm the surface elevation. Instead, the surface elevation was approximately determined from topographic maps of the area.

Strength Terms

Relative Density of Coarse-Grained Soils (More than 50% retained on No. 200 sieve.) Density determined by Standard Penetration Resistance		Consistency of Fine-Grained Soils (50% or more passing the No. 200 sieve.) Consistency determined by laboratory shear strength testing, field visual-manual procedures or standard penetration resistance		
Relative Density	Standard Penetration or N-Value (Blows/Ft.)	Consistency	Unconfined Compressive Strength Qu (tsf)	Standard Penetration or N-Value (Blows/Ft.)
Very Loose	0 - 3	Very Soft	less than 0.25	0 - 1
Loose	4 - 9	Soft	0.25 to 0.50	2 - 4
Medium Dense	10 - 29	Medium Stiff	0.50 to 1.00	4 - 8
Dense	30 - 50	Stiff	1.00 to 2.00	8 - 15
Very Dense	> 50	Very Stiff	2.00 to 4.00	15 - 30
		Hard	> 4.00	> 30

Relevance of Exploration and Laboratory Test Results

Exploration/field results and/or laboratory test data contained within this document are intended for application to the project as described in this document. Use of such exploration/field results and/or laboratory test data should not be used independently of this document.

Unified Soil Classification System

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests ^A				Soil Classification	
				Group Symbol	Group Name ^B
Coarse-Grained Soils: More than 50% retained on No. 200 sieve	Gravels: More than 50% of coarse fraction retained on No. 4 sieve	Clean Gravels: Less than 5% fines ^C	$Cu \geq 4$ and $1 \leq Cc \leq 3$ ^E	GW	Well-graded gravel ^F
			$Cu < 4$ and/or $[Cc < 1 \text{ or } Cc > 3.0]$ ^E	GP	Poorly graded gravel ^F
		Gravels with Fines: More than 12% fines ^C	Fines classify as ML or MH	GM	Silty gravel ^{F, G, H}
			Fines classify as CL or CH	GC	Clayey gravel ^{F, G, H}
	Sands: 50% or more of coarse fraction passes No. 4 sieve	Clean Sands: Less than 5% fines ^D	$Cu \geq 6$ and $1 \leq Cc \leq 3$ ^E	SW	Well-graded sand ^I
			$Cu < 6$ and/or $[Cc < 1 \text{ or } Cc > 3.0]$ ^E	SP	Poorly graded sand ^I
		Sands with Fines: More than 12% fines ^D	Fines classify as ML or MH	SM	Silty sand ^{G, H, I}
			Fines classify as CL or CH	SC	Clayey sand ^{G, H, I}
Fine-Grained Soils: 50% or more passes the No. 200 sieve	Silts and Clays: Liquid limit less than 50	Inorganic:	$PI > 7$ and plots above "A" line ^J	CL	Lean clay ^{K, L, M}
			$PI < 4$ or plots below "A" line ^J	ML	Silt ^{K, L, M}
		Organic:	$\frac{LL \text{ oven dried}}{LL \text{ not dried}} < 0.75$	OL	Organic clay ^{K, L, M, N}
					Organic silt ^{K, L, M, O}
	Silts and Clays: Liquid limit 50 or more	Inorganic:	PI plots on or above "A" line	CH	Fat clay ^{K, L, M}
			PI plots below "A" line	MH	Elastic silt ^{K, L, M}
		Organic:	$\frac{LL \text{ oven dried}}{LL \text{ not dried}} < 0.75$	OH	Organic clay ^{K, L, M, P}
					Organic silt ^{K, L, M, Q}
Highly organic soils:	Primarily organic matter, dark in color, and organic odor			PT	Peat

^A Based on the material passing the 3-inch (75-mm) sieve.

^B If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.

^C Gravels with 5 to 12% fines require dual symbols: GW-GM well-graded gravel with silt, GW-GC well-graded gravel with clay, GP-GM poorly graded gravel with silt, GP-GC poorly graded gravel with clay.

^D Sands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt, SW-SC well-graded sand with clay, SP-SM poorly graded sand with silt, SP-SC poorly graded sand with clay.

$$E \quad Cu = D_{60}/D_{10} \quad Cc = \frac{(D_{30})^2}{D_{10} \times D_{60}}$$

^F If soil contains $\geq 15\%$ sand, add "with sand" to group name.

^G If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.

^H If fines are organic, add "with organic fines" to group name.

^I If soil contains $\geq 15\%$ gravel, add "with gravel" to group name.

^J If Atterberg limits plot in shaded area, soil is a CL-ML, silty clay.

^K If soil contains 15 to 29% plus No. 200, add "with sand" or "with gravel," whichever is predominant.

^L If soil contains $\geq 30\%$ plus No. 200 predominantly sand, add "sandy" to group name.

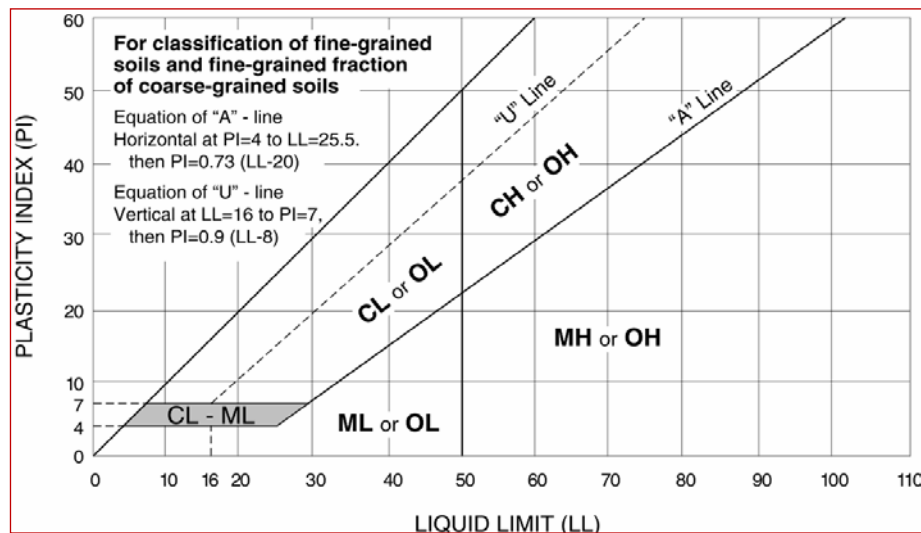
^M If soil contains $\geq 30\%$ plus No. 200, predominantly gravel, add "gravelly" to group name.

^N $PI \geq 4$ and plots on or above "A" line.

^O $PI < 4$ or plots below "A" line.

^P PI plots on or above "A" line.

^Q PI plots below "A" line.



REVISION 2 - Report of Geotechnical Investigation

Midwest Carbon Express HDD 34 – Otter Tail River HDD Crossing Wilkin County, Minnesota

Tetra Tech Project No. 117-8273015
September 19, 2022

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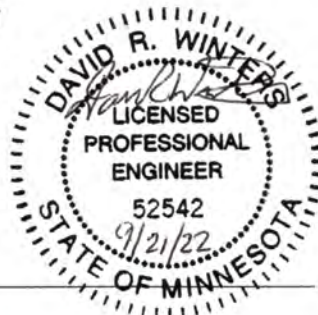
Rev	Date	Author	Reviewer	Revision Description
1	8/31/2022	Aric Hotaling	David Winters	Updated based on HDD Profile dated 8/26/2022.
2	9/19/2022	Aric Hotaling	David Winters	Edits to pipe and boring dimensions.

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APPENDIX

◆ **Appendix A: Miscellaneous Figures and Details**

- o Important Information About Your Geotechnical Engineering Report (Published by ASFE/GBA)
- o Boring Log Descriptive Terminology Key to Soil Symbols and Terms
- o Drawing No. 3015-1 – Location of Exploratory Borings and Seismic Lines
- o HDD Plan and Profile Details

◆ **Appendix B: Logs of Exploratory Borings**

- o Figures 1B through 4B

◆ **Appendix C: Laboratory Test Data**

- o American Engineering Testing Laboratory Test Report

◆ **Appendix D: Geophysical Seismic Survey Data**

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1.0 EXECUTIVE SUMMARY

Summit Carbon Solutions (SCS) plans to develop a new interstate CO₂ capture, transportation, and sequestration project (Midwest Carbon Express, MCE). The Project will capture CO₂ from multiple sources throughout Iowa, Minnesota, Nebraska, South Dakota, and North Dakota and deliver the CO₂ to three injection sites in North Dakota for permanent geological sequestration.

The Midwest Carbon Express HDD 34 location is an Otter Tail River crossing in Wilkin County, Minnesota. Proposed construction consists of installation of a 3,575 foot long, 4-inch-diameter pipe to cross the Otter Tail River. The crossing location is approximately 8.5 miles southeast of Wahpeton, North Dakota.

The soil profile encountered at the proposed pipeline crossing location generally comprised of alluvial soils consisting primarily of lean clay with varying amounts of sand and silt. Discontinuous sand layers 3 to 10 feet thick were encountered at various depths.

It is anticipated that minor site grading will be required consisting of minor cuts and fills of less than 2 feet to level the site and provide a stable, uniform bearing platform for HDD drilling equipment. Excavation of the overburden soil can be accomplished with most heavy-duty earth excavating equipment.

Drilling equipment and other support equipment and materials may be supported on prepared construction pads consisting of heavy-duty timber or fabricated mats as is typical industry practice for this type of construction.

A subsurface assessment to analyze the risk of hydraulic fracturing and inadvertent returns during the HDD process was conducted at the proposed Otter Tail River HDD crossing location. The analyses were conducted based on topographic and HDD profiles provided by Tetra Tech's engineering team coupled with subsurface characteristics determined from the field investigation and published values. The analyses were conducted using the Bingham Plastic Model for minimum required drilling fluid pressures, and the Delft approach and methods detailed by the US Army Corps of Engineers for determining maximum allowable pressures. The results indicate the risk of hydrofracture has a Factor of Safety above 2.0 along the majority of the bore paths and an elevated risk of hydrofracture near the entry and exit point of the bores.

This executive summary has been prepared solely to provide a general overview and should not be relied upon for any purpose except for that for which it was prepared. The full geotechnical report must be referenced for information about findings, recommendations, and other concerns.

2.0 PURPOSE AND SCOPE OF STUDY

Tetra Tech conducted a field exploration program consisting of four exploratory borings to obtain information on subsurface soil conditions for the proposed Otter Tail River HDD crossing. The geotechnical study was performed in accordance with Tetra Tech's scope of work dated March 26, 2022.

Results of the field investigation and laboratory tests were analyzed to characterize site material properties. This report summarizes the field and presents conclusions and recommendations for design and construction of the proposed crossing and associated site grading based on the proposed construction and subsurface conditions encountered. The report also includes design parameters and a discussion of geotechnical engineering considerations related to construction.

3.0 PROPOSED CONSTRUCTION

The project will include installation of a new HDD crossing approximately 8.5 miles southeast of Wahpeton, North Dakota. The proposed 4-inch diameter pipeline HDD crossing is approximately 3,575 feet long spanning the Otter Tail River. As the pipeline crosses the proposed alignment, HDD depths are anticipated to be on the order of 46 feet below the bottom of the Otter Tail River channel.

Equipment loads were not available at the time of report preparation, but are anticipated to be light, consisting of a small HDD drill rig and associated equipment. Site grading plans were not provided at the time of report preparation, but grading is anticipated to consist of minor cuts or fills less than 2 feet to level the site and provide a stable, uniform platform for HDD drilling equipment.

If the above proposed construction, loadings, and site grading will be significantly different from that described, Tetra Tech should be notified to re-evaluate the geotechnical recommendations and perform additional analysis as required.

4.0 FIELD EXPLORATION

The field exploration was conducted April 19 to 22, 2022 consisting of four boreholes and four geophysical seismic refraction surveys as depicted on Drawing No. 3015-1 (Locations of Exploratory Borings and Seismic Surveys) in Appendix A. Locations of the exploration borings were provided and staked in the field by project surveyor. Prior to mobilization, Minnesota One Call was contacted to request the location and clearance of public underground utilities before performing drilling.

Tetra Tech's drilling subcontractor (Interstate Drilling Services) advanced the borings with a track-mounted Diedrich drill rig equipped with 6-inch outside diameter, continuous flight, hollow stem augers, and mud rotary roller bit. Tetra Tech's field geologist provided technical oversight during the field investigation, logged the borings, and handled samples. The borings were reclaimed by backfilling with grout.

Samples of the subsurface materials were obtained with 2-inch outside diameter split-spoon samplers. Split-spoon samplers were driven into the various strata using a 140-pound hammer falling 30 inches. The number of blows required to advance the sampler each of three successive 6-inch increments was recorded. When using the split-spoon sampler, the total number of blows required to advance the sampler the second and third 6-inch increments is the penetration resistance (N value), as described by ASTM International (ASTM) Method D1586. Penetration resistance values generally indicate the relative density or consistency of the subsurface soils. Bulk samples of soil were obtained from the hollow-stem auger cuttings at select locations.

Boring logs were prepared noting the borehole location and elevation, equipment and drill methods used, subsurface profile and descriptions per ASTM D2487, and groundwater conditions. Depths at which the samples were obtained along with the penetration resistance values are shown on the logs of exploratory borings, presented in Appendix B (Figures 1B through 4B).

5.0 LABORATORY TESTING

Samples obtained during the field exploration were taken to Tetra Tech's laboratory where they were observed and visually classified in accordance with ASTM Method D2487, which is based on the Unified Soil Classification System. Representative samples were selected for testing and shipped to American Engineering Testing's laboratory to determine the physical properties of the soils in general accordance with ASTM or other approved procedures. The following list describes laboratory testing performed for this investigation, and their purpose:

Tests Conducted:	To Determine:
Natural Moisture Content	Moisture content representative of field conditions at the time samples were taken.
Grain-size Distribution	Size and distribution of soil particles (i.e., clay, silt, sand, and gravel).
Atterberg Limits	The effect of varying water content on the consistency of fine-grained soils.
Natural Dry Density	Dry unit weight of samples, representative of in-place conditions.
Direct Shear	Consolidated-Drained soil strength properties.
Resistivity and pH	The combination of these characteristics determines the potential of soil to corrode metal.
Water Soluble Sulfate Content	Potential of soils to deteriorate normal strength concrete.

Laboratory test results are presented in the American Engineering Testing lab results report in Appendix C. This data, along with the field information, were used to prepare the logs of exploratory borings on Figures 1B through 4B in Appendix B.

6.0 SITE CONDITIONS

The project alignment generally crosses agricultural fields located to the northeast and southwest of the Otter Tail River. Topography at the HDD 34 crossing site is generally relatively flat with a shallow main channel formed by the Otter Tail River. The maximum elevation difference across the ground surface along the proposed HDD 34 alignment is approximately 7 feet.

7.0 SUBSURFACE CONDITIONS

The soil profile encountered at the proposed pipeline crossing location generally comprised of alluvial soils consisting primarily of lean clay with varying amounts of sand and silt. Discontinuous sand layers 3 to 10 feet thick were encountered at various depths. The boring logs should be referenced for complete descriptions of the soil types and their estimated depths. A characterization of the subsurface profile includes grouping soils with similar physical and engineering properties into a number of distinct layers. The representative subsurface layers at the proposed crossing locations are presented below, starting at the ground surface.

7.1 ALLUVIAL SOILS

Borings BH-34-1 and BH-34-5 were located northeast of the Otter Tail River and borings BH-34-2 and BH-34-3 were located southwest of the Otter Tail River. Underlying a thin layer of topsoil, natural lean clay with varying amounts of sand and silt was encountered in the borings. The natural clay extended to the maximum boring depths explored (71.5 feet). The clay visually classified as lean clay, sandy lean clay, silty clay, and silty clay with sand according to ASTM D2488. Discontinuous layers of poorly graded sand to clayey sand 3 to 10 feet thick were encountered in the borings at varying depths. Penetration resistance values in the clay ranged from 0 to greater than 50 blows per foot indicating a very soft to hard soil stratum. Penetration resistance values generally increased with depth and with increased sand and gravel content.

Tests of representative samples obtained from the borings classified as poorly graded sand, well graded sand with silt, clayey sand, sandy lean clay, and sandy silt according to the ASTM Classification System. Liquid and plastic limit tests performed indicated that the clay portions of the samples had liquid limits ranging from 19 to 42 and plasticity indices ranging from 9 to 23 while silt portions of the sample clay portions of the samples had liquid limits ranging from 16 to 17 and plasticity indices ranging from non-plastic to 2.

Direct shear testing on representative samples indicates the soils have a friction angle of 20.4 to 32.4 degrees and are cohesionless. Unconfined compressive strength testing indicates the soils have an unconfined compressive strength of 1,051 to 5,529 pounds per square foot.

7.2 GROUNDWATER

Due to mud rotary drilling techniques and use of water as drill fluid, groundwater levels could not be observed in the borings at the time of the field investigation. The borings were backfilled immediately after drilling and water levels were not allowed to stabilize. Based on the Minnesota Well Index, wells within the project area generally encounter water at or near the ground surface. Typical fluctuations in groundwater elevations are attributed to the seasonal amounts of rainfall during a particular year and the Otter Tail River Water Level Elevation. Numerous factors contribute to groundwater fluctuations, and evaluation of such factors is beyond the scope of this report.

7.3 CORROSIVITY TESTING

Corrosivity testing consisting of pH, electrical resistivity, and water-soluble sulfate content was performed on several samples and the results are compiled below.

Boring No.	Sample Depth (ft)	Soil Type	pH	Resistivity	Sulfate Content (%)	Sulfate Exposure
BH-34-1	5	Sand	7	1,200	0.09	Low
BH-34-2	60	Sand	7	1,130	0.07	Low
BH-34-5	5	Sand	6	1,410	0.07	Low

Sulfate content is used to determine the potential for the on-site soils to deteriorate normal strength concrete and the measured results are considered low. The combination of pH and resistivity indicate the potential of corrosion of buried metal. Based on soil resistivity and pH data, the potential of corrosion of buried metal is high. A qualified corrosion engineer should review this data and recommend corrosivity protection and steel corrosion allowances as necessary.

8.0 DYNAMIC SOIL PROPERTIES

As part of the project, geophysical surveys were conducted at each end of the proposed crossings in order to further understand the subsurface geology and obtain shear modulus values for use in inadvertent returns analysis.

Tetra Tech conducted a geophysical seismic survey at the project site on June 7, 2022. Seismic data was collected to determine the shear wave (s-wave) and compression wave (p-wave) velocities of the subsurface (~116 feet) materials at the site. The seismic survey was completed as part of a geotechnical assessment at the site. The overall objective of the seismic survey was to help define the subsurface profile

and estimate dynamic soil properties. The seismic survey line locations are indicated on Drawing No. 3015-1 in Appendix A.

The interpreted p-wave and s-wave velocities and dynamic modulus calculations are presented in summary in Appendix D. Poisson's ratio and the shear modulus at various depths were also calculated and are presented in the summary tables. The values calculated for Poisson's ratio and the shear modulus were used to calculate Young's deformation modulus and the bulk modulus of the subsurface materials at each of the survey intervals. Estimated density values were used in the calculations.

The interpreted seismic cross sections indicate that the seismic s-wave velocities across the site range from approximately 410 feet per second (ft/s) to 1,781 ft/s. The interpreted seismic refraction cross sections indicate that the seismic p-wave velocities across this portion of the site range from approximately 1,526 ft/s to 9,645 ft/s. The slower velocities are representative of near surface unconsolidated material; higher velocities represent denser more consolidated material at depth. The maximum depth of investigation of the s-wave and p-wave seismic data was approximately 116 feet below ground surface. Included in the Appendix are approximate back-calculated dynamic modulus parameters obtained from the seismic data.

The geophysical survey was successful in providing data to assist in interpreting and mapping the geotechnical characteristics of the subsurface below the pipeline crossing locations along the alignment. Seismic methods, like any remote sensing technique, require the interpretation of indirect methods of measurement. As such, there is an inherent margin of error, which is unavoidable. The methods of data acquisition and interpretation are as complete as is reasonably possible and are a reasonable representation of the subsurface conditions. However, due to the subjective nature of any type of interpretation, results cannot be guaranteed to be accurate in all areas. The findings identified by this survey generally agree with the boring data when compared to the geotechnical borings collected at the site.

9.0 ENGINEERING ANALYSIS AND RECOMMENDATIONS

9.1 SITE GRADING

It is anticipated that minor site grading will be required consisting of cuts and fills of less than 2 feet to level the crossing entry/exit sites and provide a stable, uniform bearing platform for HDD drilling equipment. Excavation of the overburden soil can be accomplished with conventional heavy-duty earth excavation equipment. If site grading significantly differs from what is described herein, the recommendations of this report must be reviewed and revised as necessary to reflect the final grading plan.

Drilling equipment and other support equipment and materials may be supported on prepared construction pads consisting of heavy-duty timber or fabricated mats as is typical industry practice for this type of construction.

Depending on the season and precipitation patterns, the natural moisture content in the excavated material may be higher or lower than the optimum moisture content. Moisture conditioning will be required to adjust the natural moisture content of the soils to within 2 percent of optimum moisture to achieve proper compaction. Unless the soils are processed to adjust the moisture content, it will be difficult to achieve compaction when placed as fill.

In addition, depending on the time of construction, natural moisture conditions and precipitation will influence the mobility of construction equipment. The use of low ground pressure, track-mounted equipment should be anticipated by the contractor since tracks will exert lower ground pressures than pneumatic tires. In loose subgrade soils such as these, pneumatic-tired equipment may rut the subgrade and reduce its shear strength. Construction mats may also be an acceptable alternative to provide a stable working platform for construction equipment and high traffic areas during wetter periods.

Freezing temperatures have the potential to impact construction. Prolonged periods of cold weather in the months of November through March may be difficult for construction since it can be difficult to drill with fluid methods in subfreezing temperatures. Fill should not be placed during freezing temperatures, especially during winter months unless construction practices are altered to adjust to these conditions. Under no circumstances should foundations be constructed on frozen materials.

Site grading plans must include drainage features to rapidly drain surface run-off away from the site. All grades must provide effective drainage away from the construction area during and after construction. Drainage run-off should be controlled with Best Management Practices (BMPs) such as silt fences, straw bales and wattles, earthen berms, or similar approved features. Such collection and discharge must be in compliance with the Project's site-specific storm water pollution prevention plan (SWPPP).

Design and construction criteria presented below should be observed for site preparation purposes and when preparing project documents for construction. Construction details should be considered when preparing project documents.

1. All fill and backfill should be approved by the geotechnical engineer, moisture-conditioned to within 2 percent of optimum moisture content and placed in uniform lifts of suitable thickness for the compaction equipment. It should then be compacted to at least 95 percent of the maximum dry density as determined by ASTM D698.
2. Imported granular material used as backfill should meet the following grading requirements and be placed and compacted in accordance with Item 3 above.

Sieve and Screen Size	Percent Passing
3-Inch	90 – 100
No. 4	25 – 50
No. 40	10 – 20
No. 200	0 – 15

3. The on-site natural soils are suitable for use as general over-lot fill provided any organic or deleterious material is removed and it is placed under controlled moisture and density conditions.
4. The contractor is responsible for providing safe working conditions in connection with underground excavations. Temporary construction excavations which workers will enter will be governed by OSHA guidelines 29 CFR 1926, Subpart P. For planning purposes, subsoils encountered in the exploratory borings classify as Type C.

9.2 INADVERTENT RETURNS

Subsurface assessments to analyze the risk of hydraulic fracturing and inadvertent returns during the HDD process were conducted for the proposed Otter Tail River crossing. The proposed HDD 34 bore is anticipated to be drilled by HDD equipment with an entry point starting approximately 1,800 feet southwest of the Otter Tail River and a pilot hole drilled to a minimum depth of 46 ft below the river channel, exiting approximately 1,660 feet beyond the northeastern bank of the Otter Tail River, where the bore is stopped. The stopping point is then excavated, the bore path is reamed out and the pipe is pulled through for tie in with the next section of pipe. This bore geometry was used in the model for inadvertent return analyses of the river bore crossing.

Analyses were conducted based on topographic and HDD profiles provided by Tetra Tech coupled with subsurface characteristics determined from the field investigation and laboratory testing. The analyses were conducted using the Bingham Plastic Model for minimum required drilling fluid pressures, and the Delft (cavity expansion) approach for maximum allowable pressures using procedures detailed in the US Army Corps of Engineers Conduits, Pipes, and Culverts Associated with Dams and Levee Systems, (US Army Corps of Engineers, 2020). Graphical depiction of calculated minimum and maximum drilling fluid pressures relative to location and depth are provided in Appendix E.

9.2.1 Hydrofracture

Environmental concerns related to inadvertent drilling fluid returns are an increasingly significant issue for HDD design and operations. Although drilling fluid is comprised primarily of water and 1 to 3 percent bentonite and other additives, the fine bentonite and additive particles can smother invertebrates, aquatic and wetland plants, and fish and their eggs if discharged into a waterway or wetland area. By conducting assessments to analyze the potential risk of inadvertent fluid returns and using competent design and construction practices, risk can be minimized.

Inadvertent fluid returns are often referred to as hydrofractures or “frac-outs”. However, not all of these instances are actually caused by hydrofracture. Sources of inadvertent fluid returns can include existing fissures in the soil, preferential seepage paths along piers, piles or other structures, joints and fractures in rock masses, and open-graded, loose gravel or rocks above the bore. Hydraulic fracturing is a specific occurrence in soils when the pressure of the drilling fluid exceeds the strength and confining stress of the surrounding soils, and the excess pressure fractures the soil around the bore allowing drilling fluids to escape the annulus.

Drilling fluid in the bore exerts pressure on the surrounding soil, causing it to deform. As the drilling fluid pressure in the annulus increases, the zone of soil that is affected and plastically deforms increases until it reaches a limiting radius. Once that radius is reached, a fracture forms and drilling fluid is lost to the surrounding formation, propagating the fracture. Drilling fluid pressure decays rapidly with distance from the bore, but it generally takes less pressure to propagate a fracture than it does to initiate one, so the best method to prevent hydrofracture is to avoid initiating a fracture. Even if a fracture is initiated, not all hydrofractures are observed at the ground surface. The path of least resistance through the soil may not lead the fracture to the surface or the fracture might never reach the surface due to the rapid pressure decay.

Maximum allowable calculated pressure at any point is the pressure required to create a plastic (failed) zone equal to the depth of soil above the pipeline at that point. Graphically speaking, the factor of safety against the plastic zone reaching the ground surface is 1.0 for any location along the maximum allowable pressure curve.

Minimum drilling fluid pressure required to return the soil cuttings back through the HDD bore to the surface is a critical factor in evaluating hydrofracture risk. Minimum pressure depends on the length, depth and diameter of the bore, the weight of the drilling fluid and the flow rate. Minimum required pressure is a combination of the drilling fluid head pressure that must be overcome and the frictional resistance to flow from the bore wall.

Drilling fluid pressures are often highest during the pilot bore, because of the smaller annulus and one-way flow path. During reaming, drilling fluid can flow out through the entry or exit, and the annulus is larger, therefore pressures are usually lower. Pressures during pullback, however, can be high because the larger diameter of the product pipe reduces the annular flow path.

Drilling fluid pressures can vary greatly with the contractor's methods and changes in ground conditions. Although calculations may indicate there is little risk of hydrofracture in various locations along the bore, an

inexperienced operator or unforeseen soil conditions can greatly affect that risk. Selection of an experienced, qualified contractor is an important step in preventing hydrofracture.

Relief wells can be installed at locations where excessive drilling fluid pressures may exceed the soil's capability to resist hydrofracture. Locations should be selected that are accessible for containment and cleanup equipment, making it easier to maintain a clean worksite, while avoiding damage to sensitive features.

Regardless of the preventative measures used or the relative risk of hydrofracture, a contingency plan should be provided by the Contractor. This plan should include a procedure for containing and cleaning up any inadvertent fluid returns and describe materials that the Contractor should have on hand such as sand bags, hay bales, wattles, or turbidity curtains to contain the fluid, a vac-truck or trailer, shovels, brooms, or barrels to contain the fluid and submersible pumps to remove the liquid.

9.2.2 Analysis

The inadvertent returns analyses consisted of a two-part approach; determining the approximate maximum allowable fluid pressure that can be withstood without initiating plastic yielding (hydrofracture) and determining the minimum required drilling fluid pressure to return cuttings to the surface. The difference between the calculated maximum allowable and minimum required drilling fluid pressures indicates the relative risk of hydrofracture at any point along the bore.

The minimum required drilling fluid pressures were determined with the Bingham Plastic Model, which provides a relatively conservative approach. In order to satisfy the Bingham equation for minimum pressures, bore properties such as length, depth, and diameter, and drilling fluid properties such as viscosity, yield point, and flow rate, are needed. Drilling fluids and their properties can vary substantially depending on the specific contractor, actual drilling conditions, and other factors. As such, drilling fluid properties used in the analyses were estimated based on information provided to Tetra Tech. In the literature, a recommended value for drilling fluid (e.g. mud) is less than 9.5 lb/gallon. If the below properties will be significantly different from that assumed, Tetra Tech should be notified to perform additional analysis and update recommendations as required. The table below summarizes the drilling fluid properties assumed for the analyses.

Summary of Assumed HDD Drilling Fluid Properties

Variable	Pilot Hole	Pullback
Drilling Fluid Weight	10.5 lb/gal	10.5 lb/gal
Drilling Fluid Viscosity	35 Cp	35 Cp
Drilling Fluid Yield Point	15 lb/100ft ²	15 lb/100ft ²
Flow Rate at Drill Bit	120 gal/min	120 gal/min

Diameters of the pilot hole and reamer for pullback of the product pipe were assumed for the analyses. A pilot hole diameter of 6 inches and a reaming bit diameter of 8.5 inches for pullback were assumed for the analyses. A nominal pilot hole drill pipe diameter of 2 inches and pullback hole drill pipe diameter of 3 inches was assumed for calculations of the effective annulus for transport of drilling fluid and cuttings.

The maximum allowable drilling fluid pressures were determined from the Delft approach, commonly referred to as the Cavity Expansion Model. The model assumes the radius of the plastic zone around the bore can grow infinitely. Since this assumption is unrealistic to actual soil conditions, multiple recommendations have been suggested in the literature to limit the plastic radius according to soil type and depth.

As previously discussed, although hydrofractures can initiate during drilling, such hydrofractures may not reach the ground surface as they propagate along the path of least resistance. Since propagation of hydrofractures along these errant pathways rely on complex geologic conditions and a multitude of other factors are not readily known or determined, the risk analyses only evaluated the possibility of hydrofractures reaching ground level by means of plastic deformation.

The Cavity Expansion Model relies on soil conditions such as internal angle of friction, cohesion, shear modulus, groundwater, and effective stress, as well as the depth and radius of the bore. From these parameters, which vary depending on the position of the bore, a theoretical maximum allowable drilling fluid pressure is determined. To the extent practical, the analyses were performed using data from the field and available published values. It should be noted that the calculations assume soil properties are homogeneous within respective layers.

9.2.3 Results

Graphical results of the analyses are presented on Figures 1E through 3E in Appendix E. The plots depict minimum required drilling fluid pressure (P_{min}) and the maximum allowable drilling fluid pressure (P_{max}) (Figure 1E and 2E) and Factor of Safety (Figure 3E) as a function of the bore path and ground elevation. The results indicate the factor of safety against hydrofracture is above 2.0 across the majority of the bore path.

The analyses and accompanying plots for the crossing site show an elevated risk of hydrofracture near the entry and exit point of the bores. This risk is typical for HDD bores, and should be mitigated through common measures, including specifying that the Contractor have tools and equipment on-site for rapid containment and clean-up of any inadvertent fluid returns. SCS should also develop a detailed surface spill and hydrofracture contingency plan for the project that describes the planned response in the event of an inadvertent drilling fluid return.

The analyses show a risk of hydrofracture with a factor of safety less than 2.0 in the section between the entry point and Station 0+75 in the section between Station 33+00 and the exit point. These lower factors of safety are attributed to the soft clayey material below the water table that provides low confining resistance for hydrofracture due to relatively low shear strength. To mitigate potential hydrofracture risk, methods including relief wells or conductor casings can be utilized.

Prior to initiating drilling, the minimum fluid pressure should be determined to allow the cuttings to be returned to the surface. The minimum pressure is dependent on the length of the boring, boring depth, boring diameter, flow rate, and weight of the drilling fluid. Since actual drilling fluid conditions (e.g. viscosity, yield point, and flow rates) are unknown, drilling fluid conditions were assumed for the minimum required fluid pressures provided with this analysis. Once actual drilling fluid parameters are known, the minimum fluid pressures can be recalculated and the chart updated and reevaluated for critical points (e.g. river channel) where the factor of safety is near 1.0, indicating the risk of hydrofracturing is higher.

10.0 CONTINUING SERVICES

Two additional elements of geotechnical engineering service are important to the successful completion of this project.

1. **Consultation with Tetra Tech during the design phase.** This is essential to ensure that the intent of our recommendations is incorporated in design decisions related to the project and that changes in the design concept consider geotechnical aspects.

2. **Observation and monitoring during construction.** Tetra Tech should be retained to observe the earthwork phases of the project, including the site grading and excavations, to determine that the subsurface conditions are compatible with those described in our analysis. In addition, if environmental contaminants or other concerns are discovered in the subsurface, our personnel are available for consultation.

11.0 LIMITATIONS

This study has been conducted in accordance with generally accepted geotechnical engineering practices in the region where the work was conducted. The conclusions and recommendations submitted in this report are based upon project information provided to Tetra Tech and data obtained from the exploratory borings drilled and the geophysical surveys at the locations indicated. The nature and extent of subsurface variations across the site may not become evident until construction. Tetra Tech should be on site during construction, to verify that actual subsurface conditions are consistent with those described herein.

This report has been prepared exclusively for Tetra Tech Rooney and Summit Carbon Solutions. This report and the data included herein shall not be used by any third party without the express written consent of both the client and Tetra Tech. Tetra Tech is not responsible for technical interpretations by others. As the project evolves, Tetra Tech should provide continued consultation and field services during construction to review and monitor the implementation of the recommendations and verify that the recommendations have been appropriately interpreted. Significant design changes may require additional analysis or modifications of the recommendations presented herein. Tetra Tech recommends on-site observation of excavations and foundation bearing strata and testing of fill by a representative of the geotechnical engineer.

12.0 REFERENCES

- Bennett, D., & Wallin, K. (2008). Step by Step Evaluation of Hydrofracture Risks for Horizontal Directional Drilling Projects. *ASCE Pipelines Conference Proceeding Paper*, (p. 321).
- Miller, M., & Robison, J. (2018). *Formational Fluid Loss and Inadvertent Returns Risk in Sedimentary Rock HDD Construction*. Palm Springs: North American Society for Trenchless Technology (NASTT).
- US Army Corps of Engineers. (2020). *Conduits, Pipes, and Culverts Associated with Dams and Levee Systems*.

APPENDIX A

Important Information about Your Geotechnical Engineering
Report (Published by ASFE/GBA)

Tetra Tech Boring Log Descriptive Terminology Key
to Soil and Rock Symbols and Terms

Classification of Soils for Engineering Purposes

Location of Exploratory Borings and Seismic Surveys
Drawing No. 3015-1

HDD Plan and Profile Details

IMPORTANT INFORMATION

ABOUT YOUR

GEOTECHNICAL ENGINEERING REPORT

More construction problems are caused by site subsurface conditions than any other factor. As troublesome as subsurface problems can be, their frequency and extent have been lessened considerably in recent years, due in large measure to programs and publications of ASFE/The Association of Engineering Firms Practicing in the Geosciences.

The following suggestions and observations are offered to help you reduce the Geotechnical-related delays, cost-overruns and other costly headaches that can occur during a construction project.

A GEOTECHNICAL ENGINEERING REPORT IS BASED ON A UNIQUE SET OF PROJECT-SPECIFIC FACTORS

A Geotechnical engineering report is based on a subsurface exploration plan designed to incorporate a unique set of project-specific factors. These typically include: the general nature of the structure involved, its size and configuration; the location of the structure on the site and its orientation; physical concomitants such as access roads, parking lots, and underground utilities, and the level of additional risk which the client assumed by virtue of limitations imposed upon the exploratory program. To help avoid costly problems, consult the geotechnical engineer to determine how any factors which change subsequent to the date of the report may affect its recommendations.

Unless your consulting Geotechnical engineer indicates otherwise, *your Geotechnical engineer report should not be used:*

- When the nature of the proposed structure is changed, for example, if an office building will be erected instead of a parking garage, or if a refrigerated warehouse will be built instead of an unrefrigerated one;
- when the size or configuration of the proposed structure is altered;
- when the location or orientation of the proposed structure is modified;
- when there is a change of ownership, or
- for application to an adjacent site.

Geotechnical engineers cannot accept responsibility for problems which may develop if they are not consulted after factors considered in their reports' development have changed.

MOST GEOTECHNICAL "FINDINGS" ARE PROFESSIONAL ESTIMATES

Site exploration identifies actual subsurface conditions only at those points where samples are taken, when they are taken.

Data derived through sampling and subsequent laboratory testing are extrapolated by Geotechnical engineers who then render an opinion about overall subsurface conditions, their likely reaction to proposed conditions, their likely reaction to proposed construction activity, and appropriate foundation design. Even under optimal circumstances actual conditions may differ from those inferred to exist, because no Geotechnical engineer, no matter how qualified, and not subsurface exploration program, no matter how comprehensive, can reveal what is hidden by earth, rock and time. The actual interface between materials may be far more gradual or abrupt than a report indicates. Actual conditions in areas not sampled may differ from predictions. *Nothing can be done to prevent the unanticipated, but steps can be taken to help minimize their impact.* For this reason, *most experienced owners retain their Geotechnical consultants through the construction stage*, to identify variances, conduct additional tests which may be needed, and to recommend solutions to problems encountered on site.

SUBSURFACE CONDITIONS CAN CHANGE

Subsurface conditions may be modified by constantly-changing natural forces. Because a Geotechnical engineering report is based on conditions which existed at the time of subsurface exploration, *construction decisions should not be based on a Geotechnical engineering report whose adequacy may have been affected by time.* Speak with the Geotechnical consultant to learn if additional tests are advisable before construction starts.

Construction operations at or adjacent to the site and natural events such as flood, earthquakes or groundwater fluctuations may also affect subsurface conditions and, thus, the continuing adequacy of a geotechnical report. The geotechnical engineer should be kept apprised of any such events, and should be consulted to determine if additional tests are necessary.

GEOTECHNICAL SERVICES ARE PERFORMED FOR SPECIFIC PURPOSES AND PERSONS

Geotechnical engineers' reports are prepared to meet the specific needs of specific individuals. A report prepared for a consulting civil engineer may not be adequate for a construction contractor, or even some other consulting civil engineer. Unless indicated otherwise, this report was prepared expressly for the client involved and expressly for purposes indicated by the client. Use by any other persons for any purpose, or by the client for a different purpose, may result in problems. *No individual other than the client should apply this report for its intended purpose without first conferring with the*

geotechnical engineer. No person should apply this report for any purpose other than that originally contemplated without first conferring with the geotechnical engineer.

A GEOTECHNICAL ENGINEERING REPORT IS SUBJECT TO MISINTERPRETATION

Costly problems can occur when other design professionals develop their plans based on misinterpretations of a geotechnical engineering report. To help avoid these problems, the geotechnical engineer should be retained to work with other appropriate design professionals to explain relevant geotechnical findings and to review the adequacy of their plans and specifications relative to geotechnical issues.

BORING LOGS SHOULD NOT BE SEPARATED FROM THE ENGINEERING REPORT

Final boring logs are developed by geotechnical engineers based upon their interpretation of field logs (assembled by site personnel) and laboratory evaluation of field samples. Only final boring logs customarily are included in geotechnical engineering reports. *These logs should not under any circumstances be redrawn* for inclusion in architectural or other design drawings, because drafters may commit errors or omissions in the transfer process. Although photographic reproduction eliminates this problem, it does nothing to minimize the possibility of contractors misinterpreting the logs during bid preparation. When this occurs, delays, disputes and unanticipated costs are the all-too-frequent result.

To minimize the likelihood of boring log misinterpretation, *give contractors ready access to the complete geotechnical engineering report* prepared or authorized for their use. Those

who do not provide such access may proceed under the *mistaken* impression that simply disclaiming responsibility for the accuracy of subsurface information always insulates them from attendant liability. Providing the best available information to contractors helps prevent costly construction problems and the adversarial attitudes which aggravate them to disproportionate scale.

READ RESPONSIBILITY CLAUSES CLOSELY

Because geotechnical engineering is based extensively on judgment and opinion, it is far less exact than other design disciplines. This situation has resulted in wholly unwarranted claims being lodged against geotechnical consultants. To help prevent this problem, geotechnical engineers have developed model clauses for use in written transmittals. These are *not* exculpatory clauses designed to foist geotechnical engineers' liabilities onto someone else. Rather, they are definitive clauses which identify where geotechnical engineers' responsibilities begin and end. Their use helps all parties involved recognize their individual responsibilities and take appropriate action. Some of these definitive clauses are likely to appear in your geotechnical engineering report, and you are encouraged to read them closely. your geotechnical engineer will be pleased to give full and frank answers to your questions.

OTHER STEPS YOU CAN TAKE TO REDUCE RISK

Your consulting geotechnical engineer will be pleased to discuss other techniques which can be employed to mitigate risk. In addition, ASFE as developed a variety of materials which may be beneficial. Contact ASFE for a complimentary copy of its publications directory.

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8811 Colesville Road/Suite G106/Silver Spring, Maryland 20910/(301)565-2733



LOGS OF EXPLORATIONS

EXPLANATION OF ABBREVIATIONS AND DESCRIPTIVE TERMS

- SSS (SPT) - Standard penetration resistance test – results recorded as the number of blows of a 140-pound hammer falling 30 inches required to drive a 2-inch O.D. split sample spoon the second and third 6-inch increments of an 18-inch distance.
- LSS - Modified penetration test – results recorded as the number of blows of a 140-pound hammer falling 30 inches required to drive a 2.5-inch O.D. split spoon the second and third 6-inch increments of an 18-inch distance.
- SRS - Split barrel ring sampler 2-inches I.D. for taking undisturbed samples.
- LRS - Split barrel ring sampler 2.5 inches I.D. for taking undisturbed samples.
- STS - Shelby tube sampler for taking undisturbed samples (2” to 3-5/16” I.D.).
- Sack (SK) or Bag - Sample of disturbed soil placed in canvas sack or plastic bag.
- GWL - Groundwater level on the date shown on the logs.
- RQD - Rock quality designation (RQD) for the bedrock samples are determined for each core run by summing the length of all sound, hard pieces of core over four inches in length, and dividing this number by the total length of the core run. This value, along with the core recovery percentage, is recorded on the drill logs.

GRAIN SIZES

	U.S. Standard Series Sieve					Clear Square Sieve Openings	
	200	40	10	4	¾”	3”	12”
Silts & Clays Distinguished on Basis of Plasticity	SAND				GRAVEL		Cobbles Boulders
	Fine	Medium	Coarse	Fine	Coarse		

CONSISTENCY		RELATIVE DENSITY	
Clays & Silts	SPT* Blows/foot	Sands & Gravels	SPT* Blows/foot
Very Soft	0 – 2	Very Loose	0 – 4
Soft	3 – 4	Loose	5 – 10
Firm	5 – 8	Medium Dense	11 – 30
Stiff	9 – 15	Dense	31 – 50
Very Stiff	15 – 30	Very dense	Over 50
Hard	Over 30		

*Standard Penetration Test; PL = Plastic Limit; LL = Liquid Limit

Tetra Tech Boring Log Descriptive Terminology

Key to Soil Symbols and Terms

12/06/12



TETRA TECH

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS		TYPICAL
			GRAPH	LETTER	DESCRIPTIONS
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	Well-graded gravels, gravel sand mixtures, little or no fines.
				GP	Poorly graded gravels, gravel-sand mixtures, little or no fines.
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	Silty gravels, gravel-sand-silt mixtures.
			GC	Clayey gravels, gravel-sand-clay mixtures.	
	SAND AND SANDY SOILS	CLEAN SANDS (LITTLE OR NO FINES)		SW	Well-graded sands, gravelly sands, little or no fines.
				SP	Poorly graded sands, gravelly sands, little or no fines.
SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)			SM	Silty sands, sand-silt mixtures.	
			SC	Clayey sands, sand-clay mixtures.	
FINE GRAINED SOILS	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity.
				CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays.
				OL	Organic silts and organic silty clays of low plasticity.
	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts.
				CH	Inorganic clays of high plasticity, fat clays.
				OH	Organic clays of medium to high plasticity, organic silts.
HIGHLY ORGANIC SOILS				PT	Peat and other highly organic soils.

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

Notes

See Soil Boring Information Special Provision.

SPT (Standard Penetration Test-ASTM D1586):

The number of blows of a 140 lb (63.6 kg) hammer falling 2.5 ft (750 mm) used to drive a 2 in (50 mm) O.D. Split Spoon sampler for a total of 1.5 ft (0.45 m) of penetration.

Written as follows:

first 0.5 ft (0.15 m) - second 0.5 ft (0.15 m) - third 0.5 ft (0.15 m)
(ex: 1-3-9)

Note: if the number of blows exceeds 50 before 0.5 ft (0.15 m) of penetration is achieved, the actual penetration rounded to the nearest 0.1 ft (0.03 m) follows the number of blows in parentheses (ex: 12-24-50 (0.09 m), 34-50 (0.4 ft), or 100 (0.3 ft)). WR denotes a zero blow count with the weight of the rods only.

WH denotes a zero blow count with the weight of the rods plus the weight of the hammer.

MC=Moisture Content, LL=Liquid limit, PL=Plastic Limit
-200%=percent soil passing 200 sieve, DD=Dry Density

Soil Classifications are Based on the Unified Soil Classification System, ASTM D2487 and D2488.
Also included are the AASHTO group classifications (M145). Descriptions are based on visual observation, except where they have been modified to reflect results of laboratory tests as deemed appropriate.

Example soil description: Sandy FAT CLAY (CH), soft, wet, brown. (A-7)

Order of Descriptors

- Group Name
- Consistency or Relative Density
- Moisture Condition
- Color
- Particle size descriptor(s) (coarse grained soils only)
- Angularity of coarse grained soils
- Other relevant notes

Criteria For Descriptors

Consistency of Fine Grained Soils

Consistency	N-Value (uncorrected)
Very Soft	< 2
Soft	2 - 4
Medium Stiff	5 - 8
Stiff	9 - 15
Very Stiff	16 - 30
Hard	> 30

Apparent Density of Coarse Grained Soils

Relative Density	N-Value (uncorrected)
Very Loose	< 4
Loose	4 - 10
Medium Dense	11 - 30
Dense	31 - 50
Very Dense	> 50

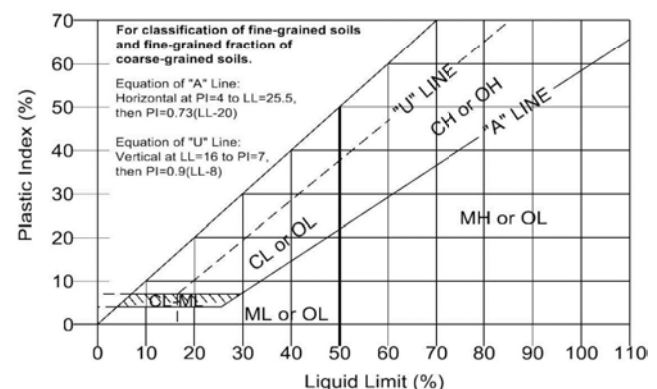
Moisture Condition

Dry	-Absence of moisture, dusty, dry to the touch.
Moist	-Damp, but no visible water.
Wet	-Visible free water.

Definition of Particle Size Ranges

Soil Component	Size Range
Boulder	> 12 in (300 mm)
Cobble	3 in (75 mm) - 12 in (300 mm)
Gravel	No. 4 Sieve (4.75 mm) to 3 in (75 mm)
Sand	No. 200 (0.075 mm) to No. 4 Sieves (4.75 mm)
Silt	< No. 200 Sieve (0.075 mm)*
Clay	< No. 200 Sieve (0.075 mm)*

*Atterberg limits and chart below to differentiate between silt and clay.



Angularity of Coarse-Grained Particles

Angular	-Particles have sharp edges and relative plane sides with unpolished surfaces.
Subangular	-Particles are similar to angular description, but have rounded edges.
Subrounded	-Particles have nearly plane sides, but have no edges.
Rounded	-Particles have smoothly curved sides and well-rounded corners and edges.

Tetra Tech Boring Log Descriptive Terminology

Key to Rock Symbols and Terms

12/06/12



TETRA TECH

Rock Type	Symbol	Rock Type	Symbol	Rock Type	Symbol
Argillite		Dolomite		Quartzite	
Basalt		Gneiss		Rhyolite	
Bedrock (other)		Granitic		Sandstone	
Breccia		Limestone		Schist	
Claystone		Siltstone		Shale	
		Conglomerate			

Order of Descriptors

- Rock Type
- Color
- Grain size (if applicable)
- Stratification/Foliation (as applicable)
- Field Hardness
- Other relevant notes

Criteria For Descriptors

Grain Size

Description	Characteristic
Coarse Grained	-Individual grains can be easily distinguished by eye
Fine Grained	-Individual grains can be distinguished with difficulty

Stratum Thickness

Thickly Bedded	3-10 ft (1-3 m)
Medium Bedded	1-3 ft (300 mm - 1 m)
Thinly Bedded	2-12 in (50-300 mm)
Very Thinly Bedded	< 2 in (50 mm)

Rock Field Hardness

Very Soft	-Can be carved with knife. Can be excavated readily with point of rock hammer. Can be scratched readily by fingernail.
Soft	-Can be grooved or gouged readily by knife or point of rock hammer. Can be excavated in fragments from chips to several inches in size by moderate blows of the point of a rock hammer.
Medium	-Can be grooved or gouged 0.05 in (2 mm) deep by firm pressure of knife or rock hammer point. Can be excavated in small chips to pieces about 1 in (25 mm) maximum size by hard blows of the point of a rock hammer.
Moderately hard	-Can be scratched with knife or pick. Gouges or grooves to 0.25 in (6 mm) can be excavated by hard blow of rock hammer. Hand specimen can be detached by moderate blows.
Hard	-Can be scratched with knife or pick only with difficulty. Hard hammer blows required to detach hand specimen.
Very Hard	-Cannot be scratched with knife or sharp rock hammer point. Breaking of hand specimens requires several hard blows of a rock hammer.

Notes:

UCS = Unconfined Compressive Strength obtained from laboratory testing at the given depth.

See Soil Boring Information Special Provision.

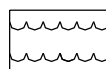
Miscellaneous Soil/Rock Symbols and Terms



Concrete



Asphalt



Water



Boulders and Cobbles



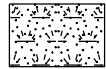
Coal



Fill



Millings



Topsoil

-Soil and Rock descriptions are based on visual observation, except where they have been modified to reflect results of laboratory tests as deemed appropriate.

Explanation of Text Fields In Boring Logs:

Material Description: Lithologic Description of soil or rock encountered.

Remarks: Comments on drilling, including method, bit type, and problems encountered.

Unless stated on logs as being surveyed by district survey, all locations are considered approximate.

General Notes

- Descriptions on these boring logs apply only at the specific boring, and at the time the borings were made. These logs are not warranted to be representative of subsurface conditions at other locations or times.
- Water level observations apply only at the specific boring, and at the time the borings were made. Due to the variability of groundwater measurements given the type of drilling used, and the stratification of the soil in the boring, these logs are not warranted to be representative of groundwater conditions at other locations or times.
- Other terms may be used as descriptors, as defined by the profession.

Operation Types:



Auger



Casing Advancer



Core Barrel



Drive Casing

Sample Types:



Split Spoon



Shelby



Bulk Sample



Grab Sample



Cone Penetrometer



Vane Shear



Special Samplers



Testpit

Example Rock Log

SANDSTONE, gray, fine grained, thickly bedded, hard field hardness.



CLASSIFICATION OF SOILS FOR ENGINEERING PURPOSES

ASTM Designation: D 2487 – 83
(Based on Unified Soil Classification System)

MAJOR DIVISIONS				GROUP SYMBOL	GROUP NAME
Coarse-Grained Soils More than 50% retained on No. 200 sieve	Gravels More than 50% coarse fraction retained on No. 4 sieve	Clean Gravels Less than 5% fines	$C_u \geq 4$ and $1 \leq C_c \leq 3^E$	GW	Well graded gravel ^F
			$C_u < 4$ and/or $1 > C_c > 3^E$	GP	Poorly graded gravel ^F
		Gravels with Fines More than 12% fines	Fines classify as ML or MH	GM	Silty gravel ^{F GH}
			Fines classify as CL or CH	GC	Clayey gravel ^{F GH}
	Sands 50% or more of coarse fraction passes No. 4 sieve	Clean Sands Less than 5% fines	$C_u \geq 6$ and $1 \leq C_c \leq 3^E$	SW	Well-graded sand ^I
			$C_u < 6$ and/or $1 > C_c > 3^E$	SP	Poorly graded sand ^I
		Sands with Fines More than 12% fines	Fines classify as ML or MH	SM	Silty Sand ^{G HI}
			Fines classify as CL or CH	SC	Clayey sand ^{G HI}
Fine-Grained Soils 50% or more passes the No. 200 sieve	Silts and Clays Liquid limit less than 50	Inorganic	PI > 7 and plots on or above "A" line	CL	Lean clay ^{K LM}
			PI < 4 or plots below "A" line	ML	Silt ^{K LM}
	Silts and Clays Liquid limit 50 or more	Organic	$\frac{\text{Liquid limit} - \text{oven dried}}{\text{Liquid limit} - \text{not dried}} < 0.75$	OL	Organic clay ^{K LMN} Organic silt ^{K LMO}
		Inorganic	PI plots on or above "A" line	CH	Fat clay ^{K LM}
			PI plots below "A" line	MH	Elastic silt ^{K LM}
		Organic	$\frac{\text{Liquid limit} - \text{oven dried}}{\text{Liquid limit} - \text{not dried}} < 0.75$	OH	Organic clay ^{K LMO} Organic silt ^{K LMO}
Highly organic soils	Primarily organic matter, dark in color, and organic odor			PT	Peat

^A Based on the material passing the 3-in. (75-mm) sieve.

^B If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.

^C Gravels with 5 to 12% require dual symbols:
GW-GM well-graded gravel with silt
GW-GC well-graded gravel with clay
GP-GM poorly graded gravel with silt
GP-GC poorly graded gravel with clay

^D Sands with 5 to 12% fines require dual symbols:
SW-SM well-graded sand with silt
SW-SC well-graded sand with clay
SP-SM poorly graded sand with silt
SP-SC poorly graded sand with clay

^E $C_u = D_{60}/D_{10}$ $C_c = (D_{30})^2 / (D_{10} \times D_{90})$

^F If soil contains $\geq 15\%$ sand, add "with sand" to group name.

^G If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.

^H If fines are organic, add "with organic fines" to group name.

^I If soil contains $\geq 15\%$ gravel, add "with gravel" to group name.

If soil contains $\geq 15\%$ gravel, add "with gravel" to group name.

^J If Atterberg limits plot in hatched area, soil is a CL-ML, silty clay.

^K If soil contains 15 to 29% plus No. 200, add "with sand" or "with gravel", whichever is predominant.

^L If solid contains $\geq 30\%$ plus No. 200, predominantly sand, add "sandy" to group name.

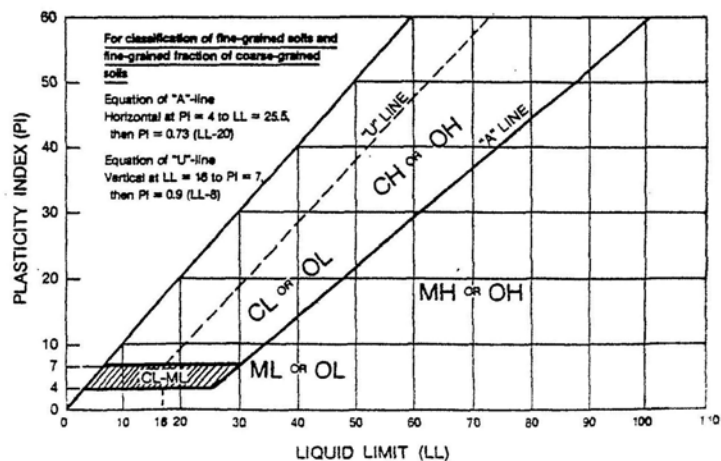
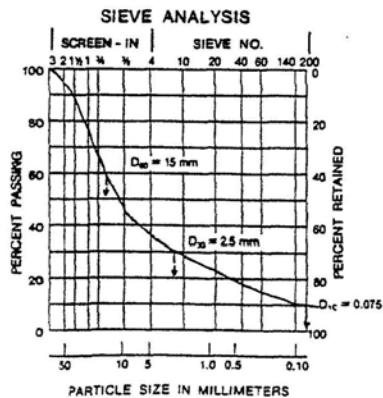
^M If soil contains $\geq 30\%$ plus No. 200, predominantly gravel, add "gravelly" to group name.

^N PI ≥ 4 and plots on or above "A" line.

^O PI < 4 or plots below "A" line.

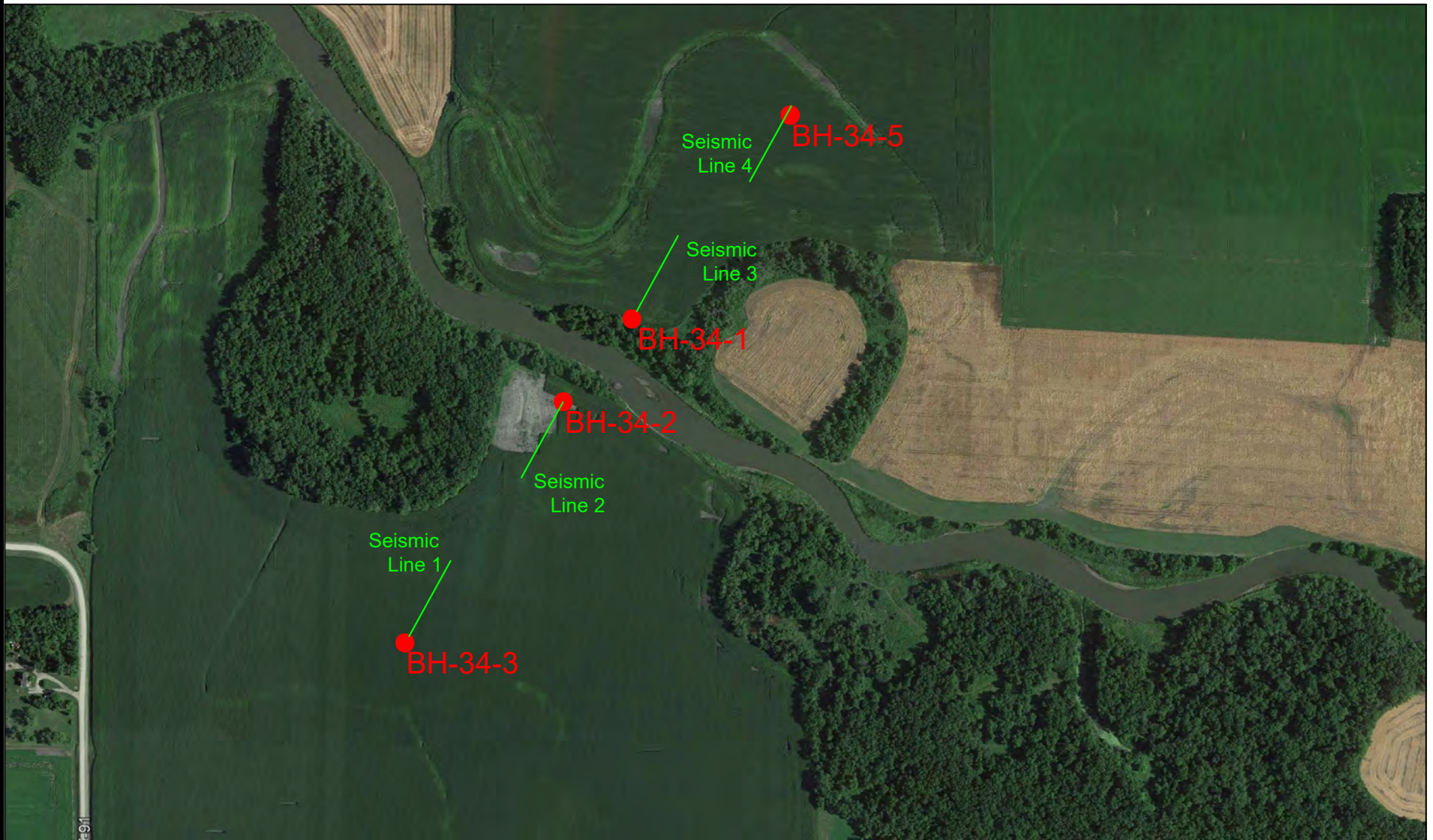
^P PI plots on or above "A" line.

^Q PI plots below "A" line.



$$C_u = \frac{D_{60}}{D_{10}} = \frac{15}{0.075} = 200 \quad C_c = \frac{(D_{30})^2}{D_{10} \times D_{90}} + \frac{(2.5) - (0.075)}{0.075 \times 15} = 5.6$$

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TETRA TECH

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Missoula, MT 59808
Phone: (406) 543-3045

Client: Tetra Tech Rooney

Midwest Carbon Express HDD 34 - Otter Tail River Crossing
Wilkin County, Minnesota
LOCATION OF EXPLORATORY BORINGS AND SEISMIC SURVEYS

Project No.: 117-8273015

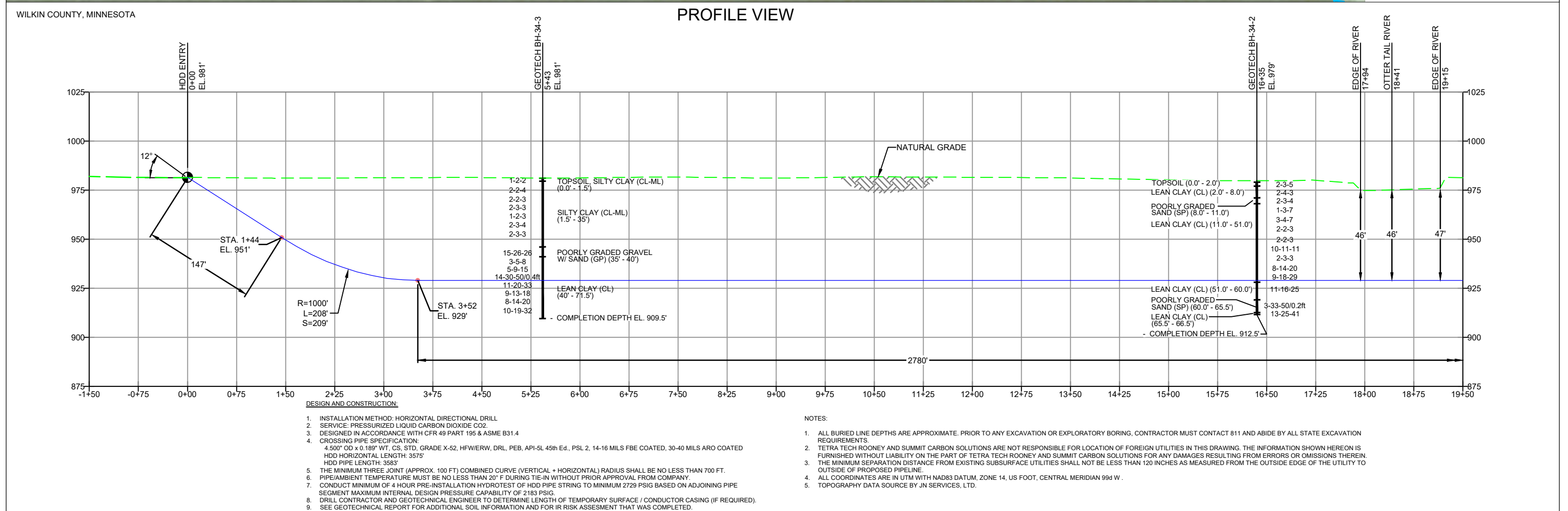
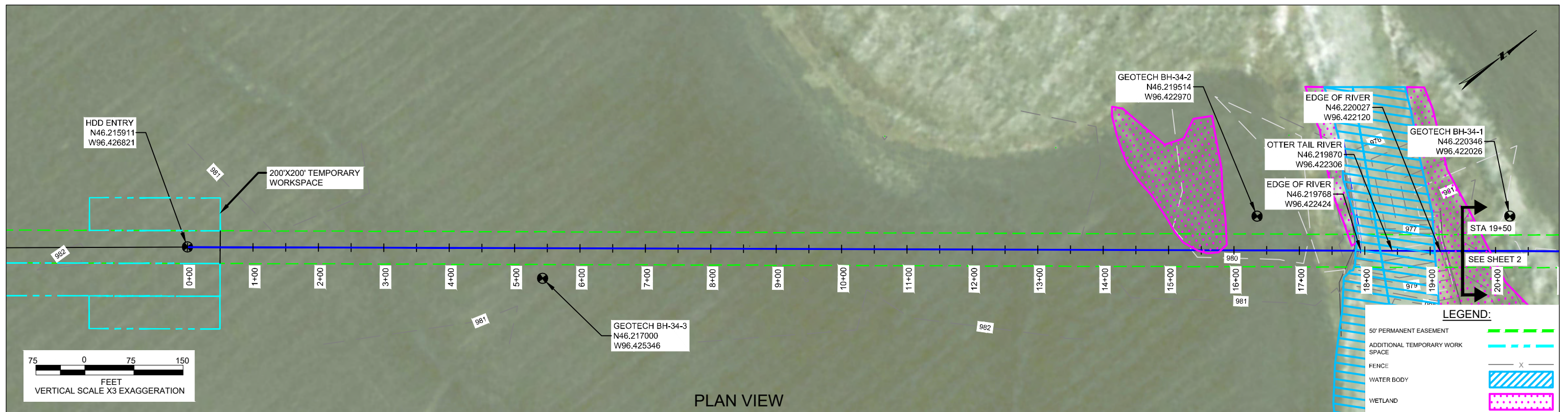
Date: July 2022

Drawn By: A. Hotaling

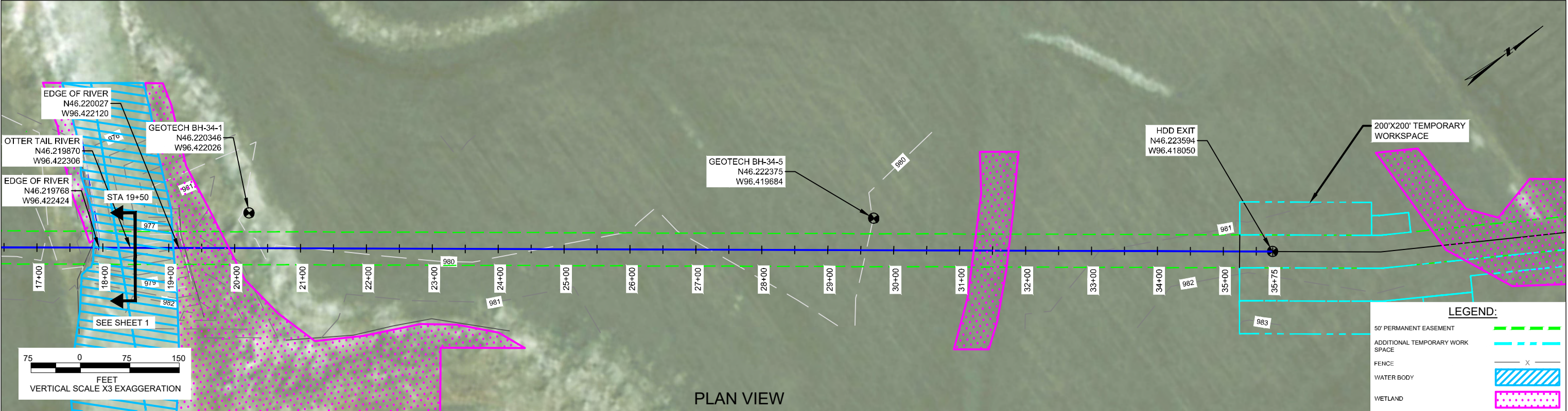
Drawing Number

3015-1



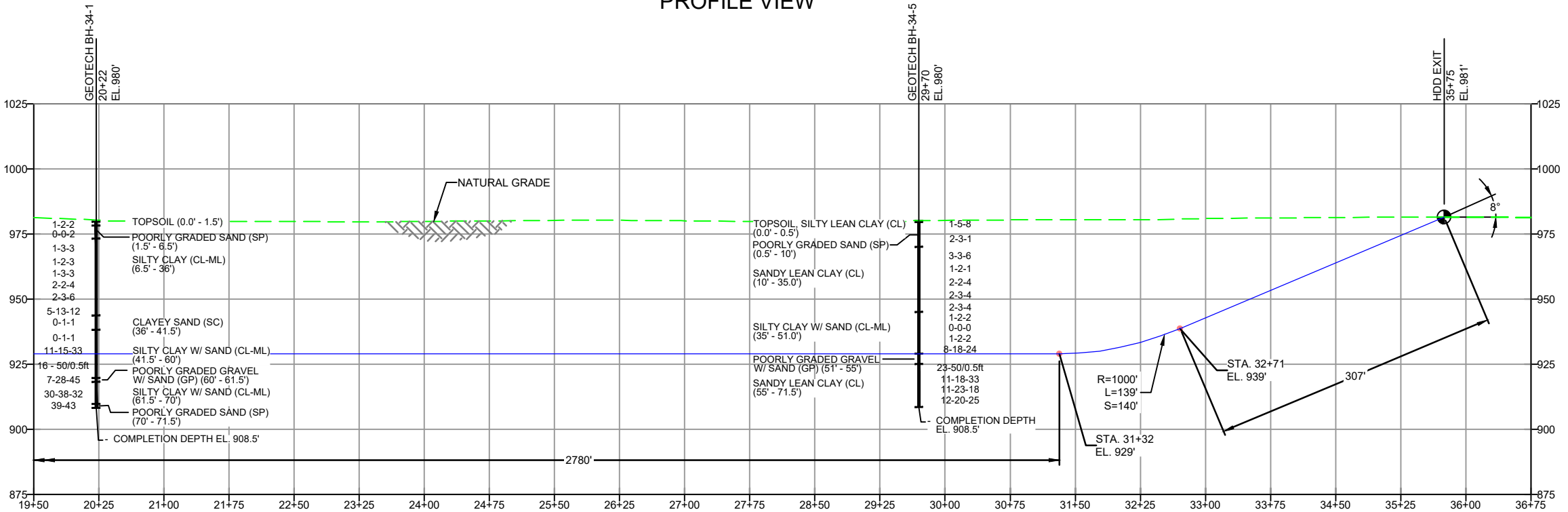


NOTES 1. ALL COORDINATES SHOWN ARE IN LATITUDE AND LONGITUDE. ALL MSL ELEVATIONS ARE NAD83 2. STATIONING IS BASED ON HORIZONTAL DISTANCES.	REVISIONS								 SUMMIT CARBON SOLUTIONS	SUMMIT CARBON SOLUTIONS	
	E	CLIENT COMMENTS	MRS	09/09/2022	AMC	09/09/2022	ZBB	09/09/2022		 TETRA TECH ROONEY (303) 792-5911	SCALE: 1"=150'
	D	DESIGN CHANGE	MRS	08/26/2022	AMC	08/26/2022	ZBB	08/26/2022			
	C	FINAL DELIVERABLE	MRS	08/02/2022	AMC	08/02/2022	ZBB	08/02/2022			
	B	ADDED GEOTECHNICAL BORING DATA TO PROFILE	MRS	07/07/2022	AMC	07/07/2022	ZBB	07/07/2022			
	A	ISSUED FOR REVIEW	MRS	05/02/2022	AMC	05/02/2022	ZBB	05/02/2022			
	NO.	DESCRIPTION	BY	DATE	CHK	DATE	APP	DATE			



WILKIN COUNTY, MINNESOTA

PROFILE VIEW



DESIGN AND CONSTRUCTION: 1. INSTALLATION METHOD: HORIZONTAL DIRECTIONAL DRILL 2. SERVICE: PRESSURIZED LIQUID CARBON DIOXIDE CO2 3. DESIGNED IN ACCORDANCE WITH CFR 49 PART 195 & ASME B31.4 4. CROSSING PIPE SPECIFICATION: 4.500" OD x 0.189" WT, CS, STD, GRADE X-52, HFW/ERW, DRL, PEB, API-5L 45th Ed., PSL 2, 14-16 MILS FBE COATED, 30-40 MILS ARO COATED HDD HORIZONTAL LENGTH: 3575' HDD PIPE LENGTH: 3583' 5. THE MINIMUM THREE JOINT (APPROX. 100 FT) COMBINED CURVE (VERTICAL + HORIZONTAL) RADIUS SHALL BE NO LESS THAN 700 FT. 6. PIPE/AMBIENT TEMPERATURE MUST BE NO LESS THAN 20° F DURING TIE-IN WITHOUT PRIOR APPROVAL FROM COMPANY. 7. CONDUCT MINIMUM OF 4 HOUR PRE-INSTALLATION HYDROTEST OF HDD PIPE STRING TO MINIMUM 2729 PSIG BASED ON ADJOINING PIPE SEGMENT MAXIMUM INTERNAL DESIGN PRESSURE CAPABILITY OF 2183 PSIG. 8. DRILL CONTRACTOR AND GEOTECHNICAL ENGINEER TO DETERMINE LENGTH OF TEMPORARY SURFACE / CONDUCTOR CASING (IF REQUIRED). 9. SEE GEOTECHNICAL REPORT FOR ADDITIONAL SOIL INFORMATION AND FOR IR RISK ASSESMENT THAT WAS COMPLETED.										NOTES: 1. ALL BURIED LINE DEPTHS ARE APPROXIMATE. PRIOR TO ANY EXCAVATION OR EXPLORATORY BORING, CONTRACTOR MUST CONTACT 811 AND ABIDE BY ALL STATE EXCAVATION REQUIREMENTS. 2. TETRA TECH ROONEY AND SUMMIT CARBON SOLUTIONS ARE NOT RESPONSIBLE FOR LOCATION OF FOREIGN UTILITIES IN THIS DRAWING. THE INFORMATION SHOWN HEREON IS FURNISHED WITHOUT LIABILITY ON THE PART OF TETRA TECH ROONEY AND SUMMIT CARBON SOLUTIONS FOR ANY DAMAGES RESULTING FROM ERRORS OR OMISSIONS THEREIN. 3. THE MINIMUM SEPARATION DISTANCE FROM EXISTING SUBSURFACE UTILITIES SHALL NOT BE LESS THAN 120 INCHES AS MEASURED FROM THE OUTSIDE EDGE OF THE UTILITY TO OUTSIDE OF PROPOSED PIPELINE. 4. ALL COORDINATES ARE IN UTM WITH NAD83 DATUM, ZONE 14, US FOOT, CENTRAL MERIDIAN 99d W. 5. TOPOGRAPHY DATA SOURCE BY JN SERVICES, LTD.																																																																													
NOTES 1. ALL COORDINATES SHOWN ARE IN LATITUDE AND LONGITUDE. ALL MSL ELEVATIONS ARE NAD83 2. STATIONING IS BASED ON HORIZONTAL DISTANCES.				REVISIONS <table><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>E</td><td>CLIENT COMMENTS</td><td>MRS</td><td>09/09/2022</td><td>AMC</td><td>09/09/2022</td><td>ZBB</td><td>09/09/2022</td><td></td><td></td></tr><tr><td>D</td><td>DESIGN CHANGE</td><td>MRS</td><td>08/26/2022</td><td>AMC</td><td>08/26/2022</td><td>ZBB</td><td>08/26/2022</td><td></td><td></td></tr><tr><td>C</td><td>FINAL DELIVERABLE</td><td>MRS</td><td>08/02/2022</td><td>AMC</td><td>08/02/2022</td><td>ZBB</td><td>08/02/2022</td><td></td><td></td></tr><tr><td>B</td><td>ADDED GEOTECHNICAL BORING DATA TO PROFILE</td><td>MRS</td><td>07/07/2022</td><td>AMC</td><td>07/07/2022</td><td>ZBB</td><td>07/07/2022</td><td></td><td></td></tr><tr><td>A</td><td>ISSUED FOR REVIEW</td><td>MRS</td><td>05/02/2022</td><td>AMC</td><td>05/02/2022</td><td>ZBB</td><td>05/02/2022</td><td></td><td></td></tr><tr><td>NO.</td><td>DESCRIPTION</td><td>BY</td><td>DATE</td><td>CHK</td><td>DATE</td><td>APP</td><td>DATE</td><td></td><td></td></tr></table>																		E	CLIENT COMMENTS	MRS	09/09/2022	AMC	09/09/2022	ZBB	09/09/2022			D	DESIGN CHANGE	MRS	08/26/2022	AMC	08/26/2022	ZBB	08/26/2022			C	FINAL DELIVERABLE	MRS	08/02/2022	AMC	08/02/2022	ZBB	08/02/2022			B	ADDED GEOTECHNICAL BORING DATA TO PROFILE	MRS	07/07/2022	AMC	07/07/2022	ZBB	07/07/2022			A	ISSUED FOR REVIEW	MRS	05/02/2022	AMC	05/02/2022	ZBB	05/02/2022			NO.	DESCRIPTION	BY	DATE	CHK	DATE	APP	DATE			SUMMIT CARBON SOLUTIONS TETRA TECH ROONEY (303) 792-5911		SUMMIT CARBON SOLUTIONS HORIZONTAL DIRECTIONAL DRILL OTTER TAIL RIVER SHEET 2 OF 2		SCALE: 1"=150' DWG. NO: HDD-34 CROSSING	
E	CLIENT COMMENTS	MRS	09/09/2022	AMC	09/09/2022	ZBB	09/09/2022																																																																																
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NOTES:

1. ALL BURIED LINE DEPTHS ARE APPROXIMATE. PRIOR TO ANY EXCAVATION OR EXPLORATORY BORING, CONTRACTOR MUST CONTACT 811 AND ABIDE BY ALL STATE EXCAVATION REQUIREMENTS.
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3. THE MINIMUM SEPARATION DISTANCE FROM EXISTING SUBSURFACE UTILITIES SHALL NOT BE LESS THAN 120 INCHES AS MEASURED FROM THE OUTSIDE EDGE OF THE UTILITY TO OUTSIDE OF PROPOSED PIPELINE.
4. ALL COORDINATES ARE IN UTM WITH NAD83 DATUM, ZONE 14, US FOOT, CENTRAL MERIDIAN 99d W .
5. TOPOGRAPHY DATA SOURCE BY JN SERVICES, LTD.

NOTES	
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2. STATIONING IS BASED ON HORIZONTAL DISTANCES.	

REVISIONS						
NO.	DESCRIPTION	BY	DATE	CHK	DATE	APP
C	CLIENT COMMENTS	MRS	09/09/2022	AMC	09/09/2022	ZBB
B	DESIGN CHANGE	MRS	08/26/2022	AMC	08/26/2022	ZBB
A	ISSUED FOR REVIEW	MRS	08/08/2022	AMC	08/08/2022	ZBB



SUMMIT
CARBON
SOLUTIONS



TETRA TECH ROONEY
(303) 792-5911

SUMMIT CARBON SOLUTIONS

HORIZONTAL DIRECTIONAL DRILL
OTTER TAIL RIVER
HDD PULL BACK PLAN SKETCH

SCALE: 1"=500' DWG. NO: HDD-34 CROSSING

APPENDIX B

Logs of Exploratory Borings (Figures 1B through 4B)

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Phone: (406) 543-3045
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Figure No. 1B LOG OF BORING



Sheet 1 of 3

Boring BH-34-1

Project: Midwest Carbon Express HDD 32 - Minnesota		Rig: Diedrich D-70	Boring Location N: 46.220346
Project Number: 117-8273015		Hammer: Auto	Coordinates E: -96.422026
Date Started: 4/20/22		Boring Diameter: 8"	System: Decimal Degrees
Date Finished: 4/21/22		Datum: NAD83	Top of Boring Elevation: 980.0 ft
Driller: IDS		Drilling Fluid: None	Abandonment Method: Bentonite
Logger: P. Lemire		Location: North Side of Ottetail River	

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Depth (ft)	Operation	Sample Type	Recovery (%)	RQD (%)	Blow Count	Lithology	Material Description	Depth (ft)	Elev. (ft)	MC (%)	LL	PL	-200 (%)	DD	Remarks and Other Tests
5			70		1-2-2		TOPSOIL, Silty Lean CLAY (CL-ML), soft, moist, dark brown.	1.5	978.5	27					pH= 7 Resistivity= 1,200 ohm-cm Sulfate Content= 0.09 %
5			75		0-0-2		Poorly-Graded SAND (SP), very loose, wet, brown.	6.5	973.5	16	26	12	37		
10			100		1-3-3		Sandy Lean CLAY (CL), medium stiff, moist, brown, coarse grained, angular, Sand and very small gravel.	23							
15			80		1-2-3			29							
20			10		1-3-3			22	35	17					Friction Angle= 20.4 degrees Cohesion= 0 ksf
25			70		2-2-4										
30															

Water Level Observations		During Drilling: Not Recorded	Remarks:
After Drilling: Not Recorded	After Drilling: Not Recorded		

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Figure No. 1B LOG OF BORING



Sheet 2 of 3

Boring BH-34-1

Project: Midwest Carbon Express HDD 32 - Minnesota		Rig: Diedrich D-70 Hammer: Auto	Boring Location N: 46.220346 Coordinates E: -96.422026
Project Number: 117-8273015		Boring Diameter: 8"	System: Decimal Degrees Datum: NAD83 Top of Boring Elevation: 980.0 ft
Date Started: 4/20/22	Date Finished: 4/21/22	Drilling Fluid: None	Abandonment Method: Bentonite
Driller: IDS Logger: P. Lemire		Location: North Side of Ottetail River	

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Depth (ft)	Operation	Sample Type	Recovery (%)	RQD (%)	Blow Count	Lithology	Material Description	Depth (ft)	Elev. (ft)	MC (%)	LL	PL	-200 (%)	DD	Remarks and Other Tests
30.0			10		2 - 3 - 6		Silty CLAY (CL-ML), stiff, moist, brown.	30.0	950.0	25					
31.5							Silty CLAY (CL-ML), medium dense, moist, brown, Some sand and small gravel.	31.5	948.5						
35			100		5 - 13 - 12			36.0	944.0						
40			15		0 - 1 - 1		Clayey SAND (SC), very loose, moist to wet, brown, angular, Small gravel.	41.5	938.5	22					
45			100		0 - 1 - 1		Sandy Lean CLAY (CL), very dense, moist to slightly moist, brown.								
50			100		11 - 15 - 33					14	33	17	42		Friction Angle= 32.4 degrees Cohesion= 0 ksf
55			50		16 - 50/0.5ft										
60															
920.0															

Water Level Observations		During Drilling: Not Recorded	Remarks:
After Drilling: Not Recorded	After Drilling: Not Recorded		

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Figure No. 1B LOG OF BORING



Sheet 3 of 3

Boring BH-34-1

Project: Midwest Carbon Express HDD 32 - Minnesota		Rig: Diedrich D-70 Hammer: Auto	Boring Location N: 46.220346 Coordinates E: -96.422026	
Project Number: 117-8273015		Boring Diameter: 8"	System: Decimal Degrees Datum: NAD83	Top of Boring Elevation: 980.0 ft
Date Started: 4/20/22	Date Finished: 4/21/22	Drilling Fluid: None	Abandonment Method: Bentonite	
Driller: IDS Logger: P. Lemire		Location: North Side of Ottertail River		

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Depth (ft)	Operation	Sample Type	Recovery (%)	RQD (%)	Blow Count	Lithology	Material Description	Depth (ft)	Elev. (ft)	MC (%)	LL	PL	-200 (%)	DD	Remarks and Other Tests
60.0			100		7 - 28 - 45		Silty SAND with gravel (SM), hard, wet, brown, fine to coarse grained, angular.	60.0	920.0	12	NV	NP	23		
61.5							Silty CLAY with sand (CL-ML), hard, moist to slightly moist, brown.	61.5	918.5						
65															
65			40		30 - 38 - 32										
70															
70															
70.0			27		39 - 43		Poorly-Graded SAND (SP), very dense, moist, brown, fine to medium grained, angular, Some small gravel.	70.0	910.0	9					
71.5								71.5	908.5						
Boring Depth: 71.5 ft, Elevation: 908.5 ft															

Water Level Observations		During Drilling: Not Recorded	Remarks:
After Drilling: Not Recorded	After Drilling: Not Recorded		

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Figure No. 2B LOG OF BORING



Sheet 1 of 3

Boring BH-34-2

Project: Midwest Carbon Express HDD 32 - Minnesota		Rig: Diedrich D-70	Boring Location N: 46.219514 E: -96.42297
Project Number: 117-8273015		Hammer: Auto	Coordinates
Date Started: 4/19/22		Boring Diameter: 8"	System: Decimal Degrees Datum: NAD83
Date Finished: 4/19/22		Drilling Fluid: None	Abandonment Method: Bentonite
Driller: IDS Logger: P. Lemire		Location: South Side of Ottetail River	

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Depth (ft)	Operation	Sample Type	Recovery (%)	RQD (%)	Blow Count	Lithology	Material Description	Depth (ft)	Elev. (ft)	MC (%)	LL	PL	-200 (%)	DD	Remarks and Other Tests
2.0			75		2-3-5		TOPSOIL, Lean CLAY (CL), medium stiff, moist, dark brown.	2.0	978.0						
5.0			75		2-4-3		Lean CLAY (CL), medium stiff, moist, brown.	8.0	972.0	18					
10.0			75		2-3-4		Poorly-Graded SAND (SP), loose, wet, brown, coarse grained.	11.0	969.0						
15.0			100		1-3-7		Lean CLAY (CL), medium stiff to stiff, moist, brown.	18.0	962.0	21					
20.0			100		3-4-7		Sandy SILT (ML), medium stiff, moist, brown.	23.0	957.0	25	NV	NP	52		
25.0			0		2-2-3		Lean CLAY (CL), medium stiff to very stiff, moist, brown.								
30.0															

Water Level Observations		During Drilling: Not Recorded	Remarks:
After Drilling: Not Recorded	After Drilling: Not Recorded		

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Figure No. 2B LOG OF BORING



Sheet 2 of 3

Boring BH-34-2

Project: Midwest Carbon Express HDD 32 - Minnesota		Rig: Diedrich D-70 Hammer: Auto	Boring Location N: 46.219514 Coordinates E: -96.42297
Project Number: 117-8273015		Boring Diameter: 8"	System: Decimal Degrees Datum: NAD83 Top of Boring Elevation: 980.0 ft
Date Started: 4/19/22	Date Finished: 4/19/22	Drilling Fluid: None	Abandonment Method: Bentonite
Driller: IDS Logger: P. Lemire		Location: South Side of Ottetail River	

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Depth (ft)	Operation	Sample Type	Recovery (%)	RQD (%)	Blow Count	Lithology	Material Description	Depth (ft)	Elev. (ft)	MC (%)	LL	PL	-200 (%)	DD	Remarks and Other Tests
35			100		2 - 2 - 3			19							
945.0			80		10 - 11 - 11			23							
40			0		2 - 3 - 3										
940.0															
45			70		8 - 14 - 20			24	42	19	3				
935.0															
50			100		9 - 18 - 29			51.0	929.0						
930.0							Lean CLAY (CL), dense, moist, brown, Some small gravels in clay.								
55			90		11 - 16 - 25			23							
925.0															
60															
920.0															

Water Level Observations		During Drilling: Not Recorded	Remarks:
After Drilling: Not Recorded	After Drilling: Not Recorded		

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Figure No. 2B LOG OF BORING

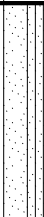


Sheet 3 of 3

Boring BH-34-2

Project: Midwest Carbon Express HDD 32 - Minnesota		Rig: Diedrich D-70	Boring Location N: 46.219514
Project Number: 117-8273015		Hammer: Auto	Coordinates E: -96.42297
Date Started: 4/19/22		Boring Diameter: 8"	System: Decimal Degrees
Date Finished: 4/19/22		Datum: NAD83	Top of Boring Elevation: 980.0 ft
Driller: IDS		Drilling Fluid: None	Abandonment Method: Bentonite
Logger: P. Lemire		Location: South Side of Ottetail River	

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Depth (ft)	Operation	Sample Type	Recovery (%)	RQD (%)	Blow Count	Lithology	Material Description	Depth (ft)	Elev. (ft)	MC (%)	LL	PL	-200 (%)	DD	Remarks and Other Tests
65			100		3 - 33 - 50/0.2ft		Well-Graded SAND with silt (SP-SM), very dense, wet, brown, medium to coarse grained.	60.0 920.0		16	16	15	8		pH= 7 Resistivity= 1,130 ohm-cm Sulfate Content= 0.07 %
915.0			75		13 - 25 - 41		Clayey SAND (SC), hard, moist, brown, Some gravel.	65.5 914.5 66.5		20	22	11	17		
Boring Depth: 66.5 ft, Elevation: 913.5 ft															

Water Level Observations		During Drilling: Not Recorded	Remarks:
After Drilling: Not Recorded	After Drilling: Not Recorded		

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Figure No. 3B LOG OF BORING



Sheet 1 of 3

Boring BH-34-3

Project: Midwest Carbon Express HDD 32 - Minnesota		Rig: Diedrich D-70 Hammer: Auto	Boring Location N: 46.217 Coordinates E: -96.425346
Project Number: 117-8273015		Boring Diameter: 8"	System: Decimal Degrees Datum: NAD83 Top of Boring Elevation: 981.0 ft
Date Started: 4/19/22	Date Finished: 4/20/22	Drilling Fluid: None	Abandonment Method: Bentonite
Driller: IDS Logger: P. Lemire		Location: South Side of Ottetail River	

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Depth (ft)	Operation	Sample Type	Recovery (%)	RQD (%)	Blow Count	Lithology	Material Description	Depth (ft)	Elev. (ft)	MC (%)	LL	PL	-200 (%)	DD	Remarks and Other Tests
5			50		1-2-2		TOPSOIL, Silty CLAY (CL-ML), soft, moist, brown.	1.5	979.5	32					
976.0			90		2-3-4		Sandy Lean CLAY (CL), medium stiff, moist, brown.								
10			100		2-2-3					36					
971.0			10		2-3-3										
15			100		1-2-3					25					
966.0			100		2-3-4										
20			100							23	34	18	45		Friction Angle= 24.6 degrees Cohesion= 0 ksf
961.0															
25															
956.0															
30															
951.0															

Water Level Observations		During Drilling: Not Recorded	Remarks:
After Drilling: Not Recorded	After Drilling: Not Recorded		

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Figure No. 3B LOG OF BORING



Sheet 2 of 3

Boring BH-34-3

Project: Midwest Carbon Express HDD 32 - Minnesota		Rig: Diedrich D-70	Boring Location N: 46.217
Project Number: 117-8273015		Hammer: Auto	Coordinates E: -96.425346
Date Started: 4/19/22		Boring Diameter: 8"	System: Decimal Degrees
Date Finished: 4/20/22		Datum: NAD83	Top of Boring Elevation: 981.0 ft
Driller: IDS		Drilling Fluid: None	Abandonment Method: Bentonite
Logger: P. Lemire		Location: South Side of Ottetail River	

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Depth (ft)	Operation	Sample Type	Recovery (%)	RQD (%)	Blow Count	Lithology	Material Description	Depth (ft)	Elev. (ft)	MC (%)	LL	PL	-200 (%)	DD	Remarks and Other Tests
35			0		2 - 3 - 3										
35.0			35		15 - 26 - 26		Poorly-Graded GRAVEL with sand (GP), very dense, wet, brown, medium to coarse grained, angular.	35.0	946.0						
40			100		3 - 5 - 8		Sandy Lean CLAY (CL), stiff to hard, moist, brown, fine grained, angular, Small angular gravel and fine grained sand.	40.0	941.0	20					
45			100		5 - 9 - 15					14					Thin 1" sand lense Coarse gravel
50			68		14 - 30 - 50/0.4ft					18	27	18	59		
55			0		11 - 20 - 33										
60															
921.0															

Water Level Observations		During Drilling: Not Recorded	Remarks:
After Drilling: Not Recorded	After Drilling: Not Recorded		

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Figure No. 3B LOG OF BORING



Sheet 3 of 3

Boring BH-34-3

Project: Midwest Carbon Express HDD 32 - Minnesota		Rig: Diedrich D-70 Hammer: Auto	Boring Location N: 46.217 Coordinates E: -96.425346
Project Number: 117-8273015		Boring Diameter: 8"	System: Decimal Degrees Datum: NAD83 Top of Boring Elevation: 981.0 ft
Date Started: 4/19/22	Date Finished: 4/20/22	Drilling Fluid: None	Abandonment Method: Bentonite
Driller: IDS Logger: P. Lemire		Location: South Side of Ottertail River	

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Depth (ft)	Operation	Sample Type	Recovery (%)	RQD (%)	Blow Count	Lithology	Material Description	Depth (ft)	MC (%)	LL	PL	-200 (%)	DD	Remarks and Other Tests
Elev. (ft)								Elev. (ft)						
65			0		9 - 13 - 18									
916.0			10		8 - 14 - 20									
70			100		10 - 19 - 32				14					
911.0								71.5						
								909.5						

Boring Depth: 71.5 ft, Elevation: 909.5 ft

Water Level Observations		During Drilling: Not Recorded	Remarks:
After Drilling: Not Recorded	After Drilling: Not Recorded		

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Figure No. 4B LOG OF BORING



Sheet 1 of 3

Boring BH-34-5

Project: Midwest Carbon Express HDD 32 - Minnesota		Rig: Diedrich D-70 Hammer: Auto	Boring Location N: 46.222375 Coordinates E: -96.419684	
Project Number: 117-8273015		Boring Diameter: 8"	System: Decimal Degrees Datum: NAD83	Top of Boring Elevation: 980.0 ft
Date Started: 4/21/22	Date Finished: 4/20/22	Drilling Fluid: None	Abandonment Method: Bentonite	
Driller: IDS Logger: P. Lemire		Location: North Side of Ottertail River		

TT LOG OF BORING - MDT REVISED 2009+ GDT - 8/5/22 10:14 - N:\GEO\TECH\REPORTS\REPORT 2022\MIDWEST CARBON EXPRESS HDDS\HDD 34 MNI\LAB LOG\OTTERTAIL BORING LOGS.GPJ

Depth (ft)	Operation	Sample Type	Recovery (%)	RQD (%)	Blow Count	Lithology	Material Description	Depth (ft)	Elev. (ft)	MC (%)	LL	PL	-200 (%)	DD	Remarks and Other Tests
0.5			80		1-5-8		TOPSOIL, Silty Lean CLAY (CL), moist, black to brown.	0.5	979.5						
5							Silty SAND (SM), very loose to medium dense, moist, brown, fine to coarse grained.								
975.0			100		2-3-1					16	17	15	29		pH= 6 Resistivity= 1,410 ohm-cm Sulfate Content= 0.07 %
10															
970.0			85		3-3-6		Sandy Lean CLAY (CL), stiff to medium stiff, moist, brown, Small gravel.	10.0	970.0						
15															
965.0			5		1-2-1										
20															
960.0			0		2-2-4										
25															
955.0			100		2-3-4					24					
30															
950.0															

Water Level Observations		During Drilling: Not Recorded	Remarks:
After Drilling: Not Recorded	After Drilling: Not Recorded		

2525 Palmer St. Suite 2
Missoula, MT 59808
Phone: (406) 543-3045
Fax: (406) 543-3088

Figure No. 4B LOG OF BORING



Sheet 2 of 3

Boring BH-34-5

Project: Midwest Carbon Express HDD 32 - Minnesota		Rig: Diedrich D-70 Hammer: Auto	Boring Location N: 46.222375 Coordinates E: -96.419684
Project Number: 117-8273015		Boring Diameter: 8"	System: Decimal Degrees Datum: NAD83 Top of Boring Elevation: 980.0 ft
Date Started: 4/21/22	Date Finished: 4/20/22	Drilling Fluid: None	Abandonment Method: Bentonite
Driller: IDS Logger: P. Lemire		Location: North Side of Ottertail River	

TT LOG OF BORING - MDT REVISED 2009+ GDT - 8/5/22 10:14 - N:\GEO\TECH\REPORTS\REPORT 2022\MIDWEST CARBON EXPRESS HDDS\HDD 34 MINLAB LOG\OTTERTAIL BORING LOGS.GPJ

Depth (ft)	Operation	Sample Type	Recovery (%)	RQD (%)	Blow Count	Lithology	Material Description	Depth (ft)	Elev. (ft)	MC (%)	LL	PL	-200 (%)	DD	Remarks and Other Tests
35			0		2 - 3 - 4										
35.0			100		1 - 2 - 2		Silty CLAY with sand (CL-ML), soft to very soft, moist, brown, Small gravel.	35.0	945.0	27					
40			0		0 - 0 - 0										
40.0			0		0 - 0 - 0										
45			0		1 - 2 - 2										
45.0			0		1 - 2 - 2										
50			70		8 - 18 - 24		Poorly-Graded GRAVEL with sand (GP), dense, wet, brown, medium to coarse grained.	51.0	929.0						UCS= 5.529 ksf
50.0			70		8 - 18 - 24										
55			70		23 - 50/0.5ft		Silty, Clayey SAND (CL), hard, wet, brown, Small rocks.	55.0	925.0	15	19	15	39		UCS= 1.051 ksf
55.0			70		23 - 50/0.5ft										
60															
60.0															
920.0															

Water Level Observations		During Drilling: Not Recorded	Remarks:
After Drilling: Not Recorded	After Drilling: Not Recorded		

2525 Palmer St. Suite 2
Missoula, MT 59808
Phone: (406) 543-3045
Fax: (406) 543-3088

Figure No. 4B LOG OF BORING



Sheet 3 of 3

Boring BH-34-5

Project: Midwest Carbon Express HDD 32 - Minnesota		Rig: Diedrich D-70 Hammer: Auto	Boring Location N: 46.222375 Coordinates E: -96.419684	
Project Number: 117-8273015		Boring Diameter: 8"	System: Decimal Degrees Datum: NAD83	Top of Boring Elevation: 980.0 ft
Date Started: 4/21/22	Date Finished: 4/20/22	Drilling Fluid: None	Abandonment Method: Bentonite	
Driller: IDS Logger: P. Lemire		Location: North Side of Ottertail River		

TT LOG OF BORING - MDT REVISED 2009+ GDT - 8/5/22 10:14 - N:\GEO\TECH\REPORTS\REPORT 2022\MIDWEST CARBON EXPRESS HDDS\HDD 34 MINILAB LOG\OTTERTAIL BORING LOGS.GPJ

Depth (ft)	Operation	Sample Type	Recovery (%)	RQD (%)	Blow Count	Lithology	Material Description	Depth (ft)	MC (%)	LL	PL	-200 (%)	DD	Remarks and Other Tests
Elev. (ft)								Elev. (ft)						
65			70		11 - 18 - 33									
915.0			0		11 - 23 - 18									
70			30		12 - 20 - 25									
910.0														

Boring Depth: 71.5 ft, Elevation: 908.5 ft

71.5
908.5

Water Level Observations		During Drilling: Not Recorded	Remarks:
After Drilling: Not Recorded	After Drilling: Not Recorded		

APPENDIX C

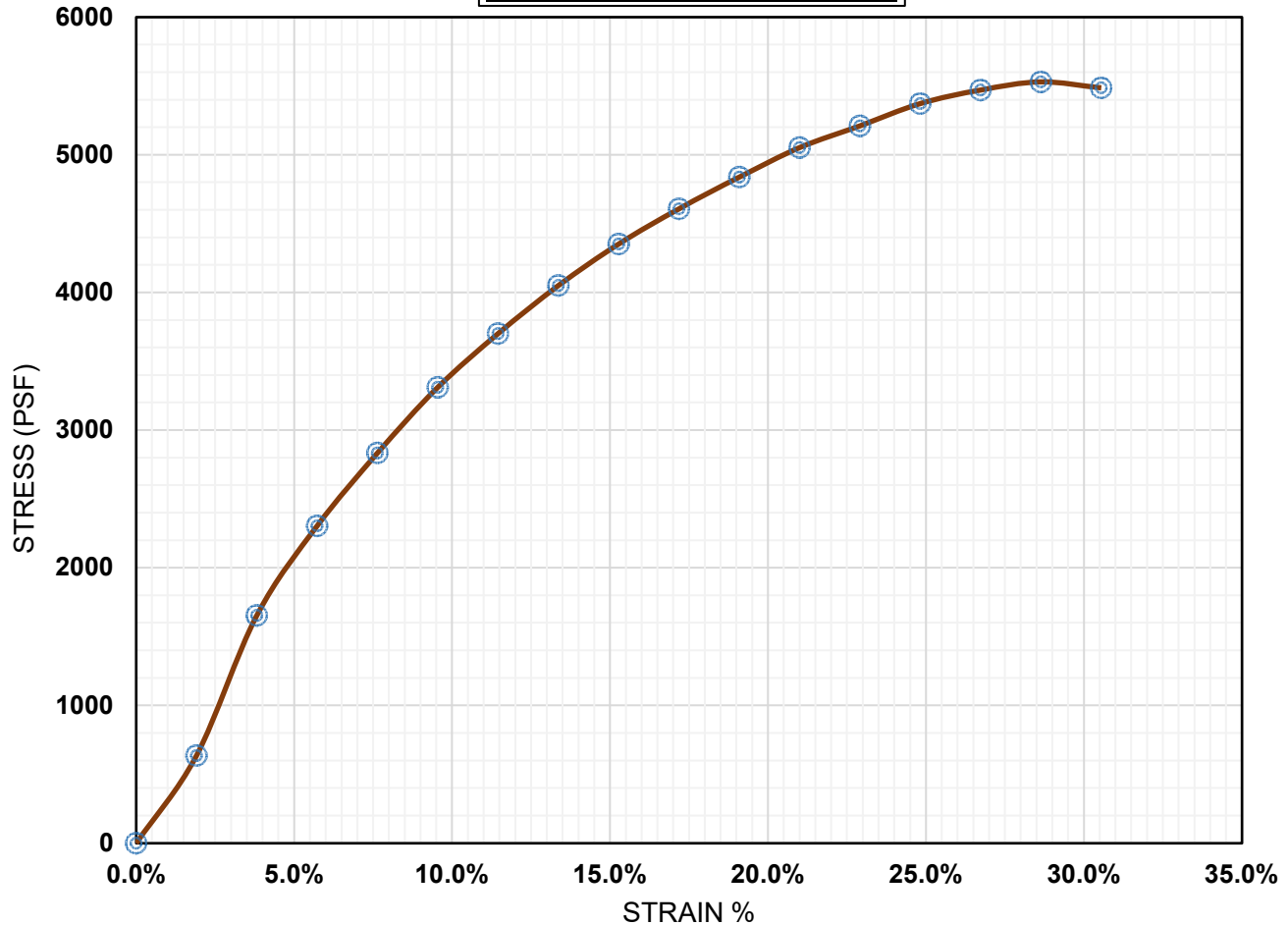
American Engineering Testing Laboratory Test Report

**TT Contract Drilling/Lab testing - HDD 34 Ottertail MN
P-0014212**

American Engineering Testing - Sheridan Wyoming								Tested by: Sarah Ostrander			
								Reviewed By: Brian Freed			
Moisture and Density Sheet Geotech											
Boring	Sample	Depth	Tare #	Tare Weight (g)	Wet Weight (g)	Dry weight (g)	Height (in)	Diameter (in)	M%	Dry Density (pcf)	Wet Density (pcf)
34-1		0-1.5		13.94	32.1	28.24			26.99%	---	---
34-1		5-10 B		131.4	584.7	521.3			16.26%	---	---
34-1		10-11.5		17.04	45.65	40.36	0.51	1.46	22.68%	104.0	127.7
34-1		20-21.5		16.64	36.67	32.22			28.56%	---	---
34-1		25-26.5		185.7	523.7	462.3			22.20%	---	---
34-1		30-31.5		14.09	36.14	31.75			24.86%	---	---
34-1		40-41.5		19.7	50.68	44.96			22.64%	---	---
34-1		50-51.5		182.6	736.1	666.5			14.38%	---	---
34-1		60-61.5		19.93	79.9	73.59			11.76%	---	---
34-1		70-71.5		13.99	52.6	49.21			9.63%	---	---
34-2		5-6.5		14.35	50.34	44.69			18.62%	---	---
34-2		15-16.5		14.34	51.92	45.28	0.79	1.38	21.46%	99.8	121.2
34-2		20-21.5		134.7	616.8	521.6			24.61%	---	---
34-2		25-26.5		No Sample					---	---	---
34-2		30-31.5		299.9	644.9	591			18.52%	---	---
34-2		35-36.5		19.82	45.02	40.33			22.87%	---	---
34-2		45-46.5		231.4	425.5	388.3			23.71%	---	---
34-2		55-56.5		20.01	68.1	59.25			22.55%	---	---
34-2		60-61.5		188.2	328.2	309.4			15.51%	---	---
34-2		65-66.6		19.68	49.56	44.68			19.52%	---	---
34-3		0-1.5		13.92	40.38	33.97	0.68	1.32	31.97%	82.1	108.3
34-3		10-11.5		19.87	70.0	56.9			35.55%	---	---
34-3		20-21.5		16.86	55.15	47.5			24.97%	---	---
34-3		25-26.5		147.3	653.5	559.4			22.83%	---	---
34-3		30-31.5		No Sample					---	---	---
34-3		40-41.5		14.34	54.54	47.85	0.82	1.35	19.96%	108.8	130.5
34-3		45-46.5		272.2	716.1	661			14.17%		
34-3		50-51.5		8.065	58.52	50.69			18.37%	---	---
34-3		60-61.5		No Sample					---	---	---
34-3		70-71.5		19.67	55.42	50.96	0.76	1.36	14.25%	108.0	123.4
34-5		5-6.5		19.97	63.72	57.58			16.33%	---	---
34-5		15-16.5		No Sample							
34-5		25-26.5		158.9	626.9	537.7			23.55%	---	---
34-5		35-36.5		296	633.8	561.7			27.14%	---	---
34-5		45-46.5		No Sample					---	---	---
34-5		55-56.5		0	360.26	313.94			14.75%	---	---
34-5		65-66.5		No Sample					---	---	---

Note: The samples recieved were Split Spoon samples in Zip-Lock Bags, as a result the density values may not be representative of the in place soils.

Stress vs. Strain



Test Results

Boring	Depth	L/D Ratio	Stress At Failure (psf)	Strain At Failure	Strain Rate (in/min)	Strain Rate (%/min)
34-5	50'	2.11	5529	28.64%	0.0757	1.91%
Date Sampled	Sample Type	Dry Density (pcf)	Wet Density (pcf)	% Moisture	N Value	
5/1/2022	California Tube	135.9	117.6	15.6%	NA	

Sample Description Lean Clay with gravel (CL)

Notes/Remarks: A large amount of gravel was observed within the sample, ranging up to approximately 1/2" in size. The sample did not fail within the first 15% strain, even at a high strain rate.

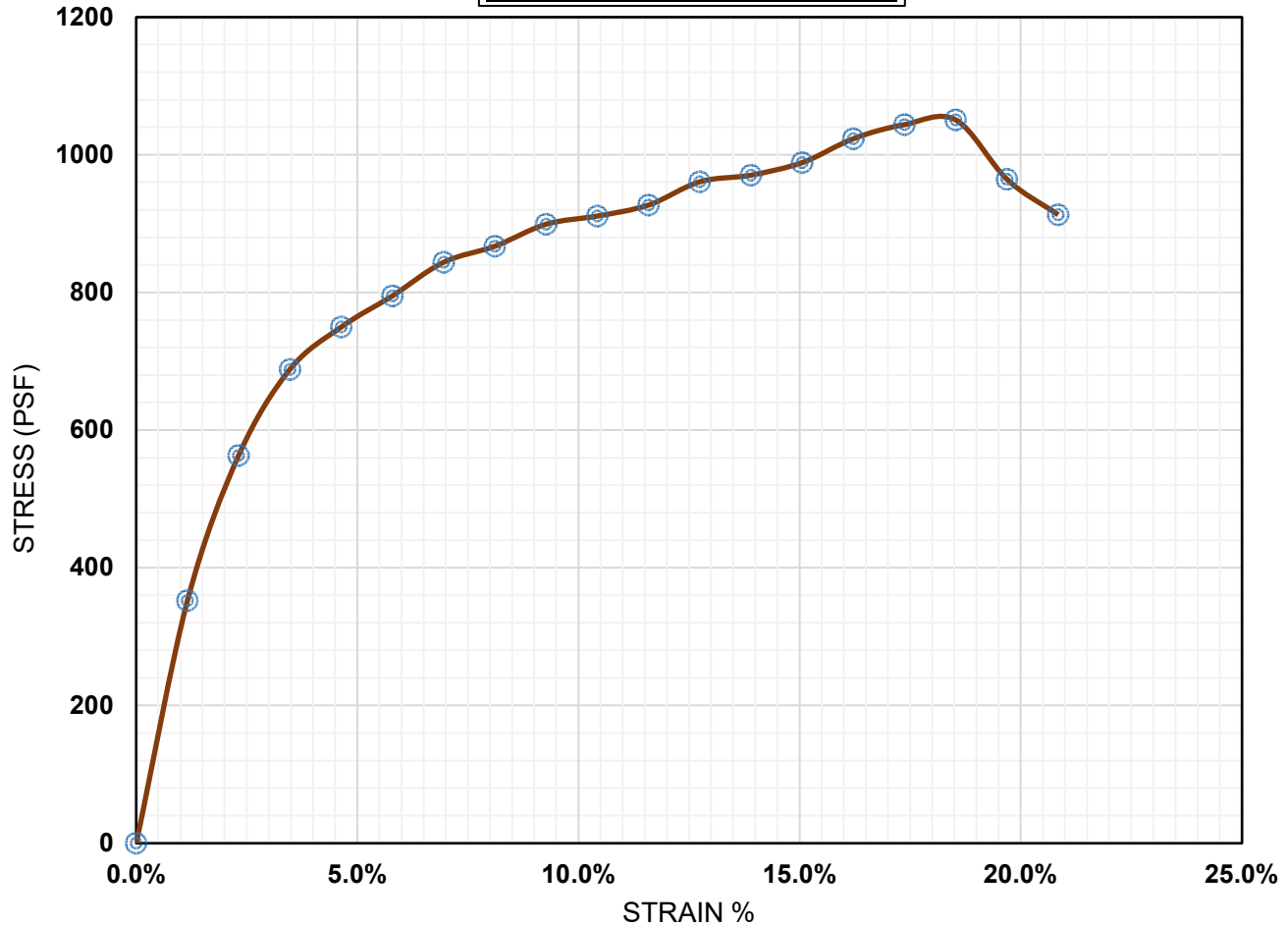
Project Information

Project:	HDD 34 - Ottertail MN	Job Number:	P-0014212
Location:	HDD 34 - Ottertail MN	Date Tested:	7/15/2022



UNCONFINED COMPRESSION TEST RESULTS (ASTM D2166)

Stress vs. Strain



Test Results

Boring	Depth	L/D Ratio	Stress At Failure (psf)	Strain At Failure	Strain Rate (in/min)	Strain Rate (%/min)
34-5	55'	1.96	1051	18.53%	0.0425	1.16%
Date Sampled	Sample Type	Dry Density (pcf)	Wet Density (pcf)	% Moisture	N Value	
5/1/2022	California Tube	136.2	118.7	14.8%	NA	

Sample Description Lean Clay with gravel (CL)

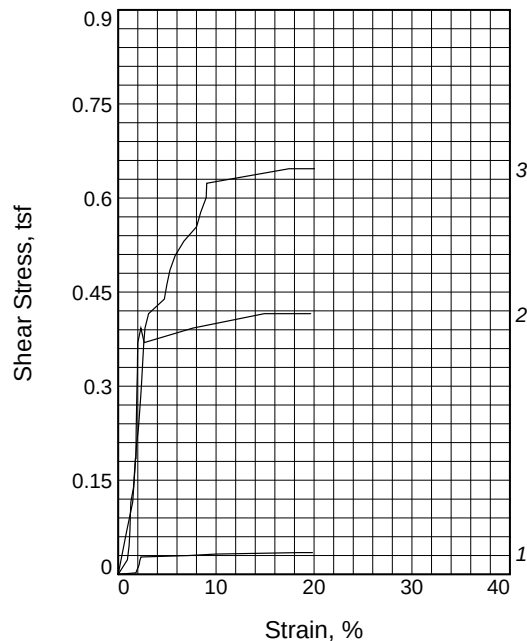
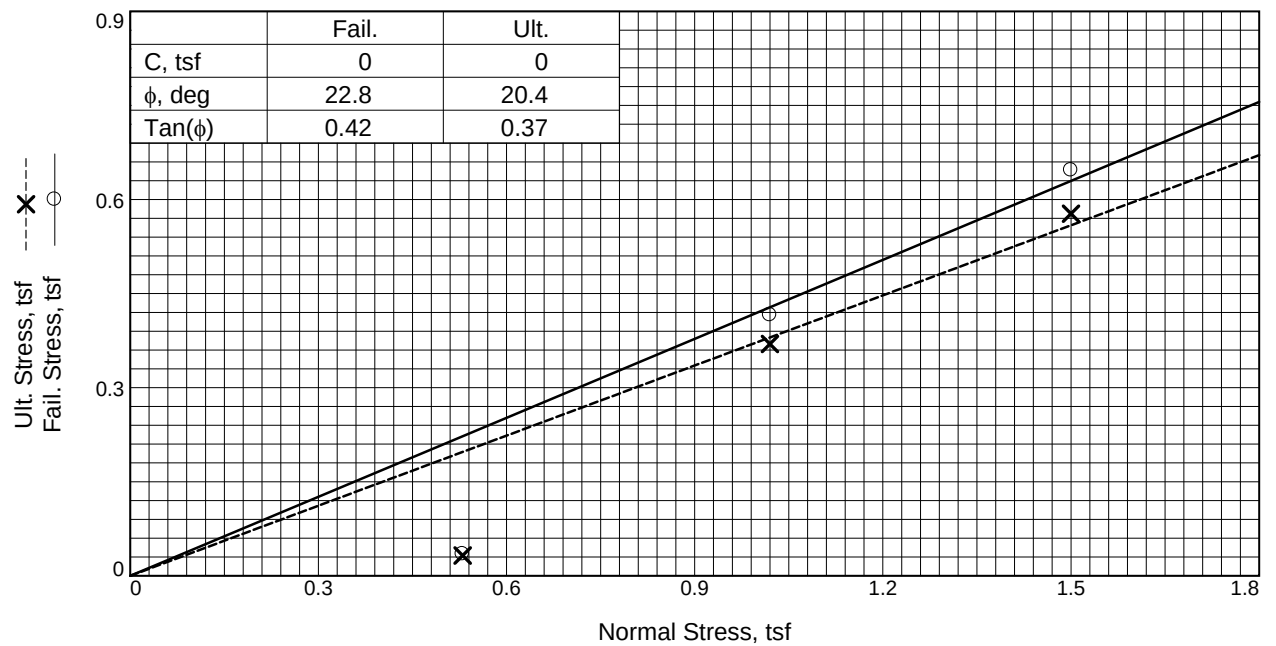
Notes/Remarks: A large amount of gravel was observed within the sample, ranging up to approximately 1/2" in size. The longest L/D Ratio possible with the amount of sample was used.

Project Information

Project:	HDD 34 - Ottertail MN	Job Number:	P-0014212
Location:	HDD 34 - Ottertail MN	Date Tested:	7/15/2022



UNCONFINED COMPRESSION TEST RESULTS (ASTM D2166)



Sample No.		1	2	3
Initial	Water Content, %	22.6	22.6	22.6
	Dry Density, pcf	101.0	96.5	96.0
	Saturation, %	94.1	84.0	82.9
	Void Ratio	0.6376	0.7145	0.7237
	Diameter, in.	1.88	1.88	1.88
	Height, in.	1.08	1.08	1.08
At Test	Water Content, %	21.1	23.6	23.6
	Dry Density, pcf	101.6	101.2	103.5
	Saturation, %	89.0	98.5	104.6
	Void Ratio	0.6285	0.6350	0.5982
	Diameter, in.	1.88	1.88	1.88
	Height, in.	1.08	1.03	1.00
Normal Stress, tsf		0.530	1.020	1.500
Fail. Stress, tsf		0.035	0.416	0.647
Strain, %		18.5	14.9	17.4
Ult. Stress, tsf		0.032	0.370	0.577
Strain, %		10.0	2.7	8.4
Strain rate, in./min.		0.001	0.001	0.001

Sample Type: California Sampler

Description: Clayey Sand

LL= 35

PL= 17

PI= 18

Assumed Specific Gravity= 2.65

Remarks:

Figure _____

Client: Tetra Tech

Project: HDD 34 Ottetail MN (Midwest Carbon)

Location: BH-34-1

Depth: 25-26.5

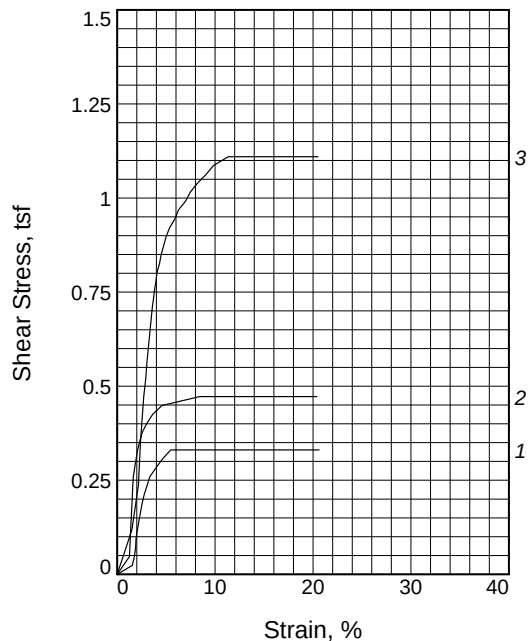
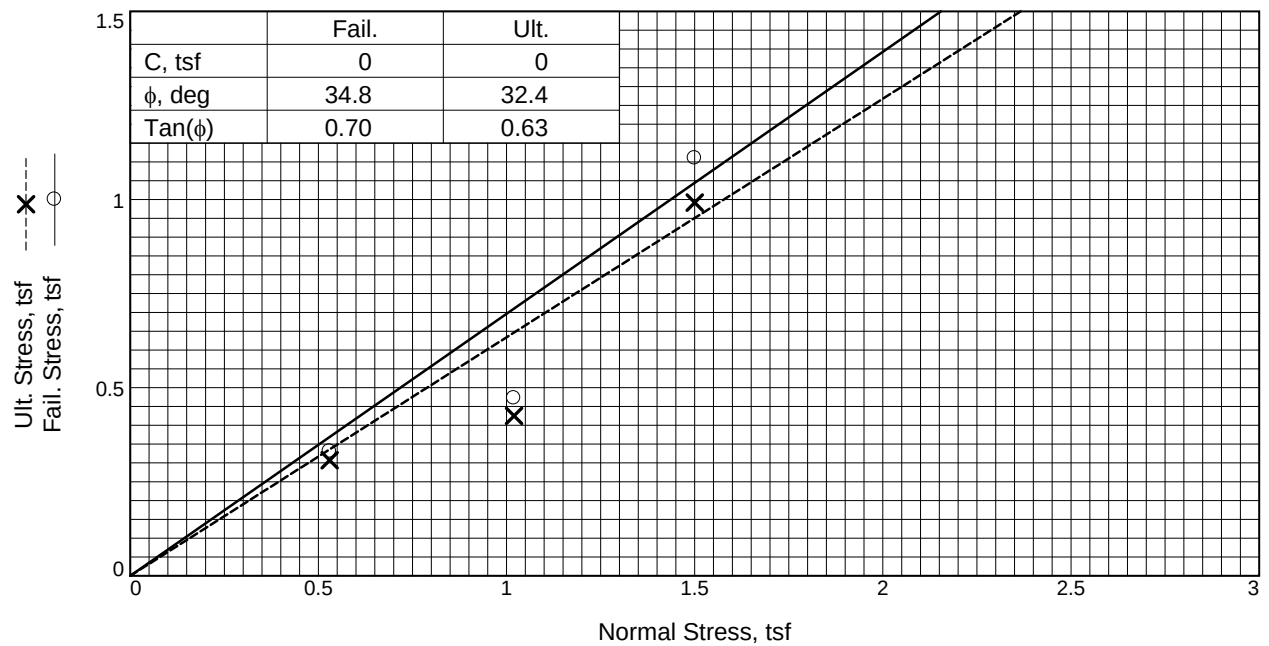
Proj. No.: P-0014212

Date Sampled:

DIRECT SHEAR TEST REPORT
American Engineering Testing, Inc.
Gillette, WY

Tested By: WTL

Checked By: BF



Sample No.		1	2	3
Initial	Water Content, %	15.0	15.0	15.0
	Dry Density, pcf	115.5	105.7	113.6
	Saturation, %	91.8	70.2	86.9
	Void Ratio	0.4317	0.5647	0.4565
	Diameter, in.	1.86	1.86	1.86
	Height, in.	1.12	1.12	1.12
At Test	Water Content, %	19.7	18.2	18.8
	Dry Density, pcf	118.3	112.2	117.2
	Saturation, %	131.1	101.5	121.0
	Void Ratio	0.3982	0.4742	0.4120
	Diameter, in.	1.86	1.86	1.86
	Height, in.	1.09	1.05	1.08
Normal Stress, tsf		0.530	1.020	1.500
Fail. Stress, tsf		0.331	0.472	1.110
Strain, %		5.5	8.4	11.3
Ult. Stress, tsf		0.307	0.425	0.992
Strain, %		4.6	3.6	7.0
Strain rate, in./min.		0.001	0.001	0.001

Sample Type: California Sampler

Description: Clayey Sand

LL= 32

PL= 16

PI= 16

Assumed Specific Gravity= 2.65

Remarks:

Figure _____

Client: Tetra Tech

Project: HDD 34 Ottetail MN (Midwest Carbon)

Location: BH-34-1

Depth: 50.5-51

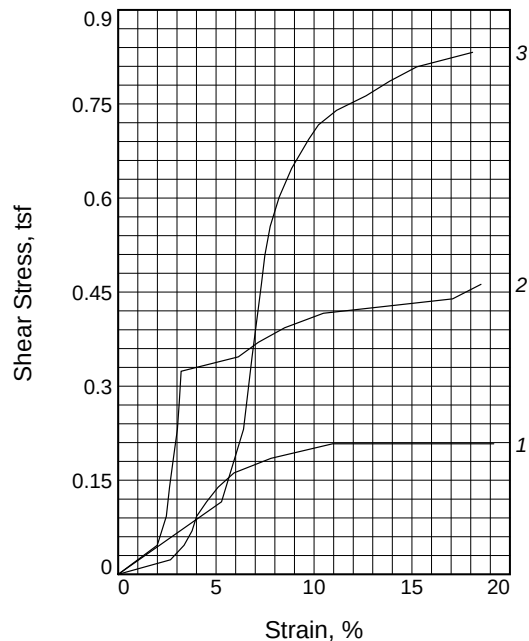
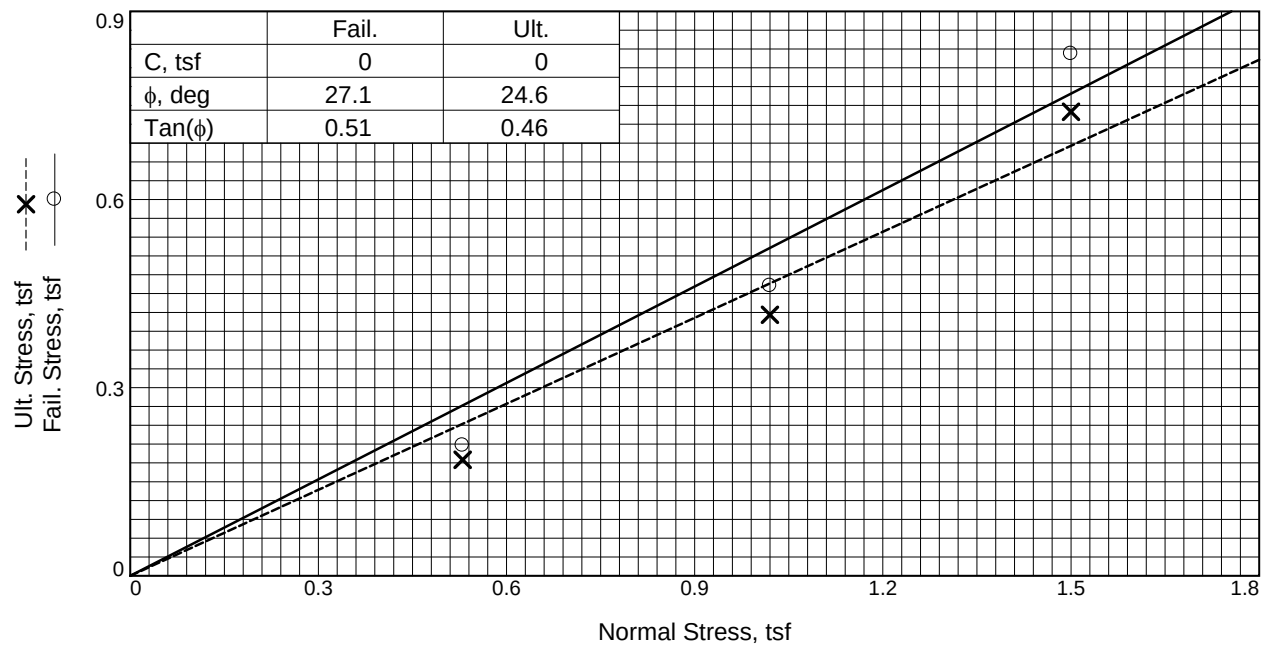
Proj. No.: P-0014212

Date Sampled:

DIRECT SHEAR TEST REPORT
American Engineering Testing, Inc.
Gillette, WY

Tested By: WTL

Checked By: BF



Sample No.		1	2	3
Initial	Water Content, %	24.9	24.9	24.9
	Dry Density, pcf	90.9	90.7	91.0
	Saturation, %	80.6	80.2	80.8
	Void Ratio	0.8195	0.8236	0.8175
	Diameter, in.	1.88	1.88	1.88
	Height, in.	1.08	1.08	1.08
At Test	Water Content, %	26.0	25.7	23.6
	Dry Density, pcf	93.7	99.9	100.2
	Saturation, %	90.0	104.0	96.0
	Void Ratio	0.7662	0.6562	0.6515
	Diameter, in.	1.88	1.88	1.88
	Height, in.	1.05	0.98	0.99
Normal Stress, tsf		0.530	1.020	1.500
Fail. Stress, tsf		0.208	0.462	0.832
Strain, %		10.9	18.5	18.1
Ult. Stress, tsf		0.185	0.416	0.740
Strain, %		7.8	10.5	11.2
Strain rate, in./min.		0.001	0.001	0.001

Sample Type: California Sampler

Description: Clayey Sand

LL= 35

PL= 18

PI= 17

Assumed Specific Gravity= 2.65

Remarks:

Figure _____

Client: Tetra Tech

Project: HDD 34 Ottertail MN (Midwest Carbon)

Location: BH-3-3

Depth: 25.5-26

Proj. No.: P-0014212

Date Sampled:

DIRECT SHEAR TEST REPORT
American Engineering Testing, Inc.
Gillette, WY

Tested By: WTL

Checked By: BF



American Engineering Testing, Inc.
 Sheridan
 72 E Ridge Rd Unit D
 Sheridan, WY 82801
 (607) 675-1862
 www.teamAET.com

Report No: MAT:AET-066754-S1

Material Test Report

Client: TETRA TECH, INC

CC:

Project: TT HDD 34 Lab Testing

Sheridan WY

Job No: P-0014212

Draft Report - Subject to
 change pending final review

Date of Issue:

7/29/2022

Sample Details

Sample ID AET-066754-S1
Field Sample ID BH-34-1 5.1-10.1
Date Sampled
Source
Material Clayey Sand (SC)
Specification Gradation + Hydrometer
Sampling Method In Place Material
General Location Ottertail (midwest)
Location BH-34-1 bulk sample
 5.1-10.1
Date Submitted

Sample Description:

Clayey Sand (SC)

Atterberg Limit:

Liquid Limit: 26
Plastic Limit: 12
Plasticity Index: 14
Linear Shrinkage (%): N/A

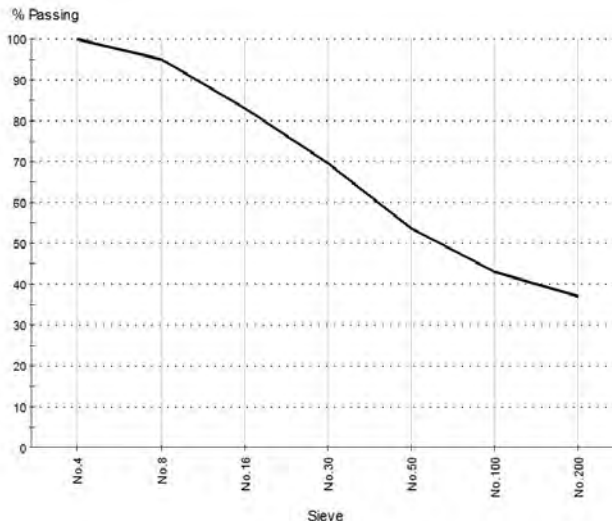
Grading: ASTM C 136, ASTM C 117

Date Tested: 6/9/2022

Tested By: Sara Ostrander

Sieve Size	% Passing	Limits
No.4	100.0	
No.8	94.9	
No.16	83.1	
No.30	69.8	
No.50	53.8	
No.100	43.0	
No.200	37.0	

Particle Size Distribution



COBBLES	GRAVEL		SAND			FINES (37.0%)	
(0.0%)	Coarse (0.0%)	Fine (0.0%)	Coarse (7.9%)	Medium (30.2%)	Fine (24.8%)	Silt	Clay

D85: 1.3193 **D60:** 0.3924 **D50:** 0.2351
D30: N/A **D15:** N/A **D10:** N/A



American Engineering Testing, Inc.
Sheridan
72 E Ridge Rd Unit D
Sheridan, WY 82801
(607) 675-1862
www.teamAET.com

Report No: MAT:AET-066754-S1

Material Test Report

Client: TETRA TECH, INC

CC:

Project: TT HDD 34 Lab Testing

Sheridan WY

Job No: P-0014212

Draft Report - Subject to
change pending final review

Date of Issue:

7/29/2022

Sample Details

Sample ID AET-066754-S1
Field Sample ID BH-34-1 5.1-10.1
Date Sampled
Source
Material Clayey Sand (SC)
Specification Gradation + Hydrometer
Sampling Method In Place Material
General Location Ottertail (midwest
Location BH-34-1 bulk sample
5.1-10.1
Date Submitted

Other Test Results

Description	Method	Result	Limits
Liquid Limit (%)	AASHTO T 89	26	
Plastic Limit (%)	AASHTO T 90	12	
Plasticity Index	AASHTO T 90	14	
Date Tested		6/9/2022	
Fineness Modulus	ASTM C 136, ASTM C 117	1.55	
Curvature Coefficient		N/A	
Uniformity Coefficient		N/A	
Maximum Dry Unit Weight (lb/ft³)	ASTM D 698	125.3	
Corrected Maximum Dry Unit Weight (lb/ft³)		125.3	
Optimum Water Content (%)		7.4	
Corrected Optimum Water Content (%)		7.4	
Method		A	
Retained Sieve No 4 (4.75mm) (%)		0	
Specific Gravity (Oversize)		2.65	
Specific Gravity (Fines)		2.65	
Date Tested		6/9/2022	

Comments

PH-7
Resistivity - 1200 ohm-cm
Sulfates - 870 mg SO42/L



American Engineering Testing, Inc.
 Sheridan
 72 E Ridge Rd Unit D
 Sheridan, WY 82801
 (607) 675-1862
 www.teamAET.com

Report No: MAT:AET-066754-S9

Material Test Report

Client: TETRA TECH, INC

CC:

Project: TT HDD 34 Lab Testing

Sheridan WY

Job No: P-0014212

Draft Report - Subject to
 change pending final review

Date of Issue:

7/29/2022

Sample Details

Sample ID AET-066754-S9
Field Sample ID BH-34-1 60-61.5
Date Sampled
Source
Material Silty Sand with Gravel
Specification Gradation + Hydrometer
Sampling Method In Place Material
General Location Ottertail (midwest
Location BH 34-1, SS Sample
 60-61.5
Date Submitted

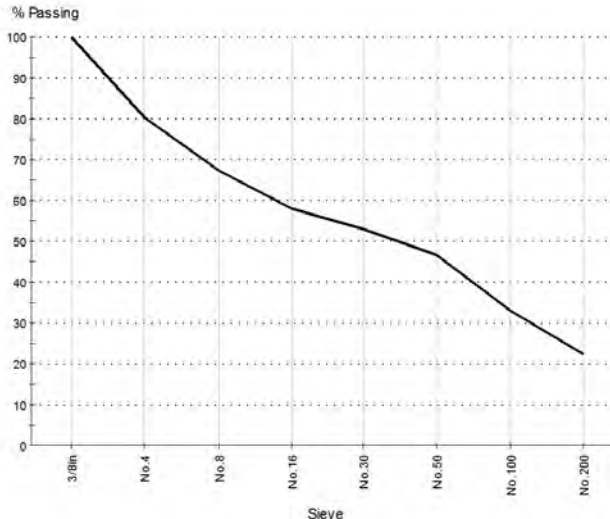
Sample Description:

Silty Sand with Gravel

Atterberg Limit:

Liquid Limit: 15
Plastic Limit: N/A
Plasticity Index: NP
Linear Shrinkage (%): N/A

Particle Size Distribution



Grading: ASTM C 136, ASTM C 117

Date Tested: 6/9/2022

Tested By: Sara Ostrander

Sieve Size	% Passing	Limits
3/8in	100.0	
No. 4	80.4	
No. 8	67.5	
No. 16	57.9	
No. 30	53.1	
No. 50	46.6	
No. 100	32.9	
No. 200	22.5	

COBBLES	GRAVEL		SAND			FINES (22.5%)	
(0.0%)	Coarse (0.0%)	Fine (19.6%)	Coarse (15.2%)	Medium (15.3%)	Fine (27.4%)	Silt	Clay

D85: 5.5891 **D60:** 1.3732 **D50:** 0.4311
D30: 0.1236 **D15:** N/A **D10:** N/A



American Engineering Testing, Inc.
Sheridan
72 E Ridge Rd Unit D
Sheridan, WY 82801
(607) 675-1862
www.teamAET.com

Report No: MAT:AET-066754-S9

Material Test Report

Client: TETRA TECH, INC

CC:

Project: TT HDD 34 Lab Testing

Sheridan WY

Job No: P-0014212

Draft Report - Subject to
change pending final review

Date of Issue:

7/29/2022

Sample Details

Sample ID AET-066754-S9
Field Sample ID BH-34-1 60-61.5
Date Sampled
Source
Material Silty Sand with Gravel
Specification Gradation + Hydrometer
Sampling Method In Place Material
General Location Ottetail (midwest
Location BH 34-1, SS Sample
60-61.5
Date Submitted

Other Test Results

Description	Method	Result	Limits
Liquid Limit (%)	AASHTO T 89	15	
Plastic Limit (%)	AASHTO T 90	N/A	
Plasticity Index	AASHTO T 90	NP	
Date Tested		6/9/2022	
Fineness Modulus	ASTM C 136, ASTM C 117	2.62	
Curvature Coefficient		N/A	
Uniformity Coefficient		N/A	

Comments

NP = Non Plastic



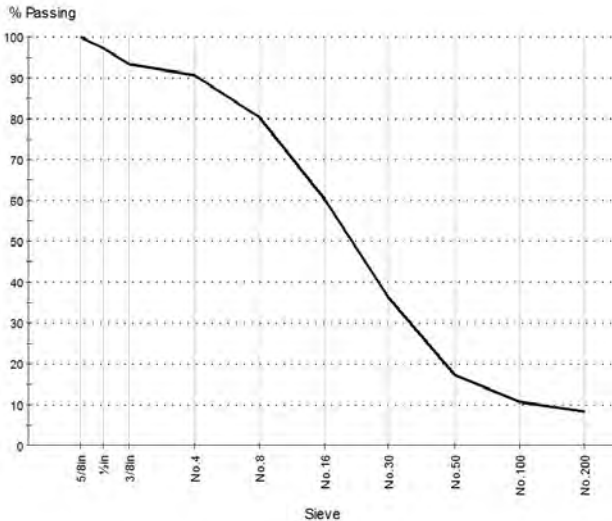
American Engineering Testing, Inc.
 Sheridan
 72 E Ridge Rd Unit D
 Sheridan, WY 82801
 (607) 675-1862
 www.teamAET.com

Material Test Report

Report No: MAT:AET-066754-S10

Client: TETRA TECH, INC Project: TT HDD 34 Lab Testing Sheridan WY Job No: P-0014212	CC: Draft Report - Subject to change pending final review Date of Issue: 7/29/2022
--	--

Sample Details Sample ID AET-066754-S10 Field Sample ID B-34-2 60-61.5 Date Sampled Source Material Well Graded Sand with silt Specification Gradation + Hydrometer In Sampling Method Place Material Ottertail General Location (midwest Location BH-34-2 60-61.5 Date Submitted	Sample Description: Well Graded Sand with silt Atterberg Limit: Liquid Limit: 16 Plastic Limit: 15 Plasticity Index: 1 Linear Shrinkage (%): N/A
---	--

Particle Size Distribution 	Grading: ASTM C 136, ASTM C 117 Date Tested: 6/9/2022 Tested By: Sara Ostrander <table border="1"> <thead> <tr> <th>Sieve Size</th> <th>% Passing</th> <th>Limits</th> </tr> </thead> <tbody> <tr><td>5/8in</td><td>100.0</td><td></td></tr> <tr><td>1/2in</td><td>97.3</td><td></td></tr> <tr><td>3/8in</td><td>93.4</td><td></td></tr> <tr><td>No. 4</td><td>90.8</td><td></td></tr> <tr><td>No. 8</td><td>80.2</td><td></td></tr> <tr><td>No. 16</td><td>60.5</td><td></td></tr> <tr><td>No. 30</td><td>36.2</td><td></td></tr> <tr><td>No. 50</td><td>17.3</td><td></td></tr> <tr><td>No. 100</td><td>10.8</td><td></td></tr> <tr><td>No. 200</td><td>8.2</td><td></td></tr> </tbody> </table>	Sieve Size	% Passing	Limits	5/8in	100.0		1/2in	97.3		3/8in	93.4		No. 4	90.8		No. 8	80.2		No. 16	60.5		No. 30	36.2		No. 50	17.3		No. 100	10.8		No. 200	8.2	
Sieve Size	% Passing	Limits																																
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No. 100	10.8																																	
No. 200	8.2																																	
<table border="1"> <thead> <tr> <th>COBBLES</th> <th colspan="2">GRAVEL</th> <th colspan="3">SAND</th> <th colspan="2">FINES (8.2%)</th> </tr> <tr> <th>(0.0%)</th> <th>Coarse (0.0%)</th> <th>Fine (9.2%)</th> <th>Coarse (15.3%)</th> <th>Medium (48.7%)</th> <th>Fine (18.6%)</th> <th>Silt</th> <th>Clay</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	COBBLES	GRAVEL		SAND			FINES (8.2%)		(0.0%)	Coarse (0.0%)	Fine (9.2%)	Coarse (15.3%)	Medium (48.7%)	Fine (18.6%)	Silt	Clay									D85: 3.2395 D60: 1.1637 D50: 0.8810 D30: 0.4780 D15: 0.2347 D10: 0.1212 Cu: 9.60 Cc: 1.62									
COBBLES	GRAVEL		SAND			FINES (8.2%)																												
(0.0%)	Coarse (0.0%)	Fine (9.2%)	Coarse (15.3%)	Medium (48.7%)	Fine (18.6%)	Silt	Clay																											



American Engineering Testing, Inc.
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Material Test Report

Report No: MAT:AET-066754-S10

Client: TETRA TECH, INC

CC:

Project: TT HDD 34 Lab Testing

Sheridan WY

Job No: P-0014212

Draft Report - Subject to
change pending final review

Date of Issue:

7/29/2022

Sample Details

Sample ID AET-066754-S10
Field Sample ID B-34-2 60-61.5
Date Sampled
Source
Material Well Graded Sand with silt
Specification Gradation + Hydrometer In
Sampling Method Place Material Ottertail
General Location (midwest
Location BH-34-2
60-61.5
Date Submitted

Other Test Results

Description	Method	Result	Limits
Liquid Limit (%)	AASHTO T 89	16	
Plastic Limit (%)	AASHTO T 90	15	
Plasticity Index	AASHTO T 90	1	
Date Tested		6/9/2022	
Fineness Modulus	ASTM C 136, ASTM C 117	3.12	
Curvature Coefficient		1.62	
Uniformity Coefficient		9.60	

Comments

PH-7
Resistivity - 1130 ohm-cm
Sulfates - 730 mg SO42/L



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Material Test Report

Report No: MAT:AET-066754-S11

Client: TETRA TECH, INC Project: TT HDD 34 Lab Testing Sheridan WY Job No: P-0014212	CC: Draft Report - Subject to change pending final review Date of Issue: 7/29/2022
--	--

Sample Details	Sample Description:
Sample ID AET-066754-S11 Field Sample ID BH-34-3 50.5-51 Date Sampled Source Material Sandy Lean Clay Specification Gradation + Hydrometer Sampling Method In Place Material General Location Ottertail (midwest Location BH-34-3 MC Sample 50.5-51.5 Date Submitted	Sandy Lean Clay Atterberg Limit: Liquid Limit: 27 Plastic Limit: 18 Plasticity Index: 9 Linear Shrinkage (%): N/A

Particle Size Distribution	Grading: ASTM C 136, ASTM C 117																																	
	Date Tested: 6/9/2022 Tested By: Sara Ostrander <table border="1"> <thead> <tr> <th>Sieve Size</th> <th>% Passing</th> <th>Limits</th> </tr> </thead> <tbody> <tr><td>1 1/2 in</td><td>100.0</td><td></td></tr> <tr><td>1 in</td><td>90.5</td><td></td></tr> <tr><td>3/8 in</td><td>88.9</td><td></td></tr> <tr><td>No. 4</td><td>88.1</td><td></td></tr> <tr><td>No. 8</td><td>86.0</td><td></td></tr> <tr><td>No. 16</td><td>83.7</td><td></td></tr> <tr><td>No. 30</td><td>80.7</td><td></td></tr> <tr><td>No. 50</td><td>77.5</td><td></td></tr> <tr><td>No. 100</td><td>67.5</td><td></td></tr> <tr><td>No. 200</td><td>59.4</td><td></td></tr> </tbody> </table>	Sieve Size	% Passing	Limits	1 1/2 in	100.0		1 in	90.5		3/8 in	88.9		No. 4	88.1		No. 8	86.0		No. 16	83.7		No. 30	80.7		No. 50	77.5		No. 100	67.5		No. 200	59.4	
Sieve Size	% Passing	Limits																																
1 1/2 in	100.0																																	
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No. 16	83.7																																	
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No. 50	77.5																																	
No. 100	67.5																																	
No. 200	59.4																																	
<table border="1"> <thead> <tr> <th>COBBLES</th> <th colspan="2">GRAVEL</th> <th colspan="3">SAND</th> <th colspan="2">FINES (59.4%)</th> </tr> <tr> <th>(0.0%)</th> <th>Coarse (10.0%)</th> <th>Fine (2.0%)</th> <th>Coarse (2.7%)</th> <th>Medium (6.3%)</th> <th>Fine (19.7%)</th> <th>Silt</th> <th>Clay</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	COBBLES	GRAVEL		SAND			FINES (59.4%)		(0.0%)	Coarse (10.0%)	Fine (2.0%)	Coarse (2.7%)	Medium (6.3%)	Fine (19.7%)	Silt	Clay									D85: 1.7459 D60: 0.0790 D50: N/A D30: N/A D15: N/A D10: N/A									
COBBLES	GRAVEL		SAND			FINES (59.4%)																												
(0.0%)	Coarse (10.0%)	Fine (2.0%)	Coarse (2.7%)	Medium (6.3%)	Fine (19.7%)	Silt	Clay																											



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Material Test Report

Report No: MAT:AET-066754-S11

Client: TETRA TECH, INC

CC:

Project: TT HDD 34 Lab Testing

Sheridan WY

Job No: P-0014212

Draft Report - Subject to
change pending final review

Date of Issue:

7/29/2022

Sample Details

Sample ID AET-066754-S11
Field Sample ID BH-34-3 50.5-51
Date Sampled
Source
Material Sandy Lean Clay
Specification Gradation + Hydrometer
Sampling Method In Place Material
General Location Ottertail (midwest
Location BH-34-3 MC Sample
50.5-51.5
Date Submitted

Other Test Results

Description	Method	Result	Limits
Liquid Limit (%)	AASHTO T 89	27	
Plastic Limit (%)	AASHTO T 90	18	
Plasticity Index	AASHTO T 90	9	
Date Tested		6/9/2022	
Fineness Modulus	ASTM C 136, ASTM C 117	N/A	
Curvature Coefficient		N/A	
Uniformity Coefficient		N/A	

Comments

N/A



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Material Test Report

Report No: MAT:AET-066754-S12

Client: TETRA TECH, INC Project: TT HDD 34 Lab Testing Sheridan WY Job No: P-0014212	CC: Draft Report - Subject to change pending final review Date of Issue: 7/29/2022
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Sample Details	Sample Description:
Sample ID AET-066754-S12 Field Sample ID BH-34-5 55-56.5 Date Sampled Source Material Silty, Clayey Sand Specification Gradation + Hydrometer Sampling Method In Place Material General Location Ottertail (midwest Location BH-34-5 55-56.5 Date Submitted	Silty, Clayey Sand Atterberg Limit: Liquid Limit: 19 Plastic Limit: 15 Plasticity Index: 4 Linear Shrinkage (%): N/A

Particle Size Distribution	Grading: ASTM C 136, ASTM C 117																																	
	Date Tested: 6/9/2022 Tested By: Sara Ostrander <table border="1"> <thead> <tr> <th>Sieve Size</th> <th>% Passing</th> <th>Limits</th> </tr> </thead> <tbody> <tr><td>1 1/2 in</td><td>100.0</td><td></td></tr> <tr><td>1 in</td><td>85.6</td><td></td></tr> <tr><td>3/8 in</td><td>83.2</td><td></td></tr> <tr><td>No. 4</td><td>81.9</td><td></td></tr> <tr><td>No. 8</td><td>78.7</td><td></td></tr> <tr><td>No. 16</td><td>75.3</td><td></td></tr> <tr><td>No. 30</td><td>70.8</td><td></td></tr> <tr><td>No. 50</td><td>65.9</td><td></td></tr> <tr><td>No. 100</td><td>50.8</td><td></td></tr> <tr><td>No. 200</td><td>38.6</td><td></td></tr> </tbody> </table>	Sieve Size	% Passing	Limits	1 1/2 in	100.0		1 in	85.6		3/8 in	83.2		No. 4	81.9		No. 8	78.7		No. 16	75.3		No. 30	70.8		No. 50	65.9		No. 100	50.8		No. 200	38.6	
Sieve Size	% Passing	Limits																																
1 1/2 in	100.0																																	
1 in	85.6																																	
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No. 16	75.3																																	
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No. 50	65.9																																	
No. 100	50.8																																	
No. 200	38.6																																	
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COBBLES	GRAVEL		SAND			FINES (38.6%)																												
(0.0%)	Coarse (15.1%)	Fine (3.0%)	Coarse (4.0%)	Medium (9.6%)	Fine (29.8%)	Silt	Clay																											



American Engineering Testing, Inc.
Sheridan
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Material Test Report

Report No: MAT:AET-066754-S12

Client: TETRA TECH, INC

CC:

Project: TT HDD 34 Lab Testing

Sheridan WY

Job No: P-0014212

Draft Report - Subject to
change pending final review

Date of Issue:

7/29/2022

Sample Details

Sample ID AET-066754-S12
Field Sample ID BH-34-5 55-56.5
Date Sampled
Source
Material Silty, Clayey Sand
Specification Gradation + Hydrometer
Sampling Method In Place Material
General Location Ottertail (midwest
Location BH-34-5
55-56.5
Date Submitted

Other Test Results

Description	Method	Result	Limits
Liquid Limit (%)	AASHTO T 89	19	
Plastic Limit (%)	AASHTO T 90	15	
Plasticity Index	AASHTO T 90	4	
Date Tested		6/9/2022	
Fineness Modulus	ASTM C 136, ASTM C 117	N/A	
Curvature Coefficient		N/A	
Uniformity Coefficient		N/A	

Comments

N/A



American Engineering Testing, Inc.
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Material Test Report

Report No: MAT:AET-066754-S13

Client: TETRA TECH, INC

CC:

Project: TT HDD 34 Lab Testing

Sheridan WY

Job No: P-0014212

Draft Report - Subject to
 change pending final review

Date of Issue:

7/29/2022

Sample Details

Sample ID AET-066754-S13
 Field Sample ID BH-34-5 5.1-10.1
 Date Sampled
 Source
 Material Silty Sand (SM)
 Specification Gradation + Hydrometer
 Sampling Method In Place Material
 General Location Ottertail (midwest)
 Location BH-34-5 Bulk Sample
 5.1-10.1
 Date Submitted

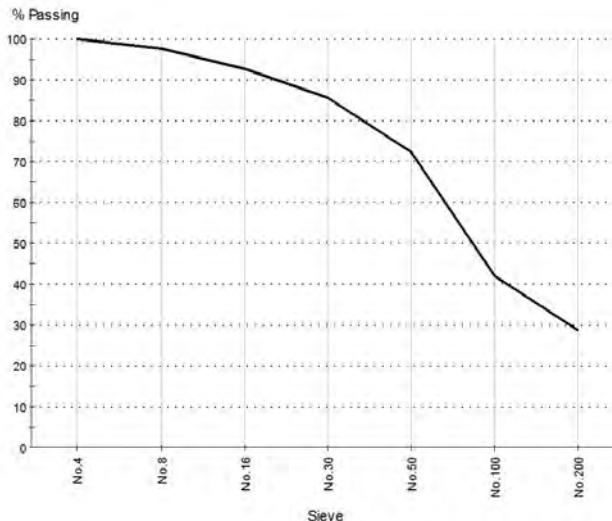
Sample Description:

Silty Sand (SM)

Atterberg Limit:

Liquid Limit: 17
 Plastic Limit: 15
 Plasticity Index: 2
 Linear Shrinkage (%): N/A

Particle Size Distribution



Grading: ASTM C 136, ASTM C 117

Date Tested: 6/9/2022

Tested By: Sara Ostrander

Sieve Size	% Passing	Limits
No.4	99.9	
No.8	97.8	
No.16	92.8	
No.30	85.7	
No.50	72.3	
No.100	42.0	
No.200	28.8	

COBBLES	GRAVEL		SAND			FINES (28.8%)	
(0.0%)	Coarse (0.0%)	Fine (0.1%)	Coarse (3.3%)	Medium (17.5%)	Fine (50.2%)	Silt	Clay

D85: 0.5787 D60: 0.2264 D50: 0.1801
 D30: 0.0799 D15: N/A D10: N/A



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Material Test Report

Report No: MAT:AET-066754-S13

Client: TETRA TECH, INC

CC:

Project: TT HDD 34 Lab Testing

Sheridan WY

Job No: P-0014212

Draft Report - Subject to
change pending final review

Date of Issue:

7/29/2022

Sample Details

Sample ID AET-066754-S13
Field Sample ID BH-34-5 5.1-10.1
Date Sampled
Source
Material Silty Sand (SM)
Specification Gradation + Hydrometer
Sampling Method In Place Material
General Location Ottertail (midwest
Location BH-34-5 Bulk Sample
5.1-10.1
Date Submitted

Other Test Results

Description	Method	Result	Limits
Liquid Limit (%)	AASHTO T 89	17	
Plastic Limit (%)	AASHTO T 90	15	
Plasticity Index	AASHTO T 90	2	
Date Tested		6/9/2022	
Fineness Modulus	ASTM C 136, ASTM C 117	N/A	
Curvature Coefficient		N/A	
Uniformity Coefficient		N/A	
Maximum Dry Unit Weight (lb/ft³)	ASTM D 698	124.5	
Corrected Maximum Dry Unit Weight (lb/ft³)		124.5	
Optimum Water Content (%)		10.3	
Corrected Optimum Water Content (%)		10.3	
Method		A	
Specific Gravity (Oversize)		2.65	
Specific Gravity (Fines)		2.65	
Date Tested		7/20/2022	

Comments

PH-6
Resistivity - 1410 ohm-cm
Sulfates - 660 mg SO42/L



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Material Test Report

Report No: MAT:AET-066754-S15

Client: TETRA TECH, INC

CC:

Project: TT HDD 34 Lab Testing

Sheridan WY

Job No: P-0014212

Draft Report - Subject to
 change pending final review

Date of Issue:

7/29/2022

Sample Details

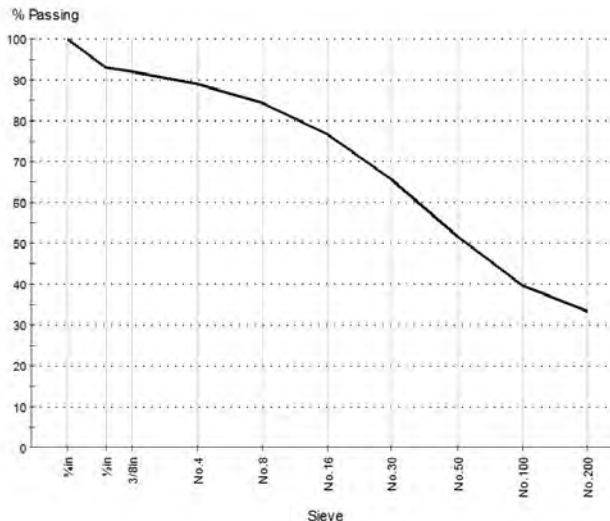
Sample ID AET-066754-S15
 Field Sample ID BH-34-1, 25-26.5
 Date Sampled
 Source
 Material
 Specification Gradation + Hydrometer
 Sampling Method In Place Material
 General Location Ottertail (midwest
 Location BH-34-1
 25-26.5
 Date Submitted

Sample Description:

Atterberg Limit:

Liquid Limit: 35
 Plastic Limit: 17
 Plasticity Index: 18
 Linear Shrinkage (%): N/A

Particle Size Distribution



Grading: ASTM C 136, ASTM C 117

Date Tested: 7/20/2022

Tested By: Sara Ostrander

Sieve Size	% Passing	Limits
3/4in	100.0	
1/2in	93.1	
3/8in	92.1	
No.4	88.9	
No.8	84.5	
No.16	76.7	
No.30	65.6	
No.50	51.6	
No.100	39.8	
No.200	33.3	

COBBLES	GRAVEL		SAND			FINES (33.3%)	
(0.0%)	Coarse (0.0%)	Fine (11.1%)	Coarse (6.2%)	Medium (24.0%)	Fine (25.4%)	Silt	Clay

D85: 2.5552 D60: 0.4547 D50: 0.2731
 D30: N/A D15: N/A D10: N/A



American Engineering Testing, Inc.
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Sheridan, WY 82801
(607) 675-1862
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Material Test Report

Report No: MAT:AET-066754-S15

Client: TETRA TECH, INC

CC:

Project: TT HDD 34 Lab Testing

Sheridan WY

Job No: P-0014212

Draft Report - Subject to
change pending final review

Date of Issue:

7/29/2022

Sample Details

Sample ID AET-066754-S15
Field Sample ID BH-34-1, 25-26.5
Date Sampled
Source
Material
Specification Gradation + Hydrometer
Sampling Method In Place Material
General Location Ottertail (midwest
Location BH-34-1
25-26.5
Date Submitted

Other Test Results

Description	Method	Result	Limits
Liquid Limit (%)	AASHTO T 89	35	
Plastic Limit (%)	AASHTO T 90	17	
Plasticity Index	AASHTO T 90	18	
Date Tested		7/20/2022	
Fineness Modulus	ASTM C 136, ASTM C 117	2.00	
Curvature Coefficient		N/A	
Uniformity Coefficient		N/A	

Comments



American Engineering Testing, Inc.
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 Sheridan, WY 82801
 (607) 675-1862
 www.teamAET.com

Material Test Report

Report No: MAT:AET-066754-S16

Client: TETRA TECH, INC Project: TT HDD 34 Lab Testing Sheridan WY Job No: P-0014212	CC:	Draft Report - Subject to change pending final review Date of Issue: 7/29/2022
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Sample Details	Sample Description:
Sample ID AET-066754-S16 Field Sample ID BH-34-1, 50-51.5 Date Sampled Source Material Specification Gradation + Hydrometer Sampling Method In Place Material General Location Ottertail (midwest Location BH-34-1 50-51.5 Date Submitted	Atterberg Limit: Liquid Limit: 33 Plastic Limit: 17 Plasticity Index: 16 Linear Shrinkage (%): N/A

Particle Size Distribution	Grading: ASTM C 136, ASTM C 117																																	
	Date Tested: 7/20/2022 Tested By: Sara Ostrander <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Sieve Size</th> <th>% Passing</th> <th>Limits</th> </tr> </thead> <tbody> <tr><td>3/4in</td><td>100.0</td><td></td></tr> <tr><td>1/2in</td><td>97.2</td><td></td></tr> <tr><td>3/8in</td><td>96.7</td><td></td></tr> <tr><td>No.4</td><td>93.8</td><td></td></tr> <tr><td>No.8</td><td>90.0</td><td></td></tr> <tr><td>No.16</td><td>82.5</td><td></td></tr> <tr><td>No.30</td><td>74.7</td><td></td></tr> <tr><td>No.50</td><td>64.5</td><td></td></tr> <tr><td>No.100</td><td>50.9</td><td></td></tr> <tr><td>No.200</td><td>41.6</td><td></td></tr> </tbody> </table>	Sieve Size	% Passing	Limits	3/4in	100.0		1/2in	97.2		3/8in	96.7		No.4	93.8		No.8	90.0		No.16	82.5		No.30	74.7		No.50	64.5		No.100	50.9		No.200	41.6	
Sieve Size	% Passing	Limits																																
3/4in	100.0																																	
1/2in	97.2																																	
3/8in	96.7																																	
No.4	93.8																																	
No.8	90.0																																	
No.16	82.5																																	
No.30	74.7																																	
No.50	64.5																																	
No.100	50.9																																	
No.200	41.6																																	
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>COBBLES</th> <th colspan="2">GRAVEL</th> <th colspan="3">SAND</th> <th colspan="2">FINES (41.6%)</th> </tr> <tr> <th>(0.0%)</th> <th>Coarse (0.0%)</th> <th>Fine (6.2%)</th> <th>Coarse (5.5%)</th> <th>Medium (18.6%)</th> <th>Fine (28.1%)</th> <th>Silt</th> <th>Clay</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	COBBLES	GRAVEL		SAND			FINES (41.6%)		(0.0%)	Coarse (0.0%)	Fine (6.2%)	Coarse (5.5%)	Medium (18.6%)	Fine (28.1%)	Silt	Clay									D85: 1.4867 D60: 0.2385 D50: 0.1403 D30: N/A D15: N/A D10: N/A									
COBBLES	GRAVEL		SAND			FINES (41.6%)																												
(0.0%)	Coarse (0.0%)	Fine (6.2%)	Coarse (5.5%)	Medium (18.6%)	Fine (28.1%)	Silt	Clay																											



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Material Test Report

Report No: MAT:AET-066754-S16

Client: TETRA TECH, INC

CC:

Project: TT HDD 34 Lab Testing

Sheridan WY

Job No: P-0014212

Draft Report - Subject to
change pending final review

Date of Issue:

7/29/2022

Sample Details

Sample ID AET-066754-S16
Field Sample ID BH-34-1, 50-51.5
Date Sampled
Source
Material
Specification Gradation + Hydrometer
Sampling Method In Place Material
General Location Ottertail (midwest
Location BH-34-1
50-51.5
Date Submitted

Other Test Results

Description	Method	Result	Limits
Liquid Limit (%)	AASHTO T 89	33	
Plastic Limit (%)	AASHTO T 90	17	
Plasticity Index	AASHTO T 90	16	
Date Tested		7/20/2022	

Comments

N/A



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Material Test Report

Report No: MAT:AET-066754-S17

Client: TETRA TECH, INC **CC:**

Project: TT HDD 34 Lab Testing

Sheridan WY

Job No: P-0014212

Draft Report - Subject to
 change pending final review

Date of Issue: 7/29/2022

Sample Details

Sample ID AET-066754-S17
Field Sample ID BH-34-2, 20-21.5
Date Sampled
Source
Material
Specification Gradation + Hydrometer
Sampling Method In Place Material
General Location Ottertail (midwest
Location BH-34-2
 20-21.5
Date Submitted

Sample Description:

Atterberg Limit:

Liquid Limit: N/A
Plastic Limit: 18
Plasticity Index: NP
Linear Shrinkage (%): N/A

Particle Size Distribution

Sieve	% Passing
3/4 in	100.0
1/2 in	98.3
3/8 in	98.3
No. 4	96.6
No. 8	93.7
No. 16	87.9
No. 30	79.7
No. 50	70.2
No. 100	59.7
No. 200	52.1

COBBLES	GRAVEL		SAND			FINES (52.1%)	
(0.0%)	Coarse (0.0%)	Fine (3.4%)	Coarse (4.3%)	Medium (17.3%)	Fine (22.8%)	Silt	Clay

Grading: ASTM C 136, ASTM C 117

Date Tested: 7/20/2022
Tested By: Sara Ostrander

Sieve Size	% Passing	Limits
3/4 in	100.0	
1/2 in	98.3	
3/8 in	98.3	
No. 4	96.6	
No. 8	93.7	
No. 16	87.9	
No. 30	79.7	
No. 50	70.2	
No. 100	59.7	
No. 200	52.1	

D85: 0.9290 **D60:** 0.1530 **D50:** N/A
D30: N/A **D15:** N/A **D10:** N/A



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Material Test Report

Report No: MAT:AET-066754-S17

Client: TETRA TECH, INC

CC:

Project: TT HDD 34 Lab Testing

Sheridan WY

Job No: P-0014212

Draft Report - Subject to
change pending final review

Date of Issue:

7/29/2022

Sample Details

Sample ID AET-066754-S17
Field Sample ID BH-34-2, 20-21.5
Date Sampled
Source
Material
Specification Gradation + Hydrometer
Sampling Method In Place Material
General Location Ottertail (midwest
Location BH-34-2
20-21.5
Date Submitted

Other Test Results

Description	Method	Result	Limits
Liquid Limit (%)	AASHTO T 89	N/A	
Plastic Limit (%)	AASHTO T 90	18	
Plasticity Index	AASHTO T 90	NP	
Date Tested		7/20/2022	
Fineness Modulus	ASTM C 136, ASTM C 117	1.13	
Curvature Coefficient		N/A	
Uniformity Coefficient		N/A	

Comments

NP = Non Plastic



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Material Test Report

Report No: MAT:AET-066754-S18

Client: TETRA TECH, INC Project: TT HDD 34 Lab Testing Sheridan WY Job No: P-0014212	CC: Draft Report - Subject to change pending final review Date of Issue: 7/29/2022
--	--

Sample Details		Sample Description:
Sample ID Field Sample ID Date Sampled Source Material Specification Sampling Method General Location Location Date Submitted	AET-066754-S18 BH-34-2, 45-46.5 Gradation + Hydrometer In Place Material Ottertail (midwest BH-34-2 45-46.5	Atterberg Limit: Liquid Limit: 42 Plastic Limit: 19 Plasticity Index: 23 Linear Shrinkage (%): N/A

Particle Size Distribution		Grading: ASTM C 136, ASTM C 117																																																						
		Date Tested: 7/20/2022 Tested By: Sara Ostrander																																																						
<table border="1"> <thead> <tr> <th>Sieve Size</th> <th>% Passing</th> <th>Limits</th> </tr> </thead> <tbody> <tr><td>3/8in</td><td>100.0</td><td></td></tr> <tr><td>No.4</td><td>98.2</td><td></td></tr> <tr><td>No.8</td><td>95.7</td><td></td></tr> <tr><td>No.16</td><td>92.7</td><td></td></tr> <tr><td>No.30</td><td>89.4</td><td></td></tr> <tr><td>No.50</td><td>84.9</td><td></td></tr> <tr><td>No.100</td><td>44.6</td><td></td></tr> <tr><td>No.200</td><td>2.7</td><td></td></tr> </tbody> </table>		Sieve Size	% Passing	Limits	3/8in	100.0		No.4	98.2		No.8	95.7		No.16	92.7		No.30	89.4		No.50	84.9		No.100	44.6		No.200	2.7		<table border="1"> <thead> <tr> <th colspan="2">COBBLES</th> <th colspan="2">GRAVEL</th> <th colspan="3">SAND</th> <th colspan="2">FINES (2.7%)</th> </tr> <tr> <th>(0.0%)</th> <th></th> <th>Coarse (0.0%)</th> <th>Fine (1.8%)</th> <th>Coarse (3.2%)</th> <th>Medium (7.8%)</th> <th>Fine (84.5%)</th> <th>Silt</th> <th>Clay</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	COBBLES		GRAVEL		SAND			FINES (2.7%)		(0.0%)		Coarse (0.0%)	Fine (1.8%)	Coarse (3.2%)	Medium (7.8%)	Fine (84.5%)	Silt	Clay									
Sieve Size	% Passing	Limits																																																						
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No.200	2.7																																																							
COBBLES		GRAVEL		SAND			FINES (2.7%)																																																	
(0.0%)		Coarse (0.0%)	Fine (1.8%)	Coarse (3.2%)	Medium (7.8%)	Fine (84.5%)	Silt	Clay																																																
		D85: 0.3047 D60: 0.1955 D50: 0.1646 D30: 0.1178 D15: 0.0919 D10: 0.0846 Cu: 2.31 Cc: 0.84																																																						



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Material Test Report

Report No: MAT:AET-066754-S18

Client: TETRA TECH, INC

CC:

Project: TT HDD 34 Lab Testing

Sheridan WY

Job No: P-0014212

Draft Report - Subject to
change pending final review

Date of Issue:

7/29/2022

Sample Details

Sample ID AET-066754-S18
Field Sample ID BH-34-2, 45-46.5
Date Sampled
Source
Material
Specification Gradation + Hydrometer
Sampling Method In Place Material
General Location Ottertail (midwest
Location BH-34-2
45-46.5
Date Submitted

Other Test Results

Description	Method	Result	Limits
Liquid Limit (%)	AASHTO T 89	42	
Plastic Limit (%)	AASHTO T 90	19	
Plasticity Index	AASHTO T 90	23	
Date Tested		7/20/2022	
Fineness Modulus	ASTM C 136, ASTM C 117	0.94	
Curvature Coefficient		0.84	
Uniformity Coefficient		2.31	

Comments

N/A



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Material Test Report

Report No: MAT:AET-066754-S20

Client: TETRA TECH, INC **CC:**

Project: TT HDD 34 Lab Testing

Sheridan WY

Job No: P-0014212

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Date of Issue: 7/29/2022

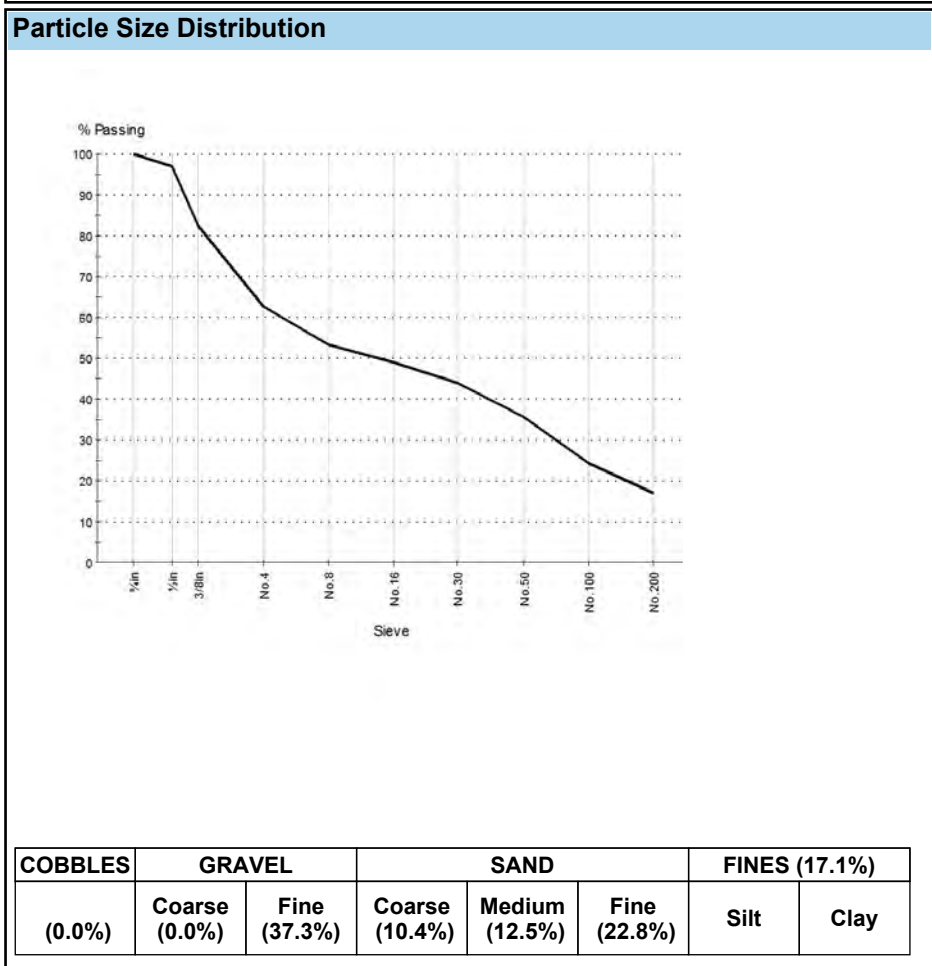
Sample Details

Sample ID AET-066754-S20
Field Sample ID BH-34-2, 65-66.5
Date Sampled
Source
Material
Specification Gradation + Hydrometer
Sampling Method In Place Material
General Location Ottertail (midwest
Location BH-34-2
 65-66.5
Date Submitted

Sample Description:

Atterberg Limit:

Liquid Limit: 22
Plastic Limit: 11
Plasticity Index: 11
Linear Shrinkage (%): N/A



Grading: ASTM C 136, ASTM C 117

Date Tested: 7/20/2022
Tested By: Sara Ostrander

Sieve Size	% Passing	Limits
3/4 in	100.0	
1/2 in	97.0	
3/8 in	82.5	
No. 4	62.7	
No. 8	53.5	
No. 16	48.9	
No. 30	43.9	
No. 50	35.7	
No. 100	24.5	
No. 200	17.1	

D85: 9.9603 **D60:** 3.8685 **D50:** 1.3927
D30: 0.2108 **D15:** N/A **D10:** N/A



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Material Test Report

Report No: MAT:AET-066754-S20

Client: TETRA TECH, INC

CC:

Project: TT HDD 34 Lab Testing

Sheridan WY

Job No: P-0014212

Draft Report - Subject to
change pending final review

Date of Issue:

7/29/2022

Sample Details

Sample ID AET-066754-S20
Field Sample ID BH-34-2, 65-66.5
Date Sampled
Source
Material
Specification Gradation + Hydrometer
Sampling Method In Place Material
General Location Ottertail (midwest
Location BH-34-2
65-66.5
Date Submitted

Other Test Results

Description	Method	Result	Limits
Liquid Limit (%)	AASHTO T 89	22	
Plastic Limit (%)	AASHTO T 90	11	
Plasticity Index	AASHTO T 90	11	
Date Tested		7/20/2022	
Fineness Modulus	ASTM C 136, ASTM C 117	3.47	
Curvature Coefficient		N/A	
Uniformity Coefficient		N/A	

Comments

N/A



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Material Test Report

Report No: MAT:AET-066754-S21

Client: TETRA TECH, INC

CC:

Project: TT HDD 34 Lab Testing

Sheridan WY

Job No: P-0014212

Draft Report - Subject to
 change pending final review

Date of Issue:

7/29/2022

Sample Details

Sample ID AET-066754-S21
 Field Sample ID BH-34-3, 25-26.5
 Date Sampled
 Source
 Material
 Specification Gradation + Hydrometer
 Sampling Method In Place Material
 General Location Ottertail (midwest
 Location BH-34-3
 25-26.5
 Date Submitted

Sample Description:

Atterberg Limit:

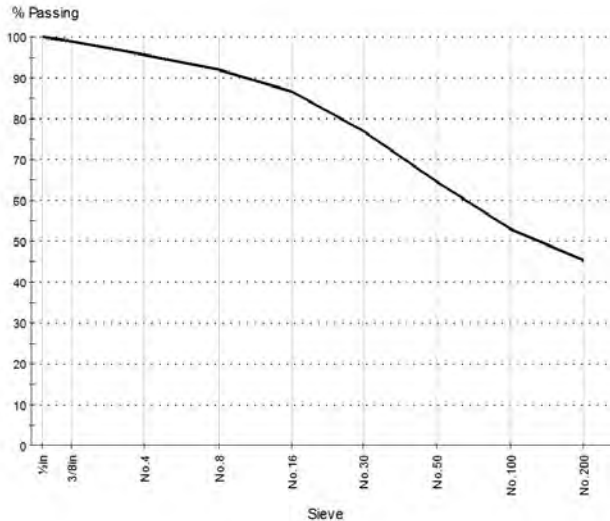
Liquid Limit: 34
 Plastic Limit: 18
 Plasticity Index: 16
 Linear Shrinkage (%): N/A

Grading: ASTM C 136, ASTM C 117

Date Tested: 7/20/2022
 Tested By: Sara Ostrander

Sieve Size	% Passing	Limits
1/2in	100.0	
3/8in	99.0	
No.4	95.7	
No.8	92.1	
No.16	86.6	
No.30	76.9	
No.50	64.7	
No.100	52.9	
No.200	45.3	

Particle Size Distribution



COBBLES	GRAVEL		SAND			FINES (45.3%)	
(0.0%)	Coarse (0.0%)	Fine (4.3%)	Coarse (4.9%)	Medium (20.0%)	Fine (25.6%)	Silt	Clay

D85: 1.0554 D60: 0.2276 D50: 0.1151
 D30: N/A D15: N/A D10: N/A



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Material Test Report

Report No: MAT:AET-066754-S21

Client: TETRA TECH, INC

CC:

Project: TT HDD 34 Lab Testing

Sheridan WY

Job No: P-0014212

Draft Report - Subject to
change pending final review

Date of Issue:

7/29/2022

Sample Details

Sample ID AET-066754-S21
Field Sample ID BH-34-3, 25-26.5
Date Sampled
Source
Material
Specification Gradation + Hydrometer
Sampling Method In Place Material
General Location Ottertail (midwest
Location BH-34-3
25-26.5
Date Submitted

Other Test Results

Description	Method	Result	Limits
Liquid Limit (%)	AASHTO T 89	34	
Plastic Limit (%)	AASHTO T 90	18	
Plasticity Index	AASHTO T 90	16	
Date Tested		7/20/2022	
Fineness Modulus	ASTM C 136, ASTM C 117	1.31	
Curvature Coefficient		N/A	
Uniformity Coefficient		N/A	

Comments

N/A



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Material Test Report

Report No: MAT:AET-066754-S23

Client: TETRA TECH, INC Project: TT HDD 34 Lab Testing Sheridan WY Job No: P-0014212	CC:	Draft Report - Subject to change pending final review Date of Issue: 7/29/2022
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Sample Details	Sample Description:
Sample ID AET-066754-S23 Field Sample ID BH-34-5, 25-26.5 Date Sampled Source Material Specification Gradation + Hydrometer Sampling Method In Place Material General Location Ottertail (midwest Location BH-34-5 25-26.5 Date Submitted	Atterberg Limit: Liquid Limit: 35 Plastic Limit: 16 Plasticity Index: 19 Linear Shrinkage (%): N/A

Particle Size Distribution	Grading: ASTM C 136, ASTM C 117																																																						
Date Tested: 7/20/2022 Tested By: Sara Ostrander <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Sieve Size</th> <th>% Passing</th> <th>Limits</th> </tr> </thead> <tbody> <tr><td>1/2in</td><td>100.0</td><td></td></tr> <tr><td>3/8in</td><td>99.0</td><td></td></tr> <tr><td>No.4</td><td>96.9</td><td></td></tr> <tr><td>No.8</td><td>93.8</td><td></td></tr> <tr><td>No.16</td><td>88.6</td><td></td></tr> <tr><td>No.30</td><td>81.0</td><td></td></tr> <tr><td>No.50</td><td>71.0</td><td></td></tr> <tr><td>No.100</td><td>60.1</td><td></td></tr> <tr><td>No.200</td><td>52.2</td><td></td></tr> </tbody> </table>	Sieve Size	% Passing	Limits	1/2in	100.0		3/8in	99.0		No.4	96.9		No.8	93.8		No.16	88.6		No.30	81.0		No.50	71.0		No.100	60.1		No.200	52.2		<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>COBBLES</th> <th colspan="2">GRAVEL</th> <th colspan="3">SAND</th> <th colspan="2">FINES (52.2%)</th> </tr> <tr> <th>(0.0%)</th> <th>Coarse (0.0%)</th> <th>Fine (3.1%)</th> <th>Coarse (4.3%)</th> <th>Medium (16.6%)</th> <th>Fine (23.8%)</th> <th>Silt</th> <th>Clay</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	COBBLES	GRAVEL		SAND			FINES (52.2%)		(0.0%)	Coarse (0.0%)	Fine (3.1%)	Coarse (4.3%)	Medium (16.6%)	Fine (23.8%)	Silt	Clay								
Sieve Size	% Passing	Limits																																																					
1/2in	100.0																																																						
3/8in	99.0																																																						
No.4	96.9																																																						
No.8	93.8																																																						
No.16	88.6																																																						
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COBBLES	GRAVEL		SAND			FINES (52.2%)																																																	
(0.0%)	Coarse (0.0%)	Fine (3.1%)	Coarse (4.3%)	Medium (16.6%)	Fine (23.8%)	Silt	Clay																																																

D85: 0.8565 D60: 0.1487 D50: N/A
 D30: N/A D15: N/A D10: N/A



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Material Test Report

Report No: MAT:AET-066754-S23

Client: TETRA TECH, INC

CC:

Project: TT HDD 34 Lab Testing

Sheridan WY

Job No: P-0014212

Draft Report - Subject to
change pending final review

Date of Issue:

7/29/2022

Sample Details

Sample ID AET-066754-S23
Field Sample ID BH-34-5, 25-26.5
Date Sampled
Source
Material
Specification Gradation + Hydrometer
Sampling Method In Place Material
General Location Ottertail (midwest
Location BH-34-5
25-26.5
Date Submitted

Other Test Results

Description	Method	Result	Limits
Liquid Limit (%)	AASHTO T 89	35	
Plastic Limit (%)	AASHTO T 90	16	
Plasticity Index	AASHTO T 90	19	
Date Tested		7/20/2022	
Fineness Modulus	ASTM C 136, ASTM C 117	1.09	
Curvature Coefficient		N/A	
Uniformity Coefficient		N/A	

Comments

NP = Non Plastic



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Report No: PTR:AET-066754-S1

Proctor Report

Client: TETRA TECH, INC

CC:

Project: TT HDD 34 Lab Testing

Sheridan WY

Job No: P-0014212

Draft Report - Subject to
change pending final review

Date of Issue:

7/29/2022

Sample Details

Sample ID: AET-066754-S1

Field ID: BH-34-1 5.1-10.1

Date Sampled:

Sampling Method: In Place Material

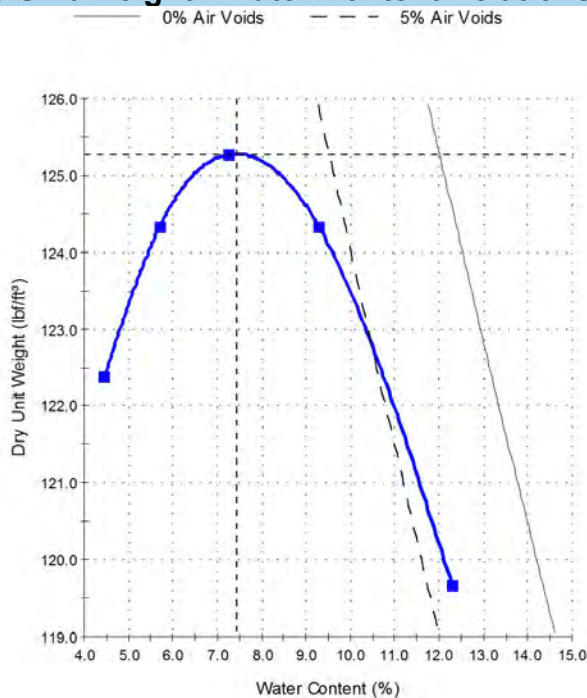
Material: clayey sand

Specification: Gradation + Hydrometer

Location: BH-34-1 bulk sample, 5.1-10.1

Sampled By: Client

Dry Unit Weight - Water Content Relationship



Test Results

ASTM D 698

Maximum Dry Unit Weight (lb/ft³): 125.3

Optimum Water Content (%): 7.4

Method: A

Preparation Method:

Specific Gravity (Fines): 2.65

Retained Sieve No 4 (4.75mm) (%): 0

Passing Sieve No 4 (4.75mm) (%): 100

Tested By: Sara Ostrander

Date Tested: 6/9/2022

AASHTO T 89/T 90

Liquid Limit (%): 26

Plastic Limit (%): 12

Plasticity Index (%): 14

Tested By: Sara Ostrander

Date Tested: 6/9/2022

Comments

PH-7

Resistivity - 1200 ohm-cm

Sulfates - 870 mg SO42/L



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Report No: PTR:AET-066754-S13

Proctor Report

Client: TETRA TECH, INC

CC:

Project: TT HDD 34 Lab Testing

Sheridan WY

Job No: P-0014212

Draft Report - Subject to
change pending final review

Date of Issue:

7/29/2022

Sample Details

Sample ID: AET-066754-S13

Field ID: BH-34-5 5.1-10.1

Date Sampled:

Sampling Method: In Place Material

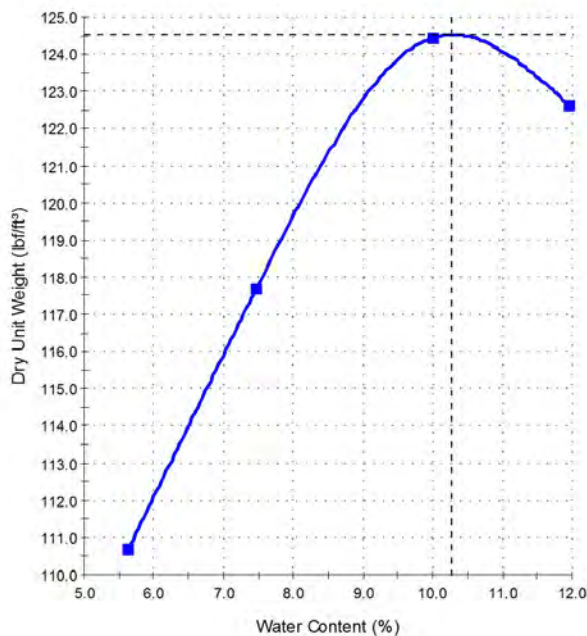
Material: Silty Sand (SM)

Specification: Gradation + Hydrometer

Location: BH-34-5 Bulk Sample, 5.1-10.1

Sampled By: Client

Dry Unit Weight - Water Content Relationship



Test Results

ASTM D 698

Maximum Dry Unit Weight (lb/ft³): 124.5

Optimum Water Content (%): 10.3

Method: A

Preparation Method:

Specific Gravity (Fines): 2.65

Tested By: Sara Ostrander

Date Tested: 7/20/2022

AASHTO T 89/T 90

Liquid Limit (%): 17

Plastic Limit (%): 15

Plasticity Index (%): 2

Tested By: Sara Ostrander

Date Tested: 6/9/2022

Comments

PH-6
Resistivity - 1410 ohm-cm
Sulfates - 660 mg SO42/L

APPENDIX D

Geophysical Seismic Survey Data
(Tables D-1 through D-4)

Table D-1. HDD 34 - Line 1 Summary of S and P Wave Data at Depth with Dynamic Modulus

Depth (ft)	S-Wave Velocity (ft/sec)	P-Wave Velocity (ft/sec)	Density (pcf)	Poisson's Ratio $\sigma_p = [(V_p/V_s)^2 - 2] / [2(V_p/V_s)^2 - 2]$	Shear Modulus $G = dV_s^2$ (psi)	Young's Modulus $E = 2G(1 + \sigma_p)$	Bulk Modulus $K = 1/3(E/(1 - 2\sigma_p))$
0	410	1,526	98	0.46	3,558	10,397	44,501
5	499	1,526	98	0.44	5,272	15,183	42,216
10	607	2,420	98	0.47	7,787	22,838	113,349
15	693	3,269	98	0.48	10,142	29,949	212,294
20	752	4,484	98	0.49	11,957	35,526	409,059
25	774	5,532	98	0.49	12,668	37,750	629,896
30	832	6,220	98	0.49	14,617	43,585	798,204
35	840	6,743	98	0.49	14,927	44,544	940,951
40	847	7,081	98	0.49	15,167	45,280	1,039,649
45	998	7,242	98	0.49	21,054	62,753	1,080,447
50	1,016	7,333	98	0.49	21,828	65,058	1,107,487
55	1035	7421	98	0.49	22,657	67,522	1,133,808
60	1122	7527	98	0.49	26,589	79,164	1,161,997
65	1141	7663	98	0.49	27,530	81,966	1,204,444
70	1159	7900	98	0.49	28,386	84,535	1,281,144
75	1176	8268	98	0.49	29,215	87,041	1,405,777
80	1192	8665	98	0.49	30,025	89,496	1,546,972
85	1208	9047	98	0.49	30,848	91,985	1,688,644
90	1225	9365	98	0.49	31,724	94,620	1,811,175
95	1234	9645	98	0.49	32,196	96,053	1,923,098
100	1238	9645	98	0.49	32,394	96,640	1,922,834

Table D-2. HDD 34 - Line 2 Summary of S and P Wave Data at Depth with Dynamic Modulus

Depth (ft)	S-Wave Velocity (ft/sec)	P-Wave Velocity (ft/sec)	Density (pcf)	Poisson's Ratio $\sigma_p = [(V_p/V_s)^2 - 2] / [2(V_p/V_s)^2 - 2]$	Shear Modulus $G = dV_s^2$ (psi)	Young's Modulus $E = 2G(1 + \sigma_p)$	Bulk Modulus $K = 1/3(E/(1 - 2\sigma_p))$
0	433	2,138	98	0.48	3,954	11,694	91,321
5	538	2,138	98	0.47	6,117	17,936	88,438
10	618	3,359	98	0.48	8,064	23,910	227,661
15	678	4,327	98	0.49	9,711	28,888	382,822
20	790	5,316	98	0.49	13,190	39,272	579,653
25	854	6,340	98	0.49	15,404	45,926	829,134
30	951	6,513	98	0.49	19,107	56,904	871,109
35	977	6,511	98	0.49	20,190	60,106	869,035
40	996	6,623	98	0.49	20,985	62,470	899,042
45	1,023	6,822	98	0.49	22,115	65,836	954,207
50	1,003	6,964	98	0.49	21,251	63,302	996,577
55	986	6986	98	0.49	20,559	61,259	1,004,131
60	1100	7130	98	0.49	25,596	76,164	1,040,232
65	1100	7524	98	0.49	25,596	76,229	1,162,306
70	1109	7901	98	0.49	26,011	77,510	1,284,703
75	1128	8252	98	0.49	26,886	80,145	1,403,333
80	1156	8608	98	0.49	28,265	84,277	1,528,442
85	1196	9018	98	0.49	30,229	90,145	1,678,595
90	1513	9498	98	0.49	48,373	143,861	1,842,057
95	1686	9498	98	0.48	60,054	178,210	1,826,483
100	1781	9498	98	0.48	67,022	198,626	1,817,192

Table D-3. HDD 34 - Line 3 Summary of S and P Wave Data at Depth with Dynamic Modulus

Depth (ft)	S-Wave Velocity (ft/sec)	P-Wave Velocity (ft/sec)	Density (pcf)	Poisson's Ratio $\sigma_p = [(V_p/V_s)^2 - 2] / [2(V_p/V_s)^2 - 2]$	Shear Modulus $G = dV_s^2$ (psi)	Young's Modulus $E = 2G(1 + \sigma_p)$	Bulk Modulus $K = 1/3(E/(1 - 2\sigma_p))$
0	416	1,990	98	0.48	3,655	10,797	78,856
5	477	1,990	98	0.47	4,812	14,142	77,313
10	583	3,494	98	0.49	7,196	21,380	248,483
15	662	4,423	98	0.49	9,258	27,561	401,152
20	758	5,711	98	0.49	12,131	36,176	673,153
25	835	6,649	98	0.49	14,731	43,958	914,659
30	873	6,697	98	0.49	16,096	48,010	926,338
35	910	6,823	98	0.49	17,495	52,169	960,618
40	938	6,864	98	0.49	18,584	55,398	970,932
45	943	6,853	98	0.49	18,803	56,045	967,534
50	987	6,852	98	0.49	20,570	61,273	964,939
55	1024	6855	98	0.49	22,177	66,026	963,632
60	1032	7013	98	0.49	22,528	67,084	1,009,354
65	1059	7399	98	0.49	23,682	70,552	1,125,632
70	1107	7837	98	0.49	25,906	77,191	1,263,521
75	1123	8321	98	0.49	26,642	79,433	1,427,740
80	1140	8810	98	0.49	27,463	81,920	1,603,994
85	1159	9190	98	0.49	28,380	84,681	1,747,043
90	1179	9589	98	0.49	29,403	87,757	1,904,346
95	1191	9589	98	0.49	29,986	89,488	1,903,569
100	1198	9589	98	0.49	30,323	90,489	1,903,120

Table D-4. HDD 34 - Line 4 Summary of S and P Wave Data at Depth with Dynamic Modulus

Depth (ft)	S-Wave Velocity (ft/sec)	P-Wave Velocity (ft/sec)	Density (pcf)	Poisson's Ratio $\sigma_p = [(V_p/V_s)^2 - 2] / [2(V_p/V_s)^2 - 2]$	Shear Modulus $G = dV_s^2$ (psi)	Young's Modulus $E = 2G(1 + \sigma_p)$	Bulk Modulus $K = 1/3(E/(1 - 2\sigma_p))$
0	448	1,823	98	0.47	4,235	12,433	64,620
5	508	1,823	98	0.46	5,463	15,929	62,982
10	677	3,073	98	0.47	9,700	28,604	186,671
15	802	4,006	98	0.48	13,599	40,229	321,102
20	894	5,096	98	0.48	16,895	50,148	526,301
25	947	5,984	98	0.49	18,937	56,325	731,456
30	1,035	6,243	98	0.49	22,641	67,282	793,589
35	1,063	6,357	98	0.49	23,883	70,963	822,382
40	1,121	6,515	98	0.48	26,582	78,933	861,611
45	1,120	6,760	98	0.49	26,520	78,812	930,349
50	1,131	7,112	98	0.49	27,051	80,450	1,033,067
55	1137	7188	98	0.49	27,336	81,306	1,055,485
60	1135	7167	98	0.49	27,244	81,031	1,049,221
65	1197	7209	98	0.49	30,297	90,031	1,057,994
70	1200	7409	98	0.49	30,436	90,487	1,119,753
75	1210	7662	98	0.49	30,960	92,089	1,199,339
80	1230	7962	98	0.49	31,971	95,130	1,297,205
85	1400	8463	98	0.49	41,442	123,161	1,458,481
90	1485	8974	98	0.49	46,602	138,494	1,640,124
95	1539	8974	98	0.48	50,069	148,688	1,635,501
100	1589	8974	98	0.48	53,345	158,309	1,631,133

APPENDIX E

Inadvertent Returns Analysis
(Figures 1E through 3E)

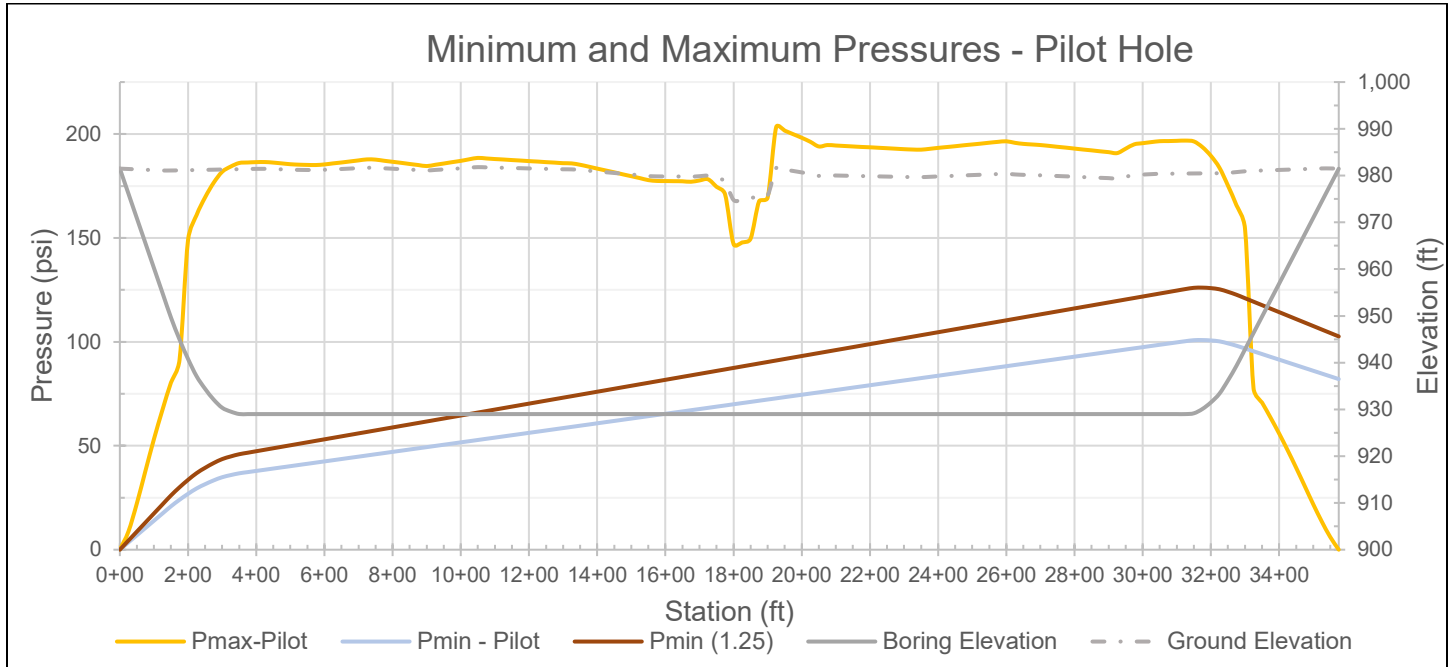


Figure 1E. HDD34 - Plot of minimum and maximum allowable drilling fluid pressures along Otter Tail River HDD bore path to prevent hydrofracture or surface release.

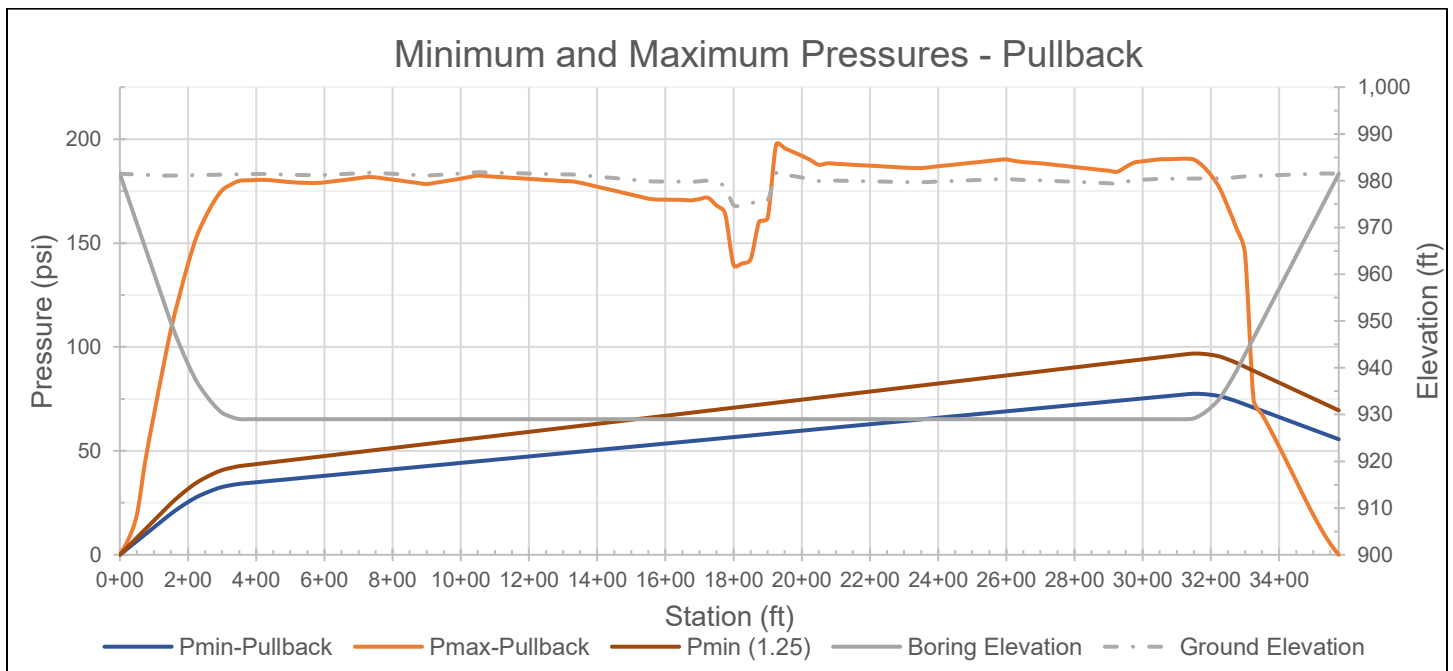


Figure 2E. HDD34 - Plot of minimum and maximum allowable drilling fluid pressures along Otter Tail River HDD bore path to prevent hydrofracture or surface release.

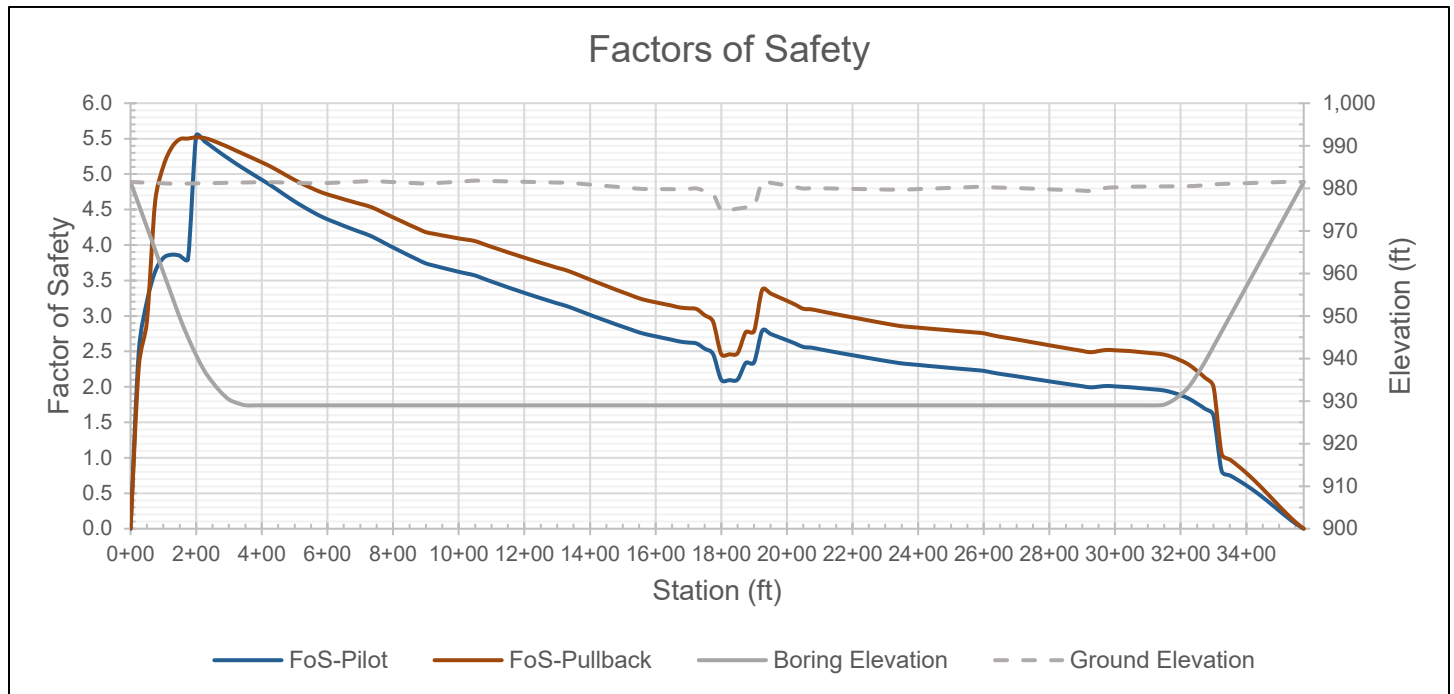


Figure 3E. HDD34 - Plot of Factors of Safety for drilling fluid pressures along Otter Tail River HDD bore path to prevent hydrofracture or surface release.



U.S. Department
of Transportation
**Pipeline and Hazardous
Materials Safety
Administration**

1200 New Jersey Avenue, SE
Washington, DC 20590

9/15/2023

Mr. Lee Blank
CEO
Summit Carbon Solutions
2321 N Loop Dr. Suite 221
Ames, Iowa 50010

Dear Mr. Blank:

The Pipeline and Hazardous Materials Safety Administration (PHMSA) has received several inquiries regarding the ability of federal, state, and local governments to affect the siting, design, construction, operation, and maintenance of carbon dioxide pipelines. The widespread interest in understanding PHMSA's authorities underscores a need to reiterate the message we shared in 2014 with a company proposing a high-visibility interstate pipeline, a message directly related to current pipeline projects proposed by your companies.

As was the case in 2014, PHMSA continues to support and encourage all three levels of government—federal, state, and local—working collaboratively to ensure the nation's pipeline systems are constructed and operated in a manner that protects public safety and the environment.

Congress has vested PHMSA with authority to regulate the design, construction, operation, and maintenance of pipeline systems, including carbon dioxide pipelines, and to protect life, property, and the environment from hazards associated with pipeline operations. While the Federal Energy Regulatory Commission has exclusive authority to regulate the siting of interstate gas transmission pipelines, there is no equivalent federal agency that determines siting of all other pipelines, such as carbon dioxide pipelines. Therefore, the responsibility for siting new carbon dioxide pipelines rests largely with the individual states and counties through which the pipelines will operate and is governed by state and local law.

The Role of PHMSA

Under the federal pipeline safety laws (49 U.S.C. § 60101 *et seq.*), PHMSA is charged with carrying out a nationwide program for regulating the country's pipelines that transport gas, hazardous liquids, and carbon dioxide. With passage of the federal pipeline safety laws, Congress determined pipeline safety is best promoted through PHMSA's development of nationwide safety standards.

PHMSA takes this responsibility seriously and has promulgated comprehensive safety regulations at 49 C.F.R. Parts 190-199. Dozens of current federal requirements regulate the safety of carbon dioxide pipelines' design,¹ construction,² testing,³ operation and maintenance,⁴ operator qualification,⁵ corrosion control,⁶ and emergency response planning.⁷ PHMSA inspects compliance with these requirements and enforces these standards through administrative and judicial enforcement processes.

Recently, PHMSA promulgated new, more stringent standards for automatic and remote shut off valves that affect carbon dioxide pipelines (Additional information: "New rule will help improve public safety and reduce greenhouse gas emissions following pipeline failures").⁸ PHMSA also announced a number of additional actions to strengthen current pipeline safety requirements for carbon dioxide pipelines (Additional information: "PHMSA announces new safety measures to protect Americans from carbon dioxide pipeline failures"),⁹ including a new rulemaking which is currently under way.

While rulemakings like this involve meticulous crafting of highly technical updates, PHMSA also retains broad authority to address imminent risks to the public posed by a pipeline—even if not specifically delineated in a rule or standard. To this extent, PHMSA will engage with all carbon dioxide pipeline project developers to ensure any unique and imminent risks from such projects are adequately mitigated pursuant to PHMSA's statutory safety authority.

The Role of State Pipeline Regulators

Federal safety standards apply to both interstate and intrastate pipeline facilities. Only PHMSA can regulate the safety of interstate pipelines, and federal pipeline safety laws expressly prohibit states from enacting or enforcing pipeline safety standards with respect to interstate pipelines (except one-call notification program regulations). However, through an agreement with PHMSA, a state authority may be authorized to inspect interstate pipelines as an agent of PHMSA, and to refer violations to PHMSA for enforcement. Thus, PHMSA's state partners play an important role in assisting to oversee the safety of the nation's interstate pipelines.

PHMSA's state partners also play a critical role in regulating the safety of intrastate pipelines. A state authority that submits a certification to PHMSA may assume exclusive regulatory authority for the safety of its intrastate pipelines. The certification must document, among other things,

¹ 49 CFR part 195, subpart C (<https://www.ecfr.gov/current/title-49/subtitle-B/chapter-I/subchapter-D/part-195/subpart-C>).

² Subpart D (<https://www.ecfr.gov/current/title-49/subtitle-B/chapter-I/subchapter-D/part-195/subpart-D>).

³ Subpart E (<https://www.ecfr.gov/current/title-49/subtitle-B/chapter-I/subchapter-D/part-195/subpart-E>).

⁴ Subpart F (<https://www.ecfr.gov/current/title-49/subtitle-B/chapter-I/subchapter-D/part-195/subpart-F>).

⁵ Subpart G (<https://www.ecfr.gov/current/title-49/subtitle-B/chapter-I/subchapter-D/part-195/subpart-G>).

⁶ Subpart H (<https://www.ecfr.gov/current/title-49/subtitle-B/chapter-I/subchapter-D/part-195/subpart-H>).

⁷ *E.g.*, Subpart F, §§ 195.402, 195.403, 195.408.

⁸ <https://www.phmsa.dot.gov/news/phmsa-announces-requirements-pipeline-shut-valves-strengthen-safety-improve-response-efforts>

⁹ <https://www.phmsa.dot.gov/news/phmsa-announces-new-safety-measures-protect-americans-carbon-dioxide-pipeline-failures>

that the state has appropriate jurisdiction under state law; has adopted the federal safety standards to which the certification applies; inspects operators for compliance with those standards; and enforces the standards to address noncompliance.

PHMSA's national regulatory program relies heavily on the efforts of these state partners, who employ roughly 70 percent of all pipeline inspectors and whose jurisdiction covers more than 80 percent of regulated pipelines. As noted above, federal law requires certified state authorities to adopt safety standards at least as stringent as, and compatible with, the federal standards. The state authorities will also inspect, regulate, and take enforcement action against operators of intrastate pipelines within their borders.

The Role of Local Governments

Federal preemption of pipeline safety means that states do not have independent authority to regulate pipeline safety but derive that authority from federal law through a certification to PHMSA.

In the case of local governments that are not subject to federal certification of pipeline safety authority, they may still exercise other powers granted to them under state law but none that adopt or enforce pipeline safety standards or contradict federal law.

However, PHMSA cannot prescribe the location or routing of a pipeline and cannot prohibit the construction of non-pipeline buildings in proximity to a pipeline. Local governments have traditionally exercised broad powers to regulate land use, including setback distances and property development that includes development in the vicinity of pipelines. Nothing in the federal pipeline safety law impinges on these traditional prerogatives of local—or state—government, so long as officials do not attempt to regulate the field of pipeline safety preempted by federal law.

PHMSA recognizes local governments have implemented authorities under state law that contribute in many ways to the safety of their citizens. We have seen localities consider measures, such as:

1. Controlling dangerous excavation activity near pipelines.
2. Limiting certain land use activities along pipeline rights-of-way.
3. Restricting land use and development along pipeline rights-of-way through zoning, setbacks, and similar measures.
4. Requiring the consideration of pipeline facilities in proposed local development plans.
5. Designing local emergency response plans and training with regulators and operators.
6. Requiring specific building code design or construction standards near pipelines.
7. Improving emergency response and evacuation plans in the event of a pipeline release.
8. Participating in federal environmental studies conducted under the National Environmental Policy Act (NEPA) and similar state laws for new pipeline construction projects.

Each state treats these issues differently, so pipeline operators should be prepared to deal directly with each locality and state body interested in the siting and construction process.

Collaboration Among Stakeholders

PHMSA believes pipeline safety is the shared responsibility of federal and state regulators as well as all other stakeholders, including pipeline operators, excavators, property owners, and local governments. In 2010, PHMSA launched the Pipelines and Informed Planning Alliance (PIPA)—available at <https://primis.phmsa.dot.gov/comm/pipa/LandUsePlanning.html>—to help pipeline safety stakeholders define their respective roles related to land use practices near pipelines and to develop best practices.

The PIPA documents are 13 years old, but they remain of value today. PHMSA looks forward to you, along with other private and public stakeholders, engaging with PHMSA in updating these documents to focus on the unique circumstances of new pipeline construction. I encourage all pipeline operators to carefully consider and adopt, as appropriate, these best practices to protect their existing and proposed rights-of-way, and to engage all stakeholders in promoting the safety of interstate pipelines.

Each community affected by an existing or proposed pipeline faces unique risks. The effective control and mitigation of such risks involves a combination of measures employed by facility operators, regulatory bodies, community groups, and individual members of the community. As a pipeline release can impact individuals, businesses, property owners, and the environment, it is important that all stakeholders carefully consider land use and development plans to make risk-informed choices that protect the best interests of the public and the individual parties involved. Sharing appropriate information with state or local governments and emergency planners, which may include dispersion models or emergency response plans, may help stakeholders make risk-informed decisions.

Bringing a pipeline into a community is often a complicated endeavor that requires tremendous coordination and open communication among stakeholders to be successful. We greatly value the efforts of pipeline operators who spend the time and energy to make sure the process goes smoothly and are responsive to all parties involved. Thank you for your cooperation in this effort.

Sincerely,

Alan K. Mayberry
Associate Administrator for Pipeline Safety

Summit Carbon Solutions Otter Tail to Wilkin Project Route Permit Application
Construction Emission Calculations
Summary

Description	Emissions (tpy)								
	Criteria Pollutants						GHGs	HAPs	
	NOx	CO	VOC	SO ₂	PM ₁₀	PM _{2.5}	CO ₂ e	Formalde hyde	Total
Off-Road Engine Emissions	75.46	17.15	5.72	0.04	3.12	3.11	3,433	0.68	1.01
Unpaved Roads	--	--	--	--	9.49	0.95	--	--	--
Earthmoving	--	--	--	--	5.50	0.58	--	--	--
Total	75.46	17.15	5.72	0.04	18.11	4.65	3,433	0.68	1.01

Summit Carbon Solutions Otter Tail to Wilkin Project Route Permit Application

Construction Emission Calculations

Emission Factors for Construction Engines

Equipment	Quantity	Hours per	Days per	Number	Total	Max	Load	Loaded	Emission Factors ^{1,2} (g/hp-hr)								
		Day	Week						NOx	CO	VOC	SO ₂	PM ₁₀	PM _{2.5}	CO ₂	CH ₄	N ₂ O
Air Compressor A	2	5	6	16	960	25	1	25	4.44	1.16	0.44	0.002	0.27	0.27	187.94	0.008	0.002
Air Compressor B	4	10	6	16	3,840	80	0.8	64	4.70	2.37	0.37	0.002	0.25	0.24	187.94	0.008	0.002
Asphalt Paver A	0	0	0	0	0	153	1	153									
Asphalt Paver B	1	5	5	8	200	75	1	75	4.70	2.37	0.37	0.002	0.24	0.24	187.94	0.008	0.002
ATV	5	10	6	16	4800	20	0.5	10	4.44	1.16	0.44	0.002	0.27	0.27	187.94	0.008	0.002
Tractors/Loaders/Backhoes	4	10	6	16	3,840	75	0.8	60	4.70	2.37	0.37	0.002	0.24	0.24	187.94	0.008	0.002
Bulldozer	2	10	6	16	1,920	250	1	250	4.00	0.75	0.31	0.002	0.13	0.13	187.94	0.008	0.002
Compactor	0	0	0	0	0	300	1	300									
Compactor, Vibratory	1	4	5	16	320	100	1	100	4.70	2.37	0.37	0.002	0.25	0.24	187.94	0.008	0.002
Concrete Mixer Truck A	0	0	0	0	0	150	0.8	120									
Concrete Mixer Truck B	2	4	5	8	320	325	1	325	4.34	0.84	0.17	0.002	0.13	0.13	187.94	0.008	0.002
Concrete Pumps A	1	2	5	8	80	300	1	300	4.00	0.75	0.31	0.002	0.13	0.13	187.94	0.008	0.002
Concrete Pumps B	0	0	0	0	0	50	1	50									
Crane, Crawler A	0	10	6	0	0	450	1	450									
Crane, Crawler B	1	10	6	8	480	300	1	300	4.00	0.75	0.31	0.002	0.13	0.13	187.94	0.008	0.002
Crane, Wheeled A	0	10	6	0	0	350	1	350									
Crane, Wheeled B	1	10	6	16	960	165	0.8	132	4.10	0.87	0.34	0.002	0.18	0.18	187.94	0.008	0.002
Dozers A	0	0	0	0	0	410	1	410									
Dozers B	10	10	6	16	9,600	150	1	150	4.10	0.87	0.34	0.002	0.18	0.18	187.94	0.008	0.002
Dump Truck A	3	4	5	16	960	325	0.8	260	4.34	0.84	0.17	0.002	0.13	0.13	187.94	0.008	0.002
Dump Truck B	3	4	5	16	960	325	1	325	4.34	0.84	0.17	0.002	0.13	0.13	187.94	0.008	0.002
Excavator	15	10	6	16	14,400	138	1	138	4.10	0.87	0.34	0.002	0.18	0.18	187.94	0.008	0.002
Fork Lift A	2	10	6	16	1,920	120	1	120	4.10	0.87	0.34	0.002	0.18	0.18	187.94	0.008	0.002
Fork Lift B	1	10	6	16	960	60	1	60	4.70	2.37	0.37	0.002	0.24	0.24	187.94	0.008	0.002
Front End Loaders A	1	10	6	16	960	196	1	196	4.00	0.75	0.31	0.002	0.13	0.13	187.94	0.008	0.002
Front End Loaders B	1	10	6	16	960	196	1	196	4.00	0.75	0.31	0.002	0.13	0.13	187.94	0.008	0.002
Generators	0	0	0	0	0	430	1	430									
Generators	1	10	6	16	960	250	0.5	125	4.00	0.75	0.31	0.002	0.13	0.13	187.94	0.008	0.002
Grader	1	10	6	16	960	140	1	140	4.10	0.87	0.34	0.002	0.18	0.18	187.94	0.008	0.002
Grader	1	10	6	16	960	175	0.8	140	4.10	0.87	0.34	0.002	0.18	0.18	187.94	0.008	0.002
HDD Equip - Rig	2	10	6	5	600	450	0.8	360	4.34	0.84	0.17	0.002	0.13	0.13	187.94	0.008	0.002
HDD - Mudd Unit	2	10	6	5	600	200	0.8	160	4.00	0.75	0.31	0.002	0.13	0.13	187.94	0.008	0.002
HDD - Cleaner	2	10	6	5	600	200	1	200	4.00	0.75	0.31	0.002	0.13	0.13	187.94	0.008	0.002
Guided Bore Machine	3	10	6	8	1,440	150	0.8	120	4.10	0.87	0.34	0.002	0.18	0.18	187.94	0.008	0.002
Light Tower	6	5	6	16	2,880	50	1	50	4.73	1.53	0.28	0.002	0.34	0.34	187.94	0.008	0.002
Man Lift	2	10	6	16	1,920	50	1	50	4.73	1.53	0.28	0.002	0.34	0.34	187.94	0.008	0.002
Medium crane	1	4	5	16	320	200	0.5	100	4.00	0.75	0.31	0.002	0.13	0.13	187.94	0.008	0.002
Pickup truck	75	10	6	16	72,000	150	0.25	38	4.10	0.87	0.34	0.002	0.18	0.18	187.94	0.008	0.002
Piping truck	10	10	6	16	9,600	300	1	300	4.00	0.75	0.31	0.002	0.13	0.13	187.94	0.008	0.002
Scraper A	0	0	0	0	0	488	1	488									
Scraper B	0	0	0	0	0	175	1	175									
Sideboom	4	10	6	16	3,840	240	1	240	4.00	0.75	0.31	0.002	0.13	0.13	187.94	0.008	0.002
Skid steer loader	2	10	6	16	1,920	50	1	50	4.73	1.53	0.28	0.002	0.34	0.34	187.94	0.008	0.002
Trackhoe A	2	10	6	16	1,920	320	1	320	4.34	0.84	0.17	0.002	0.13	0.13	187.94	0.008	0.002
Trackhoe B	10	10	6	16	9,600	138	1	138	4.10	0.87	0.34	0.002	0.18	0.18	187.94	0.008	0.002
Trackhoe C	2	10	6	16	1,920	75	1	75	4.70	2.37	0.37	0.002	0.24	0.24	187.94	0.008	0.002
Water truck	2	10	6	16	1,920	100	0.5	50	4.70	2.37	0.37	0.002	0.25	0.24	187.94	0.008	0.002
Welding Machine	10	10	6	16	9,600	35	0.8	28	4.73	1.53	0.28	0.002	0.34	0.34	187.94	0.008	0.002
Welding Rig	10	10	6	16	9,600	10	0.8	8	4.30	4.11	0.55	0.002	0.50	0.50	187.94	0.008	0.002

¹ Tier 2 EPA 420-P-04-009, Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling - Compression Ignition, USEPA, April 2004 - Tier 2 Engines.

² GHG emission factors from Title 40 Subchapter C Part 98 Subpart C Table C-1 and C-2 to Subpart C. Used Distillate Fuel Oil No. 2 for CO2 and Petroleum Products for CH4 and N2O

Grey shaded cells indicate equipment type considered in standard modeling, but not used by the Project.

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Construction Emission Calculations

Emission Estimates from Construction Engines

Equipment	Potential Emissions (ton/yr)									
	VOC	CO	NOx	PM ₁₀	PM _{2.5}	SO ₂	CO ₂	CH ₄	N ₂ O	CO ₂ e
Air Compressor A	0.012	0.031	0.117	0.007	0.007	0.000	4.97	2.0E-04	4.0E-05	4.99
Air Compressor B	0.101	0.641	1.273	0.068	0.065	0.001	50.91	2.1E-03	4.1E-04	51.09
Asphalt Paver A	0.000	0.000	0.000	0.000	0.000	0.000	0.00	0.0E+00	0.0E+00	0.00
Asphalt Paver B	0.006	0.039	0.078	0.004	0.004	0.000	3.11	1.3E-04	2.5E-05	3.12
ATV	0.023	0.061	0.235	0.014	0.014	0.000	9.94	4.0E-04	8.1E-05	9.98
Tractors/Loaders/Backhoes	0.093	0.601	1.194	0.061	0.061	0.001	47.73	1.9E-03	3.9E-04	47.89
Bulldozer	0.163	0.396	2.116	0.070	0.070	0.001	99.44	4.0E-03	8.1E-04	99.78
Compactor	0.000	0.000	0.000	0.000	0.000	0.000	0.00	0.0E+00	0.0E+00	0.00
Compactor, Vibratory	0.013	0.083	0.166	0.009	0.008	0.000	6.63	2.7E-04	5.4E-05	6.65
Concrete Mixer Truck A	0.000	0.000	0.000	0.000	0.000	0.000	0.00	0.0E+00	0.0E+00	0.00
Concrete Mixer Truck B	0.019	0.097	0.497	0.015	0.015	0.000	21.55	8.7E-04	1.7E-04	21.62
Concrete Pumps A	0.008	0.020	0.106	0.003	0.003	0.000	4.97	2.0E-04	4.0E-05	4.99
Concrete Pumps B	0.000	0.000	0.000	0.000	0.000	0.000	0.00	0.0E+00	0.0E+00	0.00
Crane, Crawler A	0.000	0.000	0.000	0.000	0.000	0.000	0.00	0.0E+00	0.0E+00	0.00
Crane, Crawler B	0.049	0.119	0.635	0.021	0.021	0.000	29.83	1.2E-03	2.4E-04	29.93
Crane, Wheeled A	0.000	0.000	0.000	0.000	0.000	0.000	0.00	0.0E+00	0.0E+00	0.00
Crane, Wheeled B	0.047	0.121	0.573	0.025	0.025	0.000	26.25	1.1E-03	2.1E-04	26.34
Dozers A	0.000	0.000	0.000	0.000	0.000	0.000	0.00	0.0E+00	0.0E+00	0.00
Dozers B	0.537	1.376	6.508	0.286	0.286	0.003	298.32	1.2E-02	2.4E-03	299.34
Dump Truck A	0.046	0.232	1.193	0.036	0.036	0.001	51.71	2.1E-03	4.2E-04	51.89
Dump Truck B	0.057	0.290	1.491	0.045	0.045	0.001	64.64	2.6E-03	5.2E-04	64.86
Excavator	0.741	1.899	8.981	0.394	0.394	0.004	411.68	1.7E-02	3.3E-03	413.09
Fork Lift A	0.086	0.220	1.041	0.046	0.046	0.001	47.73	1.9E-03	3.9E-04	47.89
Fork Lift B	0.023	0.150	0.298	0.015	0.015	0.000	11.93	4.8E-04	9.7E-05	11.97
Front End Loaders A	0.064	0.155	0.830	0.027	0.027	0.000	38.98	1.6E-03	3.2E-04	39.11
Front End Loaders B	0.064	0.155	0.830	0.027	0.027	0.000	38.98	1.6E-03	3.2E-04	39.11
Generators	0.000	0.000	0.000	0.000	0.000	0.000	0.00	0.0E+00	0.0E+00	0.00
Generators	0.041	0.099	0.529	0.017	0.017	0.000	24.86	1.0E-03	2.0E-04	24.95
Grader	0.050	0.128	0.607	0.027	0.027	0.000	27.84	1.1E-03	2.3E-04	27.94
Grader	0.050	0.128	0.607	0.027	0.027	0.000	27.84	1.1E-03	2.3E-04	27.94
HDD Equip - Rig	0.040	0.201	1.032	0.031	0.031	0.000	44.75	1.8E-03	3.6E-04	44.90
HDD - Mudd Unit	0.033	0.079	0.423	0.014	0.014	0.000	19.89	8.1E-04	1.6E-04	19.96
HDD - Cleaner	0.041	0.099	0.529	0.017	0.017	0.000	24.86	1.0E-03	2.0E-04	24.95
Guided Bore Machine	0.064	0.165	0.781	0.034	0.034	0.000	35.80	1.5E-03	2.9E-04	35.92
Light Tower	0.044	0.243	0.750	0.054	0.054	0.000	29.83	1.2E-03	2.4E-04	29.93
Man Lift	0.030	0.162	0.500	0.036	0.036	0.000	19.89	8.1E-04	1.6E-04	19.96
Medium crane	0.011	0.026	0.141	0.005	0.005	0.000	6.63	2.7E-04	5.4E-05	6.65
Pickup truck	1.007	2.580	12.203	0.536	0.536	0.006	559.35	2.3E-02	4.5E-03	561.27
Piping truck	0.979	2.373	12.699	0.418	0.418	0.006	596.64	2.4E-02	4.8E-03	598.68
Scraper A	0.000	0.000	0.000	0.000	0.000	0.000	0.00	0.0E+00	0.0E+00	0.00
Scraper B	0.000	0.000	0.000	0.000	0.000	0.000	0.00	0.0E+00	0.0E+00	0.00
Sideboom	0.313	0.759	4.064	0.134	0.134	0.002	190.92	7.7E-03	1.5E-03	191.58
Skid steer loader	0.030	0.162	0.500	0.036	0.036	0.000	19.89	8.1E-04	1.6E-04	19.96
Trackhoe A	0.113	0.571	2.936	0.089	0.089	0.001	127.28	5.2E-03	1.0E-03	127.72
Trackhoe B	0.494	1.266	5.987	0.263	0.263	0.003	274.45	1.1E-02	2.2E-03	275.39
Trackhoe C	0.058	0.375	0.746	0.038	0.038	0.000	29.83	1.2E-03	2.4E-04	29.93
Water truck	0.039	0.250	0.497	0.026	0.025	0.000	19.89	8.1E-04	1.6E-04	19.96
Welding Machine	0.083	0.454	1.401	0.100	0.100	0.001	55.69	2.3E-03	4.5E-04	55.88
Welding Rig	0.047	0.348	0.364	0.042	0.042	0.000	15.91	6.5E-04	1.3E-04	15.96
Totals:	5.72	17.15	75.46	3.12	3.11	0.04	3,421.33	1.4E-01	2.8E-02	3,433.07
	VOC	CO	NOx	PM₁₀	PM_{2.5}	SO₂	CO₂	CH₄	N₂O	CO₂e

Global Warming Potentials		
CO2	Methane	N2O
1	25	298

Hazardous Air Pollutants from Construction

Air Toxic	Fraction of VOC	Emissions (tpy)
Benzene	0.02	0.00
Formaldehyde	0.118	0.68
Acetaldehyde	0.053	0.30
1,3-butadiene	0.002	0.01
Acrolein	0.003	0.02
Total HAPs		1.01

Summit Carbon Solutions Otter Tail to Wilkin Project Route Permit Application

Construction Emission Calculations

Fugitive dust emissions from unpaved roads during pipeline construction

Equipment	Quantity	Total Project Days	Total Days Used	VMT	W	Emission Factor (lb/VMT)		Emissions (ton/yr)	
						PM ₁₀	PM _{2.5}	PM ₁₀	PM _{2.5}
Air Compressor A	2	96	192	96	25	2.11	0.21	0.10	0.01
Air Compressor B	4	96	384	192	25	2.11	0.21	0.20	0.02
Asphalt Paver A	0	0	0	0	0	0.00	0.00	0.00	0.00
Asphalt Paver B	1	40	40	20	20	1.91	0.19	0.02	0.00
ATV	5	96	480	240	20	1.91	0.19	0.23	0.02
Tractors/Loaders/Backhoes	4	96	384	192	50	2.89	0.29	0.28	0.03
Bulldozer	2	96	192	96	30	2.29	0.23	0.11	0.01
Compactor	0	0	0	0	0	0.00	0.00	0.00	0.00
Compactor, Vibratory	1	80	80	40	20	1.91	0.19	0.04	0.00
Concrete Mixer Truck A	0	0	0	0	0	0.00	0.00	0.00	0.00
Concrete Mixer Truck B	2	40	80	40	20	1.91	0.19	0.04	0.00
Concrete Pumps A	1	40	40	20	25	2.11	0.21	0.02	0.00
Concrete Pumps B	0	0	0	0	0	0.00	0.00	0.00	0.00
Crane, Crawler A	0	0	0	0	0	0.00	0.00	0.00	0.00
Crane, Crawler B	1	48	48	24	32	2.36	0.24	0.03	0.00
Crane, Wheeled A	0	0	0	0	0	0.00	0.00	0.00	0.00
Crane, Wheeled B	1	96	96	48	32	2.36	0.24	0.06	0.01
Dozers A	0	0	0	0	0	0.00	0.00	0.00	0.00
Dozers B	10	96	960	480	20	1.91	0.19	0.46	0.05
Dump Truck A	3	80	240	120	21	1.95	0.20	0.12	0.01
Dump Truck B	3	80	240	120	21	1.95	0.20	0.12	0.01
Excavator	15	96	1,440	720	22	1.99	0.20	0.72	0.07
Fork Lift A	2	96	192	96	20	1.91	0.19	0.09	0.01
Fork Lift B	1	96	96	48	20	1.91	0.19	0.05	0.00
Front End Loaders A	1	96	96	48	23	2.03	0.20	0.05	0.00
Front End Loaders B	1	96	96	48	23	2.03	0.20	0.05	0.00
Generators	0	0	0	0	0	0.00	0.00	0.00	0.00
Generators	1	96	96	48	20	1.91	0.19	0.05	0.00
Grader	1	96	96	48	20	1.91	0.19	0.05	0.00
Grader	1	96	96	48	20	1.91	0.19	0.05	0.00
HDD Equip - Rig	2	30	60	30	25	2.11	0.21	0.03	0.00
HDD - Mudd Unit	2	30	60	30	25	2.11	0.21	0.03	0.00
HDD - Cleaner	2	30	60	30	25	2.11	0.21	0.03	0.00
Guided Bore Machine	3	48	144	72	20	1.91	0.19	0.07	0.01
Light Tower	6	96	576	288	20	1.91	0.19	0.28	0.03
Man Lift	2	96	192	96	20	1.91	0.19	0.09	0.01
Medium crane	1	80	80	40	30	2.29	0.23	0.05	0.00
Pickup truck	75	96	7,200	3,600	24	2.07	0.21	3.73	0.37
Piping truck	10	96	960	480	25	2.11	0.21	0.51	0.05
Scraper A	0	0	0	0	0	0.00	0.00	0.00	0.00
Scraper B	0	0	0	0	0	0.00	0.00	0.00	0.00
Sideboom	4	96	384	192	30	2.29	0.23	0.22	0.02
Skid steer loader	2	96	192	96	26	2.15	0.21	0.10	0.01
Trackhoe A	2	96	192	96	40	2.61	0.26	0.13	0.01
Trackhoe B	10	96	960	480	40	2.61	0.26	0.63	0.06
Trackhoe C	2	96	192	96	40	2.61	0.26	0.13	0.01
Water truck	2	96	192	96	20	1.91	0.19	0.09	0.01
Welding Machine	10	96	960	480	5	1.02	0.10	0.25	0.02
Welding Rig	10	96	960	480	10	1.40	0.14	0.34	0.03
Total:								9.49	0.95

Equipment counts based on experience with construction of a pipeline

AP 42 Section 13.2.2 Unpaved Roads, dated November 2006, Equations 1a and 2 TOTALS 11.19 1.12 Surface Silt content based on Table 13.2.2-1 - construction sites

Each vehicle is assumed to travel 0.5 mile per day on site.

Eq 1a: $E = k * (s/12)^a * (W/3)^b$

Eq 2: $E_{ext} = E * [(365-P)/365]$

VMT: Vehicle Miles Traveled

W: Mean Vehicle Weight, tons

S: Mean Vehicle Speed, mph

P

95

days with at least 0.01 inches rain, EPA's AP-42 Figure 13.2.2-1

s

8.5

surface material silt content (%) for construction sites, EPA's AP-42 Table 13.2.2-1

E: size-specific emission factor, lb/ VMT

E_{ext}: annual size-specific emission factor extrapolated for natural migration, lb/VMT

Miles per day on site

0.50.5

Summit Carbon Solutions Otter Tail to Wilkin Project Route Permit Application
Construction Emission Calculations
Fugitive Dust Emissions from Earthmoving Activities

Construction Activity	Daily Material Handling		Average Exposed Area (acres)	Emission Factors (lb/ton)		Emissions (ton/yr)	
	Construction Rate (ton/day)	Handling Time (days)		PM ₁₀	PM _{2.5}	PM ₁₀	PM _{2.5}
Topsoil removed	7,355	14	---	0.06	0.01	2.99	0.31
Pipe trench excavation and loading to storage piles	2,865	14	---	0.04	0.00	0.74	0.08
Backfilling pipe trench	2,865	14	---	0.01	0.00	0.24	0.03
Topsoil replacement	7,355	14	---	0.01	0.00	0.62	0.07
Wind erosion of exposed areas	---	14	344	0.38	0.04	0.92	0.10
Total							5.50 0.58

Topsoil removal: 1 foot deep, 1.25 tons per cubic yard

Trench excavation : 15 feet wide at top, 5 yards wide at bottom, 14 yards deep (excluding top soil), 1.25 tons per yard

Topsoil removal by scraper emission factor: AP-42 Section 11.9 Western Surface Coal Mining, Table 11.9-4, July 1998, topsoil removal by scraper

Trench excavation and loading to storage piles emission factor: AP-42 Section 11.9 Western Surface Coal Mining, Table 11.9-4, July 1998, truck loading by batch dump

Backfilling trench and topsoil replacement emission factor: AP-42 Section 11.9 Western Surface Coal Mining, Table 11.9-4, July 1998, overburden replacement

As worst case, PM₁₀ is set equal to Total Particulate Matter. PM_{2.5} is set to 0.105 times PM₁₀ per Table 11.9-1

Wind Erosion Exposed Areas emission factor: AP-42 Section 11.9 Western Surface Coal Mining, Table 11.9-4, July 1998, wind erosion of exposed areas (ton/yr/acre)

Total Facility Potential to Emit													
Structure	Control Equipment	Emission Unit	Emission Sources	Criteria Pollutants (Limited Emissions)					HAPs			GHG	
				PM	PM ₁₀	PM _{2.5}	SO ₂	NO _x	VOC	CO	Acetaldehyde	Total HAPs	CO ₂ e
No.	ID	No.		(tpy)	(tpy)	(tpy)	(tpy)	(tpy)	(tpy)	(tpy)	(tpy)	(tpy)	(metric tonnes per year)
STRU 02	--	EQUI01	CO2 System Transfer	--	--	--	--	--	--	--	--	--	--
STRU 02	--	--	Startup, Shutdown, Malfunction Vent	--	--	--	--	--	1.69	--	0.13	0.15	7,001
STRU 01	--	EQUI02	Blower Suction Scrubber										
STRU 01	--	EQUI03	Blower Discharge Separator										
STRU 01	--	EQUI04	1st Stage Suction Scrubber, Compressor and Intercooler										
STRU 01	--	EQUI05	2nd Stage Suction Scrubber, Compressor and Intercooler										
STRU 01	--	EQUI06	3rd Stage Suction Scrubber, Compressor and Intercooler										
STRU 01	---	EQUI07	Dehydrator										
STRU 01	---	---	Dehydration Unit Vent	--	--	--	--	--	32.11	--	0.92	1.36	10,221
--	--	EQUI08	4th Stage Suction Scrubber, Compressor and Intercooler										
--	--	--	Space Heating	0.01	0.01	0.0061	0.00	0.17	0.01	0.07	--	--	217.71
FUGI 01	--	FUGI 01	Cooling Tower	0.18	0.13	0.0004	--	--	--	--	--	--	--
FUGI 02	--	FUGI 02	Equipment Leaks	--	--	--	--	--	3.72	--	0.28	0.28	--
TOTAL				0.19	0.15	0.01	0.00	0.17	37.53	0.07	1.32	1.79	17,440
													15,822

Note: Dark grey shading indicates equipment that do not have direct release points to the atmosphere.

Note: The September 2022 Route Permit application calculations for space heating were prepared assuming the use of fuel oil. These tables were updated to assume the use of natural gas, which is how Summit represented this equipment in the February 2023 MPCA capture facility air permit application.

Capture Equipment Potential to Emit (STRU 02)

Raw Material				Inlet CO ₂ Stream		Capture Facility:Startup, Shutdown, Malfunction Vent PTE	
				Maximum ^a	Existing Venting ^b	Emergency Venting ^{c, d}	
						lb/hr	ton/yr
CO ₂ Scrubber Exhaust	scfm	CO ₂ Scrubber PTE	PM	N/A	N/A	--	--
			PM ₁₀	N/A	N/A	--	--
			PM _{2.5}	N/A	N/A	--	--
			VOC	11.28	49.41	11.28	1.69
			Acetaldehyde	0.84	3.68	0.84	0.13
			Methanol	9.50E-02	4.16E-01	9.50E-02	1.43E-02
			Formaldehyde	2.00E-03	8.80E-02	2.00E-03	3.00E-04
			Acrolein	4.00E-02	1.75E-01	4.00E-02	6.00E-03
			Total HAPs	0.98	4.36	0.98	0.15
			CO ₂ e ^e	46,673	204,428	46,673	7,001
CO ₂ e (metric tonnes) ^e	42,342	185,456	42,342	6,351			

Fraction of VOC

7.456%

0.842%

0.018%

0.355%

^a Maximum from: Green Plains Otter Tail LLC Permit (11100077-101), 65 MMGPY facility

^b Calculated assuming 8,760 hours/yr operation.

^c Calculated assuming a maximum of 300 hours/yr emergency venting at SCS facility.

^d Normal operating emissions assume >95% removal of CO₂, >75% removal of acetaldehyde, and >35% removal of total VOCs and HAPs. VOC and HAP removal efficiency is based on process design modeling.

^e CO₂ emission rates based on a conversion factor of 6.2901 lb CO₂/gal ethanol and assume maximum production rates at the ethanol facility. [CO₂e (lbs)= 3,785.41 g ethanol/gal ethanol *0.789 /(46.07 g ethanol/44.01 g CO₂)*0.0022046 lb CO₂/g CO₂].

Assumptions

No changes are proposed to the ethanol facility's fermentation scrubber parameters or emission rates with this permit application.

Note: PTE = potential to emit; lb/hr = pound per hour; tpy = tons per year; PM = particulate matter; PM₁₀ = particulate matter less than 10 microns in diameter; PM_{2.5} = particulate matter less than 2.5 microns in diameter; VOC = volatile organic compounds; CO₂ = carbon dioxide; and CO₂e = carbon dioxide equivalent.

Capture Equipment Potential to Emit (STRU 01)

Raw Material	Emission Factor Citation	Pollutant	Inlet CO ₂ Stream		Capture Facility: Dehydration Unit Vent PTE	
			Maximum ^a	Existing Venting ^b	Process Vent ^{c, d}	
			lb/hr	ton/yr	lbs/hr	ton/yr
CO ₂ Scrubber Exhaust	scfm CO ₂ Scrubber PTE	PM	N/A	N/A	--	--
		PM ₁₀	N/A	N/A	--	--
		PM _{2.5}	N/A	N/A	--	--
		VOC	11.28	49.41	7.33	32.11
		Acetaldehyde	0.84	3.68	0.21	0.92
		Methanol	9.50E-02	4.16E-01	6.17E-02	2.70E-01
		Formaldehyde	2.00E-03	8.80E-02	1.31E-02	5.72E-02
		Acrolein	4.00E-02	1.75E-01	2.60E-02	1.14E-01
		Total HAPs	0.98	4.36	0.31	1.36
		CO ₂ e ^e	46,673	204,428	2,334	10,221
		CO ₂ e (metric tonnes) ^e	42,342	185,456	2,117	9,273

Assumptions

No changes are proposed to the ethanol facility's fermentation scrubber parameters or emission rates with this permit application.

Cooling Tower (FUGI 01)

EQUI / EU No.	Process	Flow (gpm)	Drift Loss	Emission Factor Citation	Pollutant	Potential to Emit		
						Max. lb/hr	Unc. tpy	Lim. tpy
FUGI 01	Cooling Tower	3,412	0.0010%	Manufacturer	PM	0.04	0.18	0.18
					PM ₁₀	0.03	0.13	0.13
					PM _{2.5}	0.0001	0.0004	0.0004

PM_{total} Emission Rate (lb/hr) = Water Circulation Rate (gal/min) * 60 min/hr * 8.34 lb/gal * Drift Loss (%) * TDS (ppm)

Source: EPA AP-42, Chapter 13.4

TSP/PM Emission Rate (lb/hr) = PM_{total} (lb/hr) * 96.288%

PM₁₀ Emission Rate (lb/hr) = PM_{total} (lb/hr) * 70.509%

PM_{2.5} Emission Rate (lb/hr) = PM_{total} (lb/hr) * 0.226%

Source: New Mexico Environment Department Memo:

<https://www.env.nm.gov/aqb/permit/documents/PermittingGuidanceforCoolingTowerParticulateEmissions.pdf>

TDS Concentration (ppm): 2,500

Notes:

gpm = gallons per minute; max = maximum; unc = uncontrolled; lim = limited; lb/hr = pound per hour; tpy = tons per year; PM = particulate matter; PM₁₀ = particulate matter less than 10 microns in diameter; PM_{2.5} = particulate matter less than 2.5 microns in diameter; TDS = total dissolved solids; ppm = parts per million; and TSP = total suspended particles.

Equipment Leaks (FUGI 02)																			
Process Area	Source	Product	Compon ent Count	Emission Factor (Kg/comp-hr) ¹	Uncontrolled Emission Rate (lb/hr)	Control Efficiency ²	Controlled Emission Rate (lb/hr)	TOC weight (%) ³	VOC Emissions		Acetaldehyde ⁴		Formaldehyde ⁴		Methanol ⁴		Acrolein ⁴		Total HAPs ⁴
									lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	TPY
Capture Equipment	Valves	G/V	173	0.00597	2.27	87%	0.30	13%	0.04	0.17	0.003	0.01	5.08E-07	2.22E-06	4.28E-09	1.87E-08	1.52E-11	6.64E-11	0.01
Capture Equipment	Valves	LL	147	0.00403	1.30	84%	0.21	13%	0.03	0.12	0.002	0.01	3.58E-07	1.57E-06	3.02E-09	1.32E-08	1.07E-11	4.69E-11	0.01
Capture Equipment	Pumps	LL	3	0.0199	0.13	69%	0.04	13%	0.01	0.02	0.000	0.00	7.00E-08	3.06E-07	5.89E-10	2.58E-09	2.09E-12	9.15E-12	0.00
Capture Equipment	Compressor Seals	G/V	7	0.228	3.51	0%	3.51	13%	0.46	2.00	0.034	0.15	6.03E-06	2.64E-05	5.08E-08	2.23E-07	1.80E-10	7.89E-10	0.15
Capture Equipment	Pressure-Relief Valves	G/V	11	0.104	2.52	87%	0.33	13%	0.04	0.19	0.003	0.01	5.62E-07	2.46E-06	4.74E-09	2.07E-08	1.68E-11	7.36E-11	0.01
Capture Equipment	Sampling Connections	All	4	0.015	0.13	0%	0.13	13%	0.02	0.08	0.001	0.01	2.27E-07	9.94E-07	1.91E-09	8.37E-09	6.77E-12	2.97E-11	0.01
Capture Equipment	Open-ended Lines	All	16	0.0017	0.06	0%	0.06	13%	0.01	0.03	0.001	0.00	1.03E-07	4.50E-07	8.66E-10	3.79E-09	3.07E-12	1.35E-11	0.00
Capture Equipment	Flanges	All	485	0.00183	1.95	0%	1.95	13%	0.25	1.11	0.019	0.08	3.36E-06	1.47E-05	2.83E-08	1.24E-07	1.00E-10	4.39E-10	0.08
TOTAL			846		11.88		6.53		0.85	3.72	0.063	0.28	1.12E-05	4.91E-05	9.45E-08	4.14E-07	3.35E-10	1.47E-09	0.28

¹ Emission factors taken from Protocol for Equipment Leak Emission Estimates, EPA-453/R-95-017.

² Control Effectiveness taken from Protocol for Equipment Leak Emission Estimates, EPA-453/R-95-017, Table 5-2.

³ Fermentation total organic compound (TOC) weight % is based on daily ethanol weight % testing of beerwell at a representative ethanol plant.

⁴ Actealdehyde and total HAPs calculated based on proportion of each to Total VOCs in the inlet CO₂ stream.

Note kg/comp-hr = kilogram per component-hour; lb/hr = pound per hour; TOC = total organic compounds; VOC = volatile organic compounds; HAP = hazardous air pollutant; G/V = gas / vapor; LL = light liquid; and tpy = tons per year.

Comfort Heating - Criteria Pollutants								
Subject		Pollutant	Capacity (MMcf/hr)	Emission Factor (lb/MMcf)	Emission Factor Citation	lb/hr	Potential to Emit	
Item ID	Description						unrestricted TPY	limited TPY
	Comfort Heating	PM	4.12E-04	7.60	AP-42 Section 1.4	0.003	0.01	0.01
	Comfort Heating	PM ₁₀	4.12E-04	7.60	AP-42 Section 1.4	0.003	0.01	0.01
	Comfort Heating	PM _{2.5} ^a	4.12E-04	3.40	AP-42 Section 1.4	0.001	0.01	0.01
	Comfort Heating	SO ₂	4.12E-04	0.60	AP-42 Section 1.4	0.00	0.00	0.00
	Comfort Heating	NO _x	4.12E-04	94	AP-42 Section 1.4	0.04	0.17	0.17
	Comfort Heating	VOC	4.12E-04	5.50	AP-42 Section 1.4	0.00	0.01	0.01
	Comfort Heating	CO	4.12E-04	40	AP-42 Section 1.4	0.02	0.07	0.07
	Comfort Heating	lead	4.12E-04	0.0005	AP-42 Section 1.4	0.00	0.00	0.00

^a PM_{2.5} emission factor from England, G.C., “Development of Fine Particulate Emission Factors and Speciation Profiles for Oil and Gas-fired Combustion Systems, Final Report, 2004.” Table 3.1, PM2.5 Mass Emission Factor for Gas-Fired Gas-Fired Boilers and Steam Generators.

Comfort Heating - Greenhouse Gasses								
Subject		Pollutant	Capacity (MMcf/hr)	Emission Factor (lb/MMcf)	Emission Factor Citation	lb/hr	Potential to Emit	
Item ID	Description						unrestricted TPY	limited TPY
		CO ₂	4.12E-04	120,000	AP-42 Section 1.4	49.41	216.42	216.42
		N ₂ O	4.12E-04	2.2	AP-42 Section 1.4	0.0009	0.0040	0.0040
		Methane	4.12E-04	2	AP-42 Section 1.4	0.0009	0.0041	0.0041
		CO ₂ e	4.12E-04	--	40 CFR 98 ^a	49.71	217.71	217.71

^a Global Warming Potentials (CO₂ = 1, CH₄ = 25, N₂O = 298)

Comfort Heating - Hazardous Air Pollutants								
Subject		Pollutant	Capacity (MMcf/hr)	Emission Factor (lb/MMcf)	Emission Factor Citation	lb/hr	Potential to Emit	
Item ID	Description						unrestricted TPY	limited TPY
	Comfort Heating	2-Methylnaphthalene	4.12E-04	2.40E-05	AP-42 Section 1.4	9.88E-09	4.33E-08	4.33E-08
	Comfort Heating	3-Methylchloranthrene	4.12E-04	1.80E-06	AP-42 Section 1.4	7.41E-10	3.25E-09	3.25E-09
	Comfort Heating	7,12-Dimethylbenz(a)anthracene	4.12E-04	1.60E-05	AP-42 Section 1.4	6.59E-09	2.89E-08	2.89E-08
	Comfort Heating	Acenaphthene	4.12E-04	1.80E-06	AP-42 Section 1.4	7.41E-10	3.25E-09	3.25E-09
	Comfort Heating	Acenaphthylene	4.12E-04	1.80E-06	AP-42 Section 1.4	7.41E-10	3.25E-09	3.25E-09
	Comfort Heating	Anthracene	4.12E-04	2.40E-06	AP-42 Section 1.4	9.88E-10	4.33E-09	4.33E-09
	Comfort Heating	Benz(a)anthracene	4.12E-04	1.80E-06	AP-42 Section 1.4	7.41E-10	3.25E-09	3.25E-09
	Comfort Heating	Benzene	4.12E-04	2.10E-03	AP-42 Section 1.4	8.65E-07	3.79E-06	3.79E-06
	Comfort Heating	Benzo(a)pyrene	4.12E-04	1.20E-06	AP-42 Section 1.4	4.94E-10	2.16E-09	2.16E-09
	Comfort Heating	Benzo(b)fluoranthene	4.12E-04	1.80E-06	AP-42 Section 1.4	7.41E-10	3.25E-09	3.25E-09
	Comfort Heating	Benzo(g,h,i)perylene	4.12E-04	1.20E-06	AP-42 Section 1.4	4.94E-10	2.16E-09	2.16E-09
	Comfort Heating	Benzo(k)fluoranthene	4.12E-04	1.80E-06	AP-42 Section 1.4	7.41E-10	3.25E-09	3.25E-09
	Comfort Heating	Chrysene	4.12E-04	1.80E-06	AP-42 Section 1.4	7.41E-10	3.25E-09	3.25E-09
	Comfort Heating	Dibenzo(a,h)anthracene	4.12E-04	1.20E-06	AP-42 Section 1.4	4.94E-10	2.16E-09	2.16E-09
	Comfort Heating	Dichlorobenzene	4.12E-04	1.20E-03	AP-42 Section 1.4	4.94E-07	2.16E-06	2.16E-06
	Comfort Heating	Fluoranthene	4.12E-04	3.00E-06	AP-42 Section 1.4	1.24E-09	5.41E-09	5.41E-09
	Comfort Heating	Fluorene	4.12E-04	2.80E-06	AP-42 Section 1.4	1.15E-09	5.05E-09	5.05E-09
	Comfort Heating	Formaldehyde	4.12E-04	7.50E-02	AP-42 Section 1.4	3.09E-05	1.35E-04	1.35E-04
	Comfort Heating	Hexane	4.12E-04	1.80E+00	AP-42 Section 1.4	7.41E-04	3.25E-03	3.25E-03
	Comfort Heating	Indeno(1,2,3-cd)pyrene	4.12E-04	1.80E-06	AP-42 Section 1.4	7.41E-10	3.25E-09	3.25E-09
	Comfort Heating	Napthalene	4.12E-04	6.10E-04	AP-42 Section 1.4	2.51E-07	1.10E-06	1.10E-06
	Comfort Heating	Phenanathrene	4.12E-04	1.70E-05	AP-42 Section 1.4	7.00E-09	3.07E-08	3.07E-08
	Comfort Heating	Pyrene	4.12E-04	5.00E-06	AP-42 Section 1.4	2.06E-09	9.02E-09	9.02E-09
	Comfort Heating	Toluene	4.12E-04	3.40E-03	AP-42 Section 1.4	1.40E-06	6.13E-06	6.13E-06
	Comfort Heating	Arsenic	4.12E-04	2.00E-04	AP-42 Section 1.4	8.24E-08	3.61E-07	3.61E-07
	Comfort Heating	Beryllium	4.12E-04	1.20E-05	AP-42 Section 1.4	4.94E-09	2.16E-08	2.16E-08
	Comfort Heating	Cadmium	4.12E-04	1.10E-03	AP-42 Section 1.4	4.53E-07	1.98E-06	1.98E-06
	Comfort Heating	Chromium	4.12E-04	1.40E-03	AP-42 Section 1.4	5.76E-07	2.52E-06	2.52E-06
	Comfort Heating	Cobalt	4.12E-04	8.40E-05	AP-42 Section 1.4	3.46E-08	1.51E-07	1.51E-07
	Comfort Heating	Manganese	4.12E-04	3.80E-04	AP-42 Section 1.4	1.56E-07	6.85E-07	6.85E-07
	Comfort Heating	Mercury	4.12E-04	2.60E-04	AP-42 Section 1.4	1.07E-07	4.69E-07	4.69E-07
	Comfort Heating	Nickel	4.12E-04	2.10E-03	AP-42 Section 1.4	8.65E-07	3.79E-06	3.79E-06
	Comfort Heating	Selenium	4.12E-04	2.40E-05	AP-42 Section 1.4	9.88E-09	4.33E-08	4.33E-08
Total HAPs						0.00	0.00	0.00

Assumptions:

Maximum Firing Capacity: 0.42 MMBtu/hr
0.0004 MMcf/hr (@1,020 Btu/cf) - Nat Gas

Max. Hours of Operation: 8760 hr/yr

Note: The September 2022 Route Permit application calculations for space heating were prepared assuming the use of fuel oil. These tables were updated to assume the use of natural gas, which is how Summit represented this equipment in the February 2023 MPCA capture facility air permit application.

To: Scott O’Konek
Summit Carbon Solutions

Sent via email to sokonek@summitcarbon.com

From: Andrew Levi
Energy Environmental Review and Analysis

Date: November 17, 2023

Project: Otter Tail to Wilkin CO₂ Pipeline Project
IP 7093/PPL-22-422

Respond: Preferably no later than November 27, 2023

Please respond to the following questions or provide the requested data or information. Staff will use the information provided to develop the environmental document for the project, which is a public document. Your response, in its entirety, will be included in the environmental document as an appendix; therefore, **responses will be publicly available** unless otherwise designated by the respondent as “nonpublic information” pursuant to Minnesota Statute § 13.02, subdivision 12.

Directions: Responses to questions should be contained within this form to the greatest extent possible (**11-point Calibri, plain text font, RGB 192, 0, 0**). Attach supporting documentation as necessary. While data and information requests, for example, shapefiles or draft plans, will not be contained within this form, document their submittal using this form as follows: *“Requested information sent to whom by what means on date.”*

Do not eFile your response. Return the completed form, as a PDF, along with necessary supporting documentation, and/or requested data or information to andrew.levi@state.mn.us. Contact me at (651) 539-1840 with questions.

1. Please provide a one-page, 8.5 x 11-inch figure showing a simple plan of the proposed capture facility. The figure could be similar to the one provided as Appendix 3 to the RPA, but should have labels that are visible at the 8.5 x 11-inch scale and appropriate for use in the EIS.

The requested figure is available on the Otter Tail to Wilkin Project Sharepoint site as Attachment 7-1.

2. The response to SII 4 Question 8 about HDD noise indicates “If noise mitigation is required, temporary sound dampening barrier walls will be placed around the equipment.” Clarify how the contractor would determine if noise mitigation is needed. Would noise monitoring be conducted and, if so, at what locations? Additionally, clarify if the noise levels provided in the response are in decibels on the A-weighted scale (dBA rather than dB).

The noise levels presented in response to SII 4 Question 8 are in decibels (dB). As stated in Section 19 of the Scoping EAW, Summit expects the Project to conform to state noise standards. The equipment needed to construct the HDD would have a temporary and short-term impact on noise levels in the vicinity of the Project, which would decrease from the levels presented in the response to SII 4 Question 8 based on distance, topography, and weather conditions. Summit will coordinate with nearby landowners along the Project prior to execution of HDDs. Summit’s Contractor will determine the need for noise mitigation and noise monitoring based on feedback received from landowners during construction.

3. Is any corn stover (in addition to corn grain) used for ethanol production at the plant?

No.

4. Is any natural gas required for operating the carbon capture facility? If so, how much per year?

No. However, Summit may elect to use natural gas for space (comfort) heating, although the type and size of space heating equipment has not been determined. In the air permit application for the capture facility, natural gas-fired space heating equipment sized up to 0.42 million British Thermal Units per hour was assumed, with gas consumption up to 3.61 million cubic feet per year (assuming unlimited operation). Space heating equipment would only be used as needed during colder temperatures, so actual natural gas consumption would likely be lower than presented in the air permit application.

5. Regarding the existing ethanol plant, please provide the following:

a. A description and, if available, a diagram, of the processes at the Green Plains ethanol plant.

See description on the Otter Tail to Wilkin Project Sharepoint site as Attachment 7-5a.

b. Are any energy systems sub-metered? For example, is there a separate electric meter on plug loads, lighting, milling process, distillation process, centrifuge for DDGS, etc.

For electrical utility service, there are two large meters split in zones but there are no distinct operational areas. For natural gas, there is one large meter for the plant and sub-metering for boilers.

c. Are there any additional energy needs anticipated by the Green Plains ethanol plant over the next 25 years?

It is difficult to predict future energy needs as capital is deployed based on current market conditions.

d. What is the percent composition of total corn biomass used as fuel feedstock at the ethanol plant? That is, does the ethanol plant use a mix of residues and grain? If a mix is used, what is the percent composition of the feedstock, for example, percent grain and percent corn stover? If a mix is used, are shipments of grain and residues separate?

Corn stover/corn biomass is not used to produce ethanol.

e. Does the ethanol plant produce other co-products besides distillers grains such as corn oil?

The Green Plains Ethanol Plant produces corn oil which serves as a valuable low-CI feedstock for the production of biodiesel, renewable diesel, and sustainable aviation fuel.

f. How many gallons of water is used per year by the ethanol plant? Is the water sourced from the Fergus Falls Water Filtration/ Treatment Plant?

The Green Plains Ethanol Plant consumed 131 million gallons of water in 2022 (174 million gallons withdrawn, 43 million gallons discharged). Water is sourced from the Green Plains Ethanol Plant groundwater wells.

6. Provide an estimate (as a percent of the total acreage) of the source corn for the ethanol plant that has been grown using the following practices: cover crops, conservation tillage, no till, and precision fertilizer application? If so, please also provide the source for this information/data.

The Green Plains Ethanol Plant does not have a good way to estimate this today.

7. Scoping comments implied the company is overestimating its CO₂ capture rate. How much of the CO₂ produced by fermentation at the ethanol plant will be captured by the capture facility? How was this value determined? How will the capture facility achieve this capture rate and how does it compare to other similar (i.e., ethanol) capture facilities?

The capture facility system is designed to capture 100% of the CO₂ produced by the Green Plains Ethanol Plant. The capacity of the capture facility was determined by understanding the current ethanol production and building in margin for potential growth at the facility. All of the equipment, piping, and ancillary components have been designed/sized to accommodate 100% of the CO₂ production.

A conversion factor of 6.2901 pounds CO₂ per gallon of ethanol, determined by mass balance, was used to calculate potential CO₂ production at the Green Plains Ethanol Plant. The same conversion factor is used for each capture facility across the larger Midwest Carbon Express Project. The Green Plains Ethanol Plant is limited in its air permit to producing 65 million gallons of ethanol per year, so a maximum CO₂ production rate of 204,428 tons per year was calculated. In the air permit application for the capture facility, a conservative (i.e., low) 95% removal (or, capture) rate of CO₂ was assumed, with the balance assumed, for permitting purposes, to be emitted to atmosphere due to process inefficiencies or equipment downtime.

The capture facility will achieve this capture rate by adhering to standard operating procedures and minimizing equipment downtime through preventative maintenance programs. Summit has designed the capture facility to capture as much CO₂ emissions from the Green Plains Ethanol Plant as possible, as release of CO₂ into the atmosphere would not support/realize the purpose of the Project, which is to capture the CO₂ for transportation and ultimate sequestration.

8. The scoping decision indicates that different capture rates and their methodologies will be discussed. Provide a summary of other CO₂ capture systems and methodologies that could be used to capture CO₂ at an ethanol plant or predict capture rates. Did Summit consider any other technology for the capture facility. Describe how the proposed capture facility equipment was chosen. Should the company like to respond to this statement beyond the questions here, please do.

The industry standard methodology to capture CO₂ at an ethanol plant (e.g., capture of CO₂ for food-grade purposes) is to tie-in a connection at the CO₂ scrubber stack and then process the CO₂ to the desired chemistry to transport and/or store the CO₂. As stated in response to SII Number 7, this methodology was chosen because it has the potential to capture 100% of the CO₂ produced by the Green Plains Ethanol Plant. The Project design follows this methodology, utilizing reciprocating compressors to pressure the CO₂ into a supercritical phase, as well as a triethylene glycol dewatering system to remove any excess

water from the CO₂. While different types of compressors were considered, reciprocating compressors were deemed the best fit for the Project's compression requirements. Summit is not aware of any other commercially viable capture methodologies that have the proven ability to capture 100% of the CO₂ emissions.

9. Clarify if the startup, shutdown, malfunction vent and the startup, shutdown, malfunction stack are the same; see for example Scoping EAW Section 17.a and Table 17-2.

Yes, the terms 'startup, shutdown, malfunction vent' and 'startup, shutdown, malfunction stack' are interchangeable.

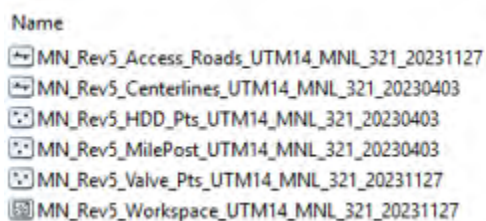
10. Provide emissions of CO₂ from pipeline facilities including valves during operation or explain why they are inconsequential to operational air emissions.

Pipeline facilities that could result in emissions of CO₂ during operation (excluding the capture facility) include mainline valves and the pipeline inspection gauge ("pig") launcher. These include the following:

- Launcher and MLV at milepost (MP) 0.0;
- MLV at MP 4.8 (new – see note below);
- MLV at MP 18.8;
- MLV at MP 20.4; and
- MLV at MP 27.8.

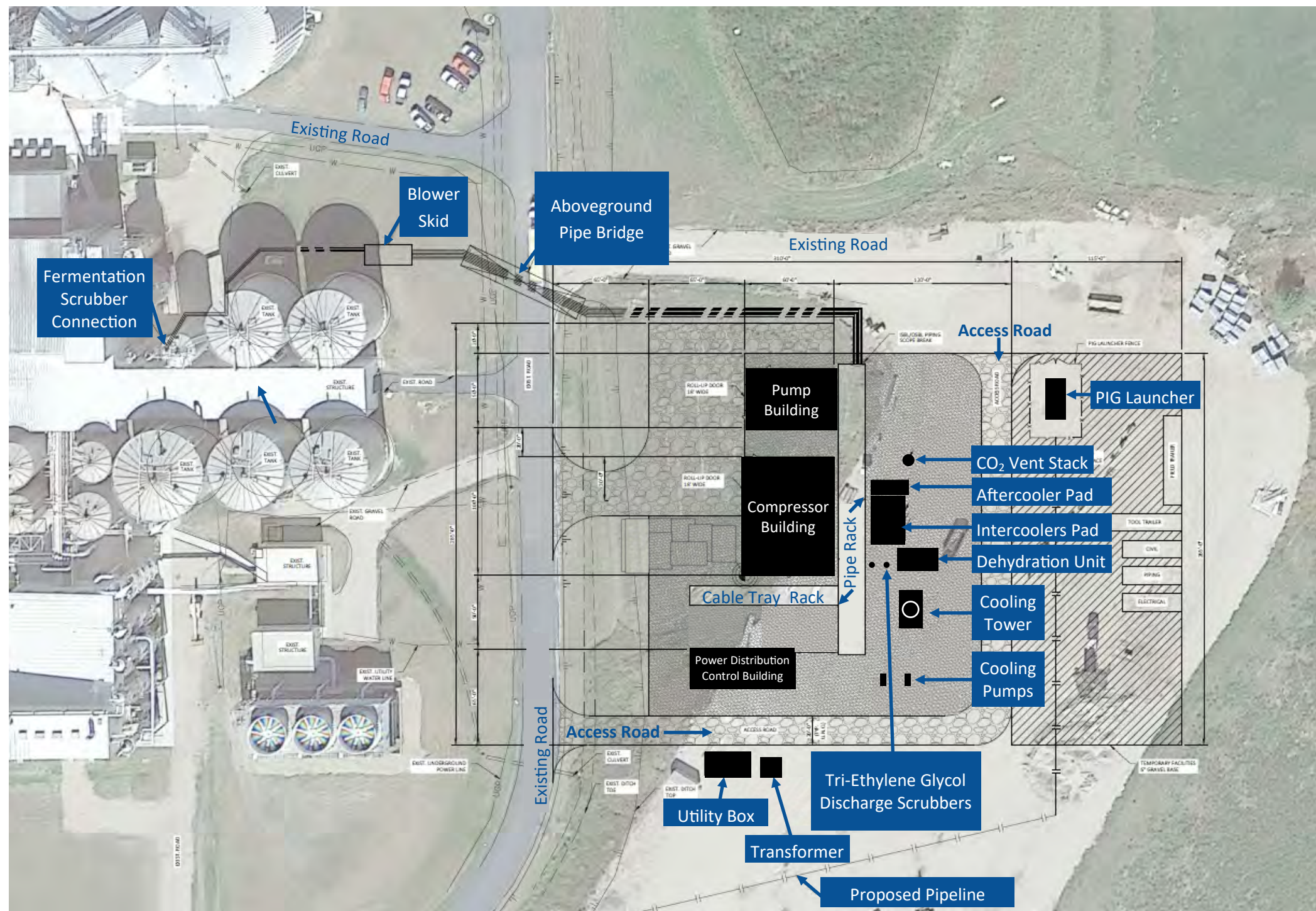
Potential emissions from these pipeline facilities are estimated at 0.20 tons per year of CO₂. Calculations are included in the table provided on the Otter Tail to Wilkin Project Sharepoint site. Minnesota Administrative Rule 4410.4300, Subpart 15, Part B, requires preparation of an EAW for stationary source facilities generating 100,000 tons or more of GHG annually or increasing GHG emissions by 100,000 tons or more annually. A reasonable conclusion is that a project with CO₂ emissions below 100,000 tons per year does not have the potential to result in significant GHG effects. Therefore, the 0.2 tons of CO₂ emissions from the pipeline facilities during operation are anticipated to be inconsequential.

Regarding the new MLV at MP 4.8, this was recently added to the Project design in accordance with 49 CFR 195, to meet and exceed the valve spacing requirements at 49 CFR 195.260(c). A map showing the location of this MLV has been provided on the Otter Tail to Wilkin Project Sharepoint site as Attachment 7-10, along with a geodatabase which includes the MLV point and label, MLV footprint, and permanent access road. Within the geodatabase, the files for mainline valve, footprint, and access roads have been updated with the new information and the date of "20231127" as shown on the image of the geodatabase files, below.



Name

- [-] MN_Rev5_Access_Roads_UTM14_MNL_321_20231127
- [-] MN_Rev5_Centerlines_UTM14_MNL_321_20230403
- [+] MN_Rev5_HDD_Pts_UTM14_MNL_321_20230403
- [+] MN_Rev5_MilePost_UTM14_MNL_321_20230403
- [+] MN_Rev5_Valve_Pts_UTM14_MNL_321_20231127
- [+] MN_Rev5_Workspace_UTM14_MNL_321_20231127





Green Plains Trade Group LLC
1811 Aksarben Drive
Omaha, NE 68106
Phone: 402.884.8700
Fax: 402.884.8776
gpreinc.com

June 30, 2022

Summary of the Ethanol Production Process

Green Plains ethanol plants are designed to convert starch-containing raw material into ethanol. The raw material used at our facilities is corn. The corn is converted into ethanol using a process known as fermentation. The remainder of the corn is recovered and sold as animal feed ingredients. The wet product is referred to as wet distiller's grains with solubles or WDGS.

The entire procedure for this conversion of corn to ethanol and feed ingredients is both mechanical (such as corn grinding) and chemical (conversion of corn to ethanol). The overall process is continuous, which means the flow of materials into and out of the plant does not stop, except for outages (both scheduled and unscheduled) or maintenance.

The first step in the process is the delivery of corn by truck. Corn is sampled and tested at the probe shack, then weighed. Corn is then dispensed by corn trucks into a grain unloading pit through a grate. Corn is then removed from the pit by a conveyor to a bucket elevator to the grain storage silos.

Hammer mills then grind the corn to flour. Corn is metered to the hammer mills to control the process flour addition rate. Flour is transferred to the mash prep area by a conveyor.

Mash Preparation- flour is mixed with hot process condensate in the slurry tank. The pH of the mash is lowered with the addition of a base. Mash is pumped into liquefaction tank.

Liquefaction- The purpose of this stage is to allow time for the added enzyme to convert the starch molecules to complex sugars. The liquefaction tank ensures complete starch conversions.

Fermentation- the purpose of this stage is to convert dextrin into simple sugars through saccharification, then to convert simple sugars into ethanol. Once the fermenter is filled with mash, yeast and nutrients, the contents will ferment for a period of time. During this time, the conversion of complex sugars to simple sugars, then simple sugars to alcohol, takes place. While the mash is fermenting, carbon dioxide is also produced. This CO₂ is vented from the fermenter to the scrubber, where trace ethanol is recovered by direct contact with fresh water.

Distillation- The purpose of distillation is to separate ethanol from the fermented mash (beer) and concentrate it to 95% by volume in the case of 190 proof ethanol. The distillation system consists of three distillation columns: the beer column, rectifier column and stripper column. The beer column will separate the fermented mash into 120 proof ethanol (60% ethanol by volume), whole stillage and carbon dioxide. The purpose of the rectifier column is to purify the ethanol to 95% by volume (190 proof.) The rectifier also provides heat to the first effect evaporator. The stripper column recovers trace ethanol from the rectifier bottoms.

Ethanol Storage- this area is the location where ethanol product is stored, tested, blended and held before being transferred off-site. In the case of production of denatured ethanol, denaturant is a substance added to ethanol to make it unfit for human consumption, so that it is not subject to taxation as beverage alcohol.

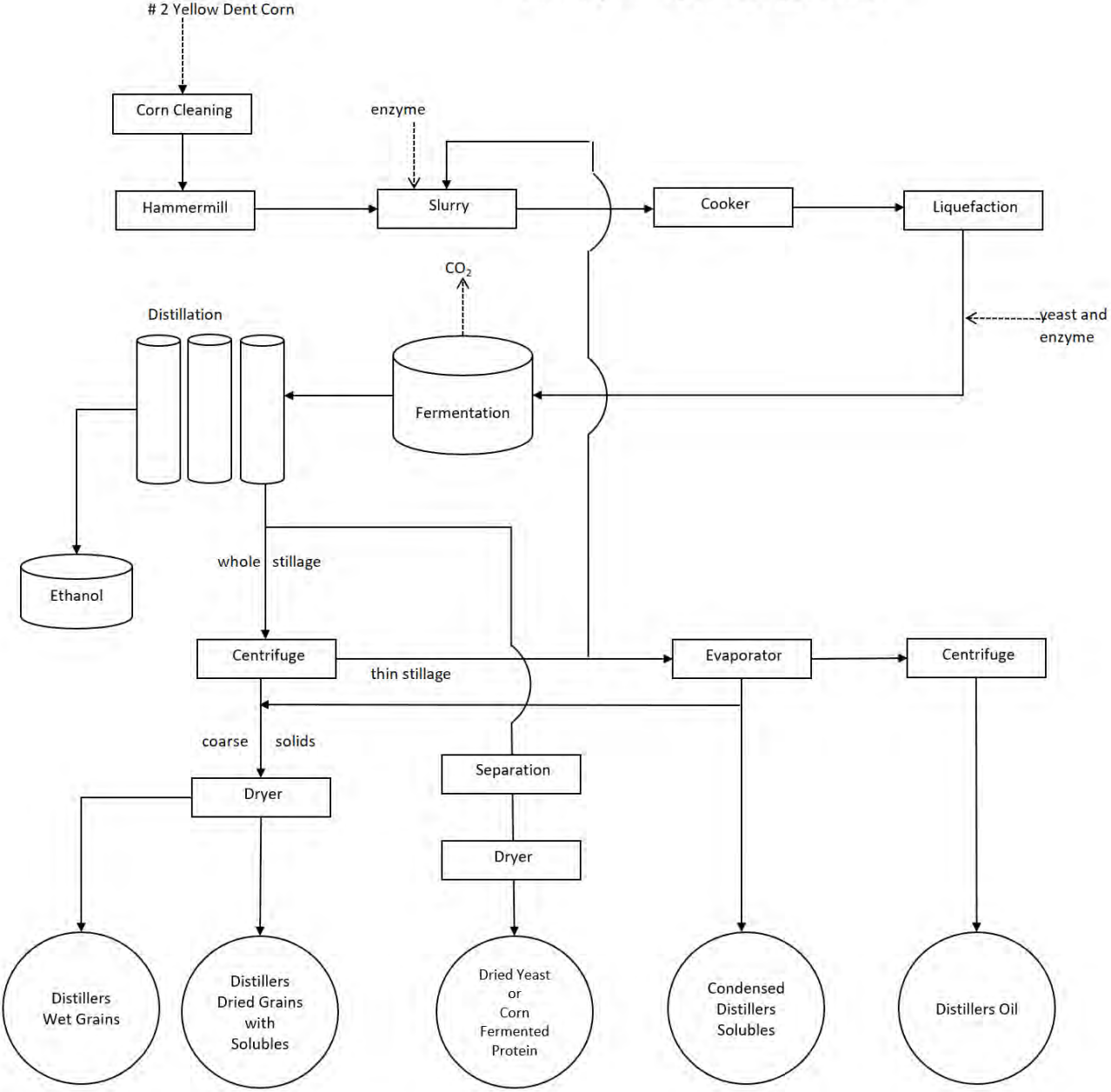
Sincerely,

Cynthia Stricker

Cynthia Stricker

QA/QC Coordinator

Corn Dry-Milling Process Overview



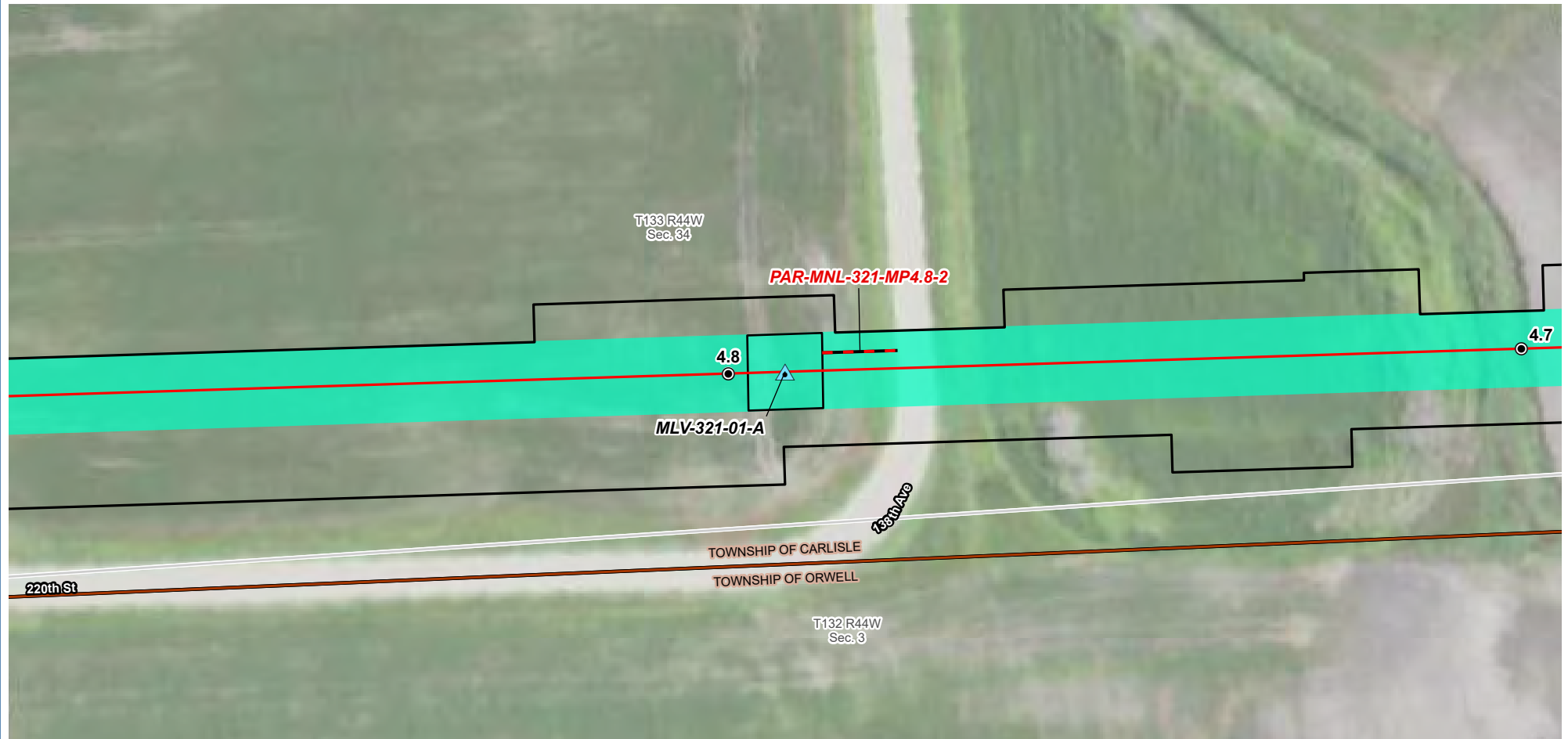
Summit Carbon Solutions, LLC
 Otter Tail to Wilkin Project
 Pipeline Operating Emission Calculations
 GHG Emissions from Equipment Leaks

Description	Count	Emissions ^a (kg/hr/source)	Emissions (lb/hr)	Potential Emissions (tons/year)			GHG Emissions tons CO ₂ e / year
				CO ₂	CH ₄	N ₂ O	
Connector	134	0.0000930	0.0275	0.12	0.00	0.00	0.12
Block Valve	5	0.0016863	0.0186	0.08	0.00	0.00	0.08
Control Valve	0	0.0276650	0.0000	0.00	0.00	0.00	0.00
Pressure Relief Valve	0	0.0017795	0.0000	0.00	0.00	0.00	0.00
Regulator	0	0.0001095	0.0000	0.00	0.00	0.00	0.00
Orifice Meter	0	0.0052938	0.0000	0.00	0.00	0.00	0.00
Other Flow Meter	0	0.0000102	0.0000	0.00	0.00	0.00	0.00
Blowdown System	0	0.0017086	0.0000	0.00	0.00	0.00	0.00
Sum			0	0.20	0.00	0.00	0.20

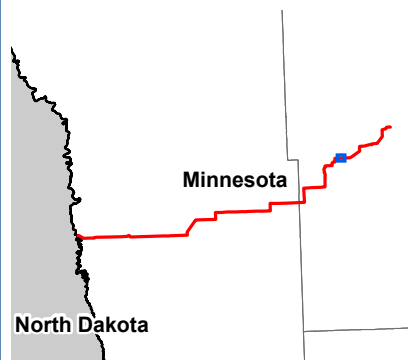
^a Source: Greenhouse Gas Emission Estimation Guidelines for Natural Gas Transmission and Storage, Volume 1 - GHG Emission Estimation Methodologies and Procedures, by Interstate Natural Gas Association of America (INGAA). Table 4-6 using no-leak emission factors for methane (CH₄). The CH₄ emission factors were then converted to CO₂ by multiplying by the molecular weight of CO₂ (44) and dividing by the molecular weight of CH₄ (16).

Pollutant	CO ₂	CH ₄	N ₂ O
Emission Factor - CO ₂ ^a	1	0	0
Global Warming Potential	1	25	298

^a Assumes all pipeline gas is CO₂.



VICINITY MAP



LEGEND

- Milepost
- ▲ Mainline Valve
- Centerline
- Permanent Access Road
- Permanent Right-of-Way
- Construction Workspace
- Section Boundary
- Municipal Boundary

MPCA = Minnesota Pollution Control Agency
 MDNR = Minnesota Department of Natural Resources
 MBS = Minnesota Biological Survey
 BWSR = Board of Water and Soil Resources
 NSR = Noise Sensitive Receptors
 PWI = Public Waters Inventory

0 50 100
 Feet

PREPARED BY

Summit Carbon Solutions

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 Ames, Iowa 50010
 United States of America

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REVISIONS

Date: 11/27/2023

Revised by: TR

Checked by:

Revision 0

Date:

Revised by:

Checked by:

SUMMIT CARBON SOLUTIONS OTTER TAIL TO WILKIN PROJECT

Figure Title:

MLV-321-01-A
 Otter Tail County, Minnesota

Figure Number:

1

Scale:
 1:1,200
 1 in = 100 ft



Projection:
 Transverse Mercator
 NAD 1983 UTM Zone 14

Sheet:
 Sheet 1
 Sheet 1 of 1

Drawing Number:
 003-00041
 Current Revision

To: Scott O’Konek
Summit Carbon Solutions

Sent via email to sokonek@summitcarbon.com

From: Andrew Levi
Energy Environmental Review and Analysis

Date: November 29, 2023

Project: Otter Tail to Wilkin CO₂ Pipeline Project
IP 7093/PPL-22-422

Respond: As soon as possible

Please respond to the following questions or provide the requested data or information. Staff will use the information provided to develop the environmental document for the project, which is a public document. Your response, in its entirety, will be included in the environmental document as an appendix; therefore, **responses will be publicly available** unless otherwise designated by the respondent as “nonpublic information” pursuant to Minnesota Statute § 13.02, subdivision 12.

Directions: Responses to questions should be contained within this form to the greatest extent possible (**11-point Calibri, plain text font, RGB 192, 0, 0**). Attach supporting documentation as necessary. While data and information requests, for example, shapefiles or draft plans, will not be contained within this form, document their submittal using this form as follows: *“Requested information sent to whom by what means on date.”*

Do not eFile your response. Return the completed form, as a PDF, along with necessary supporting documentation, and/or requested data or information to andrew.levi@state.mn.us. Contact me at (651) 539-1840 with questions.

1. Please provide locations and other available information for the Ecological Unusually Sensitive Areas (Eco USAs) on each of the 3 route alternatives.

When Summit conducted its review of Eco USAs (as defined in 49 CFR 195.6 (b)) for the Proposed Route (Alternative 3), it encompassed a large enough area to fully contain the location of RA-Hybrid (Alternative 2). There are no U.S. Pipeline and Hazardous Materials Safety Administration (PHMSA) Eco USAs along the Proposed Route (Alternative 3) or RA-Hybrid (Alternative 2). A portion of this analysis area also covered the easternmost portion of RA-North (Alternative 1). However, a western portion of RA-North (Alternative 1) extended beyond the prior area of study. Summit reviewed this area in response to this request and determined that there are no Eco USAs along the previously unstudied part of RA-North (Alternative 1). In conclusion, there are no Eco USAs crossed by the Proposed Route or either of the proposed route alternatives.

2. Does the average annual electricity consumption for the plant of 38,062,620 kWh include the pumping and treating of water from the Green Plains Ethanol Plant wells? If not, what is the annual electricity consumption for this pumping and treating?

Yes.

3. Please provide the rationale for why the new MLV was added as mentioned in the response to SII #7. If the need for an additional MLV is based on new information, please provide that information so we may include it in our analysis.

Other Populated Areas (OPAs), as defined within 49 CFR 195.450, are defined and delineated by the U.S. Census Bureau using statistical data (i.e., population density). These delineations are publicly available within the National Pipeline Mapping System (NPMS). However, PHMSA encourages operators to take a deeper look and factor non-statistical data when assessing integrity management, stating “as with all national [High Consequence Area] HCA GIS data layers, local knowledge, data, or field assessments would be more accurate than any national-level GIS data and should not be excluded from an operator’s analysis.”¹

Due to the continual refinement of the NPMS’ OPA boundaries as part of the Summit Integrity Management Program, the delineation of the City of Fergus Falls created a new HCA “could-affect.” In accordance with 49 CFR 195, MLV-321-01-A was implemented to meet and exceed the requirements of 49 CFR 195.260(c).

4. Provide a table listing each MLV for each of the three route alternatives by milepost. Include the location of a new valve along RA-North and RA-Hybrid based on CFR 195.260(c). We understand that this location may be an approximation. This will provide a necessary and appropriate comparison for dispersion modeling and the EIS.

The requested table is below. Mainline valves (MLVs) along the Proposed Route (Alternative 3) are the same as was presented in the response to Inquiry #7 on November 27, 2023. When locating MLVs along the RA-North (Alternative 1) and RA-Hybrid (Alternative 2) alternatives, Summit used the mileposts (MPs) provided in response to Inquiry #2 (Revision 2) on November 15, 2023 (file titled “Inquiry 2-2 Otter Tail to Wilkin Route Alternative NSRs_Rev2_20231115.zip”).

Proposed Route (Alternative 3)	RA-North (Alternative 1)	RA-Hybrid (Alternative 2)
MP 0.0	MP 0.0	MP 0.0
MP 4.8	MP 4.6	MP 4.6
MP 18.8	MP 17.6	MP 19.9
MP 20.4	MP 22.9	MP 21.5
MP 27.8		MP 28.9

5. In the company’s response to SII #4, it was stated that “The corn CI from the CARB Tier1 calculator is 6,442.02 grams of carbon dioxide equivalent per bushel of grain (gCO₂e/bu) and in the case of the Green Plains Ethanol Plant, this is equivalent to 21.44 grams of carbon dioxide equivalent per megajoule (gCO₂e/MJ).” Please explain how the corn CI of 21.44 gCO₂e/MJ was derived. Was the corn plug value used, or were specific input values determined from data the ethanol plant has on the farming practices of their corn producers? If so, what were those input values?

The corn plug value was used.

¹ PHMSA Public Meetings and Documents, Liquid Pipeline Advisory Committee (LPAC) Meeting, LPAC transcript for August.

To: Scott O’Konek
Summit Carbon Solutions

Sent via email to sokonek@summitcarbon.com

From: Andrew Levi
Energy Environmental Review and Analysis

Date: December 14, 2023

Project: Otter Tail to Wilkin CO₂ Pipeline Project
IP 7093/PPL-22-422

Respond: As soon as possible

Please respond to the following questions or provide the requested data or information. Staff will use the information provided to develop the environmental document for the project, which is a public document. Your response, in its entirety, will be included in the environmental document as an appendix; therefore, **responses will be publicly available** unless otherwise designated by the respondent as “nonpublic information” pursuant to Minnesota Statute § 13.02, subdivision 12.

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Do not eFile your response. Return the completed form, as a PDF, along with necessary supporting documentation, and/or requested data or information to andrew.levi@state.mn.us. Contact me at (651) 539-1840 with questions.

1. Was the GHG emission factor, used in Scoping EAW Table 18-1, calculated using the CA-GREET model or was it directly obtained from the model? If the factor was calculated, what percentage of electricity resources was used in determining the factor? Please provide calculation.

An electricity emission factor of 684.35 gCO₂e/kWh was used in Scoping EAW Table 18-1. This number was obtained from the CA-GREET 3.0 Model, file “[ca-greet30-corrected.xlsm](#)”, tab “EF”, cell C130 for the MROW Mix.

2. During scoping, one commenter requested information on “soil shrinkage” (shrink-swell soils), which was a factor in a Kansas pipeline rupture. Provide a description of shrink-swell soils and how they can impact pipelines, and an assessment of the potential for these soils to be present in the project area for each alternative pipeline route. If they are or could be present, describe the potential risks to pipeline integrity and measures to mitigate the risk.

Linear extensibility is used to determine the shrink-swell potential of soils. The shrink-swell potential is low if the soil has a linear extensibility of less than 3 percent; moderate if 3 to 6 percent; high if 6 to 9 percent; and very high if more than 9 percent. If the linear extensibility is more than 3, shrinking and

swelling can cause damage to buildings, roads, and other structures and to plant roots¹. Linear extensibility can change as you move through horizons within a given soil, based on features such as soil texture, moisture content, and type and amount of clay present in the soil horizon.

The Project is proposed to be installed with a minimum of 54 inches depth of cover over the top of the pipe. The minimum depth of cover will be increased to 60 inches at waterbody and drainage ditch crossings as well as private road crossings as measured at the bottom of the road ditch. This translates to a trench depth between 58-64 inches deep. SSURGO data published by the NRCS was analyzed to determine the shrink-swell potential of the soils present at the approximate depths that the majority of the Project will be installed, which is generally the bottom-most soil horizon for each soil in the SSURGO dataset.

Based on this analysis, most of the soils along each alternative are classified as either low or moderate shrink-swell potential, as outlined in the following table. Note that while the overall shrink-swell classifications of soils outlined by the NRCS in the National Soil Survey Handbook include soils with a linear extensibility percent (LEP) of 3.0 – 5.9 percent, soils crossed by the alternatives do not exceed a LEP of 4.5 percent.

The University of Minnesota Extension notes that Vertisol soils (with the suborder Aquerts being the main suborder in Minnesota), are wet, clay-textured soils formed in lake sediments, and these soils have shrink-swell capacity. These are rare in Minnesota (1.2% statewide).² Vertisol soils are represented in the table below as “high” potential soils. There are no “very high” potential soils crossed by any of the alternatives.

Shrink-Swell Potential of Bottom-most Soil Horizon					
	Total Miles	Low ¹	Moderate ^{1,2}	High ¹	Very High ¹
		Miles / %	Miles / %	Miles / %	Miles / %
Alternative 1	23.0	11.6 / 50.6%	10.8 / 46.8%	0.6 / 2.6%	--
Alternative 2	29.1	13.4 / 45.9%	15.7 / 54.1%	<0.01 / <0.003%	--
Alternative 3 (Proposed Route)	28.1	12.5 / 44.5%	15.6 / 55.5%	<0.01 / <0.004%	--
¹ The shrink-swell potential is low if the soil has a linear extensibility of less than 3 percent; moderate if 3 to 6 percent; high if 6 to 9 percent; and very high if more than 9 percent. ² Based on SSURGO data, all soils categorized within the Moderate rating for the listed Alternatives have a linear extensibility between 3 and 4.5 percent.					

National Soil Survey Handbook Section 618.42 Linear Extensibility Percent	
Shrink-Swell Class	LEP
Low	<3.0
Moderate	3.0 - 5.9
High	6.0 - 8.9
Very High	≥9.0
Source: U.S. Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. https://directives.sc.egov.usda.gov (accessed December, 2023).	

¹ U.S. Department of Agriculture, Natural Resources Conservation Service. National Soil Survey Handbook, title 430-VI. <https://directives.sc.egov.usda.gov>.

² <https://extension.umn.edu/soil-management-and-health/soil-orders-and-suborders-minnesota#vertisols-1383916>

Expansive soils are of higher concern to non-metallic buried pipelines with more restrained points branch connections and tie-points. Expansion and retraction of soils typically occurs slowly over large areas, and linear steel pipelines are able to adjust to these conditions without sustaining damage. Due to the relative absence of these soils within the areas of analysis and the lack of risk to pipeline integrity, Summit does not propose any mitigation measures.

3. Provide a plain English explanation describing the root cause of why Summit is installing another valve. For example, provide a specific reason for why this additional valve was needed and why the location was chosen.

The mainline valve was added to meet and exceed the requirements of 49 CFR 195. This specific location was selected because it meets and exceeds federal requirements 49 CFR 195 for valve placement, is accessible via existing road access, has electric power available to serve the location, and is located on land Summit has under voluntary easement.

4. What is Summit doing to ensure that the pipeline is properly protected from equipment and material failure as a result of lessons learned from CO₂ pipeline ruptures in the past? Given that the dominant failure modes for CO₂ pipelines are very different from typical oil and gas pipelines, what specifically will be different in Summit's design and construction standards, O&M manuals that address 49 CFR 195.416, and Integrity Management Plan that will prevent and mitigate these dominating CO₂ failure modes not readily experienced in typical oil and gas pipelines? For reference, see "Carbon dioxide pipelines: A statistical analysis of historical accidents" in the Journal of Loss Prevention in the Process Industries at: <https://www.sciencedirect.com/science/article/abs/pii/S0950423023001596?via%3Dihub>.

It is a mischaracterization to state that carbon dioxide pipeline failure modes are "very different" and "not readily experienced" when compared to oil and gas pipelines. Equipment failure, natural force damage, and material failure are all failure modes present in "typical" pipelines and are readily addressed in PHMSA regulations.

As stated within the linked article, "rupture is the most common failure mode of gas transmission pipelines and responsible for 38% of the incidents." For carbon dioxide pipelines, "leakage is the main form of accidents and rupture is the most unusual failure mode" and "extremely rare." Thus, in the case of a carbon dioxide release, a potentially smaller volume leak is more likely to occur than a rupture.

Furthermore, the article notes the "absence of injuries or fatalities and minimal property damage costs" associated with carbon dioxide pipelines. In support of this, the article states, "that the release of carbon dioxide poses an insignificant risk."

Summit's mitigative measures and PHMSA exceedances to address the potential equipment and material failures include, but are not limited to:

- o Summit will exceed the requirements of 49 CFR 195.234 by requiring 100 percent of all girth welds to be nondestructively tested and incorporating auditing of nondestructively test results, records, and procedures.

- o Summit will exceed the requirements of 49 CFR 195.214 by incorporating additional mechanical testing in excess of API 1104 Section 5 and 12 by conducting Charpy V-Notch Testing, Vickers Hardness Testing and Cross Weld Reduced Section Tensile.
- o Summit will exceed the requirements of 49 CFR 195.304 hydrotesting requirements by testing all pipe systems for (8) hours at 125% maximum operating pressure (MOP) prior to operations.
- o Summit will exceed the requirements of 49 CFR 195.112. SCS pipelines will be specified to API 5L, PSL-2 standards which mandates the additional metallurgical requirements, inspections, and record retention. In addition, all pipelines will be manufactured in accordance with SCS developed Line Pipe Specification with considerations to more stringent requirements for mechanical properties for fracture control design, stringent dimensional requirements where applicable for improved constructability and stringent inspection and testing criteria to include non-destructive evaluation of the welded pipes.
- o Summit will exceed the requirements of 49 CFR 195.111 by engaging the services of ITI and Microalloy to assist with an extensive fracture propagation and ductility analysis to determine the required metallurgical properties for the proposed pipeline system as well as utilizing crack arrestors.
- o Summit will exceed the requirements of 49 CFR 195.250 by utilizing a 24-inch clearance between the outside of the pipe and the extremity of any underground structure, including drain tiles, where feasible. In the event a 24-inch clearance cannot be achieved, Summit will meet the minimum requirements stated in 49 CFR 195.
- o Summit will exceed the requirements of 49 CFR 195.406 by implementing redundant pressure indicator (transmitter or PIT) on pump discharge, overlapping over pressure protection control logic, soft high pressure alarms well below MOP, and pump shutdown control logic below MOP. Additionally, Summit performed a comprehensive surge study that showed anticipated surge pressures to be well within regulation even when only local controls were considered.
- o Summit will exceed the requirements of 49 CFR 195.407 by implementing a system wide dual communication path to all pump stations, mainline valve sites, PLR sites, and capture sites.
- o Summit will be performing inspections on all phases of the pipe manufacturing process at each pipe mill to ensure full compliance with all QC measures. In addition, Summit will perform a factory acceptance test for each premanufactured component for facilities (pumps, compressors, dehydration units). In addition to this, all the components will be inspected at the site of installation.
- o Interior and exterior infrared cameras will be placed at the capture facility to detect a potential carbon dioxide leak.
- o Interior carbon dioxide and oxygen detectors will be placed at pump facilities to detect both the presence of hazardous vapors and confirm that there is sufficient oxygen for a safe environment.
- o Summit consulted with two separate engineering consultants to review valve soft composite material compatibility with the Summit product composition standards.
- o All PHMSA-regulated facilities are designed to be “piggable” with inline inspection (ILI) tools.
- o Summit will conduct aerial patrols along the pipeline system to monitor and identify surrounding environmental conditions.

5. The EIS will provide a brief update regarding the Midwest Carbon Express project as a whole. Please provide an update on permitting in other states as well as timeframes associated with future segments in Minnesota. Discuss the MCE project's anticipated in-service date.

The Midwest Carbon Express Project is in the permitting phase across the 5-state footprint. In Iowa, hearings before the Iowa Utilities Board (IUB) are now complete, and a final decision is expected in Q1 2024. In South Dakota, Summit plans to submit a permit application to the South Dakota Public Utility Commission (SDPUC) in 1Q 2024. South Dakota's permitting process is anticipated to take up to one year to complete. In North Dakota, Summit is working to submit supplemental information and preparing for additional hearings as part of the reconsideration process before the North Dakota Public Service Commission (NDPSC). In Nebraska, permitting is underway and occurs at the county level. In Minnesota, a route permit application is pending before the Minnesota Public Utilities Commission (MPUC) for the Otter Tail to Wilkin Project, and Summit expects to submit additional route permit applications in the future. Summit submitted Pre-Construction Notifications to the United States Army Corps of Engineers (USACE) under Nationwide Permit (NWP) 58 in North Dakota, South Dakota, Nebraska, and Iowa, and the Utility Regional General Permit in Minnesota, and anticipates receiving authorization from the USACE in Q4 2024. Summit anticipates having permits for all pending applications in hand to facilitate a start of construction for portions of the project by Q1 2025 and plans to be operational by mid-2026.

To: Scott O’Konek
Summit Carbon Solutions

Sent via email to sokonek@summitcarbon.com

From: Andrew Levi
Energy Environmental Review and Analysis

Date: December 29, 2023

Project: Otter Tail to Wilkin CO₂ Pipeline Project
IP 7093/PPL-22-422

Respond: As soon as possible

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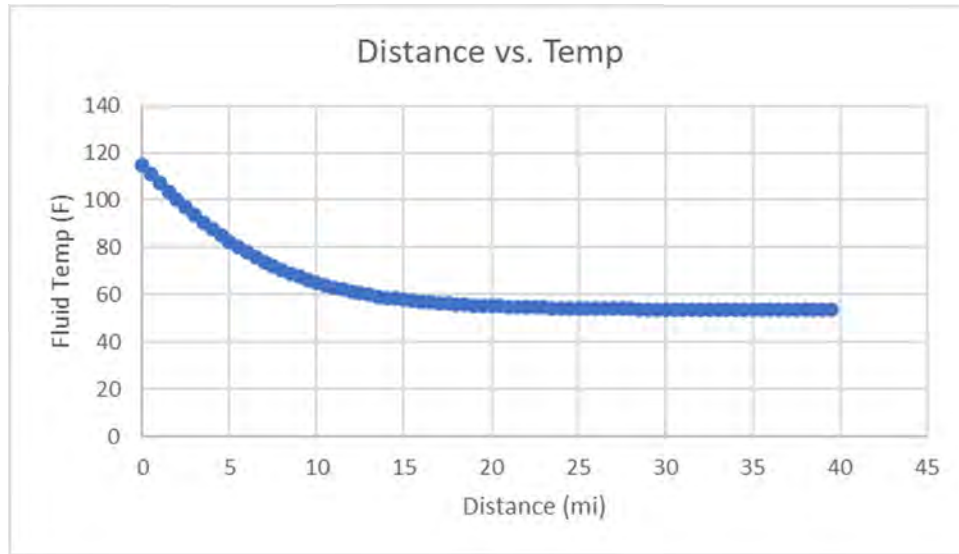
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Do not eFile your response. Return the completed form, as a PDF, along with necessary supporting documentation, and/or requested data or information to andrew.levi@state.mn.us. Contact me at (651) 539-1840 with questions.

1. To assist us in responding to the DNR’s request that the EIS consider effects of the elevated pipe temperature on surrounding soils, wetlands, and waterbodies, please provide an estimate of the distance from the capture plant that it would take for the pipeline to cool to ambient temperatures. Also include a range of the approximate distance from the pipe that soil warming would occur.

Summit retained Lake Superior Consulting to perform an analysis to determine the approximate distance it will take for the pipeline to cool to ambient ground temperatures from the carbon dioxide (CO₂) capture facility. In this analysis, a temperature of 115°F was used, based on summer conditions, for the approximate temperature of the CO₂ in the pipeline as it leaves the capture facility, and a temperature of 53°F was assumed for an average ambient temperature of the soil. The results show a significant decline in temperature from 115°F to 60°F in the first 12 miles of the pipeline followed by a temperature decay in a logarithmic fashion until the pipe and soil temperatures converge at 53 degrees a distance of 27 miles from the injection point at the capture facility. The results can be seen below in Figure 1.

Figure 1



To address the second part of the inquiry, Lake Superior Consulting performed an analysis to determine the approximate distance from the pipe that soil warming could occur. Rather than utilizing specific CO₂ and soil temperatures, which vary based on season, a temperature differential of 65°F between the CO₂ temperature and the ground temperature was used in the calculation to account for both summer and winter conditions. In addition to using conservative temperature differentials, a rate of heat transfer from the CO₂ to the pipe to the soil was calculated using 115°F, which was the maximum fluid temperature assumption used in part one of this inquiry. Using this conservative approach, Lake Superior Consulting calculated that the soil temperature surrounding the pipe will reach equilibrium with the ambient soils at an approximate distance of 13 inches from the outside wall of the pipe.

From: Levi, Andrew (COMM) <andrew.levi@state.mn.us>
Sent: Friday, January 19, 2024 9:07 AM
To: Sedarski, Joe; Storey, Catherine; Terhaar, Patricia
Subject: FW: Action Required: Costs

CAUTION: [EXTERNAL] This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Here is costs for RA-North without ND. As explained to me acquisition costs are not identical per mile to RA-South because benchmark costs associated with land values has increased since the company started actively acquiring easements. Please include this email in the SII Appendix.

Thank you.

—Andrew

From: Scott O'Konek <sokonek@summitcarbon.com>
Sent: Friday, January 19, 2024 9:23 AM
To: Levi, Andrew (COMM) <andrew.levi@state.mn.us>
Cc: Dornfeld, Richard <Richard.Dornfeld@ag.state.mn.us>; Christina Brusven <cbrusven@fredlaw.com>
Subject: RE: Action Required: Costs

This message may be from an external email source.

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Andrew, here is the adjusted cost estimate only including MN for RA-North. Hope your Friday is going great!

Engineering Cost Estimate	
North Route (23 miles)	
Work Item	Cost
Planning / Permitting*	\$ 4,075,000
ROW Acquisition*	\$ 13,750,000
Engineering*	\$ 625,000
Procurement	\$ 2,100,000
Construction	\$ 16,000,000
Closure	\$ 1,250,000
Total	\$ 40,000,000
Estimate Accuracy: +/- 15%	
* The estimate includes realized costs to date, plus the estimated cost to complete work items for the 23 miles of alternative route proposed in MN.	

From: Levi, Andrew (COMM) <andrew.levi@state.mn.us>
Sent: Friday, January 19, 2024 8:24 AM
To: Scott O'Konek <sokonek@summitcarbon.com>
Subject: Action Required: Costs
Importance: High

Hi Scott.

I need a cost estimate for RA-North WITHOUT the ND portion. I need this as soon as possible, preferably before noon today.

Please let me know you've received this email.

Thank you.

—Andrew

Andrew Levi
Environmental Review Manager

Energy Environmental Review and Analysis
Department of Commerce
85 Seventh Place East, Suite 280 | Saint Paul, MN 55101
P: (651) 539-1840 | F: (651) 539-0109
Schedule: Tuesday – Friday



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To: Scott O’Konek
Summit Carbon Solutions

Sent via email to sokonek@summitcarbon.com

From: Andrew Levi
Energy Environmental Review and Analysis

Date: February 15, 2024

Project: Otter Tail to Wilkin CO₂ Pipeline Project
IP 7093/PPL-22-422

Respond: March 8, 2024

Please respond to the following questions or provide the requested data or information. Staff will use the information provided to develop the environmental document for the project, which is a public document. Your response, in its entirety, will be included in the environmental document as an appendix; therefore, **responses will be publicly available** unless otherwise designated by the respondent as “nonpublic information” pursuant to Minnesota Statute § 13.02, subdivision 12.

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Do not eFile your response. Return the completed form, as a PDF, along with necessary supporting documentation, and/or requested data or information to andrew.levi@state.mn.us. Contact me at (651) 539-1840 with questions.

1. Please respond to mitigation proposed or discussed in the draft EIS or proposed during the public comment period—safety related or otherwise. List those mitigations the company would agree to undertake.

*Please see the file loaded to the Otter Tail to Wilkin ShareFile site titled “**SII 11_1_SCS_ Otter Tail to Wilkin Response to DEIS Recommendations**”.*

2. The final EIS may include a recommendation to use a combination of check valves and pressure control valves where possible instead of only SCADA-controlled block valves for pipeline isolation. Please provide comment on this potential recommendation.

Since the block valves proposed for this project can take up to 10 minutes to isolate the pipeline (that is, 10 minutes from rupture to valve closure), a combination of check valves and pressure-controlled valves (PCVs), also called “slam-shut” valves, could close instantaneously or nearly instantaneously in the event of rapid pipeline depressurization.

Summit does not agree with this potential recommendation. This recommendation appears to misunderstand the assumed valve closure time used in the dispersion analysis. Summit chose a 10-minute closure time in the dispersion model to produce conservative results. The mainline valves can cycle to closed in 17 seconds. Check valves in a mainline can cause complications while running smart tools,

potentially leading to failed smart tool runs due to damage from the internal components within the check valve.

3. The desktop studies Allied performed suggest different frost depths throughout the project area than those generated by the applicant's desktop studies. Both studies use available, generalized data which does not reliably indicate the actual frost depth or soil type at all points along the proposed pipeline centerline.

Therefore, the final EIS may suggest the applicant engage a qualified geotechnical firm to 1) create a soil-testing program to ensure the pipeline is installed beneath all potential frost heave areas or 2) conduct an engineering analysis using field-collected data that demonstrates why a burial depth is appropriate for each length of the proposed pipeline. This analysis would be based on engineering logic applicable to this pipeline, not on generalized data. If this second option is used, a qualified geotechnical firm should perform the soil testing on field-collected soil samples, which is necessary to understand if the local soil conditions pose a frost heave threat to the proposed pipeline.

Please provide comment on this potential recommendation.

Should the applicant have plans to test local soils along the right-of-way during construction activities, please describe that testing.

Summit does not agree with this potential recommendation and does not plan to conduct soil testing across the Project. For frost heave to be considered an issue for pipelines, there are three criteria to that need to be met: 1) the pipeline would need to be installed above the frost depth; 2) there must be presence of sufficient soil moisture/water; and 3) there must be the presence of susceptible soils, which are generally considered fine grained soils (> 10% of material smaller than 0.075 millimeters (mm), and >3% of material less than 0.02 mm).

As stated in the Scoping Environmental Assessment Worksheet (EAW), Section 6.b, "SCS's Contractor would install the pipeline to allow for a minimum of 54 inches depth of cover, measured from the top of the pipe to ground surface, in accordance with MDA agricultural area standards at Minnesota Statutes Section 216G.07 or landowner agreements. The minimum depth of cover would be increased to 60 inches at waterbody and drainage ditch crossings as well as private road crossings as measured at the bottom of the road ditch." Also, Section 11.b of the Scoping EAW notes: "The typical dimensions of the pipeline trench would be approximately 5.4 feet (65 inches) deep."

Notably, Summit's placement of the pipeline at a standard 54 inches of depth of cover is consistent with the Minnesota Department of Agriculture's recommendation for greater depth in agricultural lands. The U.S. Department of Transportation (USDOT) Pipeline and Hazardous Materials Safety Administration (PHMSA) establishes minimum depth of cover requirements in 49 CFR 195.248 which range from 30 inches to 48 inches. Summit's depth of cover commitment at 54 inches also exceeds PHMSA requirements. These depth of cover standards have been in place for decades, and Summit is unaware of any documented frost heave issues on pipelines installed across the state of Minnesota at these depths.

It should also be noted that the carbon dioxide (CO₂) entering the pipeline is estimated to be 80 degrees Fahrenheit during winter months. This warmer CO₂ stream will prevent soil in the immediate vicinity of the pipeline from freezing. In addition, if frost depths reach beyond 58 inches, the amount of movement at such a depth would be very small given the relation to the thickness of any underlying ice lenses. Today's

materials have evolved including the introduction of more ductile steels allowing greater allowable deformation due to external loads.

4. Provide a cover page for the Minnesota ECP indicating the different projects in Minnesota and the different pipeline diameters associated with each project.

Please see the file loaded to the Otter Tail to Wilkin ShareFile site titled "*SI 11_4_SCS_Otter Tail to Wilkin ECP Cover Page*" which can be used by EERA to help clarify pipeline diameters presented on the typical drawings within the Minnesota ECP.

5. Provide further information concerning how water will be used at the capture facility.

Water is necessary for capture facility operation to cool the CO₂, lubricating oil, and glycol moving through and being used by the capture facility. Cooling water circulates through the capture facility's heat exchangers to cool off CO₂ as it is compressed, to cool off lubricating oil from the compressors, and to cool off glycol from the dehydration unit regeneration system. The cooling water, which is cooler than the warmer CO₂, lubricating oil, and glycol used during the CO₂ capture process, pulls heat from the CO₂, lubricating oil, and glycol as the water passes through heat exchangers. No water comes into direct contact with the CO₂, lubricating oil, or glycol in any part of the process.

The water, which is now warm, then flows to the capture facility cooling tower. The purpose of the cooling tower is to bring air in contact with the warm water, which cools the water. During this process, a small volume of water is evaporated/vaporized. Some vaporized water will also leave the system through windage, or drift, from the cooling tower. This vaporized and/or drifted amount of water must then be made up by more fresh water to maintain a consistent volume of water within the system. Some water is also discharged from the cooling tower to manage mineral content in the water circulating within the bulk water system. The discharged amount of water must then also be made up by fresh water to maintain a consistent volume of water within the system.

The underlined sections in the description above are the only consumptive uses of water from the capture facility. The quantity of water used by the capture facility is equal to the amount of water vaporized in the cooling tower, plus any windage or drift from the cooling tower (negligible), plus water discharged from the cooling tower. There are no additional consumptive uses.

6. Please verify CO₂ capture rates at the facility.

The capture facility will capture approximately 100% of the CO₂ emissions from the Green Plains Ethanol Plant's scrubber stack during normal operations. CO₂ can only be captured if the Green Plains Ethanol Plant is operational, and the operational rates will vary over time. The capture facility may also not be operational during periods of maintenance. Summit has based its initial CO₂ capture rate estimates using best available assumptions on these variables.

Captured CO₂ will be metered as it is injected into the pipeline. The CO₂ emitted by the capture facility will be determined based on mass balance. The capture facility will report annual air emissions, including CO₂, to the Minnesota Pollution Control Agency as required by the capture facility's air permit. The actual CO₂ capture rates may be determined by comparing the amount of captured CO₂ to the potential CO₂ produced by the Green Plains Ethanol Plant.

Recommendation	Reference	Response
Surveys		
[EERA] Potential impacts to ground-nesting birds during construction would be lessened or avoided by conducting surveys for these species and their nests, per USFWS standards, at appropriate timing ahead of construction.	5-114	Summit intends to follow USFWS guidance regarding compliance with the Migratory Bird Treaty Act (MBTA) and will continue to consult with the USFWS regarding MBTA. Additionally, a MBTA plan is under development for company use with the contractors during construction and during operations. Summit will also work with MDNR to determine if additional surveys are necessary prior to construction. To avoid duplicative, and potentially conflicting requirements, Summit recommends any special condition related to this issue reference adherence to USFWS and MDNR's Natural Heritage Review recommendations rather than including the specific language suggested on DEIS page 5-114.
[EERA] Prior to construction, field surveys should be conducted for state-listed species. Surveys for state-listed plants should follow the MnDNR protocol described in the April 2022 "Guidance for Documenting and Collecting Rare Plants."	5-115	Summit is coordinating with MDNR on required surveys and protocols. To date, surveys have not identified concerns for impacts to state-listed species. Pages 75-76 of the Scoping EAW contain additional discussion of this issue.
[EERA] Appropriate surveys for archaeological resources should occur regardless of which route alternative is selected. If archaeological resources are found, treatment plans should be prepared in consultation with Tribes and SHPO as appropriate.	5-80; 11-13	Summit will complete archeological surveys regardless of the route selected and is committed to avoiding impacts to any identified eligible cultural resources and Tribal areas of interest through route modifications or construction methodology. If identified resources cannot be avoided, then treatment plans would be developed with Tribes and SHPO, as appropriate. To date, Summit has surveyed 99.8% of RA-South, and the construction of the Project will not impact any cultural resources eligible

Recommendation	Reference	Response
		for listing under the National Historic Preservation Act or Tribal areas of interest.
Restoration		
[CURE] Proper restoration of native vegetation communities would benefit rare and unique species. The proposed performance standard of 70 percent vegetation density relative to background native vegetation cover is too low and should be higher. In addition, revegetation goals should be met throughout the life of the project.	5-115	There is no regulatory requirement that mandates a performance standard greater than 70 percent; and therefore, Summit does not agree with this recommendation. The proposed 70 percent revegetation standard is in accordance with the revegetation standards contained within Condition 13.2 of the Minnesota Pollution Control Agency's (MPCA) Construction Stormwater General Permit. The condition is as follows: <i>Permittees must complete all construction activity and must install permanent cover over all areas prior to submitting the NOT. Vegetative cover must consist of a uniform perennial vegetation with a density of 70 percent of its expected final growth. Vegetation is not required where the function of a specific area dictates no vegetation, such as impervious surfaces or the base of a sand filter. [Minn. R. 7090].</i>
[EERA] A Vegetation Management Plan (VMP) should be prepared in consultation with the Vegetation Management Plan Working Group (VMPWG), a multi-agency group led by EERA staff in conjunction with several other state agencies, to address potential impacts related to pipeline construction, operation, and maintenance. The VMP should discuss existing vegetation, reestablishment and restoration, seed mixes, noxious weeds and invasive species, herbicide use, sensitive plant communities, and other topics identified during coordination with the VMPWG. Preparation and Implementation of such a plan would improve recovery efforts for state-listed plants and their habitats potentially affected by the project.	5-115	Summit will prepare a Vegetation Management Plan in consultation with the Vegetation Management Working Group prior to the start of construction of the Project.

Recommendation	Reference	Response
[MPCA] Details be provided in the ECP for preventing excessive crowning or subsidence above the restored centerline, and for addressing excessive crowning or subsidence if it is discovered during post-construction monitoring.	5-145	Summit will include details in the ECP for preventing excessive crowning or subsidence above the restored centerline. Summit will restore the construction workspace to as close to the original pre-construction contours as practicable. If uneven settling occurs or surface drainage problems develop as a result of pipeline construction, Summit will provide additional land leveling services after receiving a landowner's written notice, weather and soil conditions permitting. Alternatively, Summit will negotiate with the landowner for reasonable compensation in lieu of restoration.
Environmental Impact Mitigation		
If the selected route alignment is near the Foxhome Prairie High Biodiversity MBS site, the alignment should follow the south side of the road in the area and avoid crossing the MBS site.	5-115	The Applicant's Preferred Route (RA-South) does not cross this MBS site, so there would be no impacts to the site. If the RA-North route were to be selected, Summit would evaluate resources along the route and coordinate with MDNR to avoid impacts to the Foxhome Prairie High Biodiversity MBS site.
[DNR] One additional mitigation for nesting birds in areas of grass/shrub vegetation to be cleared for construction would be to mow/cut these areas during non-nesting season prior to actual construction so suitable nesting habitat is not present prior to final clearing and construction	5-115 and 5-151	Summit intends to follow USFWS guidance regarding compliance with MBTA and will continue to consult with the USFWS regarding MBTA. Additionally, a MBTA plan is under development for company use with the contractors during construction and during operations. Summit recommends the Commission not establish separate conditions on this issue but rather defer to USFWS and the MDNR's Natural Heritage Review for appropriate measures to minimize potential impacts to nesting birds.

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[EERA] The applicant should use only “bio-netting” or “natural netting” types and mulch products without synthetic (plastic) fiber additives. [MNDOT] And to reduce potential construction impacts on state-listed species, MnDOT recommended the use of erosion control techniques that avoid entrapping or entangling small wildlife.	5-116 and 5-151; 5-115	Summit has already agreed to use wildlife-friendly erosion and sediment control BMPs that contain biodegradable netting (Category 3N or 4N natural fibers) and to avoid the use of plastic mesh. Both BMPs help to minimize wildlife mortality resulting from the use of erosion and sediment control materials. See DEIS Appendix D (Minnesota Environmental Construction Plan).
[MNDOT] Follow MnDOT’s 2020 Standard Specifications for Construction for rolled erosion control materials that specify only natural fibers with no plastic mesh be used	5-151	During construction, Summit will follow MnDOT’s 2020 Standard Specifications for Construction for rolled erosion control materials that specify only natural fibers with no plastic mesh be used.
[EERA] No temporary workspace areas shall be placed within or adjacent to wetlands or water resources, as practicable.	5-138	This is not practicable, as the crossing of wetlands will require some temporary workspace. Summit is reducing the width of temporary workspace required for the crossing of wetlands from 50 feet to 25 feet to minimize the temporary impacts to the wetland. Additionally, additional temporary workspace (ATWS) will be sited outside of wetlands to the extent practicable (See DEIS Appendix D (Minnesota Environmental Construction Plan).
[EERA] “Soil excavated from the wetlands and riparian areas shall be contained and not placed back into the wetland or riparian area.” and “Water resource areas disturbed by construction activities shall be restored to pre-construction conditions in accordance with the requirements of applicable state and federal permits or laws and landowner agreements. All requirements of the U.S. Army Corps of Engineers (USACE), Minnesota Department of Natural Resources (DNR), and local units of government shall be met.”	5-138	This requirement would be in conflict of Condition 14 of the USACE’s Utility Regional General Permit. The condition is as follows [bolded for emphasis]: Restoration of Temporary Impacts: All temporary impacts in waters of the US, including discharges resulting from side casting material excavated from trenching, that occur as a result of the regulated activity must be fully contained with appropriate erosion control or containment methods, be restored to pre-construction contours and elevations, and, as appropriate, revegetated with native, non-invasive

Recommendation	Reference	Response
		vegetation, unless otherwise conditioned in a Corps RGP verification. All temporary access roads constructed in waters of the US must be properly bridged or culverted to maintain surface flows. In temporarily excavated wetlands, the top 6 to 12 inches of the excavation should normally be backfilled with topsoil originating from the wetland. No temporary excavation area, including, but not limited to trenches, may be constructed, or backfilled in such a manner as to drain waters of the United States (e.g., backfilling with extensive gravel layers, creating a French drain effect).
[EERA] The applicant provide documentation of coordination with the Fergus Falls Fish & Game Club.	5-56; 11-13	Summit agrees with this recommendation. As discussed in the Application, Summit is coordinating closely with the Fergus Falls Fish & Game Club to minimize impacts to its land and associated recreational economies during construction and operation of the Project. Application at 40-41. Summit will continue to coordinate with the club and, if RA-South is approved, will provide documentation of such coordination prior to construction.
Sheet Piling/Crossing Methods/Construction Specifications		
[DNR] Exploratory borings should be conducted to characterize the shallow subsurface anywhere sheet piling would be used and submitted to DNR groundwater staff for evaluation. Exploratory borings should be conducted to at least the maximum depth of any construction impacts.	5-139	Summit agrees with this recommendation and will conduct exploratory borings anywhere sheet piling would be used.
[DNR] At a minimum, Pennsylvania standards for trench breaker placement should be used, and knowledge gained from additional subsurface site characterization may provide further guidance on where to place trench breakers most effectively. Trench breakers should be	5-139	Permanent trench breaker placement is discussed in Section 2.9.1 of the Minnesota ECP. As committed to the MDNR in Enclosure 2 of its September 1, 2022 Project introduction letter (see Route Permit Application, Appendix 8), Summit is presently

Recommendation	Reference	Response
used at the entrance and exit of every waterbody regardless of slope (except for HDD crossings).		proposing to install trench breakers at the entry and exit from every public water crossing, except for at HDD crossings. In addition, as outlined Section 5.5 of the Minnesota ECP, trench breakers will be installed at wetland boundaries where the pipeline trench may cause a wetland to drain, or the trench bottom will be sealed to maintain wetland hydrology. Summit plans to select the location of trench breakers across the Project based on field conditions at the time of construction and will consider the degree and length of slope, presence of down-slope sensitive resource areas such as wetlands and waterbodies, and proximity to other features such as roads and/or railroads. Generally, slopes are higher in the eastern portion of the Project, while the majority of the Project, and particularly the western portion of the Project, is located in areas where slope is not a concern (0.001-6.71 degree slope; see Figure 11-3 of the Scoping EAW). Summit plans account for the substantial body of knowledge that it has and will gain regarding the placement of trench breakers. In Summit's view, those plans are consistent with the intent of the Pennsylvania standards, while also accounting for local, site-specific knowledge to use trench breakers most effectively. Use of this field condition review will ensure that Summit will not install trench breakers where they would not provide the intended benefit (i.e., on steep slopes where trench line erosion has the risk of occurring and at slopes adjacent to wetlands and waterbodies). In other

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		words, while Summit does not intend to specifically implement the Pennsylvania Standards, Summit's plans will achieve the same or greater levels of protection, which is consistent with the Pennsylvania Standards regarding the use of alternate BMPs.
[DNR] The pipeline should be installed deep enough to prevent pipe exposure over time. The DNR's Area Hydrologists may have specific data on depth of cover for river and stream crossings and should be consulted.	5-139	Summit agrees with this recommendation and will consult with the MDNR when crossing designs are prepared for construction at Public Waters.
[DNR] Unintentional release evaluations should be conducted for water crossings proposed to be installed via HDD to ensure the soils are amenable to HDD. (As indicated in Section 5.7.3.3, the applicant has completed geotechnical evaluations for two of the three HDD crossings at waterbodies and plans to conduct an investigation at the third once access is obtained. An assessment of the potential for an inadvertent release of drilling mud is part of the feasibility analysis and design for HDDs.)	5-139 and 5-115	Unintentional release evaluations will be conducted to ensure soils are amenable for HDD crossing method. Summit's contractor will develop an HDD contingency plan to address unintended return or release of drilling fluid within wetlands, waterbodies, and areas immediately adjacent to wetlands and waterbodies, such as stream banks or steep slopes, where drilling fluid releases can quickly reach surface waters. Containment, response, and clean-up equipment would be available at both sides of an HDD crossing location and one side of a bore prior to commencement to assure a timely response in the event of an inadvertent release of drilling fluid.
[DNR] The applicant should continue to consult with DNR on groundwater investigations for the potential routes and on construction methods in relation to groundwater.	5-139	Summit currently has an ongoing groundwater investigation underway and will continue to consult with the MDNR.
[EERA] Geotechnical investigations prior to construction in beach ridge areas would identify areas where sheet pile use should be avoided	5-137	Summit has committed to not using sheet piling in the beach ridge areas.
[EERA] The applicant should provide to the Commission results of geotechnical evaluations of groundwater conditions for any beach ridge areas in which sheet piling would be used for pipeline construction. The evaluations should be provided 30 days prior to the Plan and Profile submittal, and the applicant should document coordination with DNR	5-139 and 11-13	Summit has committed to not using sheet piling in the beach ridge areas, so the recommendations are not applicable.

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staff. The submittal could include DNR staff concurrence regarding use of sheet piling."		
[EERA/MDH] The applicant should provide documentation of coordination with residents located within 1,320 feet of HDD entries. The submittal should document locations of sound dampening barrier walls and include a plan for monitoring noise levels at these locations during HDD operations. The information should be provided 30 days prior to submittal of the Plan and Profile. In its review of a preliminary version of the draft EIS, the Minnesota Department of Health concurred with this mitigation measure.	5-37; 11-12	The equipment needed to construct the HDD would have a temporary and short-term impact on noise levels in the vicinity of the Project, which would decrease from the levels presented in the response to SII 4 Question 8 based on distance, topography, and weather conditions. Summit will coordinate with nearby landowners along the Project prior to execution of HDDs. Summit's Contractor will determine the need for noise mitigation and noise monitoring based on feedback received from landowners during construction.
[EERA] Isolated dry trench crossing methods should be used on all stream crossings instead of the proposed open trench method. This method reduces silt and sediment suspension and transport to downstream waterbodies. This would reduce potential impacts from local and downstream transport of disturbed sediments on state-listed mussel species.	5-115	Summit will implement the isolated dry trench crossing method on streams with perceivable water flow during construction. If a stream is dry and has no perceivable water flow, then Summit intends to use the proposed open trench method.
[DNR] Selecting a crossing technique that is most appropriate for each waterbody, after consultation with DNR.	5-150	Summit will consult with the MDNR when designing and selecting Public Water waterbody crossing methods.
[EERA] A special permit condition requiring the applicant to identify locations of fracture arrestors and any locations of thicker-walled pipe on the Plan and Profile filed with the Commission is reasonable.	8-26 and 11-13	Yes. Summit can provide this information. The Project will be constructed of 4-inch nominal diameter pipeline. The 4-inch pipe is all 0.189 inches thick and is self-arresting.
Emergency Response		
[EERA] Applicant-provided indoor CO2 detectors for residences within 1,000 feet of the project is a reasonable mitigation measure. This distance was chosen based on the most impactful scenario as described in Appendix G.	8-26 and 11-13	While Summit agrees with Dr. Micheal Lumpkin's testimony, Summit is willing to supply CO ₂ detectors to residents within 1,000 feet of the Project centerline, if required by the Commission.

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[EERA] A special permit condition requiring the applicant to file its Emergency Response Plan that is filed with PHMSA with the Commission is reasonable.	8-26 and 11-13	As discussed in the Application, Summit has prepared a draft Emergency Response Plan (provided as Application Appendix 6) and will develop a final Emergency Response Plan in accordance with PHMSA requirements which will be provided to PHMSA. Summit has no objection to inclusion of a special permit condition requiring Summit to file with the Commission its final Emergency Response Plan that is provided to PHMSA.
[EERA] A special permit condition requiring the applicant to provide an accidental release plan, developed in coordination with local emergency responders, for Commission review 30 days prior to submittal of the Plan and Profile is reasonable.	8-26 and 11-13	As noted above, the Emergency Response Plan will include the information required by PHMSA, and any additional/other information required by the Commission would be addressed in a separate document.
[EERA – row above continued] The accidental release plan could include the specific equipment, training, and reimbursement that could be provided to emergency managers.		Summit will file a compliance filing describing its coordination with county emergency managers, including information about equipment, training, and reimbursement provided to emergency managers.
[EERA – row above continued] The plan could also list the names of the emergency responders and a provision to update contact information as needed.		Summit’s Emergency Response Plan will include contact information for Summit’s qualified and trained response personnel as well as contact information of the county emergency managers.
[EERA – row above continued] The plan could discuss the feasibility of a “reverse 911” notice that goes out to landowners’ telephones in the event of an emergency shutdown or rupture.		In accordance with PHMSA regulations, in the event of an emergency condition on the pipeline, Summit’s control center will immediately notify the public safety answering point (PSAP) for each county. Depending on the incident type and severity, additional regulatory notifications, including notifying the public will occur. Summit plans to utilize

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		an electronic notification system, such as Send Word Now, to notify the PSAP in each county.
[EERA – row above continued] The release plan could identify how the applicant would pay for costs of any repair to public infrastructure or private property (including crops and livestock) that might occur during an accidental release.		Summit does not object to filing a compliance filing identifying how the applicant would pay for costs of any repair to public infrastructure or private property (including crops and livestock) that might occur during an accidental release.
[EERA] A special permit condition requiring the applicant to provide its public education plan for Commission review 30 days prior to submittal of the Plan and Profile is reasonable. The public education plan could include specific safety information for neighboring landowners, including what to do in case of a rupture.	8-26 and 11-13	Summit agrees with a special permit condition requiring it to provide its public education plan for Commission review 30 days prior to submittal of the Plan and Profile. As discussed in the Application, Summit will implement comprehensive public awareness and education outreach programs, including damage prevention programs, that meet or exceed industry standards and regulatory requirements concerning public awareness of pipelines and pipeline operations. Application at 26. The public awareness programs are intended to inform members of the public in the vicinity of the pipeline and facilities to protect the public from injury, prevent or mitigate effects on the environment, protect the pipeline and facility assets from damage by the public, and provide ongoing public awareness.
[MCEA] Public concerns about the Project have largely centered around the possibility of a pipeline leak or rupture. The DEIS acknowledges receiving comments about the possibility of adding an odorant to the CO ₂ to help mitigate this concern. However, the DEIS did not adequately address whether this is a feasible or effective mitigation measure. The FEIS must address the concerns of the public, in part, by exploring the efficacy in mitigating the effects of a rupture by adding an odorant.	8-25	Summit does not plan to add an odorant to the pipeline. 49 CFR Part 195 does not identify a requirement for the use of odorant in hazardous liquid or carbon dioxide pipelines. Odorant requirements typically apply to low pressure natural gas distribution pipelines and are primarily intended to alert occupants of a gas leak occurring inside of a residence

Recommendation	Reference	Response
		or structure. If federal regulations are amended in the future to require the use of an odorant in CO₂ pipelines, Summit believes that mandate will be preceded by research establishing whether the combination of CO₂ and commercially available odorants will compromise the integrity of pipeline systems and sequestration facility components. Presently, the primary component in many odorants is concentrated Methyl Mercaptan. This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200). Odorizing a pipeline system would require multiple injection facilities and would introduce additional logistic and design changes needed for the safe storage and overland transport of concentrated Methyl Mercaptan.

Environmental Construction Plan

This Minnesota Environmental Construction Plan (ECP) would be applicable to any Midwest Carbon Express pipeline that is constructed by Summit Carbon Solutions in the state of Minnesota. The ECP contains typical drawings which are applicable to a variety of pipeline diameters.

As of March 2024, Summit Carbon Solutions has one project before the Minnesota Public Utilities Commission, the Otter Tail to Wilkin Project in Otter Tail and Wilkin Counties. This pipeline has a 4 inch diameter.

Other potential pipeline infrastructure in Minnesota, by county, includes:

- Kandiyohi, Chippewa – 8 inch diameter
- Renville – 6 and 8 inch diameter
- Yellow Medicine – 8 inch diameter
- Redwood – 8 and 10 inch diameter
- Cottonwood, Jackson – 10 inch diameter
- Martin – 6 and 8 inch diameter

To: Scott O’Konek
Summit Carbon Solutions

Sent via email to sokonek@summitcarbon.com

From: Andrew Levi
Energy Environmental Review and Analysis

Date: February 29, 2024

Project: Otter Tail to Wilkin CO₂ Pipeline Project
IP 7093/PPL-22-422

Respond: ASAP

Please respond to the following questions or provide the requested data or information. Staff will use the information provided to develop the environmental document for the project, which is a public document. Your response, in its entirety, will be included in the environmental document as an appendix; therefore, **responses will be publicly available** unless otherwise designated by the respondent as “nonpublic information” pursuant to Minnesota Statute § 13.02, subdivision 12.

Directions: Responses to questions should be contained within this form to the greatest extent possible (**11-point Calibri, plain text font, RGB 192, 0, 0**). Attach supporting documentation as necessary. While data and information requests, for example, shapefiles or draft plans, will not be contained within this form, document their submittal using this form as follows: *“Requested information sent to whom by what means on date.”*

Do not eFile your response. Return the completed form, as a PDF, along with necessary supporting documentation, and/or requested data or information to andrew.levi@state.mn.us. Contact me at (651) 539-1840 with questions.

1. The final EIS may include a recommendation that any land application of drill cuttings and drilling mud within the construction workspace must be done prior to replacing topsoil. Please provide comment on this potential recommendation.

Summit assumes that in asking this question, EERA is envisioning that drill cuttings and drilling mud be placed within excavated trenches or HDD pits, and then topsoil be placed over the materials. Summit does not agree with this recommendation as it has the potential to result in logistical challenges related to construction timing and additional environmental impacts.

Execution of HDDs is conducted by a specialized construction crew which is not responsible for mainline pipeline installation. The installation of the mainline pipe on either side of the HDD might be completed before and/or after the HDD. If the mainline pipeline near the HDD had already been installed, but the HDD had not yet occurred or would not yet occur for some time, this would lead to extended, and potentially lengthy, periods of time where the trench must stay open, and topsoil must remain piled on the right-of-way while awaiting drilling materials. As stated in the Environmental Construction Plan (ECP), Summit intends to minimize the length of time any open excavation is left open to the extent practicable. Section 3.2 of the Minnesota ECP states that, “Except at boreholes and tie-ins, the Contractor will limit the amount of excavated open trench in uplands to a maximum of 15 days of anticipated welding production per spread, or 15 miles per spread. For locations along the Project where the USACE Section 404 Utility RGP applies (i.e., waters of the U.S.), this will be limited to 5,280 linear feet of open trench.”

Leaving the trench or any other excavation open to await placement of drilling materials is inconsistent with this goal and would add to the concern raised in Question 4, below, regarding entrapment of wildlife in open excavations.

If the mainline pipeline near the HDD had not yet been installed, the topsoil may have not yet been removed and there would therefore be no place to apply drilling materials. Drill materials may then need to be stored nearby while awaiting an open trench, or transported to another location on the right-of-way, for disposal. It is highly likely that either scenario would occur at each HDD because it is rare that the construction ROW is returned to its pre-construction state at the same time as adjacent drilling activities.

Furthermore, drill cuttings and drilling mud are traditionally land-applied by mixing with topsoil. As previously stated in response to SII #5, Question 14, the Minnesota Pollution Control Agency (MPCA) does not require a permit or approval to land apply drilling mud with additives that are approved by Minnesota Department of Health (MDH) or additives that meet ANSI/NSF Standard 60 (drinking water well material standards). Drilling mud mixed with additives that are not on the MDH approved additive list and/or do not meet ANSI/NSF Standard 60 must be disposed of as a solid waste at an approved facility or Summit must obtain a land application permit from MPCA.

It is not a common practice within the pipeline industry to bury drilling mud. Burying a mass of clay material between the subsoil and topsoil could lead to localized differences in permeability related to the surrounding soils. Burying mud would also displace either topsoil or subsoil from the trench and require that topsoil or subsoil be disposed of elsewhere. Furthermore, drilling mud properly mixed in to topsoil can prove to be a beneficial amendment to improve water retention in loamy sand soils.

Sections 4.5.6 and 10.4 of the Minnesota ECP state that the contractor will dispose of HDD drill cuttings and drilling mud at a SCS-approved location with landowner approval. This process allows for the appropriate flexibility and permissions for managing these materials. Please also see response to SII #5, Question 15, for additional information on how Summit plans to manage drill cuttings and drilling mud.

2. Summit has stated that water for operation of the Project (approximately 13 million gallons per year) would be from onsite wells at the ethanol plant. Clarify how many wells would be used and what aquifers they are completed in. Does Summit propose to obtain the water by amending an existing DNR Water Appropriation Permit, or would a new permit be needed? Has Summit determined the source(s) of water to be used during construction of the pipeline and the source and volume of water for construction of the capture facility?

Regarding water needed for operation of the capture facility, the Green Plains Ethanol Plant currently has two groundwater wells. The Minnesota Well Index (MWI) ID for the first well is 795966; it was completed to a depth of 211 feet in a quaternary buried artesian aquifer.¹ This is a commercial well. The MWI ID for the second well is 846639; it was completed to a depth of 199 feet in an undocumented aquifer.² This is a domestic well. Should the capture facility utilize water from the Green Plains Ethanol Plant wells, it would likely utilize the commercial well (MWI ID 795966). However, Summit has not yet finalized these plans with the Green Plains Ethanol Plant and Summit has not yet held conversations with the MDNR regarding the need to amend an existing MDNR Water Appropriation Permit, or the need to obtain a new permit, for the capture facility's operational water needs.

¹ <https://mnwellindex.web.health.state.mn.us/mwi/index.xhtml?wellId=0000795966>

² <https://mnwellindex.web.health.state.mn.us/mwi/index.xhtml?wellId=0000846639>

As stated in the Direct Testimony of Jason Zoller filed on February 13, 2024, “Summit is currently exploring options for appropriation of water, including duration of use, volume, and appropriation location(s). These could be private, municipal, or surface water sources. Once proposed/preferred and contingency sources and volumes are finalized, these details would be reviewed by the MDNR.” Summit has not yet determined the source(s) of water to be used during construction of the pipeline. Summit has also not yet determined the source and/or volume of water needed for construction of the capture facility.

3. Discuss the potential risk of some soil types to cause corrosion of the underground pipeline and whether any of those soils are present along the route alternatives. If applicable, describe Summit’s plans to mitigate or minimize potential for degradation of infrastructure from these soils, aside from the standard measures of epoxy coating and installation of a cathodic protection system.

All soil types will cause corrosion on an unprotected pipeline through the process of galvanic corrosion. The pipe protections applied to counter this will be the same for all soil types, including coating and cathodic protection (CP) as required by 49 CFR Subpart H – Corrosion Control (Section 195.563 and Sections 195.567 through 195.577). Summit will complete site specific soil resistivity testing along the permitted route to finalize CP design. If soil resistivity conditions are found that warrant additional protection, additional current sources may be applied, or voltage potentials may be adjusted to ensure proper protection against galvanic corrosion. The CP system will be in operation under the timeline defined by 49 CFR Subpart H – Section 195.563(a) and will be continuously monitored once commissioned.

4. State whether Summit would adhere to DNR’s recommendations that a) any open trenches incorporate escape routes so that any animals that enter the trench can escape, such as by including moderate grade ramps; and b) trenches would be inspected immediately prior to backfilling, and that any trapped animals present would be removed.

As stated in the Minnesota ECP, Section 3.2, “Plugs of subsoil in the ditch will be left or bridges may also be constructed to allow the passage of wildlife and livestock.” Summit believes this is sufficient. In addition, because the pipeline is only 4 inches in diameter, the trench will be excavated with a single backhoe bucket. This will result in a trench width that is approximately 10.5 inches at the bottom and 30 inches at the top, with a trench depth of approximately 59 inches. These dimensions will not allow for installation of “moderate grade ramps” within the trench. Summit’s Route Permit Application, page 58, also states: “Trenches may also be sloped where they start and end to allow ramps for livestock or other wildlife to escape.” Summit will commit to adding this sentence in Section 3.2 of the ECP.

Wildlife entrapment is typically more of an issue on pipeline projects with a large pipe diameter, deeper trench, wider excavation, and location within wildlife habitat. As the Project is occurring in agricultural areas, where native wildlife habitat is scarce, Summit anticipates that this will be a relatively small issue. However, Summit will commit to adding this sentence in Section 3.3 of the ECP: “The Contractor will inspect the trench prior to backfilling to determine if there are any trapped animals, and if there are, the animals will be removed.”

5. Does the pipeline construction design consider the prevention of French drain effects via the pipeline trench across the entire project, and especially in the beach ridge area? At a minimum, address the following statement: “Pennsylvania standards for trench breaker placement should be used and additional knowledge gained from more expansive subsurface site characterization may provide further guidance on where to place trench breakers most effectively.”

Portions of this response are repeated from Summit's response to SII #5, Question 20. Permanent trench breaker placement is discussed in Section 2.9.1 of the Minnesota ECP. As committed to the MDNR in Enclosure 2 of its September 1, 2022 Project introduction letter (see Route Permit Application, Appendix 8), Summit is presently proposing to install trench breakers at the entry and exit from every public water crossing, except for at HDD crossings. In addition, as outlined Section 5.5 of the Minnesota ECP, trench breakers will be installed at wetland boundaries where the pipeline trench may cause a wetland to drain, or the trench bottom will be sealed to maintain wetland hydrology.

Summit plans to select the location of trench breakers across the Project based on field conditions at the time of construction and will consider the degree and length of slope, presence of down-slope sensitive resource areas such as wetlands and waterbodies, and proximity to other features such as roads and/or railroads. Generally, slopes are higher in the eastern portion of the Project, while the majority of the Project, and particularly the western portion of the Project, is located in areas where slope is not a concern (0.001-6.71 degree slope; see Figure 11-3 of the Scoping EAW).

Use of this field condition review will ensure that Summit will not install trench breakers where they would not provide the intended benefit (i.e., on steep slopes where trench line erosion has the risk of occurring and at slopes adjacent to wetlands and waterbodies). When trench breakers are installed in areas where they do not provide any benefit, they have the potential to further disturb existing drainage patterns. This is especially important to prevent in agricultural fields where landowners have installed tile systems to effectively manage water on their property.

The "Pennsylvania standards" for trench breaker (plug) placement can be found in the Pennsylvania Department of Environmental Protection (DEP)'s "Erosion and Sediment Pollution Control Program Manual" (DEP Manual)¹ in Standard Construction Detail #13-4, and as shown below in Table 13.1 of the Manual.

PA DEP

TABLE 13.1
Maximum Spacing and Materials for Trench Plugs

Trench Slope (%)	Spacing L (FT)	Plug Material
< 5	1,000	* Clay, Bentonite, or Concrete Filled Sacks
5 - 15	500	* Clay, Bentonite, or Concrete Filled Sacks
15 - 25	300	* Clay, Bentonite, or Concrete Filled Sacks
25 - 35	200	* Clay, Bentonite, or Concrete Filled Sacks
35 - 100	100	* Clay, Bentonite, or Concrete Filled Sacks
> 100	50	Cement Filled Bags (Wetted) or Mortared Stone

***TOPSOIL MAY NOT BE USED TO FILL SACKS.**

Impervious trench plugs are required for all stream, river, wetland, or other water body crossings.

The DEP Manual describes the materials within as BMPs and design standards to minimize accelerated erosion and sediment pollution associated with construction activities in Pennsylvania, and to ensure compliance with Pennsylvania regulations found at 25 Pa. Code Chapter 102 (DEP Manual, p. i and ii). The policies and procedures in the DEP Manual are "not an adjudication or a regulation. There is no intent by DEP to give the rules in these policies that weight or deference" (DEP Manual, p. i). The DEP Manual offers

Pennsylvania users the options to utilize alternate BMPs that are not listed in this manual but that provide the same (or greater) level of protection (DEP Manual, p. i).

When describing the occurrence of the “French Drain” effect, DEP noted that the backfill considered was “usually permeable aggregate” (DEP Manual, p. 286). The Project will not backfill the trench with permeable aggregate but with native material, which on the Project will be subsoil and topsoil soil free from rocks or other materials that would damage the pipeline. There are no locations in which the Project would use permeable aggregate to backfill the Project, although this practice is used in other parts of the United States where rocky, stony, or bedrock trenches are excavated and filled with coarse material that would be more likely to cause the “French Drain” effect.

It is not practical, nor would it provide any additional protection, to install trench breakers at “all stream, river, wetland, or other waterbody crossings” as suggested in the DEP Manual. For example, trench breakers do not need to be installed at waterbodies crossed by the HDD method. The HDD method is a trenchless method that involves no direct excavation of the features crossed. Furthermore, at the point that the HDD crosses the waterbody feature, it is generally located between 30 to 40 feet below the stream bed. Here, installation of a trench breaker is not necessary and would be impractical.

Summit’s commitment to installation of trench breakers in specific locations as outlined in the Minnesota ECP, and additional site review considering slope and other conditions, will adequately prevent “French Drain” effects via the pipeline trench while working to ensure that landowner’s existing drainage patterns are maintained to the extent practicable and are not unnecessarily modified. Prior to construction, Summit will identify the general location of trench breakers on construction alignment sheets with a note to “Field Verify” the precise location through coordination between Summit’s EIs and the Contractor. It is possible that Summit’s work with the MDNR in the beach ridge area may offer insight into where trench breakers may be desirable, and if such areas are identified during this process, Summit will consider these locations in its pre-construction planning. During construction, trench breakers may be moved short distances in either direction from the location identified on the construction alignment sheets to more stable soils, or to accommodate other site-specific conditions. Additional trench breakers may also be added depending on site-specific conditions. Summit will require the Contractor to have additional materials on hand to install additional trench breakers as needed.

6. Provide a response to DNR’s recommended changes to Summit’s Environmental Construction Plan in its comment filed February 23, 2024.

The MDNR’s February 23, 2024 comments on the ECP are repeated below, with Summit’s response following. Note that the MDNR did not preface all of these comments on the ECP as “recommended changes;” therefore, where Summit will reflect a change in a revised ECP in response to MDNR comment, those changes are noted in bold.

Page 5. The DNR recommends that erosion control mesh be limited to materials that specify only natural fibers, with no plastic.

- As stated in Jason Zoller’s Direct Testimony filed on February 13, 2024, “Summit will follow MnDOT’s 2020 Standard Specifications for Construction for rolled erosion control materials that specify only natural fibers with no plastic mesh be used.” This was a recommendation of the MDNR that EERA included in the DEIS. Therefore, Summit will revise the statement on page 5 of the ECP as follows: “The Contractor will ~~select wildlife-friendly erosion control fabric that~~

~~contains biodegradable netting (Category 3N or 4N natural fibers) and will avoid the use of plastic mesh follow MnDOT's 2020 Standard Specifications for Construction (or more recent edition) for rolled erosion control materials that specify only natural fibers with no plastic mesh be used."~~

Page 7, trench breakers. The DNR previously provided recommendations to follow Pennsylvania standards for trench breaker placement. The draft EIS includes these recommendations in sections 4.6 and 5.7.83, which discuss mitigation measures offered during scoping. The DNR continues to recommend that Pennsylvania standards for trench breakers be utilized, and recommends that the ECP be updated.

- See response to Question 5, above. Summit is not proposing ECP revisions in response to this comment.

The ECP should clarify if travel lanes will be used on HDD river crossings. If a travel lane is used across waterbodies, significantly more vegetation removal and disturbance will occur, including bridge construction. The DNR recommends that no travel lanes be utilized across waters that use HDD.

- For this Project, Summit will not use travel lanes or bridges across any HDD crossings. As stated in Section 2.4.2 of the DEIS, "No ground disturbance would occur between the entry and exit of HDDs."

The Minnesota ECP is a general construction document that would apply to any Midwest Carbon Express infrastructure constructed in Minnesota and does not contain information on specific crossing methods or bridge use. Therefore, this revision would not be appropriate, and Summit is not proposing ECP revisions in response to this comment. Summit needs to retain the ability to consider using bridges at future HDD crossings because there may not be adequate road infrastructure in the area surrounding future HDDs to support a work-around.

Where trench crossings are used for streams, we recommend segregating the streambed surface material for restoring streambed surface material that is usually courser than underlying material (similar to how topsoil is segregated in uplands).

- Summit will add the following statement to Section 4.8 of the Minnesota ECP. "Where trenched crossings were used, the Contractor will restore the stream by first replacing underlying streambed materials in the trench before replacing streambed surface/substrate materials to support the consistency of the disturbed stream bottom relative to undisturbed areas."

The DNR recommends not using flowing open cut method for any stream crossing.

- While the flowing open cut method is presented as a general construction method in Section 4.5.2 of the ECP, Summit is not proposing to use this method at any waterbodies that are crossed by the Project. The ECP does not contain information on specific crossing methods.

As Jason Zoller describes in Direct Testimony filed on February 13, 2024, "Summit will implement the isolated dry trench crossing method on delineated waterbodies with perceivable water flow during construction. If a delineated waterbody is dry and has no perceivable water flow, then Summit intends to use the proposed open trench method." Jason Zoller's Rebuttal Testimony filed on March 14, 2024 states, "If a delineated waterbody is dry and has no perceivable water

flow, then Summit intends to use open cut methods...Open cut methods are employed in areas where no perceivable water flow is present or anticipated to be present from initial disturbance and final stabilization as an industry standard method for installation of pipe across dry waterbodies, and this method will comply with applicable permit regulations and conditions.” Therefore, Summit will keep the flowing open cut method description in the ECP as a general construction method, but it is not proposed for use on the Project. Summit is not proposing ECP revisions in response to this comment.

The ECP should address trench crowning/subsidence. The ECP should address post construction monitoring for topography and crowning/subsidence, vegetation restoration, erosion, and monitoring groundwater expressions along the project route.

- As stated in Scott O’Konek’s Direct Testimony filed on February 13, 2024, “Summit will include details in the [ECP] for preventing excessive crowning or subsidence above the restored centerline. Summit will restore the construction workspace to as close to the original pre-construction contours as practicable. If uneven settling occurs or surface drainage problems develop as a result of pipeline construction, Summit will provide additional land leveling services after receiving a landowner's written notice, weather and soil conditions permitting.” **Summit will revise the ECP to address trench crowning/subsidence.**

Section 8.2 of the ECP states, “SCS will monitor areas where stabilization and restoration methods are implemented in accordance with requirements in state permits and landowner agreements. Monitoring will identify areas where remedial measures are required to establish a stable surface for reclamation to be successful. This may include re-grading, re-seeding, re-mulching, and additional monitoring.” Summit suggests that further details on post-construction monitoring and restoration is best addressed in a post-construction monitoring plan with the appropriate regulatory agencies.

Page 14. The ECP states that HDD drilling fluids and additives will be nontoxic to the aquatic environment and humans. Toxicity is primarily related to magnitude of release, as larger amounts of even “nontoxic” drilling fluids could be harmful to aquatic life. The contingency plan to address inadvertent release response should include equipment such as a functioning vac-truck on site and other equipment/materials. This contingency plan should be in coordination with the DNR utility license application.

- As stated in Section 4.5 of the ECP, “The Contractor will develop a contingency plan to address an inadvertent return during a directional drill. The contingency plan will include instructions for monitoring during the directional drill and mitigation in the event that there is a release of drilling fluids. Containment, response, and clean-up equipment will be available at both sides of an HDD crossing location and one side of a guided or road bore prior to commencement to assure a timely response in the event of an inadvertent release of drilling fluid.” Summit’s Contractor will prepare these plans closer to the time of construction and will provide them to the MDNR as part of the public water licensing effort. Summit is not proposing ECP revisions in response to this comment.

7. Respond to numerous comments that questioned the ability of the project to capture 100% of the CO₂ emissions from the ethanol plant.

This response is repeated from Summit's response to SII #11, Question 6. The capture facility will capture approximately 100% of the CO₂ emissions from the Green Plains Ethanol Plant's scrubber stack during normal operations. CO₂ can only be captured if the Green Plains Ethanol Plant is operational, and the operational rates will vary over time. The capture facility may also not be operational during periods of maintenance. Summit has based its initial CO₂ capture rate estimates using best available assumptions on these variables.

8. Will water recycling ponds be used at the capture facility during operation?

No.

9. Provide more details on drilling mud additives that would be used. Include a description of any additives that are not on the MDH-approved additive list and the potential environmental impacts of these additives in the event of an inadvertent return.

Summit will seek to utilize MDH-approved additives before considering other options; The drilling mud additives will be determined closer to construction by Summit's HDD contractor. Because Summit is not aware of any non-MDH-approved additives under consideration, it is not possible to describe the environmental impacts of such additives in the event of an inadvertent return.

10. Describe any measures Summit proposes to follow the PHMSA advisory bulletin issued in May 2022. Include measures that plan for and mitigate risks related to shrink-well soils and frost-heave.

Summit has addressed both shrink-swell soils and frost heave in other data requests. Summit consults with geotechnical engineers across its footprint and will develop a Phase I Geohazard Assessment for the Project. The Phase I Geohazard Assessment is designed to comply with the recommendations within Advisory Bulletin (ABD-2022-01). The Phase I Assessment is a desktop assessment intended to identify and assess potential geohazards (i.e., naturally occurring or human-triggered geologic conditions, ongoing geologic processes, or potential natural events that could adversely affect construction and/or operation of a pipeline) along the Project route. The information collected during the Phase I Assessment can be used to understand where potentially hazardous geologic, hydrologic, or atmospheric features and conditions may be present along the proposed pipelines and may ultimately be used to guide best management practices during pipeline construction and operation to avoid, mitigate, and/or monitor possible geohazards. Based on the perceived threat potential, select hazards identified during a Phase I Assessment may be further assessed through more detailed assessment(s), such as Phase II Assessment (e.g., field reconnaissance), and possibly Phase III Assessment (site-specific investigations), where necessary, to improve understanding and characterization of the selected hazard(s). Additional phase assessments will be at the recommendation of a geohazard consultant. In addition, Summit will run an inertial measurement unit (IMU) smart tool as part of the baseline assessment after construction. During operations, Summit will have the ability to run additional IMU smart tools to track movement, strain, and stress within the pipeline.

To: Scott O’Konek
Summit Carbon Solutions

Sent via email to sokonek@summitcarbon.com

From: Andrew Levi
Energy Environmental Review and Analysis

Date: June 5, 2024

Project: Otter Tail to Wilkin CO₂ Pipeline Project
IP 7093/PPL-22-422

Respond: As soon as possible

Please respond to the following questions or provide the requested data or information. Staff will use the information provided to develop the environmental document for the project, which is a public document. Your response, in its entirety, will be included in the environmental document as an appendix; therefore, **responses will be publicly available** unless otherwise designated by the respondent as “nonpublic information” pursuant to Minnesota Statute § 13.02, subdivision 12.

Directions: Responses to questions should be contained within this form to the greatest extent possible (**11-point Calibri, plain text font, RGB 192, 0, 0**). Attach supporting documentation as necessary. While data and information requests, for example, shapefiles or draft plans, will not be contained within this form, document their submittal using this form as follows: *“Requested information sent to whom by what means on date.”*

Do not eFile your response. Return the completed form, as a PDF, along with necessary supporting documentation, and/or requested data or information to andrew.levi@state.mn.us. Contact me at (651) 539-1840 with questions.

1. Summit has indicated that it would be solely responsible for costs associated with an accidental release of CO₂. However, commenters asked who would have financial responsibility for clean-up and damages in the case of a release of CO₂. Representative comment includes: “Who will be liable if there’s an accident with the pipeline or construction causes damage to the natural environment, farmland, or built structures?” Please respond to this comment and confirm Scott O’Konek’s response to a question asked at the Breckenridge public meeting on February 6, 2024, that Summit would be responsible for 100 percent of costs in case of an accident.

Confirmed as to Mr. O’Konek’s prior statement.

2. Respond to concerns about ability of landowners to obtain insurance and increased costs of insurance. Representative comments include:
 - a. “Also, we’ve recently been notified from our insurance company that there are ‘a lot of red flags that could lead to a gap in coverage as it relates to liability for damages and/or bodily injury related to this pipeline.’ I think we also need solid clarification on who is responsible for all the scenarios surrounding a rupture/accident that happens on privately held land.”
 - b. “The EIS is inadequate because it does not address the increased cost of insurance for those households, farms, and businesses living with in the 1,600 ROI.”

The Interstate Natural Gas Association of America (INGAA) Foundation published a report dated February 2016 titled “Pipeline Impact to Property Value and Property Insurability” (the INGAA Report). The INGAA Report provides an evaluation of valuations and insurability of lands along interstate natural gas pipeline easements located in Ohio, Virginia, New Jersey, Pennsylvania, and Mississippi. While the INGAA Report is not focused on Minnesota farmlands or CO₂ pipelines specifically, the results provide useful insight regarding potential impacts to insurability along interstate pipelines. Some of the major conclusions from the INGAA report are as follows: (1) insurance companies and agents have said that there is no indication that the presence of a natural gas pipeline would hinder a buyer’s ability to acquire property insurance; and (2) insurance companies and agents have said that there is no indication that premiums paid for insurance policies would increase because of the proximity to a natural gas pipeline.

Regarding potential gaps in insurance coverage, Summit has taken steps to ensure that landowners do not incur uninsurable risk because of the pipeline. Specifically, Summit has agreed to indemnify landowners for loss resulting from Summit’s use of the easements, which would include loss resulting from the pipeline. Summit includes the following language in its template easement agreements with landowners: “Company shall pay commercially reasonable costs and indemnify and hold Landowner harmless for any loss, damage, claim, or action resulting from Company’s use of the Easements, except to the extent such loss, damage, claim or action arises out of, relates to, and/or results from the gross negligence or willful misconduct of Landowner, its tenants, guests, invitees, agents, and the like, and/or those acting by or through them or subject to their control.” Notably, Summit is obtaining its agreements on a voluntary basis and landowners have had the opportunity to further address liability issues to their satisfaction before granting Summit the easements. Further, based on Summit’s review in Minnesota and elsewhere, there is not a plausible scenario in which owners of land adjoined to the pipeline would be held liable, or carry insurance for, an accidental release from the pipeline. Likewise, Summit has no indication that insurance coverages would be required of landowners, either on the pipeline route or otherwise, related to the pipeline.

3. Provide an updated construction schedule for the pipeline and the capture facility. Is winter construction planned?

Summit has prepared the following revised construction schedule. These dates do not include a winter construction season, and, at this time, Summit does not plan to construct the Project during the winter.

- Pipeline Construction August 2025 – October 2025
- Capture Facility Construction August 2025 – March 2026

4. Respond to the following comment on the Draft EIS: “In Appendix E,6.3 it states that in frozen conditions a ripper can be used to scarify the topsoil to aid in removal. How would the operator in this case be able to determine topsoil depth? If he goes too deep, mixing top and subsoil will occur and cause even more permanent damage to the land.”

As stated in the Draft EIS, Appendix E, Section 2 (Summit’s Agricultural Protection Plan), “[Summit] will employ Agricultural Inspectors whose role is to verify compliance with the requirements of the [Agricultural Protection Plan] during construction of the pipeline.” Listed duties in this section include, but are not limited to, “provide construction personnel with field training on specific topics, such as protocols for topsoil stripping” and “observe construction activities on agricultural land on a continual basis” and

“be responsible for verifying [Summit’s] compliance with provisions of the [Agricultural Protection Plan] during construction.” Further, the Agricultural Inspector has the authority to stop construction activities that are determined to be out of compliance with the provisions of the Agricultural Protection Plan.

5. Respond to the following comment on the Draft EIS: “Appendix F 2.8.2 states that in frost conditions that Summit has the right to modify the plans. What does this mean?”

Appendix F 2.8.2 (Summit’s Winter Construction Plan) states that, “Trench topsoil will be segregated as practicable but modified dependent on depth of frost, thickness of topsoil, and the trenching method used.” Prior to this statement, the Winter Construction Plan states that “Where frozen blocks have been cut, excavation equipment (e.g., a backhoe or excavator) will be used to remove the large frozen blocks and to place them adjacent to the trench.” The sentence in question indicates that depending on conditions, the ability to segregate topsoil will require flexibility in methodology. Segregation of topsoil in winter with a shallow frost depth will occur differently than with a deep freeze in more saturated soil conditions where soil may need to be cut in blocks. Soils with little to no frost layer may still be able to be segregated in separate piles by topsoil and subsoil, but segregation may not occur in the same manner when soil must be stored in blocks. See response to Supplemental Information Request Number 4 regarding the oversight responsibilities of the Agricultural Monitor.

6. Respond to the following comment from the Minnesota DNR on the Draft EIS: “In addition to the stated potential risk of sheet pile causing a breach in a confining layer, the proposed depth of excavation for the pipeline may also be deep enough to compromise shallow confining layers, if present. This may be of heightened concern through the beach ridge system or near wetlands and surface water features. The EIS should discuss these potential impacts, as well as proposed mitigation.”

Following coordination with the MDNR, Summit has agreed to use ground penetrating radar to study the depth of the confining layer through the entire beach ridge area crossed by the pipeline to further define existing conditions and advise on construction methodology. Summit has also committed to not using sheet piling in the beach ridge area.

7. In applicant surrebuttal testimony on March 28, 2024, Scott O’Konek responded to a question regarding pipeline construction in beach ridge areas with the following: “If the horizontal direction drill (HDD) method is used *outside* [emphasis added] the beach ridge area, pipe will be installed to a depth of six to ten feet. A shallow bore installed to a depth of six to ten feet will minimize the likelihood of intersecting groundwater.” Table 2-2 of the DEIS indicates, based on information provided by the applicant, that the minimum cover at the lowest point for the five HDDs proposed for the project (none of which would be within the beach ridge area crossed between MPs 4 and 9) would range from 20 to 25 feet. Section 2.4.8 of the DEIS also states: “The actual depths of the HDDs could be greater. For example, the geotechnical investigation report for the Otter Tail River crossing indicates an estimated HDD depth of 46 feet below the bottom of the river channel.” Explain this apparent discrepancy in how deep the pipeline sections constructed via HDD would be installed and clarify what the actual HDD depths would be, if available.

This statement in Mr. O’Konek’s testimony should have stated, “If the horizontal direction drill (HDD) method is used *inside*....” Summit will make this correction to the testimony prior to the hearing. The shallower depth inside of the beach ridge area is intended to provide mitigation for potential shallow

groundwater in areas where Summit does not have additional construction workspace. Referenced text in Table 2-2 and Section 2.4.8 is correct.

8. Respond to the following comment from the Minnesota DNR on the ECP: “Where trench crossings are used for streams, we recommend segregating the streambed surface material for restoring streambed surface material that is usually coarser than underlaying material (similar to how topsoil is segregated in uplands).” Please respond to this comment.

See response to Supplemental Information Inquiry Number 12, Question 6 (page 6 of 8).

9. Provide additional details on the effectiveness/efficiency of the sequestration site in North Dakota, such as a range of permanent sequestration rates, and citations to applicable studies. Discuss potential for leaks during and after the sequestration process. How much CO₂ could potentially be lost to leaks? Describe proposed monitoring and maintenance at the sequestration site.

Below are links to detailed information on the size of the storage reservoir, injection rates, design elements to ensure safe and permanent storage of the CO₂ in the formation. They also contain the monitoring plan for during injection and post injection.

- <https://www.dmr.nd.gov/dmr/sites/www/files/documents/Oil%20and%20Gas/Class%20VI/Summit/SCS%20%231/C30869.pdf>
- <https://www.dmr.nd.gov/dmr/sites/www/files/documents/Oil%20and%20Gas/Class%20VI/Summit/SCS%20%232/C30873.pdf>
- <https://www.dmr.nd.gov/dmr/sites/www/files/documents/Oil%20and%20Gas/Class%20VI/Summit/SCS%20%233/C30877.pdf>

10. Please provide clarification on applicant testimony from Alex Lange on February 13, 2024, that stated: “When emergency conditions indicate a small leak, in addition to closing valves and isolating the pipe segment, Summit’s operations team would also open vents and complete a controlled blowdown at the MLV site to safely evacuate the pipeline segment of product such that the duration of the leak would be much shorter **longer** than described in the DEIS.” The DEIS describes a guillotine rupture, which has the shortest leak duration possible. Is the correction in red (replacement of the word “shorter” with “longer”) what was meant? If not, please explain what was meant. As written, it sounds like a controlled blowdown would provide a leak duration shorter than what is described in the DEIS, that is, a guillotine rupture.

Mr. Lange’s quoted statement describes conditions related to a small leak, and the statement is accurate as written.

11. Please provide the letter from PHMSA to the applicant that is mentioned by commenters. Representative comments include: “PHMSA has expressly said in public letters to CO₂ pipeline companies like Summit that state and local authorities can exercise their powers to regulate land use—including setback distances—and that “nothing in the federal pipeline safety law impinges on these traditional prerogatives of local—or state—government.”

Please see Attachment 13-11, *PHMSA Letter to Summit Clarifying Federal, State, and Local Government Pipeline Authorities*.

12. Please update the tables of noise sensitive receptors provided for each route alternative (Table 5-6, Table 5-7, and Table 5-8 in Section 5.4.5 of the Draft EIS) to expand the definition of a noise sensitive receptor from residences and businesses to the longer list of receivers within areas grouped according to land activities by the noise area classification system established in Minnesota Rule 7030.0050, Subp. 2, using Noise Area Classification 1. Provide revised shapefiles with newly identified noise receptors. The revised tables should identify any of the following within 1,600 feet of the route width of RA-North, RA-Hybrid, and RA-South:

- Household Units (includes farmhouses)
- Hotels, motels, or other overnight lodging
- Mobile home parks or courts
- Other residential units
- Motion picture production
- Medical and other health services
- Correctional institutions
- Educational services
- Religious activities
- Cultural activities and nature exhibitions
- Entertainment assembly
- Camping and picnicking areas (designated)
- Resorts and group camps
- Other cultural, entertainment, and recreational activities

Summit has prepared updated tables of noise sensitive receptors (NSRs) with 1,600 feet of Alternative Route 1 (previously referred to as CURE alternative route 2); Alternative Route 2 (previously CURE alternative route 3); and Alternative Route 3 (Summit's proposed route) using the requested terms (see Attachment 13-12). Note:

- Summit has changed the previously reported "residences" to "household units."
- Summit previously reported each "Garage/Barn." This is a category which is not represented in the above list, so these features were not relabeled.
- Summit previously reported each "Industrial" and "Business." If the type of "Industrial" or "Business" feature was not represented on the list, it was not relabeled.

For all receptors within the 1,600-foot route buffers, Summit did not locate any NSRs beyond those of Household Unit, Garage/Barn, Business, or Industrial.

A zip file with the following shapefiles has also been provided on the Summit ShareFile site:

Contents	Preview	Description
Name		
Alternative_Route_1.shp		
Alternative_Route_1_Route_Width.shp		
Alternative_Route_2.shp		
Alternative_Route_2_Route_Width.shp		
Alternative_Route_3.shp		
Alternative_Route_3_Route_Width.shp		
MP_Alternative_Route_1.shp		
MP_Alternative_Route_2.shp		
MP_Alternative_Route_3.shp		
Receptor_Alternative_Route_1_1600ft.shp		
Receptor_Alternative_Route_2_1600ft.shp		
Receptor_Alternative_Route_3_1600ft.shp		

13. In applicant testimony on February 13, 2024, Jason Zoller listed additional studies that have been performed for the project. Provide these studies.

A copy of the following reports has been provided with this response (see Attachment 13-13 folder):

- Wetland and Waterbody Delineation Report – Minnesota [dated October 3, 2022]
- Wetland and Waterbody Delineation Supplemental Report for MNL-305 and 20 MNL-321 (2022) – Minnesota [dated March 31, 2023]
- Results of 2022 Field Surveys for Listed Butterfly and Plant Species in Minnesota [dated February 28, 2023] - **Marked as NONPUBLIC**
- Results of 2022-2023 Field Surveys for Listed Butterfly and Plant Species in Minnesota [dated January 18, 2024] – **Marked as NONPUBLIC**

The following report is not provided with this response as Summit is currently addressing comments received from the SHPO regarding the content of the report. Once, the report is revised and resubmitted to the SHPO, Summit will provide a copy of the report.

- Draft Minnesota Conventional Archaeological Resources Survey (Phase 1) 12 Volume 4: Fieldwork Report Addendum (MNL-305 and MNL-321) For Work Completed Between July 2, 2022, and November 14, 2022 on MNL-321 in Otter Tail County and MNL-305 in Martin County, and Since December 3, 2021, for the Eliminated Segment of MNL-305 in Faribault County [dated March 31, 2023]

14. Sherri Webb filed a comment dated February 23, 2024, that is included in eDockets Document ID 20243-204403-01. Please describe the 13 permit applications that are noted in her comment on page 340 of 461 of the PDF.

Summit has not applied for 13 water well permits. Summit has applied for one permit in Lawler, Iowa.

15. Please confirm that the entire pipeline project would be designed and built in a manner that would arrest crack propagation and that, therefore, fracture arrestors are not needed.

Confirmed.

16. Does Summit know of any precedent for adding an odorant to CO2 pipelines? If so, please provide the name of the project, pipeline, and details of use of odorant in other CO2 pipelines.

No.

17. Please clarify the updated calculations in this portion of Benjamin Nelson's March 14, 2024, applicant rebuttal testimony to Dr. Grubert's earlier testimony: "this results in emission sources of 26,349 MT CO2e, or 14% of the 0.19 metric tons per annum. As such, an expected 14% reduction would result in a reduction of 5.0 gCO2e/MJ from the base impact of 36.3 gCO2e/MJ mentioned above." Provide sources for updated assumptions in this calculation.

Mr. Nelson's full response on this point is as follows, with the portion quoted in question 17 in bold:

"The carbon capture and storage process is designed for 100% electrical use. Summit agrees that these sources of emissions should be incorporated into the impact of the CI score. The system is designed to utilize 38.5 million kWh. Utilizing the GREET emission factor for MROW of 684 g CO2e/kWh (as done by DEIS), **this results in emission sources of 26,349 MT CO2e, or 14% of the 0.19 mmtpa. As such, an expected 14% reduction would result in a reduction of 5.0 g CO2e/MJ from the base impact of 36.3 g CO2e/MJ mentioned above.**"

Sources and Calculations:

CO2e emissions:

38.5 million kWh. The DEIS report stated 39.3 million kWh (Table 5-39, footnote e). The 38.5 million kWh assumption is updated to reflect Summit's response to Question 6 in Summit's Response to Supplemental Information Inquiry 5.

GREET emission factor for MROW of 684 g CO2e/kWh.

Source: <https://www.energy.gov/eere/greet>.

Note that this is the same assumption the DEIS uses in Table 5-39, footnote e.

Calculation of CO2 sources:

$38.5 \text{ million kWh} * 684 \text{ g CO2e/kWh} / 1,000,000 \text{ g/MT} = 26,349 \text{ MT CO2e}$

CI impact of CO2 emissions:

0.19 million MT captured.

This assumption is the same as used in the DEIS report. For example, Table 5-39 lists it as 185,454 (without rounding).

Calculation of emissions sources to captured CO2:

$26,349 / 185,454 = 14\%$

Calculation of impact to CI:

$$36.3 \text{ g CO}_2\text{e/MJ} * 14\% = 5 \text{ g CO}_2\text{e/MJ}$$

18. Please explain in relative detail how the project would provide tax revenue to the local economy. For example, how is the project taxed? How is the money distributed?

In Minnesota, a CO₂ pipeline should be subject to property tax and centrally assessed by the Commissioner of Revenue at its market value as of January 2 each year. The January 2 assessment date forms the basis for the tax due and payable in the following year (e.g., the January 2, 2024, assessed value forms the basis for the taxes payable in 2025). The market value of a centrally assessed property is set forth in Administrative Rule 8100, and generally requires the operating property of the entire pipeline to be valued as a unit using a combination of the income and cost approaches. The unit value is then allocated back to Minnesota and to each county and local taxing district in which the CO₂ pipeline is located. The tax is then administered by the treasurer's office for each county, who will issue property tax statements and distribute the tax collected in the same manner as all other property taxes.

19. Public commenters ask about electricity use at the capture facility. Representative comments include: "EERA should revisit the potential for impacts to the electrical system and other Lake Region Coop customers and member-owners. It is important to know both the total expected energy use as well as the variable demand that is anticipated by the project's additional electric usage. Will the project's use spike at the same time as the existing plant's demand? Will Lake Region Coop have to implement peak-shaving policies and technologies elsewhere to manage this new intense use? Even if no immediate upgrades are required to deliver energy to the plant, will this increase member-owners' exposure to power outages or brown-outs in times of peak demand?" Also, "who is paying for that electricity? Summit or the ethanol facility? And if the latter, will those cost increases be passed on to producers or other member-owners?"

When operating, the CO₂ capture facility is expected to draw 3,678 kW of electrical load from the grid. Summit plans to install variable frequency drives on all medium-voltage electrical loads to limit the impact on the electrical grid as loads come online. To serve our load, Lake Region Electric Coop (LREC) plans to upgrade a feeder in the existing substation. They have indicated to Summit that their system has ample capacity to manage the incremental load without issue. Summit is responsible for all costs associated with the upgrade and operation of the capture facility, including the cost of the utility power. LREC has not indicated to Summit that the additional load would cause the utility to implement peak-shaving policies or technologies anywhere in their system. LREC has not indicated that, nor does Summit anticipate an increase in other member-owners exposure to power outages or brown-outs.



U.S. Department
of Transportation
**Pipeline and Hazardous
Materials Safety
Administration**

1200 New Jersey Avenue, SE
Washington, DC 20590

9/15/2023

Mr. Lee Blank
CEO
Summit Carbon Solutions
2321 N Loop Dr. Suite 221
Ames, Iowa 50010

Dear Mr. Blank:

The Pipeline and Hazardous Materials Safety Administration (PHMSA) has received several inquiries regarding the ability of federal, state, and local governments to affect the siting, design, construction, operation, and maintenance of carbon dioxide pipelines. The widespread interest in understanding PHMSA's authorities underscores a need to reiterate the message we shared in 2014 with a company proposing a high-visibility interstate pipeline, a message directly related to current pipeline projects proposed by your companies.

As was the case in 2014, PHMSA continues to support and encourage all three levels of government—federal, state, and local—working collaboratively to ensure the nation's pipeline systems are constructed and operated in a manner that protects public safety and the environment.

Congress has vested PHMSA with authority to regulate the design, construction, operation, and maintenance of pipeline systems, including carbon dioxide pipelines, and to protect life, property, and the environment from hazards associated with pipeline operations. While the Federal Energy Regulatory Commission has exclusive authority to regulate the siting of interstate gas transmission pipelines, there is no equivalent federal agency that determines siting of all other pipelines, such as carbon dioxide pipelines. Therefore, the responsibility for siting new carbon dioxide pipelines rests largely with the individual states and counties through which the pipelines will operate and is governed by state and local law.

The Role of PHMSA

Under the federal pipeline safety laws (49 U.S.C. § 60101 *et seq.*), PHMSA is charged with carrying out a nationwide program for regulating the country's pipelines that transport gas, hazardous liquids, and carbon dioxide. With passage of the federal pipeline safety laws, Congress determined pipeline safety is best promoted through PHMSA's development of nationwide safety standards.

PHMSA takes this responsibility seriously and has promulgated comprehensive safety regulations at 49 C.F.R. Parts 190-199. Dozens of current federal requirements regulate the safety of carbon dioxide pipelines' design,¹ construction,² testing,³ operation and maintenance,⁴ operator qualification,⁵ corrosion control,⁶ and emergency response planning.⁷ PHMSA inspects compliance with these requirements and enforces these standards through administrative and judicial enforcement processes.

Recently, PHMSA promulgated new, more stringent standards for automatic and remote shut off valves that affect carbon dioxide pipelines (Additional information: "New rule will help improve public safety and reduce greenhouse gas emissions following pipeline failures").⁸ PHMSA also announced a number of additional actions to strengthen current pipeline safety requirements for carbon dioxide pipelines (Additional information: "PHMSA announces new safety measures to protect Americans from carbon dioxide pipeline failures"),⁹ including a new rulemaking which is currently under way.

While rulemakings like this involve meticulous crafting of highly technical updates, PHMSA also retains broad authority to address imminent risks to the public posed by a pipeline—even if not specifically delineated in a rule or standard. To this extent, PHMSA will engage with all carbon dioxide pipeline project developers to ensure any unique and imminent risks from such projects are adequately mitigated pursuant to PHMSA's statutory safety authority.

The Role of State Pipeline Regulators

Federal safety standards apply to both interstate and intrastate pipeline facilities. Only PHMSA can regulate the safety of interstate pipelines, and federal pipeline safety laws expressly prohibit states from enacting or enforcing pipeline safety standards with respect to interstate pipelines (except one-call notification program regulations). However, through an agreement with PHMSA, a state authority may be authorized to inspect interstate pipelines as an agent of PHMSA, and to refer violations to PHMSA for enforcement. Thus, PHMSA's state partners play an important role in assisting to oversee the safety of the nation's interstate pipelines.

PHMSA's state partners also play a critical role in regulating the safety of intrastate pipelines. A state authority that submits a certification to PHMSA may assume exclusive regulatory authority for the safety of its intrastate pipelines. The certification must document, among other things,

¹ 49 CFR part 195, subpart C (<https://www.ecfr.gov/current/title-49/subtitle-B/chapter-I/subchapter-D/part-195/subpart-C>).

² Subpart D (<https://www.ecfr.gov/current/title-49/subtitle-B/chapter-I/subchapter-D/part-195/subpart-D>).

³ Subpart E (<https://www.ecfr.gov/current/title-49/subtitle-B/chapter-I/subchapter-D/part-195/subpart-E>).

⁴ Subpart F (<https://www.ecfr.gov/current/title-49/subtitle-B/chapter-I/subchapter-D/part-195/subpart-F>).

⁵ Subpart G (<https://www.ecfr.gov/current/title-49/subtitle-B/chapter-I/subchapter-D/part-195/subpart-G>).

⁶ Subpart H (<https://www.ecfr.gov/current/title-49/subtitle-B/chapter-I/subchapter-D/part-195/subpart-H>).

⁷ *E.g.*, Subpart F, §§ 195.402, 195.403, 195.408.

⁸ <https://www.phmsa.dot.gov/news/phmsa-announces-requirements-pipeline-shut-valves-strengthen-safety-improve-response-efforts>

⁹ <https://www.phmsa.dot.gov/news/phmsa-announces-new-safety-measures-protect-americans-carbon-dioxide-pipeline-failures>

that the state has appropriate jurisdiction under state law; has adopted the federal safety standards to which the certification applies; inspects operators for compliance with those standards; and enforces the standards to address noncompliance.

PHMSA's national regulatory program relies heavily on the efforts of these state partners, who employ roughly 70 percent of all pipeline inspectors and whose jurisdiction covers more than 80 percent of regulated pipelines. As noted above, federal law requires certified state authorities to adopt safety standards at least as stringent as, and compatible with, the federal standards. The state authorities will also inspect, regulate, and take enforcement action against operators of intrastate pipelines within their borders.

The Role of Local Governments

Federal preemption of pipeline safety means that states do not have independent authority to regulate pipeline safety but derive that authority from federal law through a certification to PHMSA.

In the case of local governments that are not subject to federal certification of pipeline safety authority, they may still exercise other powers granted to them under state law but none that adopt or enforce pipeline safety standards or contradict federal law.

However, PHMSA cannot prescribe the location or routing of a pipeline and cannot prohibit the construction of non-pipeline buildings in proximity to a pipeline. Local governments have traditionally exercised broad powers to regulate land use, including setback distances and property development that includes development in the vicinity of pipelines. Nothing in the federal pipeline safety law impinges on these traditional prerogatives of local—or state—government, so long as officials do not attempt to regulate the field of pipeline safety preempted by federal law.

PHMSA recognizes local governments have implemented authorities under state law that contribute in many ways to the safety of their citizens. We have seen localities consider measures, such as:

1. Controlling dangerous excavation activity near pipelines.
2. Limiting certain land use activities along pipeline rights-of-way.
3. Restricting land use and development along pipeline rights-of-way through zoning, setbacks, and similar measures.
4. Requiring the consideration of pipeline facilities in proposed local development plans.
5. Designing local emergency response plans and training with regulators and operators.
6. Requiring specific building code design or construction standards near pipelines.
7. Improving emergency response and evacuation plans in the event of a pipeline release.
8. Participating in federal environmental studies conducted under the National Environmental Policy Act (NEPA) and similar state laws for new pipeline construction projects.

Each state treats these issues differently, so pipeline operators should be prepared to deal directly with each locality and state body interested in the siting and construction process.

Collaboration Among Stakeholders

PHMSA believes pipeline safety is the shared responsibility of federal and state regulators as well as all other stakeholders, including pipeline operators, excavators, property owners, and local governments. In 2010, PHMSA launched the Pipelines and Informed Planning Alliance (PIPA)—available at <https://primis.phmsa.dot.gov/comm/pipa/LandUsePlanning.html>—to help pipeline safety stakeholders define their respective roles related to land use practices near pipelines and to develop best practices.

The PIPA documents are 13 years old, but they remain of value today. PHMSA looks forward to you, along with other private and public stakeholders, engaging with PHMSA in updating these documents to focus on the unique circumstances of new pipeline construction. I encourage all pipeline operators to carefully consider and adopt, as appropriate, these best practices to protect their existing and proposed rights-of-way, and to engage all stakeholders in promoting the safety of interstate pipelines.

Each community affected by an existing or proposed pipeline faces unique risks. The effective control and mitigation of such risks involves a combination of measures employed by facility operators, regulatory bodies, community groups, and individual members of the community. As a pipeline release can impact individuals, businesses, property owners, and the environment, it is important that all stakeholders carefully consider land use and development plans to make risk-informed choices that protect the best interests of the public and the individual parties involved. Sharing appropriate information with state or local governments and emergency planners, which may include dispersion models or emergency response plans, may help stakeholders make risk-informed decisions.

Bringing a pipeline into a community is often a complicated endeavor that requires tremendous coordination and open communication among stakeholders to be successful. We greatly value the efforts of pipeline operators who spend the time and energy to make sure the process goes smoothly and are responsive to all parties involved. Thank you for your cooperation in this effort.

Sincerely,

Alan K. Mayberry
Associate Administrator for Pipeline Safety

Noise Sensitive Receptors Within 1,600 Feet of Alternative Route 1 Route Width			
Approximate Milepost ^a	Description	Distance From Alternative Route 1 Centerline (feet)	Direction from Alternative Route 1
0.01	Garage/Barn	1,383	SE
0.01	Household Unit	1,491	SE
0.01	Garage/Barn	1,607	SE
0.01	Garage/Barn	1,317	SE
0.07	Industrial	752	N
0.07	Industrial	545	N
0.08	Industrial	330	N
0.08	Industrial	662	N
0.10	Industrial	475	N
0.15	Business	245	N
0.23	Industrial	700	N
0.24	Household Unit	930	NW
0.24	Garage/Barn	835	NW
0.24	Garage/Barn	817	NW
0.24	Garage/Barn	979	NW
0.41	Garage/Barn	781	S
0.41	Garage/Barn	715	S
0.41	Garage/Barn	846	S
0.42	Household Unit	721	S
0.75	Industrial	296	N
0.75	Industrial	256	N
0.96	Garage/Barn	475	S
0.97	Household Unit	417	S
0.99	Garage/Barn	520	S
1.06	Household Unit	267	N
1.07	Garage/Barn	312	N
1.10	Household Unit	420	N
1.10	Garage/Barn	572	N
1.11	Garage/Barn	439	N
1.11	Garage/Barn	500	N
1.11	Garage/Barn	309	N
1.12	Household Unit	262	N
1.21	Household Unit	1,044	S
1.23	Garage/Barn	1,107	S
1.23	Garage/Barn	1,141	S
1.86	Garage/Barn	378	SW
1.89	Household Unit	295	NE
1.89	Garage/Barn	437	NE
1.96	Household Unit	279	S
1.97	Garage/Barn	476	S
1.97	Garage/Barn	398	S
1.98	Garage/Barn	592	S
2.01	Garage/Barn	391	S
2.01	Garage/Barn	483	S

Noise Sensitive Receptors Within 1,600 Feet of Alternative Route 1 Route Width			
Approximate Milepost ^a	Description	Distance From Alternative Route 1 Centerline (feet)	Direction from Alternative Route 1
2.04	Garage/Barn	912	N
2.06	Garage/Barn	973	N
2.07	Garage/Barn	1,142	N
2.07	Garage/Barn	1,096	N
2.08	Garage/Barn	305	S
2.09	Garage/Barn	1,018	N
2.09	Household Unit	920	N
2.09	Garage/Barn	350	S
2.09	Garage/Barn	1,071	N
2.09	Garage/Barn	196	S
2.10	Garage/Barn	446	S
2.10	Garage/Barn	1,117	N
2.11	Garage/Barn	286	S
2.11	Household Unit	382	S
2.97	Household Unit	381	NW
2.97	Garage/Barn	595	NW
3.09	Garage/Barn	681	N
3.09	Garage/Barn	473	N
3.10	Garage/Barn	757	N
3.11	Garage/Barn	505	N
3.57	Household Unit	1,542	S
3.59	Garage/Barn	1,496	S
3.60	Garage/Barn	1,539	S
3.61	Garage/Barn	1,652	S
3.98	Garage/Barn	877	N
4.00	Garage/Barn	807	N
4.05	Household Unit	468	N
4.05	Garage/Barn	724	N
4.06	Garage/Barn	538	N
4.07	Garage/Barn	709	N
4.89	Industrial	144	S
5.27	Garage/Barn	966	N
5.30	Household Unit	976	N
5.31	Garage/Barn	796	N
5.32	Garage/Barn	981	N
5.34	Garage/Barn	888	N
5.35	Garage/Barn	935	N
5.36	Garage/Barn	873	N
5.67	Garage/Barn	1,248	N
5.69	Garage/Barn	1,190	N
5.69	Household Unit	1,008	N
5.69	Household Unit	353	S
5.70	Garage/Barn	448	S
5.71	Garage/Barn	1,342	N

Noise Sensitive Receptors Within 1,600 Feet of Alternative Route 1 Route Width			
Approximate Milepost ^a	Description	Distance From Alternative Route 1 Centerline (feet)	Direction from Alternative Route 1
5.71	Garage/Barn	1,094	N
5.71	Garage/Barn	215	S
5.71	Garage/Barn	421	S
5.75	Garage/Barn	362	S
5.75	Garage/Barn	422	S
5.75	Garage/Barn	257	S
6.21	Garage/Barn	434	N
6.23	Garage/Barn	506	N
6.24	Garage/Barn	568	N
6.24	Household Unit	367	N
6.25	Garage/Barn	382	N
6.25	Garage/Barn	494	N
6.26	Garage/Barn	390	N
6.26	Garage/Barn	445	N
9.89	Garage/Barn	478	N
9.92	Household Unit	306	N
9.94	Garage/Barn	391	N
10.82	Household Unit	1,164	N
10.84	Garage/Barn	1,435	N
10.84	Garage/Barn	1,118	N
10.86	Garage/Barn	1,161	N
10.89	Garage/Barn	1,031	N
12.31	Household Unit	299	N
12.32	Garage/Barn	341	N
12.33	Garage/Barn	406	N
12.34	Garage/Barn	357	N
12.35	Garage/Barn	416	N
13.59	Garage/Barn	634	N
13.60	Garage/Barn	275	N
13.61	Household Unit	402	N
17.72	Household Unit	553	S
17.73	Garage/Barn	486	S
17.74	Garage/Barn	396	S
17.74	Garage/Barn	557	S
20.42	Garage/Barn	330	N
20.43	Garage/Barn	350	N
20.44	Household Unit	182	N
20.45	Garage/Barn	289	N
20.87	Garage/Barn	496	S
20.87	Garage/Barn	347	S
20.90	Garage/Barn	475	S
21.39	Garage/Barn	311	S
21.39	Business	700	S
21.39	Garage/Barn	672	S

Noise Sensitive Receptors Within 1,600 Feet of Alternative Route 1 Route Width			
Approximate Milepost ^a	Description	Distance From Alternative Route 1 Centerline (feet)	Direction from Alternative Route 1
21.49	Garage/Barn	462	N
21.50	Garage/Barn	445	N
21.53	Household Unit	285	N
21.60	Household Unit	1,824	S
21.62	Garage/Barn	369	N
21.63	Household Unit	258	N
21.64	Garage/Barn	252	N
21.64	Garage/Barn	377	N
22.66	Garage/Barn	741	N
22.66	Garage/Barn	374	N
22.67	Garage/Barn	450	N
22.67	Garage/Barn	665	N
22.68	Household Unit	831	N
22.68	Household Unit	516	N
22.69	Household Unit	305	N
23.02	Household Unit	823	NW
23.02	Garage/Barn	981	NW
23.02	Garage/Barn	800	NW
23.02	Garage/Barn	1,360	S
23.02	Garage/Barn	1,343	S
23.02	Garage/Barn	1,149	S
23.02	Garage/Barn	1,089	S
23.02	Household Unit	1,244	S
23.02	Garage/Barn	972	S
23.02	Garage/Barn	1,062	S
23.02	Garage/Barn	1,116	S
23.02	Garage/Barn	1,499	NW
^a Mileposts for Alternative Route 1 are unofficial distances along the centerline from the Green Plains Ethanol Plant and are included here to help describe the location of noise sensitive receptors (NSR).			

Noise Sensitive Receptors Within 1,600 Feet of Alternative Route 2 Route Width			
Approximate Milepost ^a	Description	Distance From Alternative Route 2 Centerline (feet)	Direction from Alternative Route 2
0.01	Garage/Barn	1,607	SE
0.01	Garage/Barn	1,383	SE
0.01	Household Unit	1,491	SE
0.01	Garage/Barn	1,317	SE
0.07	Industrial	545	N
0.07	Industrial	752	N
0.08	Industrial	330	N
0.08	Industrial	662	N

Noise Sensitive Receptors Within 1,600 Feet of Alternative Route 2 Route Width			
Approximate Milepost ^a	Description	Distance From Alternative Route 2 Centerline (feet)	Direction from Alternative Route 2
0.10	Industrial	475	N
0.15	Business	245	N
0.23	Industrial	700	N
0.24	Garage/Barn	817	NW
0.24	Household Unit	930	NW
0.24	Garage/Barn	835	NW
0.24	Garage/Barn	979	NW
0.41	Garage/Barn	846	S
0.41	Garage/Barn	781	S
0.41	Garage/Barn	715	S
0.42	Household Unit	721	S
0.75	Industrial	296	N
0.75	Industrial	256	N
0.96	Garage/Barn	475	S
0.97	Household Unit	417	S
0.99	Garage/Barn	520	S
1.06	Household Unit	267	N
1.07	Garage/Barn	312	N
1.10	Garage/Barn	572	N
1.10	Household Unit	420	N
1.11	Garage/Barn	439	N
1.11	Garage/Barn	500	N
1.11	Garage/Barn	309	N
1.12	Household Unit	262	N
1.21	Household Unit	1,044	S
1.23	Garage/Barn	1,107	S
1.23	Garage/Barn	1,141	S
1.86	Garage/Barn	378	SW
1.89	Household Unit	295	NE
1.89	Garage/Barn	437	NE
1.96	Household Unit	279	S
1.97	Garage/Barn	476	S
1.97	Garage/Barn	398	S
1.98	Garage/Barn	592	S
2.01	Garage/Barn	391	S
2.01	Garage/Barn	483	S
2.04	Garage/Barn	912	N
2.06	Garage/Barn	973	N
2.07	Garage/Barn	1,142	N
2.07	Garage/Barn	1,096	N
2.08	Garage/Barn	305	S
2.09	Garage/Barn	1,018	N
2.09	Household Unit	920	N
2.09	Garage/Barn	350	S

Noise Sensitive Receptors Within 1,600 Feet of Alternative Route 2 Route Width			
Approximate Milepost ^a	Description	Distance From Alternative Route 2 Centerline (feet)	Direction from Alternative Route 2
2.09	Garage/Barn	1,071	N
2.09	Garage/Barn	196	S
2.10	Garage/Barn	446	S
2.10	Garage/Barn	1,117	N
2.11	Garage/Barn	286	S
2.11	Household Unit	382	S
2.97	Household Unit	381	NW
2.97	Garage/Barn	595	NW
3.09	Garage/Barn	681	N
3.09	Garage/Barn	473	N
3.10	Garage/Barn	757	N
3.11	Garage/Barn	505	N
3.57	Household Unit	1,542	S
3.59	Garage/Barn	1,496	S
3.60	Garage/Barn	1,539	S
3.61	Garage/Barn	1,652	S
3.98	Garage/Barn	877	N
4.00	Garage/Barn	807	N
4.05	Household Unit	468	N
4.05	Garage/Barn	724	N
4.06	Garage/Barn	538	N
4.07	Garage/Barn	709	N
4.89	Industrial	144	S
5.27	Garage/Barn	966	N
5.30	Household Unit	976	N
5.31	Garage/Barn	796	N
5.32	Garage/Barn	981	N
5.34	Garage/Barn	888	N
5.35	Garage/Barn	935	N
5.36	Garage/Barn	873	N
5.67	Garage/Barn	1,248	N
5.69	Garage/Barn	1,190	N
5.69	Household Unit	1,008	N
5.69	Household Unit	353	S
5.70	Garage/Barn	448	S
5.71	Garage/Barn	1,342	N
5.71	Garage/Barn	1,094	N
5.71	Garage/Barn	215	S
5.71	Garage/Barn	421	S
5.75	Garage/Barn	362	S
5.75	Garage/Barn	422	S
5.75	Garage/Barn	257	S
6.21	Garage/Barn	434	N
6.23	Garage/Barn	506	N

Noise Sensitive Receptors Within 1,600 Feet of Alternative Route 2 Route Width			
Approximate Milepost ^a	Description	Distance From Alternative Route 2 Centerline (feet)	Direction from Alternative Route 2
6.24	Garage/Barn	568	N
6.24	Household Unit	367	N
6.25	Garage/Barn	382	N
6.25	Garage/Barn	494	N
6.26	Garage/Barn	390	N
6.26	Garage/Barn	445	N
8.49	Garage/Barn	806	E
8.49	Garage/Barn	643	E
8.51	Household Unit	765	E
10.01	Industrial	408	W
14.51	Garage/Barn	1,571	S
14.53	Household Unit	1,147	S
14.54	Garage/Barn	1,392	S
14.56	Garage/Barn	1,270	S
15.30	Garage/Barn	1,126	S
15.32	Garage/Barn	966	S
15.33	Garage/Barn	1,202	S
15.33	Household Unit	1,054	S
19.62	Garage/Barn	2,626	N
19.62	Garage/Barn	2,725	N
19.65	Garage/Barn	2,929	N
19.67	Household Unit	2,574	N
19.75	Household Unit	3,837	N
19.76	Household Unit	1,542	S
19.77	Garage/Barn	3,945	N
19.78	Garage/Barn	1,704	S
19.78	Garage/Barn	1,638	S
19.78	Garage/Barn	4,082	N
20.96	Household Unit	973	NW
20.98	Garage/Barn	1,115	NW
23.40	Household Unit	1,047	S
23.41	Garage/Barn	1,315	S
23.41	Garage/Barn	1,219	S
24.38	Garage/Barn	183	N
24.43	Household Unit	262	N
25.23	Garage/Barn	542	N
25.25	Garage/Barn	583	N
25.43	Household Unit	493	NE
26.19	Garage/Barn	325	S
26.19	Garage/Barn	614	S
26.21	Household Unit	586	S
26.22	Garage/Barn	312	S
26.25	Garage/Barn	745	S
26.27	Household Unit	351	S

Noise Sensitive Receptors Within 1,600 Feet of Alternative Route 2 Route Width			
Approximate Milepost ^a	Description	Distance From Alternative Route 2 Centerline (feet)	Direction from Alternative Route 2
26.62	Garage/Barn	1,206	S
26.64	Household Unit	1,403	S
26.66	Garage/Barn	1,209	S
27.86	Garage/Barn	1,271	N
27.87	Household Unit	1,202	N
27.88	Garage/Barn	1,019	N
27.89	Garage/Barn	1,183	N
27.90	Garage/Barn	1,151	N
27.90	Garage/Barn	1,254	N
28.26	Garage/Barn	1,623	N
28.26	Garage/Barn	1,706	N
28.27	Garage/Barn	1,651	N
28.27	Garage/Barn	1,392	N
28.30	Household Unit	1,581	N
28.37	Garage/Barn	1,602	N
28.70	Garage/Barn	1,458	SW
28.73	Household Unit	1,458	SW
28.74	Garage/Barn	1,639	SW
28.98	Household Unit	1,758	SW
29.15	Household Unit	1,825	S
29.15	Household Unit	866	SW
29.15	Garage/Barn	836	SW
29.15	Garage/Barn	701	SW
29.15	Garage/Barn	702	SW
29.15	Garage/Barn	1,615	N
29.15	Garage/Barn	1,678	N
29.15	Household Unit	1,742	N
29.15	Garage/Barn	1,835	N
^a Mileposts for Alternative Route 2 are unofficial distances along the centerline from the Green Plains Ethanol Plant and are included here to help describe the location of noise sensitive receptors (NSR).			

Noise Sensitive Receptors Within 1,600 Feet of Alternative Route 3 Route Width			
Approximate Milepost ^a	Description	Distance From Alternative Route 3 Centerline (feet)	Direction from Alternative Route 3
0.01	Garage/Barn	1,607	SE
0.01	Garage/Barn	1,383	SE
0.01	Garage/Barn	1,317	SE
0.01	Household Unit	1,491	SE
0.07	Industrial	545	N
0.07	Industrial	752	N
0.08	Industrial	330	N
0.08	Industrial	662	N

Noise Sensitive Receptors Within 1,600 Feet of Alternative Route 3 Route Width			
Approximate Milepost ^a	Description	Distance From Alternative Route 3 Centerline (feet)	Direction from Alternative Route 3
0.10	Industrial	475	N
0.15	Business	245	N
0.24	Industrial	672	N
0.28	Garage/Barn	669	NW
0.28	Garage/Barn	734	N
0.28	Garage/Barn	878	N
0.28	Household Unit	800	NW
0.46	Garage/Barn	799	S
0.47	Garage/Barn	710	S
0.47	Garage/Barn	633	S
0.49	Household Unit	571	S
0.68	Garage/Barn	1,050	W
0.68	Garage/Barn	1,803	NW
0.68	Household Unit	1,082	W
0.68	Household Unit	1,726	NW
0.68	Industrial	498	NW
0.68	Industrial	519	N
0.68	Garage/Barn	1,179	W
1.15	Garage/Barn	1,198	SE
1.15	Garage/Barn	1,748	E
1.15	Household Unit	1,779	E
1.18	Garage/Barn	1,341	SE
1.33	Business	1,821	SE
1.74	Garage/Barn	1,206	S
1.74	Garage/Barn	1,174	SE
1.74	Garage/Barn	644	SE
1.74	Household Unit	1,259	SE
2.14	Business	555	SW
2.14	Garage/Barn	1,176	S
2.24	Garage/Barn	367	N
2.26	Garage/Barn	525	S
2.28	Household Unit	491	N
2.28	Garage/Barn	1,186	S
2.32	Garage/Barn	375	N
2.33	Garage/Barn	1,079	S
2.37	Garage/Barn	1,846	N
3.01	Garage/Barn	1,584	NW
3.16	Garage/Barn	791	W
3.35	Garage/Barn	1,244	E
3.35	Garage/Barn	955	SE
3.35	Household Unit	1,120	E
4.81	Industrial	1,801	N
4.85	Business	1,477	N
4.86	Industrial	1,812	N
4.92	Industrial	1,740	N

Noise Sensitive Receptors Within 1,600 Feet of Alternative Route 3 Route Width			
Approximate Milepost ^a	Description	Distance From Alternative Route 3 Centerline (feet)	Direction from Alternative Route 3
4.98	Garage/Barn	1,010	S
4.98	Garage/Barn	927	S
4.98	Household Unit	1,193	S
4.98	Industrial	1,413	N
4.99	Garage/Barn	1,109	S
4.99	Garage/Barn	1,051	S
5.49	Garage/Barn	1,234	E
5.49	Household Unit	1,312	E
6.94	Household Unit	229	NE
6.97	Household Unit	179	SW
7.03	Garage/Barn	186	W
13.46	Garage/Barn	1,571	S
13.48	Household Unit	1,147	S
13.49	Garage/Barn	1,392	S
13.51	Garage/Barn	1,270	S
14.25	Garage/Barn	1,126	S
14.27	Garage/Barn	966	S
14.28	Garage/Barn	1,202	S
14.28	Household Unit	1,054	S
18.57	Garage/Barn	2,626	N
18.57	Garage/Barn	2,725	N
18.60	Garage/Barn	2,929	N
18.62	Household Unit	2,574	N
18.70	Household Unit	3,837	N
18.71	Household Unit	1,542	S
18.72	Garage/Barn	3,945	N
18.73	Garage/Barn	1,704	S
18.73	Garage/Barn	1,638	S
18.73	Garage/Barn	4,082	N
19.91	Household Unit	973	NW
19.93	Garage/Barn	1,115	NW
22.35	Household Unit	1,047	S
22.36	Garage/Barn	1,315	S
22.36	Garage/Barn	1,219	S
23.33	Garage/Barn	183	N
23.38	Household Unit	262	N
24.18	Garage/Barn	542	N
24.20	Garage/Barn	583	N
24.38	Household Unit	493	NE
25.14	Garage/Barn	325	S
25.14	Garage/Barn	614	S
25.16	Household Unit	586	S
25.17	Garage/Barn	312	S
25.20	Garage/Barn	745	S
25.22	Household Unit	351	S

Noise Sensitive Receptors Within 1,600 Feet of Alternative Route 3 Route Width			
Approximate Milepost ^a	Description	Distance From Alternative Route 3 Centerline (feet)	Direction from Alternative Route 3
25.57	Garage/Barn	1,206	S
25.59	Household Unit	1,403	S
25.61	Garage/Barn	1,209	S
26.81	Garage/Barn	1,271	N
26.82	Household Unit	1,202	N
26.83	Garage/Barn	1,019	N
26.84	Garage/Barn	1,183	N
26.85	Garage/Barn	1,151	N
26.85	Garage/Barn	1,254	N
27.21	Garage/Barn	1,623	N
27.21	Garage/Barn	1,706	N
27.22	Garage/Barn	1,651	N
27.22	Garage/Barn	1,392	N
27.25	Household Unit	1,581	N
27.32	Garage/Barn	1,602	N
27.65	Garage/Barn	1,458	SW
27.68	Household Unit	1,458	SW
27.69	Garage/Barn	1,639	SW
27.93	Household Unit	1,758	SW
28.10	Garage/Barn	836	SW
28.10	Garage/Barn	701	SW
28.10	Garage/Barn	702	SW
28.10	Garage/Barn	1,615	N
28.10	Garage/Barn	1,678	N
28.10	Garage/Barn	1,835	N
28.10	Household Unit	1,825	S
28.10	Household Unit	866	SW
28.10	Household Unit	1,742	N
^a Mileposts for Alternative Route 3 are unofficial distances along the centerline from the Green Plains Ethanol Plant and are included here to help describe the location of noise sensitive receptors (NSR).			

NOTICE:

In accordance with Minnesota Rules, part 7829.0500 and Minnesota Statutes Chapter 13, Summit Carbon has designated portions of the report titled “Results of 2022-2023 Field Surveys for Listed Butterfly and Plant Species in Minnesota” as NONPUBLIC DATA – NOT FOR PUBLIC DISCLOSURE because it contains natural heritage information. Natural heritage information is nonpublic under Minn. Stat. § 84.0872. The Minnesota Department of Natural Resources also restricts its dissemination by license agreement. Given the need to include nonpublic information, Summit Carbon will prepare both Nonpublic and Public versions of “Results of 2022-2023 Field Surveys for Listed Butterfly and Plant Species in Minnesota.”



Results of 2022-2023 Field Surveys for Listed Butterfly and Plant Species in Minnesota

Project Name:

Summit Carbon Solutions Midwest Carbon Express Project

Document Number:

SCS-0700-ENV-02-RPT-048

Date

January 18, 2024

REVISION HISTORY

DATE	REVISION	REVISION DESCRIPTION	PREPARED BY:	REVIEWED BY:	APPROVED BY:
1/18/2024	0	Results of 2022-2023 Field Surveys for Listed Butterfly and Plant Species in Minnesota	SMS	BB	JZ

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Attachment C – MNL-304 Survey Sites and Results

Attachment D – MNL-305 Survey Sites and Results

Attachment E – MDNR’s Rare Species Survey Reports Memo (2012)

Attachment F – NHIS Documentation and Species Identification Confirmation

Attachment G – MDNR’s Guidance on Documenting and Collecting Rare Plants (2018)

Acronyms and Abbreviations

CO ₂	carbon dioxide
DASK	Dakota skipper
MDNR	Minnesota Department of Natural Resources
Merjent	Merjent, Inc.
MNR	Midwest Natural Resources, Inc.
MBS	Minnesota Biological Survey
NHIS	Natural Heritage Information System
NLCD	National Land Cover Dataset
NPC	Native Plant Community
PBCL	prairie bush clover
POSK	Poweshiek skipperling
Project	Midwest Carbon Express Project
ROW Prairie	Minnesota Railroad Right-of-way Prairies
SCS	Summit Carbon Solutions, LLC
USFWS	U.S. Fish and Wildlife Service
WPFO	western prairie fringed orchid

1 Introduction

Summit Carbon Solutions, LLC (SCS) is proposing to develop the Midwest Carbon Express Project (the Project), a carbon capture, transportation, and sequestration project that will capture and transport carbon dioxide (CO₂) emissions from industrial facilities in Iowa, Minnesota, Nebraska, North Dakota, and South Dakota to a sequestration site in North Dakota, where the CO₂ will be safely and permanently stored. Construction of the Project will involve approximately 2,000 miles of 4-inch to 24-inch pipelines.

SCS is preparing for Project permitting and construction with support from Merjent, Inc. (Merjent) for the Project's environmental review efforts in Minnesota. SCS and Merjent have been coordinating with the Minnesota Department of Natural Resources (MDNR) regarding potential occurrences of sensitive species,¹ including field surveys for certain species in 2022 and 2023. On February 28, 2023, Merjent submitted a report entitled *Results of 2022 Field Surveys for Listed Butterfly and Plant Species in Minnesota*. Merjent then completed additional field surveys in 2023. This current report combines the previously reported results of the 2022 field surveys² with the new results of the 2023 field surveys. The surveys have been conducted along the Project's Minnesota pipeline segments (shown on the map in Figure 1 and listed in Table 1 with their associated counties and year(s) of survey). The 2023 field work was limited to the MNL-304A and MNL-304B laterals.

Table 1: Pipeline Segments in Minnesota and Associated Counties

Pipeline Segment ID	Counties	Year(s) When Survey Locations Were Identified
MNL-321 ^a	Otter Tail, Wilkin	2022
MNL-337	Chippewa, Kandiyohi, Renville	N/A (no survey locations identified)
MNL-303	Chippewa, Redwood, Renville, Yellow Medicine	2022
MNL-304A ^b	Jackson	2022, 2023
MNL-304B	Cottonwood	2022, 2023
MNL-305 ^c	Martin	2022
^a Prior communication with MDNR has referred to this as the "Otter Tail to Wilkin Project."		
^b Prior communication with MDNR has referred to this as the "Jackson County Project."		
^c Prior communication with MDNR has referred to this as the "Martin County Project."		

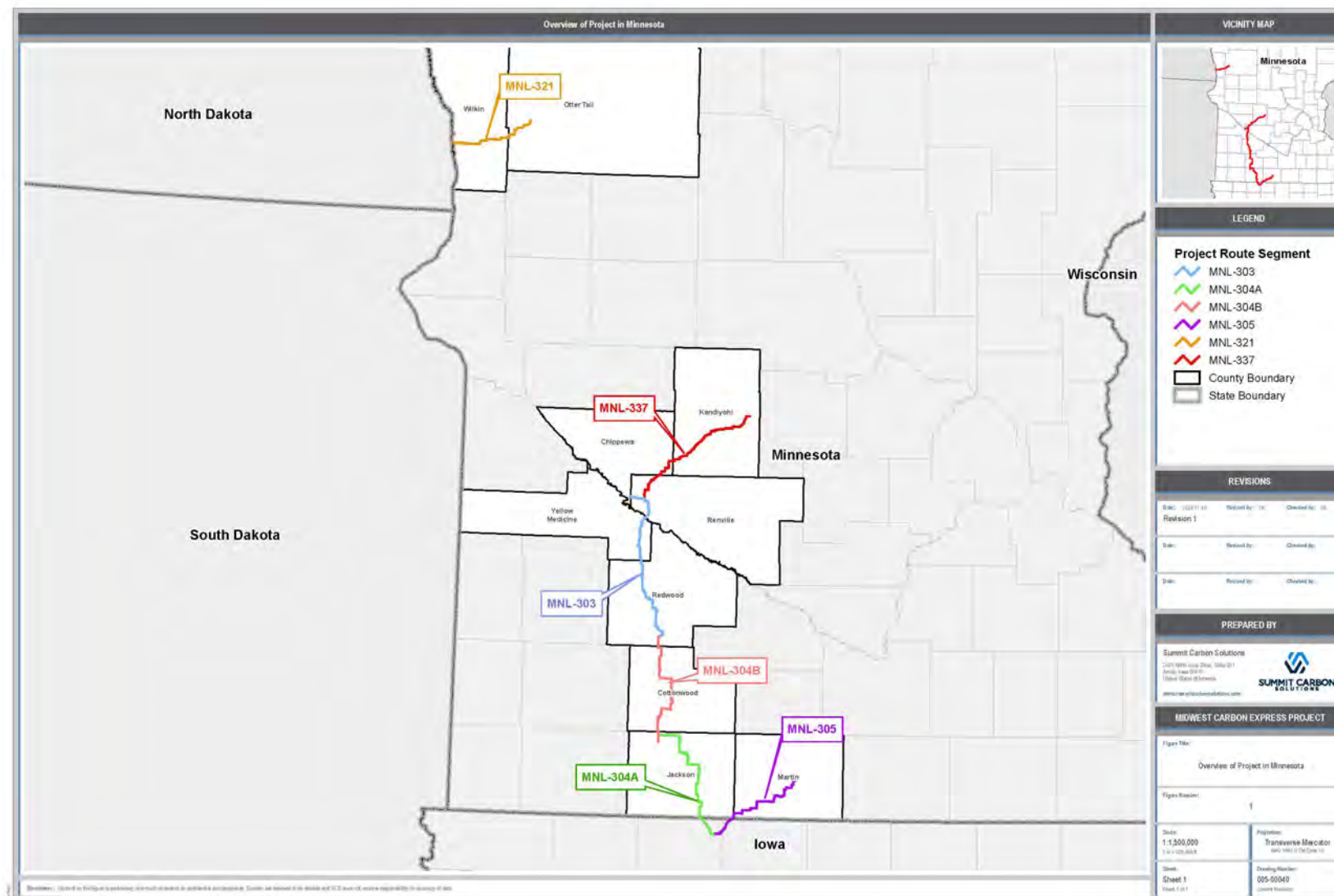
In both 2022 and 2023, plant surveys targeted species that are state-listed in Minnesota as special concern, threatened, or endangered and for which suitable habitat may occur in or near the environmental survey area. Plant species on the MDNR watch list according to MNTaxa³ were also to be documented if observed.

¹ SCS submitted a letter to MDNR on April 5, 2022, requesting consultation regarding sensitive species in Minnesota's Natural Heritage Information System database and providing its proposed survey protocol for sensitive plant species in the vicinity of the Project. MDNR responded on May 13, 2022, with approval of SCS's protocol, which was followed to obtain the results reported here. SCS submitted a protocol again on May 17, 2023, with the same content as in 2022 except for revised locations of the sites to be surveyed. The plant survey methodology was the same in both years.

² Sites that were surveyed in 2022 and included in the 2022 report but are no longer within the Project's environmental survey area are not included here except as footnotes in Attachments A-D.

³ MDNR watch-list status was obtained from http://www.dnr.state.mn.us/eco/mcbs/plant_lists.html.

Figure 1: Overview of Project in Minnesota



Additionally, through a parallel coordination process with the U.S. Fish and Wildlife Service (USFWS), four federally listed species were determined to warrant field habitat assessments (Table 2).⁴

Table 2: Federally Listed Species Targeted for Survey in Minnesota

Species	Federal Status	Minnesota Status	Survey Year(s)
Dakota Skipper (<i>Hesperia dacotae</i>)	Threatened	Endangered	2022
Poweshiek Skipperling (<i>Oarisma poweshiek</i>)	Endangered	Endangered	2022
Prairie Bush Clover (<i>Lespedeza leptostachya</i>)	Threatened	Threatened	2022, 2023
Western Prairie Fringed Orchid (<i>Platanthera praeclara</i>)	Threatened	Endangered	2022, 2023

All four species in Table 2 are also state-listed in Minnesota. Although the butterfly species were not targeted as part of SCS's 2022 correspondence with MDNR regarding survey protocols, results of 2022 butterfly habitat assessments are reported here due to the species' state status. In 2023, surveys for three additional state-listed butterfly species at one site were added to the scope of field work: Ottoe Skipper (*Hesperia ottoe*), state-listed endangered; Iowa skipper (*Atrytone arogos iowa*), state-listed special concern; and regal fritillary (*Argynnis idalia*), state-listed special concern. These three species are not federally listed.

2 Butterfly Survey Methods

Merjent worked with qualified biologists at Midwest Natural Resources, Inc. (MNR) to identify and assess habitat within the Project's environmental survey area in Minnesota for the Dakota skipper and Poweshiek skipperling (in 2022) and for the Ottoe skipper, Iowa skipper, and regal fritillary (in 2023). All of the Lepidoptera species targeted for field survey are inhabitants of native prairie remnants.

In 2022, MNR conducted a desktop assessment to identify areas of potentially suitable habitat for the Dakota skipper and Poweshiek skipperling within the Project footprint and then completed on-the-ground surveys to evaluate those areas further. Where suitable habitat was present as determined by the field surveys, MNR conducted occupancy surveys during the appropriate flight period. Methods for the desktop assessment and field surveys are described further below. MNR's biologists conducting the surveys, Otto Gockman and Jake Walden, are both MDNR-approved Prairie Skipper Surveyors and hold a Federal Recovery Permit for the Dakota skipper.

MNR did not conduct an additional desktop assessment in 2023, but Merjent identified relevant occurrences of the Ottoe skipper, Iowa skipper, and regal fritillary (one occurrence per species) in MDNR's Natural Heritage Information System (NHIS) dataset in a single location. The polygons representing the occurrences crossed or were near a portion of the Project footprint that was new to 2023. Given the overlap of the three NHIS occurrences in one area, Merjent determined that the area warranted a field survey to assess the potential for suitable habitat for the three species. Jake Walden of MNR conducted the field surveys.

⁴ USFWS did not specifically request field surveys for the Dakota skipper, but SCS included this species in the desktop and field effort because of its status as endangered in Minnesota and the similarity of its habitat requirements to the Poweshiek skipperling.

2.1 Desktop Assessment

For the 2022 surveys, MNR evaluated areas of potentially uncultivated grassland within the Project footprint in Minnesota by using the following publicly available data.

- Recent and historic aerial imagery from the National Agricultural Imagery Program and Google Earth
- National Land Cover Dataset (NLCD)
- Lidar elevation
- Natural Resources Conservation Service Soil Survey Geographic Database
- MDNR Native Plant Communities (NPCs), typically located within Minnesota Biological Survey (MBS) Sites of Biodiversity Significance
- Minnesota Railroad Right-of-way Prairies (ROW Prairies)

For 2023, Merjent determined that no further desktop assessment using the 2022 approach was needed.

2.2 Field Surveys

Between May 31 and June 15, 2022, MNR conducted field surveys for suitable habitat at the areas identified in the desktop assessment. The pedestrian surveys involved evaluating the quality of each habitat polygon based on the presence of larval-host species as well as nectar plants. Habitat documentation included: estimating cover of native graminoids, native forbs, non-native species (both graminoids and forbs), and trees and shrubs; documenting presence/absence of requisite prairie species and cover, where applicable; and taking representative photographs at each location.

MNR conducted occupancy surveys for the Dakota skipper and Poweshiek skipperling, where indicated by the June field habitat assessments, on July 3, 6, and 9, 2022. Occupancy survey methods were based on the Dakota Skipper North Dakota Survey Protocol, prepared by the USFWS Mountain-Prairie Region in 2018 and used at the request of USFWS. MNR's methodology followed the specifications in that document for survey frequency and duration, timing and environmental conditions, phenological indicators, and other aspects. MNR consulted with MDNR and USFWS about the appropriate window for the species' flight periods, based on 2022 phenology in the relevant portion of the state (late June through mid-July, accordingly).

Using the same field methods as in 2022, MNR conducted an initial field habitat assessment for the Ottoe skipper, Iowa skipper, and regal fritillary on June 2, 2023, where the Project footprint intersected NHIS occurrence data. MNR then conducted occupancy surveys at suitable habitat identified within the Project footprint on July 15, 17, and 20, 2023.

3 Plant Survey Methods

Similar to the approach taken for butterflies, in 2022 and 2023 Merjent conducted a desktop assessment to identify areas of potentially suitable habitat for state-listed plants within the Project footprint. The assessment considered all state-listed plant species, including the two federally listed species in Table 2. Merjent's Andy Kranz, a MDNR-approved botanist, then carried out field surveys. Methods for the desktop assessment and field surveys are described further below.

3.1 Desktop Assessment

In 2022 and 2023, Merjent identified the areas to be surveyed in the field by reviewing NHIS data and public data sources. Where features from the sources listed below overlapped the Project environmental survey area (or were within 1 mile, for NHIS occurrences), Merjent considered the location to have potentially suitable habitat for the two federally listed plant species and/or for other state-listed species that may occur in the Project vicinity.

- NHIS Element Occurrences of rare plants within a 1-mile radius, where potentially suitable habitats were visible within the environmental survey area on aerial imagery⁵
- Other potentially suitable habitats visible on aerial imagery, such as potential fens, sites with aquatic features, or other aerial signatures that were unique relative to the surrounding area
- MBS sites (with a biodiversity significance ranking of moderate, high, or outstanding)⁶
- NPCs⁷
- ROW Prairies⁸

Western prairie fringed orchids and prairie bush clovers both inhabit native prairie remnants, with the orchid preferring wet-mesic prairie types and the clover preferring dry-mesic prairie types. Sites with the potential for any native prairie types were flagged for field survey. Wooded NPCs were mostly absent in the Project environmental survey area.

3.2 Field Surveys

The field surveys had three objectives: (1) to determine whether any state-listed plants were present within the Project environmental survey area; (2) to assess, regardless of survey timing, the habitat suitability for the western prairie fringed orchid and/or prairie bush clover at each site; and (3) if possible, depending on survey timing, to document whether any western prairie fringed orchid and/or prairie bush clover individuals were present. According to MDNR, the optimal identification window for the western prairie fringed orchid is between late June and late July (when they are flowering), and the optimal window for the prairie bush clover is mid-August through September (when they are producing fruit).

Surveys in 2022 were conducted on June 6, 7, and 8; on July 9; and on September 1, 2, 22, 23, and 24. Surveys in 2023 were conducted on June 12, June 13, and August 7.

Where western prairie fringed orchid habitat was present, it was rated according to the following criteria. The criteria were developed in coordination with USFWS and used in field habitat assessments for the same species in the Nebraska, North Dakota, and South Dakota portions of the Project footprint.⁹

- Western prairie fringed orchid habitat criteria:
 - Excellent (A) - completely native tall-grass/lowland/mesic prairie, appears to be mowed or lightly grazed every year or two. Suitable hydrology present.
 - Good (B) - primarily native tall-grass/lowland/mesic prairie and non-native vegetation, appears to be hayed or lightly grazed every year or two. Suitable hydrology present.
 - Fair (C) - mix of native tall-grass/lowland/mesic prairie and non-native vegetation, appears to be hayed or lightly grazed approximately every year or two. Suitable hydrology present.
 - Poor (D) - primarily non-native vegetation with a minor native tall-grass/lowland/mesic prairie component, appears to be hayed or lightly grazed every year or two, or is a mix of native and non-native plant species but heavily grazed and/or sprayed to reduce broadleaf species. Suitable hydrology present.

⁵ Merjent used NHIS data dated 2/15/2022 through MDNR license agreement 1066.

⁶ Merjent used MBS data (obtained from MN Geospatial Commons) with a content date of 2/16/2023.

⁷ Merjent used NPC data (obtained from MN Geospatial Commons) with a content date of 2/10/2023.

⁸ Merjent used ROW Prairie data (obtained from MN Geospatial Commons) with a content date of 7/27/2017.

⁹ The field habitat assessments outside of Minnesota are not reported here. A USFWS-approved set of western prairie fringed orchid habitat criteria is described in the 2022 Western Prairie Fringed Orchid Study Plan, prepared by WESTECH Environmental Services, Inc., on March 4, 2022, for Perennial Environmental Services, which is providing support to SCS for the Project's environmental review in Nebraska, North Dakota, and South Dakota.

4 Results

The field results are provided in Attachments A, B, C, and D, with each attachment containing: (a) a table that summarizes the presence or absence of findings for surveyed areas along each pipeline segment; (b) an overview map that shows the survey sites for that pipeline segment; and (c) site-specific maps where habitats and/or individuals were documented (all as outlined below). There were no locations along the MNL-337 segment that warranted survey.

- MNL-321 (Attachment A): Table A, Figures A-1 (overview map) and A-2 (site-specific map)
- MNL-303 (Attachment B): Table B, Figure B-1 (overview map)
- MNL-304 (Attachment C):
 - MNL-304A: Table C1, Figures C-1 (overview map) and C-2 through C-5 (site-specific maps)
 - MNL-304B: Table C2, Figure C-6 (overview map)
- MNL-305 (Attachment D): Table D, Figures D-1 (overview map) and D-2 (site-specific map)

The following abbreviations are used in the attachments.

- Dakota skipper (DASK)
- Poweshiek skipperling (POSK)
- Prairie bush clover (PBCL)
- Western prairie fringed orchid (WPFO)

5 Reporting

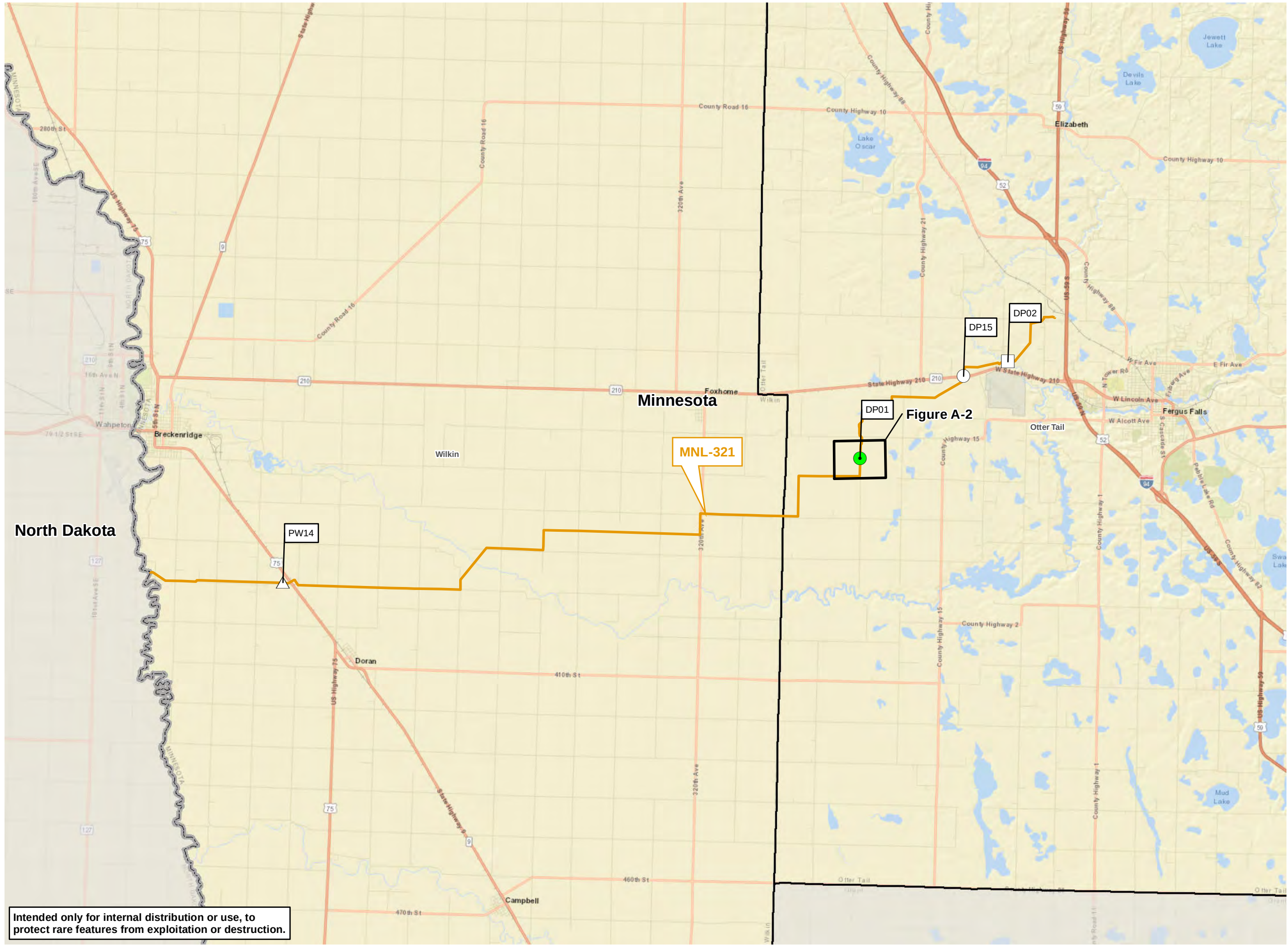
Per MDNR's Rare Species Survey Reports Memo (2012) (Attachment E), Merjent's botanist completed an electronic submission of the 2022 survey findings that must be reported for NHIS purposes (i.e., documented occurrences of state-listed species) on February 22, 2023. Welby Smith at MDNR confirmed the identification of the state-listed species reported in 2022. Despite additional survey locations being identified in 2023, there were no findings of state-listed species to report in 2023. The NHIS documentation and the species identification confirmation from 2022 are in Attachment F. The plant survey methods used to obtain the results reported here are consistent with MDNR's Guidance on Documenting and Collecting Rare Plants (2018) (Attachment G).

Attachment A – MNL-321 Survey Sites and Results

Table A: Survey Sites and Outcomes for MNL-321, Listed East to West (Figure A-1)

Site ID	Targeted for Listed Butterfly Surveys? (Year)	Butterfly Survey Outcome	Targeted for Listed Plant Surveys? (Year)	Plant Survey Outcome	Site-specific Map
DP02	Yes (2022)	No habitat/no individuals.	No	N/A (surveyed only for DASK/POSK)	N/A
DP15	Yes (2022)	No habitat/no individuals.	Yes (2022)	No habitat/no individuals.	N/A
DP01 ^a	Yes (2022)	Suitable DASK/POSK habitat was present. No DASK or POSK individuals were observed during occupancy surveys.	Yes (2022)	Suitable WPFO habitat was present (rank C/D). Small white lady's-slipper (<i>Cypripedium candidum</i> ; state-listed special concern) was present. Merjent's botanist documented 17 individuals within the environmental survey area.	Figure A-2
PW14	No	N/A (surveyed only for plants)	Yes (2022)	No habitat/no individuals.	N/A

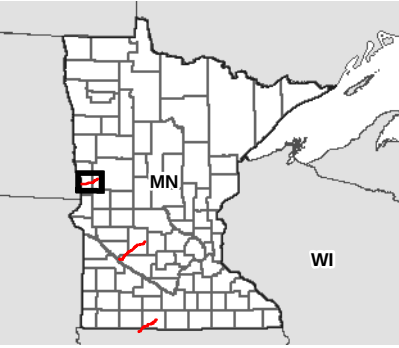
^a DP01 did not warrant survey again in 2023 but is within the May 2023 ESA as shown on Figure A-2.



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Disclaimer: Content on this figure is preliminary, and must be treated as confidential and proprietary. Sources are believed to be reliable and SCS does not assume responsibility for accuracy of data.

VICINITY MAP



LEGEND

Project Route Segment

- MNL-321
- Survey Site for DASK/POSK and Flora (finding: DASK/POSK habitat, WPFO habitat, and individuals of state-listed plant species*)
- Survey Site for DASK/POSK and Flora (no habitat/no individuals)
- Survey Site for DASK/POSK (no habitat/no individuals)
- Survey Site for Flora (no habitat/no individuals)
- County Boundary
- State Boundary
- Site-Specific Map

*See Figure A-2

REVISIONS

Date:	2023-12-05	Revised by:	TR	Checked by:	SS
Revision 1					
Date:		Revised by:		Checked by:	
Date:		Revised by:		Checked by:	

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MIDWEST CARBON EXPRESS PROJECT

Figure Title:
Survey Sites: MNL-321
Overview Map

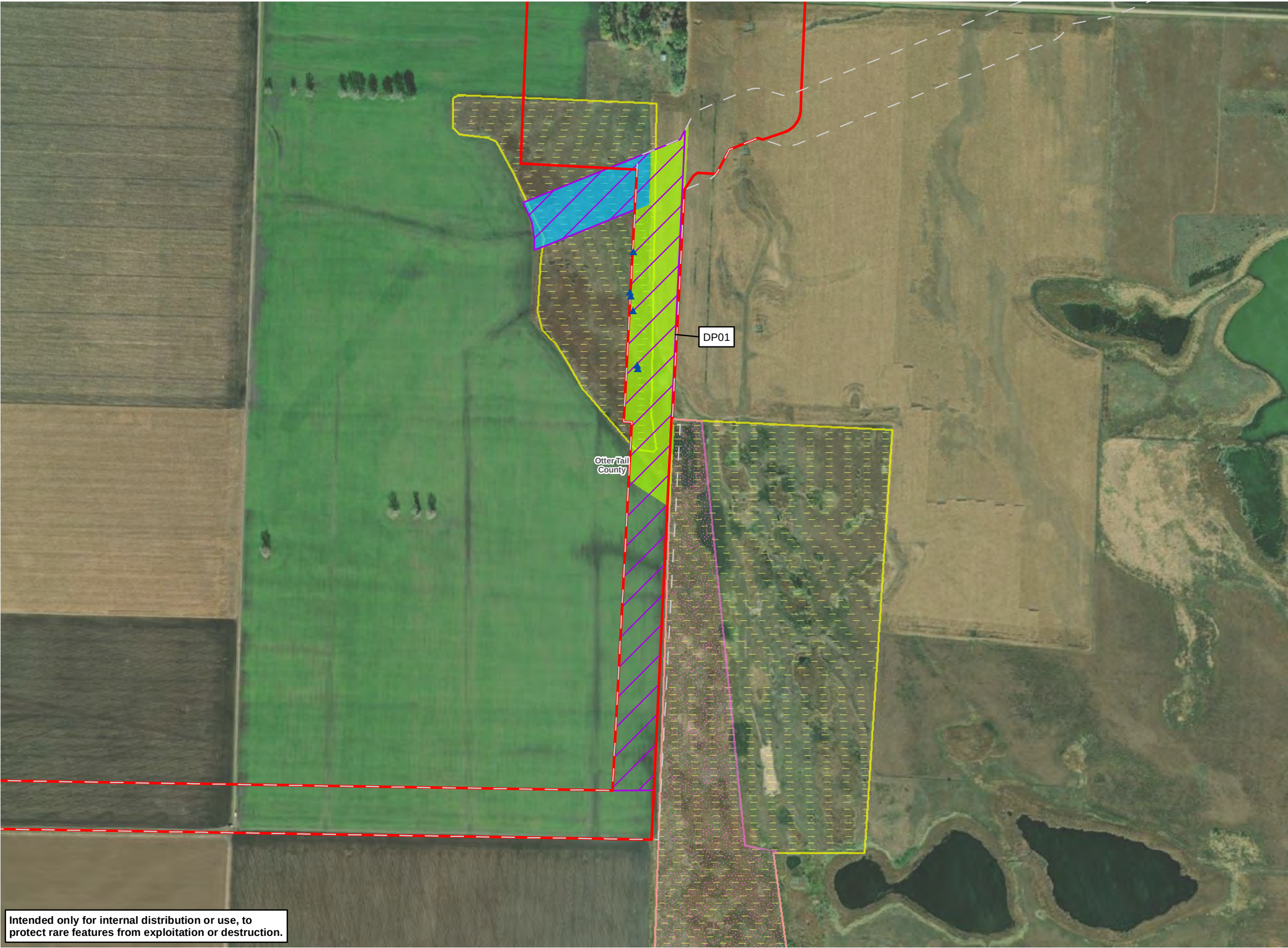
Figure Number:
A-1

Scale:
1:150,000
1 in = 12,500 ft

Projection:
Transverse Mercator
NAD 1983 UTM Zone 14

Sheet:
Sheet 1
Sheet 1 of 2

Drawing Number:
005-00040
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VICINITY MAP



LEGEND

- Environmental Survey Area (5/25/23)
- Environmental Survey Area (5/24/22)
- Native Plant Communities
- Site of Biodiversity Significance
- Small White Lady's-Slipper (Cypripedium candidum)
- Survey Site for DASK/POSK and Flora
- DASK/POSK Habitat
- WPFO Habitat (Rank C/D)

REVISIONS

Date: 2023-12-05 Revised by: TR Checked by: SS
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Date: Revised by: Checked by:

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MIDWEST CARBON EXPRESS PROJECT

Figure Title:
Survey Results: MNL-321
Site-Specific Map

Figure Number:
A-2

Scale:
1:7,200
1 in = 600 ft

Projection:
Transverse Mercator
NAD 1983 UTM Zone 14

Sheet:
Sheet 2
Sheet 2 of 2

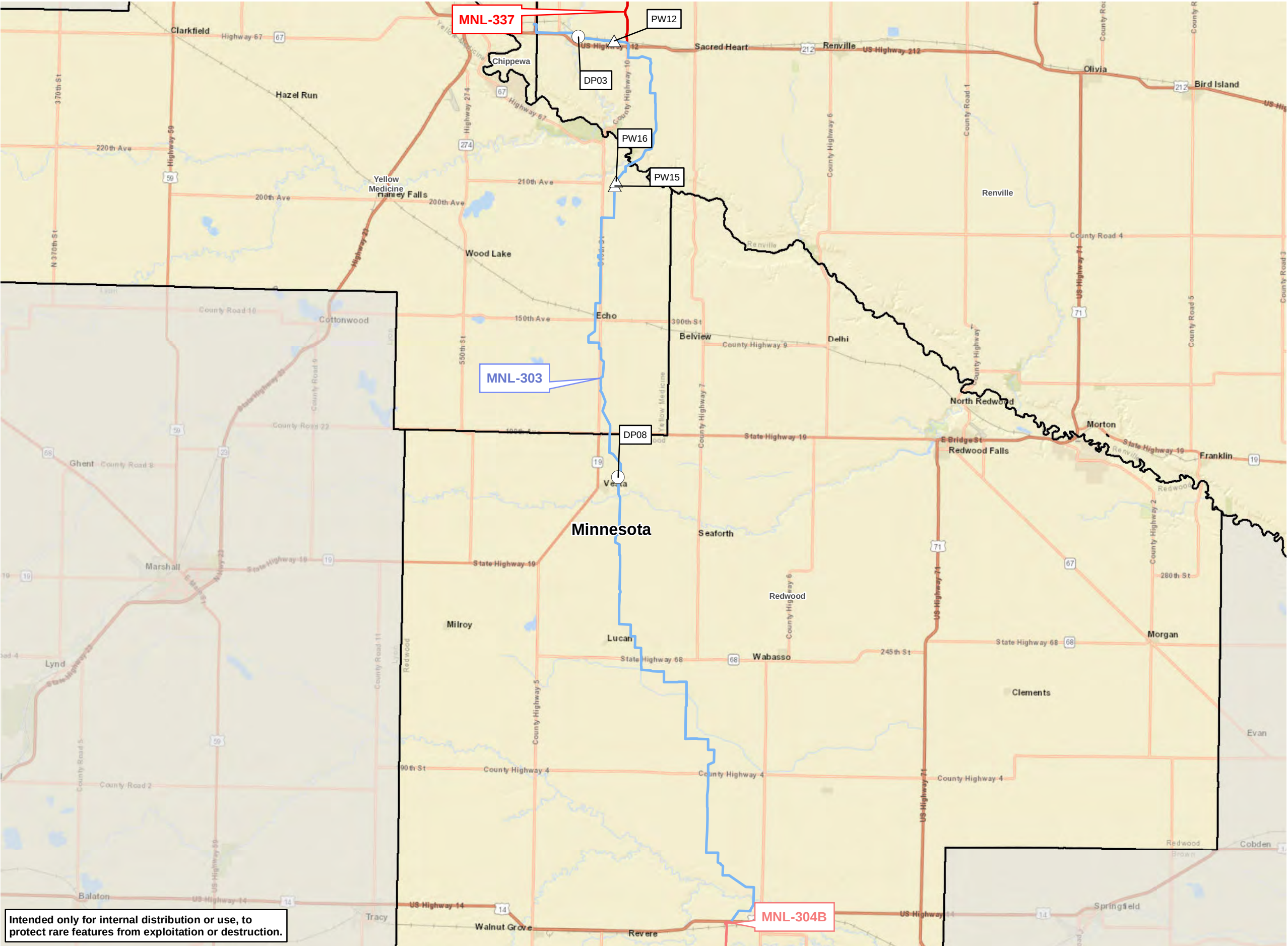
Drawing Number:
005-00040
Current Revision

Attachment B – MNL-303 Survey Sites and Results

Table B: Survey Sites and Outcomes for MNL-303, Listed North to South (Figure B-1)¹⁰

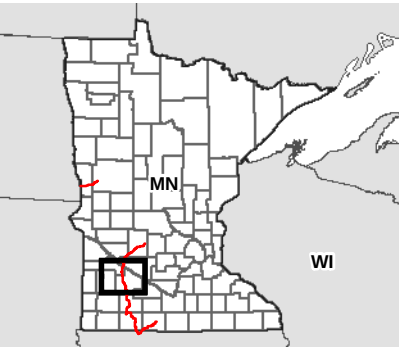
Site ID	Targeted for Listed Butterfly Surveys? (Year)	Butterfly Survey Outcome	Targeted for Listed Plant Surveys? (Year)	Plant Survey Outcome	Site-specific Map
DP03	Yes (2022)	No habitat/no individuals.	No	N/A (surveyed only for DASK/POSK)	N/A
PW12	No	N/A (surveyed only for plants)	Yes (2022)	No habitat/no individuals.	N/A
PW16	No	N/A (surveyed only for plants)	Yes (2022)	No habitat/no individuals.	N/A
PW15	No	N/A (surveyed only for plants)	Yes (2022)	No habitat/no individuals.	N/A
DP08	Yes (2022)	No habitat/no individuals.	No	N/A (surveyed only for DASK/POSK)	N/A

¹⁰ The following ten sites were included in the 2022 report but are not listed in the table here, because they are no longer within the Project environmental survey area: DP04, DP05, DP06, PW13, DP19, PW18, DP07, PW17, DP18, and DP10. All sites with a DP prefix were surveyed for DASK/POSK habitat, with none found. All sites with a PW prefix, plus DP19, DP07, and DP18, were surveyed for PBCL/WPFO habitat and state-listed plants. The finding at PW13, DP19, PW18, PW17, and DP18 was no habitat/no individuals. At DP07, suitable PBCL and WPFO habitat was present (rank D for WPFO), but Merjent's botanist did not find individuals of PBCL, WPFO, or any other state-listed plants within the environmental survey area. Four sites (PW19, PW20, PW21, and DP08) were newly identified in 2023 but could not be accessed for survey.



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VICINITY MAP



LEGEND

Project Route Segment

- MNL-303
- MNL-304B
- MNL-337

- Survey Site for DASK/POSK and Flora (no habitat/no individuals)
- Survey Site for Flora (no habitat/no individuals)
- County Boundary
- State Boundary

*See Figure B-2

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Date: 2023-12-05 Revised by: TR Checked by: SS
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MIDWEST CARBON EXPRESS PROJECT

Figure Title:
Survey Sites: MNL-303
Overview Map

Figure Number:
B-1

Scale:
1:270,000
1 in = 22,500 ft

Projection:
Transverse Mercator
NAD 1983 UTM Zone 15

Sheet:
Sheet 1
Sheet 1 of 2

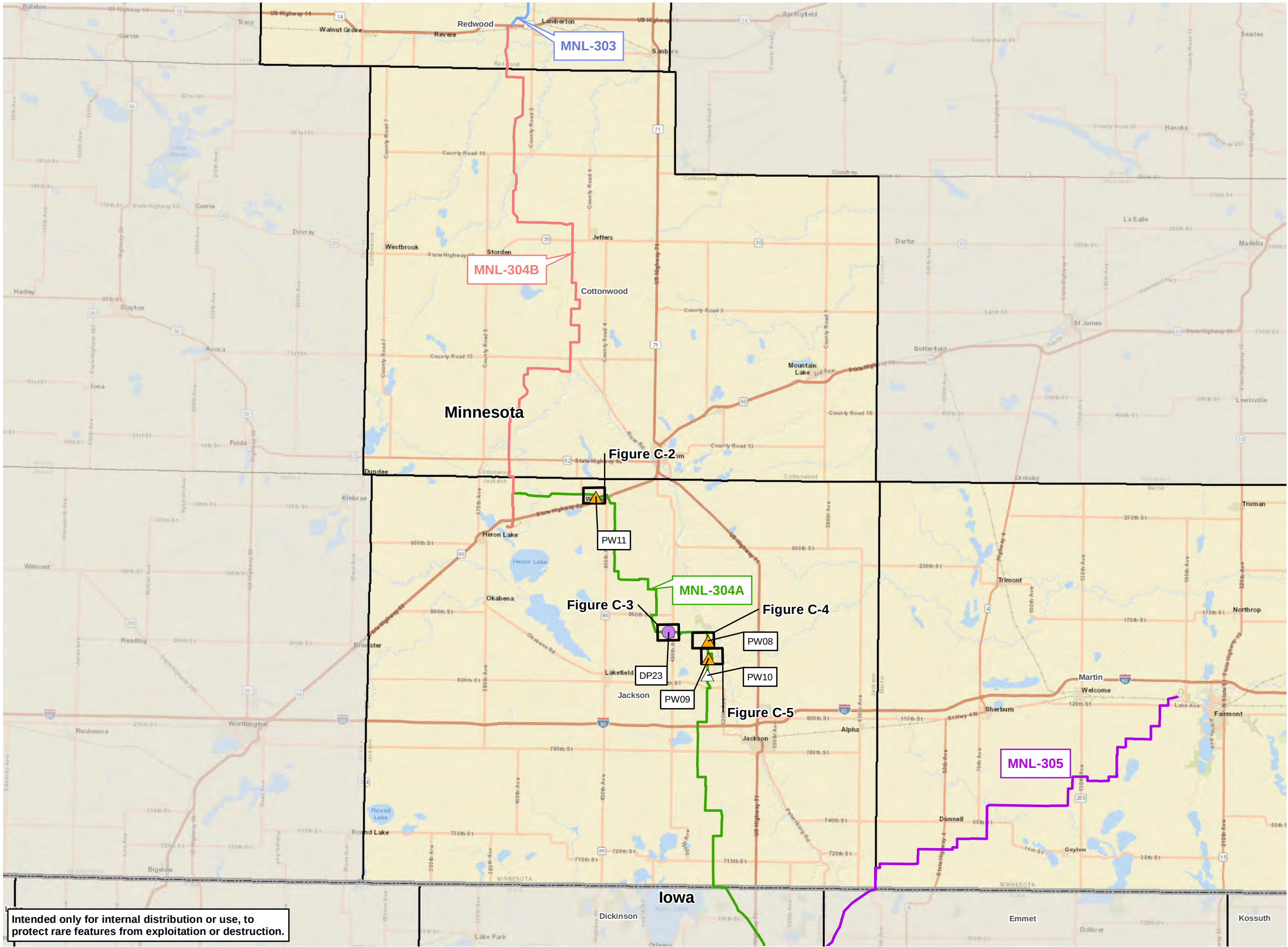
Drawing Number:
005-00040
Current Revision

Attachment C – MNL-304 Survey Sites and Results

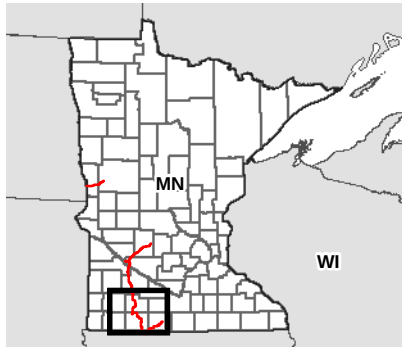
Table C1: Survey Sites and Outcomes for MNL-304A, Listed North to South (Figure C-1)¹¹

Site ID	Targeted for Listed Butterfly Surveys? (Year)	Butterfly Survey Outcome	Targeted for Listed Plant Surveys? (Year)	Plant Survey Outcome	Site-specific Map
PW11	No	N/A (surveyed only for plants)	Yes (2022, 2023)	Suitable PBCL habitat was present. Merjent's botanist did not find individuals of PBCL or any other listed species within the environmental survey area.	Figure C-2
DP23	Yes (2023)	Suitable habitat for state-listed butterfly species was present. No state-listed butterfly individuals were observed during occupancy surveys.	Yes (2023)	No habitat/no individuals.	Figure C-3
PW08	No	N/A (surveyed only for plants)	Yes (2022, 2023)	Suitable PBCL habitat was present. Merjent's botanist did not find individuals of PBCL or any other listed species within the environmental survey area.	Figure C-4
PW09	No	N/A (surveyed only for plants)	Yes (2022, 2023)	Suitable PBCL habitat was present. Merjent's botanist did not find individuals of PBCL or any other listed species within the environmental survey area.	Figure C-5
PW10	No	N/A (surveyed only for plants)	Yes (2022, 2023)	No habitat/no individuals.	N/A

¹¹ One site, DP16, was included in the 2022 report but is not listed in the table here, because it is no longer within the Project environmental survey area. There was no suitable habitat present for DASK/POSK. Suitable PBCL/WPFO habitat was present (rank D for WPFO), but Merjent's botanist did not find individuals of PBCL, WPFO, or any other state-listed species within the environmental survey area.



VICINITY MAP



LEGEND

Project Route Segment

- MNL-303
- MNL-304A
- MNL-304B
- MNL-305

- Survey Site for State-listed Butterflies and Flora (finding: state-listed butterfly habitat* and no habitat/no individuals for flora)
- Survey Site for Flora (finding: PBCL habitat*)
- Survey Site for Flora (no habitat/no individuals)
- County Boundary
- State Boundary
- Site-Specific Map

*See Figures C-2, C-3, C-4, C-5

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Date: 2023-12-05 Revised by: TR Checked by: SS
Revision 1

Date: Revised by: Checked by:

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MIDWEST CARBON EXPRESS PROJECT

Figure Title:
Survey Sites: MNL-304A
Overview Map

Figure Number:
C-1

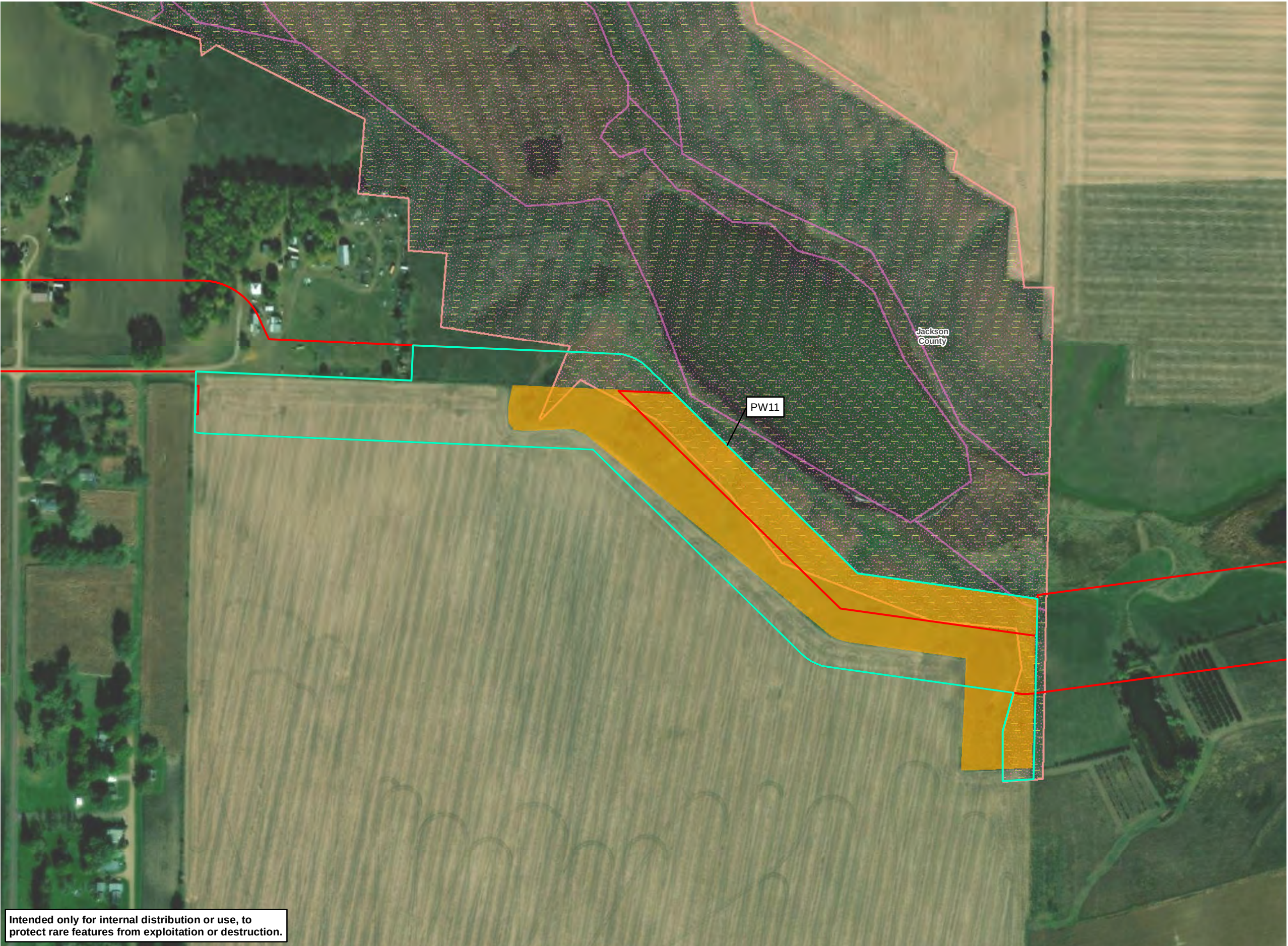
Scale:
1:360,000
1 in = 30,000 ft

Projection:
Transverse Mercator
NAD 1983 UTM Zone 15

Sheet:
Sheet 1
Sheet 1 of 5

Drawing Number:
005-00040
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VICINITY MAP



LEGEND

- Environmental Survey Area (5/25/23)
- Native Plant Communities
- Site of Biodiversity Significance
- Survey Site for Flora
- Prairie Bush-Clover Habitat

REVISIONS

Date:	2023-12-05	Revised by:	TR	Checked by:	SS
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Figure Title: Survey Results: MNL-304A/B Site-Specific Map	
Figure Number: C-2	
Scale: 1:3,600 1 in = 300 ft	Projection: Transverse Mercator NAD 1983 UTM Zone 15
Sheet: Sheet 1 Sheet 1 of 5	Drawing Number: 005-00040 Current Revision



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VICINITY MAP



LEGEND

- Environmental Survey Area (5/25/23)
- Native Plant Communities
- Site of Biodiversity Significance
- Survey Site for State-listed Butterflies and Flora
- State-Listed Butterfly Habitat

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Date:		Revised by:		Checked by:	

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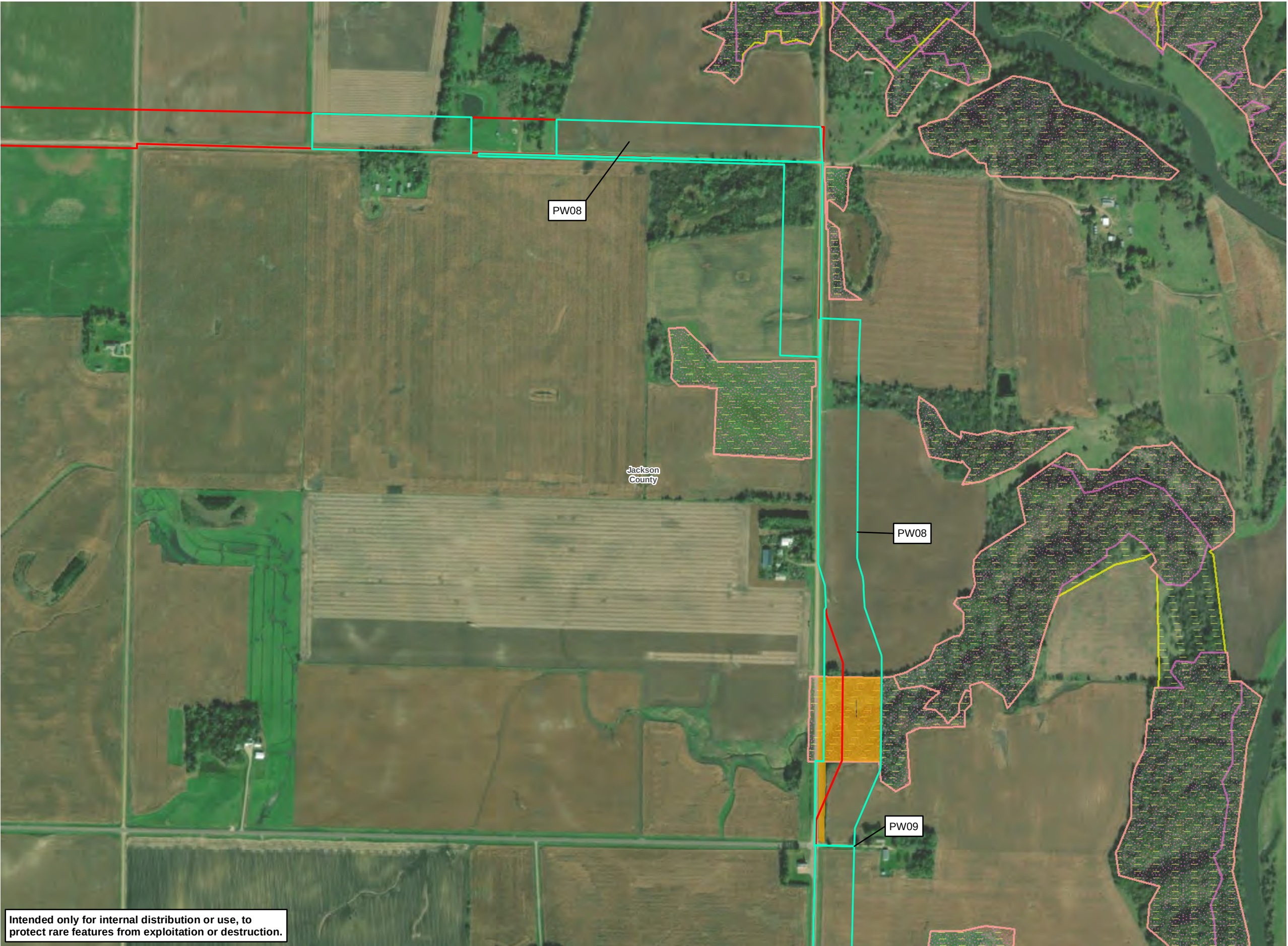
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MIDWEST CARBON EXPRESS PROJECT

Figure Title: Survey Results: MNL-304A/B Site-Specific Map	
Figure Number: C-3	
Scale: 1:7,200 1 in = 600 ft	Projection: Transverse Mercator NAD 1983 UTM Zone 15
Sheet: Sheet 2 Sheet 2 of 5	Drawing Number: 005-00040 Current Revision



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VICINITY MAP



LEGEND

- Environmental Survey Area (5/25/23)
- Native Plant Communities
- Site of Biodiversity Significance
- Survey Site for Flora
- Prairie Bush-Clover Habitat

REVISIONS

Date:	2023-12-05	Revised by:	TR	Checked by:	SS
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Date:		Revised by:		Checked by:	
Date:		Revised by:		Checked by:	

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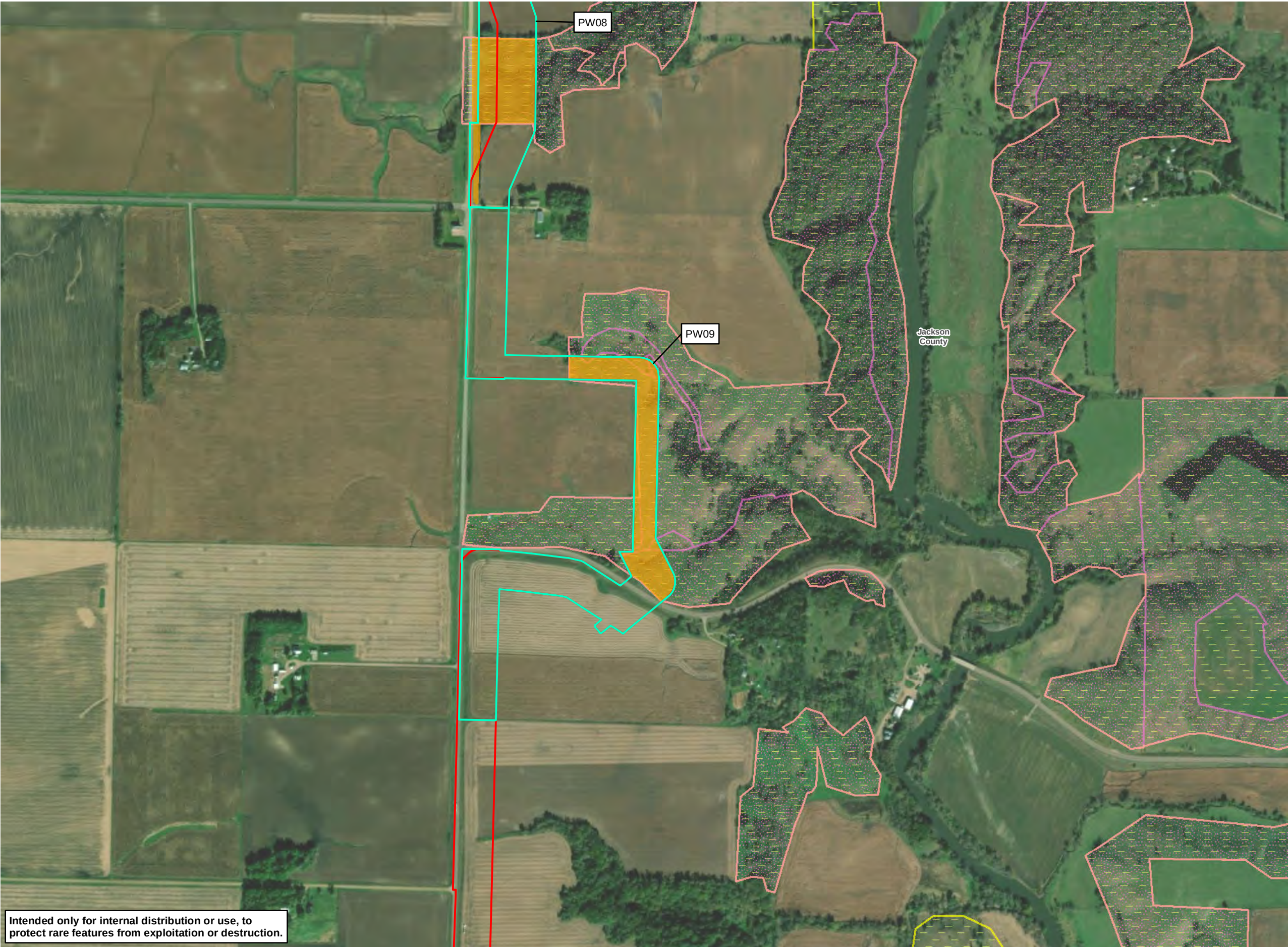
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MIDWEST CARBON EXPRESS PROJECT

Figure Title: Survey Results: MNL-304A/B Site-Specific Map	
Figure Number: C-4	
Scale: 1:9,000 1 in = 750 ft	Projection: Transverse Mercator NAD 1983 UTM Zone 15
Sheet: Sheet 3 Sheet 3 of 5	Drawing Number: 005-00040 Current Revision



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VICINITY MAP



LEGEND

- Environmental Survey Area (5/25/23)
- Native Plant Communities
- Site of Biodiversity Significance
- Survey Site for Flora
- Prairie Bush-Clover Habitat

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Date:		Revised by:		Checked by:	

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MIDWEST CARBON EXPRESS PROJECT

Figure Title:
Survey Results: MNL-304A/B
Site-Specific Map

Figure Number:
C-5

Scale:
1:9,000
1 in = 750 ft

Projection:
Transverse Mercator
NAD 1983 UTM Zone 15

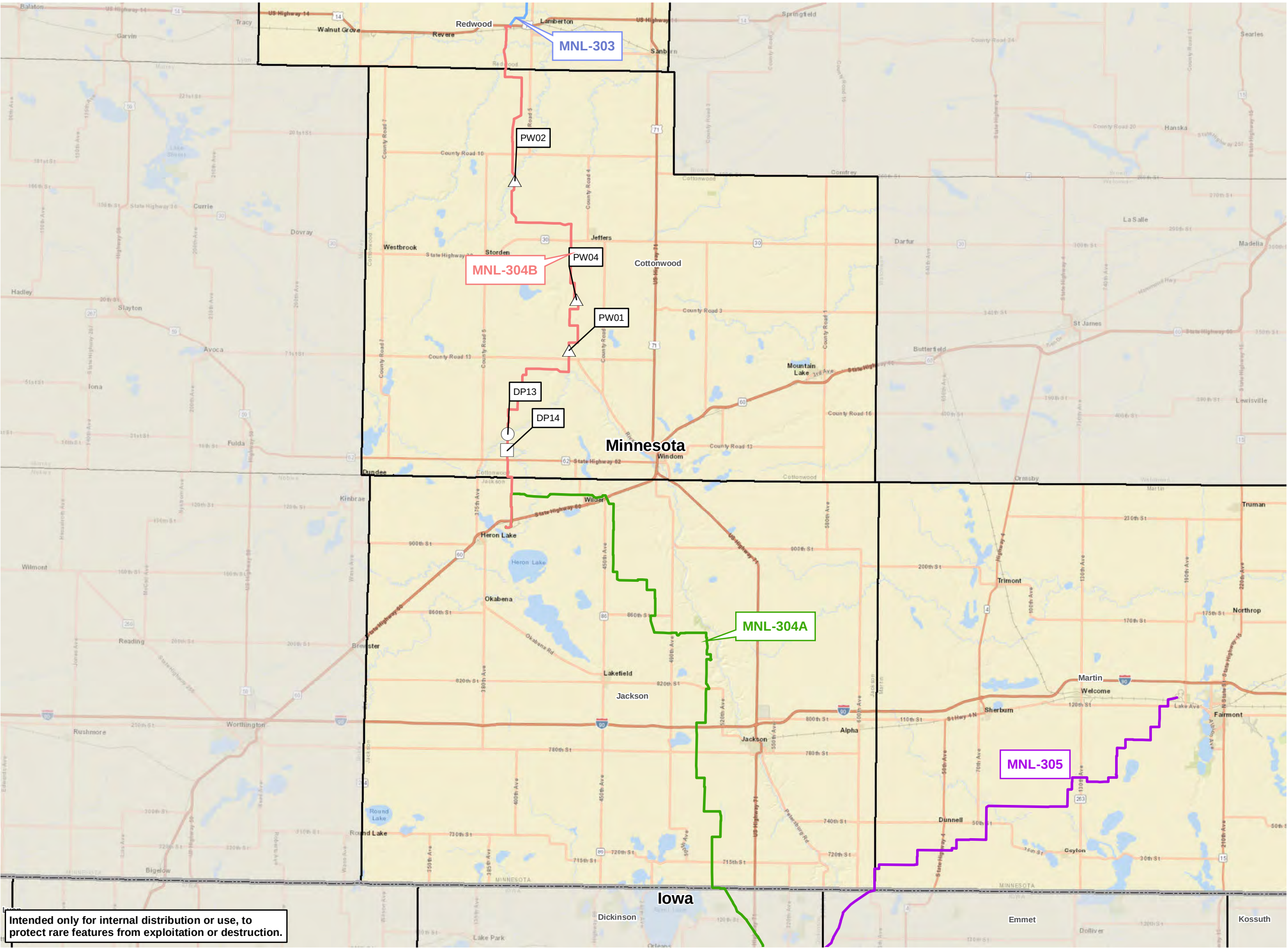
Sheet:
Sheet 4
Sheet 4 of 5

Drawing Number:
005-00040
Current Revision

Table C2: Survey Sites and Outcomes for MNL-304B, Listed North to South (Figure C-6)¹²

Site ID	Targeted for Listed Butterfly Surveys? (Year)	Butterfly Survey Outcome	Targeted for Listed Plant Surveys? (Year)	Plant Survey Outcome	Site-specific Map
PW02	No	N/A (surveyed only for plants)	Yes (2022, 2023)	No habitat/no individuals.	N/A
PW04	No	N/A (surveyed only for plants)	Yes (2022, 2023)	No habitat/no individuals.	N/A
PW01	No	N/A (surveyed only for plants)	Yes (2022, 2023)	No habitat/no individuals.	N/A
DP13	Yes (2022)	No habitat/no individuals.	Yes (2023)	No habitat/no individuals.	N/A
DP14	Yes (2022)	No habitat/no individuals.	No	N/A (surveyed only for DASK/POSK)	N/A

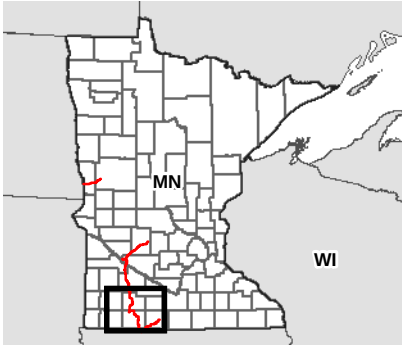
¹² The following five sites were included in the 2022 report but are not listed in the table here, because they are no longer within the Project environmental survey area: PW03, DP11, DP12, PW06, and PW07. DP11 and DP12 were surveyed for DASK/POSK habitat, with none found. PW03, PW06, and PW07 were surveyed for PBCL/WPFO habitat and state-listed plants. The finding at PW03 and PW07 was no habitat/no individuals. At PW06, suitable PBCL habitat was present, but Merjent's botanist did not find suitable WPFO habitat or individuals of PBCL, WPFO, or any other state-listed plants within the environmental survey area.



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Disclaimer: Content on this figure is preliminary, and must be treated as confidential and proprietary. Sources are believed to be reliable and SCS does not assume responsibility for accuracy of data.

VICINITY MAP



LEGEND

Project Route Segment

- MNL-303
- MNL-304A
- MNL-304B
- MNL-305
- Survey Site for DASK/POSK and Flora (no habitat/no individuals)
- Survey Site for DASK/POSK (no habitat/no individuals)
- Survey Site for Flora (no habitat/no individuals)
- County Boundary
- State Boundary

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MIDWEST CARBON EXPRESS PROJECT

Figure Title:
Survey Sites: MNL-304B
Overview Map

Figure Number:
C-6

Scale:
1:360,000
1 in = 30,000 ft

Projection:
Transverse Mercator
NAD 1983 UTM Zone 15

Sheet:
Sheet 1
Sheet 1 of 5

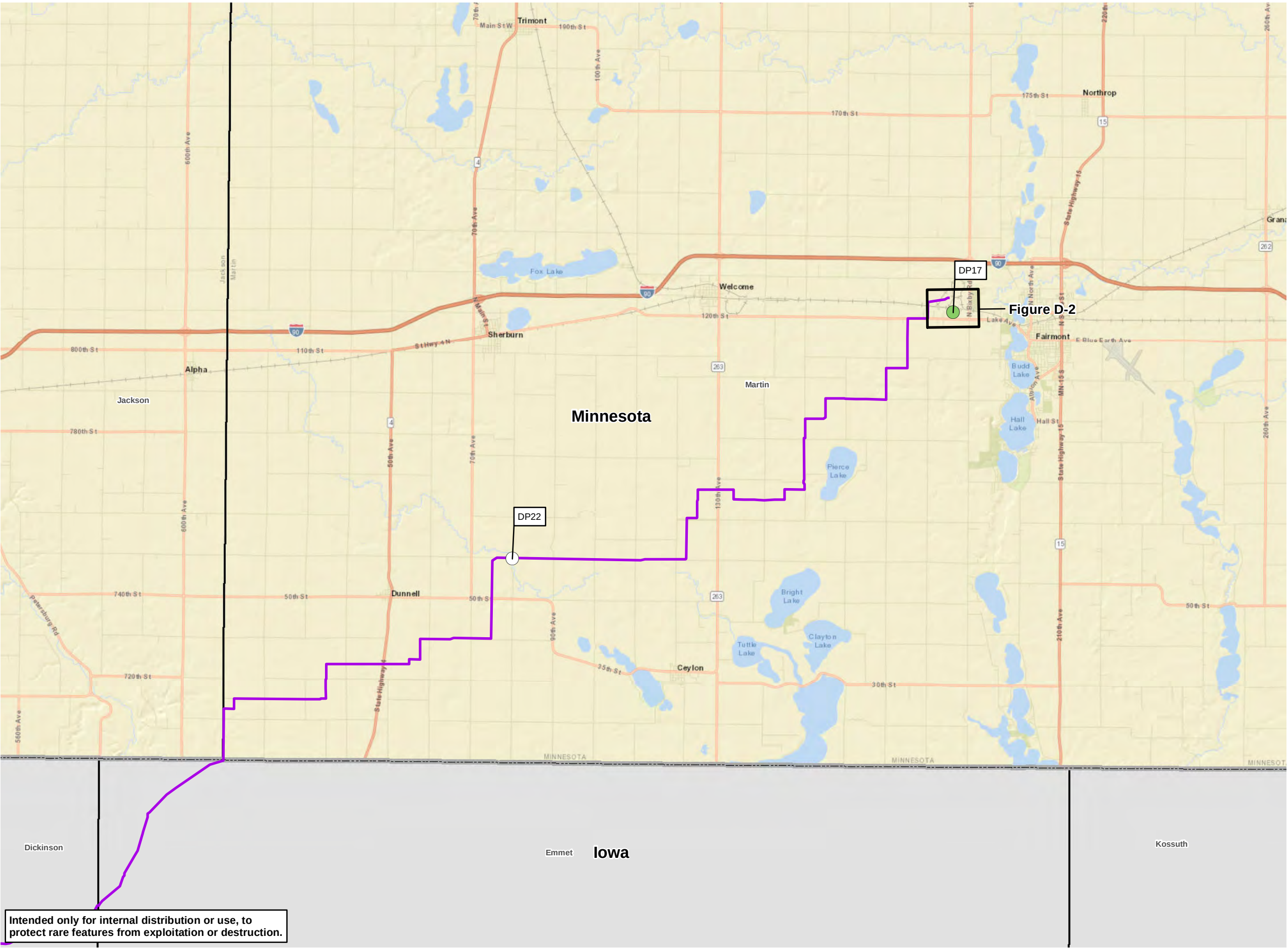
Drawing Number:
005-00040
Current Revision

Attachment D – MNL-305 Survey Sites and Results

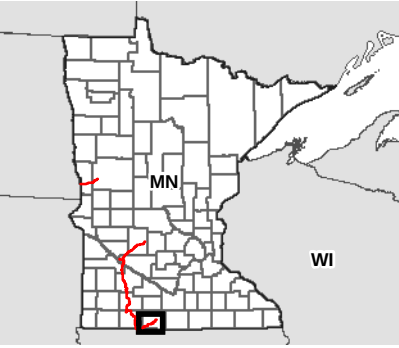
Table D: Survey Sites and Outcomes for MNL-305, Listed East to West (Figure D-1)

Site ID	Targeted for Listed Butterfly Surveys? (Year)	Butterfly Survey Outcome	Targeted for Listed Plant Surveys? (Year)	Plant Survey Outcome	Site-specific Map
DP17 ^a	Yes (2022)	No habitat/no individuals.	Yes (2022)	Suitable WPFO habitat was present (rank C). Tuberous Indian-plantain (<i>Arnoglossum plantagineum</i> ; state-listed threatened) was present approximately 1,750 feet west of the environmental survey area at the time of survey. Merjent's botanist documented 7 individuals. Sullivant's milkweed (<i>Asclepias sullivantii</i> ; state-listed threatened) was present approximately 1,770 feet east of the environmental survey area at the time of survey. Merjent's botanist documented 8 individuals.	Figure D-2
DP22	Yes (2022)	No habitat/no individuals.	Yes (2022)	No habitat/no individuals.	N/A

^a DP17 is no longer within the Project environmental survey area, but it is included here in the table and on Figure D-2 due to the presence of state-listed plants that require reporting (see Attachment F).



VICINITY MAP



LEGEND

Project Route Segment

- MNL-305
- Survey Site for DASK/POSK and Flora (finding: WPFO habitat and individuals of state-listed plant species* and no habitat/no individuals for DASK/POSK)
- Survey Site for DASK/POSK and Flora (no habitat/no individuals)
- County Boundary
- State Boundary
- Site-Specific Map

*See Figure D-2

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Date: 2023-12-05 Revised by: TR Checked by: SS

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Date: Revised by: Checked by:

Date: Revised by: Checked by:

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MIDWEST CARBON EXPRESS PROJECT

Figure Title:
Survey Sites: MNL-305
Overview Map

Figure Number:
D-1

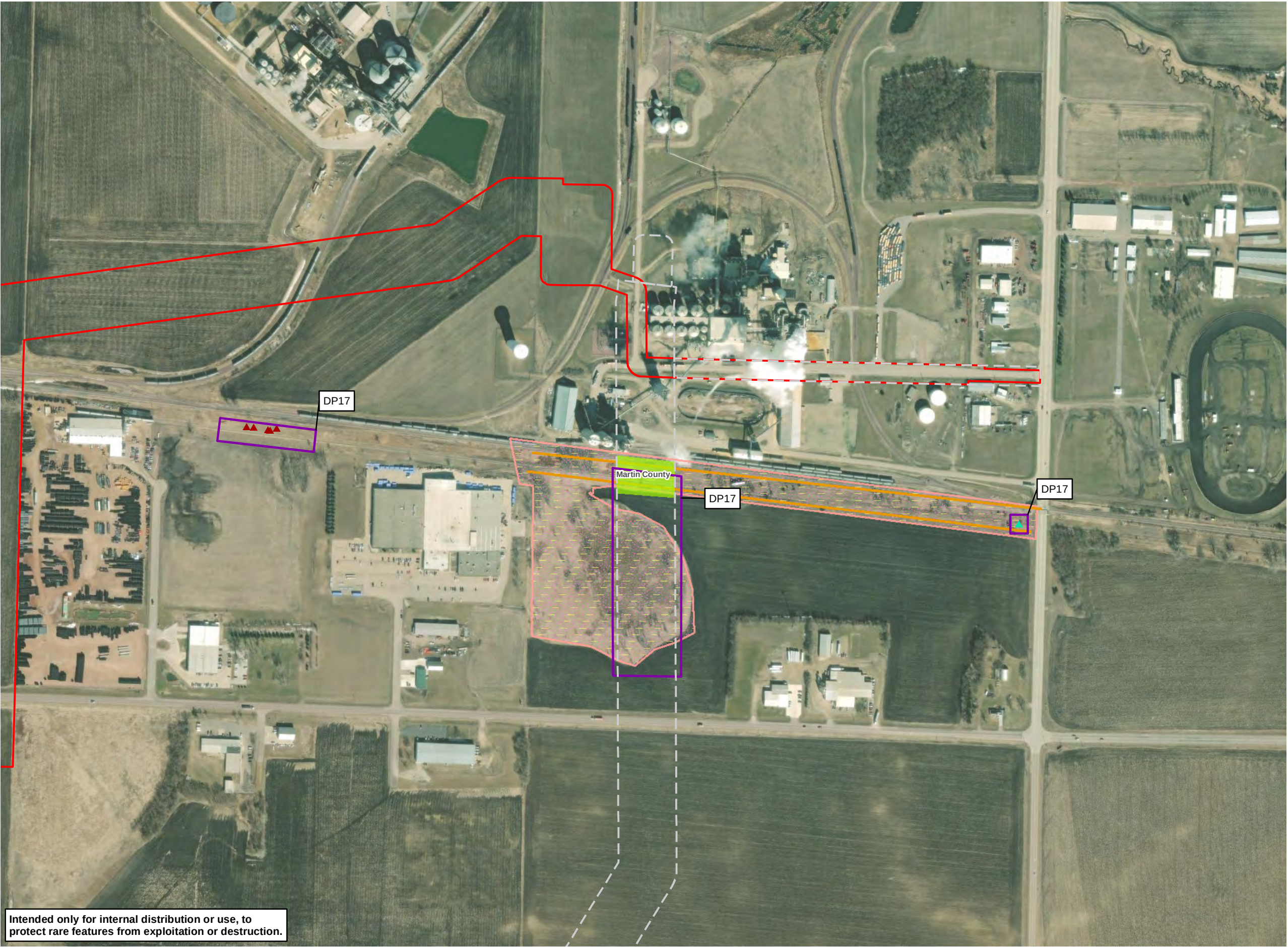
Scale:
1:150,000
1 in = 12,500 ft

Projection:
Transverse Mercator
NAD 1983 UTM Zone 15

Sheet:
Sheet 1
Sheet 1 of 2

Drawing Number:
005-00040
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VICINITY MAP



LEGEND

- Environmental Survey Area (5/25/23)
- Environmental Survey Area (5/24/22)
- Native Plant Communities
- Site of Biodiversity Significance
- Railroad Rights of Way Prairies
- Tuberous Indian-Plantain (Amoglossum plantagineum)
- Sullivant's Milkweed (Asclepias sullivantii)
- Survey Site for DASK/POSK and Flora
- WPFO Habitat (Rank C)

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Date:	2023-12-05	Revised by:	TR	Checked by:	SS
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Date:		Revised by:		Checked by:	

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Figure Title: Survey Results: MNL-305 Site-Specific Map	
Figure Number: D-2	
Scale: 1:6,000 1 in = 500 ft	Projection: Transverse Mercator NAD 1983 UTM Zone 15
Sheet: Sheet 2 Sheet 2 of 2	Drawing Number: 005-00040 Current Revision

Attachment E – MDNR's Rare Species Survey Reports Memo (2012)



Division of Ecological and Water Resources

TO: Endangered and Threatened Species Surveyors

FROM: Lisa Joyal, Endangered Species Review Coordinator

Phone: (651) 259-5109

e-mail: lisa.joyal@state.mn.us

RE: Rare Species Survey Reports

The Minnesota Department of Natural Resources' Division of Ecological and Water Resources (DNR) relies upon the results of endangered and threatened species surveys to conserve these species through its conservation, management, environmental review, and permitting responsibilities. When surveys for rare species are requested as part of the environmental review process, the DNR makes every effort to coordinate closely with surveyors to ensure that survey results are reliable. High quality survey data enables the DNR's to uphold Minnesota's endangered species law (*Minnesota Statutes*, section 84.0895) and associated rules (*Minnesota Rules*, part 6212.1800 to 6212.2300 and 6134).

As such, for projects associated with environmental review, we request that survey proposals be submitted to the DNR before any survey work is initiated. This process is an attempt to avoid any potential delays or other problems due to incomplete list of target species or inappropriate survey protocol. Surveys should primarily target the species mentioned in the Natural Heritage letter, but should also target any other state-listed species that are likely to be found in the habitat in question. Please refer to the DNR Rare Species Guide (<http://www.dnr.state.mn.us/rsg/index.html>) for further information on the rare species that can be found in a particular habitat, and for the habitat and phenology of each targeted species. The DNR Rare Species Guide is the state's authoritative reference for Minnesota's endangered, threatened, and special concern species. It is a dynamic, interactive source that can be queried by county, ECS subsection, watershed, or habitat. Final survey results should also be submitted to the DNR.

Please include the following information in the Rare Species Survey Proposals and Survey Results:

- Purpose of the survey
- List of the targeted species
- Qualifications of the surveyor(s) and his or her experience working with the targeted species
- If applicable, a copy of the collection permit issued by the DNR.
- Survey date(s) and methodology
- Map (and GIS shapefile if large project area) of areas (to be) surveyed or assessed for habitat suitability
- Locations and number of individuals for any state-listed species
- State type of documentation for each listed species (e.g., photograph or collected specimen)
- A completed Rare Feature Reporting Form for each state-listed or tracked species, or a statement that the data has been submitted electronically
- Any associated specimens and electronic data should be submitted with the Survey Results

Survey Proposals and Survey Results may be sent electronically to the email address listed above or mailed to the following address:

Lisa Joyal
DNR Division of Ecological and Water Resources
500 Lafayette Road, Box 25
St. Paul, MN 55155

Thank you for your interest in conducting rare species surveys in Minnesota.

Attachment F – NHIS Documentation and Species Identification Confirmation



MEMO

Date:

February 22, 2023

To:

Data Manager, Natural Heritage Information System, Minnesota Department of Natural Resources

From:

Andy Kranz, Merjent

CC:

Sarah Stai, Merjent

Subject:

NHIS Rare Plant Observation Data, Summit Carbon Solutions, LLC Projects

Attachments:

- NHIS Rare Plant Observation Data_ARK 2022.xlsx
- NHIS Rare Plant Observation Data_ARK 2022_UTM14.zip
- NHIS Rare Plant Observation Data_ARK 2022_UTM15.zip
- NHIS Species ID Confirmation SCS.pdf

I am submitting data for observations of three rare plant populations in Minnesota documented during field surveys in 2022. The surveys were conducted to assess habitat for federally threatened plants. The surveys also documented plants that are state-listed in Minnesota as special concern, threatened, or endangered.

I observed one population each of *Arnoglossum plantagineum*, on June 6, 2022, and *Asclepias sullivantii*, on July 9, 2022, in the City of Fairmont, Martin County, Minnesota. These populations were observed during surveys as part of the Summit Carbon Solutions, LLC Martin County Project. The populations were located within the same parcel, owned by Fairmont Economic Development Authority.

I also observed one population of *Cypripedium candidum* on June 8, 2022, in Orwell Township, Otter Tail County. This population was observed during surveys as part of the Summit Carbon Solutions, LLC Otter Tail to Wilkin Project and is located on the property of Ethel Maack.

Please see the attached rare plant observation data spreadsheet and shapefiles for details.

Specimens of *A. plantagineum* and *A. sullivantii* were collected under DNR Special Permit #23226. This permit is assigned to Otto Gockman who was also conducting field work on the project. Correct identification was confirmed by Welby Smith and the specimens will be submitted to the University of Minnesota Herbarium.

Please contact me with any questions or concerns.

Respectfully submitted,



Andy Kranz
Environmental Consultant/Botanist
Merjent
507-459-3150
andy.kranz@merjent.com

Nun	Shapefile Name	Shape_ID	Shape_Detail	Species_Name	Alternate_Species	urce	Observer	Affiliation	Additional_Observers	Contact	Contact_Info	Project	Survey	Observation_Date	Fuzzy_Date	Observation_Remarks	Act_Num_Ind	Est_Num_Ind	Population_Size	Phenology	Phenology_Comments	Native_Plant_Community	Habitat	Population_Extent	Viability_Comments	Management_Comments	Directions	County	TWP	RGE	RGE_Dir	SEC	QQ_SEC	Area_Name	Ownership	ID_Type	ID_Confirmed	ID_Conf_By	Col_No	Repository
1	NHIS Rare Plant Observation Data_ARK 2022_UTM15	1	Point locations of Arnoglossum plantagineum individuals or groups of individuals (number indicated in attribute data)	Arnoglossum plantagineum		FNA	Andrew R. Kranz	Merjent, Inc.		Andy Kranz 507-459-3150; andrew.r.kranz@gmail.com	Summit Carbon Solutions, LLC Martin County Project	Flora	2022-06-06			Population near but outside survey area. Herbarium label: Northwestern Fairmont; 0.8 mile west of County Hwy. 39; 0.3 mile north of 120th St.; 80 feet south of primary railroad; 20 feet north of side-track. Rosette ~2 feet in diameter; 7 plants, possibly more north of surveyed area to railroad; 1 plant in bloom on return July 9, 2022, fls. ~80, white. In small patch of degraded mesic prairie in railroad right-of-way dominated by ruderal vegetation with intermittent prairie flora. Associated with Bromus inermis, Hesperostipa spartea, Poa pratensis, Helianthus pauciflorus, Zizia aptera, Asclepias syriaca, Ratibida pinnata, Lithospermum canescens, Veronicastrum virginicum, Anemone canadensis, Helopsis helianthoides, Rhamnus cathartica.	7	7+	3000 sq ft; did not have permission to survey all the way north to rail; possibly larger population	Emerging (forb)	Rosettes mature at time of collection; upon return on July 9, 2022, 1 individual was in bloom (~50% of infll)	UPs23 - Southern Mesic Prairie	Degraded UPs23; dominated by Bromus inermis, Hesperostipa spartea, Poa pratensis, Helianthus pauciflorus, Dichanthelium oligosanthes; patches of NPC in matrix of ruderal vegetation, all within a railroad right-of-way.	? - Uncertain whether full extent of Observation is known	Aggressive ruderal vegetation present; potential for mowing and herbicide	Mowing apparent at southern limit of observed population	Northwestern Fairmont; 0.8 mile west of County Hwy. 39; 0.3 mile north of 120th St.; 80 feet south of primary railroad; 20 feet north of side-track.	Martin			Fairmont Economic Development Authority	S	Yes	Smith, Welby R.	1001	University of Minnesota Herbarium				
2	NHIS Rare Plant Observation Data_ARK 2022_UTM15	2	Point location of Asclepias sullivantii colony center	Asclepias sullivantii			Gleason and Cronquist 1991	Andrew R. Kranz	Merjent, Inc.		Andy Kranz 507-459-3150; andrew.r.kranz@gmail.com	Summit Carbon Solutions, LLC Martin County Project	Flora	2022-07-09		Population near but well outside survey area. Herbarium label: Northwestern Fairmont; 90 feet west of County Hwy. 39; 0.2 mile north of 120th St.; 95 feet south of railroad. Infl. axillary and terminal umbels; fls. 6-9 per umbel, pink; 8 stems, 0.5 to 3 feet between stems. In railroad right-of-way dominated by cool season grasses, trees and shrubs sparse to patchy. Directly associated with Bromus inermis, Acer negundo, Spartina pectinata, Solidago altissima; patches of mesic prairie flora nearby include Andropogon gerardi, Apocynum cannabinum, Symphyotrichum lanceolatum, Zizia aurea, Anemone cylindrica, Solidago rigida, Symphyotrichum ericoides, Ratibida pinnata, Helopsis helianthoides, Comandra umbellata, Taraxacum officinale, Rhamnus cathartica, Helianthus grosseserratus.	8	8	300 sq ft stems/ramets	Flowering	1 individual in bloom, 2 umbels	In ruderal vegetation; dominated by Bromus inermis, partly shaded by Acer negundo; UPs23 flora nearby; all within a railroad right-of-way.	? - Uncertain whether full extent of Observation is known	Aggressive ruderal vegetation present; potential for mowing and herbicide		Northwestern Fairmont; 90 feet west of County Hwy. 39; 0.2 mile north of 120th St.; 95 feet south of railroad.	Martin			Fairmont Economic Development Authority	S	Yes	Smith, Welby R.	1002	University of Minnesota Herbarium					
3	NHIS Rare Plant Observation Data_ARK 2022_UTM14	3	Point locations of Cypripedium candidum individuals or groups of	Cypripedium candidum		FNA	Andrew R. Kranz	Merjent, Inc.		Andy Kranz 507-459-3150; andrew.r.kranz@gmail.com	Summit Carbon Solutions, LLC Otter Tail to Wilkin Project	Flora	2022-06-08			Population within and extending beyond survey area. 17 individuals observed within survey area, all in bloom; population continues to the west outside survey area, perhaps dozens or hundreds in total; specimens were not collected; photographs available upon request.	17 dozens to hundreds		18,000 sq ft (portion of population within survey area)	Flowering	All observed individuals were in bloom	WPN53 - Northern Wet Prairie	Degraded/grazed wet prairie, occurring as an ecotone between mesic prairie and sedge meadow.	N - Confident full extent of Observation is NOT known	Ruderal vegetation abundant; possibly grazing pressure	Uncertain if recently grazed or retired pasture	Northern Orwell Township; 1.1 miles west of County Hwy. 124; 0.3 miles south of County Hwy. 1	Otter Tail			Ethel Maack	P	n/c							

From: [Andy Kranz](#)
To: Reports.NHIS@state.mn.us
Cc: [Joyal, Lisa \(DNR\)](#); [Sarah Stai](#); [MCE Archive](#)
Subject: Rare Plant Observations 2022
Date: Wednesday, February 22, 2023 2:37:05 PM
Attachments: [image001.png](#)
[NHIS Rare Plant Observation Data Memo - 02-22-23.pdf](#)
[NHIS Rare Plant Observation Data ARK 2022.xlsx](#)
[NHIS Rare Plant Observation Data ARK 2022 UTM14.zip](#)
[NHIS Rare Plant Observation Data ARK 2022 UTM15.zip](#)
[NHIS Species ID Confirmation SCS.pdf](#)

To whom it may concern:

Please see the attached memo and rare plant observation data. Let me know if you have any questions or concerns.

Thank you,

Andy Kranz

612.924.3998 direct

507.459.3150 mobile

andy.kranz@merjent.com



1 Main Street SE, Suite 300

Minneapolis, MN 55414

612.746.3660 main

www.merjent.com

From: [Andy Kranz](#)
To: [Sarah Stai](#)
Subject: Fwd: EXTERNAL: Re: Rare plant specimens
Date: Monday, February 20, 2023 8:23:50 PM
Attachments: [image001.png](#)

See Welby's confirmation below.

Andy Kranz
Merjent
507-459-3150

From: Smith, Welby R (DNR) <welby.smith@state.mn.us>
Sent: Friday, February 17, 2023 10:43:22 AM
To: Andy Kranz <andy.kranz@merjent.com>
Subject: Re: EXTERNAL: Re: Rare plant specimens

The specimens look, and correctly identified. I will bring them to the Bell herbarium today and get them accessioned into the collections right away.

welby

From: Andy Kranz <andy.kranz@merjent.com>
Sent: Tuesday, February 14, 2023 8:14 PM
To: Smith, Welby R (DNR) <welby.smith@state.mn.us>
Subject: Re: EXTERNAL: Re: Rare plant specimens

No problem. Nathan Dahlgren met me in the lobby and said he would set them in your cubicle.

Andy Kranz
Merjent
507-459-3150

From: Smith, Welby R (DNR) <welby.smith@state.mn.us>
Sent: Tuesday, February 14, 2023, 7:27 PM
To: Andy Kranz <andy.kranz@merjent.com>
Subject: Re: EXTERNAL: Re: Rare plant specimens

I wasn't there (you know that now), but I will return to my cube tomorrow afternoon.

welby

From: Andy Kranz <andy.kranz@merjent.com>
Sent: Tuesday, February 14, 2023 12:13 PM
To: Smith, Welby R (DNR) <welby.smith@state.mn.us>
Subject: RE: EXTERNAL: Re: Rare plant specimens

Welby,

I'll drop the specimens off this afternoon, probably between 3:00 and 4:00.

Andy Kranz

612.924.3998 direct

507.459.3150 mobile

andy.kranz@merjent.com



1 Main Street SE, Suite 300

Minneapolis, MN 55414

612.746.3660 main

www.merjent.com

From: Smith, Welby R (DNR) <welby.smith@state.mn.us>

Sent: Monday, February 13, 2023 6:31 PM

To: Andy Kranz <andy.kranz@merjent.com>

Subject: EXTERNAL: Re: Rare plant specimens

CAUTION: This email originated from outside of Merjent.

Hi Andy,

Sure, bring them in, or get them to me whatever way is most convenient for you. If I'm not there, they can be left in my cubicle.

welby

From: Andy Kranz <andy.kranz@merjent.com>

Sent: Monday, February 13, 2023 6:24 PM

To: Smith, Welby R (DNR) <welby.smith@state.mn.us>

Subject: Rare plant specimens

This message may be from an external email source.

Do not select links or open attachments unless verified. Report all suspicious emails to Minnesota IT Services Security Operations Center.

Hi Welby,

I have two specimens to submit, *Arnoglossum plantagineum* and *Asclepias sullivantii*, from the same railroad ROW in Martin County. These were collected in the course of 2022 Merjent work. I made collections at Otto's suggestion, under his permit number (he was working on the same project). Can

I bring these to you to verify ID?

I've attached some photos as well as herbarium labels and the NHIS data sheet.

Andy Kranz

612.924.3998 direct

507.459.3150 mobile

andy.kranz@merjent.com



1 Main Street SE, Suite 300

Minneapolis, MN 55414

612.746.3660 main

www.merjent.com

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Attachment G – MDNR’s Guidance on Documenting and Collecting Rare Plants (2018)

Guidance on Documenting and Collecting Rare Plants

DNR Division of Ecological and Water Resources

February 2018

Please refer to the following guidance if you will be submitting records for entry into the DNR's Natural Heritage Information System (NHIS). All botanical surveys conducted for environmental review or permitting purposes should follow this guidance.

Before Going in the Field

- Review the [current list of state-listed species](#) so you will know which species are rare.
- Check the Rare Features Database (see [How to Obtain Natural Heritage Data](#)) and, if applicable, the records of other public land managers to see if there are known occurrences of rare plants within your work or study area.
- Familiarize yourself with critical identifying features of species likely to be collected. This might include a visit to a herbarium to review previous collections of a plant species.
- Obtain the plant spreadsheet template for data entry purposes. Review this spreadsheet to familiarize yourself with the type of information that should be collected. The Rare Plant Observations spreadsheet template is available under "Submitting Data" on the [NHIS Website](#).
- Obtain a permit if you plan to collect specimen vouchers of state-listed endangered or threatened species. Minnesota's endangered species law (*Minnesota Statutes*, section 84.0895) and associated rules (*Minnesota Rules*, part 6212.1800 to 6212.2300 and 6134) prohibit the taking of threatened or endangered species without a permit. Please contact Richard Baker, Endangered Species Coordinator, at Richard.Baker@state.mn.us to request a permit.
- When required, obtain permits for collecting on public lands such as Scientific and Natural Areas, State Parks, and National Forests.
- Respect property owners' rights. Obtain permission from the private landowner or public land manager to 1) go on the land and 2) to collect plants.
- **Any surveys required through the DNR environmental review process must follow the standards contained in this Guidance.** Before initiating any such survey, the surveyor must receive approval of a project-specific survey plan from Lisa Joyal, Endangered Species Review Coordinator. Any proposed departure from the standards in the *Guidance* must be identified in the project-specific plan.

Specimen Collection

Most rare plant records in the DNR's Rare Features Database are documented with collected specimens deposited in credible herbaria. Records documented by standard herbarium collections in museums are strongly preferred over all other forms of documentation. A specimen of a rare plant often is sufficient if it includes a portion of the plant that allows positive identification of the species.

Under what circumstances should I collect a herbarium specimen?

- Collect state-listed endangered or threatened plants only if you have a permit. If you have unintentionally collected an endangered or threatened plant without a permit, the specimen should be submitted to the DNR as soon as is practical following the procedures described below, with a brief note attached that explains the circumstances.
- For new locations of a species, collect a specimen; in general, make no more than one collection of a particular species per 40 acres of habitat.
- For previously known populations of an endangered or threatened plant, consider collecting a new voucher if the DNR's Rare Features Database indicates that it has been more than thirty years since the last voucher was collected from the population.
- For any given species, collect only when distinguishing characters are present (usually flowers and/or fruits are necessary); if key characters are not present, mark the location and return at the appropriate time for collecting a specimen with distinguishing characteristics.
- For endangered or threatened vascular plants, collect a complete specimen (which includes roots) only when the population has more than 100 individuals.

- For populations of endangered or threatened vascular plants with fewer than 100 individuals, collect only the distinguishing portion of the plant (e.g., a portion of the inflorescence that has one or more flowers or a portion of the stem that has one or more leaves). A partial specimen might be inadequate to confirm the identification. In this case, supplement the partial collection with a close-up photograph that clearly shows the diagnostic features. Please note that in many cases photographs are not sufficient to confirm identification.
- For aquatic plants, collect a portion of the stem with leaves and fruits or flowers. Do not collect the roots. If you are unsure whether you have found a rare species, collect several specimens. Please note that in most cases photographs are not sufficient to confirm the identification of aquatic species. If your target search area is aquatic, please contact Welby Smith, DNR Botanist, at Welby.Smith@state.mn.us for additional guidance.
- For *Botrychium* spp., always collect a specimen of the above-ground portion of the plant, regardless of the apparent population size or the state status of the species.
- For mosses, liverworts, fungi and lichens, collect such that the viability of the population is maintained.

How do I make a proper collection? See General Guidelines for Collecting Vascular Plant Specimens on page 3.

Specimen Submission

- For quality control purposes, the identification of the specimen must be confirmed by a qualified second party before a record can be entered into the Rare Features Database.
- Send specimen(s) of state-listed species or suspected state-listed species directly to Welby Smith, DNR Botanist, for verification. Each specimen must have a label that meets the Bell Museum standards (see page 3). Do not submit unknown specimens unless you suspect that it is a state-listed species. If you are unsure of the species' identification, you can leave the space for the scientific name blank. Send specimens to:
 Welby Smith
 Minnesota Department of Natural Resources
 Division of Ecological Resources
 500 Lafayette Road, Box 25
 St. Paul, MN 55155
- DNR staff will complete verification or submit the specimen to an outside expert for annotation. Following verification, the DNR will donate specimens to the University of Minnesota Herbarium, a division of the [Bell Museum of Natural History](#). Save response from the DNR and submit with data.

Data Submission

- Follow the directions and templates under "Submitting Data" on the [NHIS Website](#).
- Document *all* state-listed endangered, threatened, or special concern species encountered. Include type of documentation for each record (e.g., photograph or specimen).
- Submit data electronically as a spreadsheet with an accompanying shapefile. Use the Rare Plant Observations spreadsheet template available under "Submitting Data" at [NHIS Website](#).
- **Important!** *Ensure that the unique identifier for each record is the same in the shapefile, the spreadsheet, the report's tables and figures, and the information submitted with the specimens.*
- Submit cover sheet, survey report, GIS shapefile, spreadsheet, and email verifying specimen identification to Reports.NHIS@state.mn.us.

How will my records be used to protect rare plants?

- Conservation planning at local, state and regional levels.
- Environmental review of development projects.
- Research about life history.
- Revisions to the state list of endangered, threatened and special concern species.
- Legal challenges related to protected species locations are possible. Properly vouchered specimens are often critical in the protection of rare plant populations in these cases.

Questions?

- **Regarding permits:** Contact Rich Baker at Richard.Baker@state.mn.us or 651-259-5073.
- **Regarding specimens:** Contact Welby Smith at Welby.Smith@state.mn.us or 651-259-5142.
 or Hannah Texler at Hannah.Texler@state.mn.us or 651-259-5048.
- **Regarding data submittal:** Contact Karen Cieminski at Karen.Cieminski@state.mn.us or 651-259-5081.
- **Regarding environmental review process:** Contact Lisa Joyal at Lisa.Joyal@state.mn.us or 651-259-5109.

General Guidelines for Collecting Vascular Plant Specimens*

*For mosses, liverworts, algae, fungi and lichens, please contact the [University of Minnesota Herbarium](#) for collection guidelines.

1. **Equipment:** Plant press, straps (2), felt blotters, ventilators (corrugated boards), and newspaper. Also, a knife or other tool for cutting and digging and a notebook of standardized form for recording field data. The press can be made from $\frac{3}{4}$ " plywood cut 12" x 18" (2 pieces); the ventilators can be cut from discarded "cardboard" boxes, also 12" x 18" (the corrugations should run the short direction). The blotters can be obtained from a stationery store.
2. **Preparation:** Once the specimen is found, it is necessary to determine what portion of the plant will be collected. A complete collection includes the entire plant with roots, but for purposes of conservation, the roots of rare species should not be collected if the population consists of fewer than 100 individuals. For most species, such as orchids, a single flower is enough for purposes of identification. Other species, e.g., sedges, usually require the complete aboveground stem with mature fruit. Specimens of trees and shrubs should include a twig with mature leaves and flowers and/or fruit. Specimens that do not show diagnostic features cannot be identified and are worthless. If only a portion of the plant is collected, it is important to record a description of the entire plant.

Before collecting plants, it is a good idea to check with the curator of the herbarium where the specimen will be deposited. Some herbaria may not accept a partial specimen unless it has special significance (e.g., a new location for an endangered species).

3. **Pressing and processing specimens:** The freshly collected specimen is placed within the sheet of folded newspaper with the leaves, flowers, etc. in a natural position, but clearly showing the diagnostic features. The paper is placed between two sheets of felt blotters, which are themselves placed between two corrugated ventilators. It is then put within the press, which is tightened with the straps (or ropes). Several specimens can be put in a single press by layering the blotters and ventilators. Commercial plant presses are slightly larger than herbarium paper so the specimens should not fill the plant press side to side. Also, be sure to leave room for a label in the lower right portion. The press must then be put in a warm dry place until the plants are dry. A simple plant drier that uses heat rising from a light bulb works well, but is not essential. The blotters should be changed every day until the specimen is dry. If a specimen does not dry within 4-5 days, it will likely begin to decompose. When the specimen is dry, it should be taken from the press, but kept within the folded newspaper for protection.

A label (see example below) must be prepared before the specimen can be sent to a herbarium. The label should be on acid-free, archival quality paper. We suggest that you use labels that are 2 $\frac{3}{4}$ x 4 $\frac{1}{4}$ inches in size, but other labels not to exceed 3 x 5 inches will be acceptable. At a bare minimum, the label must contain the name of the species, location of collection, description of habitat, name of collector, and date of collection. The label should also include latitude and longitude coordinates and/or UTM coordinates, and, if a permit was required, the permit number. Providing a label is the responsibility of the collector, not the herbarium or the DNR. A specimen without a label will not be accepted by a herbarium.

After the label is prepared, it should be put with the specimen inside the folded newspaper, which may be held between two corrugated ventilators for rigidity. The herbarium will mount the specimen and label on a stiff sheet of paper and accession it into their collection.

The University of Minnesota Herbarium, a division of the Bell Museum of Natural History, houses the largest collection documenting Minnesota's plant diversity and is the primary repository for the DNR's Minnesota Biological Survey. Additional [guidance on collecting rare plants for museum specimens](#) can be found on the University of Minnesota Herbarium website.

Plants of Scott County, Minnesota, USA

Silphium integrifolium Michx. var. *integrifolium*

3 miles west of Jordan in north half of quarter-quarter section.

Approximately 100 plants in wet to wet-mesic prairie on terrace within the Minnesota River Valley. In heavily grazed pasture dominated mostly by *Spartina pectinata* and *Agrostis stolonifera*. Soils range from black muck with marl concretions to silt loam. Site has been compacted by grazing. Glacial erratics common. Associated with *Carex stricta*, *Pycnanthemum virginianum*, *Lobelia siphilitica*, *Lysimachia quadriflora*, *Aster puniceus*.

T 114N R 24W NW $\frac{1}{4}$ of SE $\frac{1}{4}$ of Sec 27

MNDNR Permit # 1996

Fred S. Harris

96235

September 3, 1996

MINNESOTA BIOLOGICAL SURVEY
MINNESOTA DEPARTMENT OF NATURAL RESOURCES

NOTICE:

In accordance with Minnesota Rules, part 7829.0500 and Minnesota Statutes Chapter 13, Summit Carbon has designated portions of the report titled "Results of 2022 Field Surveys for Listed Butterfly and Plant Species in Minnesota" as NONPUBLIC DATA – NOT FOR PUBLIC DISCLOSURE because it contains natural heritage information. Natural heritage information is nonpublic under Minn. Stat. § 84.0872. The Minnesota Department of Natural Resources also restricts its dissemination by license agreement. Given the need to include nonpublic information, Summit Carbon will prepare both Nonpublic and Public versions of "Results of 2022 Field Surveys for Listed Butterfly and Plant Species in Minnesota."



Results of 2022 Field Surveys for Listed Butterfly and Plant Species in Minnesota

Project Name:

Summit Carbon Solutions Midwest Carbon Express Project

Document Number:

SCS-0700-ENV-02-RPT-040

Date

February 28, 2023

REVISION HISTORY

DATE	REVISION	REVISION DESCRIPTION	PREPARED BY:	REVIEWED BY:	APPROVED BY:
02/28/23	0	Results of 2022 Field Surveys for Listed Butterfly and Plant Species in Minnesota	SMS	BAB	JZ

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Attachment B – MNL-303 Survey Sites and Results

Attachment C – MNL-304 Survey Sites and Results

Attachment D – MNL-305 Survey Sites and Results

Attachment E – MDNR’s Rare Species Survey Reports Memo (2012)

Attachment F – NHIS Documentation and Species Identification Confirmation

Attachment G – MDNR’s Guidance on Documenting and Collecting Rare Plants (2018)

Acronyms and Abbreviations

CO ₂	carbon dioxide
DASK	Dakota skipper
MDNR	Minnesota Department of Natural Resources
Merjent	Merjent, Inc.
MNR	Midwest Natural Resources, Inc.
NHIS	Natural Heritage Information System
NLCD	National Land Cover Dataset
NPC	Native Plant Community
PBCL	prairie bush clover
POSK	Poweshiek skipperling
Project	Midwest Carbon Express Project
ROW Prairie	Minnesota Railroad Right-of-way Prairies
SCS	Summit Carbon Solutions, LLC
SOBS	Sites of Biodiversity Significance
USFWS	U.S. Fish and Wildlife Service
WPFO	western prairie fringed orchid

1 Introduction

Summit Carbon Solutions, LLC (SCS) is proposing to develop the Midwest Carbon Express Project (the Project), a carbon capture, transportation, and sequestration project that will capture and transport carbon dioxide (CO₂) emissions from industrial facilities in Iowa, Minnesota, Nebraska, North Dakota, and South Dakota to a sequestration site in North Dakota, where the CO₂ will be safely and permanently stored. Construction of the Project will involve approximately 2,000 miles of 4-inch to 24-inch pipelines.

SCS is preparing for Project permitting and construction with support from Merjent, Inc. (Merjent) for the Project's environmental review efforts in Minnesota. SCS and Merjent have been coordinating with the Minnesota Department of Natural Resources (MDNR) regarding potential occurrences of sensitive species.¹ This report describes field surveys conducted in 2022 along the Project's five Minnesota pipeline segments (shown on the map in Figure 1 and listed in Table 1 with their associated counties).

Table 1: Pipeline Segments in Minnesota and Associated Counties

Pipeline Segment ID	Counties
MNL-321	Otter Tail, Wilkin
MNL-337	Chippewa, Kandiyohi, Renville
MNL-303	Chippewa, Redwood, Renville, Yellow Medicine
MNL-304	Cottonwood, Jackson, Redwood
MNL-305	Martin

The surveys targeted plants that are state-listed in Minnesota as special concern, threatened, or endangered and for which suitable habitat may occur in or near the environmental survey area. Species on the MDNR watch list according to MNTAXA² were also documented when observed. Additionally, through a parallel coordination process with the U.S. Fish and Wildlife Service (USFWS), four federally listed species were determined to warrant field surveys (Table 2).³ All four species, two butterflies and two plants, are also state-listed in Minnesota. Although the butterfly species were not targeted as part of SCS's correspondence with the MDNR regarding survey protocols, results of butterfly habitat assessments are reported here due to the species' state status.

Table 2: Federally Listed Species Targeted for Survey

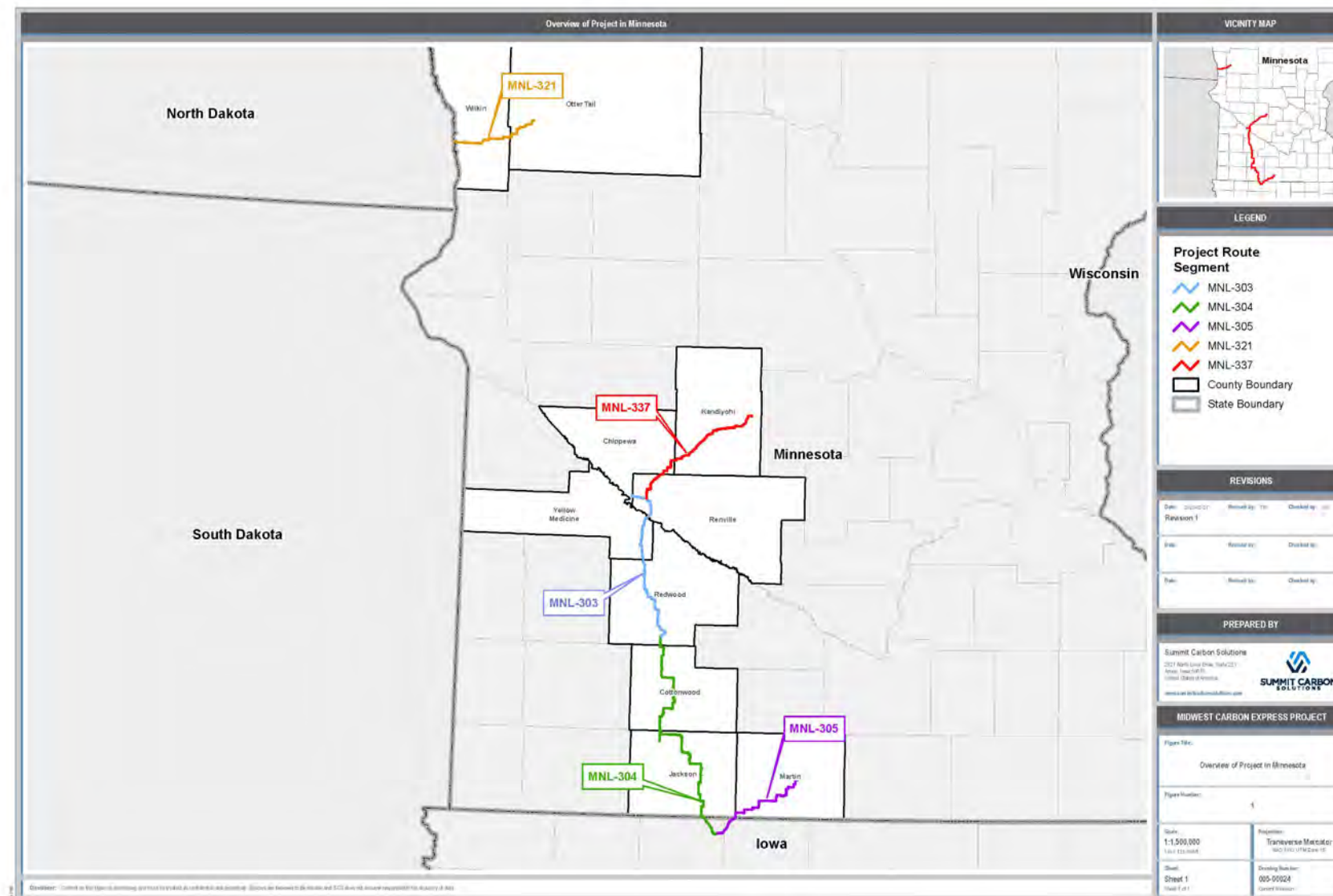
Species	Federal Status	Minnesota Status
Dakota Skipper (<i>Hesperia dacotae</i>)	Threatened	Endangered
Poweshiek Skipperling (<i>Oarisma poweshiek</i>)	Endangered	Endangered
Prairie Bush Clover (<i>Lespedeza leptostachya</i>)	Threatened	Threatened
Western Prairie Fringed Orchid (<i>Platanthera praeclara</i>)	Threatened	Endangered

¹ SCS submitted a letter to MDNR on April 5, 2022, requesting consultation regarding sensitive species in Minnesota's Natural Heritage Information System database and providing its proposed survey protocol for sensitive flora species in the vicinity of the Project. MDNR responded on May 13, 2022, with approval of SCS's protocol, which was followed to obtain the results reported here.

² MDNR watch-list status was obtained from http://www.dnr.state.mn.us/eco/mcbs/plant_lists.html.

³ USFWS did not specifically request field surveys for the Dakota skipper, but SCS included this species in the desktop and field effort because of its status as endangered in Minnesota and the similarity of its habitat requirements to the Poweshiek skipperling.

Figure 1: Overview of Project in Minnesota



2 Butterfly Survey Methods

Merjent worked with qualified biologists at Midwest Natural Resources, Inc. (MNR) to identify and assess habitat for the Dakota skipper and Poweshiek skipperling within the Project's environmental survey area in Minnesota. Both Lepidoptera species inhabit native prairie remnants. MNR conducted a desktop assessment to identify areas of potentially suitable habitat within the Project footprint and then completed on-the-ground surveys to evaluate those areas further. Where suitable habitat was present as determined by the field surveys, MNR conducted occupancy surveys during the 2022 flight period. Methods for the desktop assessment and field surveys are described further below. MNR's biologists conducting the surveys, Otto Gockman and Jake Walden, are both MDNR-approved Prairie Skipper Surveyors and hold a Federal Recovery Permit for the Dakota skipper.

2.1 Desktop Assessment

MNR evaluated areas of potentially uncultivated grassland within the Project footprint in Minnesota by using the following publicly available data.

- Recent and historic aerial imagery from the National Agricultural Imagery Program and Google Earth
- National Land Cover Dataset (NLCD)
- Lidar elevation
- Natural Resources Conservation Service Soil Survey Geographic Database
- MDNR Native Plant Communities (NPCs), typically located within Sites of Biodiversity Significance (SOBS)
- Minnesota Railroad Right-of-way Prairies (ROW Prairies)

2.2 Field Surveys

Between May 31 and June 15, 2022, MNR conducted field surveys for the areas identified in the desktop assessment. The pedestrian surveys involved evaluating the quality of each habitat polygon based on the presence of larval-host species as well as nectar plants. Habitat documentation included: estimating cover of native graminoids, native forbs, non-native species (both graminoids and forbs), and trees and shrubs; documenting presence/absence of requisite prairie species and cover, where applicable; and taking representative photographs at each location.

MNR then conducted occupancy surveys, where indicated by the June field habitat assessments, on July 3, 6, and 9, 2022. Occupancy survey methods were based on the Dakota Skipper North Dakota Survey Protocol, prepared by the USFWS Mountain-Prairie Region in 2018 and used at the request of USFWS. MNR's methodology followed the specifications in this document for survey frequency and duration, timing and environmental conditions, phenological indicators, and other aspects. MNR consulted with MDNR and USFWS about the appropriate window to target for the species' flight periods in Otter Tail County, based on this year's phenology (late June through mid-July, accordingly).

3 Plant Survey Methods

Similar to the approach taken for butterflies, Merjent conducted a desktop assessment to identify areas of potentially suitable habitat for state-listed plants within the Project footprint. The assessment considered all state-listed species, including the two that are also federally listed (see Table 2). Merjent's Andy Kranz, a MDNR-approved botanist, then carried out field surveys. Methods for the desktop assessment and field surveys are described further below.

3.1 Desktop Assessment

Merjent identified the areas to be surveyed in the field by reviewing MDNR's Natural Heritage Information System (NHIS) and public data sources. Where resources from the sources listed below overlapped the Project

environmental survey area (or based on the criteria given below for certain data sources), Merjent considered the location to have potentially suitable habitat for the two federally listed plant species and/or for other state-listed species that may occur in the Project vicinity.

- NHIS⁴ Element Occurrences of state-listed plants within a 1-mile radius, where potentially suitable habitats are visible within the environmental survey area on aerial imagery
- Other potentially suitable habitats visible on aerial imagery, such as potential fens, sites with aquatic features, or other aerial signatures that are unique relative to the surrounding area
- SOBS (with a biodiversity significance ranking of moderate, high, or outstanding)⁵
- NPCs⁶
- ROW Prairies⁷

Western prairie fringed orchids and prairie bush clovers both inhabit native prairie remnants, with the orchid preferring wet-mesic prairie types and the clover preferring dry-mesic prairie types. Sites with the potential for any native prairie types were flagged for field survey. Wooded NPCs were mostly absent in the Project environmental survey area.

3.2 Field Surveys

The field surveys had three objectives: (1) to determine whether any state-listed plants were present within the Project environmental survey area; (2) to assess, regardless of survey timing, the habitat suitability for the western prairie fringed orchid and/or prairie bush clover at each site; and (3) if possible, depending on survey timing, to document whether any western prairie fringed orchid and/or prairie bush clover individuals were present. According to MDNR, the optimal identification window for the western prairie fringed orchid is between late June and late July (when they are flowering), and the optimal window for the prairie bush clover is mid-August through September (when they are producing fruit).

Surveys in 2022 were conducted between June 6 and June 8, on July 9, and during the time frame of September 1-2 and September 22-24.

Where western prairie fringed orchid habitat was present, it was rated according to the following criteria. The criteria were developed in coordination with USFWS and used in field habitat assessments for the same species in the Nebraska, North Dakota, and South Dakota portions of the Project footprint.⁸

- Western prairie fringed orchid habitat criteria:
 - Excellent (A) - completely native tall-grass/lowland/mesic prairie, appears to be mowed or lightly grazed every year or two. Suitable hydrology present.
 - Good (B) - primarily native tall-grass/lowland/mesic prairie and non-native vegetation, appears to be hayed or lightly grazed every year or two. Suitable hydrology present.
 - Fair (C) - mix of native tall-grass/lowland/mesic prairie and non-native vegetation, appears to be hayed or lightly grazed approximately every year or two. Suitable hydrology present.

⁴ Merjent used data dated 2/15/2022 through MDNR license agreement 1066.

⁵ Merjent used SOBS data (obtained from MN Geospatial Commons) with a content date of 2/24/2022.

⁶ Merjent used NPC data (obtained from MN Geospatial Commons) with a content date of 3/2/2022.

⁷ Merjent used ROW Prairie data (obtained from MN Geospatial Commons) with a content date of 7/27/2017.

⁸ The field habitat assessments outside of Minnesota are not reported here. A USFWS-approved set of western prairie fringed orchid habitat criteria is described in the 2022 Western Prairie Fringed Orchid Study Plan, prepared by WESTECH Environmental Services, Inc., on March 4, 2022, for Perennial Environmental Services, which is providing support to SCS for the Project's environmental review in Nebraska, North Dakota, and South Dakota.

- Poor (D) - primarily non-native vegetation with a minor native tall-grass/lowland/mesic prairie component, appears to be hayed or lightly grazed every year or two, or is a mix of native and non-native plant species but heavily grazed and/or sprayed to reduce broadleaf species. Suitable hydrology present.

4 Results

Through the desktop assessments, sites with potentially suitable habitat for Dakota skippers, Poweshiek skipperlings, western prairie fringed orchids, prairie bush clovers, and/or other state-listed plant species were identified along four of the five Project segments in Minnesota. All sites were at least partially accessible in the field. The field results are provided in Attachments A, B, C, and D, with each attachment containing a table that summarizes the findings for each line segment, an overview map that shows the survey sites for that segment, and site-specific maps where habitats and/or individuals were documented (all as outlined below). There were no targeted survey locations along the MNL-337 segment.

- MNL-321 (Attachment A): Table A, Figures A-1 (overview map) and A-2 (site-specific map)
- MNL-303 (Attachment B): Table B, Figures B-1 (overview map) and B-2 (site-specific map)
- MNL-304 (Attachment C): Table C, Figures C-1 (overview map) and C-2 through C-5 (site-specific maps)
- MNL-305 (Attachment D): Table D, Figures D-1 (overview map) and D-2 (site-specific map)

The following abbreviations are used in the attachments.

- Dakota skipper (DASK)
- Poweshiek skipperling (POSK)
- Prairie bush clover (PBCL)
- Western prairie fringed orchid (WPFO)

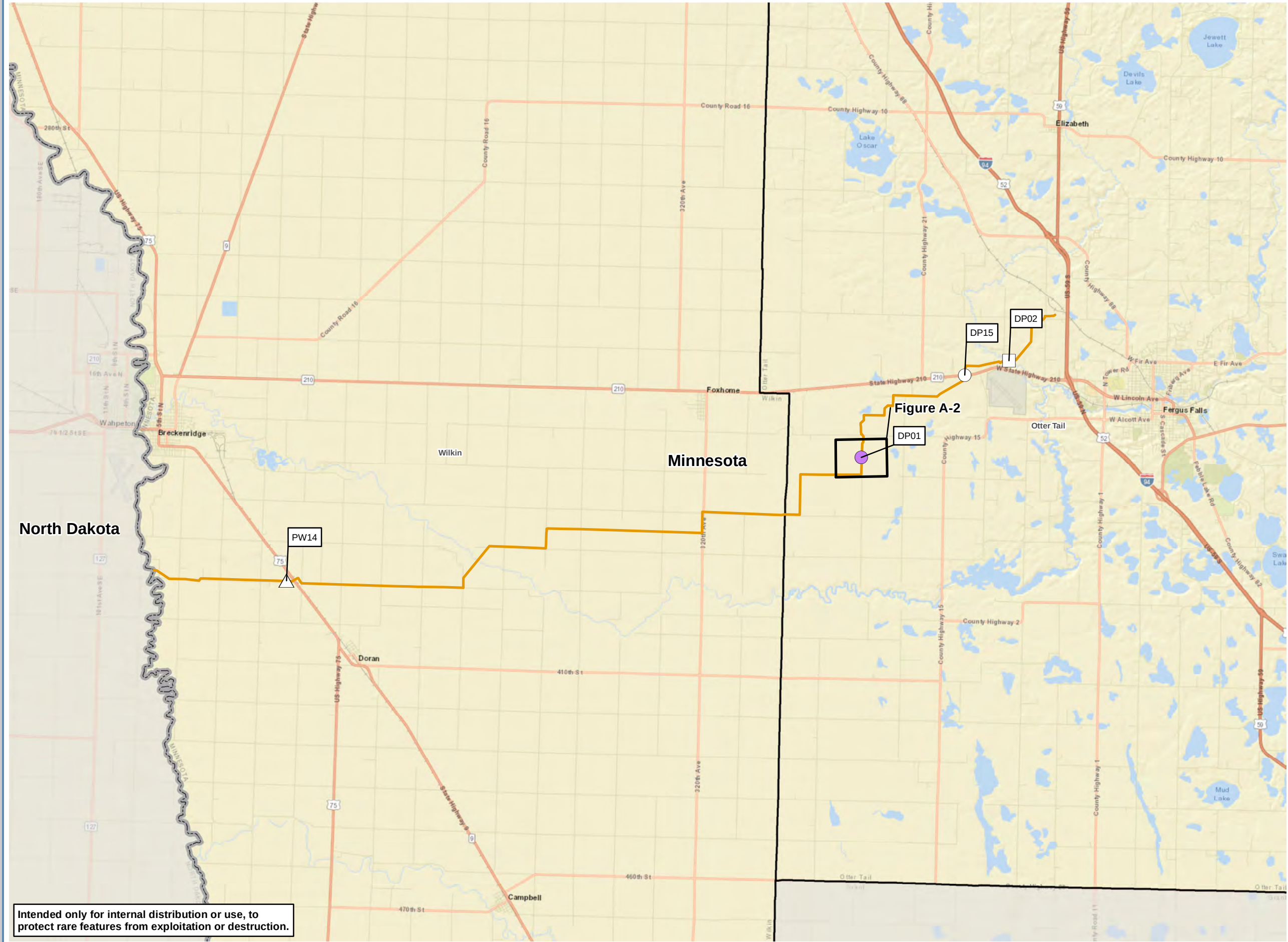
5 Reporting

Per MDNR's Rare Species Survey Reports Memo (2012) (Attachment E), Merjent's botanist submitted the required NHIS documentation electronically on February 22, 2023. Welby Smith at MDNR confirmed the identification of the two state-threatened species that were documented. The NHIS documentation and the species identification confirmation are in Attachment F. The plant survey methods used to obtain the results reported here are consistent with MDNR's Guidance on Documenting and Collecting Rare Plants (2018) (Attachment G).

Attachment A – MNL-321 Survey Sites and Results

Table A: Survey Sites and Outcomes for MNL-321, Listed East to West (Figure A-1)

Site ID	Targeted for Listed Butterfly Surveys?	Butterfly Survey Outcome	Targeted for Listed Plant Surveys?	Plant Survey Outcome	Site-specific Map
DP02	Yes	No habitat/no individuals.	No	N/A (surveyed only for DASK/POSK)	N/A
DP15	Yes	No habitat/no individuals.	Yes	No habitat/no individuals.	N/A
DP01	Yes	Suitable DASK/POSK habitat was present. No DASK or POSK individuals were observed during occupancy surveys.	Yes	Suitable WPFO habitat was present (rank C/D). Small white lady's-slipper (<i>Cypripedium candidum</i> ; state-listed special concern) was present. Merjent's botanist documented 17 individuals within the environmental survey area.	Figure A-2
PW14	No	N/A (surveyed only for plants)	Yes	No habitat/no individuals.	N/A



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VICINITY MAP

LEGEND

Project Route Segment

MNL-321

Site Surveyed for Listed Flora - No Habitat

Site Surveyed for Listed Butterflies - No Habitat

Site Surveyed for Both Flora and Butterflies - Habitat Found*

Site Surveyed for Both Flora and Butterflies - No Habitat

County Boundary

State Boundary

Site-Specific Map

*See Figure A-2

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Figure Title:

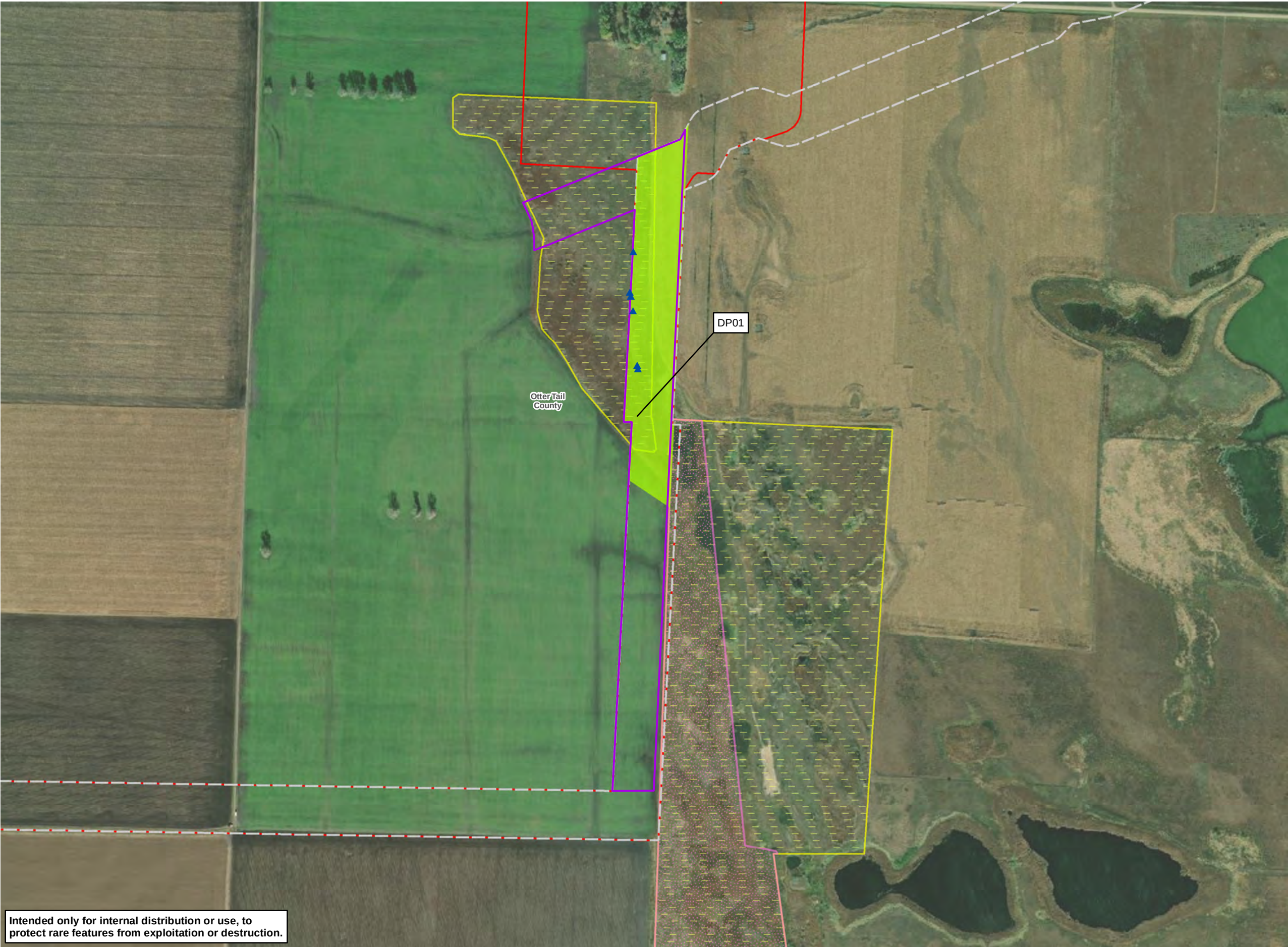
Survey Sites: MNL-321 Overview Map

Figure Number:

A-1

Scale:	Projection:
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1 in = 12,500 ft	NAD 1983 UTM Zone 14

Sheet:	Drawing Number:
Sheet 1	005-00025
Sheet 1 of 2	Current Revision



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VICINITY MAP



LEGEND

- Environmental Survey Area (February 2023)
- Environmental Survey Area (June 2022)
- Native Plant Communities
- Site of Biodiversity Significance
- Listed Flora and Butterfly Survey Site
- Small White Lady's-Slipper (Cypripedium candidum)
- Western Prairie Fringed Orchid Habitat (Rank C/D)

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Figure Title:
Survey Results: MNL-321
Site-Specific Map

Figure Number:
A-2

Scale:
1:7,200
1 in = 600 ft

Projection:
Transverse Mercator
NAD 1983 UTM Zone 14

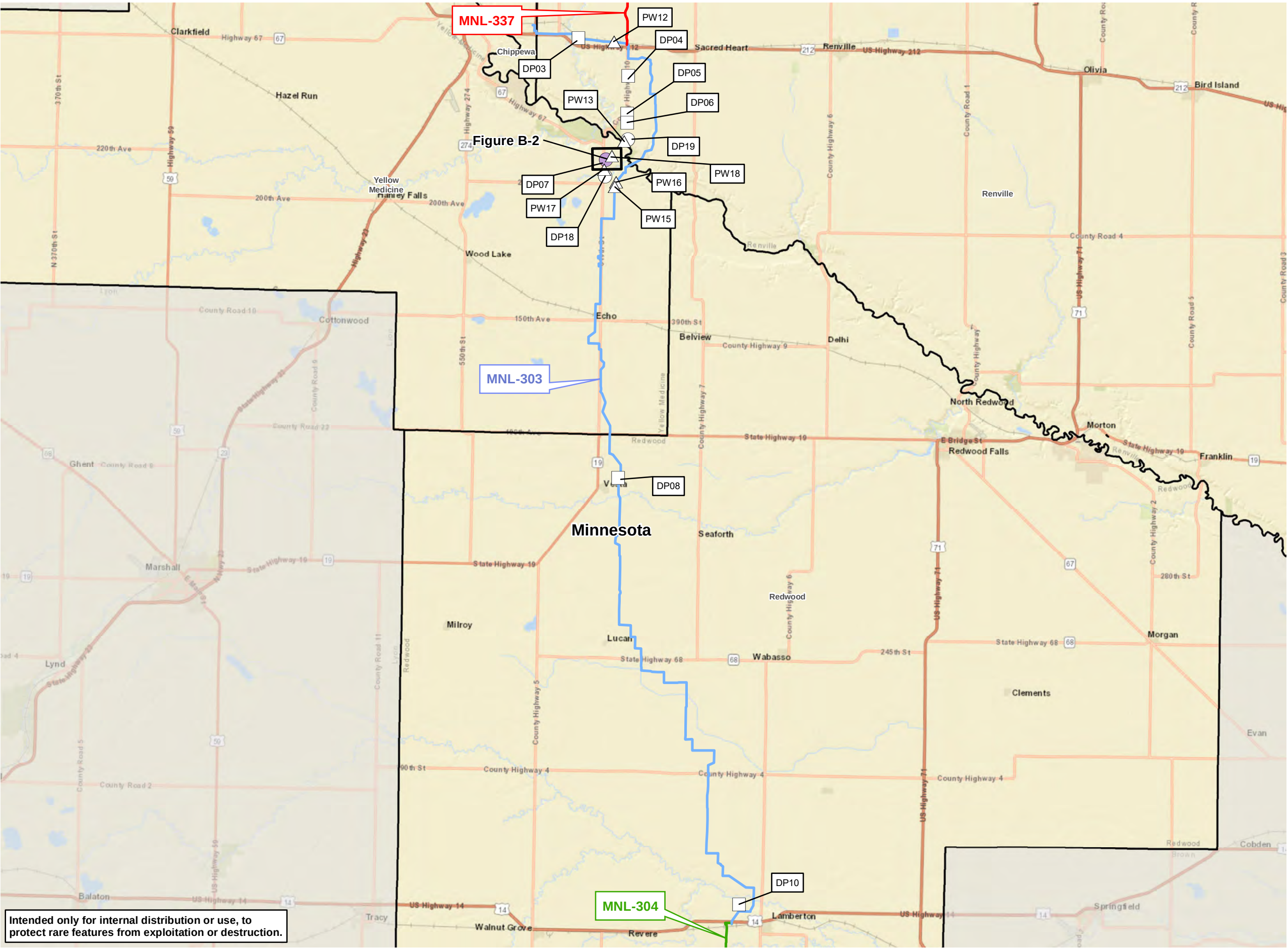
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Sheet 2 of 2

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Attachment B – MNL-303 Survey Sites and Results

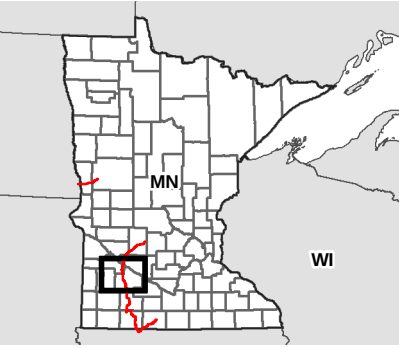
Table B: Survey Sites and Outcomes for MNL-303, Listed North to South (Figure B-1)

Site ID	Targeted for Listed Butterfly Surveys?	Butterfly Survey Outcome	Targeted for Listed Plant Surveys?	Plant Survey Outcome	Site-specific Map
DP03	Yes	No habitat/no individuals.	No	N/A (surveyed only for DASK/POSK)	N/A
PW12	No	N/A (surveyed only for plants)	Yes	No habitat/no individuals.	N/A
DP04	Yes	No habitat/no individuals.	No	N/A (surveyed only for DASK/POSK)	N/A
DP05	Yes	No habitat/no individuals.	No	N/A (surveyed only for DASK/POSK)	N/A
DP06	Yes	No habitat/no individuals.	No	N/A (surveyed only for DASK/POSK)	N/A
PW13	No	N/A (surveyed only for plants)	Yes	No habitat/no individuals.	N/A
DP19	Yes	No habitat/no individuals.	Yes	No habitat/no individuals.	N/A
PW18	No	N/A (surveyed only for plants)	Yes	No habitat/no individuals.	N/A
PW16	No	N/A (surveyed only for plants)	Yes	No habitat/no individuals.	N/A
PW15	No	N/A (surveyed only for plants)	Yes	No habitat/no individuals.	N/A
DP07	Yes	No habitat/no individuals.	Yes	Suitable PBCL and WPFO habitat was present (rank D for WPFO). Merjent's botanist did not find individuals of PBCL, WPFO, or any other listed species within the environmental survey area.	Figure B-2
PW17	No	N/A (surveyed only for plants)	Yes	No habitat/no individuals.	N/A
DP18	Yes	No habitat/no individuals.	Yes	No habitat/no individuals.	N/A
DP08	Yes	No habitat/no individuals.	No	N/A (surveyed only for DASK/POSK)	N/A
DP10	Yes	No habitat/no individuals.	No	N/A (surveyed only for DASK/POSK)	N/A



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VICINITY MAP



LEGEND

Project Route Segment

- MNL-303
- MNL-304
- MNL-337
- Site Surveyed for Listed Flora - No Habitat
- Site Surveyed for Listed Butterflies - No Habitat
- Site Surveyed for Both Flora and Butterflies - Habitat Found*
- Site Surveyed for Both Flora and Butterflies - No Habitat
- County Boundary
- State Boundary
- Site-Specific Map

*See Figure B-2

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Figure Title:
Survey Sites: MNL-303
Overview Map

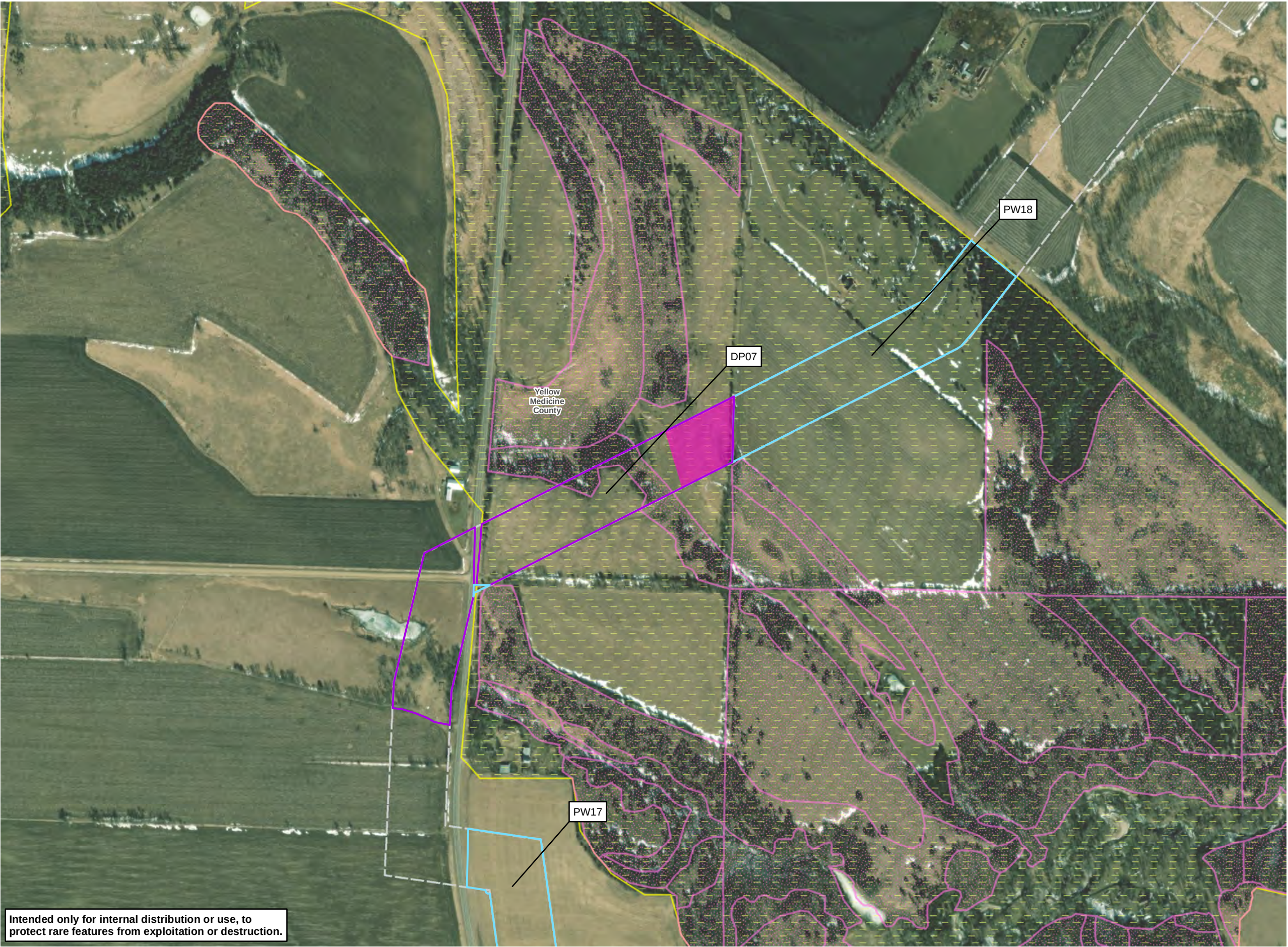
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Projection:
Transverse Mercator
NAD 1983 UTM Zone 15

Sheet:
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Sheet 1 of 2

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VICINITY MAP



LEGEND

- Environmental Survey Area (June 2022)
- Native Plant Communities
- Site of Biodiversity Significance
- Listed Flora Survey Site
- Listed Flora and Butterfly Survey Site
- Habitat for Both Listed Flora Species (WPFO Rank D)

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Figure Title:
Survey Results: MNL-303
Site-Specific Map

Figure Number:
B-2

Scale:
1:6,000
1 in = 500 ft

Projection:
Transverse Mercator
NAD 1983 UTM Zone 15

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Sheet 2
Sheet 2 of 2

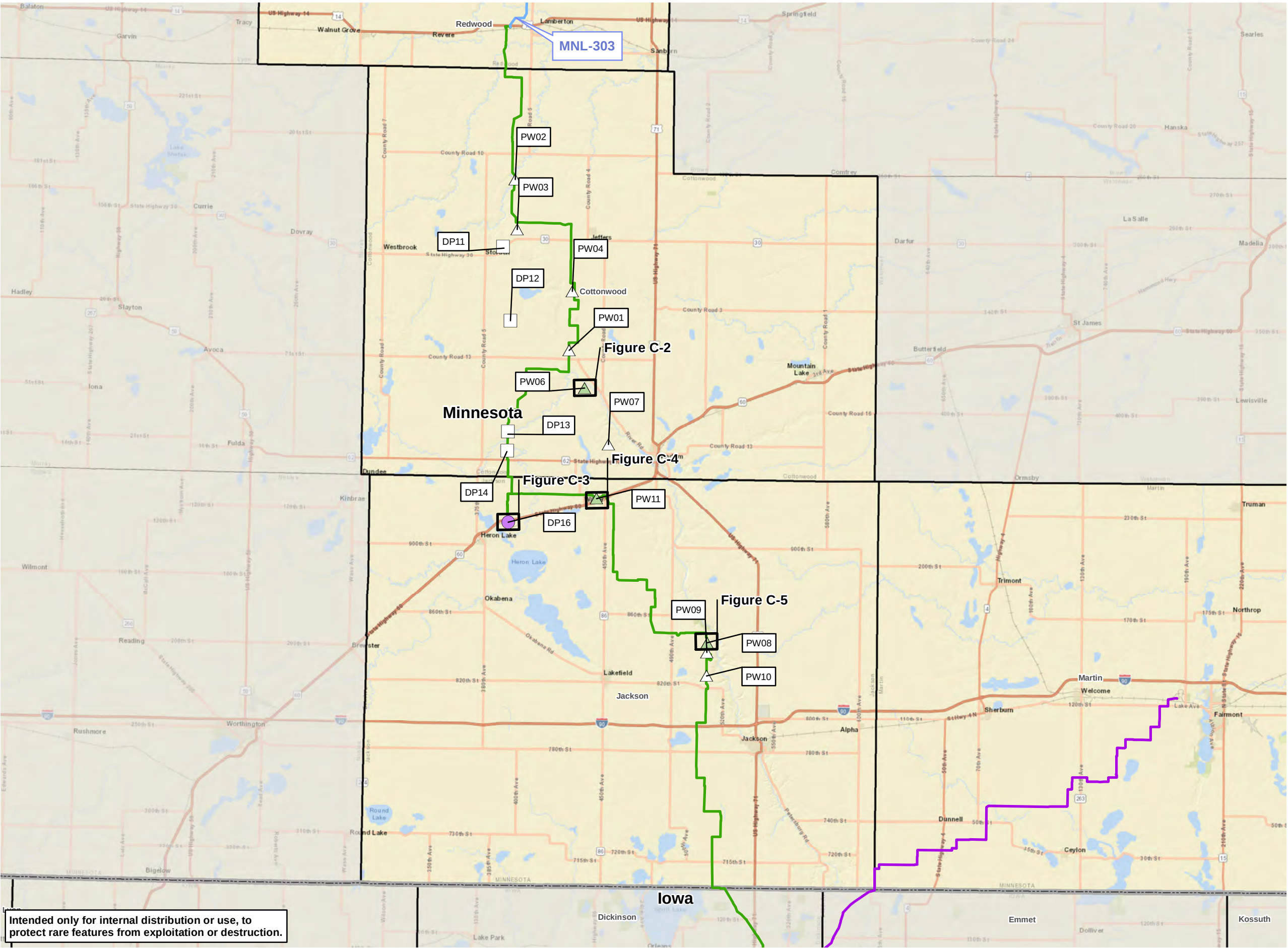
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Attachment C – MNL-304 Survey Sites and Results

Table C: Survey Sites and Outcomes for MNL-304, Listed North to South (Figure C-1)

Site ID	Targeted for Listed Butterfly Surveys?	Butterfly Survey Outcome	Targeted for Listed Plant Surveys?	Plant Survey Outcome	Site-specific Map
PW02	No	N/A (surveyed only for plants)	Yes	No habitat/no individuals.	N/A
PW03	No	N/A (surveyed only for plants)	Yes	No habitat/no individuals.	N/A
DP11	Yes	No habitat/no individuals.	No	N/A (surveyed only for DASK/POSK)	N/A
PW04	No	N/A (surveyed only for plants)	Yes	No habitat/no individuals.	N/A
DP12	Yes	No habitat/no individuals.	No	N/A (surveyed only for DASK/POSK)	N/A
PW01	No	N/A (surveyed only for plants)	Yes	No habitat/no individuals.	N/A
DP13	Yes	No habitat/no individuals.	No	N/A (surveyed only for DASK/POSK)	N/A
DP14	Yes	No habitat/no individuals.	No	N/A (surveyed only for DASK/POSK)	N/A
PW06	No	N/A (surveyed only for plants)	Yes	Suitable PBCL habitat was present. Merjent's botanist did not find individuals of PBCL or any other listed species within the environmental survey area.	Figure C-2
DP16	Yes	No habitat/no individuals.	Yes	Suitable PBCL and WPFO habitat was present (rank D for WPFO). Merjent's botanist did not find individuals of PBCL, WPFO, or any other listed species within the environmental survey area.	Figure C-3
PW07	No	N/A (surveyed only for plants)	Yes	No habitat/no individuals.	N/A
PW11	No	N/A (surveyed only for plants)	Yes	Suitable PBCL habitat was present. Merjent's botanist did not find individuals of PBCL or any other listed species within the environmental survey area.	Figure C-4

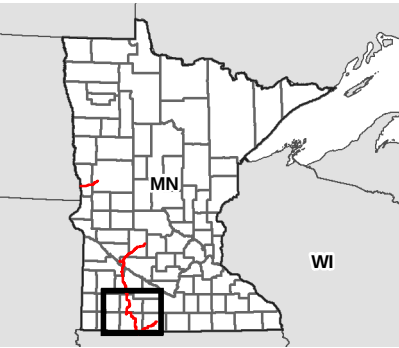
Site ID	Targeted for Listed Butterfly Surveys?	Butterfly Survey Outcome	Targeted for Listed Plant Surveys?	Plant Survey Outcome	Site-specific Map
PW08	No	N/A (surveyed only for plants)	Yes	Suitable PBCL habitat was present. Merjent's botanist did not find individuals of PBCL or any other listed species within the environmental survey area.	Figure C-5
PW09	No	N/A (surveyed only for plants)	Yes	No habitat/no individuals.	N/A
PW10	No	N/A (surveyed only for plants)	Yes	No habitat/no individuals.	N/A



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VICINITY MAP



LEGEND

Project Route Segment

- MNL-303
- MNL-304
- MNL-305
- Site Surveyed for Listed Flora - Habitat Found*
- Site Surveyed for Listed Flora - No Habitat
- Site Surveyed for Listed Butterflies - No Habitat
- Site Surveyed for Both Flora and Butterflies - Habitat Found*
- County Boundary
- State Boundary
- Site-Specific Map

*See Figures C-2, C-3, C-4, C-5

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Figure Title:
Survey Sites: MNL-304
Overview Map

Figure Number:
C-1

Scale:
1:360,000
1 in = 30,000 ft

Projection:
Transverse Mercator
NAD 1983 UTM Zone 15

Sheet:
Sheet 1
Sheet 1 of 5

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VICINITY MAP

LEGEND

Environmental Survey Area (August 2022)

Native Plant Communities

Site of Biodiversity Significance

Listed Flora Survey Site

Prairie Bush-Clover Habitat

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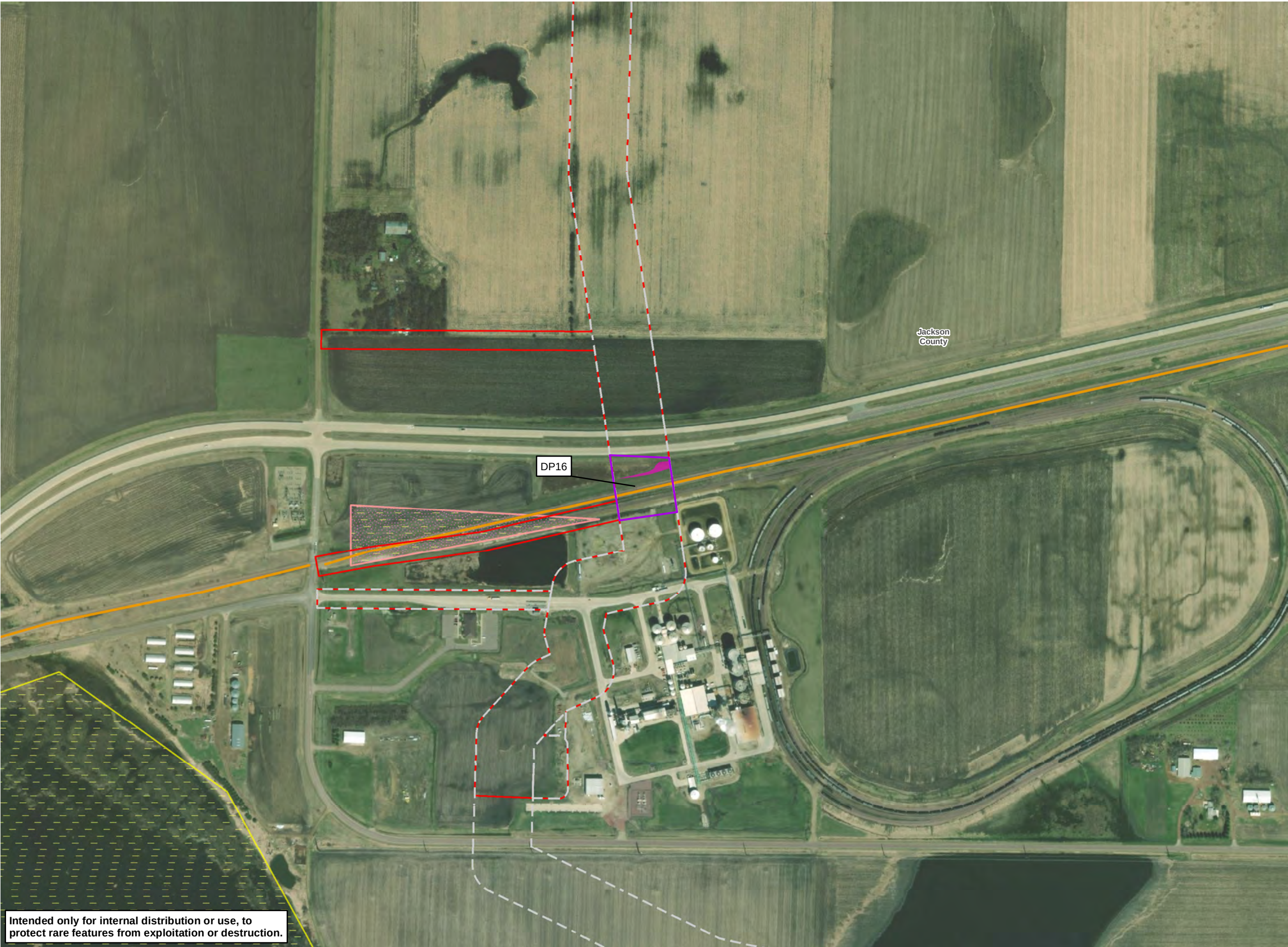
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Figure Title:	
Survey Results: MNL-304 Site-Specific Map	
Figure Number:	
C-2	
Scale:	Projection:
1:6,000 1 in = 500 ft	Transverse Mercator NAD 1983 UTM Zone 15
Sheet:	Drawing Number:
Sheet 2 Sheet 2 of 5	005-00025 Current Revision

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VICINITY MAP



LEGEND

- Environmental Survey Area (February 2023)
- Environmental Survey Area (August 2022)
- Native Plant Communities
- Site of Biodiversity Significance
- Railroad Rights of Way Prairies
- Listed Flora and Butterfly Survey Site
- Habitat for Both Listed Flora Species (WPFO Rank D)

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Figure Title:
Survey Results: MNL-304
Site-Specific Map

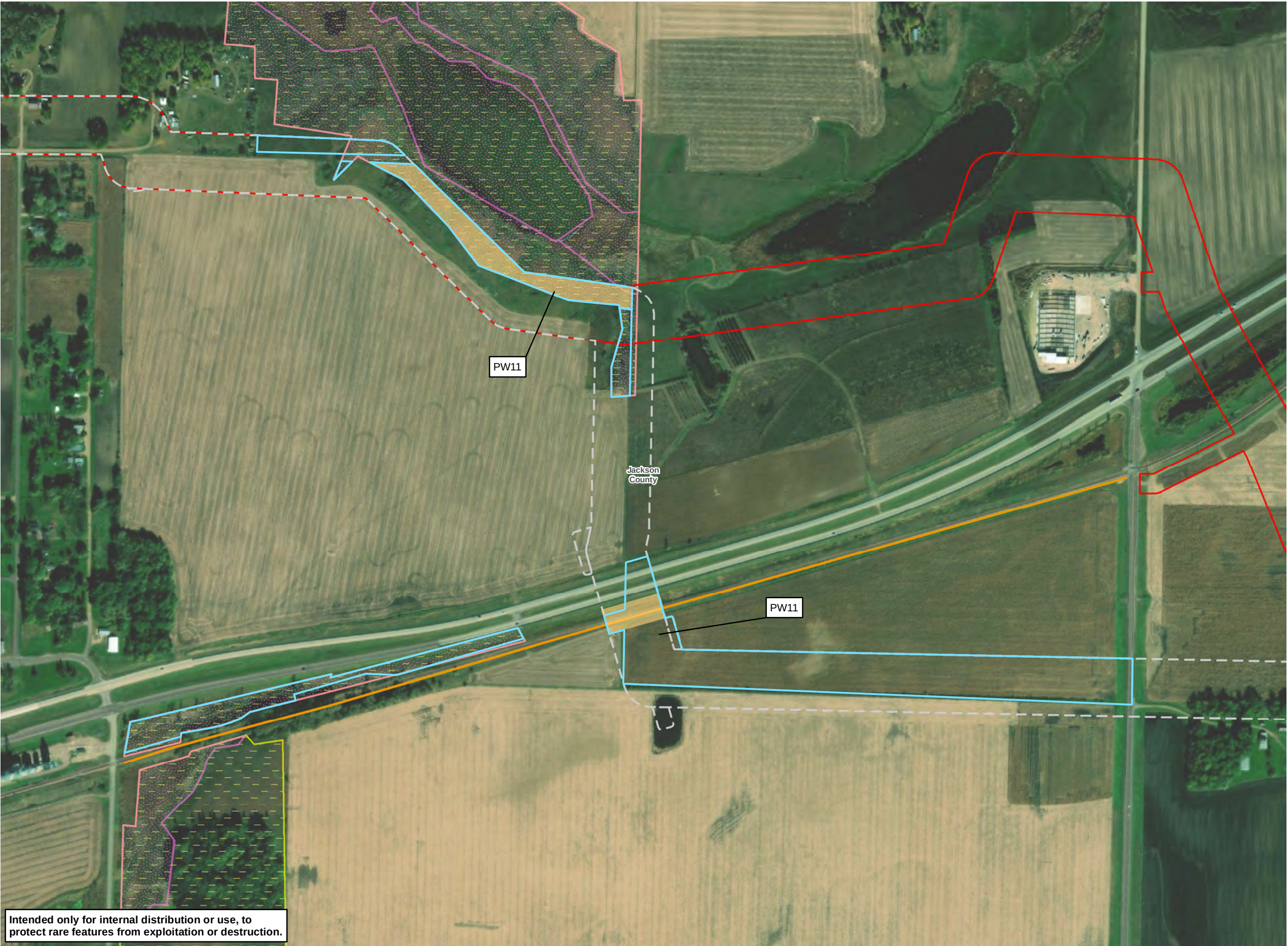
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1 in = 500 ft

Projection:
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NAD 1983 UTM Zone 15

Sheet:
Sheet 3
Sheet 3 of 5

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VICINITY MAP



LEGEND

- Environmental Survey Area (February 2023)
- Environmental Survey Area (August 2022)
- Native Plant Communities
- Site of Biodiversity Significance
- Railroad Rights of Way Prairies
- Listed Flora Survey Site
- Prairie Bush-Clover Habitat

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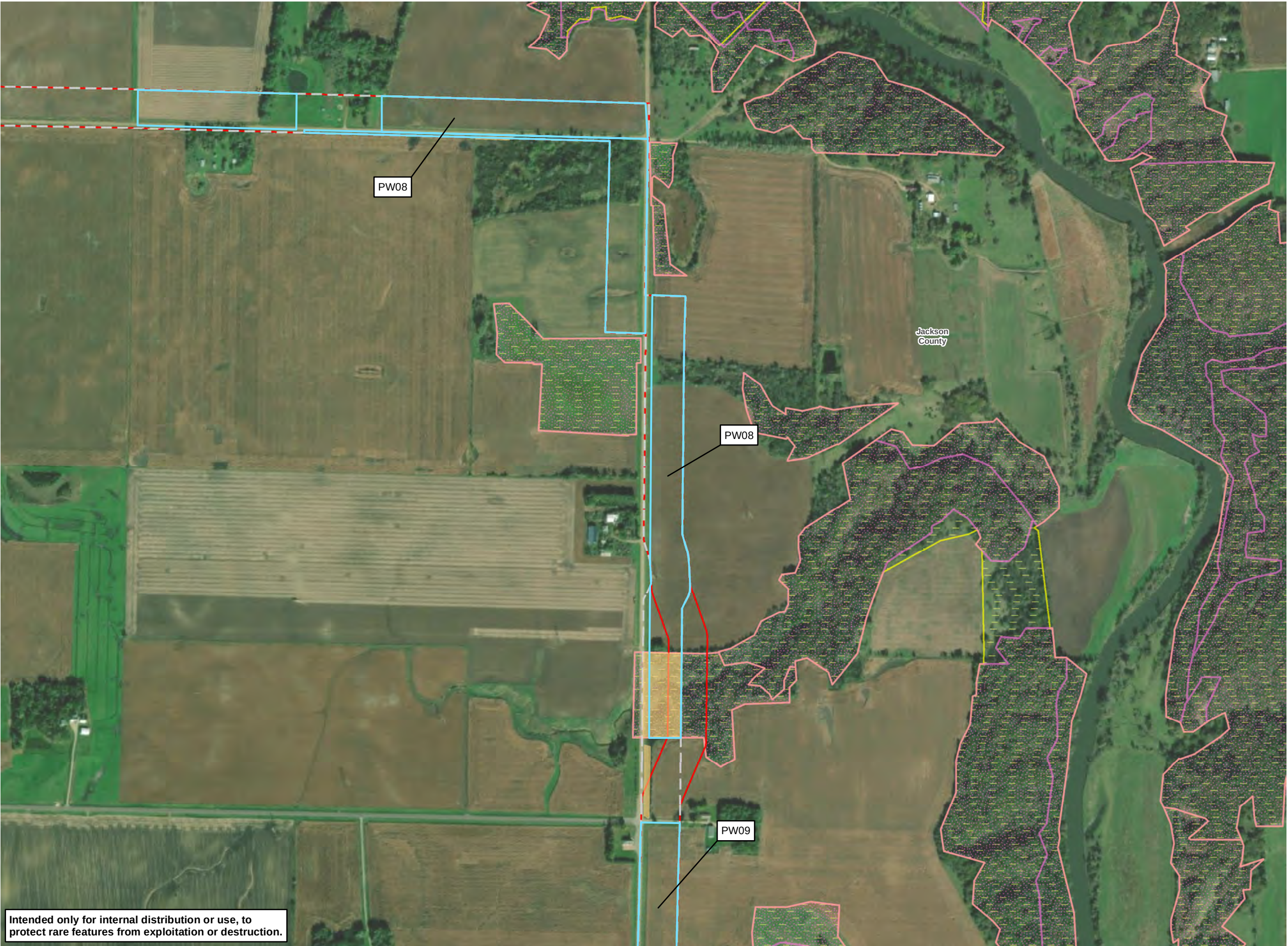
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Figure Title: Survey Results: MNL-304 Site-Specific Map	
Figure Number: C-4	
Scale: 1:6,000 1 in = 500 ft	Projection: Transverse Mercator NAD 1983 UTM Zone 15
Sheet: Sheet 4 Sheet 4 of 5	Drawing Number: 005-00025 Current Revision



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VICINITY MAP



LEGEND

- Environmental Survey Area (February 2023)
- Environmental Survey Area (August 2022)
- Native Plant Communities
- Site of Biodiversity Significance
- Listed Flora Survey Site
- Prairie Bush-Clover Habitat

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Figure Title:
Survey Results: MNL-304
Site-Specific Map

Figure Number:
C-5

Scale:
1:9,000
1 in = 750 ft

Projection:
Transverse Mercator
NAD 1983 UTM Zone 15

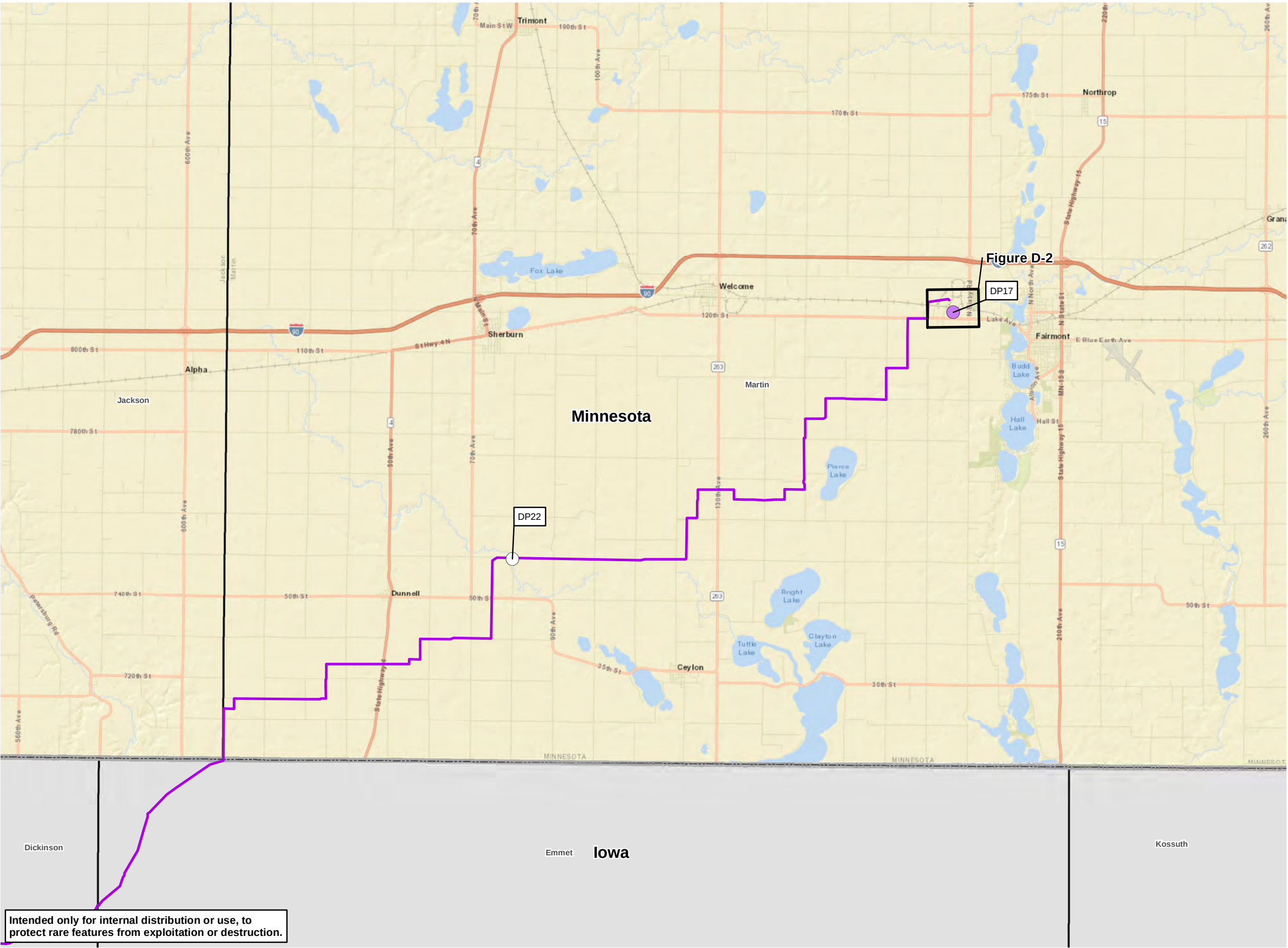
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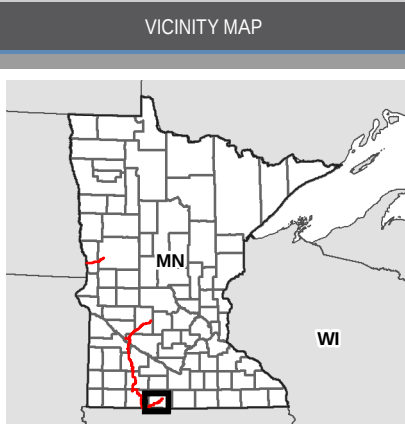
Attachment D – MNL-305 Survey Sites and Results

Table D: Survey Sites and Outcomes for MNL-305, Listed East to West (Figure D-1)

Site ID	Targeted for Listed Butterfly Surveys?	Butterfly Survey Outcome	Targeted for Listed Plant Surveys?	Plant Survey Outcome	Site-specific Map
DP17	Yes	No habitat/no individuals.	Yes	Suitable WPFO habitat was present (rank C). Tuberous Indian-plantain (<i>Arnoglossum plantagineum</i>; state-listed threatened) was present approximately 1,750 feet west of the environmental survey area at the time of survey. Merjent's botanist documented 7 individuals. Sullivant's Milkweed (<i>Asclepias sullivantii</i>; state-listed threatened) was present approximately 1,770 feet east of the environmental survey area at the time of survey. Merjent's botanist documented 8 individuals.	Figure D-2
DP22	Yes	No habitat/no individuals.	Yes	No habitat/no individuals.	N/A



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LEGEND

Project Route Segment

- MNL-305
- Site Surveyed for Both Flora and Butterflies - Habitat Found*
- Site Surveyed for Both Flora and Butterflies - No Habitat
- County Boundary
- State Boundary
- Site-Specific Map

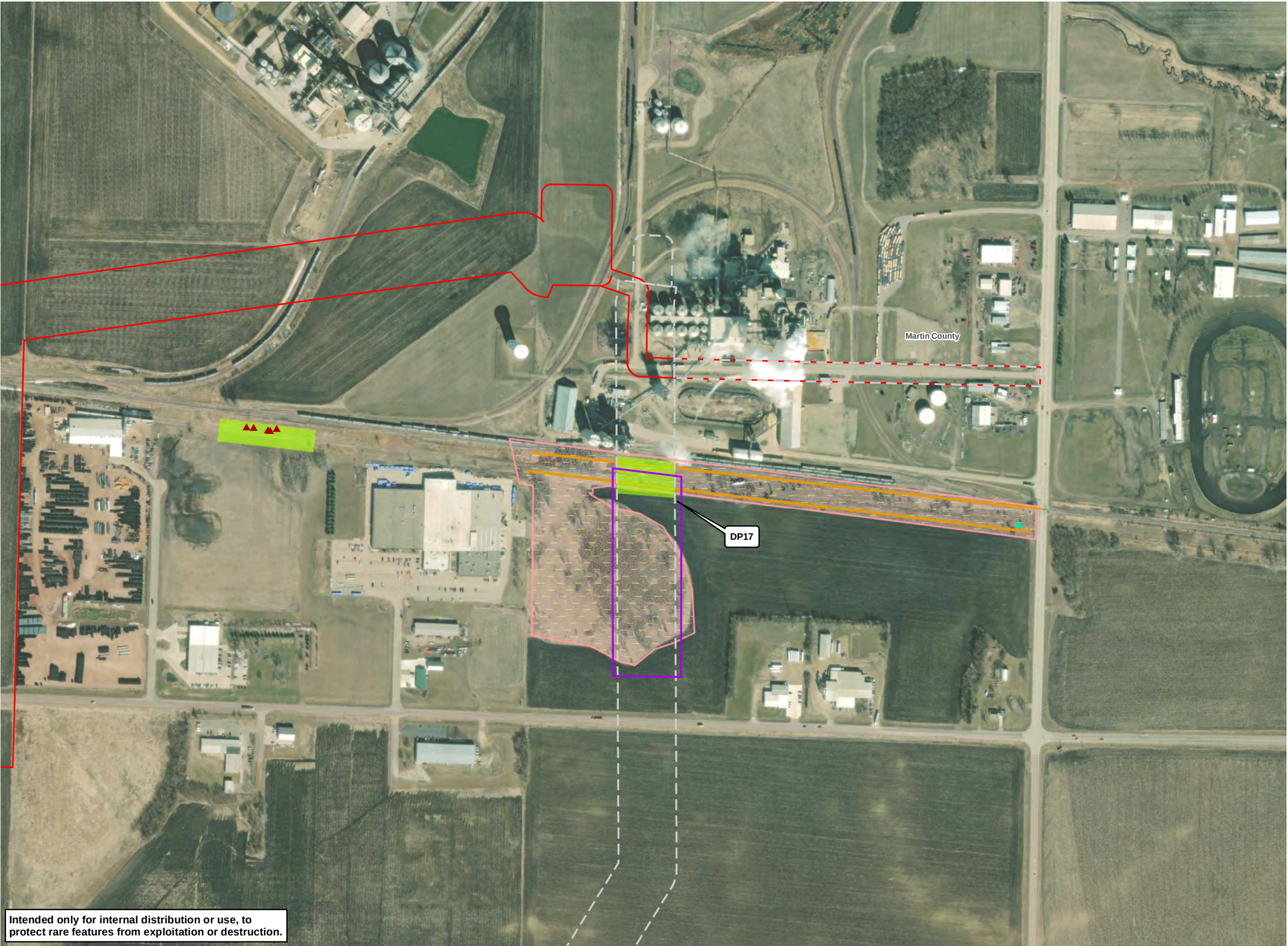
*See Figure D-2

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Figure Title:	Survey Sites: MNL-305 Overview Map
Figure Number:	D-1
Scale:	Projection:
1:150,000 1 in = 12,500 ft	Transverse Mercator NAD 1983 UTM Zone 15
Sheet:	Drawing Number:
Sheet 1 Sheet 1 of 2	005-00025 Current Revision



Intended only for internal distribution or use, to protect rare features from exploitation or destruction.

VICINITY MAP



LEGEND

- Environmental Survey Area (February 2023)
- Environmental Survey Area (June 2022)
- Native Plant Communities
- Site of Biodiversity Significance
- Railroad Rights of Way
- Listed Flora and Butterfly Survey Site
- Tuberous Indian-Plantain (Amoglossum plantagineum)
- Sullivan's Milkweed (Asclepias sullivantii)
- Western Prairie Fringed Orchid Habitat (Rank C)

REVISIONS

Date:	2023-02-27	Revised by:	TR	Checked by:	SS
Revision 1					
Date:		Revised by:		Checked by:	
Date:		Revised by:		Checked by:	

PREPARED BY

Summit Carbon Solutions
2321 North Loop Drive, Suite 221
Ames, Iowa 50010
United States of America
www.summitcarbonsolutions.com



SUMMIT CARBON
SOLUTIONS

MIDWEST CARBON EXPRESS PROJECT

Figure Title:	Survey Results: MNL-305 Site-Specific Map		
Figure Number:	D-2		
Scale:	1:6,000 1 in = 500 ft	Projection:	Transverse Mercator NAD 1983 UTM Zone 15
Sheet:	Sheet 2 Sheet 2 of 2	Drawing Number:	005-00025 Current Revision

Attachment E – MDNR's Rare Species Survey Reports Memo (2012)



Division of Ecological and Water Resources

TO: Endangered and Threatened Species Surveyors

FROM: Lisa Joyal, Endangered Species Review Coordinator

Phone: (651) 259-5109

e-mail: lisa.joyal@state.mn.us

RE: Rare Species Survey Reports

The Minnesota Department of Natural Resources' Division of Ecological and Water Resources (DNR) relies upon the results of endangered and threatened species surveys to conserve these species through its conservation, management, environmental review, and permitting responsibilities. When surveys for rare species are requested as part of the environmental review process, the DNR makes every effort to coordinate closely with surveyors to ensure that survey results are reliable. High quality survey data enables the DNR's to uphold Minnesota's endangered species law (*Minnesota Statutes*, section 84.0895) and associated rules (*Minnesota Rules*, part 6212.1800 to 6212.2300 and 6134).

As such, for projects associated with environmental review, we request that survey proposals be submitted to the DNR before any survey work is initiated. This process is an attempt to avoid any potential delays or other problems due to incomplete list of target species or inappropriate survey protocol. Surveys should primarily target the species mentioned in the Natural Heritage letter, but should also target any other state-listed species that are likely to be found in the habitat in question. Please refer to the DNR Rare Species Guide (<http://www.dnr.state.mn.us/rsg/index.html>) for further information on the rare species that can be found in a particular habitat, and for the habitat and phenology of each targeted species. The DNR Rare Species Guide is the state's authoritative reference for Minnesota's endangered, threatened, and special concern species. It is a dynamic, interactive source that can be queried by county, ECS subsection, watershed, or habitat. Final survey results should also be submitted to the DNR.

Please include the following information in the Rare Species Survey Proposals and Survey Results:

- Purpose of the survey
- List of the targeted species
- Qualifications of the surveyor(s) and his or her experience working with the targeted species
- If applicable, a copy of the collection permit issued by the DNR.
- Survey date(s) and methodology
- Map (and GIS shapefile if large project area) of areas (to be) surveyed or assessed for habitat suitability
- Locations and number of individuals for any state-listed species
- State type of documentation for each listed species (e.g., photograph or collected specimen)
- A completed Rare Feature Reporting Form for each state-listed or tracked species, or a statement that the data has been submitted electronically
- Any associated specimens and electronic data should be submitted with the Survey Results

Survey Proposals and Survey Results may be sent electronically to the email address listed above or mailed to the following address:

Lisa Joyal
DNR Division of Ecological and Water Resources
500 Lafayette Road, Box 25
St. Paul, MN 55155

Thank you for your interest in conducting rare species surveys in Minnesota.

Attachment F – NHIS Documentation and Species Identification Confirmation



MEMO

Date:

February 22, 2023

To:

Data Manager, Natural Heritage Information System, Minnesota Department of Natural Resources

From:

Andy Kranz, Merjent

CC:

Sarah Stai, Merjent

Subject:

NHIS Rare Plant Observation Data, Summit Carbon Solutions, LLC Projects

Attachments:

- NHIS Rare Plant Observation Data_ARK 2022.xlsx
- NHIS Rare Plant Observation Data_ARK 2022_UTM14.zip
- NHIS Rare Plant Observation Data_ARK 2022_UTM15.zip
- NHIS Species ID Confirmation SCS.pdf

I am submitting data for observations of three rare plant populations in Minnesota documented during field surveys in 2022. The surveys were conducted to assess habitat for federally threatened plants. The surveys also documented plants that are state-listed in Minnesota as special concern, threatened, or endangered.

I observed one population each of *Arnoglossum plantagineum*, on June 6, 2022, and *Asclepias sullivantii*, on July 9, 2022, in the City of Fairmont, Martin County, Minnesota. These populations were observed during surveys as part of the Summit Carbon Solutions, LLC Martin County Project. The populations were located within the same parcel, owned by Fairmont Economic Development Authority.

I also observed one population of *Cypripedium candidum* on June 8, 2022, in Orwell Township, Otter Tail County. This population was observed during surveys as part of the Summit Carbon Solutions, LLC Otter Tail to Wilkin Project and is located on the property of Ethel Maack.

Please see the attached rare plant observation data spreadsheet and shapefiles for details.

Specimens of *A. plantagineum* and *A. sullivantii* were collected under DNR Special Permit #23226. This permit is assigned to Otto Gockman who was also conducting field work on the project. Correct identification was confirmed by Welby Smith and the specimens will be submitted to the University of Minnesota Herbarium.

Please contact me with any questions or concerns.

Respectfully submitted,



Andy Kranz
Environmental Consultant/Botanist
Merjent
507-459-3150
andy.kranz@merjent.com

Nun	Shapefile Name	Shape_ID	Shape_Detail	Species_Name	Alternate_Species	urce	Observer	Affiliation	Additional_Observers	Contact	Contact_Info	Project	Survey	Observation_Date	Fuzzy_Date	Observation_Remarks	Act_Num_Ind	Est_Num_Ind	Population_Size	Phenology	Phenology_Comments	Native_Plant_Community	Habitat	Population_Extent	Viability_Comments	Management_Comments	Directions	County	TWP	RGE	RGE_Dir	SEC	QQ_SEC	Area_Name	Ownership	ID_Type	ID_Confirmed	ID_Conf_By	Col_No	Repository
1	NHIS Rare Plant Observation Data_ARK 2022_UTM15	1	Point locations of Arnoglossum plantagineum individuals or groups of individuals (number indicated in attribute data)	Arnoglossum plantagineum		FNA	Andrew R. Kranz	Merjent, Inc.		Andy Kranz 507-459-3150; andrew.r.kranz@gmail.com	Summit Carbon Solutions, LLC Martin County Project	Flora	2022-06-06			Population near but outside survey area. Herbarium label: Northwestern Fairmont; 0.8 mile west of County Hwy. 39; 0.3 mile north of 120th St.; 80 feet south of primary railroad; 20 feet north of side-track. Rosette ~2 feet in diameter; 7 plants, possibly more north of surveyed area to railroad; 1 plant in bloom on return July 9, 2022, fls. ~80, white. In small patch of degraded mesic prairie in railroad right-of-way dominated by ruderal vegetation with intermittent prairie flora. Associated with Bromus inermis, Hesperostipa spartea, Poa pratensis, Helianthus pauciflorus, Zizia aptera, Asclepias syriaca, Ratibida pinnata, Lithospermum canescens, Veronicastrum virginicum, Anemone canadensis, Helopsis helianthoides, Rhamnus cathartica.	7	7+	3000 sq ft; did not have permission to survey all the way north to rail; possibly larger population	Emerging (forb)	Rosettes mature at time of collection; upon return on July 9, 2022, 1 individual was in bloom (~50% of infll)	UPs23 - Southern Mesic Prairie	Degraded UPs23; dominated by Bromus inermis, Hesperostipa spartea, Poa pratensis, Helianthus pauciflorus, Dichanthelium oligosanthes; patches of NPC in matrix of ruderal vegetation, all within a railroad right-of-way.	? - Uncertain whether full extent of Observation is known	Aggressive ruderal vegetation present; potential for mowing and herbicide	Mowing apparent at southern limit of observed population	Northwestern Fairmont; 0.8 mile west of County Hwy. 39; 0.3 mile north of 120th St.; 80 feet south of primary railroad; 20 feet north of side-track.	Martin		Fairmont Economic Development Authority	S	Yes	Smith, Welby R.	1001	University of Minnesota Herbarium					
2	NHIS Rare Plant Observation Data_ARK 2022_UTM15	2	Point location of Asclepias sullivantii colony center	Asclepias sullivantii			Gleason and Cronquist 1991	Andrew R. Kranz	Merjent, Inc.		Andy Kranz 507-459-3150; andrew.r.kranz@gmail.com	Summit Carbon Solutions, LLC Martin County Project	Flora	2022-07-09		Population near but well outside survey area. Herbarium label: Northwestern Fairmont; 90 feet west of County Hwy. 39; 0.2 mile north of 120th St.; 95 feet south of railroad. Infl. axillary and terminal umbels; fls. 6-9 per umbel, pink; 8 stems, 0.5 to 3 feet between stems. In railroad right-of-way dominated by cool season grasses, trees and shrubs sparse to patchy. Directly associated with Bromus inermis, Acer negundo, Spartina pectinata, Solidago altissima; patches of mesic prairie flora nearby include Andropogon gerardi, Apocynum cannabinum, Symphyotrichum lanceolatum, Zizia aurea, Anemone cylindrica, Solidago rigida, Symphyotrichum ericoides, Ratibida pinnata, Helopsis helianthoides, Comandra umbellata, Taraxacum officinale, Rhamnus cathartica, Helianthus grosseserratus.	8	8	300 sq ft stems/ramets	Flowering	1 individual in bloom, 2 umbels	In ruderal vegetation; dominated by Bromus inermis, partly shaded by Acer negundo; UPs23 flora nearby; all within a railroad right-of-way.	? - Uncertain whether full extent of Observation is known	Aggressive ruderal vegetation present; potential for mowing and herbicide		Northwestern Fairmont; 90 feet west of County Hwy. 39; 0.2 mile north of 120th St.; 95 feet south of railroad.	Martin		Fairmont Economic Development Authority	S	Yes	Smith, Welby R.	1002	University of Minnesota Herbarium						
3	NHIS Rare Plant Observation Data_ARK 2022_UTM14	3	Point locations of Cypripedium candidum individuals or groups of	Cypripedium candidum		FNA	Andrew R. Kranz	Merjent, Inc.		Andy Kranz 507-459-3150; andrew.r.kranz@gmail.com	Summit Carbon Solutions, LLC Otter Tail to Wilkin Project	Flora	2022-06-08			Population within and extending beyond survey area. 17 individuals observed within survey area, all in bloom; population continues to the west outside survey area, perhaps dozens or hundreds in total; specimens were not collected; photographs available upon request.	17 dozens to hundreds		18,000 sq ft (portion of population within survey area)	Flowering	All observed individuals were in bloom	WPN53 - Northern Wet Prairie	Degraded/grazed wet prairie, occurring as an ecotone between mesic prairie and sedge meadow.	N - Confident full extent of Observation is NOT known	Ruderal vegetation abundant; possibly grazing pressure	Uncertain if recently grazed or retired pasture	Northern Orwell Township; 1.1 miles west of County Hwy. 124; 0.3 miles south of County Hwy. 1	Otter Tail		Ethel Maack	P	n/c								

From: [Andy Kranz](#)
To: Reports.NHIS@state.mn.us
Cc: [Joyal, Lisa \(DNR\)](#); [Sarah Stai](#); [MCE Archive](#)
Subject: Rare Plant Observations 2022
Date: Wednesday, February 22, 2023 2:37:05 PM
Attachments: [image001.png](#)
[NHIS Rare Plant Observation Data Memo - 02-22-23.pdf](#)
[NHIS Rare Plant Observation Data ARK 2022.xlsx](#)
[NHIS Rare Plant Observation Data ARK 2022 UTM14.zip](#)
[NHIS Rare Plant Observation Data ARK 2022 UTM15.zip](#)
[NHIS Species ID Confirmation SCS.pdf](#)

To whom it may concern:

Please see the attached memo and rare plant observation data. Let me know if you have any questions or concerns.

Thank you,

Andy Kranz

612.924.3998 direct

507.459.3150 mobile

andy.kranz@merjent.com



1 Main Street SE, Suite 300

Minneapolis, MN 55414

612.746.3660 main

www.merjent.com

From: [Andy Kranz](#)
To: [Sarah Stai](#)
Subject: Fwd: EXTERNAL: Re: Rare plant specimens
Date: Monday, February 20, 2023 8:23:50 PM
Attachments: [image001.png](#)

See Welby's confirmation below.

Andy Kranz
Merjent
507-459-3150

From: Smith, Welby R (DNR) <welby.smith@state.mn.us>
Sent: Friday, February 17, 2023 10:43:22 AM
To: Andy Kranz <andy.kranz@merjent.com>
Subject: Re: EXTERNAL: Re: Rare plant specimens

The specimens look, and correctly identified. I will bring them to the Bell herbarium today and get them accessioned into the collections right away.

welby

From: Andy Kranz <andy.kranz@merjent.com>
Sent: Tuesday, February 14, 2023 8:14 PM
To: Smith, Welby R (DNR) <welby.smith@state.mn.us>
Subject: Re: EXTERNAL: Re: Rare plant specimens

No problem. Nathan Dahlgren met me in the lobby and said he would set them in your cubicle.

Andy Kranz
Merjent
507-459-3150

From: Smith, Welby R (DNR) <welby.smith@state.mn.us>
Sent: Tuesday, February 14, 2023, 7:27 PM
To: Andy Kranz <andy.kranz@merjent.com>
Subject: Re: EXTERNAL: Re: Rare plant specimens

I wasn't there (you know that now), but I will return to my cube tomorrow afternoon.

welby

From: Andy Kranz <andy.kranz@merjent.com>
Sent: Tuesday, February 14, 2023 12:13 PM
To: Smith, Welby R (DNR) <welby.smith@state.mn.us>
Subject: RE: EXTERNAL: Re: Rare plant specimens

Welby,

I'll drop the specimens off this afternoon, probably between 3:00 and 4:00.

Andy Kranz

612.924.3998 direct

507.459.3150 mobile

andy.kranz@merjent.com



1 Main Street SE, Suite 300

Minneapolis, MN 55414

612.746.3660 main

www.merjent.com

From: Smith, Welby R (DNR) <welby.smith@state.mn.us>

Sent: Monday, February 13, 2023 6:31 PM

To: Andy Kranz <andy.kranz@merjent.com>

Subject: EXTERNAL: Re: Rare plant specimens

CAUTION: This email originated from outside of Merjent.

Hi Andy,

Sure, bring them in, or get them to me whatever way is most convenient for you. If I'm not there, they can be left in my cubicle.

welby

From: Andy Kranz <andy.kranz@merjent.com>

Sent: Monday, February 13, 2023 6:24 PM

To: Smith, Welby R (DNR) <welby.smith@state.mn.us>

Subject: Rare plant specimens

This message may be from an external email source.

Do not select links or open attachments unless verified. Report all suspicious emails to Minnesota IT Services Security Operations Center.

Hi Welby,

I have two specimens to submit, *Arnoglossum plantagineum* and *Asclepias sullivantii*, from the same railroad ROW in Martin County. These were collected in the course of 2022 Merjent work. I made collections at Otto's suggestion, under his permit number (he was working on the same project). Can

I bring these to you to verify ID?

I've attached some photos as well as herbarium labels and the NHIS data sheet.

Andy Kranz

612.924.3998 direct

507.459.3150 mobile

andy.kranz@merjent.com



1 Main Street SE, Suite 300

Minneapolis, MN 55414

612.746.3660 main

www.merjent.com

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Attachment G – MDNR's Guidance on Documenting and Collecting Rare Plants (2018)

Guidance on Documenting and Collecting Rare Plants

DNR Division of Ecological and Water Resources

February 2018

Please refer to the following guidance if you will be submitting records for entry into the DNR's Natural Heritage Information System (NHIS). All botanical surveys conducted for environmental review or permitting purposes should follow this guidance.

Before Going in the Field

- Review the [current list of state-listed species](#) so you will know which species are rare.
- Check the Rare Features Database (see [How to Obtain Natural Heritage Data](#)) and, if applicable, the records of other public land managers to see if there are known occurrences of rare plants within your work or study area.
- Familiarize yourself with critical identifying features of species likely to be collected. This might include a visit to a herbarium to review previous collections of a plant species.
- Obtain the plant spreadsheet template for data entry purposes. Review this spreadsheet to familiarize yourself with the type of information that should be collected. The Rare Plant Observations spreadsheet template is available under "Submitting Data" on the [NHIS Website](#).
- Obtain a permit if you plan to collect specimen vouchers of state-listed endangered or threatened species. Minnesota's endangered species law (*Minnesota Statutes*, section 84.0895) and associated rules (*Minnesota Rules*, part 6212.1800 to 6212.2300 and 6134) prohibit the taking of threatened or endangered species without a permit. Please contact Richard Baker, Endangered Species Coordinator, at Richard.Baker@state.mn.us to request a permit.
- When required, obtain permits for collecting on public lands such as Scientific and Natural Areas, State Parks, and National Forests.
- Respect property owners' rights. Obtain permission from the private landowner or public land manager to 1) go on the land and 2) to collect plants.
- **Any surveys required through the DNR environmental review process must follow the standards contained in this Guidance.** Before initiating any such survey, the surveyor must receive approval of a project-specific survey plan from Lisa Joyal, Endangered Species Review Coordinator. Any proposed departure from the standards in the *Guidance* must be identified in the project-specific plan.

Specimen Collection

Most rare plant records in the DNR's Rare Features Database are documented with collected specimens deposited in credible herbaria. Records documented by standard herbarium collections in museums are strongly preferred over all other forms of documentation. A specimen of a rare plant often is sufficient if it includes a portion of the plant that allows positive identification of the species.

Under what circumstances should I collect a herbarium specimen?

- Collect state-listed endangered or threatened plants only if you have a permit. If you have unintentionally collected an endangered or threatened plant without a permit, the specimen should be submitted to the DNR as soon as is practical following the procedures described below, with a brief note attached that explains the circumstances.
- For new locations of a species, collect a specimen; in general, make no more than one collection of a particular species per 40 acres of habitat.
- For previously known populations of an endangered or threatened plant, consider collecting a new voucher if the DNR's Rare Features Database indicates that it has been more than thirty years since the last voucher was collected from the population.
- For any given species, collect only when distinguishing characters are present (usually flowers and/or fruits are necessary); if key characters are not present, mark the location and return at the appropriate time for collecting a specimen with distinguishing characteristics.
- For endangered or threatened vascular plants, collect a complete specimen (which includes roots) only when the population has more than 100 individuals.

- For populations of endangered or threatened vascular plants with fewer than 100 individuals, collect only the distinguishing portion of the plant (e.g., a portion of the inflorescence that has one or more flowers or a portion of the stem that has one or more leaves). A partial specimen might be inadequate to confirm the identification. In this case, supplement the partial collection with a close-up photograph that clearly shows the diagnostic features. Please note that in many cases photographs are not sufficient to confirm identification.
- For aquatic plants, collect a portion of the stem with leaves and fruits or flowers. Do not collect the roots. If you are unsure whether you have found a rare species, collect several specimens. Please note that in most cases photographs are not sufficient to confirm the identification of aquatic species. If your target search area is aquatic, please contact Welby Smith, DNR Botanist, at Welby.Smith@state.mn.us for additional guidance.
- For *Botrychium* spp., always collect a specimen of the above-ground portion of the plant, regardless of the apparent population size or the state status of the species.
- For mosses, liverworts, fungi and lichens, collect such that the viability of the population is maintained.

How do I make a proper collection? See General Guidelines for Collecting Vascular Plant Specimens on page 3.

Specimen Submission

- For quality control purposes, the identification of the specimen must be confirmed by a qualified second party before a record can be entered into the Rare Features Database.
- Send specimen(s) of state-listed species or suspected state-listed species directly to Welby Smith, DNR Botanist, for verification. Each specimen must have a label that meets the Bell Museum standards (see page 3). Do not submit unknown specimens unless you suspect that it is a state-listed species. If you are unsure of the species' identification, you can leave the space for the scientific name blank. Send specimens to:
 Welby Smith
 Minnesota Department of Natural Resources
 Division of Ecological Resources
 500 Lafayette Road, Box 25
 St. Paul, MN 55155
- DNR staff will complete verification or submit the specimen to an outside expert for annotation. Following verification, the DNR will donate specimens to the University of Minnesota Herbarium, a division of the [Bell Museum of Natural History](#). Save response from the DNR and submit with data.

Data Submission

- Follow the directions and templates under "Submitting Data" on the [NHIS Website](#).
- Document *all* state-listed endangered, threatened, or special concern species encountered. Include type of documentation for each record (e.g., photograph or specimen).
- Submit data electronically as a spreadsheet with an accompanying shapefile. Use the Rare Plant Observations spreadsheet template available under "Submitting Data" at [NHIS Website](#).
- **Important!** *Ensure that the unique identifier for each record is the same in the shapefile, the spreadsheet, the report's tables and figures, and the information submitted with the specimens.*
- Submit cover sheet, survey report, GIS shapefile, spreadsheet, and email verifying specimen identification to Reports.NHIS@state.mn.us.

How will my records be used to protect rare plants?

- Conservation planning at local, state and regional levels.
- Environmental review of development projects.
- Research about life history.
- Revisions to the state list of endangered, threatened and special concern species.
- Legal challenges related to protected species locations are possible. Properly vouchered specimens are often critical in the protection of rare plant populations in these cases.

Questions?

- **Regarding permits:** Contact Rich Baker at Richard.Baker@state.mn.us or 651-259-5073.
- **Regarding specimens:** Contact Welby Smith at Welby.Smith@state.mn.us or 651-259-5142.
or Hannah Texler at Hannah.Texler@state.mn.us or 651-259-5048.
- **Regarding data submittal:** Contact Karen Cieminski at Karen.Cieminski@state.mn.us or 651-259-5081.
- **Regarding environmental review process:** Contact Lisa Joyal at Lisa.Joyal@state.mn.us or 651-259-5109.

General Guidelines for Collecting Vascular Plant Specimens*

*For mosses, liverworts, algae, fungi and lichens, please contact the [University of Minnesota Herbarium](#) for collection guidelines.

1. **Equipment:** Plant press, straps (2), felt blotters, ventilators (corrugated boards), and newspaper. Also, a knife or other tool for cutting and digging and a notebook of standardized form for recording field data. The press can be made from $\frac{3}{4}$ " plywood cut 12" x 18" (2 pieces); the ventilators can be cut from discarded "cardboard" boxes, also 12" x 18" (the corrugations should run the short direction). The blotters can be obtained from a stationery store.
2. **Preparation:** Once the specimen is found, it is necessary to determine what portion of the plant will be collected. A complete collection includes the entire plant with roots, but for purposes of conservation, the roots of rare species should not be collected if the population consists of fewer than 100 individuals. For most species, such as orchids, a single flower is enough for purposes of identification. Other species, e.g., sedges, usually require the complete aboveground stem with mature fruit. Specimens of trees and shrubs should include a twig with mature leaves and flowers and/or fruit. Specimens that do not show diagnostic features cannot be identified and are worthless. If only a portion of the plant is collected, it is important to record a description of the entire plant.

Before collecting plants, it is a good idea to check with the curator of the herbarium where the specimen will be deposited. Some herbaria may not accept a partial specimen unless it has special significance (e.g., a new location for an endangered species).

3. **Pressing and processing specimens:** The freshly collected specimen is placed within the sheet of folded newspaper with the leaves, flowers, etc. in a natural position, but clearly showing the diagnostic features. The paper is placed between two sheets of felt blotters, which are themselves placed between two corrugated ventilators. It is then put within the press, which is tightened with the straps (or ropes). Several specimens can be put in a single press by layering the blotters and ventilators. Commercial plant presses are slightly larger than herbarium paper so the specimens should not fill the plant press side to side. Also, be sure to leave room for a label in the lower right portion. The press must then be put in a warm dry place until the plants are dry. A simple plant drier that uses heat rising from a light bulb works well, but is not essential. The blotters should be changed every day until the specimen is dry. If a specimen does not dry within 4-5 days, it will likely begin to decompose. When the specimen is dry, it should be taken from the press, but kept within the folded newspaper for protection.

A label (see example below) must be prepared before the specimen can be sent to a herbarium. The label should be on acid-free, archival quality paper. We suggest that you use labels that are 2 $\frac{3}{4}$ x 4 $\frac{1}{4}$ inches in size, but other labels not to exceed 3 x 5 inches will be acceptable. At a bare minimum, the label must contain the name of the species, location of collection, description of habitat, name of collector, and date of collection. The label should also include latitude and longitude coordinates and/or UTM coordinates, and, if a permit was required, the permit number. Providing a label is the responsibility of the collector, not the herbarium or the DNR. A specimen without a label will not be accepted by a herbarium.

After the label is prepared, it should be put with the specimen inside the folded newspaper, which may be held between two corrugated ventilators for rigidity. The herbarium will mount the specimen and label on a stiff sheet of paper and accession it into their collection.

The University of Minnesota Herbarium, a division of the Bell Museum of Natural History, houses the largest collection documenting Minnesota's plant diversity and is the primary repository for the DNR's Minnesota Biological Survey. Additional [guidance on collecting rare plants for museum specimens](#) can be found on the University of Minnesota Herbarium website.

Plants of Scott County, Minnesota, USA

Silphium integrifolium Michx. var. *integrifolium*

3 miles west of Jordan in north half of quarter-quarter section.

Approximately 100 plants in wet to wet-mesic prairie on terrace within the Minnesota River Valley. In heavily grazed pasture dominated mostly by *Spartina pectinata* and *Agrostis stolonifera*. Soils range from black muck with marl concretions to silt loam. Site has been compacted by grazing. Glacial erratics common. Associated with *Carex stricta*, *Pycnanthemum virginianum*, *Lobelia siphilitica*, *Lysimachia quadriflora*, *Aster puniceus*.

T 114N R 24W NW $\frac{1}{4}$ of SE $\frac{1}{4}$ of Sec 27

MNDNR Permit # 1996

Fred S. Harris 96235

September 3, 1996

MINNESOTA BIOLOGICAL SURVEY
MINNESOTA DEPARTMENT OF NATURAL RESOURCES



Wetland and Waterbody Delineation Report - Minnesota

Project Name:

Summit Carbon Solutions (SCS) Midwest Carbon Express

Document Number: SCS-0700-ENV-RPT-005

Date

October 3, 2022

REVISION HISTORY

DATE	REVISION	REVISION DESCRIPTION	PREPARED BY:	REVIEWED BY:	APPROVED BY:
7/26/22	A	Draft for review	Tom Errico	Billy VonSee	
10/3/22	0	Issued for Use			

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Appendix 4 – WETS Precipitation Summary Table	
Appendix 5 – Wetland & Waterbody Summary Tables	
Appendix 6 – USACE Wetland Determination Data Forms	
Appendix 7 – Photos	

1 Introduction

Summit Carbon Solutions, LLC (SCS) retained Merjent, Inc. (Merjent) to conduct wetland and waterbody surveys for the Midwest Carbon Express Project (Project) in the State of Minnesota. The Project will capture carbon dioxide (CO₂) from industrial facilities across five states (i.e., Iowa, Minnesota, Nebraska, South Dakota, and North Dakota) and transport the captured CO₂ via pipeline to North Dakota to be permanently sequestered within deep underground geologic formations. The Project aims to reduce the carbon intensity of biofuels produced from ethanol facilities and work towards achieving climate goals while creating jobs and other economic benefits across the Project footprint. The planned pipeline is approximately 2,000 miles, with diameters ranging from 4 to 24 inches.

Field crews conducted surveys in accordance with technical guidance from the U.S. Army Corps of Engineers (USACE) and Minnesota Department of Natural Resources (MDNR). The purpose of the wetland and waterbody field surveys was to identify aquatic resources within the environmental survey corridor for use in workspace planning and evaluation, impact analyses, and water resources permitting.

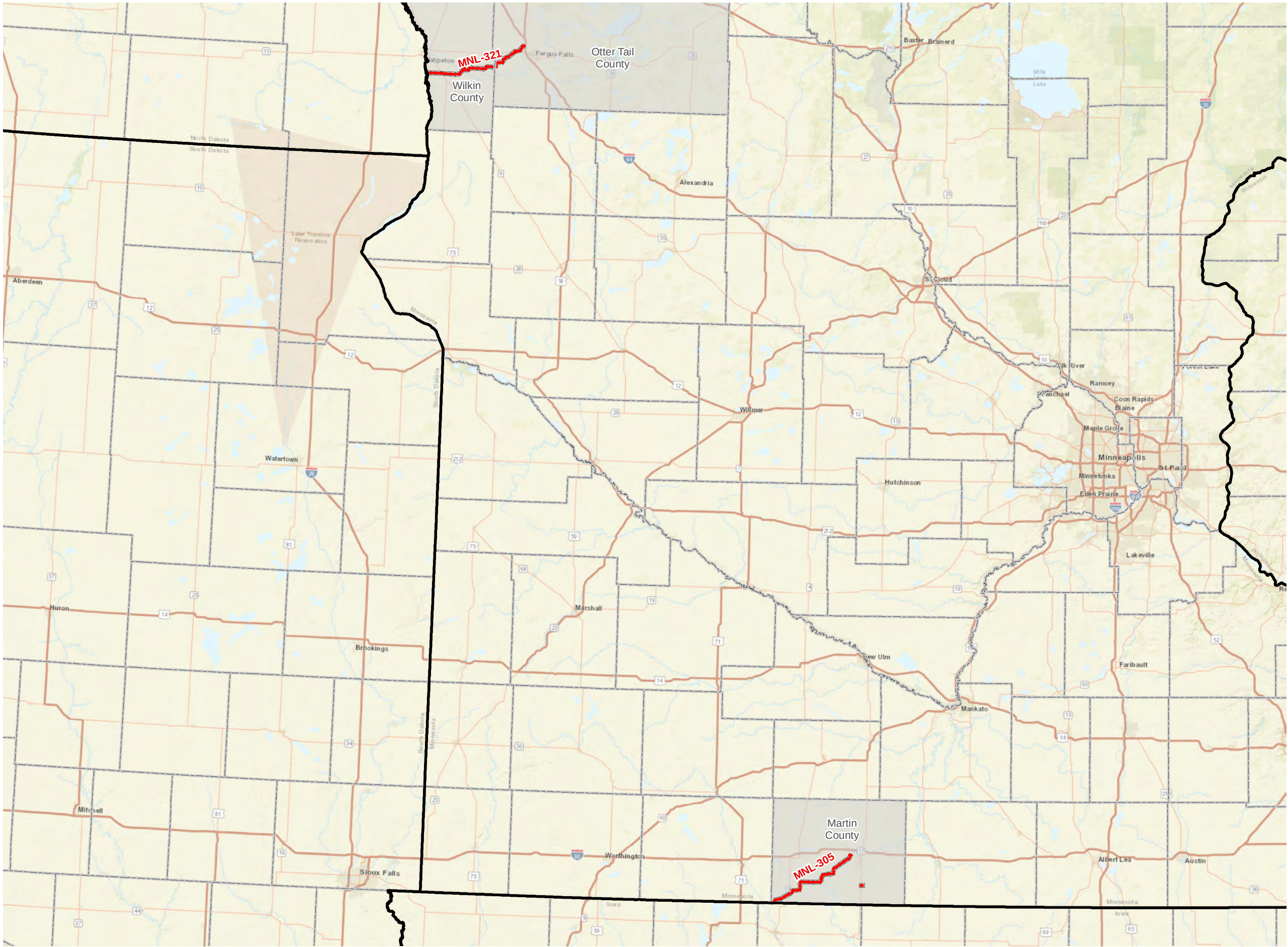
Specific objectives of the surveys were to:

- 1) delineate wetland boundaries;
- 2) categorize wetland community types; and
- 3) locate and characterize waterbodies.

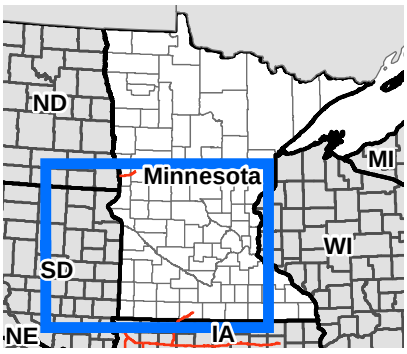
Wetland and waterbody surveys were conducted on two-line segments in three counties in Minnesota (refer to Table 1 and Figure 1).

The wetland delineation performed by Merjent included the identification and recording of physical features that may be considered Waters of the United States (WOTUS) as defined by the USACE. WOTUS include most wetlands, rivers, creeks, streams, lakes, tributaries, etc. This report summarizes the results of the wetland delineation within the Project survey area and will be utilized to determine impacts to potentially jurisdictional WOTUS.

Location Map



VICINITY MAP



LEGEND

- Environmental Survey Area
- Page Index
- State Boundary
- County Boundary
- Counties Crossed

REVISIONS

Date:	2022-08-30	Revised by:	JLL	Checked by:	THE
Revision 1					
Revision description : Environmental Survey Area using Rev3 Route (8/23/2022)					
Date:	N/A	Revised by:	N/A	Checked by:	N/A
Revision 2					
Revision description					
Date:	N/A	Revised by:	N/A	Checked by:	N/A
Revision 3					
Revision description					

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SUMMIT CARBON
SOLUTIONS

MIDWEST CARBON EXPRESS PROJECT

Figure Title: Location Map	
Figure Number: Figure 1	
Scale: 1:1,400,000 1 in = 116,667 ft	Projection: Transverse Mercator NAD 1983 UTM Zone 15
Sheet: Sheet Sheet of	Drawing Number: 005-00003 Current Revision

Table 1: Line Segments

Line Segment ID	Counties	Total Mileage
MNL-305	Martin	25.4
MNL-321	Wilkin, Otter Tail	28.1
Total Mileage		53.5

2 Methodology

2.1 Identification of Potential Waters of the United States

Merjent completed a resource review of background site information to prepare for the survey effort. Data compiled as part of the resource review included:

- U.S. Geological Survey (USGS) topographic maps;
- U.S. Department of Agriculture, Natural Resource Conservation Service (NRCS) soil survey data;
- U.S. Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI) data;
- MDNR NWI Data; and
- recent aerial imagery.

Appendix 1 includes the map index of the environmental survey corridor, and Appendix 2 includes the environmental features exhibit used to conduct the field survey and desktop review.

In addition to the Biological Survey Methodology and Protocols for Minnesota ("Biological Survey Protocols;" refer to Appendix 3) a unique naming scheme was used to identify wetlands and waterbody features. This consisted of feature type abbreviation (W for wetland, U for uplands, and S for waterbodies), company/team ID (1002, 1003, 1004, etc.), county code (OT for Otter Tail County), and feature ID number. For example, a wetland location would be labeled W1004OT001, an upland would be U10041OT001, and a waterbody would be S1004OT001. For multitype wetlands, a suffix with the cover type was added to the wetland name, such as Palustrine Forested (PFO), Palustrine Scrub-Shrub (PSS), or Palustrine Emergent (PEM) (e.g., W2001OT001_PEM).

A separate naming scheme was utilized for wetland and waterbody features that were identified via desktop analysis. Wetland features were labeled using a nomenclature that includes a feature type (W for wetlands and S for waterbodies), number code for company identification (1), county code (e.g., WI for Wilkin County), feature number/ID, and "DT" to denote that the feature was generated at a workstation and not surveyed in the field. For example, a desktop wetland location would be labeled W_1_WI_001_DT.

2.1.1 Wetlands

Field crews conducted wetland surveys in accordance with the criteria and methods outlined in:

- the USACE Wetlands Delineation Manual, Technical Report Y-87-1 (Environmental Laboratory, 1987; Manual);
- subsequent guidance documents (USACE, 1991a; 1991b; 1992); and
- applicable Regional Supplements to the 1987 Manual.

Merjent determined antecedent precipitation within each county crossed by the environmental survey corridor using the date when the field survey was conducted. Merjent evaluated antecedent precipitation with the Precipitation Worksheet using Gridded Database (Minnesota Climatology Working Group) for the 3 months prior to the date of field survey. The worksheet, which applies the methodology described in Engineering Field Handbook,

Part 650: Hydrology Tools for Wetland Determination (NRCS, 1997), calculates the multi-month score for the prior 3 months based on precipitation data. Merjent generated a precipitation worksheet for the approximate mid-point of the environmental survey corridor within each county and is summarized in Table 2-1 and Table 2-2 (refer to Appendix 4).

Field crews conducted on-site wetland delineations using the three criteria technical approach (i.e., vegetation, soil, and hydrology) as described in the Biological Survey Protocols and as defined in the Manual and applicable Regional Supplements. According to procedures described in the Manual and applicable Regional Supplements, field crews determined an area to be a wetland if under normal circumstances it reflects a predominance of:

- hydrophytic vegetation;
- hydric soils; and
- wetland hydrology (e.g., inundated or saturated soils).

Field crews located and recorded wetland sample points and boundaries using global positioning system (GPS) technology with sub-meter accuracy. Each wetland feature was given a unique ID as defined in the Biological Survey Protocols. After collection, Merjent reviewed, geospatially corrected, and consolidated the collected data for use in workspace evaluation and impact analyses. Wetlands included PEM, PSS, and PFO vegetative communities.

2.1.2 Waterbodies

Field crews identified, classified, and documented waterbodies according to the methodology outlined in the Biological Survey Protocols and the Classification of Wetlands and Deepwater Habitats (Cowardin, 1979). Field crews located and delineated waterbody boundaries with sub-meter GPS technology. Each waterbody feature was given a unique ID as defined by the Biological Survey Protocols. Field crews collected the following attributes in the field and used them to classify each waterbody:

- top of bank width and height;
- ordinary high-water mark (OHWM) width and height;
- substrate type;
- flow direction;
- estimated water velocity;
- water quality; and
- dominant riparian vegetation.

Field crews identified OHWMs, if present, per USACE Regulatory Guidance Letter 05-05 (USACE, 2005) and took photographs at each waterbody to record general conditions at the time of the field survey. Field crews identified Ephemeral, Intermittent, Perennial, and pond or other open water types of waterbodies.

2.2 Desktop Delineation Review

A desktop delineation review of wetlands and waterbodies was conducted for all Project areas that were not surveyed by field crews during the 2021 or 2022 surveys. Merjent gathered available data and imagery resources to complete a detailed assessment of potential wetland and waterbody locations within the Project environmental survey corridor. Resources utilized for the desktop delineation review included:

- USGS topographic maps;
- NRCS soil survey data;
- USFWS NWI data;
- MDNR NWI Data;

- Google Earth™ historic imagery (multiple years);
- National Agricultural Imagery Program (NAIP) Imagery (multiple years); and
- NAIP imagery color-infrared (multiple years).

Each potential wetland and waterbody feature identified was given a unique feature ID. Each potential wetland community was classified according to the Classification of Wetlands and Deepwater Habitats of the United States (Cowardin, 1979), Circular 39 System, and Wetland Plants and Plant Communities of Minnesota and Wisconsin (Eggers and Reed, Ver. 3.2, 2015). Each potential waterbody was classified by flow regime. Field surveys for these areas are anticipated to be completed in the summer and fall of 2022, access and weather permitting.

3 Results

3.1 Survey Completion

Field crews conducted wetland and waterbody surveys of approximately 43.7 miles (1,533.1 acres) of the 53.5-mile (2,061.9-acre) Project environmental survey corridor. A desktop delineation review was completed for the remaining 9.8 miles (528.8.5 acres).

3.2 Wetland & Waterbody Delineation Summary

Field crews identified 20 waterbodies and 60 wetlands containing 62 wetland communities. The desktop delineation review identified 9 waterbodies and 37 wetlands containing 37 wetland communities. Appendix 2 includes maps illustrating wetlands and waterbodies by Cowardin Class. Appendix 5 includes a tabular list of wetland and waterbody features and associated data collected: Table 3 summarizes wetland and waterbody features by Cowardin Class; Table 3-1 provides a summary of wetland features; and Table 3-2 provides a summary of waterbody features. Appendix 6 includes the USACE Wetland Determination Data Forms. Appendix 7 includes photographs of each sampled wetland and waterbody and representative photos of the environmental survey corridor.

4 References

- Cowardin, L.M., V. Carter, and E.T. LaRoe. 1979. Classification of Wetlands and Deepwater Habitats of the United States. U.S. Department of the Interior, Fish & Wildlife Service, Office of Biological Services. FWS/OBS-79/31. Washington, D.C. 20240.
- Eggers, S. and D. Reed. 2015. *Wetland Plants and Plant Communities of Minnesota and Wisconsin (Version 3.2)*. Published by U.S. Army Corps of Engineers, St. Paul District. Available online at: <http://www.mvp.usace.army.mil/Portals/57/docs/regulatory/WetlandBook/Part%201%20%20Introduction,%20Key%20to%20Plant%20Communities,%20Shallow%20Open%20Water%20Communities.pdf>
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- U.S. Department of Agriculture (USDA), Natural Resource Conservation Service (NRCS), Soil Survey.
- USDA-Natural Resource Conservation Service (NRCS). 1997. Engineering Handbook, Part 650: Hydrology Tools for Wetland Determination. Issued August 1997.
- USDA-NRCS. 2010. "Field Indicators of Hydric Soils in the United States, Version 7.0." L.M. Vasilas, G.W. Hurt, and C.V. Noble (eds.). USDA-NRCS in cooperation with the National Technical Committee for Hydric Soils.

Appendix 1 – Map Index

Appendix 2 – Environmental Features Exhibit

Appendix 3 – Wetland & Waterbody Field Protocols

Appendix 4 – WETS Precipitation Summary Table

Appendix 5 – Wetland & Waterbody Summary Tables

Appendix 6 – USACE Wetland Determination Data Forms

Appendix 7 – Photos



Wetland and Waterbody Delineation Supplemental Report for MNL-305 and MNL-321 (2022) - Minnesota

Project Name:

Summit Carbon Solutions Midwest Carbon Express Project

Document Number: SCS-0700-ENV-RPT-005

Date

March 31, 2023

REVISION HISTORY

DATE	REVISION	REVISION DESCRIPTION	PREPARED BY:	REVIEWED BY:	APPROVED BY:
10/03/2022	0	Report for MNL-305 and MNL-321 (2022)	TE	AR	
3/31/23	1	Supplemental Report for MNL-305 and MNL-321 (2022)	TE	AR	

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1 Introduction

Summit Carbon Solutions, LLC (SCS) retained Merjent, Inc. (Merjent) to conduct wetland and waterbody surveys for the Midwest Carbon Express Project (Project) in the State of Minnesota. The Project will capture carbon dioxide (CO₂) from industrial facilities across five states (i.e., Iowa, Minnesota, Nebraska, South Dakota, and North Dakota) and transport the captured CO₂ via pipeline to a sequestration area in North Dakota, where the CO₂ will be safely and permanently stored deep underground utilizing separately permitted Class VI injection wells. Once operational, the Project will include approximately 2,000 miles of pipelines for transportation of CO₂ from industrial facilities.

Field crews conducted surveys in accordance with technical guidance from the U.S. Army Corps of Engineers (USACE) and Minnesota Department of Natural Resources (MDNR). The purpose of the wetland and waterbody field surveys was to identify aquatic resources within the environmental survey area for use in workspace planning and evaluation, impact analyses, and water resources permitting.

Specific objectives of the surveys were to:

- 1) delineate wetland boundaries;
- 2) categorize wetland community types; and
- 3) locate and characterize waterbodies.

On October 3, 2022, SCS submitted a preliminary report to the USACE that summarized the results of surveys conducted during 2021 and the first half of the 2022 field season through July 1 along the pipeline laterals listed in Table 1. This new report supersedes the October 2022 report by providing field survey results for the full 2021 and 2022 field seasons along the pipeline laterals listed in Table 1. On January 10, 2023, SCS submitted a report to the USACE that summarized the full 2021 and 2022 field survey results conducted along the MNL-303, MNL-304, and MNL-337 pipeline laterals.

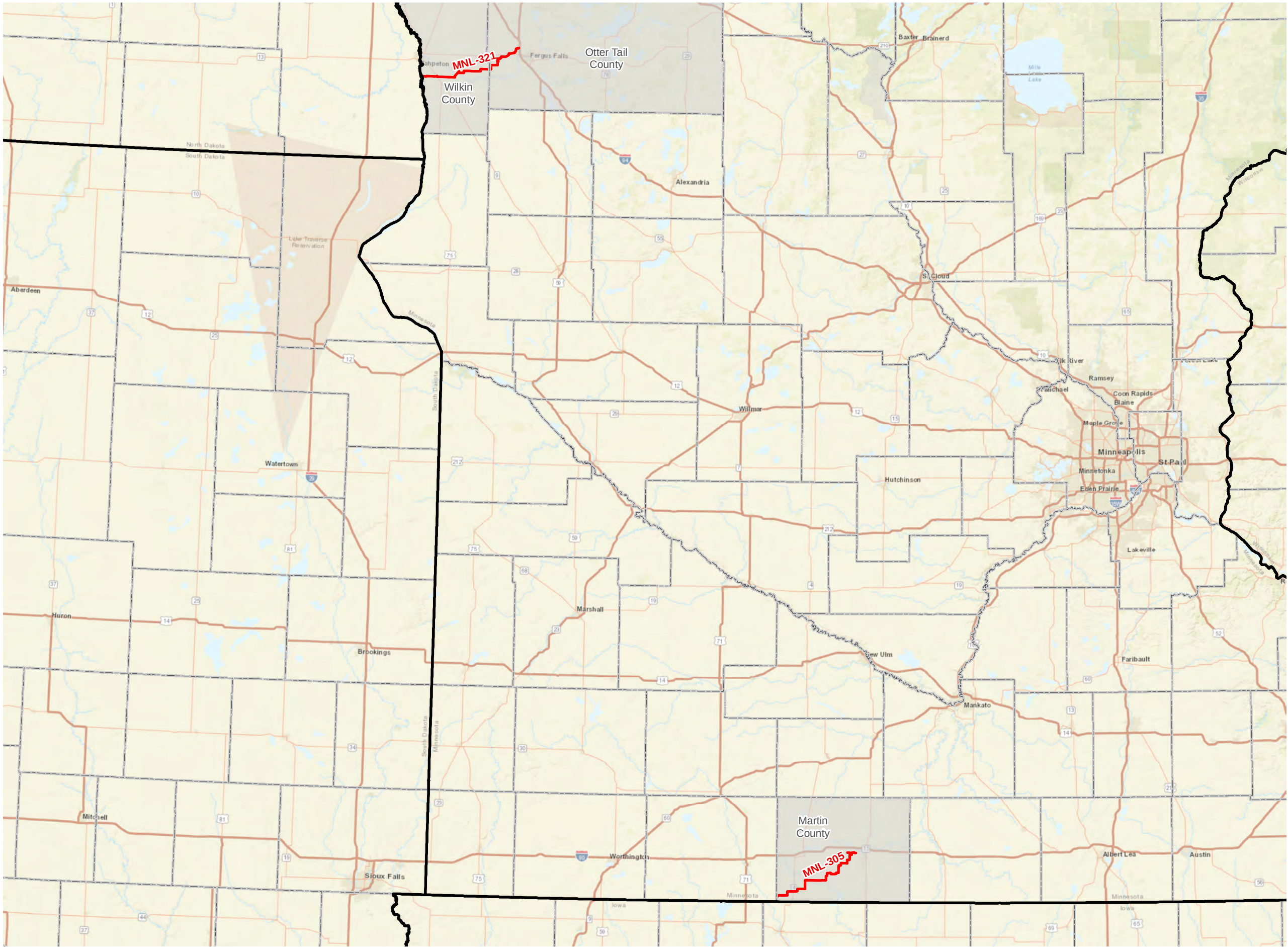
Wetland and waterbody surveys were conducted on two pipeline laterals in three counties in Minnesota (refer to Table 1 and Figure 1).

Table 1: Pipeline Laterals

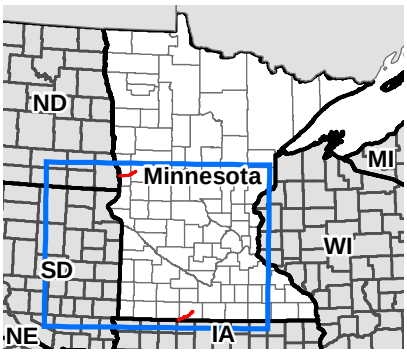
Pipeline Lateral	Counties	Total Mileage
MNL-305	Martin	29.4
MNL-321	Otter Tail, Wilkin	28.1
Total Mileage		57.5

The wetland delineation performed by Merjent included the identification and recording of physical features that may be considered Waters of the United States (WOTUS) as defined by the USACE. WOTUS include most wetlands, rivers, creeks, streams, lakes, tributaries, etc. This report summarizes the results of the wetland delineation within the Project environmental survey area and will be utilized to determine impacts to potential WOTUS.

Location Map



VICINITY MAP



LEGEND

- Environmental Survey Area
- State Boundary
- County Boundary
- Counties Crossed

REVISIONS

Date:	2023-02-28	Revised by:	JLL	Checked by:	THE
Revision Letter/Number - Revision					
Revision description: RevS Route (2/8/2023)					
Date:	YYYY-MM-DD	Revised by:	TBD	Checked by:	TBD
Revision Letter/Number - Revision					
Revision description					
Date:	YYYY-MM-DD	Revised by:	TBD	Checked by:	TBD
Revision Letter/Number - Revision					
Revision description					

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MIDWEST CARBON EXPRESS PROJECT

Figure Title: Location Map	
Figure Number: Figure 1	
Scale: 1:1,400,000 1 in = 116,667 ft	Projection: Transverse Mercator NAD 1983 UTM Zone 15
Sheet: Sheet 1 Sheet 1 of 1	Drawing Number: 005-00027 Current Revision

2 Methodology

2.1 Identification of Potential Waters of the United States

Merjent completed a resource review of background site information to prepare for the survey effort. Data compiled as part of the resource review included:

- U.S. Geological Survey (USGS) topographic maps;
- U.S. Department of Agriculture, Natural Resource Conservation Service (NRCS) soil survey data;
- U.S. Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI) data; and
- recent aerial imagery.

Appendix 1 includes the map index of the environmental survey area, and Appendix 2 includes the environmental features exhibit used to conduct the field survey and desktop review.

In addition to the Biological Survey Methodology and Protocols for Minnesota (“Biological Survey Protocols;” refer to Appendix 3) a unique naming scheme was used to identify wetlands and waterbody features. This consisted of feature type abbreviation (W for wetland, U for uplands, and S for waterbodies), company/team ID (1002, 1003, 1004, etc.), county code (e.g., OT for Otter Tail County), and feature ID number. For example, a wetland location would be labeled W1004OT001, an upland would be U10041OT001, and a waterbody would be S1004OT001. For multitype wetlands, a suffix with the cover type was added to the wetland name, such as Palustrine Forested (PFO), Palustrine Scrub-Shrub (PSS), or Palustrine Emergent (PEM) (e.g., W1004JA001_PEM).

A separate naming scheme was utilized for wetland and waterbody features that were identified via desktop analysis. Wetland features were labeled using a nomenclature that includes a feature type (W for wetlands and S for waterbodies), number code for company identification (1), county code (e.g., OT for Otter Tail County), feature number/ID, and “DT” to denote that the feature was generated at a workstation and not surveyed in the field. For example, a desktop wetland location would be labeled W_1_OT_001_DT.

2.1.1 Wetlands

Field crews conducted wetland surveys in accordance with the criteria and methods outlined in:

- the USACE Wetlands Delineation Manual, Technical Report Y-87-1 (Environmental Laboratory, 1987; Manual);
- subsequent guidance documents (USACE, 1991a; 1991b; 1992); and
- applicable Regional Supplements to the 1987 Manual.

Merjent determined antecedent precipitation within each county crossed by the environmental survey area using the date when the field survey was conducted. Merjent evaluated antecedent precipitation with the Precipitation Worksheet using the Gridded Database (Minnesota Climatology Working Group) for the 3 months prior to the date of field survey. The worksheet, which applies the methodology described in Engineering Field Handbook, Part 650: Hydrology Tools for Wetland Determination (NRCS, 1997), calculates the multi-month score for the prior 3 months based on precipitation data. Merjent generated a precipitation worksheet for the approximate mid-point of the environmental survey area within each county and is summarized in Table 2-1 and Table 2-2 (refer to Appendix 4).

Field crews conducted on-site wetland delineations using the three criteria technical approach (i.e., vegetation, soil, and hydrology) as described in the Biological Survey Protocols and as defined in the Manual and applicable Regional Supplements. According to procedures described in the Manual and applicable Regional Supplements, field crews determined an area to be a wetland if under normal circumstances it reflects a predominance of:

- hydrophytic vegetation;
- hydric soils; and

- wetland hydrology (e.g., inundated or saturated soils).

Field crews located and recorded wetland sample points and boundaries using global positioning system (GPS) technology with sub-meter accuracy. Each wetland feature was given a unique ID as defined in the Biological Survey Protocols. After collection, Merjent reviewed, geospatially corrected, and consolidated the collected data for use in workspace evaluation and impact analyses. Wetlands included PEM, PSS, and PFO vegetative communities.

2.1.2 Waterbodies

Field crews identified, classified, and documented waterbodies according to the methodology outlined in the Biological Survey Protocols and the Classification of Wetlands and Deepwater Habitats (Cowardin, 1979). Field crews located and delineated waterbody boundaries with sub-meter GPS technology. Each waterbody feature was given a unique ID as defined by the Biological Survey Protocols. Field crews collected the following attributes in the field and used them to classify each waterbody:

- top of bank width and height;
- ordinary high-water mark (OHWM) width and height;
- substrate type;
- flow direction;
- estimated water velocity;
- water quality; and
- dominant riparian vegetation.

Field crews identified OHWMs, if present, per USACE Regulatory Guidance Letter 05-05 (USACE, 2005) and took photographs of each waterbody to record general conditions at the time of the field survey. Field crews identified Ephemeral, Intermittent, Perennial, and pond or other open water types of waterbodies. When field crews encountered a mapped National Hydrography Dataset (NHD) waterbody that did not exhibit the characteristics to be classified as a waterbody, photographs were taken to document the presence of upland conditions. Photographs of these areas are available in Appendix 7 and Table 8-1 in Appendix 8 lists NHDs crossed by the Project environmental survey area that did not exhibit characteristics to be classified as a waterbody.

2.2 Desktop Delineation Review

A desktop delineation review of wetlands and waterbodies was conducted for all Project areas that were not surveyed by field crews during the 2021 or 2022 surveys. Merjent gathered available data and imagery resources to complete a detailed assessment of potential wetland and waterbody locations within the Project environmental survey area. Resources utilized for the desktop delineation review included:

- USGS topographic maps;
- NRCS soil survey data;
- USFWS NWI data;
- Google Earth™ historic imagery (multiple years);
- National Agricultural Imagery Program (NAIP) Imagery (multiple years); and
- NAIP imagery color-infrared (multiple years).

Each potential wetland and waterbody feature identified was given a unique feature ID. Each potential wetland community was classified according to the Classification of Wetlands and Deepwater Habitats of the United States (Cowardin, 1979), Circular 39 System, and Wetland Plants and Plant Communities of Minnesota and Wisconsin (Eggers and Reed, Ver. 3.2, 2015). Each potential waterbody was classified by flow regime. Field surveys for these areas are anticipated to be completed in the spring and summer of 2023, access and weather permitting.

3 Results

3.1 Survey Completion

Field crews conducted wetland and waterbody surveys of approximately 45.7 miles (1,600.0 acres) of the 57.5-mile (2,220.0-acre) Project environmental survey area in Minnesota. A desktop delineation review was completed for the remaining 11.8 miles (620.0 acres) in Minnesota.

3.2 Wetland & Waterbody Delineation Summary

Field crews identified 20 waterbodies and 65 wetlands containing 70 wetland communities. The desktop delineation review identified 11 waterbodies and 45 wetlands containing 46 wetland communities. Appendix 2 includes maps illustrating wetlands and waterbodies by Cowardin Class. Appendix 5 includes tables of wetland and waterbody features and associated data collected: Table 3 summarizes wetland and waterbody features by Cowardin Class; Table 3-1 provides a summary of wetland features; and Table 3-2 provides a summary of waterbody features. Appendix 6 includes the USACE Wetland Determination Data Forms. Appendix 7 includes a photograph location map set, photographs of each sampled wetland and waterbody, and representative photos of the environmental survey area.

4 References

- Cowardin, L.M., V. Carter, and E.T. LaRoe. 1979. Classification of Wetlands and Deepwater Habitats of the United States. U.S. Department of the Interior, Fish & Wildlife Service, Office of Biological Services. FWS/OBS-79/31. Washington, D.C. 20240.
- Eggers, S. and D. Reed. 2015. *Wetland Plants and Plant Communities of Minnesota and Wisconsin (Version 3.2)*. Published by U.S. Army Corps of Engineers, St. Paul District. Available online at: <http://www.mvp.usace.army.mil/Portals/57/docs/regulatory/WetlandBook/Part%201%20%20Introduction,%20Key%20to%20Plant%20Communities,%20Shallow%20Open%20Water%20Communities.pdf>.
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- USACE. 1991b. "Questions & Answers on the 1987 Manual," memorandum from John F. Study dated 7 October 1991.
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- USACE. 2010. "Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Midwest Region, Version 2.0." J.S. Wakeley, R.W. Lichvar, and C.V. Noble (eds.). ERDC/EL TR-10-16. U.S. Army Engineer Research and Development Center. Vicksburg, MS.

U.S. Department of Agriculture (USDA), Natural Resource Conservation Service (NRCS), Soil Survey.

USDA-Natural Resource Conservation Service (NRCS). 1997. Engineering Handbook, Part 650: Hydrology Tools for Wetland Determination. Issued August 1997.

USDA-NRCS. 2010. "Field Indicators of Hydric Soils in the United States, Version 7.0." L.M. Vasilas, G.W. Hurt, and C.V. Noble (eds.). USDA-NRCS in cooperation with the National Technical Committee for Hydric Soils.

Appendix 1 – Map Index (Provided Electronically)

Appendix 2 – Environmental Features Exhibit (Provided Electronically)

Appendix 3 – Wetland & Waterbody Field Protocols

Biological Survey Methodology and Protocols for Minnesota; 2021 Merjent Field Services

*Summit Carbon Solutions
Midwest Carbon Express*

Type of Document:

Final

Document Number:

SCS-0700-ENV-01-PLN-009

Project Number:

TAL-2105451-00

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Jason Zoller, Senior Environmental Project Manager
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Date Submitted:

2021-09-20

Legal Notice

This report was prepared by Merjent, Inc. for the account of (Summit Carbon Solutions).

Any use a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. Merjent, Inc. cannot be held liable for damages suffered, if any, by any third party as a result of decisions made or actions based on this report.

REVISION HISTORY

DATE	REVISION	REVISION DESCRIPTION	PREPARED BY:	REVIEWED BY:	APPROVED BY:

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Acronyms and Abbreviations

AGO	ArcGIS Online
GIS	geographic information system
GPS	Global Positioning System
HASP	Health and Safety Plan
MCE	Midwest Carbon Express
Merjent	Merjent, Inc.
NHD	National Hydrography Database
NHIS	Natural Heritage Information System
NWI	National Wetland Inventory
OHWM	ordinary high-water mark
PEM	palustrine emergent
PFO	palustrine forested
PSS	palustrine scrub shrub
PUB	palustrine unconsolidated bottom
ROW	right-of-way
RTE	Rare, Threatened and Endangered
SCS	Summit Carbon Solutions
TOB	Top of Bank
USACE	U.S. Army Corps of Engineers

1 Scope

The objective of the Biological Survey Methodology and Protocols for Minnesota is to ensure that Merjent, Inc. (Merjent) and its subconsultants implement consistent field data collection procedures for wetland and waterbody surveys for Summit Carbon Solution's (SCS) Midwest Carbon Express (MCE) project. The Biological Survey Methodology and Protocols incorporates all applicable agency and client requirements to facilitate timely and complete permitting applications.

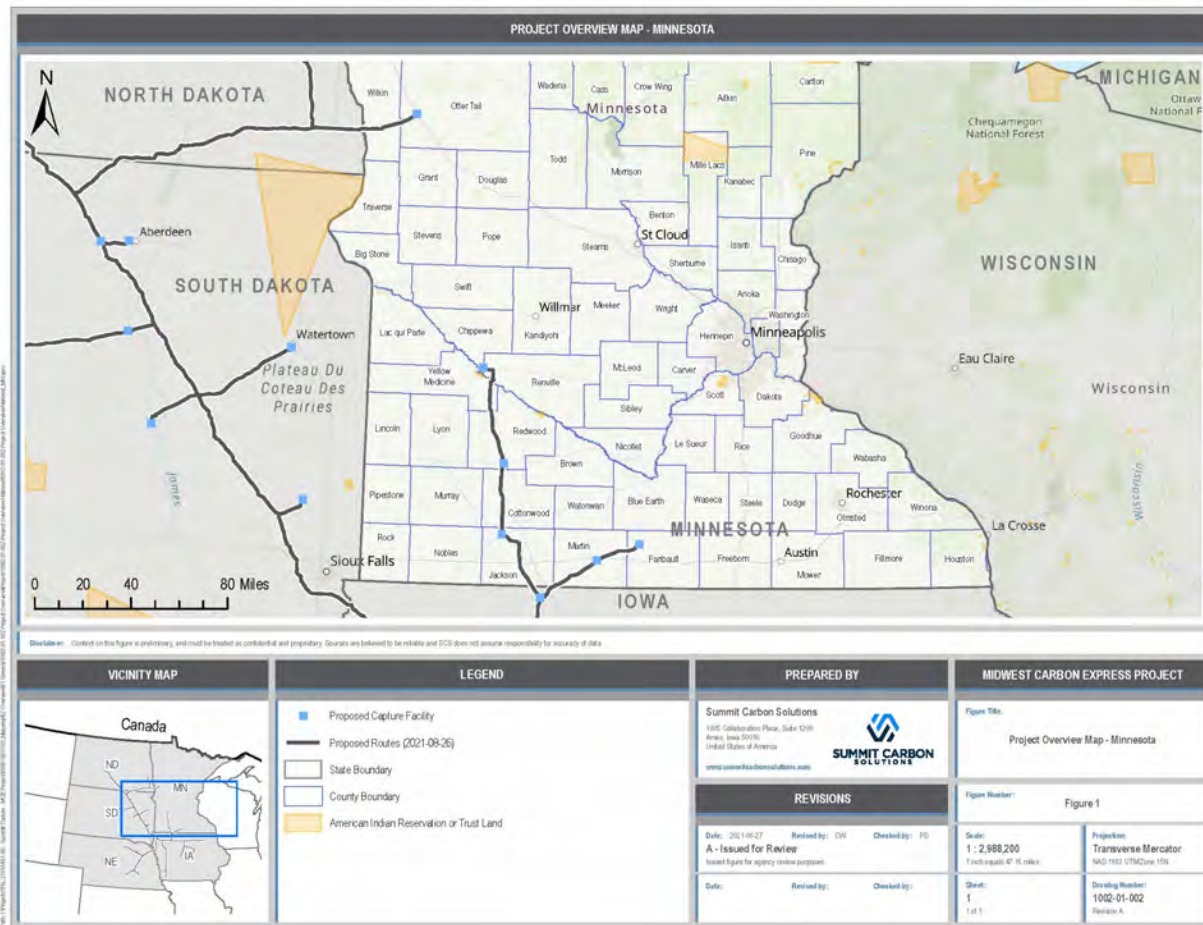


Figure 1 Project Overview in Minnesota

2 Preliminary Survey Protocols

2.1 Desktop Review

It is assumed prior to survey, the field staff will review all relevant and available spatial information related to each survey type including, but not limited National Wetland Inventory (NWI), National Hydrography Database (NHD), Natural Resource Conservation Service data for hydric soils, aerial imagery, etc.

2.2 Safety

Safety is a priority for SCS and Merjent. Compliance with all safety requirements is mandated by SCS and Merjent. For specific information on safety requirements, please refer to the Project Specific Health and Safety Plan (HASP). A daily tailgate form will be required to document potential site-specific issues and controls to address them.

For the MCE project, permission to conduct biological resource surveys within the environmental survey corridor will be secured through right-of-way (ROW) agents in coordination with Merjent's Field Logistics Coordinator prior to Merjent's biological crews entering the survey corridor. However, if a crew is ever asked by a landowner to vacate their property, the survey crew will cease work immediately, leave the property without question, and notify the appropriate ROW contact as well as the appropriate Merjent Field Logistics Coordinator.

3 Survey Protocols

3.1 Wetland and waterbody delineations

Crews will delineate and collect data for all wetland and waterbody features encountered in the environmental survey corridor as follows:

- Wetland delineation methods will follow the standardized protocol as described in the U.S. Army Corps of Engineers (USACE) Wetland Delineation Manual (1987) and associated Regional Supplements (Midwest Region (Version 2.0, 2010) and Great Plains Region (Version 2.0, 2010))
 - Surveys will require the collection of wetland boundaries, sample points, and completion of the appropriate USACE Regional Supplement sample point forms. The boundaries of each regional supplement are defined by the U.S. Department of Agriculture Land Resource Regions boundaries.
- Surveys will require the delineation of wetland communities according to the Classification of Wetlands and Deepwater Habitats of the United States (Cowardin, 1979), Circular 39 System and Eggers and Reed.
- All waterbody features encountered in the environmental survey corridor will be delineated and have characteristics documented regardless of the potential jurisdictional status.

4 Typical Sampling Protocol

4.1 Wetland Sampling Protocol

The entire environmental survey corridor will be walked, not just the exterior boundary of a located wetland (as far as safe conditions allow). This will minimize the chance of missing upland inclusions, potential Rare, Threatened and Endangered (RTE) species habitat or wetland communities that may affect permitting, construction, or mitigation.

All wetlands will be delineated regardless of potential jurisdictional status. Examples of potential scenarios and sampling can be found in Appendix A.

4.1.1 Vegetation

Vegetation sampling and documentation will follow procedures as described in the appropriate Regional Supplement.

4.1.2 Hydrology

Hydrology sampling and documentation will follow procedures as described in the appropriate Regional Supplement.

4.1.3 Soils

Soil sampling and documentation will follow procedures as described in the appropriate Regional Supplement. This requirement includes one soil sample collected at each data point. Due to safety concerns, one exception is:

- 1) No soil sampling will occur near roadsides. In cases of roadside wetlands, crews will be restricted from sampling the soils and assume soils are hydric. Crews are to indicate such on their data forms (i.e., in soil notes write: “roadside wetland – soils assumed hydric).

4.1.4 Upland Inclusions within Wetland Complexes

Upland inclusions within a wetland may be observed. Upland inclusions greater than 2,500 square feet will be delineated. In these cases:

- Collect an USACE data form to represent the upland inclusion.

4.1.5 Photo Documentation

Photos of all surveyed wetlands will be captured. The purpose of photos is to characterize the surveyed wetland. A representative photograph should be taken of each wetland. If multiple plant communities are present in each wetland, a representative photograph of each plant community should be taken. Photos of upland areas are not necessary. Photos should:

- Be taken in the landscape (horizontal) orientation;
- Be representative of the wetland plant community. It is not necessary to be standing within the wetland, and it may be preferable to stand back from the wetland plant community while taking the photo;
- Not be taken looking into the sun as this will obscure the photo. When possible, the sun should be at the back of the photographer;
- Be level with the horizon such that the top quarter of the photo captures the sky (assuming flat topography and open conditions); and
- Be taken of NWI wetlands that are entirely upland (see below).

4.1.6 National Wetland Inventory – Upland Verification

An area may be identified as a NWI wetland, but field indicators may conclude that the area is entirely upland. In these situations, field crews will:

- 1) Collect a USACE wetland determination data point location within the area indicated by NWI to be wetland.
- 2) Complete a USACE wetland determination data form (including soils) to document why the NWI-indicated area is entirely upland.
- 3) Take a photograph of the NWI-indicated area to further characterize its upland nature.

In other instances, crews may locate a NWI that overlaps the observed wetland or is “skewed” from the observed wetland. In those cases, no additional documentation is needed for the upland fragment of the NWI area.

4.1.7 Lakes & Ponds

Lakes, ponds, and areas of small open water will be delineated as wetland features and classified according to the Cowardin Classification System (i.e., either Lacustrine or Palustrine).

A USACE wetland determination data point per feature may not be necessary where a lake or pond feature either lacks a vegetative fringe or has a narrow fringe comprised of annual or perennial vegetation.

Crews are to collect a USACE wetland determination point in the vegetative fringe if one is present. In that situation, crews should note in the data form that the emergent component is associated with an open water feature and crews should identify the Cowardin class for the open water component within the remarks section of the wetland data form (e.g., PUB, L1UB).

4.1.8 PUB Wetland vs Deepwater Aquatic Habitat (Lake or Pond)

In determining whether an area meets the definition of a palustrine unconsolidated bottom (PUB) wetland or a waterbody (lake or pond) the below criteria shall be used.

- Lakes or ponds are areas that are permanently inundated at mean annual water depths >6.6 feet or permanently inundated areas ≤6.6 feet in depth that do not support rooted-emergent or woody plant species.

4.1.9 Roadside Ditches

According to Merjent safety standard practices, no digging may occur in roadside ditches because of the increased likelihood that buried utilities will be present. Roadside ditches may fall into one of the three following categories:

The crews will delineate roadside ditches as wetlands when:

- They are entirely vegetated and dominated by hydrophytic vegetation; and
- A bed and bank are not present (i.e., no ordinary high-water mark (OHWM))

“Roadside ditch wetlands” will use the Wetland ID nomenclature outlined in this document, and only the vegetation and hydrology section of the USACE wetland determination data form will be filled out. Indicate in the soil comments, “Soils not sampled due to safety requirements – soils assumed hydric”.

The crews will delineate roadside ditches as waterbodies when:

- A bed and bank are present (i.e., OHWM present).

“Roadside ditch waterbodies” will use the Waterbody ID nomenclature outlined below in this protocol.

4.1.10 Special Resources

Special resources are features of unique agency designation or meet the criteria of unique agency designations. In general, all special resources wetlands will be delineated following standard delineation methods as described above. In addition, special resource wetlands will likely be evaluated by the team’s botanical staff separate from the delineation process.

4.1.11 Existing (Known) Special Resources

Known special resources such as areas identified as High and Outstanding Sites of Biological Significance by the Minnesota Biological Survey (formerly Minnesota County Biological Survey) will automatically be surveyed by the team’s botanical staff. The areas will be identified during the desktop review and targeted for rare plant surveys. The results of the botanical surveys will be addressed in a separate report.

4.1.12 Unknown Special Resources

There may be situations where field crews identify a previously undocumented special resource, such as calcareous fens. In these situations, field crews will report their findings to the biological lead, who will immediately alert the team. The team will formulate an adaptive field survey strategy to address these types of occurrences.

4.2 Waterbody Sampling Protocol

Crews will delineate and collect data for all waterbody features encountered in the environmental survey corridor as follows:

- Waterbodies <10 feet between OHWM will be delineated by capturing the centerline of the waterbody bed.
- Waterbodies >10 feet will be delineated by capturing the OHWM along each bank. The OHWM will be identified according to USACE Regulatory Guidance Letter (No. 05-05, December 7, 2005) *Subject: Ordinary High Water Mark Identification*.

- Each delineated waterbody will require the collection of a waterbody point and photos.

4.2.1 Flow Regime Classifications

Flow regime will be defined as ephemeral, intermittent, or perennial.

- 1) Ephemeral waterbodies – Inundated following spring thaw and after periods of rainfall. These features otherwise lack hydrology.
- 2) Intermittent waterbodies – Likely have water present within the feature throughout the growing season. These features will additionally show evidence of sorting or stratification of materials (cobble, sand, organic matter). During other seasons, these features generally lack hydrology.
- 3) Perennial waterbodies – Possess surface water hydrology consistently throughout the year, regardless of season.

4.2.2 Water Quality

The water quality of each individual water body will be classified as high, medium or low based on the below characteristics:

- 1) High - Waterbody consisting of either an Intermittent or Perennial flow regime which has aquatic fauna present. Riffles and pools are most likely present. Adjacent wetlands may be present and 30-60% native woody community species are present. No maintenance and/or grazing is apparent within the buffer. Additionally, channelization is absent, and no dams, dikes, levees, culverts, riprap, bulkheads, armor, or hoof tread found along the feature.
- 2) Medium - Waterbody consisting of either an Ephemeral, Intermittent or Perennial flow regime with a high degree of sedimentation or turbidity and few pools and riffles. Aquatic fauna may not be present. Area may be surrounded by woody vegetation with less than or equal to 30-60% aerial coverage with little to no maintenance or grazing visible. Less than 100 feet or the minority of the feature within the survey corridor is adversely impacted by channelization, dams, dikes, levees, culverts, riprap, bulkheads, armor, or hoof tread found along the feature.
- 3) Low - Waterbody consisting of either an Ephemeral or Intermittent flow regime, with a high degree of sedimentation or turbidity and no pools and riffles. Aquatic fauna most likely not present. Trash may or may not be present. Areas such as these may have a poor surrounding riparian buffer such as cropland, grazed pasture, maintained ROW or similar condition. More than 100 feet of the feature or the majority of the feature within the survey corridor is adversely impacted by channelization, dams, dikes, levees, culverts, riprap, bulkheads, armor, or hoof tread found along the feature.

4.2.3 Waterbodies within Wetland Complexes

There may be situations where a waterbody feature is surrounded by a poorly developed floating organic mat, leading to safety concerns for field crews. Under these circumstances, the waterbody feature will be digitized based on high resolution aerial photography. However, all pertinent data for the waterbody data form would be collected to the extent possible given the conditions.

4.2.4 Bank Heights

Crews will provide bank height data when delineating a waterbody. A view looking upstream will be used to differentiate the left bank from the right bank of a waterbody.

4.2.5 NHD Verification

An area may be identified as a NHD waterbody, but field indicators may conclude the area is not a waterbody or wetland resource and is entirely upland. In these situations, field crews will take a photopoint with at least two photos documenting the area as upland.

4.3 Habitat Assessment and Rare, Threatened, and Endangered Species

Merjent Technical Leads will review the available Natural Heritage Information System (NHIS) data. This review will also inform planning for Minnesota special-status species surveys that could need to occur to support routing/permitting of the Project. Merjent will submit an NHIS Review request to the Minnesota Department of Natural Resources to initiate consultation. The results of this review will provide information on specific species occurrences in or near the Project area and help define whether species-specific surveys may be needed.

4.3.1 Habitat Assessments

All field leads will determine the potential for suitable RTE species habitats within the environmental survey corridor. Crews will identify, collect data, and photograph areas within the survey corridor that have the potential to support the presence of RTE species. See Appendix B for a list of potential species within the project survey area.

4.4 Land Use

Land use descriptions will be collected along the environmental survey corridor for the project to classify current conditions observed on the ground. Examples of land use values include:

- Open Land
- Forested
- Agricultural field (active)
- Agricultural field (fallow)
- Residential
- Industrial
- Transportation
- Tallgrass Prairie
- Shortgrass Prairie
- Mixed Grass Prairie
- Sand Hills
- Hayfield
- Tamed Grassland

5 Field Data Collection

Data collection is limited to the bounds of the environmental survey corridor. Data will be collected electronically using a Global Positioning System (GPS) datalogger and a mobile tablet computer (tablet) on the ArcGIS Online (AGO) Field Maps Application. Survey teams will consist of two people. Recommended division of responsibility is as follows:

- Crew Member A will operate a sub-meter GPS datalogger (Trimble R1 GPS unit that pairs with a tablet via a Bluetooth connection) to geolocate the wetland boundary and USACE sample point locations.
- Crew Member B will operate a tablet to collect wetland parameter data, which includes:
 - USACE Wetland Determination Data Form information;
 - Wetland community observation point information; and
 - Photo, caption, and location.

5.1 Data Processing

5.1.1 Field Data QA/QC

The daily uploaded data (geographic information system (GIS), mobile device data and photos) shall be considered “raw” data that has not undergone post-processing, QA/QC, or editing. Merjent shall review all raw data to confirm completeness.

Crew members must QA/QC attribute data collected on their mobile device before the daily data upload. Post processing of the data will include edits to wetland lines and community polygons within a given wetland complex. Data sheets also require review following collection in the field and before uploading at the end of the day. Community polygons will be created during post-process within each wetland feature to match collected community observation points

5.1.2 Daily Data Upload

All data collected with the GPS datalogger will be converted to a GIS shapefile format and uploaded nightly to Merjent’s SharePoint site. Merjent shall review this data to confirm daily progress in the field

All data collected via tablet, or otherwise, will be uploaded to Merjent’s SharePoint site on a daily basis.

5.1.3 Daily Progress Tracking

5.1.3.1 Survey Start and Stop Points

Crews will log a “start” point and a “stop” point at the beginning and end of each day for the areas worked. If crews are moving around due to lack of survey access, the start and stop points will be used for each individual parcel or area surveyed.

5.1.3.2 Survey Status

At the end of the day, on the tablet in the collector application, crews will update the status of the individual parcels surveyed with the fields below:

- Complete – Biological surveys complete for the entirety of the environmental survey area in that parcel.
- In Progress – A portion of the environmental survey area has been completed in that parcel.
- Not Started (default) – Biological surveys have not been started in that parcel.

5.1.4 Post-Processed Data and QA/QC

Spatial data collected in the field will be post-processed by Merjent. Line data of wetlands and waterbodies will be processed into appropriate polygons and lines. Merjent will QA/QC attribute data collected on the tablets. GIS data will also include point data representing data collection points. The Feature ID of wetland polygons and waterbody lines must match that of the point data.

Post processing of the data will include edits to wetland lines and community polygons within a given wetland complex. Data sheets may also require editing following collection in the field. Community polygons will be created during post-process within each wetland feature to match collected community observation points. A unique numerical ID will be assigned for each community within a wetland.

An updated, contractor QA/QC Geodatabase of all GIS data, and updated data sheets are due Wednesday at 9:00 a.m. CDT. This data shall include all data collected for the prior week of fieldwork (i.e., the September 29 data submittal shall include all data collected for the period of September 20 through September 25). Merjent will conduct an additional QA/QC review of all data submitted.

5.1.5 Coordinate System

The WGS 84 UTM coordinate system will be used for all field-collected data.

5.1.6 Electronic Devices

5.1.6.1 Trimble GPS

Sub-meter Trimble R1 GPS Units paired with a tablet will be used to locate wetland boundaries and USACE sample point locations within the environmental survey corridor.

5.1.6.2 Mobile Tablet Computer

USACE data form information, wetland community observation point data, and photos will be collected using a tablet.

5.2 Field Data ID Nomenclature

5.2.1 Community Type Classification

The wetland community type will be categorized based on the Cowardin Classification System, Eggers & Reed Classification System, and Circular 39.

For wetlands with multiple Cowardin classes, each discrete community will be identified when it comprises 10 percent or more of the wetland complex. Each discrete community within a wetland complex will require a “wetland community observation point” form and photo. Each unique community will also require a representative USACE Wetland Determination Form.

Each wetland will be labeled in the following manner:

- “W”; Team ID; County Code, Chronological Feature Number
 - “W” – Each Wetland ID begins with a static “W”
 - Team ID – Unique four digit team ID (Merjent team numbers can start with 1 (1001, 1002, 1003, etc.)
 - County Code – Two letter county abbreviation
 - Numerical designation in consecutive order within the County Code and Team

Example 1: W1003OT001 is the first wetland delineated within Otter Tail County (OT abbreviation) by Team 1003.

Each waterbody will be labelled in the above manner with the exception of an “S” in place of an “W” at the beginning of the ID.

Each potential habitat will be labelled in the above manner with the exception of an “H” in place of an “W” at the beginning of the ID.

Each land use point will be labelled in the above manner with the exception of an “LU” in place of an “W” at the beginning of the ID.

5.2.1.1 USACE Wetland Determination Data Sheets & Points (Wetland & Upland)

Each USACE wetland determination data point will be labeled in the following manner.

- Wetland (“W”) or Upland (“U”); Team ID; County Code; Wetland Number; Point Number.
 - As with the “W1003OT001” example above, all data points for this wetland will contain 1003OT001, which identifies these data points as part of the first wetland delineated within in Otter Tail County by Team 1003.

- Wetland data sheets will begin with “W” and end with a Point Number that increases with each wetland data point collected (“W1003OT001_W1” “W1003OT001_W2” and so on).
- Upland data sheets will begin with “U” and end with a “U” and Point Number that increases with each upland data point collected (“W1003OT001_U1” “W1003OT001_U2” and so on).
- Transects of upland/wetland data points should have matching point numbers when possible (“W1003OT001_W2” paired with “W1003OT001_U2”).
- For multitype wetlands, a suffix with the cover type will be added to the wetland name, such as palustrine forested (PFO), palustrine scrub shrub (PSS) or palustrine emergent (PEM). An example wetland ID for a single type of wetland would be W1001OL001, while a PFO/PEM wetland complex would be labeled as W1001OL001_PFO and W1001OL001_PEM, respectively.

5.2.1.2 Photos

Photo IDs should match Wetland IDs. To take a photo of a wetland, or a specific plant community within a complex, it may be necessary to do so from outside the wetland or community. The name for the photo should match the wetland or community being photographed; not the location where it was taken. For example, a photo of a wetland taken from an upland should be labeled with a W, not a U or upland label.

5.2.2 Data Collection Fields

Wetland Line Data – Collected on AGO Field Maps

- 1) Feature ID – Unique Wetland Feature ID (see above for naming convention)
- 2) Feature Type – Select PEM, PFO, PSS, PUB
- 3) State and County – State and County the wetland line is in
- 4) Date – Date of survey
- 5) Remarks – Additional comments of importance

Wetland Community Observation Point - Collected on AGO Field Maps

- 1) Feature_ID – Unique Wetland Feature ID (see above for naming convention)
- 2) Sub Community ID – Starting with “01”, increase incrementally for each wetland community within a wetland complex
- 3) Date – Date of survey
- 4) Cowardin – Select PEM, PFO, PSS, PUB

USACE Data Form Point or Soil Station Point - Collected on AGO Field Maps

- 1) Feature Type – Select PEM, PFO, PSS, PUB, Upland
- 2) Feature ID – Unique Wetland Feature ID (see above for naming convention)
- 3) State and County – State and County the photo point is in
- 4) Date – Date of photograph
- 5) Remarks – Additional comments of importance

Wetland Community Observation Form – Collected on tablet

- 1) Feature ID – Unique Wetland Feature ID (see above for naming convention)
- 2) Sub Community ID – Starting with “01”, increase incrementally for each wetland community within a wetland complex
- 3) Date – Date of survey

- 4) Cowardin – Select PEM, PFO, PSS, PUB
- 5) Eggers & Reed – Identify the appropriate community type
 - a) Seasonally Flooded Basin
 - b) Shallow, Open Water Community
 - c) Fresh (Wet) Meadow
 - d) Wet to Wet-Mesic Prairie
 - e) Calcareous Fen
 - f) Deep Marsh
 - g) Shallow Marsh
 - h) Sedge Meadow
 - i) Open Bog
 - j) Shrub-Carr
 - k) Alder Thicket
 - l) Coniferous Swamp
 - m) Coniferous Bog
 - n) Hardwood Swamp
 - o) Floodplain Forest
- 6) Circular 39
 - a) Type 1 – Seasonally Flooded Basins or Floodplains
 - b) Type 2 – Wet Meadows
 - c) Type 3 – Shallow Marshes
 - d) Type 4 – Deep Marshes
 - e) Type 5 – Open Water Wetlands
 - f) Type 6 – Shrub Swamps
 - g) Type 7 – Wooded Swamps
 - h) Type 8 – Bogs
- 7) Dominant Plants – List the top three dominant plants
- 8) Notes – Relevant information observed by crews in the field
- 9) Data Sheet – Was a data sheet completed for the sample point (Y/N)
- 10) County – County the wetland is located in
- 11) State – State the wetland is located in

USACE Wetland Determination Forms (applicable regional supplement) – Collected on tablet

- 1) Standard USACE form information

Stream Data Plot - Collected on AGO Field Maps

- 1) Feature ID – Unique Stream Feature ID (see above for naming convention)
- 2) Flow Regime – Ephemeral, intermittent, or perennial
- 3) OHWM Width – Width of OHWM
- 4) OHWM Point – Left Bank (when facing upstream)
- 5) OHWM Point – Right Bank (when facing upstream)

- 6) Top of Bank (TOB) Width – Width of top of bank
- 7) TOB Point – Left Bank (when facing upstream)
- 8) TOB Point – Right Bank (when facing upstream)
- 9) Depth – Current water depth
- 10) Substrate – Channel substrate (e.g. sand, cobble/gravel, organic, silt/clay)
- 11) Flow Rate – Flow rate in feet per second
- 12) Riparian Species – List the three dominant riparian species (regardless if adjacent area is upland or wetland)
- 13) Water Quality – High, Medium, Low
- 14) Flow Direction – North, South, Northwest, etc.
- 15) Bank Heights – Height measurement for both the right and left bank

Photo Point – Collected on Tablet

- 1) Feature ID – See above for naming convention. Feature ID of photo point should match the wetland or stream photographed
- 2) Feature Description – Direction in which the photo was taken (East, West, Southeast etc.)
- 3) State and County – State and County the photo point is in
- 4) Date – Date of photograph
- 5) Remarks – Additional comments of importance

Start and Stop Survey Point - Collected on AGO Field Maps

- 1) Feature Type – Start or Stop point
- 2) Crew ID – Unique Crew ID
- 3) State and County – State and County the point is in
- 4) Date – Date of survey
- 5) Remarks – Additional comments of importance

RTE Habitat Point - Collected on AGO Field Maps

- 1) Feature Type – Choose species from dropdown
- 2) Feature ID – Unique habitat ID
- 3) Feature Description – General description of habitat
- 4) State and County – State and County the habitat point is in
- 5) Date – Date of survey
- 6) Remarks – Additional comments of importance

Land Use Point - Collected on AGO Field Maps

- 1) Feature Type – Choose type of land use from dropdown
- 2) Feature ID – Unique Land Use ID (see above for naming convention)
- 3) Feature Description – General description of land use (if applicable)
- 4) State and County – State and County the habitat point is in
- 5) Date – Date of survey
- 6) Remarks – Additional comments of importance

County Codes

Chippewa (CH)
Cottonwood (CO)
Faribault (FA)
Jackson (JA)
Martin (MA)
Otter Tail (OT)
Redwood (RE)
Wilkin (WI)
Yellow Medicine (YM)

Appendix 1 – Illustrated Field Scenario Examples

ILLUSTRATED FIELD SCENARIOS

Example 1. Small Size (<750' linear boundary length) and One Vegetative Community

Collection should include:

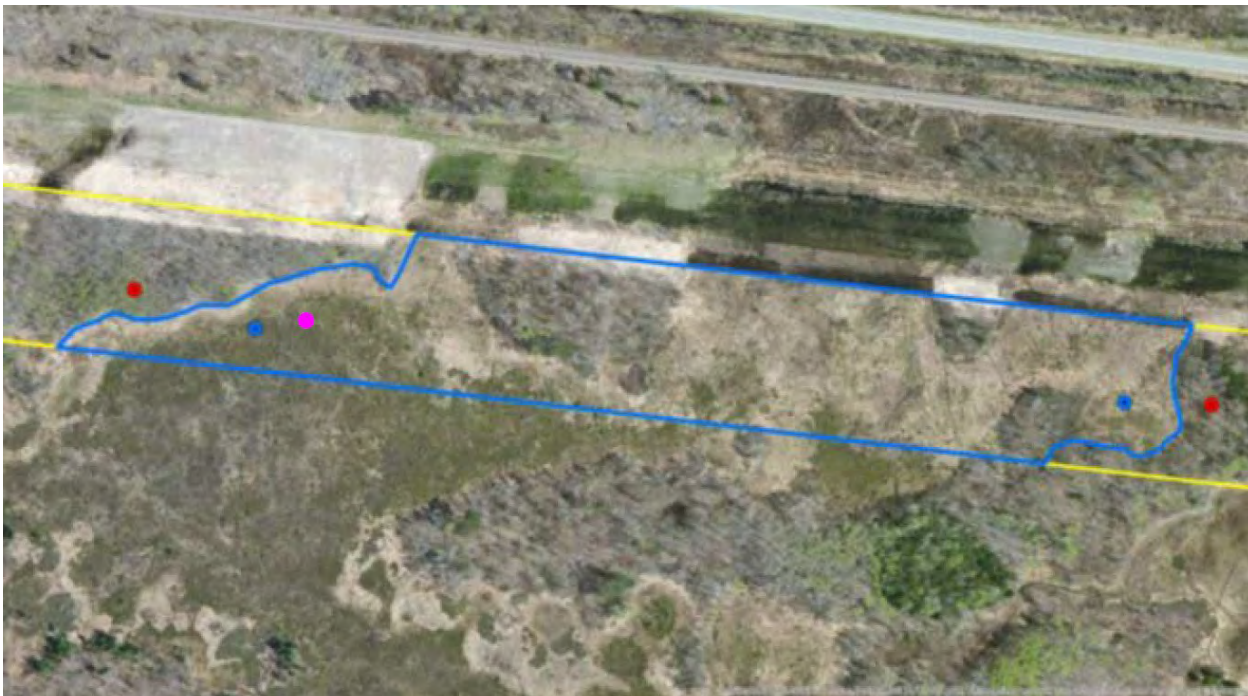
- 1) **1 red point** to represent upland USACE wetland determination data form (on the tablet) and associated GPS location (on the Trimble);
- 2) **1 blue point** to represent wetland USACE wetland determination data form (tablet) and associated GPS location (Trimble);
- 3) **1 pink point** to represent wetland community observation point form with photo (tablet); and
- 4) **Blue lines** to represent GPS location of wetland boundary (Trimble).
 - a. Crews should collect enough vertices to capture the true shape of the wetland feature and avoid square or rectangular boundaries.
 - b. At a minimum, five points should be recorded per vertex.



Example 2. Large Size (>750' linear boundary length) and One Vegetative Community

Collection should include:

- 1) **2 red points** to represent upland USACE wetland determination data forms (on the tablet) and associated GPS location (on the Trimble);
- 2) **2 blue points** to represent wetland USACE wetland determination data forms (tablet) and associated GPS location (Trimble);
- 3) **1 pink point** to represent wetland community observation point form with photo (tablet); and
- 4) **Blue lines** to represent GPS location of wetland boundary (Trimble).
 - a. Crews should collect enough vertices to capture the true shape of the wetland feature and avoid square or rectangular boundaries.
 - b. At a minimum, five points should be recorded per vertex.



Example 3. Large Size (>750' linear boundary length), 3 Unique Vegetative Communities Comprised of 9 Discrete Areas, and One Wetland Boundary Adjacent to the Road

Collection should include:

- 5) **1 red point** to represent upland USACE wetland determination data form (on the tablet) and associated GPS location (on the Trimble);
- 6) **3 blue points** to represent wetland USACE wetland determination data forms (tablet) and associated GPS location (Trimble);
- 7) **9 pink points** to represent wetland community observation point forms with photo (tablet); and
- 8) **Blue lines** to represent GPS location of wetland boundary (Trimble).
 - a. Crews should collect enough vertices to capture the true shape of the wetland feature and avoid square or rectangular boundaries.
 - b. At a minimum, five points should be recorded per vertex.

When multiple wetland community boundaries (pink points) are present, respective GIS staff will align them during the QA/QC process.



Example 4. Upland Inclusions (>2,500 ft²) and 2 Unique Vegetative Communities

Collection should include:

- 1) **3 red points** to represent upland USACE wetland determination data forms (on the tablet) and associated GPS location (on the Trimble);
- 2) **2 blue points** to represent wetland USACE wetland determination data forms (tablet) and associated GPS location (Trimble);
- 3) **2 pink points** to represent wetland community observation point forms with photo (tablet); and
- 4) **Blue lines** to represent GPS location of wetland boundary (Trimble).
 - a. Crews should collect enough vertices to capture the true shape of the wetland feature and avoid square or rectangular boundaries.
 - b. At a minimum, five points should be recorded per vertex.

When multiple wetland community boundaries are present, respective GIS staff will align them during the QA/QC process.



Example 5. Series of 2 Wetlands in Close Proximity to One Another

Collection should include:

- 1) **4 red points** to represent upland USACE wetland determination data forms (on the tablet) and associated GPS location (on the Trimble);
- 2) **3 blue points** to represent wetland USACE wetland determination data forms (tablet) and associated GPS location (Trimble);
- 3) **2 pink points** to represent community observation point forms with photo (tablet); and
- 4) **Blue lines** to represent GPS location of wetland boundary (Trimble).
 - a. Crews should collect enough vertices to capture the true shape of the wetland feature and avoid square or rectangular boundaries.
 - b. At a minimum, five points should be recorded per vertex.

When multiple wetland community boundaries (pink points) are present, respective GIS staff will align them during the QA/QC process.



Example 6. Lakes, Ponds and Open Water

Collection should include:

- 1) **1 red point** to represent upland USACE wetland determination data form (on the tablet) and associated GPS location (on the Trimble);
- 2) **1 blue point** to represent wetland USACE wetland determination data form (tablet) and associated GPS location (Trimble);
- 3) **1 pink point** to represent wetland community observation point form with photo (tablet); and
- 4) **Blue lines** to represent GPS location of wetland boundary (Trimble).
 - a. Crews should collect enough vertices to capture the true shape of the wetland feature and avoid square or rectangular boundaries.
 - b. At a minimum, five points should be recorded per vertex.



Appendix 2 – Potential Rare, Threatened, and Endangered Species

Merjent, Inc. (Merjent), reviewed the U.S. Fish and Wildlife Service’s Information for Planning and Consultation (IPaC) website¹ for a list of species and critical habitat that may be present along the proposed route in both Minnesota and Iowa. The table below provides the federal status and counties of occurrence where species and designated critical habitat may occur.

Scientific Name	Common Name	Federal Status	County	State	Line
<i>Myotis sodalis</i>	Indiana bat	Endangered	Boone, Story	IA	IAL-301 IAL-302
<i>Myotis septentrionalis</i>	Northern long-eared bat	Threatened	All	Both	All
<i>Charadrius melodus</i>	Piping plover	Endangered	Pottawatomie, Woodbury	IA	IAL-306 IAL-307 IAL-308
<i>Sistrurus catenatus</i>	Eastern massasauga	Threatened	Chickasaw	IA	IAM-101
<i>Notropis topeka</i>	Topeka shiner	Endangered	8	IA	IAL-301 IAL-302 IAT-202 IAM-102 SDM-104
<i>Scaphirhynchus albus</i>	Pallid sturgeon	Endangered	5	IA	IAL-318 IAT-205 IAL-306 IAL-307
<i>Bombus affinis</i>	Rusty patched bumble bee	Endangered	Boone/Story Jackson	IA MN	IAL-301 IAL-302 MNL-304
<i>Hesperia dacotae</i>	Dakota Skipper	Threatened	Chippewa	MN	MNL-303
<i>Oarisma poweshiek</i>	Poweshiek skipperling	Endangered	5 4	IA MN	IAM-101 IAM-102 IAT-201 IAT-202 IAT-203 MNL-304 MNL-303 MNL-305 ML-321
<i>Danaus plexippus</i>	Monarch butterfly	Candidate	All	Both	All
<i>Lespedeza leptostachya</i>	Prairie bush clover	Threatened	Most	Both	All
<i>Platanthera praeclara</i>	Western prairie fringed orchid	Threatened	All Iowa	IA	All Iowa lines
<i>Platanthera leucophaea</i>	Eastern prairie fringed orchid	Threatened	Hardin, Story	IA	IAL-301

¹ Information for Planning and Consultation (IPaC). USFWS website. Available at <https://ecos.fws.gov/ipac/>. Accessed July 2021

Indiana bat

Indiana bats hibernate in caves or, occasionally, in abandoned mines. They require cool, humid caves with stable temperatures under 50°F but above freezing; very few caves within the range of the species have these conditions. Hibernation is an adaptation for survival during the cold winter months when prey species are not available. Bats must store energy in the form of fat before hibernating; during the 6 months of hibernation, this stored fat is the bat's only source of energy. If bats are disturbed during hibernation, they may deplete energy stores meant to sustain them until spring emergence. This depletion could lead to reduced fitness and death of individuals.

After hibernation, Indiana bats migrate to their summer habitat in wooded areas and small stream corridors with well-developed riparian woods where they usually roost under exfoliating tree bark on dead or dying trees. They can also be found foraging in upland areas in or along the edges of forest habitat. During summer, males roost alone or in small groups, while females roost in larger groups of up to 100 bats or more.

The range of the Indiana bat overlaps the proposed route in Boone and Story Counties, IA. Tree clearing within these two counties will need to be addressed for impacts on Indiana bats. Generally, tree clearing of trees greater than 5" diameter at breast height (dbh) may only occur between November 1 and March 31. Suitable hibernacula such as caves or mines do not appear to be present within the Project area and therefore impacts to winter habitat are not expected.

Indiana bat summary

- Only in Boone and Story Counties, Iowa
- Tree clearing generally prohibited April 1 to October 31 (potentially October 1)
- Winter habitat (i.e., caves/hibernacula) unlikely based on initial desktop review
- Habitat assessments can be done almost any time of year
- Presence/Absence (P/A) surveys (unlikely to be required, would not recommend) need to be done in summer

Northern long-eared bat

The range of the northern long-eared bat stretches across much of the Eastern and Midwestern U.S. During summer, northern long-eared bats roost singly or in colonies under bark, in cavities, or in crevices of both live and dead trees. Males and non-reproductive females may also roost in cooler places such as caves and mines. This species is thought to be opportunistic in selecting roosts, utilizing tree species based on the tree's ability to retain bark or provide cavities or crevices. It has also been found, rarely, roosting in structures such as barns and sheds. In winter, northern long-eared bats utilize caves and mines as hibernacula.

The northern long-eared bat was listed as a federally threatened species in May 2015, with an interim 4(d) rule; effective February 16, 2016, the U.S. Fish and Wildlife Service (USFWS) finalized the 4(d) rule. A 4(d) rule may only be applied to species listed as threatened, and is a tool periodically utilized by the USFWS to allow for flexibility in Endangered Species Act implementation. The rule allows the USFWS to tailor take restrictions to those that make the most sense for protecting and managing at-risk species and directs the USFWS to issue regulations considered "necessary and advisable to provide for the conservation of threatened species."

Merjent reviewed the USFWS Known Northern Long-eared Bat Hibernacula and Roost Trees in Iowa map² (dated May 3, 2016) to identify the presence of maternity roost trees or hibernacula in the vicinity of the Project. No known roost trees or hibernacula have been recorded in the counties and/or townships in which the Project occurs. Therefore, Incidental take of northern long-eared bats would not be prohibited under the 4(d) rule because project activities are not conducted within 0.25 mile of known hibernacula and do not remove known roost trees or trees within 150 feet of known roosts. Streamlined consultation can be used to satisfy Section 7 consultation for projects with a federal nexus.

Northern long-eared bat summary

- Present in all counties
- Tree clearing should be covered by 4(d)/Programmatic Biological Opinion (which will go away if/when listed as endangered)

Eastern massasauga

The eastern massasauga rattlesnake is a short, heavy-bodied snake found wet prairies, marshes, and low-lying areas along lakes and rivers. Massasaugas are very rare in Iowa and prefer emergent wetlands, shrub wetlands, and lowland hardwood habitats, and avoid upland hardwood and disturbed habitats. The massasauga is primarily a diurnal ambush predator, feeding mainly on small mammals. They generally occupy wetland habitats in the spring, fall, and winter, and overwintering habitat varies depending on geographic location. The species is often reported to overwinter in crayfish burrows, but may also use small mammal burrows, old stumps, rotten logs and moist poorly drained habitats. Known sites appear to be characterized by the presence of the water table near the surface for hibernation, and hibernation sites are located below the frost line; the presence of water that does not freeze is critical to hibernaculum suitability. Individuals emerge from winter dormancy as spring floods begin in March and April and are active until late October.

The range of the eastern massasauga overlaps the proposed route in Chickasaw County, IA. Suitable wetland habitat for the species is isolated and fragmented in the vicinity of the proposed route. Eastern massasaugas are sensitive to vibration. Impacts are possible where the proposed route crosses wetlands, bottomland forest, and adjacent uplands. Areas such as agricultural fields, and open landscape not adjacent to wetlands are unsuitable habitat.

Eastern massasauga rattlesnake summary:

- Only in Chickasaw County, IA
- Impacts should be considered in areas of large, contiguous tracts of wetland habitat
- Due to isolated and heavily fragmented landscape, impacts are unlikely

Topeka shiner

The Topeka shiner, an endangered species, is a small minnow that lives in small to mid-size prairie streams in the central U.S. where it is usually found in pool and run areas. Suitable streams tend to have good water quality and cool to moderate temperatures. In Iowa, Minnesota, and portions of South Dakota, Topeka shiners also occur in oxbows and off-channel pools.

² Known Northern Long-eared Bat Hibernacula and Roost Trees in Iowa. Available at <https://www.fws.gov/midwest/endangered/mammals/nleb/pdf/IowaNLEBHibernaculaAndRoostsByTWP03May16.pdf>. Accessed August 2019.

Suitable habitat may present along the proposed route at stream crossings in eight Iowa counties. USFWS designated critical habitat (DCH) is present in several counties, but specifically in close proximity to the route in Greene County, IA.

Topeka shiner summary:

- Listed in 8 counties in Iowa
- DCH occurs in 18 project counties in IA and MN
- Primary concern is stream crossings

Pallid sturgeon

Pallid sturgeon are bottom dwelling, slow growing fish that feed primarily on small fish and immature aquatic insects. Suitable habitat is present in the Missouri River on the border between Iowa and Nebraska and Big Sioux River between Iowa and South Dakota. Impacts need to only be considered for impacts to the Missouri River and immediate tributaries.

Pallid sturgeon summary:

- Iowa border counties with Missouri River
- Only habitat is Missouri River and Big Sioux River and immediate tributaries

Rusty patched bumble bee

The rusty patched bumble bee is a medium-sized bumble bee; workers and males are characterized by a rusty-colored patch located centrally on the second abdominal segment. Queens lack the species' eponymous rusty patch and can be further distinguished from workers and males by their large size.

Suitable habitat for the rusty patched bumble bee can be found in grasslands, prairies, marshes, agricultural areas, woodlands, and residential parks and gardens. The species is a generalist forager and utilizes both pollen and nectar from a wide variety of plants. It is thought that like other bumble bee species, rusty patched bumble bees typically forage within 0.6 mile from the nest site. Nests are commonly established underground in abandoned rodent burrows or other cavities, typically 1 to 4 feet beneath the surface; however, the species may also utilize clumps of grass aboveground. Suitable habitat must also provide overwintering sites for hibernating queens. While little is known regarding the overwintering habits of rusty patched queens, it is thought they may behave similarly to other *Bombus* species, that is, queens hibernate in a chamber created in uncompacted soils. Rusty patched bumble bees may choose sites in sandy, moss-covered soils on northwest slopes, and may be found in interior forest areas; areas with these characteristics near forested edges and open fields may be especially important. They may also use other areas, such as compost piles or mole hills.

The USFWS has identified "high potential zones (HPZ)" around current records (i.e., 2007-present); these areas indicate a high probability of rusty patched bumble bee presence. Within these zones, both suitable and unsuitable habitat may be present. The proposed Project route (8/2/6/2021 route) does not intersect a high potential zone as defined in the March 17, 2021 USFWS dataset, but does occur within a low potential zone in Jackson County, MN and Story County, IA. Low potential zones are the most likely areas to convert to HPZ during USFWS dataset updates. If the

Project occurs in HPZ, to fully determine impacts, field surveys assessing suitable foraging and overwinter habitat may need to be conducted. In general, cropland and roadside shoulders that exhibit high compaction do not provide suitable habitat; however, any pockets of floral blooms would provide suitable habitat. Forest edge habitat provides suitable overwinter habitat and would need to be avoided

during the hibernation period of October 15 to March 14. Inversely, habitat that provides only suitable active season foraging resources should be avoided from March 15 to October 14.

Rusty patched bumble bee summary:

- Boone and Story County, IA and Jackson County, MN
- Jackson County HPZ is in close proximity to route
- Impacts can be avoided by conducting work in summer habitat between October 15 and March 14
- Impacts to overwintering habitat can be avoided by conducting work March 15 to October 14

Dakota skipper

The Dakota skipper is a small butterfly that lives in high-quality mixed and tallgrass prairie. It has been extirpated from Illinois and Iowa and now occurs in remnants of native mixed and tallgrass prairie in Minnesota, the Dakotas and southern Canada. Impacts to Dakota skipper should be considered where the proposed route crosses native prairie. It does not appear the route crosses native prairie in the lone county in which Dakota skipper is listed along the proposed route (Chippewa County, MN).

Dakota skipper summary:

- Only in Chippewa County, MN
- Not within USWFS DCH
- Suitable habitat not identified on desktop review
- If route crosses prairie, research and surveys to identify native vs restored prairie will be prudent

Poweshiek skipperling

Poweshiek skipperlings are small butterflies most often found in remnants of native prairie in Iowa, Minnesota, North Dakota, South Dakota, and Wisconsin and in fens in Michigan. However, this skipperling may have been extirpated from the Dakotas, Minnesota and Iowa within the last 10 years – an area that, until recently, contained the vast majority of the surviving populations.

Poweshiek skipperling summary:

- Multiple counties in IA and MN.
- Not within USFWS DCH
- If route crosses prairie, research and surveys to identify native vs restored prairie will be prudent

Monarch butterfly

In general, butterfly habitat requirements include host plants for larvae, adult nectar sources, and sites for roosting, thermoregulation, mating, hibernation, and predator escape. In addition to these, the monarch butterfly requires conditions and resources for initiating and completing migration both to and from winter roosting areas, making them vulnerable to habitat degradation across wide areas. Because monarchs are host-plant specific, they are entirely dependent on the abundance of milkweeds, and threats to milkweed thus threaten their survival, as do threats to the specific forested areas that provide the microclimatic conditions they need to survive the winter.

This species is currently listed as a candidate species and therefore is not granted the full legal protections of a threatened or endangered species. Impacts to suitable habitat would occur where floral resources are present, especially milkweed.

Monarch butterfly summary:

- Candidate species
- Suitable habitat likely present throughout proposed route
- Species may be listed before Project goes to construction
- Candidate Conservation Agreement with Assurances (CCAA) an option

Prairie bush clover

Prairie bush clover is found only in the tallgrass prairie region of four Midwestern states. It is a member of the bean family and a midwestern "endemic" – known only from the tallgrass prairie region of the upper Mississippi River Valley.

Impacts can be avoided by avoiding work in any native prairies along the proposed route.

Prairie bush clover summary:

- Listed in most counties
- Habitat is limited to native tallgrass prairie
- Survey period: July to August (source: WI DNR; verify with botanist on staff for IA regional differences). MN DNR: August-September optimal; ID possible anytime after early June

Western prairie fringed orchid

The western prairie fringed orchid occurs most often in mesic to wet unplowed tallgrass prairies and meadows (native prairie areas and prairie remnants). Impacts can be avoided by avoiding work in any native prairies along the proposed route.

Western prairie fringed orchid summary:

- Western Iowa counties
- Habitat limited to mesic and wet native prairie
- Survey: July (source: MN DNR)

Eastern prairie fringed orchid

The eastern prairie fringed orchid occurs in a wide variety of habitats, from mesic prairie to wetlands such as sedge meadows, marsh edges, even bogs. It requires full sun for optimum growth and flowering and a grassy habitat with little or no woody encroachment. A symbiotic relationship between the seed and soil fungi, called mycorrhizae, is necessary for seedlings to become established. This fungi helps the seeds assimilate nutrients in the soil.

Suitable habitat may be present in Hardin and Story Counties, Iowa where the proposed route crosses wetland or prairie habitat.

Eastern prairie fringed orchid summary:

- Hardin and Story Counties, IA only
- Habitat more general than western prairie fringed orchid

- Survey period: July (source: WI DNR; verify with botanist on staff for IA regional differences).
USFWS: June 28 to July 11

Appendix 4 – WETS Precipitation Summary Table

Table 2-1
Precipitation Worksheet Using Gridded Database*
2021 Summary of Worksheet Outputs by Minnesota County

County	Month	First Prior Month	Second Prior Month	Third Prior Month	Multi-Month Score**
Martin	October	Dry	Wet	Dry	(10) Normal
	November	Wet	Dry	Wet	(14) Normal
Otter Tail	October	Normal	Normal	Dry	(11) Normal
	November	Wet	Normal	Normal	(15) Wet
Wilkin	October	Normal	Normal	Normal	(12) Normal
	November	Wet	Normal	Normal	(15) Wet

* Minnesota Climatology Working Group, Precipitation Documentation Worksheet Using Gridded Database – 1991-2021 Normal Period

** Multi-Month Score: 6-9 (dry), 10-14 (normal), 15-18 (wet)

Table 2-2
Precipitation Worksheet Using Gridded Database*
2022 Summary of Worksheet Outputs by Minnesota County

County	Month	First Prior Month	Second Prior Month	Third Prior Month	Multi-Month Score**
Martin	May	Dry	Normal	Dry	(8) Dry
	June	Wet	Dry	Normal	(13) Normal
	July	Dry	Normal	Normal	(9) Dry
	August	Normal	Dry	Normal	(10) Normal
	September	Normal	Normal	Dry	(11) Normal
	October	Dry	Normal	Normal	(9) Dry
Otter Tail	May	Wet	Dry	Wet	(14) Normal
	June	Wet	Wet	Dry	(16) Wet
	July	Dry	Wet	Wet	(12) Normal
	August	Dry	Dry	Wet	(8) Dry
	September	Normal	Dry	Dry	(9) Dry
	October	Dry	Normal	Dry	(8) Dry
Wilkin	May	Wet	Dry	Wet	(14) Normal
	June	Wet	Wet	Dry	(16) Wet
	July	Normal	Wet	Wet	(15) Wet
	August	Normal	Normal	Wet	(13) Normal
	September	Normal	Normal	Normal	(12) Normal
	October	Dry	Normal	Normal	(9) Dry
* Minnesota Climatology Working Group, Precipitation Documentation Worksheet Using Gridded Database – 1991-2021 Normal Period ** Multi-Month Score: 6-9 (dry), 10-14 (normal), 15-18 (wet)					

Appendix 5 – Wetland & Waterbody Summary Tables

Table 3 - Wetland and Waterbody Classification Summary

Table 3 - Wetland and Waterbody Classification Summary										
County	Feature Category	Total Number of Documented Wetlands and Waterbodies	Number of Wetland Communities and Waterbody Classifications Observed							
			PEM	PSS	PFO	PUB	Ephemeral	Intermittent	Perennial	Open Water/Pond
Lateral Line MNL-305										
Martin	Wetlands (Field)	11	9	0	4	0				
	Wetlands (Desktop)	20	19	1	1	0				
	Waterbodies (Field)	10					3	2	6	0
	Waterbodies (Desktop)	4					1	0	4	0
Lateral Line MNL-321										
Otter Tail	Wetlands (Field)	17	17	2	0	0				
	Wetlands (Desktop)	16	15	0	1	0				
	Waterbodies (Field)	5					1	2	2	0
	Waterbodies (Desktop)	6					0	4	2	0
Wilkin	Wetlands (Field)	37	36	1	1	0				
	Wetlands (Desktop)	9	9	0	0	0				
	Waterbodies (Field)	5					0	2	2	1
	Waterbodies (Desktop)	1					0	1	0	0
Sub-total Documented Features			105	4	7	0	5	11	16	1
TOTAL			110 wetlands / 116 communities				31 waterbodies / 33 waterbody types			

Table 3-1 – Wetland Summary Table¹

Feature ID	County	Survey Type	Coverttype	Wetland Area (Acres) ¹	Wetland Complex Area (Acres) ¹
MNL-305					
W_1_MA_011_DT	Martin	Desktop	PEM	0.063	
W_1_MA_025_DT	Martin	Desktop	PEM	0.069	
W_1_MA_026_DT	Martin	Desktop	PEM	5.070	
W_1_MA_027_DT	Martin	Desktop	PEM	0.382	
W_1_MA_028_DT	Martin	Desktop	PEM	0.126	
W_1_MA_029_DT	Martin	Desktop	PEM	0.099	
W_1_MA_030_DT	Martin	Desktop	PEM	0.031	
W_1_MA_031_DT	Martin	Desktop	PEM	0.074	
W_1_MA_032_DT	Martin	Desktop	PEM	1.877	
W_1_MA_033_DT	Martin	Desktop	PEM	0.293	
W_1_MA_034_DT	Martin	Desktop	PEM	0.229	
W_1_MA_035_DT	Martin	Desktop	PEM	0.072	
W_1_MA_036_DT	Martin	Desktop	PEM	0.162	
W_1_MA_037_DT	Martin	Desktop	PSS	0.031	
W_1_MA_038_DT	Martin	Desktop	PEM	0.110	
W_1_MA_039_DT	Martin	Desktop	PEM	0.275	
W_1_MA_040_DT	Martin	Desktop	PEM	0.236	
W_1_MA_041_DT	Martin	Desktop	PEM	0.028	
W_1_MA_042_DT	Martin	Desktop	PEM	0.377	
W1015MA001	Martin	Survey	PEM	1.147	
W1016MA001	Martin	Survey	PFO	0.087	
W1016MA002_PEM	Martin	Survey	PEM	0.478	0.730
W1016MA002_PFO	Martin	Survey	PFO	0.252	
W1016MA003	Martin	Survey	PEM	0.244	
W1016MA004_PEM	Martin	Survey	PEM	0.100	0.238
W1016MA004_PFO	Martin	Survey	PFO	0.138	
W1016MA004_PEM_DT	Martin	Desktop	PEM	0.099	0.262
W1016MA004_PFO_DT	Martin	Desktop	PFO	0.163	
W1017MA001	Martin	Survey	PFO	0.652	
W1017MA002	Martin	Survey	PEM	3.227	
W1017MA003	Martin	Survey	PEM	0.045	
W1020MA001	Martin	Survey	PEM	0.055	
W1020MA002	Martin	Survey	PEM	0.235	
W1020MA003	Martin	Survey	PEM	0.667	
MNL-321					
W_1_OT_020_DT	Otter Tail	Desktop	PEM	3.472	
W_1_OT_021_DT	Otter Tail	Desktop	PEM	1.981	
W_1_OT_022_DT	Otter Tail	Desktop	PEM	0.351	
W_1_OT_023_DT	Otter Tail	Desktop	PEM	0.974	
W_1_OT_024_DT	Otter Tail	Desktop	PEM	0.066	
W_1_OT_026_DT	Otter Tail	Desktop	PEM	0.664	
W_1_OT_027_DT	Otter Tail	Desktop	PFO	0.540	
W_1_OT_028_DT	Otter Tail	Desktop	PEM	4.236	
W_1_OT_029_DT	Otter Tail	Desktop	PEM	0.163	
W_1_OT_030_DT	Otter Tail	Desktop	PEM	1.452	
W_1_OT_031_DT	Otter Tail	Desktop	PEM	2.494	
W_1_OT_032_DT	Otter Tail	Desktop	PEM	1.303	
W_1_WI_056_DT	Wilkin	Desktop	PEM	0.155	
W_1_WI_078_DT	Wilkin	Desktop	PEM	0.064	

Table 3-1 – Wetland Summary Table¹

Feature ID	County	Survey Type	Coverttype	Wetland Area (Acres) ¹	Wetland Complex Area (Acres) ¹
W_1_WI_079_DT	Wilkin	Desktop	PEM	0.043	
W_1_WI_090_DT	Wilkin	Desktop	PEM	0.007	
W_1_WI_092_DT	Wilkin	Desktop	PEM	0.182	
W1002OT001	Otter Tail	Survey	PEM	0.109	
W1002OT001_DT	Otter Tail	Desktop	PEM	2.620	
W1002OT005	Otter Tail	Survey	PEM	0.054	
W1002OT005_DT	Otter Tail	Desktop	PEM	3.094	
W1002OT007_PEM W1002OT007_PSS	Otter Tail Otter Tail	Survey Survey	PEM PSS	1.175 1.859	3.034
W1002OT009	Otter Tail	Survey	PEM	0.443	
W1002WI001	Wilkin	Survey	PEM	0.251	
W1002WI002	Wilkin	Survey	PEM	0.051	
W1002WI003	Wilkin	Survey	PEM	0.059	
W1002WI004	Wilkin	Survey	PEM	0.122	
W1002WI005_PEM W1002WI005_PSS	Wilkin Wilkin	Survey Survey	PEM PSS	1.897 0.221	2.118
W1002WI010	Wilkin	Survey	PEM	0.213	
W1002WI012	Wilkin	Survey	PEM	0.365	
W1010WI002	Wilkin	Survey	PEM	0.105	
W1010WI007	Wilkin	Survey	PEM	0.024	
W1010WI008	Wilkin	Survey	PEM	0.014	
W1010WI009	Wilkin	Survey	PEM	0.011	
W1010WI010	Wilkin	Survey	PEM	0.065	
W1016OT001	Otter Tail	Survey	PEM	0.397	
W1016OT002	Otter Tail	Survey	PEM	0.041	
W1016OT003	Otter Tail	Survey	PEM	0.906	
W1016OT004	Otter Tail	Survey	PEM	0.289	
W1016OT004_DT	Otter Tail	Desktop	PEM	0.267	
W1016OT005_PEM W1016OT005_PSS	Otter Tail Otter Tail	Survey Survey	PEM PSS	5.205 0.423	5.628
W1016OT005_PEM_DT	Otter Tail	Desktop	PEM	0.553	
W1016OT006	Otter Tail	Survey	PEM	0.111	
W1016OT007	Otter Tail	Survey	PEM	0.054	
W1016OT008	Otter Tail	Survey	PEM	0.012	
W1016WI001	Wilkin	Survey	PEM	0.169	
W1016WI002	Wilkin	Survey	PEM	0.113	
W1016WI002_DT	Wilkin	Desktop	PEM	0.029	
W1016WI003	Wilkin	Survey	PEM	0.080	
W1016WI003_DT	Wilkin	Desktop	PEM	0.014	
W1016WI004	Wilkin	Survey	PEM	0.575	
W1016WI004_DT	Wilkin	Desktop	PEM	0.342	
W1016WI006	Wilkin	Survey	PEM	0.087	
W1016WI008_DT	Wilkin	Desktop	PEM	0.046	
W1017WI001	Wilkin	Survey	PEM	0.051	
W1017WI002	Wilkin	Survey	PEM	0.118	
W1019WI001	Wilkin	Survey	PEM	0.060	
W1019WI002	Wilkin	Survey	PEM	2.608	
W1019WI003	Wilkin	Survey	PEM	0.580	
W1019WI004	Wilkin	Survey	PEM	0.548	

Table 3-1 – Wetland Summary Table¹

Feature ID	County	Survey Type	Covertime	Wetland Area (Acres) ¹	Wetland Complex Area (Acres) ¹
W1019WI005	Wilkin	Survey	PEM	0.086	
W1019WI006	Wilkin	Survey	PEM	0.066	
W1019WI007	Wilkin	Survey	PEM	1.602	
W1019WI008	Wilkin	Survey	PEM	0.019	
W1019WI009	Wilkin	Survey	PEM	2.085	
W1019WI010	Wilkin	Survey	PEM	0.336	
W1019WI011	Wilkin	Survey	PEM	0.241	
W1019WI012	Wilkin	Survey	PEM	0.037	
W1019WI013	Wilkin	Survey	PEM	0.111	
W1019WI014	Wilkin	Survey	PEM	0.319	
W1019WI015	Wilkin	Survey	PFO	0.234	
W1019WI016	Wilkin	Survey	PEM	0.025	
W1019WI024	Wilkin	Survey	PEM	0.032	
W1020WI001	Wilkin	Survey	PEM	0.043	
W1025OT001	Otter Tail	Survey	PEM	0.345	
W1025OT002	Otter Tail	Survey	PEM	0.101	
W1025OT004	Otter Tail	Survey	PEM	0.774	
W1025OT005	Otter Tail	Survey	PEM	0.403	
W1025OT006	Otter Tail	Survey	PEM	0.099	

¹ Within Environmental Survey Area

Table 3-2 – Waterbody Summary Table

[illegible]

Table 3-2 – Waterbody Summary Table

[illegible]

Appendix 6 – USACE Wetland Determination Data Forms

Appendix 7 – Photos

Appendix 8 – Upland NHD Crossings Table

Table 8-1 Non-Water Feature NHD Crossings		
County	Approximate Mile Post (MP)	Description
MNL-305		
Martin	MP 2.5	Desktop reviewed. Multiple years of aerial imagery and desktop review indicate no evidence of waterbody
MNL-321		
Otter Tail	MP 1.6	Swale in between agricultural fields dominated by upland grass species. No evidence of OHWM or bed/bank, channel, flow, or scouring
Otter Tail	MP 3.6	Flat agricultural field. No evidence of OHWM or bed/bank, channel, flow, or scouring
Otter Tail	MP 5.6	Desktop reviewed. Multiple years of aerial imagery and desktop review indicate no evidence of waterbody
Otter Tail	MP 8.9	Flat agricultural field. No evidence of OHWM or bed/bank, channel, flow, or scouring
Otter Tail	MP 9.8	Flat agricultural field. No evidence of OHWM or bed/bank, channel, flow, or scouring
Wilkin	MP 15.4	Flat agricultural field. No evidence of OHWM or bed/bank, channel, flow, or scouring
Wilkin	MP 15.9	Flat agricultural field. No evidence of OHWM or bed/bank, channel, flow, or scouring
Wilkin	MP 18.1	Flat agricultural field. No evidence of OHWM or bed/bank, channel, flow, or scouring
Wilkin	MP 23.8	Flat agricultural field. No evidence of OHWM or bed/bank, channel, flow, or scouring
NHD – National Hydrography Dataset OHWM – Ordinary High-Water Mark		

From: Scott O'Konek <sokonek@summitcarbon.com>
Sent: Wednesday, July 10, 2024 1:52 PM
To: Levi, Andrew (COMM) <andrew.levi@state.mn.us>
Cc: Christina Brusven <cbrusven@fredlaw.com>; Dornfeld, Richard <Richard.Dornfeld@ag.state.mn.us>
Subject: MN EIS IR 13 question 19

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Andrew,
Please see the response from Lake Region Electric Cooperative.

SCOTT O'KONEK | O: (515) 384-0964 | SOKONEK@SUMMITCARBON.COM

From: Tim Thompson <TThompson@lrec.coop>
Sent: Wednesday, July 10, 2024 5:56 AM
To: Daniel Wood <dwood@summitcarbon.com>
Cc: Charlie Chamblee <cchamblee@summitcarbon.com>; David Smith <dsmith@summitcarbon.com>; Scott O'Konek <sokonek@summitcarbon.com>; Alan Fazio <AFazio@lrec.coop>

Some people who received this message don't often get email from tthompson@lrec.coop. [Learn why this is important](#)

Hi Daniel,

Al and I both like your response and feel it is very adequate. Good luck with your process and don't hesitate to ask us for any support you need. Thanks and have a great day.

Tim



Tim Thompson
CEO

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From: Daniel Wood <dwood@summitcarbon.com>
Sent: Tuesday, July 9, 2024 3:06 PM
To: Tim Thompson <TThompson@lrec.coop>
Cc: Charlie Chamblee <cchamblee@summitcarbon.com>; David Smith <dsmith@summitcarbon.com>; Scott O'Konek <sokonek@summitcarbon.com>; Alan Fazio <AFazio@lrec.coop>
Subject: RE: MN EIS - Questions & Letter of Support

CAUTION: This email originated from a sender outside of LREC. Please use caution when opening links and attachments.

Good afternoon, Tim. Below is a question (text in black) we received pertaining to our MN EIS and our response (text in red). Could you review the response and see if you agree with my answer from the LREC perspective?

19. Public commenters ask about electricity use at the capture facility. Representative comments include: "EERA should revisit the potential for impacts to the electrical system and other Lake Region Coop customers and member-owners. It is important to know both the total expected energy use as well as the variable demand that is anticipated by the project's additional electric usage. Will the project's use spike at the same time as the existing plant's demand? Will Lake Region Coop have to implement peak-shaving policies and technologies elsewhere to manage this new intense use? Even if no immediate upgrades are required to deliver energy to the plant, will this increase member-owners' exposure to power outages or brown-outs in times of peak demand?" Also, "who is paying for that electricity? Summit or the ethanol facility? And if the latter, will those cost increases be passed on to producers or other member-owners?"

When operating, the CO₂ capture facility is expected to draw 3,678 kW of electrical load from the grid. Summit plans to install variable frequency drives on all medium-voltage electrical loads to limit the impact on the electrical grid as loads come online. To serve our load, Lake Region Electric Coop (LREC) plans to upgrade a feeder in the existing substation. They have indicated to Summit that their system has ample capacity to manage the incremental load without issue. Summit is responsible for all costs associated with the upgrade and operation of the capture facility, including the cost of the utility power. LREC has not indicated to Summit that the additional load would cause the utility to implement peak-shaving policies or technologies anywhere in their system. LREC has not indicated that, nor does Summit anticipate an increase in other member-owners exposure to power outages or brown-outs.

Thanks,
DANIEL WOOD | O: 515-531-2611 | M: 307-331-9491 | DWOOD@SUMMITCARBON.COM