APPENDIX D-5: AQUATIC RESOURCE DELINEATION REPORT

Alternative 2: Cart Creek Site 1
North Branch Park River Watershed, Pembina County, North Dakota

Prepared for:

Park River Joint Water Resource District

600 Cooper Avenue

Grafton, ND 58237

I hereby certify that this report was prepared by me or under my direct supervision.

Mark D. Aanenson

Houston Engineering Inc.

Date: 2020-06-25

HEI project no. 8150-002

HOUSTON ENGINEERING INC.

EXECUTIVE SUMMARY

Staff from Houston Engineering, Inc. (Houston Engineering) and Prairie Soil Consulting, LLC. (Prairie Soil Consulting) completed the components of a field investigation of the subject area to identify and delineate aquatic resources for a project on behalf of the Park River Joint Water Resource District. The subject property is in Thingvalla and Park Townships near the town of Mountain, in Pembina County, North Dakota, (**Attachment A: Project Location Map**). The delineation was conducted in accordance with the 1987 Corps of Engineers Wetland Delineation Manual, and the Great Plains Regional Supplement (2010), and guidelines for Ordinary High-Water Mark determinations (USACE 2005). Results of the field delineations indicate there are seventeen wetland areas (30.72 acres) and three Other Waters (total 1.42 acres) located in the 825.01-acre survey area (**Attachment B: Aquatic Resources Delineation Maps).**

1 INTRODUCTION

Staff from Houston Engineering and Prairie Soil Consulting completed a field investigation in accordance with the 1987 Army Corps of Engineers Wetland Delineation Manual, and the Great Plains Regional Supplement (USACE 2010). The proposed project is a flood control retention site to reduce downstream flood damages. The purpose of this report is to identify the wetlands and water resources within the project area.

2 LOCATION

The project is located in Thingvalla and Park Townships near the town of Mountain, in Pembina County, North Dakota,; general latitude: 48.666971, longitude -97.799409; (**Attachment A: Project Location Map**).The boundary extends along Section 26, T160, R56, and to the north along 131st St. The project is approximately 2.1 miles east of Mountain, ND (driving directions: from Mountain; head north until 88th St and head east; from there keep going until 131st St and go south; In about 0.3 miles you will reach the northern part of the project boundary).

3 METHODS

For the delineation, we followed the methods described in the 1987 Army Corps of Engineers Manual for "routine" delineations (USACE 1987). Additionally, we followed methodology specific to the Great Plains Regional Supplement (2010). The delineation of wetlands along streams and rivers followed guidance from the USACE (2005). Prior to the field delineation to identify potential wetland habitats and provide guidance for the investigation of wetlands at the project site, we reviewed the U.S. Fish and Wildlife Service National Wetland Inventory (2019) and the county digital soil surveys (USDA-NRCS 2010), as well as current and historical aerial photography.

The following procedures were used to determine wetland habitats:

- We surveyed vegetation to determine the proportion of the dominant plant species classified as either obligate wetland, facultative wetland, or facultative plants; or if other indicators of wetland vegetation were present (Lichvar et al. 2016).
- We sampled the soil using a soil probe to identify soil morphology, redoximorphic features, and soil texture. We determined the hydric soil indicators according to Field Indicators of Hydric Soils in the United States; Guide for Identifying and Delineating Hydric Soils, Version 7.0 (USDA-NRCS, 2016).
- We determined wetland hydrology on-site by observation of primary and secondary hydrologic indicators (USACE 2010). We also used aerial photography to assist hydrologic assessment. To describe the climactic conditions at the time of sampling, we accessed antecedent and recent rainfall data before going in the field (NDAWN 2019). To determine if the dry season water table hydrology indicator applies, we obtained the typical water balance for the site at the date of sampling (Matsuura et al. 2003).
- For determination of the extent of Other Waters (OW) in the vicinity, we surveyed the Ordinary High Water Mark (OHWM). This entailed identifying the transition between plant communities adapted to wet soils and those adapted to drier soils (USACE 2005).

Staff from Houston Engineering (Mark D. Aanenson) and a Registered Professional Soil Classifier (Mike Ulmer, Prairie Soil Consulting, LLC) performed fieldwork on August 26th, 2019. We marked the wetland boundaries and sample locations using a Trimble Geo 7x hand-held GPS unit for those representative plant communities present along the wetland boundaries. Sample points included observations of dominant vegetation, soil profiling including color and texture, and indications of hydrology. We also used additional, undocumented sample points throughout the delineation to verify vegetation, hydric soils, and hydrology. We recorded our observations using data forms and geolocated photographs. All areas within the project boundaries were surveyed.

4 PRESETTLEMENT CONDITIONS

A significant portion (66.7%) of the project area contains soils with hydric ratings of 92 or greater. A wetland boundary based on the presence of hydric soils, which cover 703.6 acres of the project area, is shown in **Attachment H: Historic Wetlands**. Hydric soils in the northern Red River Valley developed under dramatically different hydrologic conditions than presently exist. Historically, fine and very fine textures, slow and very slow permeability, and a combination of seasonal endo- and epi- zones of saturation (i.e. ground water and surface ponding) created conditions favorable for the development of

hydric soils. However, contemporary hydrology has changed substantially from the time before agricultural development. Agricultural drainage, both regionally through the construction of legal drains and sectional road ditches and locally, with surface and tile drainage, has impacted the frequency and duration of soil saturation in some hydric soils. Hydric soils that occur in run-on or concave positions usually have the necessary saturation and associated reduction necessary to qualify as a wetland. However due to the change in hydrology, many hydric soils in plane positions will lack the duration of saturation necessary to obtain long-term reduction, thereby not qualifying as a wetland under the formal definition.

Due to anthropogenic influences such as the construction of roads and agricultural tillage, these areas differ from presettlement conditions in terms of vegetative composition also. The native vegetation listed for each soil series compared to the vegetation listed in the data forms shows these differences. For the Fargo soil series, native vegetation is western wheatgrass, Kentucky bluegrass, and a variety of forbs. Native vegetation for the Ryan soil series is western wheatgrass, sedges, blue grama, inland saltgrass, Nuttal alkaligrass, and salt tolerant forbs. Native vegetation for the Hegne soil series is tall grass prairie (USDA-NRCS 2020).

Vegetation found during the site visit did not coincide with native vegetation listed for each soil series (wetland determination data forms can be made available upon request from the North Dakota Natural Resources Conservation Service). Despite being located in an area with hydric soil, hydrophytic vegetation was not found at the upland points 6-11 either. Upland vegetation found at the points instead included *Bromus inermis* (smooth brome), *Poa pratensis* (Kentucky bluegrass), and *Elymus repens* (quack grass). The lack of hydrophytic vegetation prevented the classification of these areas as wetlands.

If hydrologic conditions returned to their natural state through a restoration process, a larger portion of this area may be considered a wetland in the future. This process would likely involve lessening the impact of artificial drainage through physical means. Hydrophytic vegetation would have a greater chance of establishment if this area was restored to previous hydrologic conditions.

5 EXISTING CONDITIONS

Landscape Setting:

The project area is located in the Lake Agassiz Plain Ecological Province, Glacial Lake Agassiz Basin (USEPA 2019). The Lake Agassiz plain is made of glacial till below lacustrine sediments. It is very flat and has few wetlands compared to surrounding ecoregions. The flat land is prone to flooding by the Red River of the North, which creates very productive agricultural land with high water tables. Soils range from silty to clay in texture around the region (USDA-NRCS 2019).

The weather conditions at the time of the delineation were good. The circumstances were drier than normal at the time of delineation. However, vegetation and soils were disturbed in multiple locations due to agricultural practices and ditch construction. Site photographs are shown in **Attachment C**.

Hydrology description:

The project area drains generally to the south east toward into the Cart Creek which runs throughout the project boundary. This eventually drains into The Red River of the North. (**Attachment D: LiDAR Maps**).

Soil descriptions:

Dominant soils within the project area are poorly drained to somewhat poorly drained soil that was formed from clayey lacustrine sediments (USDA-NRCS 2019). The project area is composed of a variety of soil types with slopes ranging between zero and six percent (**Attachment E: Hydric Soils Map**). The dominant soils include Ryan-Fargo silty clays (100% hydric), Fargo silty clay (100% hydric), Glyndon silt loam (13% hydric), and Neche silty clay (9% hydric). Hydric soil indicators observed within the project boundary include: Depleted Below Dark Surface (A11), Depleted Matrix (F3), Redox Dark Surface (F6), and Thick Dark Surface (A12).

Vegetation descriptions:

The plant communities in the survey area are wet-mesic prairie, and riparian forests. Dominant species in the wetland areas within the project area (**Attachment F: Plant List**) represent the tree, shrub, and herb strata (see **Appendix D-6: Biological Inventory Report** for full list of plant species identified in the survey area). The tree stratum is dominated by: *Fraxinus pennsylvanica* (green ash) and *Salix amygdaloides* (peachleaf willow). The shrub stratum is dominated by *Salix interior (*sandbar willow*).* There are a variety of wetland herbs, the more frequent species include *Phalaris arundinacea* (reed canary grass), *Typha X glauca* (hybrid cattail), and *Alopecurus arundinaceus* (creeping meadow foxtail).

Commerce:

There are no evident commerce activities associated with these wetlands.

Climatic Conditions:

The conditions at the time of the delineation were good. The climatic conditions in the area were drier than normal because of decreased precipitation in the three months before. (NDAWN 2019) However, the site received 0.61 inches of rain the week prior to fieldwork. The typical water balance for this site shows the dry season begins July 1st (Matsuura et al. 2003).

Table 1. Antecedent Precipitation

Year	Month	Station: Cavalier, ND		
		Total Rainfall (inch)	Normal Total Rainfall (inch)	Departure from Normal Total Rainfall (inch)
2019	5	1.26	2.57	-1.31
2019	6	2.29	3.68	-1.39
2019	7	1.72	3.19	-1.47
Averages:				-1.39
Totals:		5.28	9.44	
Percent difference				56 %

Aquatic Resources: Results of the wetland delineation indicate there are seventeen wetland areas (30.72 acres) and three Other Waters (total 1.42 acres) located in the 825.01-acre survey area (**Tables 2 and 3, Attachment B: Aquatic Resources Delineation Maps**). Some of the wetlands are listed in the NWI **(Tables 2 and 3)**.

Wetlands 1a-b: This wetland is a roadway ditch wetland connected by culverts. These wetlands are not isted by the NWI. Field observations classify this wetland as PEM1Ax. Hydrology indicators documented for these wetlands include: C9-Saturation Visible on Aerial Imagery, D2- Geomorphic Position, and D5- FAC Neutral Test. It contains silty clay textured soils with redoximorphic features in the upper part. The soil met following hydric soil indicator: F3- Depleted Matrix, and A11- Depleted Below Dark Surface. It is dominated by *Phalaris arundinacea*- FACW, *Typha X glauca*-OBL, *Rumex crispis*- FACW, *Eleocharis palustris*-OBL, and *Cirsium arvense*- FACU.

Wetland 2: This wetland formed in the roadway ditch between Cart Creek and an old farmstead site. It is listed by the NWI as a PEM1Cx, field observations indicate these wetlands can also be classified as PEM1Ax. Hydrology indicators documented for these wetlands include: C9-Saturation Visible on Aerial Imagery, D2- Geomorphic Position, and D5- FAC Neutral Test. It contains loam and loam fine sand textured soils with redoximorphic features in the upper part. The soils met the following hydric soil indicators: F3- Depleted Matrix, and A11- Depleted Below Dark Surface. It is dominated by *Phalaris arundinacea*- FACW.

Wetland 3: This wetland is a depressional basin near Cart Creek. Wetland 3 is listed by the NWI as PEM1Cx, and field observations indicated it can be classified as PEM1Ax. Hydrology indicators documented for this wetland include: C9-Saturation Visible on Aerial Imagery, D2- Geomorphic Position, and D5- FAC Neutral Test. It contains silty clay loam textured soils with redoximorphic features in the upper part. The soil met the following hydric soil indicators: F6- Redox Dark Surface. It is dominated by *Phalaris arundinacea*- FACW.

Wetland 4: This is a natural wetland area that located in an agricultural field. It is not listed by the NWI. Field observations indicate this wetland can be classified as a PEM1A. Hydrology indicators documented for this wetland include: C9-Saturation Visible on Aerial Imagery, D2- Geomorphic Position, and D5- FAC Neutral Test. The soil met the following hydric soil indicators: F6- Redox Dark Surface. It is dominated by *Phalaris arundinacea*- FACW, and *Alopecurus arundinacea*-FACW.

Wetland 5: This is a natural basin wetland located adjacent to Cart Creek. It is not listed by the NWI. Field observation indicate this wetland can be classified as PEM1A. Hydrology indicators documented for this wetland include: C9-Saturation Visible on Aerial Imagery, D2- Geomorphic Position, and D5- FAC Neutral Test. It contains silty clay loam textured soils with redoximorphic features in the upper part. The soil met the following hydric soil indicators: F3- Depleted Matrix, and A11-Depleted Below Dark Surface. It is dominated by *Phalaris arundinacea*- FACW, and *Alopecurus arundinacea*-FACW.

Wetland 6: This is a natural basin wetland located along Cart Creek and extends mostly outside of the project boundary to the east. It is listed by the NWI as a PFOC wetland. Field observation indicate this wetland can be classified as PEM/FO1C. Hydrology indicators documented for this wetland include: C9-Saturation Visible on Aerial Imagery, D2- Geomorphic Position, and D5- FAC Neutral Test. It contains silty clay textured soils with redoximorphic features in the upper part. The soil met the following hydric soil indicators: A12- Thick Dark Surface. It is dominated by *Phalaris arundinacea*- FACW and *Salix amygdaloides* - FACW.

Wetland 7: This is a natural basin wetland in an agricultural field. It is not listed by the NWI. Field observation indicate this wetland can be classified as PEM1A. Hydrology indicators documented for this wetland include: C9-Saturation Visible on Aerial Imagery, D2- Geomorphic Position, and D5- FAC Neutral Test. It contains silty clay textured soils with redoximorphic features in the upper part. The soil met the following hydric soil indicators: F3- Depleted Matrix, and A11-Depleted Below Dark Surface. It is dominated by *Phalaris arundinacea*- FACW, *Typha X glauca*-OBL, *Rumex crispis*- FACW, *Eleocharis palustris*-OBL, Schoenoplectus tabernaemontani- OBL.

Wetland 8: This is a natural basin wetland on the edge on an agricultural field. It is not listed by the NWI. Field observation indicate this wetland can be classified as PEM1A. Hydrology indicators documented for this wetland include: C9-Saturation Visible on Aerial Imagery, D2- Geomorphic Position, and D5- FAC Neutral Test. It contains silty clay textured soils with redoximorphic features in the upper part. The soil met the following hydric soil indicators: F3- Depleted Matrix, and A11-Depleted Below Dark Surface. It is dominated by *Phalaris arundinacea*- FACW.

Wetland 9: This is a natural basin wetland in an agricultural field. It is not listed by the NWI. Field observation indicate this wetland can be classified as PEM1A. Hydrology indicators documented for this wetland include: C9-Saturation Visible on Aerial Imagery, D2- Geomorphic Position, and D5- FAC Neutral Test. It contains silty clay textured soils with redoximorphic features in the upper part. The soil met the following hydric soil indicators: A12- Thick Dark Surface. It is dominated by *Phalaris arundinacea*- FACW, and *Symphyotrichum lanceolatum*- FACW.

Wetland 10: This is a natural basin wetland located in an agricultural field. It is not listed by the NWI. Field observation indicate this wetland can be classified as PEM1A. Hydrology indicators documented for this wetland include: C9-Saturation Visible on Aerial Imagery, D2- Geomorphic Position, and D5- FAC Neutral Test. It contains silty clay textured soils with redoximorphic features in the upper part. The soil met the following hydric soil indicators: F3- Depleted Matrix. It is dominated by *Symphyotrichum lanceolatum*- FACW, and *Typha X glauca*- OBL.

Wetlands 11 and 12: This is a large natural basin wetland that extends throughout a large portion of the boundary. Parts of this wetland are listed by the NWI as R4SBC. Field observation indicate this wetland can be classified as PEM1A/PEM1C. Hydrology indicators documented for this wetland include: C9-Saturation Visible on Aerial Imagery, D2- Geomorphic Position, C3- Oxidized Rhizospheres along living Roots, and D5- FAC Neutral Test. It contains silty clay textured soils with redoximorphic features in the upper part. The soil met the following hydric soil indicators: F6- Redox Dark Surface, F3- Depleted Matrix, and A11- Depleted Below Dark Surface. It is dominated by *Phalaris arundinacea*- FACW, and

Typha X glauca- OBL. Wetland 12 is a small lobe of Wetland 11 that was cut off from the main wetland area by a fill activity or old fenceline.

Wetland 13: This is a natural basin wetland located along Cart Creek. It is connected to Wetland 11 by a culvert. It is listed by the NWI as R4SBC, and PEM1C. Field observation indicate this wetland can be classified as R4SBC/PEM1A. Hydrology indicators documented for this wetland include: C9-Saturation Visible on Aerial Imagery, and D2- Geomorphic Position. It contains silty clay textured soils with redoximorphic features in the upper part. The soil met the following hydric soil indicators: F6- Redox Dark Surface, F3- Depleted Matrix, and Depleted Below Dark Surface. It is dominated by *Phalaris arundinacea*- FACW, and *Salix interior*- FACW in the shrub stratum.

Wetland 14: This is a natural basin wetland located along Cart Creek. It is not listed by the NWI. Field observation indicate this wetland can be classified as PEM1A. Hydrology indicators documented for this wetland include: C9-Saturation Visible on Aerial Imagery, D5- Fac-Neutral Test, and D2- Geomorphic Position. It contains silty clay textured soils with redoximorphic features in the upper part. The soil met the following hydric soil indicators: F6- Redox Dark SurfaceSurface. It is dominated by *Typha X glauca*-OBL, and *Phalaris arundinacea*- FACW.

Wetland 15: This is a natural basin wetland located along Cart Creek. It is listed by the NWI as PEM1Cx. Field observation indicate this wetland can be classified as PEM1C. Hydrology indicators documented for this wetland include: C9-Saturation Visible on Aerial Imagery, D5- Fac-Neutral Test, and D2- Geomorphic Position. It contains silty clay textured soils with redoximorphic features in the upper part. The soil met the following hydric soil indicators: F6- Redox Dark SurfaceSurface. It is dominated by *Phalaris arundinacea*- FACW.

Wetlands 16a, 16b and 16c: These wetlands formed from the construction of the roadway ditch and are connected through culverts. They are not listed by the NWI. Field observation indicate this wetland can be classified as PEM1Ax. Hydrology indicators documented for these wetlands include: C9-Saturation Visible on Aerial Imagery, D5- Fac-Neutral Test, C3- Oxidized Rhizospheres along Living Roots, and D2- Geomorphic Position. They contain clay textured soils with redoximorphic features in the upper part. The soil met the following hydric soil indicators: F6- Redox Dark SurfaceSurface. Dominant vegetation includes primarily *Phalaris arundinacea*- FACW.

Wetland 17: This is a natural basin wetland in an agricultural field. It is not listed by the NWI. Field observation indicate this wetland can be classified as PEM1A. Hydrology indicators documented for this wetland include: C9-Saturation Visible on Aerial Imagery, D2- Geomorphic Position, and D5- FAC

Neutral Test. It contains silty clay textured soils with redoximorphic features in the upper part. The soil met the following hydric soil indicators: A12- Thick Dark Surface and F6 – Redox Dark Surface. It is dominated by *Phalaris arundinacea*- FACW, and Typha X glauca- OBL.

Other Waters 1, 2 and 3: This Other Waters is known as Cart Creek and is located in the Northern and eastern part of the project boundary. It is listed by the NWI as a PEM1Cx and as R4SBC. Field observations indicate this stream can be classified as R4UBH. The stream flows from northwest to southeast through the project boundary.

Table 2: Delineated Wetlands and their characteristics (data limited to project boundary only)

Wetland Number	NWI Listing	Wetland type Cowardin et al. 1979	Wetland/Other Waters area (acres)	Latitude (center)	Longitude (center)
1a	-	PEM1Ax	0.17	48.673618	-97.818530
1b	-	PEM1Ax	1.14	48.673603	-97.808682
2	-	PEM1A	0.19	48.670987	-97.796382
3	PEM1Cx	PEM1Ax	0.06	48.670116	-97.797685
4	-	PEM1A	0.19	48.669344	-97.796949
5	-	PEM1A	0.55	48.668937	-97.795985
6	PFOC	PEM/FO1C	0.77	48.669769	-97.794053
7	-	PEM1A	0.17	48.668225	-97.800724
8	-	PEM1A	1.20	48.666373	-97.797300
9	-	PEM1A	1.85	48.666507	-97.801264
10	-	PEM1A	0.18	48.665778	-97.801195
11	R4SBC	PEM1A/PEM1C	16.60	48.664376	-97.803726
12	-	PEM1A	0.06	48.667488	-97.807534
13	R4SBC/PEM1A	R4SBC/PEM1A	1.68	48.664512	-97.795263
14	-	PEM1A	0.40	48.662717	-97.795414
15	PEM1C	PEM1C	0.45	48.663084	-97.795308
16a	-	PEM1Ax	0.66	48.659097	-97.793868
16b	-	PEM1Ax	2.21	48.659068	-97.804136
16c	-	PEM1Ax	0.27	48.659073	-97.819948
17	-	PEM1A	0.60	48.668056	-97.813222
total acres within project boundary			30.72		

Table 3: Other Waters and their characteristics (data limited to project boundary only)

Other Waters Number	NWI Listing	Wetland Type	Other Waters Area (acres)	Other Waters Length in Project (feet)	Latitude (center)	Longitude (center)

OW 1	PEM1Cx	PEM1Cx	0.37	818	48.683638	-97.817123
OW 2	PEM1Cx/R4SBC	R4SBC	0.92	2016	48.228423	-97.963219
OW 3	PEM1Cx/R4SBC	R4SBC	0.13	280	48.223340	-97.940967
		Total	1.42	3114		

6 REFERENCES

Cowardin LM, Carter V, Golet FC, LaRoe ET (1979) Classification of wetlands and deepwater habitats of the United States. U. S. Department of the Interior, Fish and Wildlife Service, Washington, D.C. https://www.fws.gov/wetlands/Documents/Classification-of-Wetlands-and-Deepwater-Habitats-of-the-United-States.pdf

Lichvar RW, Banks DL, Kirchner WN, Melvin NC (2016) The National Wetland Plant List: 2016 wetland ratings. Phytoneuron 2016-30: 1-17. 28 April 2016. ISSN 2153 733X

Matsuura K, Wilmott C, Legates D (2003) WebWIMP version 1.02 with upgrades in 2009, University of Delaware. http://climate.geog.udel.edu/~wimp/index.html (Accessed August 2019).

NDAWN (2019) North Dakota Agricultural Weather Network. NDSU School of Natural Resource Sciences. https://ndawn.ndsu.nodak.edu/weather-data-monthly.html (Accessed August 2019).

USACE (2010) U.S. Army Corps of Engineers. Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Great Plains Region (Version 2.0), eds. Wakeley JS, Lichvar RW, Noble CV. ERDC/EL TR-12-1. Vicksburg, MS: U.S. Army Engineer Research and Development Center.

USACE (2005) U.S. Army Corps of Engineers. Regulatory Guidance Letter NO. 05-05, Ordinary High Water Mark Identification, 7 December 2005.

USACE (1987) U.S. Army Corps of Engineers. Wetlands Delineation Manual. Wetlands Research Program. Technical Report Y-87-1. Department of the Army, Waterways Experiment Station, US Army Corps of Engineers. Vicksburg, Mississippi, USA.

USDA-NRCS (2016) US Department of Agriculture-Natural Resource Conservations Service. Field Indicators of Hydric Soils in the United States – Guide for identifying and delineating Hydric Soils, Version. 8.0. eds. Vasilas LM, Hurt GW, Berkowitz JF. USDA – NRCS in cooperation with the National Technical Committee for Hydric Soils.

USDA-NRCS (2019) US Department of Agriculture-Natural Resource Conservations Service. Official Soil Series Descriptions. https://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053587 (Accessed August 2019).

USDA-NRCS (2010) US Department of Agriculture-Natural Resource Conservations Service. Soil Survey of North Dakota by County (Pembina County). http://websoilsurvey.nrcs.usda.gov/app/ (Accessed August 2019).

USEPA (2019) US EPA Office of Environmental Information (OEI). Data: US EPA Office of Research and Development (ORD). https://geodata.epa.gov/ArcGIS/rest/services/ORD/USEPA_Ecoregions_Level_III_and_IV/MapServer (Accessed August 2019).

USFWS (2019) United States Fish and Wildlife Service. National Wetlands Inventory. http://www.fws.gov/wetlands/Data/Mapper.html (Accessed August 2019).

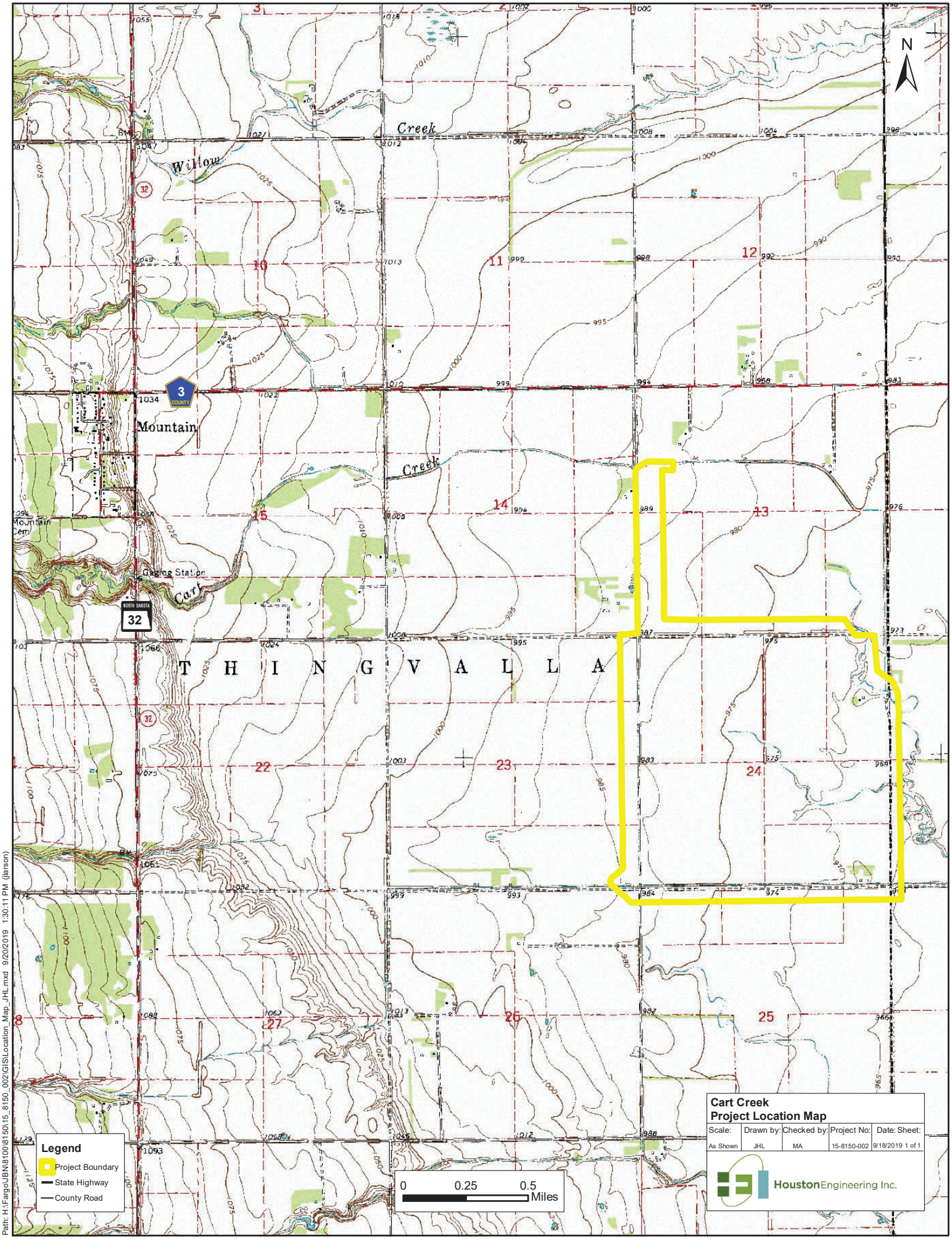
7 DELINEATORS' CREDENTIALS

Name: Mark D. Aanenson, Senior Environmental Scientist
Education: Minnesota State University Moorhead – BS Biology
Professional Membership: MN Wetland Professionals Association
Certifications/Licenses: Certified Wetland Delineator State of Minnesota (no. 1001)
Training: Board of Water and Soil Resources – Jurisdictional Delineation of Wetlands in Minnesota; Advanced Delineation Practicum; Hydrologic Monitoring; Minnesota Routine Assessment Method; Wetland Plant Identification; University of Minnesota St. Paul – Soils 5555 – Wetland Soils, Dr. Jay Bell; NRCS – Engineering Properties of Soils; Minnesota DNR Native Plant Community Field Guide Training; Minnesota DNR Native Plant Community Field Plant Identification, Sedges of Minnesota Laboratory and Field Identification, 20+ years of fieldwork experience in the Northern Plains, UMN Approved Self-study course: Grasses of the Northern Plains

Name: Mike Ulmer, Soil Scientist, Prairie Soil Consulting, LLC
Education: North Dakota State School of Science, Wahpeton ND – AS Civil Engineering Technology, North Dakota State University, Fargo, ND – BS and MS Soil Science
Professional Memberships: Professional Soil Classifiers Association of North Dakota, Soil Science Society of America, Soil and Water Conservation Society, North Dakota Geological Society, North Dakota Academy of Science National Association of Soil Conservation Districts, Phi Kappa Phi Honor Society
Training: SOIL Wetland identification (1978, 1995), SOIL Wetland training (1999), SOIL Reg. IV (1991), SOIL Hydric Soils (1995), SOIL Advanced Hydric Soils (2005)

ATTACHMENT A

Project Location Map


N
Willow Creek
Mountain
Mountain Cem
Gaging Station
Cart Creek
T H I N G V A L L A
3
32
1034
1066
1093
10
11
12
13
14
15
22
23
24
25
26
27
0
0.25
0.5
Miles
Legend
Project Boundary
State Highway
County Road
Cart Creek
Project Location Map
Scale: As Shown
Drawn by: JHL
Checked by: MA
Project No: 15-8150-002
Date: Sheet: 9/18/2019 1 of 1
HoustonEngineering Inc.
Path: H:\Fargo\JBN\81\0081\50\15_8150_002\GIS\Location_Map_JHL.mxd 9/20/2019 1:30:11 PM (jlarson)

ATTACHMENT B

Aquatic Resource Delineation Maps

Path: C:\Users\jlarson\Desktop\Projects\Project MXD's\CART_Creek.mxd 9/18/2019 4:39:59 PM (jlarson)

Legend

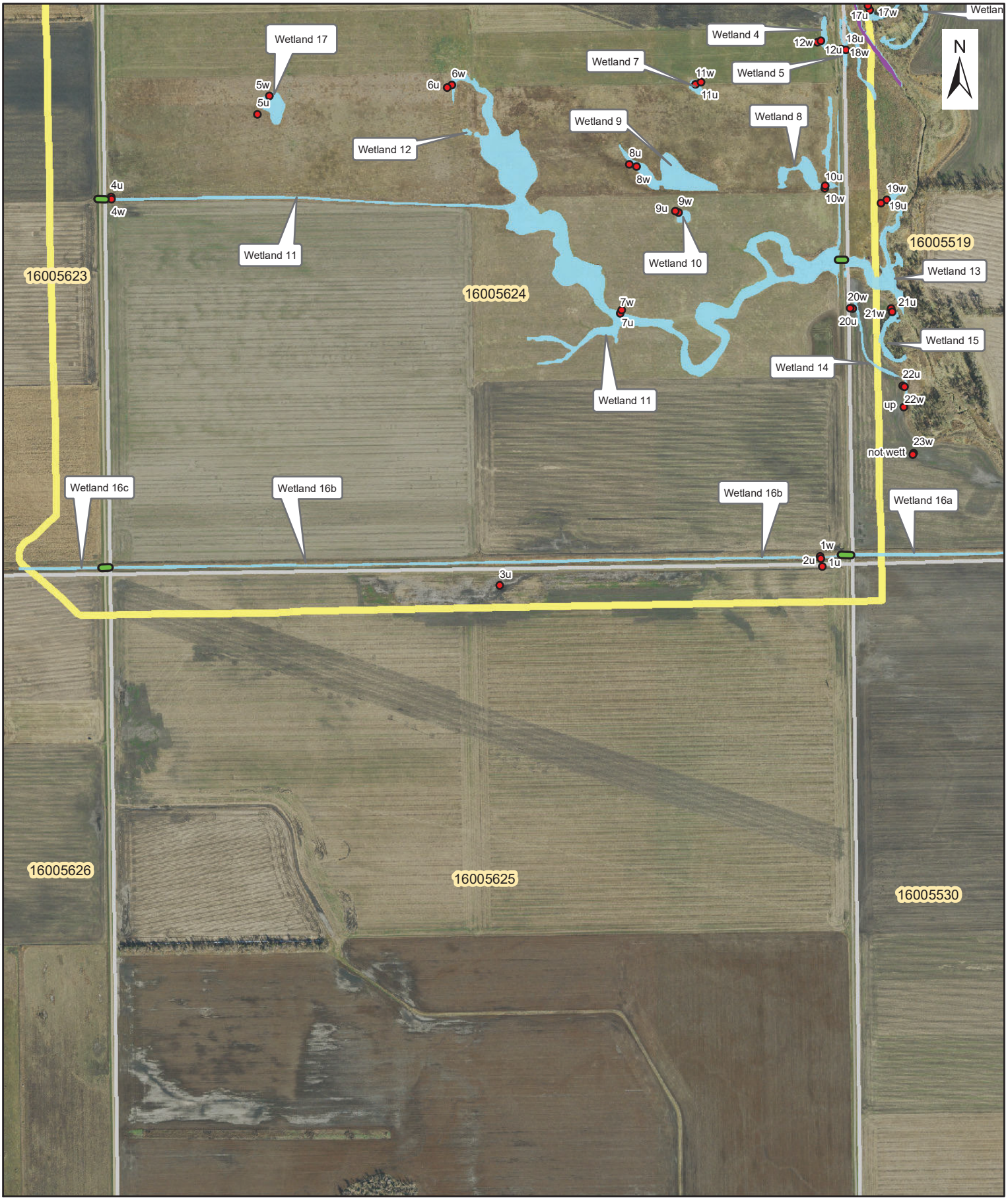
- Culverts
- On Site Wetlands
- Other Waters
- Project Boundary
- Test Holes
- PLSS Sections

0 0.25 0.5 Miles

Cart CreekProject Map

Scale:	Drawn by:	Checked by:	Project No:	Date:	Sheet:
As Shown	JHL	MA	15-8150-002	9/18/2019	of 4

Houston Engineering Inc.



Path: C:\Users\jlarson\Desktop\Projects\Project MXD's\CART_Creek.mxd 9/18/2019 4:40:13 PM (jlarson)

Legend

- Culverts
- On Site Wetlands
- Other Waters
- Project Boundary
- Test Holes
- PLSS Sections

0 0.25 0.5 Miles

Cart CreekProject Map

Scale:	Drawn by:	Checked by:	Project No:	Date:	Sheet:
As Shown	JHL	MA	15-8150-002	9/18/2019	of 4

Houston Engineering Inc.

ATTACHMENT C

Site Photographs

Site Photographs

4w – view east

9w – view southeast

11w – view southwest

14w – view east

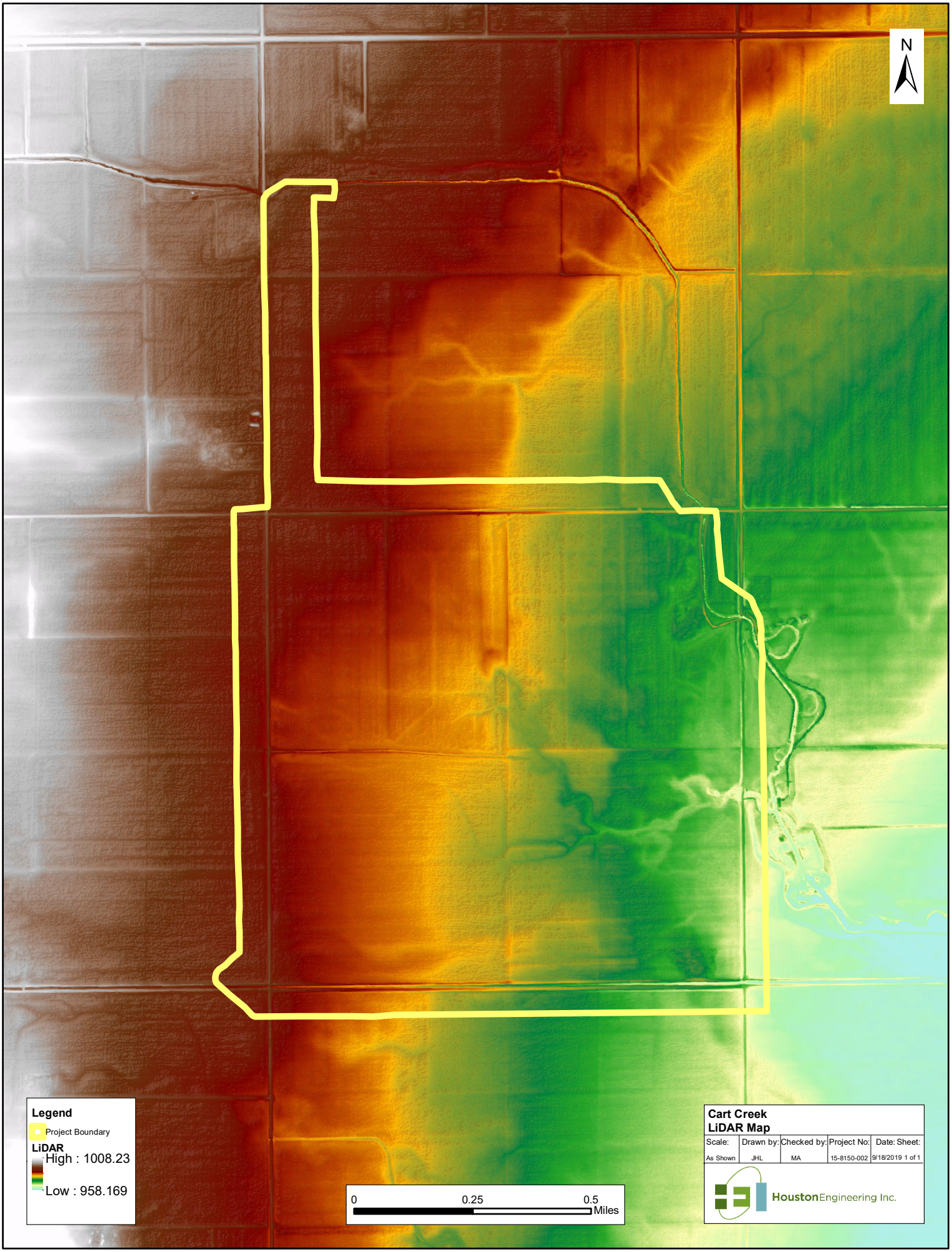
15w – view south

18w – view southeast

	
20w – view south	**OW 1 – view northeast**

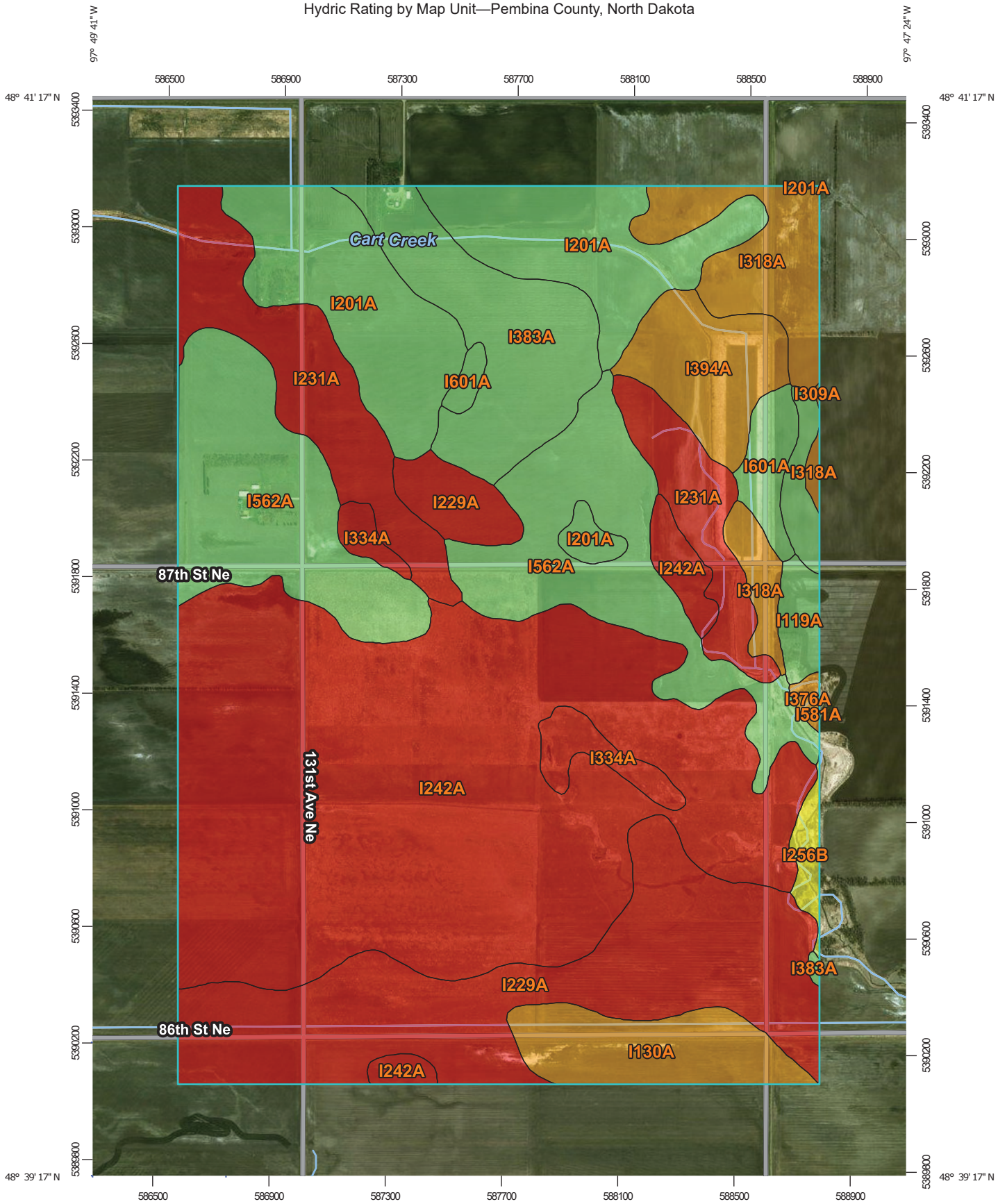
ATTACHMENT D

LiDAR Maps


N
Legend
Project Boundary
LiDAR
High : 1008.23
Low : 958.169
0
0.25
0.5
Miles
Cart Creek
LiDAR Map
Scale: As Shown
Drawn by: JHL
Checked by: MA
Project No: 15-8150-002
Date: 9/18/2019
Sheet: 1 of 1
HoustonEngineering Inc.
Path: H:\Fargo\JBN\81\00\81501 5_8150_002\GIS\Location_Map_JHL.mxd 9/18/2019 9:20:58 AM (jlarson)

ATTACHMENT E

Hydric Soils Map



Map Scale: 1:18,000 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 250 500 1000 1500

Feet: 0 500 1000 2000 3000

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 14N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils

Soil Rating Polygons
- Hydric (100%)
- Hydric (66 to 99%)
- Hydric (33 to 65%)
- Hydric (1 to 32%)
- Not Hydric (0%)
- Not rated or not available

Soil Rating Lines
- Hydric (100%)
- Hydric (66 to 99%)
- Hydric (33 to 65%)
- Hydric (1 to 32%)
- Not Hydric (0%)
- Not rated or not available

Soil Rating Points
- Hydric (100%)
- Hydric (66 to 99%)
- Hydric (33 to 65%)
- Hydric (1 to 32%)
- Not Hydric (0%)
- Not rated or not available

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Pembina County, North Dakota
Survey Area Data: Version 20, Sep 13, 2018

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Aug 17, 2011—May 16, 2016

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydric Rating by Map Unit

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
I119A	Bearden silty clay loam, 0 to 2 percent slopes	10	13.0	0.8%
I130A	Hegne-Fargo silty clays, 0 to 1 percent slopes	95	55.3	3.3%
I201A	Glyndon silt loam, 0 to 2 percent slopes	13	177.2	10.5%
I229A	Fargo silty clay, 0 to 1 percent slopes	100	233.2	13.8%
I231A	Dovray silty clay, 0 to 1 percent slopes	100	131.7	7.8%
I242A	Ryan-Fargo silty clays, 0 to 1 percent slopes	100	555.8	32.9%
I256B	La Prairie-Fluvaquents, channeled complex, 0 to 6 percent slopes, frequently flooded	39	9.2	0.5%
I309A	Arveson loam, 0 to 1 percent slopes	92	0.3	0.0%
I318A	Borup silt loam, 0 to 1 percent slopes	92	70.4	4.2%
I334A	Hegne silty clay, moderately saline, 0 to 1 percent slopes	100	24.1	1.4%
I376A	Colvin silty clay loam, 0 to 1 percent slopes	95	3.3	0.2%
I383A	Overly silty clay loam, 0 to 2 percent slopes	5	93.5	5.5%
I394A	Lamoure silt loam, 0 to 1 percent slopes, occasionally flooded	97	52.0	3.1%
I476A	Glyndon silt loam, moderately saline, 0 to 2 percent slopes	10	12.9	0.8%
I562A	Neche silty clay, 0 to 1 percent slopes, occasionally flooded	9	231.9	13.7%
I581A	Gardena very fine sandy loam, 0 to 2 percent slopes	5	0.1	0.0%
I601A	Bearden silty clay loam, moderately saline, 0 to 2 percent slopes	12	23.6	1.4%
Totals for Area of Interest			**1,687.6**	**100.0%**

Description

This rating indicates the percentage of map units that meets the criteria for hydric soils. Map units are composed of one or more map unit components or soil types, each of which is rated as hydric soil or not hydric. Map units that are made up dominantly of hydric soils may have small areas of minor nonhydric components in the higher positions on the landform, and map units that are made up dominantly of nonhydric soils may have small areas of minor hydric components in the lower positions on the landform. Each map unit is rated based on its respective components and the percentage of each component within the map unit.

The thematic map is color coded based on the composition of hydric components. The five color classes are separated as 100 percent hydric components, 66 to 99 percent hydric components, 33 to 65 percent hydric components, 1 to 32 percent hydric components, and less than one percent hydric components.

In Web Soil Survey, the Summary by Map Unit table that is displayed below the map pane contains a column named 'Rating'. In this column the percentage of each map unit that is classified as hydric is displayed.

Hydric soils are defined by the National Technical Committee for Hydric Soils (NTCHS) as soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part (Federal Register, 1994). Under natural conditions, these soils are either saturated or inundated long enough during the growing season to support the growth and reproduction of hydrophytic vegetation.

The NTCHS definition identifies general soil properties that are associated with wetness. In order to determine whether a specific soil is a hydric soil or nonhydric soil, however, more specific information, such as information about the depth and duration of the water table, is needed. Thus, criteria that identify those estimated soil properties unique to hydric soils have been established (Federal Register, 2002). These criteria are used to identify map unit components that normally are associated with wetlands. The criteria used are selected estimated soil properties that are described in "Soil Taxonomy" (Soil Survey Staff, 1999) and "Keys to Soil Taxonomy" (Soil Survey Staff, 2006) and in the "Soil Survey Manual" (Soil Survey Division Staff, 1993).

If soils are wet enough for a long enough period of time to be considered hydric, they should exhibit certain properties that can be easily observed in the field. These visible properties are indicators of hydric soils. The indicators used to make onsite determinations of hydric soils are specified in "Field Indicators of Hydric Soils in the United States" (Hurt and Vasilas, 2006).

References:

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18.

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service. U.S. Department of Agriculture Handbook 436.

Soil Survey Staff. 2006. Keys to soil taxonomy. 10th edition. U.S. Department of Agriculture, Natural Resources Conservation Service.

Rating Options

Aggregation Method: Percent Present

Component Percent Cutoff: None Specified

Tie-break Rule: Lower

ATTACHMENT F

Plant List

Table: Plant List

Genus/Species	Common Name	Indicator Status Great Plains region*	Stratum
Agrostis gigantea	redtop grass	FACW	herb
Alopecurus arundinaceus	creeping foxtail	FACW	herb
Ambrosia artemesiifolia	ragweed	FACU	herb
Artemisia absinthium	wormwood sage	UPL	herb
Asclepias syriaca	common milkweed	UPL	herb
Beckmannia syzigachne	sloughgrass	OBL	herb
Bromus inermis	smooth brome	UPL	herb
Cirsium arvense	Canada thistle	FACU	herb
Cyclachaena xanthifolia	marsh elder	FAC	herb
Echinochloa crus-galli	barnyard grass	FACW	herb
Elymus repens	quack grass	FACU	herb
Eleocharis palustris	spikerush	OBL	herb
Fraxinus pennsylvanica	green ash	FAC	tree/shrub
Glycine max	soybeans	UPL	herb
Hordeum jubatum	foxtail barley grass	FACW	herb
Bassia scoparia	kochia	FAC	herb
Medicago lupulina	black medic	FACU	herb
Medicago sativa	alfalfa	UPL	herb
Melilotus alba	white sweetclover	FACU	herb
Melilotus officinalis	yellow sweetclover	FACU	herb
Phalaris arundinacea	reed canary grass	FACW	herb
Phlox pilosa	prairie phlox	FACU	herb
Poa pratensis	Kentucky bluegrass	FACU	herb
Rhamnus cathartica	European buckthorn	FACU	shrub
Rosa arkansana	prairie rose	FACU	shrub
Rumex crispus	curled dock	FACW	herb
Salix amygdaloides	peachleaf willow	FACW	tree/shrub
Salix discolor	pussy willow	FACW	shrub
Salix interior	sandbar willow	FACW	shrub
Salix petiolaris	meadow willow	OBL	shrub
Schoenoplectus tabernaemontani	softstem bulrush	OBL	herb
Solidago canadensis	Canada goldenrod	FACU	herb
Solidago gigantea	smooth goldenrod	FAC	herb
Sonchus arvense	sow thistle	FAC	herb
Spartina pectinata	cord grass	FACW	herb
Symphoricarpos albus	wolfberry	FACU	shrub
Symphyotrichum lanceolatum	eastern lined aster	FACW	herb
Tanacetum vulgare	tansey	FACU	herb
Thlaspi arvense	field pennycress	FACU	herb
Trifolium hybridum	alsike clover	FACU	herb
Trifolium pratense	red clover	FACU	herb
Typha X glauca	cattail	OBL	herb

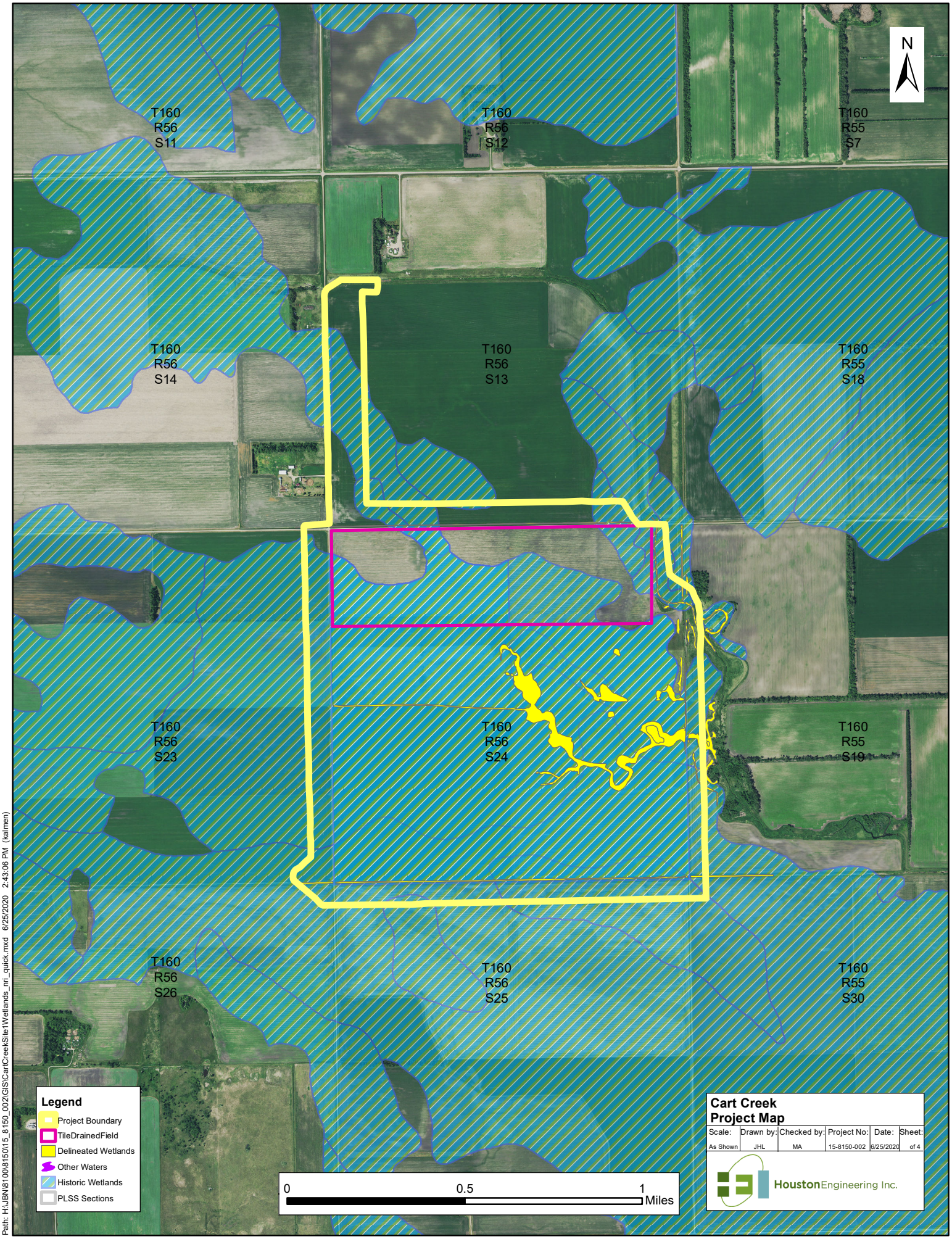
* Lichvar RW, Banks DL, Kirchner WN, Melvin NC (2016) The National Wetland Plant List: 2016 wetland ratings. Phytoneuron 2016-30: 1-17. 28 April 2016. ISSN 2153 733X

ATTACHMENT G

Wetland Determination Data Forms
(Available upon request)

ATTACHMENT H

Historic Wetlands Map


N
T160
R56
S11
T160
R56
S12
T160
R55
S7
T160
R56
S14
T160
R56
S13
T160
R55
S18
T160
R56
S23
T160
R56
S24
T160
R55
S19
T160
R56
S26
T160
R56
S25
T160
R55
S30
Legend
Project Boundary
TileDrainedField
Delineated Wetlands
Other Waters
Historic Wetlands
PLSS Sections
0
0.5
1
Miles
Cart Creek
Project Map
Scale: As Shown
Drawn by: JHL
Checked by: MA
Project No: 15-8150-002
Date: 6/25/2020
Sheet: of 4
HoustonEngineering Inc.
Path: H:\JBN\8100\8150\15_8150_002\GIS\CartCreek\Site1Wetlands_nri_quick.mxd 6/25/2020 2:43:06 PM (kalmen)