TETRA TECH

Norem Farm Wetlands
Wetland Delineation

Sweetgrass County, Montana

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September 29, 2010

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Norem Farm Wetlands
Wetland Delineation

Sweetgrass County, Montana

Prepared for:

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September 29, 2010

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1.0 INTRODUCTION

Norem Farm Wetlands is a wetland development site (hereafter referred to as Project) which is intended to provide wetland mitigation credits to offset Montana Department of Transportation (MDT) actions that have or may result in wetland impacts associated road or bridge reconstruction projects in the vicinity of Big Timber, Montana and the middle reaches of watershed #13 – Upper Yellowstone River Basin.

In 2002, the landowner, Mr. Mark Norem, developed the Project with the intent to sell credits to MDT. Maxim Technologies, Inc (now Tetra Tech) did the Project design and developed the monitoring plan, while Mr. Norem used a local contractor for the earthwork and construction on-site.

The Project was intended to develop approximately 14.71 acres of wetland credits within a 26.88 acre conservation easement on the property owned by Mr. Norem. The overall wetland development objectives were to enhance existing wetlands, create emergent wetlands and shallow open water ponds, as well as establish a buffer zone around the majority of the project site. More specifically, primary goals were to create contiguous, palustrine emergent and shrub/scrub wetlands within the project boundaries.

Approximately 6.98 acres of existing wetlands were delineated by Maxim Technologies, Inc. in 2001. The US Army Corps of Engineers (USACE) approved allocation of 2.32 credit acres (3:1 ratio) for the enhancement of these existing wetlands. Enhancement was achieved by several methods including the removal of high impact grazing, the addition and subsequent maturation of herbaceous and woody plants to increase species diversity and by increasing the depth and period of inundation of water on the Project. An additional 1.5 acres of credit was approved by the USACE in 2002 for the maintenance of an upland buffer zone around the perimeter of the wetlands (4:1 ratio).

The Project further intended to create 9.46 acres of wetlands and 1.58 acres of shallow open water ponds (1:1 ratio approved by the USACE). Construction activities included the placement of a low berm in the southeast portion of the site to impound irrigation return water and high flow from the Yellowstone River. In addition, four shallow open water ponds were constructed. The berm construction impacted approximately 0.15 acres of existing wetlands. An outflow culvert diverts excess water to the wetlands east of the berm (PBS&J, 2006).

Annual monitoring has been conducted by a MDT contractor and has included quantitative and qualitative sampling of herbaceous and woody vegetation, soils analysis, wildlife observations, observations of wetland hydrology, and general observations of as-built conditions. Through vegetation monitoring and mapping from aerial photography, MDT's contractor identified 8.23 acres of wetlands at the Project in 2005 which increased to 10.06 acres of mapped wetlands in 2008. The Project was designed and is required to account for 14.71 acres of wetlands.

As of the 2008 monitoring, the Project is approximately 4.7 acres short of its goal. Tetra Tech has been in communication with MDT personnel and contractors regarding the results of their annual monitoring and methods employed to obtain the aforementioned acreage. Tetra Tech believes the aerial photograph interpretation of wetland boundaries may be underestimating the total wetlands at the Project. As a result, Mr. Norem requested that Tetra Tech conduct a wetland delineation on his behalf, which was done September 10, 2009. The following report identifies methods and results of the field reconnaissance.

2.0 WETLAND REGULATORY POLICY

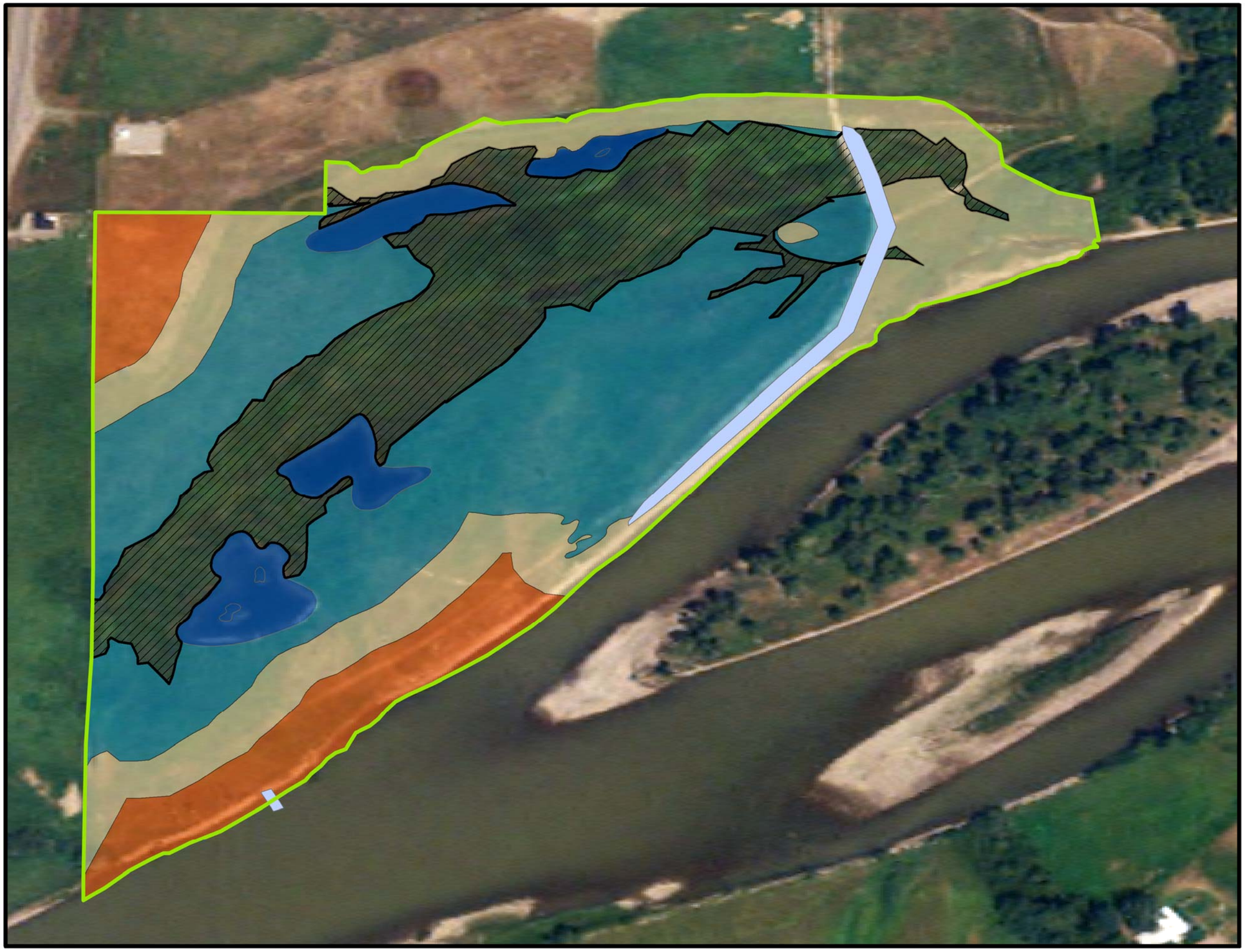
Jurisdictional wetlands are Waters of the U.S. (WUS) and are regulated by Section 404 of the Clean Water Act (CWA) or the Swampbuster Provision under the Food Security Act, and defined by Title 33 Code of Federal Regulations § 328.3(a)(1) and Title 40 Code of Regulations § 230.3 (s)(1). In general, the term WUS includes all of the traditional navigable waters of the United States, which include all waters that are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce. In addition, WUS include all wetlands adjacent to traditional navigable waters, non-navigable tributaries of traditional navigable waters that are relatively permanent where the tributaries typically flow year-round or have continuous flow at least seasonally (typically three months), and wetlands that directly abut such tributaries.

A Supreme Court ruling handed down in 2001 (known as the Solid Waste Agency of Northern Cook County [SWANCC] decision) removed isolated wetlands from the jurisdiction of the U.S. Environmental Protection Agency (EPA) and U.S. Army Corps of Engineers (USACE). Isolated wetlands are those that have no connection with any tributary system that flows into traditional navigable waters or interstate waters (e.g., intrastate lakes, streams, prairie potholes, etc.).

In June 2006, a Supreme Court decision in the consolidated cases Rapanos v. United States and Carabell v. United States (referred to as the Rapanos decision) re-addressed the jurisdiction over WUS under the CWA. The assertion of jurisdiction over traditional WUS by the EPA and USACE, as it relates to the Rapanos decision, will need to be considered over the following waters: non-navigable tributaries that are not relatively permanent, wetlands adjacent to non-navigable tributaries that are not relatively permanent, and wetlands adjacent to but that do not directly abut a relatively permanent non-navigable tributary. The agencies generally will not assert jurisdiction over swales or other erosional features and ditches excavated wholly in and draining only uplands that do not carry a relatively permanent flow of water.

3.0 STUDY AREA DESCRIPTION

The Project is located in Section 12, Township 1 North, Range 14 East in Sweetgrass County, approximately two miles northeast of Big Timber, Montana. The Project is bounded by the Yellowstone River on the southeast and Big Timber Creek on the east (**Figure 1**). The surrounding area is mostly pasture land, hay production, and rural residential development (PBSJ, 2008). The Project is flat to gently sloped towards the south/southeast.



Legend

Project Features

- Open Water (1.58 acres)*
- Wetland Acres Resulting from Berm (9.46 acres)*
- Original Wetlands (6.98 acres)*
- Stranded Area (2.84 acres)*
- Buffer Zone (6.02 acres)*
- Berm (0.5 acres)*
- Easement (26.88 acres)*

*Actual acreage. Not adjusted for wetland credit ratio.

Feet
0 100 200 400

TETRA TECH

Projected Wetland Extent
Norem Farm Wetland Mitigation
Sweetgrass County, MT
Figure 1

4.0 METHODS

Tetra Tech accomplished this delineation in accordance with methodology described in the 1987 Army Corps of Engineers Wetland Delineation Manual (USACE, 1987). Wetland delineations rely on evaluation of hydrology, soils and vegetation and the observation of wetland indicators in each of these three areas. Outwardly, much of the Project has characteristics indicative of wetlands (wetland hydrology, hydric soils, and hydrophytic vegetation) but an in depth and formal delineation is required in order to determine both the extent of the wetlands, and their regulatory status (jurisdictional or non-jurisdictional), which were the objectives of this study.

In addition to the wetland delineation, Tetra Tech mapped vegetation with data collected during the field work in concert with photo interpretation of a National Agriculture Imagery Program (NAIP) digital ortho-image (**Figure 2**).

Prior to the field investigation, Tetra Tech consulted several pertinent sources of information. Regional climate data, Sweetgrass County soil survey, aerial photography, U.S. Geological Survey topographical quadrangles, National Hydrology Dataset (NHD), National Wetland Inventory (NWI) data and mapping resources were reviewed.

The field investigation was conducted on September 10, 2009. The field investigation was performed to describe dominant plant species, hydrological characteristics and soil properties as they relate to the presence of wetlands. Wetland identification was based on the current Federal regulatory definition of wetlands as generally defined in, and regulated under 33 CFR 328, and 40 CFR 230. For an area to be classified as a wetland, the area must exhibit a dominance of positive wetland indicators for wetland hydrology, hydrophytic vegetation, and hydric soils. The occurrence of all three indicators provides ecological justification for determination of a site as a functional wetland, irrespective of its jurisdictional status, based upon characteristics defined by the USACE Wetland Delineation Manual (1987). The assessment of each individual environmental indicator is directed by the occurrence of defined criteria specific to each indicator. Procedures used in this study followed the Routine Approach, Level 2 Onsite Inspection methodologies described in the 1987 Corps of Engineers Wetlands Delineation Manual (Technical Report Y-87-1). Briefly, this method includes the following:

- Determination of site conditions;
- Identification of plant community types;
- Selection of observation points;
- Characterization of plant community types and determination of hydrophytic vegetation status;
- Determination of whether wetland hydrology and hydric soils are present; and,
- Delineation of the wetland boundary with resource grade GPS units.

5.0 EXISTING DATA

As indicated in Section 4.0, Tetra Tech conducted a preliminary investigation of several pertinent data sources including soil surveys, climate data, NHD datasets, and previous work at the Project. NHD data were used to locate open water features that would aid in determining jurisdictional status of any delineated wetland as it relates to the significant nexus requirement dictated by the U.S Supreme Court's Rapanos decision. NHD data was limited and included only two adjacent features: the Yellowstone River to the south, and Big Timber Creek to the east. National Wetland Inventory (NWI) data are incomplete and do not provide coverage for the Project area at this time.

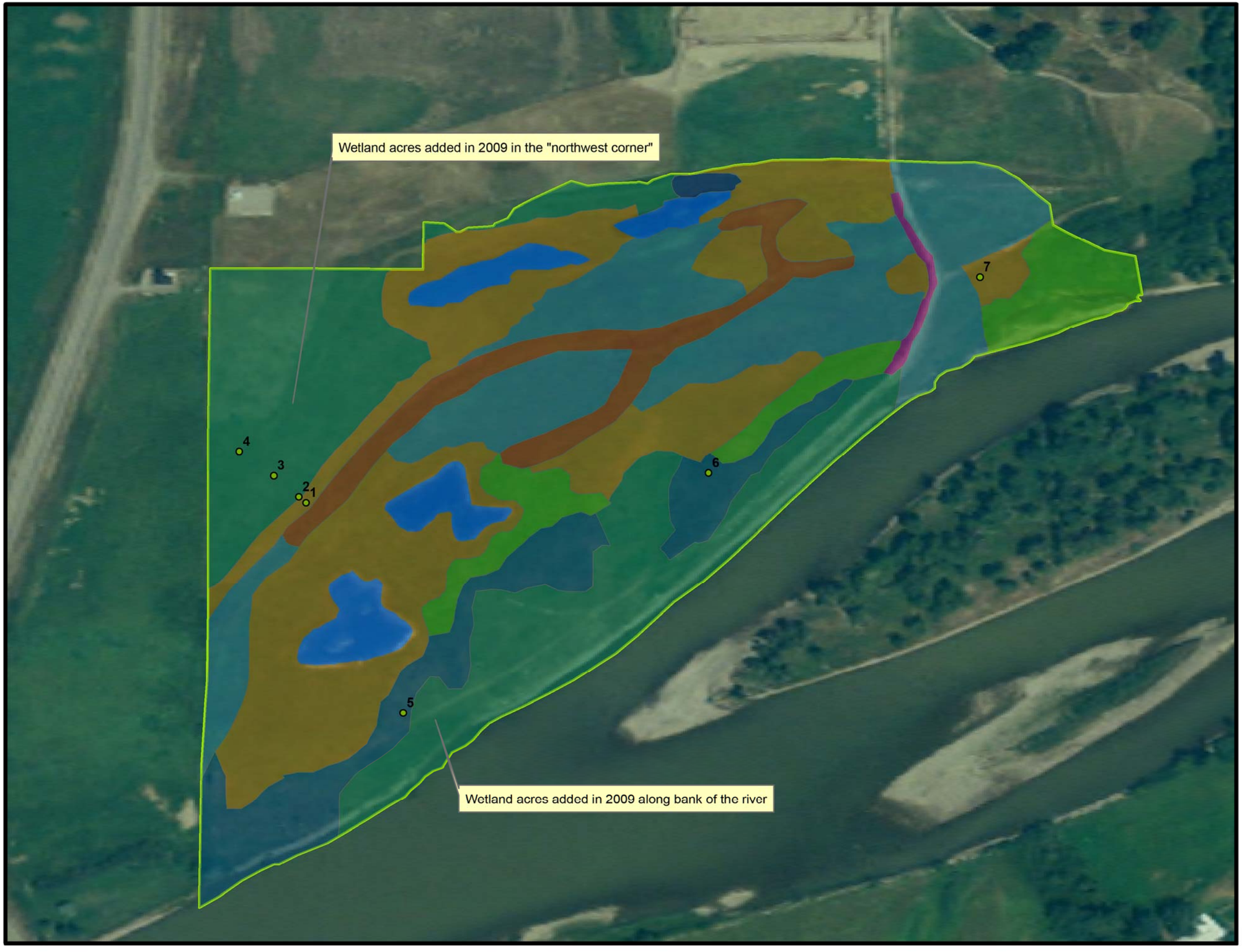
Tetra Tech did review the results of a previous wetland delineation completed on this property. The most recent monitoring indicated the extent of the wetland to be approximately 10.06 acres (PBS&J, 2008).

The Sweetgrass county soil survey indicates several soil types for the Property. The most abundant is the Lallie family. This is a poorly drained soil which is found on frequently flooded wet meadows at elevations of 3,700 to 6,000 feet. These soils occur in areas with 10 to 19 inches of annual precipitation and with a frost free period of 85 – 125 days. Of secondary abundance on the Property are Nesda-McIlwaine loams, which are found on floodplains with moderate flood frequency. This soil is found from 4,200 to 6,000 feet, and in areas that see 15 to 19 inches of precipitation annually. For these soils, the frost free period is typically 85 – 115 days. Each of these soils is of alluvial parent material. Both occur on relatively flat topography, and have linear down-slope and across-slope shapes.

Tetra Tech obtained climate data from the Western Regional Climate Center (WRCC) and the Natural Resources Conservation Service (NRCS). The WRCC Big Timber station data indicate an annual mean precipitation for the area of 15.33 inches and a mean September precipitation of 1.42 inches. In 2009, the total precipitation for the months of May through August was 7.38 inches. The mean for those months for the time period of 1894 through 2009 is 7.57 inches. Monthly precipitation and temperature numbers are found in **Table 1**.

Table 1. WRCC Climate Data 1894 through 2009

	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Mean
Mean Max Temp (F)	37	41.1	47.8	58.8	68.5	77.1	87	85.5	74.1	62.2	47.1	39.2	60.5
Mean Min. Temp (F)	16.5	19	23.3	31.8	39.8	47.4	52.9	51	42.4	34.7	25.8	19.4	33.7
Mean Precip (in.)	0.61	0.49	0.97	1.65	2.67	2.5	1.28	1.12	1.42	1.31	0.76	0.57	15.35



Legend

Vegetation Types

- *Agrostis stolonifera/ Equisetum hyemale*
- *Carex ssp./Juncus ssp.*
- *Mixed Carex spp.*
- Open water
- *Salix exigua*
- *Salix lutea/Agropyron repens*
- *Salix lutea/Mixed Wetland ssp.*
- *Spartina pectinata*
- *Typha latifolia*

N

0 120 240 480 Feet

TETRA TECH

Vegetation Communities
Norem Farm Wetland Mitigation
Sweetgrass County, MT
Figure 2

Two NRCS Water and Climate Center Wetland Evaluation Tables (WETS) stations are located near the Project including stations in Big Timber and Melville. A summary of precipitation data from surrounding WETS stations is provided in **Table 2**.

Table 2. NRCS WETS Table

Station	Latitude	Elevation (ft.)	Precipitation (In.)				
			Total Annual Average	Annual Average 30% Chance		Annual Average Total # of Days w/ 0.1 or More	Average Total Annual Snowfall
				Less Than	More Than		
Big Timber	4550	4100	16.29	13.85	17.80	38	30.7
Melville	4606	5370	17.60	15.30	19.47	44	44.7

In addition to the sources described above, USGS topographical maps and digital orthophotos were used to identify open water features and drainages in order to focus our efforts.

6.0 RESULTS

Seven sample plots were surveyed for wetland indicators (hydrophytic vegetation, hydric soils, and wetland hydrology) in order to delineate the full boundary of the wetland. Photographs were taken of each plot area, as well as each soil pit, and are presented in **Appendix A**. Wetland delineation data forms are presented in **Appendix B**.

Hydrology
This delineation was done during the dry season, so absence of surface water at the plot sites is not surprising, nor does it preclude classification of the plot as wetland. While neither surface water nor saturated soil in the top 12 inches of the soil profile were observed, each of the seven plots exhibited positive indicators of wetland hydrology. Oxidized root rhizospheres and the presence of reduced iron were the most common indicators. These indicate the presence of hydrophytic plants that diffuse oxygen from their roots into adjacent soil.

Vegetation
The herbaceous stratum was dominant at the Project with a variety of hydrophytic and non-hydrophytic species present. *Equisetum hyemale* (scouringrush horsetail), *Juncus arcticus ssp littoralis* (mountain rush), *Agrostis stolonifera* (creeping bentgrass) and *Bromus inermis* (smooth brome) were commonly observed species. Several non-native invasive species were observed as well, including *Cirsium vulgare* (bull thistle) and *Cirsium arvense* (Canada thistle). One shrub, *Salix lutea* (yellow willow) was commonly observed. A complete list of the dominant plants observed is included in **Table 3**. In all plots, the presence of hydrophytic vegetation was sufficient to satisfy the criteria for wetland classification. For the purposes of wetland delineation, a species is considered hydrophytic if it is given a Wetland Indicator Status of Facultative (FAC), Facultative Wetland (FACW) or Obligate (OBL). These indicators are based on the probability that the species will be found within a wetland versus a non-wetland, and are further defined by the National List of Vascular Plant Species that Occur in Wetlands (US Fish and Wildlife Service, 1988)

Tetra Tech mapped nine vegetation communities within the delineated wetland (**Table 4**). Each community is identified by the dominant vegetation. The *Carex* ssp/*Juncus* ssp community was the most abundant at nearly 7 acres. This community is not dominated by a single species of

the *Carex* or *Juncus* genus, but rather a combination of several. This community is fairly evenly distributed throughout the Project. The Mixed *Carex* community is dominated by a combination of several sedge species and is found adjacent to *Typha latifolia* (common cattail) stands in the center of the wetland. This community is the second most abundant and covers approximately 4.6 acres. The *Agrostis stolonifera/Equisetum hyemale* community covers approximately 3.8 acres. The occurrence of this community in the northwest corner of the wetland is noteworthy, as previous delineators identified *Festuca pratesnsis*, an upland species, as a dominant plant here. During Tetra Tech's delineation, it was clear that the faculative species *Agrostis stolonifera* was in fact a dominant, therefore satisfying the hydrophytic vegetation requirement for wetlands. Two communities dominated by *Salix* species are found along the southern edge of the wetland. *Salix lutea/Agropyron repens* and *Salix lutea/*Mixed Wetland ssp. each account for approximately 2 acres. Descriptions of each of the mapped vegetation communities can be found in **Appendix C**.

Table 3. Dominant Plant Species at Norem Farm Wetlands

Scientific Name	Common Name	Wetland Indicator Status
Agropyron dasystachyum	thickspike wheatgrass	FACU
Agrostis alba	redtop	FAC
Agrostis stolonifera	creeping bentgrass	FAC
Asclepias speciosa	showy milkweed	FAC
Bromus inermis	smooth brome	FACU
Carex nebrascensis	Nebraska sedge	OBL
Carex praticola	meadow sedge	FACW
Cirsium vulgare	bull thistle	FACU
Cirsium arvense	Canada thistle	FACU
Echinochloa crus-galli	barnyardgrass	FACW
Equisetum ssp.	horsetail	FAC
Equisetum hyemale	scouringrush horsetail	FACW
Festuca pratensis	meadow fescue	FACU
Juncus arcticus ssp. *littoralis*	mountain rush	FACW
Pascopyrum smithii	western wheatgrass	FACU
Phalaris arundinacea	reed canarygrass	FACW
Poa palustris	fowl bluegrass	FAC
Potentilla anserina	silverweed cinquefoil	OBL
Salix lutea	yellow willow	OBL
Aster ssp	NA	NA

Table 4. Mapped Vegetation Communities

Vegetation Community	Acres
Carex ssp./*Juncus* ssp.	7.09
Mixed *Carex* spp.	5.30
Agrostis stolonifera/Equisetum hyemale	6.96
Salix lutea/Agropyron repens	2.44
Salix lutea/Mixed Wetland ssp.	1.83
Typha latifolia	1.53
Open water	1.58
Spartina pectinata	0.09
Salix exigua	0.06
Total	26.88

Soils
In addition to observations of vegetation and surface hydrology, each of the seven soil pits observed exhibited indicators of wetland soils. Soil textures ranged from clay to silty clay loam and each had an organic horizon that varied in depth from three to four inches. Redoximorphic features within the soil matrix were commonly observed and the most common indicator was the presence of redox dark surfaces (F6). This is an indication of reducing conditions resulting from soil saturation and is identified by redox concentrations in the soil matrix. Six of the seven plots exhibited this wetland soil indicator.

7.0 DISCUSSION

Figure 3 depicts current conditions on the project based on the most recent delineation. **Table 5** outlines the planned and delineated acreages along with the credit ratios used to make the determination that 17.91 credit acres have been delineated on the project.

Table 5. Wetland Credit Acres

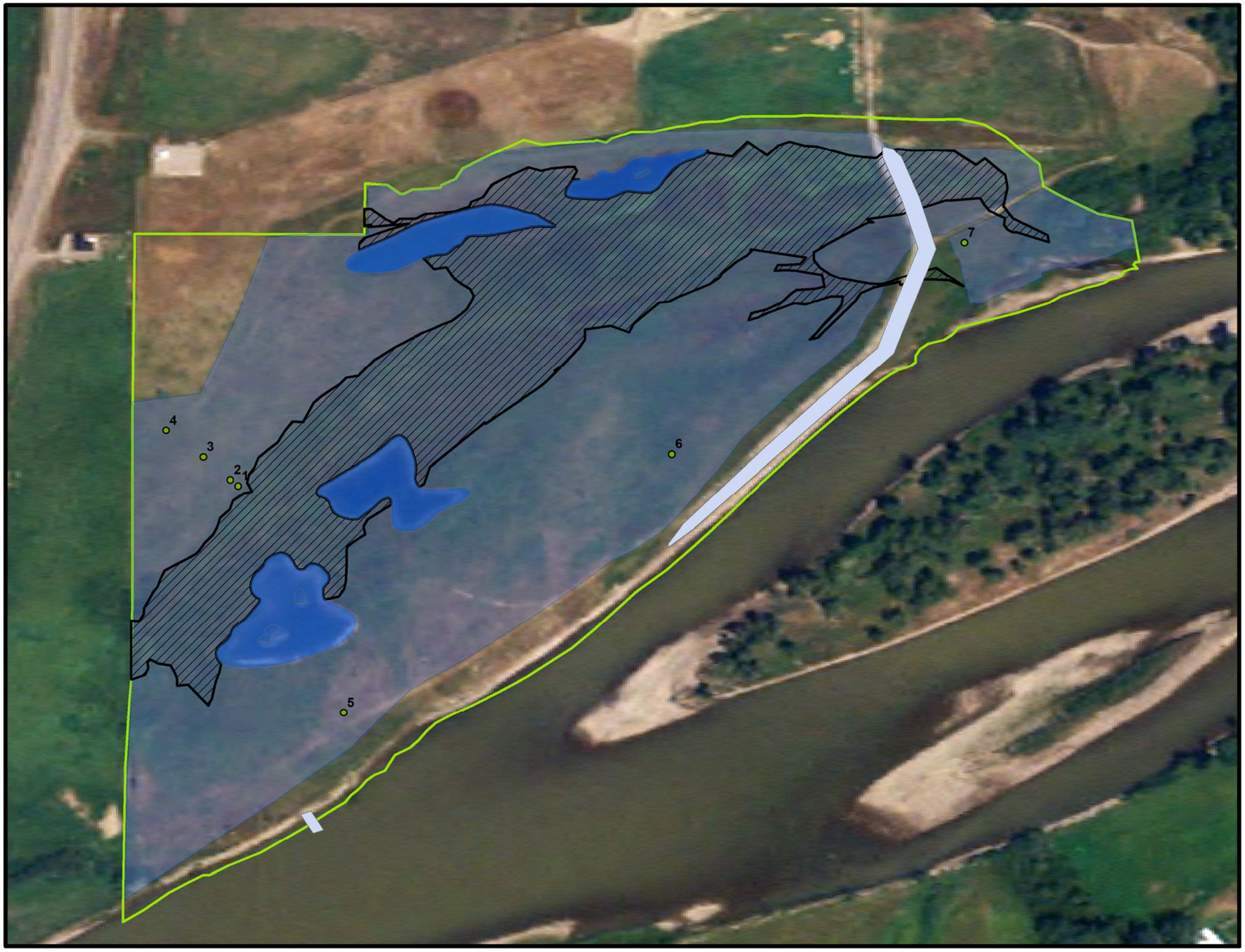
	Planned			2010 Delineation		
	Acres	**Ratio**	**Credit acres**	**Acres**	**Ratio**	**Credit acres**
Original Wetland	6.98	3:1	2.33	6.98	3:1	2.33
Delineated Wetland	9.46	1:1	9.46	13.49	1:1	13.49
Buffer Zone	6.02	4:1	1.51	2.07	4:1	.52
Open Water	1.58	1:1	1.58	1.58	1:1	1.58
Stranded Acres	2.84		0	2.75		0
Total Acres	26.88		14.87	26.87		17.91

The increase of wetland acres is due to inclusion of two main areas which were not determined to be wetlands in previous monitoring by MDT's contractor from 2005 to 2008 (**Figure 2**). These areas are situated in the northwest corner and the southern stretch of the Project along the Yellowstone River (**Figure 3**). Soil properties in the northwest corner were difficult to analyze. Although surface water or soil saturation was not observed, soil conditions suggest that saturation regularly occurs. Signs of saturation within a depth of 12 inches were difficult to identify but are sufficient to classify these soils as having hydric indicators. Tetra Tech has also characterized the vegetation differently in this area than previous reports. The vegetation here is dominated by species such as creeping bentgrass, mountain rush and horsetail. These plants are all assigned a wetland indicator status of FAC, or FACW. Although surface water was not observed in this area, hydrology indicators were present, such as oxidized root rhizospheres and presence of reduced iron. With these factors considered, the inclusion of the area on the northwest corner of the Project is appropriate.

With regards to the northwest corner, the area appears to be on the fringe of jurisdictional wetland status. Furthermore the area is seldom flooded. The diverted irrigation water that is used to supplement the hydrology of the mitigation area is controlled by a berm and outflow structure that is capable of sustaining surface and groundwater elevations for extended periods. Soil pits in the northwest corner exhibit a consistent depleted matrix at the same soil depth. This is interpreted to be the annual elevation of soil inundation. This elevation occurred consistently between 10-12 inches. This satisfies requirements for both wetland hydrology and hydric soils. The issue is that without the seasonal flooding and surface inundation, establishment of wetland vegetation is slow. The vegetation is in a slow transition made evident by the mix of upland pasture grasses and hydrophytic species. The hydrophytic species that were observed are rhizomatous in growth habit and likely creeping into area with their already

established root systems. Over time, as wet springs aid in further hydrophytic species establishment, and more time is allowed for rhizomatous species to colonize the area, it will satisfy the hydrophytic vegetation requirement. Nonetheless, the area has been determined to be functioning as a wetland.

Along the southern portion of the Project on the shores of the Yellowstone River, similar conditions were observed. OBL, FAC or FACW dominant species included yellow willow, horsetail, and mountain rush. Hydric soils were indicated by redox dark surfaces, and evidence of wetland hydrology is indicated by oxidized root rhizospheres and the presence of reduced iron. These findings extend the border of the previously delineated wetland much closer to the bank of the Yellowstone River.



Legend

Project Features

- Survey Plots
- Open Water (1.58 acres)*
- Original Wetlands (6.98 acres)*
- 2009 Delineation (13.49 acres)*
- Berm (0.50 acres)*
- Easement (26.88 acres)*

*Actual acreage. Not adjusted for wetland credit ratio.

Feet

0 105 210 420

TETRA TECH

Delineated Wetland Extent and Plot Locations
Norem Farm Wetland Mitigation
Sweetgrass County, MT
Figure 3

8.0 SUMMARY

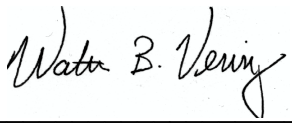
This wetland delineation represents a continuing effort to monitor the wetland development activities at the Property.

Tetra Tech determines there to be 17.91 credit acres of wetland on the Project. This is a substantial increase from previously reported numbers. The wetland delineation combined with the information gathered through the aerial image interpretation allows Tetra Tech to accurately map wetland boundary. All areas within the boundary of the delineated wetland feature dominant hydrophytic vegetation (obligate, facultative wetland, or facultative), indicators of wetland hydrology, and hydric soils. It is the opinion of Tetra Tech biologists that this newest delineation accurately defines the wetland boundary.

Prepared by:

Josh Rodriguez
Staff Biologist

Reviewed by:



Walt Vering
Project Manager

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APPENDIX A
WETLAND PLOT DATA FORMS

DATA FORM
ROUTINE WETLAND DETERMINATION
(Adapted From The 1987 COE Wetlands Delineation Manual)

Project/Site: Norem			Date:	09/10/09
Applicant/Owner: Mark Norem			County:	Sweetwater
Investigator (s): Colson			State:	Montana
Do Normal Circumstances Exist on the site?	☒ Yes	☐ No	Community ID:	
Is the site significantly disturbed (Atypical Situation)?	☐ Yes	☒ No	Transect ID:	
Is the area a potential Problem Area?	☐ Yes	☒ No	Plot ID:	1

Remarks:

VEGETATION

Dominant Plant Species	Cover (%)	Stratum	Indicator	Dominant Plant Species	Cover (%)	Stratum	Indicator
1. Juncus articus ssp. littoralis		grass	FACW	9.			
2. Agrostis stolonifera		grass	FAC	10.			
3. Bromus inermis		grass	FACU	11.			
4. Cirsium arvense		forb	FACU	12.			
5. Equisetum hyemale		forb	FACW	13.			
6.				14.			
7.				15.			
8.				16.			

Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC-). 60

Remarks:

HYDROLOGY

☐ Recorded Data (Describe in Remarks)
- ☐ Stream, Lake, or Tide Gauge
- ☐ Aerial Photographs
- ☐ Other

☒ No Recorded Data Available

Field Observations:

Depth of Surface Water na (in.)

Depth to Free Water in Pit na (in.)

Depth to Saturated Soil na (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ☐ Inundated
- ☐ Saturated in Upper 12 Inches
- ☐ Water Marks
- ☐ Drift Lines
- ☐ Sediment Deposits
- ☒ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ☒ Oxidized Roots Channels in Upper 12”
- ☐ Water-Stained Leaves
- ☐ Local Soil Survey Data
- ☐ FAC-Neutral Test
- ☐ Other (Explain in Remarks)

Remarks:

SOILS

Map Unit Name
(Series and Phase): _____ Drainage Class: _____

Taxonomy (Subgroup): _____ Field Observations
Confirmed Mapped Type? ☐ Yes ☐ No

Profile Description:

Depth (Inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast/Size	Texture, Concretions, Structure, etc.
0-3	om				
3-6		10YR 2/2			loam
6-11		10YR 2/2	10YR 3/3	30% concentrations in matrix	clay loam
11+		5Y 4/1	10YR 3/2	50% concentrations and depletions in matrix	clay

Hydric Soil Indicators:

- ☐ Histosol
- ☐ Histic Epipedon
- ☐ Sulfidic Odor
- ☐ Aquic Moisture Regime
- ☒ Reducing Conditions
- ☒ Gleyed or Low-Chroma Colors
- ☐ Concretions
- ☐ High Organic Content in Surface Layer Sandy Soils
- ☐ Organic Streaking in Sandy Soils
- ☐ Listed on Local Hydric Soils List
- ☐ Listed on National Hydic Soils List
- ☐ Other (Explain in Remarks)

Remarks:

WETLAND DETERMINATION

Hydrophytic Vegetation Present? ☒ YES NO ☐

Wetland Hydrology Present? ☒ YES NO ☐

Hydric Soils Present? ☒ YES NO ☐

Is this Sampling Point Within a Wetland? ☒ YES ☐ NO

Remarks:

Plot 1 Area

Plot 1 Pit

Plot 1 Soil Profile

DATA FORM
ROUTINE WETLAND DETERMINATION
(Adapted From The 1987 COE Wetlands Delineation Manual)

Project/Site:	Norem			Date:	09/10/09
Applicant/Owner:	Mark Norem			County:	Sweetwater
Investigator (s):	Colson			State:	Montana
Do Normal Circumstances Exist on the site?	☒ Yes	☐ No		Community ID:	
Is the site significantly disturbed (Atypical Situation)?	☐ Yes	☒ No		Transect ID:	
Is the area a potential Problem Area?	☐ Yes	☒ No		Plot ID:	2

Remarks:

VEGETATION

Dominant Plant Species	Cover (%)	Stratum	Indicator	Dominant Plant Species	Cover (%)	Stratum	Indicator
1. Juncus articus ssp. littoralis		grass	FACW	9. Asclepias speciosa		forb	FAC
2. Agrostis stolonifera		grass	FAC	10.			
3. Equisetum hyemale		forb	FACW	11.			
4. Poa palustris		grass	FAC	12.			
5. Bromus inermis		grass	FACU	13.			
6. Cersium vulgare		forb	FACU	14.			
7. Asteraceae sp.		forb	UNK	15.			
8. Agrostis gigantea		grass	FAC	16.			

Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC-). 66.7

Remarks:

HYDROLOGY

☐ Recorded Data (Describe in Remarks)
- ☐ Stream, Lake, or Tide Gauge
- ☐ Aerial Photographs
- ☐ Other

☒ No Recorded Data Available

Field Observations:

Depth of Surface Water na (in.)

Depth to Free Water in Pit na (in.)

Depth to Saturated Soil na (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ☐ Inundated
- ☐ Saturated in Upper 12 Inches
- ☐ Water Marks
- ☐ Drift Lines
- ☒ Sediment Deposits
- ☒ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ☒ Oxidized Roots Channels in Upper 12”
- ☐ Water-Stained Leaves
- ☐ Local Soil Survey Data
- ☐ FAC-Neutral Test
- ☐ Other (Explain in Remarks)

Remarks:

SOILS

Map Unit Name
(Series and Phase): _____ Drainage Class: _____

Taxonomy (Subgroup): _____ Field Observations
Confirmed Mapped Type? ☐ Yes ☐ No

Profile Description:

Depth (Inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast/Size	Texture, Concretions, Structure, etc.
0-3	om				
3-9		10YR 3/2	7.5YR 4/3	25% concentrations in matrix with minor mottling	clay loam
9+		10YR 3/2	10YR 3/3	75% concentration sin matrix with strong mottling	silty clay

Hydric Soil Indicators:

- ☐ Histosol
- ☐ Histic Epipedon
- ☐ Sulfidic Odor
- ☐ Aquic Moisture Regime
- ☒ Reducing Conditions
- ☒ Gleyed or Low-Chroma Colors
- ☐ Concretions
- ☐ High Organic Content in Surface Layer Sandy Soils
- ☐ Organic Streaking in Sandy Soils
- ☐ Listed on Local Hydric Soils List
- ☐ Listed on National Hydic Soils List
- ☐ Other (Explain in Remarks)

Remarks:

WETLAND DETERMINATION

Hydrophytic Vegetation Present? ☒ YES NO ☐

Wetland Hydrology Present? ☒ YES NO ☐

Hydric Soils Present? ☒ YES NO ☐

Is this Sampling Point Within a Wetland? ☒ YES ☐ NO

Remarks:

Plot 2 Area

Plot 2 Pit

Plot 2 Soil Profile

DATA FORM
ROUTINE WETLAND DETERMINATION
(Adapted From The 1987 COE Wetlands Delineation Manual)

Project/Site: Norem			Date:	09/10/09
Applicant/Owner: Mark Norem			County:	Sweetwater
Investigator (s): Colson			State:	Montana
Do Normal Circumstances Exist on the site?	☒ Yes	☐ No	Community ID:	
Is the site significantly disturbed (Atypical Situation)?	☐ Yes	☒ No	Transect ID:	
Is the area a potential Problem Area?	☐ Yes	☒ No	Plot ID:	3

Remarks:

VEGETATION

Dominant Plant Species	Cover (%)	Stratum	Indicator	Dominant Plant Species	Cover (%)	Stratum	Indicator
1. Equisetum hyemale		forb	FACW	9.			
2. Agrostis stolonifera		grass	FAC	10.			
3. Juncus arcticus ssp. littoralis		grass	FACW	11.			
4. Bromus inermis		grass	FACU	12.			
5. Cirsium vulgare		forb	FACU	13.			
6.				14.			
7.				15.			
8.				16.			

Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC-). 60

Remarks:

HYDROLOGY

☐ Recorded Data (Describe in Remarks)
- ☐ Stream, Lake, or Tide Gauge
- ☐ Aerial Photographs
- ☐ Other

☒ No Recorded Data Available

Field Observations:

Depth of Surface Water na (in.)

Depth to Free Water in Pit na (in.)

Depth to Saturated Soil na (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ☐ Inundated
- ☐ Saturated in Upper 12 Inches
- ☐ Water Marks
- ☐ Drift Lines
- ☒ Sediment Deposits
- ☒ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ☒ Oxidized Roots Channels in Upper 12”
- ☐ Water-Stained Leaves
- ☐ Local Soil Survey Data
- ☐ FAC-Neutral Test
- ☐ Other (Explain in Remarks)

Remarks:

SOILS

Map Unit Name
(Series and Phase): _____ Drainage Class: _____

Taxonomy (Subgroup): _____ Field Observations
Confirmed Mapped Type? ☐ Yes ☐ No

Profile Description:

Depth (Inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast/Size	Texture, Concretions, Structure, etc.
0-3	om				
3-8		10YR 3/2			clay
8+		2.5Y 4/1	10YR 2/1	15% concentration in matrix	clay
			10YR 5/1	30% depletions in matrix	
			10YR 3/2	5% concentrations in matrix	

Hydric Soil Indicators:

- ☐ Histosol
- ☐ Histic Epipedon
- ☐ Sulfidic Odor
- ☐ Aquic Moisture Regime
- ☒ Reducing Conditions
- ☒ Gleyed or Low-Chroma Colors
- ☐ Concretions
- ☐ High Organic Content in Surface Layer Sandy Soils
- ☐ Organic Streaking in Sandy Soils
- ☐ Listed on Local Hydric Soils List
- ☐ Listed on National Hydic Soils List
- ☐ Other (Explain in Remarks)

Remarks:

WETLAND DETERMINATION

Hydrophytic Vegetation Present? ☒ YES NO ☐

Wetland Hydrology Present? ☒ YES NO ☐

Hydric Soils Present? ☒ YES NO ☐

Is this Sampling Point Within a Wetland? ☒ YES ☐ NO

Remarks:

Plot 3 Area

Plot 3 Pit

Plot 3 Soil Profile

DATA FORM
ROUTINE WETLAND DETERMINATION
(Adapted From The 1987 COE Wetlands Delineation Manual)

Project/Site:	Norem			Date:	09/10/09
Applicant/Owner:	Mark Norem			County:	Sweetwater
Investigator (s):	Colson			State:	Montana
Do Normal Circumstances Exist on the site?	☒ Yes	☐ No		Community ID:	
Is the site significantly disturbed (Atypical Situation)?	☐ Yes	☒ No		Transect ID:	
Is the area a potential Problem Area?	☐ Yes	☒ No		Plot ID:	4

Remarks:

VEGETATION

Dominant Plant Species	Cover (%)	Stratum	Indicator	Dominant Plant Species	Cover (%)	Stratum	Indicator
1. Equisetum hyemale		forb	FACW	9.			
2. Festuca pratensis		grass	FACU	10.			
3. Poa palustris		grass	FAC	11.			
4. Carex praegracilis		grass	FACW	12.			
5. Juncus arcticus ssp. littoralis		grass	FACW	13.			
6. Cirsium arvense		forb	FACU	14.			
7. Pascopyrum smithii		grass	FACU	15.			
8.				16.			

Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC-). 57.1

Remarks:

HYDROLOGY

☐ Recorded Data (Describe in Remarks)
- ☐ Stream, Lake, or Tide Gauge
- ☐ Aerial Photographs
- ☐ Other

☒ No Recorded Data Available

Field Observations:

Depth of Surface Water na (in.)

Depth to Free Water in Pit na (in.)

Depth to Saturated Soil na (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ☐ Inundated
- ☐ Saturated in Upper 12 Inches
- ☐ Water Marks
- ☐ Drift Lines
- ☒ Sediment Deposits
- ☒ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ☒ Oxidized Roots Channels in Upper 12”
- ☐ Water-Stained Leaves
- ☐ Local Soil Survey Data
- ☐ FAC-Neutral Test
- ☐ Other (Explain in Remarks)

Remarks:

SOILS

Map Unit Name
(Series and Phase): _____ Drainage Class: _____

Taxonomy (Subgroup): _____ Field Observations
Confirmed Mapped Type? ☐ Yes ☐ No

Profile Description:

Depth (Inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast/Size	Texture, Concretions, Structure, etc.
0-3	om				
3-10		10YR 2/2			clay loam
10+		7.5Y 2.5/1	2.5Y 6/1	15% depletions in matrix	clay
			2.5YR 4/6	15% concentrations in matrix	

Hydric Soil Indicators:

- ☐ Histosol
- ☐ Histic Epipedon
- ☐ Sulfidic Odor
- ☐ Aquic Moisture Regime
- ☒ Reducing Conditions
- ☒ Gleyed or Low-Chroma Colors
- ☐ Concretions
- ☐ High Organic Content in Surface Layer Sandy Soils
- ☐ Organic Streaking in Sandy Soils
- ☐ Listed on Local Hydric Soils List
- ☐ Listed on National Hydic Soils List
- ☐ Other (Explain in Remarks)

Remarks:

WETLAND DETERMINATION

Hydrophytic Vegetation Present? ☒ YES NO ☐

Wetland Hydrology Present? ☒ YES NO ☐

Hydric Soils Present? ☒ YES NO ☐

Is this Sampling Point Within a Wetland? ☒ YES ☐ NO

Remarks:

Plot 4 Area

Plot 4 Pit

Plot 4 Soil Profile

DATA FORM
ROUTINE WETLAND DETERMINATION
(Adapted From The 1987 COE Wetlands Delineation Manual)

Project/Site: Norem			Date:	09/10/09
Applicant/Owner: Mark Norem			County:	Sweetwater
Investigator (s): Colson			State:	Montana
Do Normal Circumstances Exist on the site?	☒ Yes	☐ No	Community ID:	
Is the site significantly disturbed (Atypical Situation)?	☐ Yes	☒ No	Transect ID:	
Is the area a potential Problem Area?	☐ Yes	☒ No	Plot ID:	5

Remarks:

VEGETATION

Dominant Plant Species	Cover (%)	Stratum	Indicator	Dominant Plant Species	Cover (%)	Stratum	Indicator
1. Carex praegracilis		grass	FACW	9.			
2. Bromus inermis		grass	FACU	10.			
3. Elymus lanceolatus ssp. lanceolatus		grass	FACU	11.			
4. Equisetum hyemale		forb	FACW	12.			
5. Poa palustris		grass	FAC	13.			
6. Juncus arcticus ssp. littoralis		grass	FACW	14.			
7. Echinichloa crus-galli		grass	FACW	15.			
8.				16.			

Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC-). 71.1

Remarks:

HYDROLOGY

☐ Recorded Data (Describe in Remarks)
- ☐ Stream, Lake, or Tide Gauge
- ☐ Aerial Photographs
- ☐ Other

☒ No Recorded Data Available

Field Observations:

Depth of Surface Water na (in.)

Depth to Free Water in Pit na (in.)

Depth to Saturated Soil na (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ☐ Inundated
- ☐ Saturated in Upper 12 Inches
- ☐ Water Marks
- ☐ Drift Lines
- ☒ Sediment Deposits
- ☒ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ☒ Oxidized Roots Channels in Upper 12”
- ☐ Water-Stained Leaves
- ☐ Local Soil Survey Data
- ☐ FAC-Neutral Test
- ☐ Other (Explain in Remarks)

Remarks:

SOILS

Map Unit Name
(Series and Phase): _____ Drainage Class: _____

Taxonomy (Subgroup): _____ Field Observations
Confirmed Mapped Type? ☐ Yes ☐ No

Profile Description:

Depth (Inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast/Size	Texture, Concretions, Structure, etc.
0-4	om				
4-8		10YR 3/1	10YR 2/1	1% concentrations in matrix	clay loam
8+		10YR 3/1	10YR 2/1	15% concentrations in matrix	clay

Hydric Soil Indicators:

- ☐ Histosol
- ☐ Histic Epipedon
- ☐ Sulfidic Odor
- ☐ Aquic Moisture Regime
- ☒ Reducing Conditions
- ☒ Gleyed or Low-Chroma Colors
- ☐ Concretions
- ☐ High Organic Content in Surface Layer Sandy Soils
- ☐ Organic Streaking in Sandy Soils
- ☐ Listed on Local Hydric Soils List
- ☐ Listed on National Hydic Soils List
- ☐ Other (Explain in Remarks)

Remarks:

WETLAND DETERMINATION

Hydrophytic Vegetation Present? ☒ YES NO ☐

Wetland Hydrology Present? ☒ YES NO ☐

Hydric Soils Present? ☒ YES NO ☐

Is this Sampling Point Within a Wetland? ☒ YES ☐ NO

Remarks:

Plot 5 Area

Plot 5 Pit

Plot 5 Soil Profile

DATA FORM
ROUTINE WETLAND DETERMINATION
(Adapted From The 1987 COE Wetlands Delineation Manual)

Project/Site:	Norem			Date:	09/10/09
Applicant/Owner:	Mark Norem			County:	Sweetwater
Investigator (s):	Colson			State:	Montana
Do Normal Circumstances Exist on the site?	☒ Yes	☐ No		Community ID:	
Is the site significantly disturbed (Atypical Situation)?	☐ Yes	☒ No		Transect ID:	
Is the area a potential Problem Area?	☐ Yes	☒ No		Plot ID:	6

Remarks:

VEGETATION

Dominant Plant Species	Cover (%)	Stratum	Indicator	Dominant Plant Species	Cover (%)	Stratum	Indicator
1. Elymus lanceolatus ssp. lanceolatus		grass	FACU	9.			
2. Juncus arcticus ssp. littoralis		grass	FACW	10.			
3. salix lutea		shrub/ tree	FACW	11.			
4. Potentilla anserina		forb	OBL	12.			
5. Phalaris arundinacea		grass	FACW	13.			
6.				14.			
7.				15.			
8.				16.			

Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC-). 80

Remarks:

HYDROLOGY

☐ Recorded Data (Describe in Remarks)
- ☐ Stream, Lake, or Tide Gauge
- ☐ Aerial Photographs
- ☐ Other

☒ No Recorded Data Available

Field Observations:

Depth of Surface Water na (in.)

Depth to Free Water in Pit na (in.)

Depth to Saturated Soil na (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ☐ Inundated
- ☐ Saturated in Upper 12 Inches
- ☐ Water Marks
- ☐ Drift Lines
- ☒ Sediment Deposits
- ☒ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ☒ Oxidized Roots Channels in Upper 12”
- ☐ Water-Stained Leaves
- ☐ Local Soil Survey Data
- ☐ FAC-Neutral Test
- ☐ Other (Explain in Remarks)

Remarks:

SOILS

Map Unit Name
(Series and Phase): _____ Drainage Class: _____

Taxonomy (Subgroup): _____ Field Observations
Confirmed Mapped Type? ☐ Yes ☐ No

Profile Description:

Depth (Inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast/Size	Texture, Concretions, Structure, etc.
0-3	om				
3-9		10YR 3/2		1% minor mottling	clay loam
9+		10YR 2/2	7.5YR 3/2	25% concentrations in matrix	silty clay
			5YR 5/1	5% depletions in matrix	

Hydric Soil Indicators:

- ☐ Histosol
- ☐ Histic Epipedon
- ☐ Sulfidic Odor
- ☐ Aquic Moisture Regime
- ☒ Reducing Conditions
- ☒ Gleyed or Low-Chroma Colors
- ☐ Concretions
- ☐ High Organic Content in Surface Layer Sandy Soils
- ☐ Organic Streaking in Sandy Soils
- ☐ Listed on Local Hydric Soils List
- ☐ Listed on National Hydic Soils List
- ☐ Other (Explain in Remarks)

Remarks:

WETLAND DETERMINATION

Hydrophytic Vegetation Present? ☒ YES NO ☐

Wetland Hydrology Present? ☒ YES NO ☐

Hydric Soils Present? ☒ YES NO ☐

Is this Sampling Point Within a Wetland? ☒ YES ☐ NO

Remarks:

Plot 6 Area

Plot 6 Pit

Plot 6 Soil Profile

DATA FORM
ROUTINE WETLAND DETERMINATION
(Adapted From The 1987 COE Wetlands Delineation Manual)

Project/Site: Norem			Date: 09/10/09	
Applicant/Owner: Mark Norem			County: Sweetwater	
Investigator (s): Colson			State: Montana	
Do Normal Circumstances Exist on the site?	☒ Yes	☐ No	Community ID:	
Is the site significantly disturbed (Atypical Situation)?	☐ Yes	☒ No	Transect ID:	
Is the area a potential Problem Area?	☐ Yes	☒ No	Plot ID: 7	

Remarks:

VEGETATION

Dominant Plant Species	Cover (%)	Stratum	Indicator	Dominant Plant Species	Cover (%)	Stratum	Indicator
1. Elymus lanceolatus ssp. lanceolatus		grass	FACU	9.			
2. Agrostis stolonifera		grass	FAC	10.			
3. Juncus arcticus ssp. littoralis		grass	FACW	11.			
4. Equisetum hyemale		grass	FACW	12.			
5. Carex nebrascensis		grass	OBL	13.			
6. Poa palustris		grass	FAC	14.			
7.				15.			
8.				16.			

Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC-). 83.3

Remarks:

HYDROLOGY

☐ Recorded Data (Describe in Remarks)
- ☐ Stream, Lake, or Tide Gauge
- ☐ Aerial Photographs
- ☐ Other

☒ No Recorded Data Available

Field Observations:

Depth of Surface Water na (in.)

Depth to Free Water in Pit na (in.)

Depth to Saturated Soil na (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ☐ Inundated
- ☐ Saturated in Upper 12 Inches
- ☐ Water Marks
- ☐ Drift Lines
- ☒ Sediment Deposits
- ☒ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ☒ Oxidized Roots Channels in Upper 12”
- ☐ Water-Stained Leaves
- ☐ Local Soil Survey Data
- ☐ FAC-Neutral Test
- ☐ Other (Explain in Remarks)

Remarks:

SOILS

Map Unit Name
(Series and Phase): _____ Drainage Class: _____

Taxonomy (Subgroup): _____ Field Observations
Confirmed Mapped Type? ☐ Yes ☐ No

Profile Description:

Depth (Inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast/Size	Texture, Concretions, Structure, etc.
0-3	om				
3-7		10YR 3/3		minor mottling	clay loam
7+		7.5YR 4/1	5YR 4/4	10% concentrations in matrix	clay

Hydric Soil Indicators:

- ☐ Histosol
- ☐ Histic Epipedon
- ☐ Sulfidic Odor
- ☐ Aquic Moisture Regime
- ☒ Reducing Conditions
- ☒ Gleyed or Low-Chroma Colors
- ☐ Concretions
- ☐ High Organic Content in Surface Layer Sandy Soils
- ☐ Organic Streaking in Sandy Soils
- ☐ Listed on Local Hydric Soils List
- ☐ Listed on National Hydic Soils List
- ☐ Other (Explain in Remarks)

Remarks:

WETLAND DETERMINATION

Hydrophytic Vegetation Present? ☒ YES NO ☐

Wetland Hydrology Present? ☒ YES NO ☐

Hydric Soils Present? ☒ YES NO ☐

Is this Sampling Point Within a Wetland? ☒ YES ☐ NO

Remarks:

Plot 7 Area

Plot 7 Pit

Plot 7 Soil Profile

APPENDIX C
VEGETATION COMMUNITY DESCRIPTIONS

Agrostis stolonifera / Equisetum hyemale
Creeping bentgrass / Horsetail
This mesic grassland community is dominated by creeping bentgrass and horsetail. The creeping bentgrass and horsetail are likely slowly establishing and proliferating through the community as groundwater elevation has been increased as a result of hydrological manipulation of the mitigation site. Other hydrophytic forbs such as *Potentilla anserina* (silverweed cinquefoil) are also common throughout the community.

***Carex* ssp. / *Juncus* ssp.**
Sedges / Rushes
This wetland grass community is dominated by sedges and rushes. Basal cover is nearly 100% and variations in groundwater elevation and soil saturation drive micro-site distribution and composition of the respective species in the community. Predominantly, the community is dominated by *Carex nebrascensis* (Nebraska sedge), *Carex praegracilis* (clustered field sedge), and *Juncus arcticus* ssp. *littoralis* (Baltic rush).

Mixed *Carex* ssp.
Mixed Sedges
This wetland grass community is similar to the *Carex* ssp. / *Juncus* ssp. community but is solely dominated by sedge species. This community is defined by shallower groundwater and increased duration of soil saturation.

Salix exigua
Coyote Willow
This shrub community is dominated by one species of willow shrub. On the site, coyote willow has formed dense thickets where the subcanopy is vegetation is sparse. Isolated individuals in adjacent communities suggest that the communities are spreading. This is consistent with coyote willow's rhizomatous growth habit.

Salix lutea / Agropyron repens
Yellow willow / Quackgrass
This community is defined by mature yellow willows with understories of quackgrass. The community is likely a residual product of the historical pastureland, but is reflective of shallow groundwater and mesic to wet conditions.

***Salix lutea* / Mixed wetland ssp.**
Yellow willow / Mixed wetland species
This community is similar to the yellow willow / quackgrass community, however quackgrass is replaced in the understory by an assortment of hydrophytic forbs and grasses. The transition of the understory is reflective of the increased soil moisture; likely a function of the alterations to hydrology on the mitigation site.

Spartina pectinata
Prairie cordgrass
This community is limited on the site in both size and distribution. Only one community occurs in the northern edge of the mitigations site. The community is a relative monoculture of the defining species. The species is hydrophytic in nature and typically characterizes wetland habitat.

Typha latifolia
Cattail
This emergent community is defined solely by cattails. The community is situated on the margins of deepwater habitat where surface water typically persists through the growing season. On the mitigation site, this community is exclusively associated with the open water habitats.