MONTANA DEPARTMENT OF TRANSPORTATION
WETLAND MITIGATION MONITORING REPORT: YEAR 2006

Little Muddy Creek
Cascade County, Montana

Prepared for:

MONTANA DEPARTMENT OF TRANSPORTATION
2701 Prospect Ave
Helena, MT 59620-1001

Prepared by:

POST, BUCKLEY, SCHUH, AND JERNIGAN
P.O. Box 239
Helena, MT 59624

December 2006

Project No: B43054.00 - 0302

PBS&J

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1.0 INTRODUCTION

The Little Muddy Creek wetland mitigation project was constructed in 2004 by Ducks Unlimited and the property owners. The purpose of the project is to create wetland habitat for migratory birds and to serve as a wetland mitigation reserve for the Montana Department of Transportation (MDT). It was originally anticipated by MDT that approximately 13.57 acres of compensatory wetland mitigation credit may be needed to offset impacts associated with ten different projects within the Missouri-Sun-Smith River watershed (#7) (MDT 2002). An additional 50 acres of reserve credit was also being sought by MDT (MDT 2002). Thus, MDT originally sought 63.57 acres of compensatory wetland mitigation credit.

The Little Muddy Creek Wetland Mitigation project is located on private land, approximately one mile west of Interstate 15 between the towns of Cascade and Ulm, Montana (**Figure 1**). The project site straddles Sections 30, 31, and 32 of Township 19 North and Range 1 East in Cascade County.

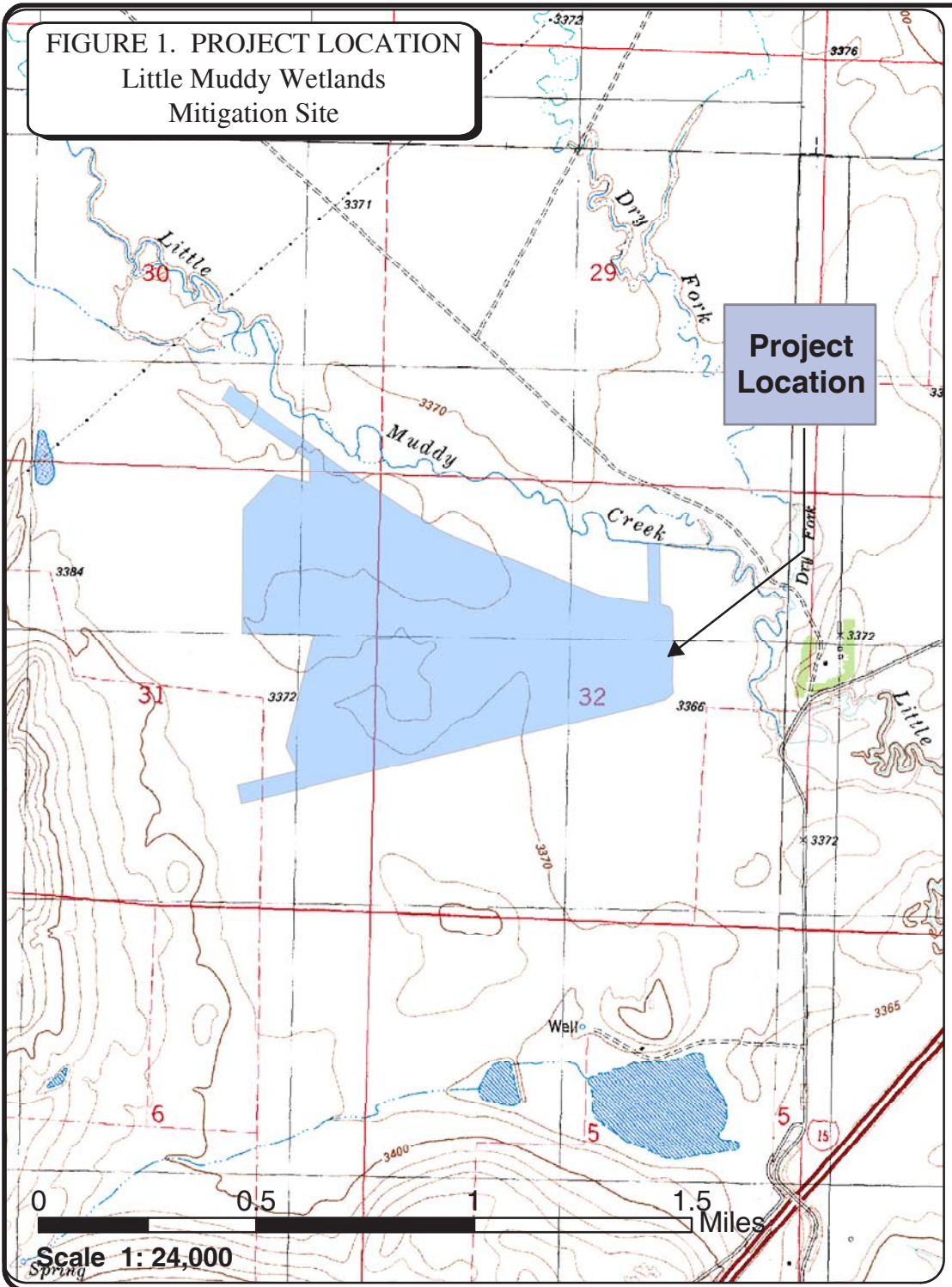
Little Muddy Creek is an intermittent stream that flows directly into the Missouri River (COE 2002). In 2004, an 88 foot-wide diversion dam was built across the entire Little Muddy Creek channel (COE 2002). The central 30 feet of the dam is elevated three feet above the existing channel bottom and the ends of the dam rise up to meet the adjacent stream banks. Water is impounded in the channel of Little Muddy Creek for a distance upstream of 2,700 feet. An inlet channel of approximately 400 feet was excavated from the point of diversion to an inlet water control structure with a headgate, at which point water flows through another excavated channel to the off-channel impoundment. The off-channel impoundment is surrounded by an 11,500-foot long berm. A project plan sheet is provided in **Appendix D**.

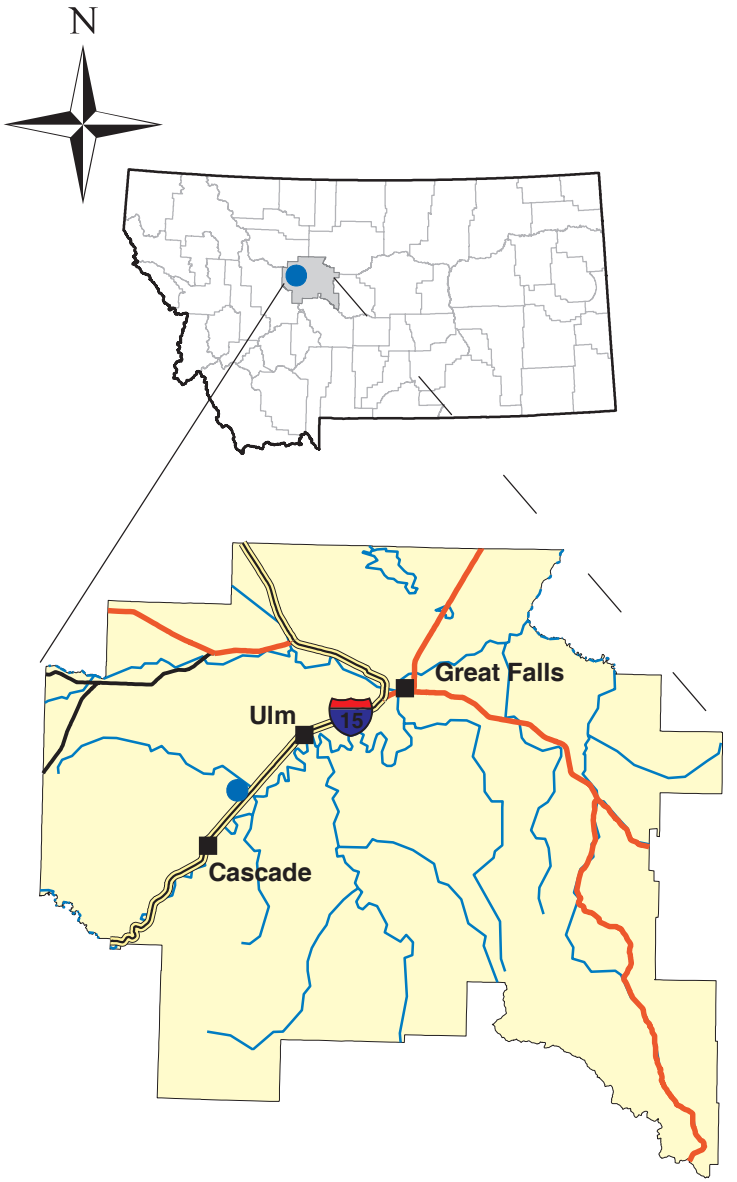
At the full pool elevation, the off-channel impoundment is anticipated to have a surface area of about 216 acres, a depth of five feet, and a maximum water storage volume of 387 acre-feet. To create this wetland, a maximum of 35 cubic feet per second (cfs) of water can be diverted during spring flows (COE 2002). When Little Muddy Creek is flowing, a minimum of 1 cfs must remain in the channel below the point of diversion. Upon filling the site, all streamflow continues downstream. No diversion of water is allowed after June 1st of each year. Further, no diversion is allowed when the combined flow of the Missouri River near Ulm and the Sun River near Vaughn totals less than 7,880 cfs.

Prior to project implementation, no wetland habitat existed within the main project site. However, three emergent wetlands did occur in association with Little Muddy Creek near the proposed project structures and a narrow wetland fringe occurred along most of Little Muddy Creek (LWC 2002). Target wetland communities to be produced at the site included open water/aquatic bed and shallow marsh/wet meadow.

This report documents the third year of monitoring at the site. In Year 1 (2004), combined flows in the Missouri River at Ulm and the Sun River at Vaughn did not exceed 7,880 cfs by June 1, and therefore, no water was turned into the site. In Year 2 (2005), enough precipitation occurred

FIGURE 1. PROJECT LOCATION
Little Muddy Wetlands
Mitigation Site





PROJECT #: 330054.302
DATE: Feb 2005
LOCATION:
PROJECT MANAGER: A. Pipp
DRAWN BY: L. Lundquist

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in May that the most of the mitigation site was inundated. In this third year, the site was topped off from streamflow and precipitation and it continued to hold water through the growing season.

2.0 METHODS

2.1 Monitoring Dates and Activities

The site was visited on May 3rd (spring bird survey) and August 23rd (mid-season survey) of 2006. All information contained on the Wetland Mitigation Site Monitoring Form was collected during these two site visits (**Appendix B**). Monitoring activity locations are illustrated on **Figure 2** in **Appendix A**. Activities conducted and information collected included: wetland delineation; vegetation community mapping; vegetation transect; soils data; hydrology data; bird and general wildlife use; photograph points; and (non-engineering) examination of the dike structure.

2.2 Hydrology

Hydrologic indicators were evaluated during the mid-season visit on August 23. Wetland hydrology indicators were recorded using procedures outlined in the COE 1987 Wetland Delineation Manual (Environmental Laboratory 1987). Hydrology data were recorded on COE Routine Wetland Delineation Data Forms and on the Wetland Mitigation Site Monitoring Form (**Appendix B**).

There are no groundwater monitoring wells at the site. Soil pits dug for wetland delineation were also used to evaluate the presence of groundwater if occurring within 12 inches from the ground surface; data was recorded on the COE Routine Wetland Delineation Data Form (**Appendix B**).

2.3 Vegetation

General dominant species-based vegetation community types were delineated in the field during the spring and mid-summer field visits. Standardized community mapping was not employed as many of these systems are geared towards climax vegetation. Estimated percent cover of the dominant species in each community type was recorded on the Wetland Mitigation Site Monitoring Form (**Appendix B**).

Annual changes in vegetation, especially the establishment and increase of hydrophytic plants, were evaluated through the use of belt transects. Two vegetation belt transects approximately 300 feet long by 10 feet wide and 600 feet long by 10-foot wide were established in early June of 2004 (**Figure 2** in **Appendix A)**. The transect locations were recorded with a GPS unit in 2004. In 2005 and 2006, these transects were inundated and the transect starts were re-established in the same location. Percent cover was estimated for each successive vegetative species encountered within the "belt" using the following values: + (<1%); 1 (1-5%); 2 (6-10%); 3 (11-20%); 4 (21-50%); and 5 (>50%). Photographs were taken at the start of each transect during the mid-season visit (**Appendix C**).

No woody species were planted at the site. Consequently, no monitoring relative to the survival of such species was conducted.

2.4 Soils

Soil information was obtained from the Soil Survey for Cascade County. Soils were evaluated during the mid-season visit according to procedures outlined in the COE 1987 Wetland Delineation Manual. In the field, surface soils were evaluated for signs of wetland formation during the mid-season visit. If wetland indicators for hydrology or plants were found then a soil pit was dug to look for evidence of hydric soil formation. Soil data were then recorded on the COE Routine Wetland Delineation Form (**Appendix B**).

2.5 Wetland Delineation

Wetland delineation was conducted during the mid-season visit according the 1987 COE Wetland Delineation Manual. The monitoring area was investigated for the presence of wetland hydrology, hydrophytic vegetation, and hydric soils. The indicator status of vegetation was derived from the National List of Plant Species that Occur in Wetlands: Northwest Region 9 (Reed 1988). The information was recorded on a COE Routine Wetland Delineation Data Form (**Appendix B**).

2.6 Mammals, Reptiles, and Amphibians

Mammal, reptile, and amphibian species observations and other positive indicators of use, such as vocalizations, were recorded on the wetland monitoring form during the site visits. Indirect use indicators, including tracks, scat, burrow, eggshells, skins, and bones, were also recorded. These signs were recorded as the observer traversed the site while conducting other required activities. Direct sampling methods, such as snap traps, live traps, and pitfall traps, were not used. A comprehensive wildlife species list for the entire site was compiled (**Appendix B**).

2.7 Birds

Bird observations were recorded during the site visits. No formal census plots, spot mapping, point counts, or strip transects were conducted. Bird observations were recorded incidental to other monitoring activity observations, using the bird survey protocol as a general guideline (**Appendix E**). Observations were categorized by species, activity code, and general habitat association (**Bird Survey Field Data Sheet** in **Appendix B**). A comprehensive bird list was compiled using these observations.

2.8 Macroinvertebrates

Per MDT instructions, aquatic macroinvertebrates were not sampled in 2004 through 2006.

2.9 Functional Assessment

A functional assessment was completed using the 1999 MDT Montana Wetland Assessment Method (Berglund 1999). Field data necessary for this assessment were primarily collected during the mid-season site visit. The remainder of the functional assessment was completed in the office. For each wetland or group of wetlands a Functional Assessment Form was completed (**Appendix B**).

2.10 Photographs

Photographs were taken in 2006 to show the current land use surrounding the site, the upland buffer, the monitored area, and the vegetation transects (**Appendix C**). Six photograph points were established and their location recorded with a resource grade GPS unit in 2004 (**Figure 2** in **Appendix A**). Photographs have been taken at these six photo points each year since in 2004. A description and compass direction for each photograph was recorded onto the Wetland Mitigation Site Monitoring Form.

2.11 GPS Data

During the 2004 monitoring season, survey points were collected with a resource grade GPS unit at vegetation transect beginning and ending locations (**Appendix E**). GPS point and survey data from Ducks Unlimited was used to rectify MDT aerial photographs taken during the 2006 flight. Mapping of site features in 2006 included both GPS data collection and hand-drawing onto the 2005 aerial photograph.

2.12 Maintenance Needs

The diversion, excavated channels, and 11,500-foot long berm were built in winter of 2003. In addition, the berm was seeded with an upland plant mix. These were examined during the 2006 site visits for obvious signs of breaching, damage, or other problems. This did not constitute an engineering-level structural inspection, but rather a cursory examination.

3.0 RESULTS

3.1 Hydrology

Little Muddy Creek is an intermittent stream that flows directly into the Missouri River (COE 2002). Spring flows in Little Muddy Creek in combination with direct precipitation were high enough to fill the site. During the May visit water had filled the canal and the site. Through the dry summer, the site lost some water allowing for islands and a large peninsula to be exposed. Based on the July 7th aerial photo, approximately 182 acres were inundated. Depth of inundation ranged from a few inches to about three feet in the main project impoundment. Depth of the deepest portion of the inlet channel was approximately six to eight feet.

From January to August of 2006, the Great Falls Airport weather station (#243751) reported 14.21 inches (in) of annual precipitation (Western Regional Climate Center (WRCC) 2006). This was a wetter time period than exhibited from January to August of 2005 (11.30 in) and 2004 (10.34 in). From July 1948 to August 2006, the long-term annual total precipitation received at the Great Falls airport averaged 11.6 in (WRCC 2006). It is assumed that precipitation levels measured at the Great Falls Airport can be an indicator of precipitation received at the mitigation site.

3.2 Vegetation

Historical aerial photographs showed that the native vegetation of mixed grass- and shrub-land was converted into cropland sometime between 1937 and 1950 (LWC 2002). Since conversion, the project site has been used for dryland farming (domestic barley and wheat) and possibly for occasional grazing (LWC 2002). Prior to 2003, grazing was terminated and the land was planted with native grass and crop species and placed into the Conservation Reserve Program (LWC 2002).

Plant species observed since the baseline year of 2004 have been compiled in a list (**Table 1**). In 2004, the mitigation site remained dry. The area to be flooded consisted of upland grasses and herbaceous plants and the berm was colonized by newly germinated plants. By July 2005 most of this upland vegetation was inundated and drowned out, but no wetland vegetation had established. By August 2006, wetland vegetation had germinated over most of the saturated soils and aquatic plants had colonized inundated areas. In 2006 one vegetation type remained and seven new vegetation types emerged as mappable units: Type 6 - *Kochia / Agropyron;* Type 7 – *Rumex maritmus*; Type 8 – *Polygonum / Potamogeton*; Type 9 – *Polygonum aviculare*; Type 10 – *Typha latifolia*; Type 11 – *Hordeum jubatum*; Type 12 – *Alisma gramineum*; and Type 13 – *Upland* (**Monitoring Forms** in **Appendix B**).

Vegetation community types were based on topography, hydrology, and plant composition. The Type 7 – *Rumex maritmus* wetland community occurred as a discontinuous fringe along the shoreline and inlet channel. The Type 8 – *Polygonum / Potamogeton* wetland community occupied land shallowly inundated with water and colonized by *P. aviculare*, two species of *Potamogeton*, and *Alisma gramineum*. The Type 9 – *Polygonum aviculare* wetland occupied land where the water had receded and large patches of *P. aviculare* dominated with occasional *T. latifolia*. The Type 10 – *Typha latifolia* wetland also occupied land where the water had receded, but was colonized by denser *T. latifolia* and *Sisymbrium*. A portion of Type 10 – *Typha latifolia* was mapped separately as Type 10a. Type 10a is distinguished from Type 10 in that *T. latifolia* had a scattered presence and was intermixed with basal rosettes of emergent plants and potentially dying *Agropyron* species. The Type 11 – *Hordeum jubatum* wetland occupied a small area where soils were saturated and dominated only by *H. jubatum*. The Type 12 – *Alisma gramineum* wetland occupied the outlet. Types 6 and 13 were upland habitats that colonized the berm and the land along the western project boundary. The remainder of the site was mapped as *Transitional Open Water*. This Transitional Open Water contained areas of at least six feet deep and shallower areas where wetland vegetation was at best occasionally observed. It is anticipated that this area will incrementally colonize with wetland vegetation.

Table 1: ***2004 - 2006 vegetation species list for the Little Muddy Creek Wetland Mitigation Site.***

Scientific Name	Region 9 (Northwest) Wetland Indicator
Agropyron cristatum	---
Alisma gramineum	**OBL**
Agropyron smithii	FACU
Arctium minus	---
Artemisia frigida	---
Aster pansus	FAC+
Atriplex rosea (*A. argentea*)	FACU- (FAC-)
Avena spp.	---
Bromus inermis	---
Bromus secalinus or B. japonicus	
Cardaria pubescens	---
***Chenopodium* (*capitatum*?)**	---
Chenopodium glaucum	**FAC**
Chenopodium leptophyllum	**FACU**
Chenopodium (*rubrum*?)	FACW+
Cirsium arvense	FACU+
Elymus hispidus (syn. *Agropyron intermedium*)	---
Elymus varnensis	---
Festuca spp.	---
Grindelia squarrosa	FACU
Helianthus annuus	FACU+
Hordeum jubatum	FAC+
Iva axillaris	FAC
Kochia scoparia	FAC
Lactuca serriola	FAC-
Medicago sativa	---
Melilotus alba	---
Melilotus officinale	FACU
Polygonum aviculare	**FACW-**
Polygonum douglasii	FACU
Polygonum spp.	---
Populus tremuloides	**FAC+**
***Potamogeton* (*amplifolius*?)**	**OBL**
Potamogeton pectinatus	OBL
Rosa spp.	---
Rumex crispus	FACW
Rumex maritimus	**FACW+**
Salix exigua	**OBL**
Salix lutea	**OBL**
Salsola iberica (syn. *S. kali*)	FACU
Scirpus acutus	**OBL**
Sisymbrium altissimum	FACU-
Tragopogon dubois	---
Typha latifolia	**OBL**

Bolded species were observed for the first time in 2006.

The changes in plant composition and hydrology from 2004 to 2006 were quantified on vegetation Transects 1 (T-1) and 2 (T-2) (**Tables 2** and **3**). Along T-1, upland habitat found in 2004 was inundated in 2005 and by 2006 had transitioned into mostly wetland with some areas

of upland and open water (**Chart 1**). As in 2005, T-1 was mostly under water, but for the first time aquatic plants were present (**Chart 2**). Prostrate knotweed (*Polygonum aviculare*), a facultative wet plant, had colonized approximately 92 % of the T-1 (**Photo 10** in **Appendix C**; **Chart 2**). Mixed in with the prostate knotweed were aquatic plants including pondweed (*Potamogeton*) and narrow-leaf water-plantain (*Alisma gramineum*) (**Monitoring Forms** in **Appendix B**). At T-1 the shoreline had not developed wetland habitat and was classified as bare ground (**Charts 1** and **2**).

Table 2: ***2004 - 2006 data summary for Transect 1.***

Monitoring Year	2004	2005[1]	2006
Transect Length (feet)	585	585	585
# Vegetation Community Transitions along Transect	2	0	3
# Vegetation Communities along Transect	3	0	2
# Hydrophytic Vegetation Communities along Transect	0	0	1
Total Vegetative Species	11	1	7
Total Hydrophytic Species	2	1	4
Total Upland Species	9	0	3
Estimated % Total Vegetative Cover	90	8	60
% Transect Length Comprised of Hydrophytic Vegetation Communities	0	0	92
% Transect Length Comprised of Upland Vegetation Communities	100	0	1
% Transect Length Comprised of Unvegetated Open Water	0	100	5
% Transect Length Comprised of Bare Substrate	0	0	2

[1] Transect 1 consisted of only open water with scattered *Hordeum jubatum* plants that did not constitute a vegetation community and may have been in the process of dying due to flooding.

Chart 1: ***Length of vegetation communities within Transect 1 during 2004 - 2006.***

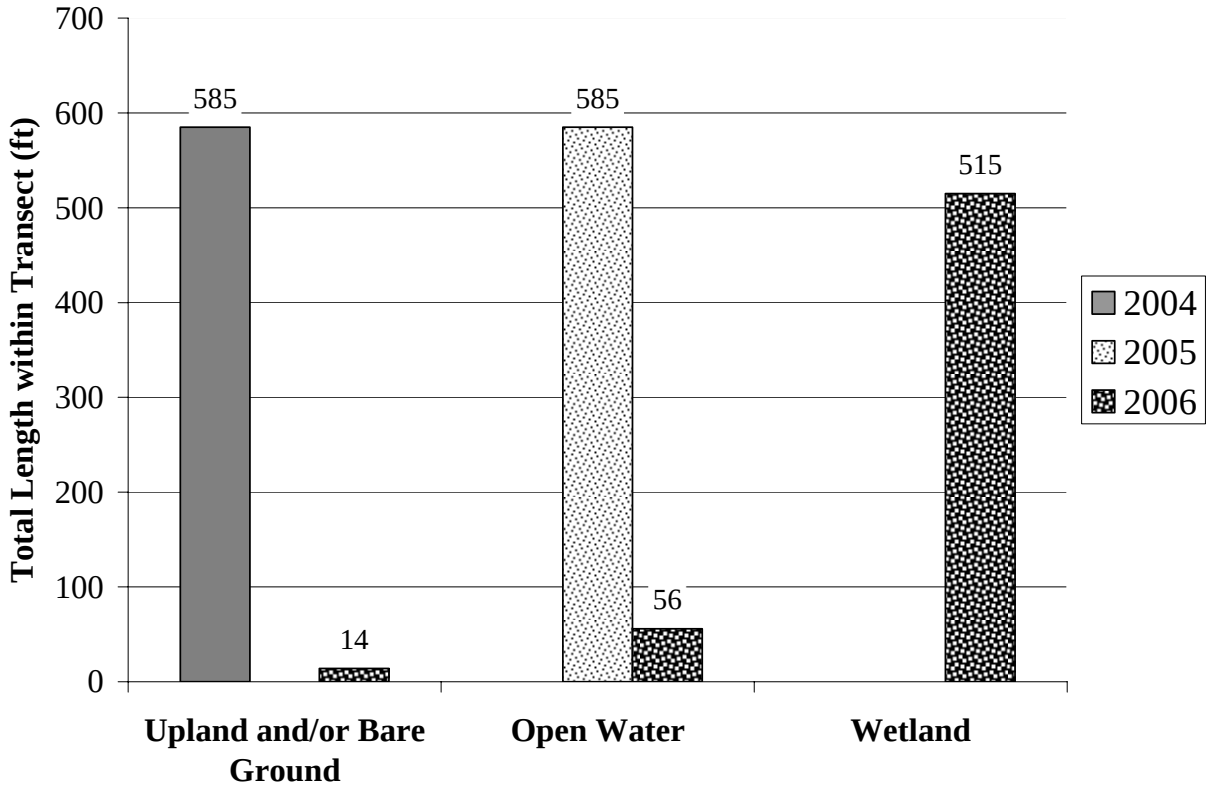
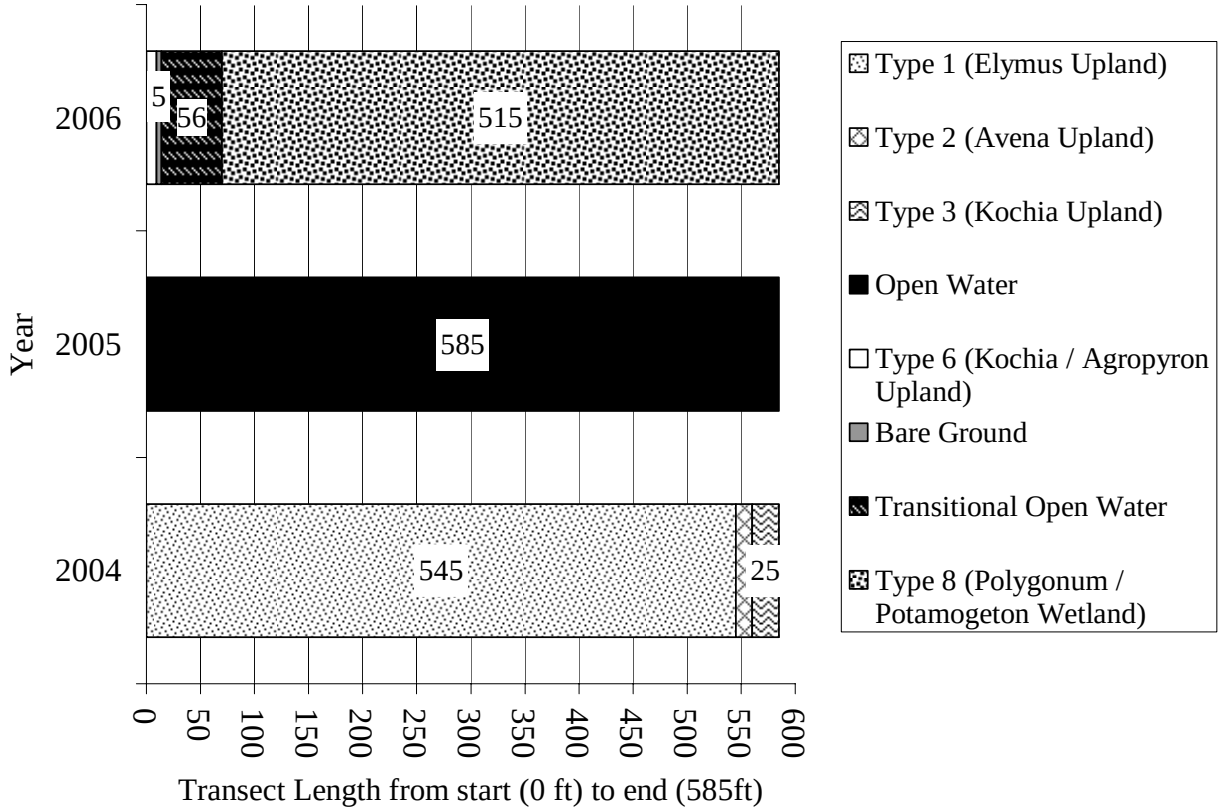


Chart 2: ***Transect maps showing vegetation types of Transect 1 from start (0 feet) to end (585 feet) from 2004 to 2006.***



Similar trends of wetland development were found at T-2. The 2004 upland habitat was inundated in 2005 and then transitioned by 2006 to some wetland (**Chart 3**). Unlike the barren shoreline at T-1, the shoreline at T-2 had developed wetland characteristics and was dominated by golden dock (*Rumex maritimus*), a facultative wetland plant. The inundated portion of T-2 was classified as transitional open water because only very minor signs of potential wetland plant growth were observed (**Chart 4**).

Table 3: ***2004 - 2006 data summary for Transect 2.***

Monitoring Year	2004	2005	2006
Transect Length (feet)	310	310	310
# Vegetation Community Transitions along Transect	1	2	3
# Vegetation Communities along Transect	2	3	3
# Hydrophytic Vegetation Communities along Transect	0	0	2
Total Vegetative Species	5	4	7
Total Hydrophytic Species	2	2	4
Total Upland Species	3	2	3
Estimated % Total Vegetative Cover	60	30	14
% Transect Length Comprised of Hydrophytic Vegetation Communities	0	0	2.0
% Transect Length Comprised of Upland Vegetation Communities	100	2	2.5
% Transect Length Comprised of Unvegetated Open Water	0	96	95.5
% Transect Length Comprised of Bare Substrate	0	1	0.0

[1] It is difficult to determine if there is open water without any aquatic vegetation. It may be that 97% of the transect is both.

Chart 3: ***Length of vegetation communities within Transect 2 during 2004 - 2006.***

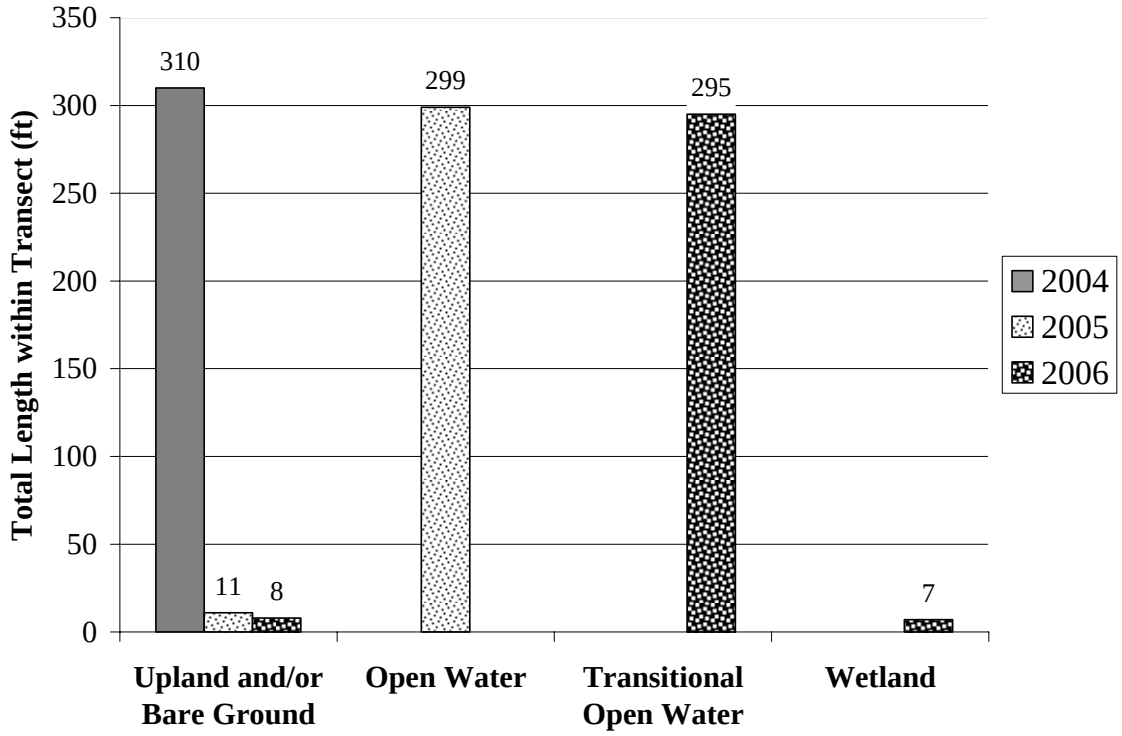
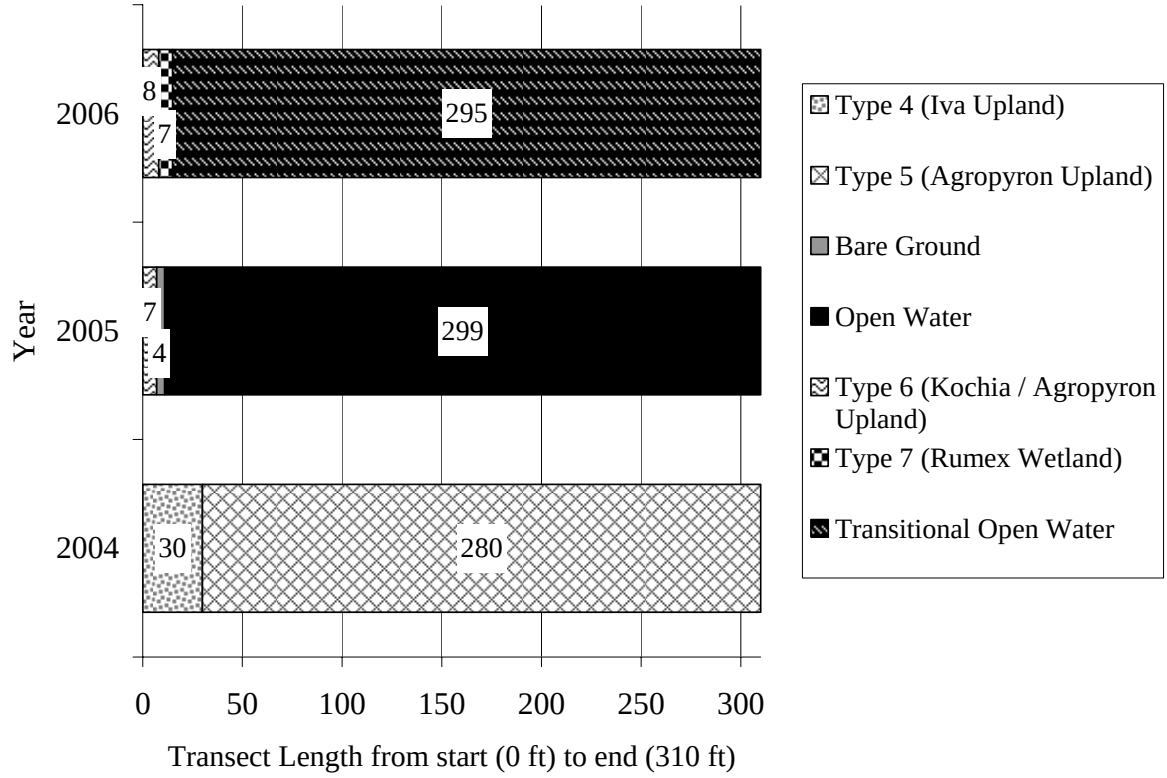


Chart 4: ***Transect maps showing vegetation types of Transect 2 from start (0 feet) to end (310 feet) from 2004 to 2006.***



3.3 Soils

Prior to construction of the wetland mitigation site, the project site was composed of three soil types: *Absher-Noble Complex, 0-5% slopes*; *Marvan Clay, 0-2% slopes*; and *Lallie Silty Clay Loam* (USDA 1982). These soil types are conducive for creating ponds due to their high clay content and low permeability (USDA 1982). However, major excavation was performed to create a depression and build the surrounding berms; thereby, greatly disturbing these soil types.

In 2005 and 2006, these soil types were all inundated. Matrix soil colors and textures have mostly remained the same since 2005. Clay soil textures had matrix colors ranging from 2.5Y 4/2 to 2.5Y 5/2. Darker matrix soils of 2.5Y 4/1 were found in the northwest corner of the project area. For the first time since 2004, a thin layer of highly decomposed organic material was found in the 2006 soil pits 1B, 2B, 3, and 6 (**Figure 2** in **Appendix A**; **COE Form**s in **Appendix B**). Also for the first time since 2004, mottles were detected in soil pits dug in the southwest (3 & 4), northwest (7), and outlet channel (8) of the project area (**Figure 2** in **Appendix A**; **COE Forms** in **Appendix B**).

3.4 Wetland Delineation

Prior to project implementation, no wetland habitat existed within the main project site; however, three small emergent wetlands did occur in association with Little Muddy Creek (LWC 2002). No previously delineated wetlands were filled in during the development of this mitigation site.

Wetland development occurred for the first time in this 2006 monitoring year. Each wetland community was mapped onto the 2006 aerial photograph and its acreage was calculated (**Figure 3** in **Appendix B**; **Table 4**). Vegetation, soils, and hydrology were discussed in previous sections. Overall, 102.43 acres of wetlands and an additional 85.8 acres of transitional open water were mapped in 2006 (**Figure 3** in **Appendix B**).

Table 4: ***2006 wetland acreages for each community within the Little Muddy Creek Wetland Mitigation Site.***

Wetland Community	Acreage
Type 7 – *Rumex maritimus* Wetland Fringe	0.63
Type 8 – *Polygonum / Potamogeton* Wetland	50.67
Type 9 – *Polygonum aviculare* Wetland	21.14
Type 10 / 10A – *Typha latifolia* Wetland	23.94
Type 11 – *Hordeum jubatum* Wetland	5.73
Type 12 – *Alisma gramineum* Wetland	0.34
Total Wetland Habitat	**102.45**

3.5 Wildlife

Direct observations of all wildlife species and signs indicating their presence have been compiled since 2004 (**Table 5**; **Appendix B)**. A dramatic change in bird guilds was observed from 2004 to 2005. The bird guilds observed in 2005 were present during both visits in 2006. In 2006 only a few upland bird species were found within the site; most upland birds were observed outside the project are in the surrounding uplands. In 2006 more than 25 species of shorebirds,

waterfowl, and gulls inhabited the site (**Table 5**). Ducks were observed resting in the tall vegetation growing on the berm. In addition, the property owner stated that Bald Eagles have been observed during 2006 in the project site (Durocher pers. comm.). However, Bald Eagle use will probably remain limited as the site does not have any perching or roosting structures. A Ferruginous Hawk was also observed flying overhead during the spring birding visit; although it was not observed directly on the site. Incidentally, the abundant bird scat in combination with water and plant material is developing an organic soil layer through much of the project area.

Changes in the mammalian, amphibian, and reptile communities have also been noticeable since 2004 (**Table 5**). In 2002 and 2004, pronghorns (*Antilocapra americana*) were consistently observed within the site, but were not seen during the 2005 or 2006 site visits. As in 2005, white-tailed deer (*Odocoileus virginianus*) have been present along the perimeter of the site. No amphibians or reptiles were observed in 2006. Aquatic insects like dragonflies and mosquitoes continue to flourish.

Table 5: ***Fish and wildlife species observed within the Little Muddy Creek Wetland Mitigation Site in 2004 to 2006.***

FISH, AMPHIBIANS, REPTILES	
Plains Garter Snake (*Thamnophis radix*) Western Chorus Frog (*Pseudacris triseriata*)	
BIRDS	
American Avocet (*Recurvirostra americana*) **American Coot (*Fulica americana*)** **American Wigeon (*Anas americana*)** **American White Pelican (*Pelecanus erythrorhynchos*)** **Blue-winged Teal (*Anas discors*)** **Bufflehead (*Bucephala albeola*)** **Canada Goose (*Branta Canadensis*)** **Canvasback (*Aythya valisineria*)** **Cinnamon Teal (*Anas cyanoptera*)** **Common Raven (*Corvus corax*)** **Common Tern (*Sterna hirundo*)** **Franklin's Gull (*Larus pipixcan*)** **Gadwall (*Anas strepera*)** **Great Blue Heron (*Ardea herodias*)** **Eared Grebe (*Podiceps nigricollis*)** Horned Grebe (*Podiceps auritus*) **Horned Lark (*Eremophila alpestris*)** **Killdeer (*Charadrius vociferous*)**	**Lesser Scaup (*Aythya affinis*)** Long-billed Dowitcher (*Limnodromus scolopaceus*) **Mallard (*Anas platyrhynchos*)** Marbled Godwit (*Limosa fedoa*) [probably] Mourning Dove (*Zenaida macroura*) **Northern Harrier (*Circus cyaneus*)** **Northern Pintail (*Anas acuta*)** **Northern Shoveler (*Anas clypeata*)** Red-winged Blackbird (*Agelaius phoeniceus*) **Ring-necked Duck (*Aythya collaris*)** **Ruddy Duck (*Oxyura jamaicensis*)** Sandpiper (unidentified species) **Vesper Sparrow (*Pooecetes gramineus*)** Western Meadowlark (*Sturnella neglecta*) Willet (*Catoptrophorus semipalmatus*) **Wilson's Phalarope (*Phalaropus tricolor*)** Yellow-headed Blackbird (*Xanthocephalus xanthocephalus*)
MAMMALS	
American Badger (*Taxidea taxus*) **Common Raccoon (*Procyon lotor*)** Coyote (*Canis latrans*) Richardson's Ground Squirrel (*Spermophilus richardsonii*) Pronghorn (*Antilocapra americana*) **White-tailed Deer (*Odocoileus virginianus*)**	

Bolded species were observed in 2006.

3.6 Macroinvertebrates

Aquatic macroinvertebrates have not been sampled from 2004 to 2006.

3.7 Functional Assessment

A functional assessment was completed this year for the mitigation site because wetland habitat had developed (**Functional Assessment Form** in **Appendix B**). In 2006, the Little Muddy Creek Wetland Mitigation Site rated as a Category II wetland because it offered an exceptional wildlife habitat rating (**Table 6**). The site also rated high for short and long term surface water storage and production export/food chain support (**Table 6**).

Table 6: ***Summary of 2006 wetland function/value ratings and functional points at the Little Muddy Creek Wetland Mitigation Site.***

Function and Value Parameters from the 1999 MDT Montana Wetland Assessment Method[1]	**2006**
Listed/Proposed T&E Species Habitat	Mod (0.7)
MTNHP Species Habitat	Low (0.1)
General Wildlife Habitat	Exc (1.00)
General Fish/Aquatic Habitat	Mod (0.4)
Flood Attenuation	Mod (0.6)
Short and Long Term Surface Water Storage	High (1.0)
Sediment, Nutrient, Toxicant Removal	Mod (0.7)
Sediment/Shoreline Stabilization	Low (0.3)
Production Export/Food Chain Support	High (0.9)
Groundwater Discharge/Recharge	Low (0.1)
Uniqueness	Mod (0.4)
Recreation/Education Potential	Mod (0.7)
Actual Points/Possible Points	6.9 / 12
% of Possible Score Achieved	58%
Overall Category	II
Total Acreage of Assessed Wetlands and Other Aquatic Habitats within Site Boundaries (ac)	**188.25**
Functional Units (acreage x actual points)	**1298.93**

3.8 Photographs

Representative photos taken from photo-points and transect starts and of the general project area are provided in **Appendix C**. The 2006 aerial photograph taken on July 7th was used as a base for **Figures 2** and **3** (**Appendix A**).

3.9 Maintenance Needs / Recommendations

The berm, diversion structures, excavated channels, and inlet/outlet structures were in good condition during the mid-season visit. Water was let into the mitigation site during phases in order to prevent erosion of the berm. Vegetation on the berm has grown dense and tall. Some wide and deep cracks are beginning to appear in portions of the berm, especially near PP-5, which should continue to be monitored.

3.10 Current Credit Summary

As of 2006, the Little Muddy site has developed 102.45 acres of Class II wetland and 85.80 acres of transitional open water, for a total of 188.25 acres of aquatic habitat. Additionally, the site has developed nearly 1,300 functional units as of 2006. The COE anticipated that the project would result in establishment of emergent marsh and some shallow water habitat, with diversity accomplished through fluctuating water levels. No specific performance criteria or ratios were stipulated in the COE correspondence to MDT regarding the project (Steinle 2001; Steinle 2002).

It was anticipated by MDT that approximately 13.57 acres of compensatory wetland mitigation credit may be needed to offset impacts associated with ten different projects within the Missouri-Sun-Smith River watershed (#7) (MDT 2002). An additional 50 acres of reserve credit was also being sought by MDT (MDT 2002). Thus, MDT originally sought a total 63.57 acres of compensatory wetland mitigation credit.

Approximately 0.80 acre, 9.97 acres, and 2.80 acres of these 13.57-acre impacts were projected at Class II, III, and IV wetlands, respectively. The COE approved application of these projected impact acres to the Little Muddy site as previously "owed" mitigation, with the exception of the Bowman's Corner project, which comprised 10.7 of the 13.57 projected impact acres (Steinle 2002). Consequently, 2.87 acres of "owed" mitigation was approved for application against the Little Muddy site, with any additional projects (including Bowman's Corner) to be applied against the 50-acre "reserve". Final application of projected or incurred wetland impacts against this mitigation site are subject to ongoing discussions and specific agreements between the COE and MDT. However, as of 2006, the site appears to be developing the anticipated target credits.

4.0 REFERENCES

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Appendix A

FIGURE 2 & 3

MDT Wetland Mitigation Monitoring
Little Muddy Creek
Cascade County, Montana

Figure 2 - 2006 Monitoring Activity Location

PP4

Inlet

PP3

Soil Pit 6

Little Muddy Creek

Soil Pit 7

PP2

Outlet

PP1

Soil Pit 1

T2 End

T2 Start

T1 End

PP6

T1 Start

Soil Pit 2

PP5

Soil Pit 3

Soil Pit 5

Soil Pit 4

Monitoring Area Limits

LEGEND

Monitoring Area Limits
Vegetation Transect
Photo Points
Soil Pit
Base Photograph Date: July 07, 2006

N
W
E
S

SCALE 1"=700ft

PROJECT NAME
MDT Little Muddy Wetland Mitigation

DRAWING TITLE
2006 Monitoring Activity Location

PROJ NO: B43054.302	DRAWN: LLL		
LOCATION:	PROJ MGR: A.Pipp		
SCALE: NOTED	CHECKED:	APPVD:	
FILE NAME:L:\330054.302 Muddy\dwg\Task302_2006.dwg			

PBSJ
1120 Cedar
Missoula, MT 59802

FIGURE
2 OF 3
REV -
Dec/05/2006

Figure 3 - 2006 Mapped Site Features

LEGEND
Transitional Open Water
Monitoring Area Limits
Upland Islands
Base Photograph Date: July 07, 2006

N
W E
S

Project Area	407.50 acres
Wetland Area	102.45 acres
Transitional Open Water	85.80 acres
Upland Area	219.25 acres

SCALE 1"=700ft

Vegetation Types
Type 6 - Kochia/Agropyron Upland
Type 7 - Rumex maritimus Wetland Fringe
Type 8 - Polygonum/Potamogeton Wetland
Type 9 - Polygonum aviculare Wetland
Type 10 - Typha latifolia Wetland
Type 10A - Typha latifolia Wetland
Type 11 - Hordeum jubatum Wetland
Type 12 - Alisma gramineum Wetland
Type 13 - Upland

7
13
7
13
10A
Berm = 6
12
10
8
Transitional
Open Water
13
9
9
Berm = 6
7
6
11
10
Monitoring Area Limits
Transitional
Open Water

PROJECT NAME
MDT Little Muddy Wetland Mitigation
DRAWING TITLE
2006 Mapped Site Features

DRAWN: LLL
PROJ MGR: A.Pipp
CHECKED: APP'VD:
PROJ NO: B43054.302
LOCATION:
SCALE: NOTED
FILE NAME: L:\330054.302 Muddy\dwg\Task302_2006.dwg

PBSJ
1120 Cedar
Missoula, MT 59802

FIGURE
3 OF 3
REV -
Dec/07/2006

Appendix B

2006 WETLAND MITIGATION SITE MONITORING FORM
2006 BIRD SURVEY FORM
2006 COE WETLAND DELINEATION FORMS
2006 MDT FUNCTIONAL ASSESSMENT FORM

MDT Wetland Mitigation Monitoring
Little Muddy Creek
Cascade County, Montana

LWC / MDT WETLAND MITIGATION SITE MONITORING FORM

Project Name: **Little Muddy Wetland** Project Number: **B43054.00-0302**
Assessment Date: **August 23, 2006** Person(s) conducting the assessment: **A. Pipp**
Location: **9 miles SW of Ulm** MDT District: **Great Falls** Milepost: _____
Legal Description: T **19N** R **1E** Section **30, 31, 32**
Weather Conditions: **sunny, calm, mid-eighties** Time of Day: **9:00am-4:00pm**
Initial Evaluation Date: **June 4, 2004** Monitoring Year: **2006 (Year 3)** # Visits in Year: **2**
Size of evaluation area: **265 acres** Land use surrounding wetland: **dryland agriculture**

HYDROLOGY

Surface Water Source: **Little Muddy Creek**
Inundation: **Present** Average Depth: **2.0 feet** Range of Depths: **0.1 to 8.0**
Percent of assessment area under inundation: **75%**
Depth at emergent vegetation-open water boundary: **site specific: 2 or 8 feet**
If assessment area is not inundated then are the soils saturated within 12 inches of surface: _
Other evidence of hydrology on the site (ex. – drift lines, erosion, stained vegetation, etc.):

_____

Groundwater Monitoring Wells: **Absent**
Record depth of water below ground surface (in feet):

Well Number	Depth	Well Number	Depth	Well Number	Depth

Additional Activities Checklist:
☒ Map emergent vegetation-open water boundary on aerial photograph.
☒ Observe extent of surface water during each site visit and look for evidence of past surface water elevations (drift lines, erosion, vegetation staining, etc.)
☒ Use GPS to survey groundwater monitoring well locations, if present.

COMMENTS / PROBLEMS:
Water flow in the Little Muddy Creek and precipitation were sufficient to fill site. Throughout summer site dried out providing saturated, but not inundated ground for emergent wetland plants to colonize.

VEGETATION COMMUNITIES

Community Number: **1** Community Title (main spp): **Elymus varnensis**

Dominant Species	% Cover	Dominant Species	% Cover
Elymus varnensis	5 = > 50%	Melilotus officinale	1 = 1-5%
Festuca spp.	1 = 1-5%	Sisymbrium altissimum	1 = 1-5%
Hordeum jubatum	+ = < 1%	Tragopogon dubius	+ = < 1%

Comments / Problems: **Plant species and % coverage reflects conditions in 2004. Entire community became Open Water in 2005.**

Community Number: **2** Community Title (main spp): **Avena**

Dominant Species	% Cover	Dominant Species	% Cover
Elymus varnensis	1 = 1-5%	Avena/Festuca	5 = > 50%
Lactuca serriola	+ = < 1%		

Comments / Problems: **Plant species and % coverage reflects conditions in 2004. Entire community became Open Water in 2005.**

Community Number: **3** Community Title (main spp): **Kochia scoparia**

Dominant Species	% Cover	Dominant Species	% Cover
Avena spp.	2 = 6-10%	Kochia scoparia	5 = > 50%
Festuca spp	1 = 1-5%	Lactuca serriola	1 = 1-5%
Helianthus annuus	2 = 6-10%	Polygonum spp.	1 = 1-5%

Comments / Problems: **Plant species and % coverage reflects conditions in 2004. Entire community became Open Water in 2005.**

Community Number: **4** Community Title (main spp): **Iva axillaris**

Dominant Species	% Cover	Dominant Species	% Cover
Agropyron cristatum	2 = 6-10%	Iva axillaris	4 = 21-50%
Lactuca serriola	1 = 1-5%		

Comments / Problems: **Plant species and % coverage reflects conditions in 2004. Entire community became Open Water in 2005.**

VEGETATION COMMUNITIES (continued)

Community Number: **5** Community Title (main spp): **Agropyron cristatum**

Dominant Species	% Cover	Dominant Species	% Cover
Agropyron cristatum	5 = > 50%	Kochia scoparia	5 = > 50%
Elymus hispidus	2 = 6-10%	Lactuca serriola	+ = < 1%

Comments / Problems: **Plant species and % coverage reflects conditions in 2004. Entire community became Open Water in 2005.**

Community Number: **6** Community Title (main spp): **Kochia / Agropyron**

Dominant Species	% Cover	Dominant Species	% Cover
Kochia scoparia	4 = 21-50%	Iva axillaris	+ = < 1%
Elymus varnensis	3 = 11-20%	Agropyron cristatum	2 = 6-10%
Agropyron intermedium	2 = 6-10%	Hordeum jubatum	1 = 1-5%
Polygonum douglassii	+ = < 1%	Helianthus annuus	1 = 1-5%

Comments / Problems: **In 2006, this community occupies some of the upland shoreline and all of the berm that surrounds the open water.**

Community Number: **7** Community Title (main spp): **Rumex maritimus**

Dominant Species	% Cover	Dominant Species	% Cover
Rumex maritimus	3 = 11-20%	Family Brassicaceae	+ = < 1%
Hordeum jubatum	1 = 1-5%	Typha latifolia	+ = < 1%
Rumex crispus	2 = 6-10%	Scirpus spp.	+ = < 1%
Grass Seedlines (unidentifiable	+ = < 1%		
Kochia scoparia	+ = < 1%		
Salix lutea	+ = < 1%		

Comments / Problems: **In 2006, this community is a developing fringe along the shoreline.**

Community Number: **8** Community Title (main spp): **Type 8 - Polygonum / Potamogeton**

Dominant Species	% Cover	Dominant Species	% Cover
Polygonum aviculare	4 = 21-50%		
Potamogeton pectinatus	2 = 6-10%		
Potamogeton (amplifolius ?)	+ = < 1%		
Alisma gramineum	+ = < 1%		

Comments / Problems: **In 2006, these plant species were found growing up through Open Water. Percent cover is hard to determine due to inundation and a developing community.**

VEGETATION COMMUNITIES (continued)

Community Number: **9** Community Title (main spp): **Type 9 - Polygonum aviculare**

Dominant Species	% Cover	Dominant Species	% Cover
Polygonum aviculare	5 = > 50%		
Typha latifolia	1 = 1-5%		
Sisymbrium spp.	2 = 6-10%		
Agropyron smithii	1 = 1-5%		
Hordeum jubatum	1 = 1-5%		
algae			

Comments / Problems: **In 2006, this community dominated land that became exposed as the Open Water receded.**

Community Number: **10** Community Title (main spp): **Type 10 - Typha latifolia**

Dominant Species	% Cover	Dominant Species	% Cover
Typha latifolia	4 = 21-50%		
Sisymbrium spp.	4 = 21-50%		
Polygonum aviculare	2 = 6-10%		
Hordeum jubatum	1 = 1-5%		
Avena / Festuca spp.	+ = < 1%		

Comments / Problems: **In 2006, this community was developing on land exposed when the Open Water receded. This community occurs in the southwest to northwest areas of the project.**

Community Number: **11** Community Title (main spp): **Type 11 - Hordeum jubatum**

Dominant Species	% Cover	Dominant Species	% Cover
Hordeum jubatum	5 = > 50%		
Typha latifolia	+ = < 1%		
Sisymbrium spp.	2 = 6-10%		

Comments / Problems: **In 2006, this community developing on land that was saturated, but may not have been inundated. This community occurs in the southwest area of the project.**

Community Number: **12** Community Title (main spp): **Type 12 - Alisma gramineum**

Dominant Species	% Cover	Dominant Species	% Cover
Alisma gramineum	5 = > 50%		
Scirpus acutus	1 = 1-5%		
Hordeum jubatum	1 = 1-5%		
Rumex maritimus	1 = 1-5%		
Typha latifolia	1 = 1-5%		

Comments / Problems: **In 2006, this community developed in the outlet channel.**

VEGETATION COMMUNITIES (continued)

Community Number: **13** Community Title (main spp): **Type 13 - Upland**

Dominant Species	% Cover	Dominant Species	% Cover
Cirsium canadensis	4 = 21-50%		
Agropyron smithii	4 = 21-50%		
Elymus varnensis	2 = 6-10%		
Avena / Festuca spp.	1 = 1-5%		
Sisymbrium spp.	2 = 6-10%		
Kochia scoparia	1 = 1-5%		

Comments / Problems: **In 2006, this community occurred as islands and created the boundary on the west side of the project area.**

Community Number: ___ Community Title (main spp): _____

Dominant Species	% Cover	Dominant Species	% Cover

Comments / Problems: _____

Community Number: ___ Community Title (main spp): _____

Dominant Species	% Cover	Dominant Species	% Cover

Comments / Problems: _____

Community Number: ___ Community Title (main spp): _____

Dominant Species	% Cover	Dominant Species	% Cover

Comments / Problems: _____

Additional Activities Checklist:

☒ Record and map vegetative communities on aerial photograph.

COMPREHENSIVE VEGETATION LIST

Plant Species	Vegetation Community Number (s)	Plant Species	Vegetation Community Number (s)
Agropyron cristatum	5, 6	Chenopodium glaucum	10, 13
Agropyron smithii	1-5, 13	Chenopodium leptophyllum	10, 13
Arctium minus	1-5	Sisymbrium spp.	9-11, 13
Artemisia frigida	3	Alisma gramineum	8, 12
Aster pansus	5, 6	Polygonum aviculare	8-10
Atriplex rosea (A. argentea)	1-5	Populus tremuloides	10
Avena spp.	3, 6, 10, 13	Potamogeton (amplifolius?)	8
Bromus inermis	1-6	Potamogeton pectinatus	8
Bromus secalinus (B. japonicus?)	6	Rumex maritimus	7, 12
Cardaria pubescens	1-5	Salix exigua	7, 10
Cirsium arvense	1-5, 13	Salix lutea	7, 10
Chenopodium (capitatum? / rubrum?)	6, 13	Scirpus acutus	7, 12
Chenopodium spp.	6	Typha latifolia	7, 9-12
Grindelia squarrosa	1-5		
Helianthus annuus	3, 6, 13		
Hordeum jubatum	1-7, 9-12		
Iva axillaris	1-6		
Elymus hispidus (Agropyron intermid	5, 6		
Elymus varnensis	1-2, 6, 13		
Kochia scoparia	5-7, 13		
Lactuca serriola	2-6		
Medicago sativa	1-6		
Melilotus officinale	1-5, inlet chan		
Melilotus alba	inlet channel		
Polygonum douglassii	inlet channel		
Rosa spp.	1-5, inlet chan		
Rumex crispus	7		
Salsola iberica (syn. S. kali)	1-5		
Sisymbium altissiumum	1-5		
Tragopogon dubuis	1-6		

Comments / Problems: _____

PLANTED WOODY VEGETATION SURVIVAL

Plant Species	Number Originally Planted	Number Observed	Mortality Causes

Comments / Problems: **N/A**

WILDLIFE

Birds

Were man-made nesting structures installed? **No**
If yes, type of structure: _____ How many? _____
Are the nesting structures being used? **NA**
Do the nesting structures need repairs? _____

Mammals and Herptiles

Mammal and Herptile Species	Number Observed	Indirect Indication of Use			
		Tracks	Scat	Burrows	Other
coyote		☒	☐	☐	
raccoon		☒	☐	☐	
		☐	☐	☐	
		☐	☐	☐	
		☐	☐	☐	
		☐	☐	☐	
		☐	☐	☐	
		☐	☐	☐	

Additional Activities Checklist:
NA Macroinvertebrate Sampling (if required)

Comments / Problems: White-tailed deer present outside site.

PHOTOGRAPHS

Using a camera with a 50mm lens and color film take photographs of the following permanent reference points listed in the check list below. Record the direction of the photograph using a compass. When at the site for the first time, establish a permanent reference point by setting a ½ inch rebar or fencepost extending 2-3 feet above ground. Survey the location with a resource grade GPS and mark the location on the aerial photograph.

Photograph Checklist:

- ☒ One photograph for each of the four cardinal directions surrounding the wetland.
- ☒ At least one photograph showing upland use surrounding the wetland. If more than one upland exists then take additional photographs.
- ☒ At least one photograph showing the buffer surrounding the wetland.
- ☒ One photograph from each end of the vegetation transect, showing the transect.

Location	Photograph Frame #	Photograph Description	Compass Reading (°)
P-1		From P-1 [see Photo Sheet, Photo 1]	136
P-1		From P-1 [see Photo Sheet, Photo 2]	210
P-1		From behind P-1 [see Photo Sheet, Photo 3]	40
P-2		From P-2	282
P-2		From P-2	246
P-2		From P-2	208
P-2		From P-2	246-208
P-2		From P-2	180
P-2		From P-2	150
P-2		From P-2	108
P-3		From P-3	130
P-3		From P-3	bridge
P-4		From P-4	208
P-4		From P-4 towards diversion dam	71
P-5		From P-5	316
P-6	27-28	From P-6	317,283
T-1	23-25	From T-1 start	10
T-2	31, 32	From T-2 start	266
Misc.	remainder	Miscellaneous photographs	

Comments / Problems: **Compass declination set at 16 degrees East in 2005 and 2006; Declination was set slightly different in 2004.**

GPS SURVEYING

Using a resource grade GPS survey the items on the checklist below. Collect at least 3 location points set at a 5 second recording rate. Record file numbers for site in designated GPS field notebook.

GPS Checklist:

- ☐ Jurisdictional wetland boundary.
- ☒ 4-6 landmarks that are recognizable on the aerial photograph.
- ☒ Start and End points of vegetation transect(s).
- ☒ Photograph reference points.
- ☐ Groundwater monitoring well locations.

Comments / Problems: **Mapped with GPS points and by drawing directly onto aerial photo.**

WETLAND DELINEATION

(attach COE delineation forms)

At each site conduct these checklist items:

- ☒ Delineate wetlands according to the 1987 Army COE manual.
- ☒ Delineate wetland – upland boundary onto aerial photograph.

Yes Survey wetland – upland boundary with a resource grade GPS survey.

Comments / Problems: _____

FUNCTIONAL ASSESSMENT

(Complete and attach full MDT Montana Wetland Assessment Method field forms.)
(Also attach any completed abbreviated field forms, if used)

Comments / Problems: _____

MAINTENANCE

Were man-made nesting structure installed at this site? **No**
If yes, do they need to be repaired? **NA**
If yes, describe the problems below and indicate if any actions were taken to remedy the problems.

Were man-made structures built or installed to impound water or control water flow into or out of the wetland? **Yes**
If yes, are the structures working properly and in good working order? **Yes**
If no, describe the problems below.

Comments / Problems: _____

MDT WETLAND MONITORING – VEGETATION TRANSECT

Site: **Little Muddy** Date: **August 23, 2006** Examiner: **A. Pipp**
Transect Number: **1** Approximate Transect Length: **585 feet** Compass Direction from Start: **10˚** Note: **Open water without a T-1 end; Declination is at 16 degrees.**

Vegetation Type A: **Type 6 - Kochia / Agropyron**	
Length of transect in this type: 0-9.5 feet	
Plant Species	**Cover**
Kochia scoparia	5 = > 50%
Helianthus annuus	1 = 1-5%
Agropyron intermedium	+ = < 1%
Elymus varnensis	+ = < 1%
Hordeum jubatum	+ = < 1%
Total Vegetative Cover:	95%

Vegetation Type B: **Bare Ground**	
Length of transect in this type: 9.5-14.0 feet	
Plant Species	**Cover**
Grass seedlings (unidentifiable)	+ = < 1%
Bare soil and bird poop is >99%.	
Total Vegetative Cover:	1%

Vegetation Type C: **Transitional Open Water**	
Length of transect in this type: 14.0 to 44 feet	
Plant Species	**Cover**
Total Vegetative Cover:	25%

Vegetation Type D: **Type 8 - Polygonum / Potamogeton**	
Length of transect in this type: 44 to 585 feet	
Plant Species	**Cover**
Polygonum aviculare	3 = 11-20%
Potamogeton pectinatus	1 = 1-5%
Cloudy Open Water (80%)	5 = > 50%
Total Vegetative Cover:	20%

MDT WETLAND MONITORING – VEGETATION TRANSECT

Site: **Little Muddy Wetland** Date: **August 23, 2006** Examiner: **A. Pipp**
Transect Number: **2** Approximate Transect Length: **310 feet** Compass Direction from Start: **266˚** Note: **Open water without a T2 end; declination at 16 deg.**

Vegetation Type E: **Type 6 - Kochia / Agropyron**	
Length of transect in this type: 0-8 feet	
Plant Species	**Cover**
Elymus varnensis	3 = 11-20%
Kochia scoparia	+ = < 1%
Rumex maritimus	+ = < 1%
Agropyron intermedium	1 = 1-5%
Total Vegetative Cover:	30%

Vegetation Type F: **Type 7 - Rumex maritimus**	
Length of transect in this type: 8 to 15 feet	
Plant Species	**Cover**
Rumex maritimus	2 = 6-10%
Grass seedlings (unidentifiable)	+ = < 1%
Kochia scoparia	+ = < 1%
Brassicaceae (basal rosette)	+ = < 1%
Total Vegetative Cover:	10%

Vegetation Type G: **Transitional Open Water**	
Length of transect in this type: 15 - 310 feet	
Plant Species	**Cover**
Rumex maritimus	+ = < 1%
Potamogeton pectinatus	+ = < 1%
Polygonum aviculare	+ = < 1%
Total Vegetative Cover:	<1%

Vegetation Type H:	
Length of transect in this type: feet	
Plant Species	**Cover**
Total Vegetative Cover:	%

MDT WETLAND MONITORING – VEGETATION TRANSECT

Cover Estimate		**Indicator Class**	**Source**
+ = < 1%	3 = 11-10%	+ = Obligate	P = Planted
1 = 1-5%	4 = 21-50%	- = Facultative/Wet	V = Volunteer
2 = 6-10%	5 = > 50%	0 = Facultative	

Percent of perimeter developing wetland vegetation (excluding dam/berm structures): **80%**

Establish transects perpendicular to the shoreline (or saturated perimeter). The transect should begin in the upland area. Permanently mark this location with a standard metal fencepost. Extend the imaginary transect line towards the center of the wetland, ending at the 3 foot depth (in open water), or at the point where water depths or saturation are maximized. Mark this location with another metal fencepost.

Estimate cover within a 10 foot wide "belt" along the transect length. At a minimum, establish a transect at the windward and leeward sides of the wetland. Remember that the purpose of this sampling is to monitor, not inventory, representative portions of the wetland site.

Comments: **Perimeter is saturated and wetland vegetation is developing. Three aquatic plant species were washed up by wind and wave action along much of the perimeter.**

BIRD SURVEY – FIELD DATA SHEET

Site: **Little Muddy Wetland** Date: **5/3/06**
Survey Time: **1137 am** to **1400 am**

Bird Species	#	Behavior	Habitat	Bird Species	#	Behavior	Habitat
Killdeer	10	FO F	US UP OW	Blue-winged Teal	7	FO	OW
Horned Lark	2	FO	UP	Cinnamon Teal	4	F L	MA
Swallow, Tree	40	F FO	OW US	Gadwall	14	F L	MA OW
Sparrow	3	F L	US	Scaup	>1	F L	OW
Ferruginous Hawk	1	FO	MA OW	Northern Shoveler	50	F L BD	OW MA
				Mallard	2	L	MA OW
				Ruddy Duck	30	F L	OW
				Northern Pintail	20	F L FO	MA OW US
				American Wigeon	3	F L	OW MA
				Canada Goose	3	FO F L	MA
				Ring-necked Duck	20	F L	OW
				Bufflehead	6	F L	OW
				Canvasback	3	F L	OW
				American Coot	60	F L	OW
				Common Tern	1	L	US
		L		Shorebird (unid)	2	N	MA
				Eared Grebe	20	F L	OW
		L		Gull (unident.)	30	FO L	MA OW
				American Avocet	30	F FO BD	OW MA US
		L					

BEHAVIOR CODES
BP = One of a breeding pair
BD = Breeding display
F = Foraging
FO = Flyover
L = Loafing
N = Nesting

HABITAT CODES
AB = Aquatic bed
FO = Forested
I = Island
MA = Marsh
MF = Mud Flat
OW = Open Water
SS = Scrub/Shrub
UP = Upland buffer
WM = Wet meadow
US = Unconsolidated shore

Weather: **Cloudy, light wind, 50 degrees, dry.**

Notes: **Bob Durocher sometimes sees Bald Eagles. American avocets mostly found in SE corner of site. In May visit saw Red-winged Blackbird (1), Meadowlark (4), Horned Lark (2), Raven (1), Northern Harrier (1), and unidentified sparrow (40) in upland surrounding site.**

BIRD SURVEY – FIELD DATA SHEET

Site: **Little Muddy Wetland** Date: **8/23/06**
Survey Time: **0900 am** to **1630 pm**

Bird Species	#	Behavior	Habitat	Bird Species	#	Behavior	Habitat
Gull	20	FO L	MA US				
Ducks (many species)	20	F F	OW				
Am. White Pelican	3	L	US				
American Coot	3	F L	US OW				
Ferruginous Hawk	1	FO	MA OW				
Gadwall	2	FO	OW				
Teal (unid)	10	F L	OW				
Great Blue Heron	1	F	US				
Cormorant	1	L	OW MA				
Northern Harrier	2	F FO	US UP				
Wilson's Pharlarope	>5	FO F	US MA				
Canada Goose	20	FO L F	MA US OW				

BEHAVIOR CODES
BP = One of a breeding pair
BD = Breeding display
F = Foraging
FO = Flyover
L = Loafing
N = Nesting

HABITAT CODES
AB = Aquatic bed
FO = Forested
I = Island
MA = Marsh
MF = Mud Flat
OW = Open Water
SS = Scrub/Shrub
UP = Upland buffer
WM = Wet meadow
US = Unconsolidated shore

Weather: **Mostly sunny with thin cloud cover; calm; 85 degrees.**

Notes: _____

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

Project/Site:	Little Muddy Creek Wetland Mitigation 2006	**Project No:** B43054	**Date:** 23-Aug-2006
Applicant/Owner:	-Montana Department of Transportation-		**County:** Cascade
Investigators:	Andrea Pipp		**State:** Montana
			Plot ID: Soil Pit 1a

Do Normal Circumstances exist on the site?	(Yes) No	**Community ID:** Emergent
Is the site significantly disturbed (Atypical Situation:)?	Yes (No)	**Transect ID:**
Is the area a potential Problem Area? (If needed, explain on the reverse side)	Yes (No)	**Field Location:** Beside T-2 from 8 - 15 feet

VEGETATION (USFWS Region No. 9)

Dominant Plant Species(Latin/Common)	Stratum	Indicator	Plant Species(Latin/Common)	Stratum	Indicator
Rumex maritimus	Herb	FACW+	*Kochia scoparia*	Herb	FAC
Dock,Golden			Summer-Cypress,Mexican		

Percent of Dominant Species that are OBL, FACW or FAC: (excluding FAC-) 2/2 = 100.00%
FAC Neutral: 1/1 = 100.00%
Numeric Index: 5/2 = 2.50

Remarks:
Also present were grass seedlings and basal rosettes of a Brassicaceae (Mustard family) species.

HYDROLOGY

NO **Recorded Data(Describe in Remarks):**
- N/A **Stream, Lake or Tide Gauge**
- N/A **Aerial Photographs**
- N/A **Other**

YES **No Recorded Data**

Field Observations

Depth of Surface Water:	N/A *(in.)*
Depth to Free Water in Pit:	N/A *(in.)*
Depth to Saturated Soil:	= 0.0 *(in.)*

Wetland Hydrology Indicators

Primary Indicators
- NO **Inundated**
- YES **Saturated in Upper 12 Inches**
- NO **Water Marks**
- NO **Drift Lines**
- NO **Sediment Deposits**
- NO **Drainage Patterns in Wetlands**

Secondary Indicators
- NO **Oxidized Root Channels in Upper 12 Inches**
- NO **Water-Stained Leaves**
- NO **Local Soil Survey Data**
- YES **FAC-Neutral Test**
- NO **Other(Explain in Remarks)**

Remarks:

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

Project/Site:	Little Muddy Creek Wetland Mitigation 2006	**Project No:** B43054	**Date:** 23-Aug-2006
Applicant/Owner:	-Montana Department of Transportation-		**County:** Cascade
Investigators:	Andrea Pipp		**State:** Montana
			Plot ID: Soil Pit 1a

SOILS

Map Unit Name (Series and Phase): Absher-Noble Complex, 0-5% slopes
Map Symbol: 10 **Drainage Class:** moderately well drained **Mapped Hydric Inclusion?**
Taxonomy (Subgroup): Fine montmorillonitic Borollic Natragid **Field Observations Confirm Mapped Type?** Yes (No)
Profile Description

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Color (Munsell Moist)	Mottle Abundance/Contrast		Texture, Concretions, Structure, etc
0-13	A	2.5YR4/2	N/A	N/A	N/A	Clay

Hydric Soil Indicators:
- NO **Histosol**
- NO **Histic Epipedon**
- NO **Sulfidic Odor**
- NO **Aquic Moisture Regime**
- NO **Reducing Conditions**
- NO **Gleyed or Low Chroma Colors**
- NO **Concretions**
- NO **High Organic Content in Surface Layer in Sandy Soils**
- NO **Organic Streaking in Sandy Soils**
- NO **Listed on Local Hydric Soils List**
- NO **Listed on National Hydric Soils List**
- YES **Other (Explain in Remarks)**

Remarks:
Satisfies NRCS Hydric Soil Criteria #3, "Soils that are frequently ponded for long duration or very long duration during the growing season."

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	(Yes) No	**Is the Sampling Point within the Wetland?** (Yes) No
Wetland Hydrology Present?	(Yes) No	
Hydric Soils Present?	(Yes) No	

Remarks:
T 2 from 8 feet to 15 feet meets all three criteria for wetland determination.

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

Project/Site: Little Muddy Creek Wetland Mitigation 2006	**Project No:** B43054	**Date:** 23-Aug-2006
Applicant/Owner: -Montana Department of Transportation-		**County:** Cascade
Investigators: Andrea Pipp		**State:** Montana
		Plot ID: Soil Pit 1b

Do Normal Circumstances exist on the site?	(Yes) No	**Community ID:** Emergent / Aquatic Bed
Is the site significantly disturbed (Atypical Situation:)?	Yes (No)	**Transect ID:**
Is the area a potential Problem Area? (If needed, explain on the reverse side)	Yes (No)	**Field Location:** Beside T-2 from 15 feet to end.

VEGETATION (USFWS Region No. 9)

Dominant Plant Species(Latin/Common)	Stratum	Indicator	Plant Species(Latin/Common)	Stratum	Indicator
Rumex maritimus	Herb	FACW+	*Polygonum aviculare*	Herb	FACW-
Dock,Golden			Knotweed,Prostrate		
Potamogeton pectinatus	Herb	OBL			
Pondweed,Sago					

Percent of Dominant Species that are OBL, FACW or FAC: (excluding FAC-) 3/3 = 100.00%
FAC Neutral: 3/3 = 100.00%
Numeric Index: 5/3 = 1.67

Remarks:

HYDROLOGY

Recorded Data(Describe in Remarks):
- NO Recorded Data
- N/A Stream, Lake or Tide Gauge
- N/A Aerial Photographs
- N/A Other

YES No Recorded Data

Field Observations

Depth of Surface Water:	= 1.0 *(in.)*
Depth to Free Water in Pit:	N/A *(in.)*
Depth to Saturated Soil:	N/A *(in.)*

Wetland Hydrology Indicators

Primary Indicators
- YES Inundated
- YES Saturated in Upper 12 Inches
- NO Water Marks
- NO Drift Lines
- NO Sediment Deposits
- NO Drainage Patterns in Wetlands

Secondary Indicators
- NO Oxidized Root Channels in Upper 12 Inches
- NO Water-Stained Leaves
- NO Local Soil Survey Data
- YES FAC-Neutral Test
- NO Other(Explain in Remarks)

Remarks:

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

Project/Site: Little Muddy Creek Wetland Mitigation 2006	**Project No:** B43054	**Date:** 23-Aug-2006
Applicant/Owner: -Montana Department of Transportation-		**County:** Cascade
Investigators: Andrea Pipp		**State:** Montana
		Plot ID: Soil Pit 1b

SOILS

Map Unit Name (Series and Phase): Absher-Noble Complex, 0-5% slopes
Map Symbol: 10 **Drainage Class:** moderately well drained **Mapped Hydric Inclusion?**
Taxonomy (Subgroup): Fine montmorillonitic Borollic Natragid **Field Observations Confirm Mapped Type?** Yes (No)
Profile Description

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Color (Munsell Moist)	Mottle Abundance/Contrast		Texture, Concretions, Structure, etc
0-12	A	2.5YR4/2	N/A	N/A	N/A	Clay

Hydric Soil Indicators:
- NO Histosol
- NO Histic Epipedon
- NO Sulfidic Odor
- NO Aquic Moisture Regime
- NO Reducing Conditions
- NO Gleyed or Low Chroma Colors
- NO Concretions
- NO High Organic Content in Surface Layer in Sandy Soils
- NO Organic Streaking in Sandy Soils
- NO Listed on Local Hydric Soils List
- NO Listed on National Hydric Soils List
- YES Other (Explain in Remarks)

Remarks:
A thin layer of organic soil occurred in pit (but depth was not recorded). Soil colored at 10YR 2/2. Satisfies NRCS Hydric Soil Criteria #3, "Soils that are frequently ponded for long duration or very long duration during the growing season."

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	(Yes) No	Is the Sampling Point within the Wetland? (Yes) No
Wetland Hydrology Present?	(Yes) No	
Hydric Soils Present?	(Yes) No	

Remarks:
On T-2 from 15 feet to end meets all three criteria for wetland determination.

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

Project/Site: Little Muddy Creek Wetland Mitigation 2006	**Project No:** B43054	**Date:** 23-Aug-2006
Applicant/Owner: -Montana Department of Transportation-		**County:** Cascade
Investigators: Andrea Pipp		**State:** Montana
		Plot ID: Soil Pit 2a

Do Normal Circumstances exist on the site?	(Yes) No	**Community ID:** Open Water
Is the site significantly disturbed (Atypical Situation:)?	Yes (No)	**Transect ID:**
Is the area a potential Problem Area? (If needed, explain on the reverse side)	Yes (No)	**Field Location:** Beside T-1, 0-14 feet.

VEGETATION (USFWS Region No. 9)

Dominant Plant Species(Latin/Common)	Stratum	Indicator	Plant Species(Latin/Common)	Stratum	Indicator
Kochia scoparia	Herb	FAC	*Agropyron intermedium*	Herb	NI
Summer-Cypress,Mexican			Wheatgrass, intermediate		
Helianthus annuus	Herb	FACU+	*Hordeum jubatum*	Herb	FAC+
Sunflower,Common			Barley,Fox-Tail		

Percent of Dominant Species that are OBL, FACW or FAC: (excluding FAC-) 2/3 = 66.67%

FAC Neutral: 0/1 = 0.00%
Numeric Index: 10/3 = 3.33

Remarks:
Listed vegetation above and Elymus varnensis occur from 0-9.5 feet. From 9.5 to 14 feet the transect is bare except for a few unidentifiable grass seedlings.

HYDROLOGY

NO Recorded Data(Describe in Remarks):
- N/A Stream, Lake or Tide Gauge
- N/A Aerial Photographs
- N/A Other

YES No Recorded Data

Field Observations

Depth of Surface Water:	N/A *(in.)*
Depth to Free Water in Pit:	N/A *(in.)*
Depth to Saturated Soil:	> 13 *(in.)*

Wetland Hydrology Indicators

Primary Indicators
- NO Inundated
- NO Saturated in Upper 12 Inches
- NO Water Marks
- NO Drift Lines
- NO Sediment Deposits
- NO Drainage Patterns in Wetlands

Secondary Indicators
- NO Oxidized Root Channels in Upper 12 Inches
- NO Water-Stained Leaves
- NO Local Soil Survey Data
- NO FAC-Neutral Test
- NO Other(Explain in Remarks)

Remarks:
From 0-9.5 feet the transect falls on the berm. The berm is deeply cracked: 1-2 inches wide by 6-10 inches deep! From 9.5 to 14 feet the soil is saturated.

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

Project/Site: Little Muddy Creek Wetland Mitigation 2006	**Project No:** B43054	**Date:** 23-Aug-2006
Applicant/Owner: -Montana Department of Transportation-		**County:** Cascade
Investigators: Andrea Pipp		**State:** Montana
		Plot ID: Soil Pit 2a

SOILS

Map Unit Name (Series and Phase): Absher-Noble Complex, 0-5% slopes
Map Symbol: 10 **Drainage Class:** moderately well drained **Mapped Hydric Inclusion?**
Taxonomy (Subgroup): Fine montmorillonitic Borollic Natragid **Field Observations Confirm Mapped Type?** Yes (No)
Profile Description

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Color (Munsell Moist)	Mottle Abundance/Contrast		Texture, Concretions, Structure, etc
0-12	A	2.5Y5/2	N/A	N/A	N/A	Clay

Hydric Soil Indicators:
- NO Histosol
- NO Histic Epipedon
- NO Sulfidic Odor
- NO Aquic Moisture Regime
- NO Reducing Conditions
- NO Gleyed or Low Chroma Colors
- NO Concretions
- NO High Organic Content in Surface Layer in Sandy Soils
- NO Organic Streaking in Sandy Soils
- NO Listed on Local Hydric Soils List
- NO Listed on National Hydric Soils List
- NO Other (Explain in Remarks)

Remarks:

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	(Yes) No	**Is the Sampling Point within the Wetland?** Yes (No)
Wetland Hydrology Present?	Yes (No)	
Hydric Soils Present?	Yes (No)	

Remarks:
From 0 to 14 feet on T-1 the hydrology and hydric soils criteria are not met.

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

Project/Site: Little Muddy Creek Wetland Mitigation 2006	**Project No:** B43054	**Date:** 23-Aug-2006
Applicant/Owner: -Montana Department of Transportation-		**County:** Cascade
Investigators: Andrea Pipp		**State:** Montana
		Plot ID: Soil Pit 2b

Do Normal Circumstances exist on the site? (Yes) No	**Community ID:** Emergent / Aquatic Bed
Is the site significantly disturbed (Atypical Situation:)? Yes (No)	**Transect ID:**
Is the area a potential Problem Area? Yes (No)	**Field Location:**
(If needed, explain on the reverse side)	Beside T-1 from 14 feet to end

VEGETATION (USFWS Region No. 9)

Dominant Plant Species(Latin/Common)	Stratum	Indicator	Plant Species(Latin/Common)	Stratum	Indicator
Polygonum aviculare	Herb	FACW-	*Potamogeton pectinatus*	Herb	OBL
Knotweed,Prostrate			Pondweed,Sago		

Percent of Dominant Species that are OBL, FACW or FAC: (excluding FAC-) 2/2 = 100.00%	**FAC Neutral:** 2/2 = 100.00% **Numeric Index:** 3/2 = 1.50

Remarks:

HYDROLOGY

NO **Recorded Data(Describe in Remarks):**	**Wetland Hydrology Indicators**
N/A **Stream, Lake or Tide Gauge**	**Primary Indicators**
N/A **Aerial Photographs**	YES **Inundated**
N/A **Other**	YES **Saturated in Upper 12 Inches**
YES **No Recorded Data**	NO **Water Marks**
	NO **Drift Lines**
Field Observations	NO **Sediment Deposits**
Depth of Surface Water: > 1.0 *(in.)*	NO **Drainage Patterns in Wetlands**
Depth to Free Water in Pit: N/A *(in.)*	**Secondary Indicators**
Depth to Saturated Soil: N/A *(in.)*	NO **Oxidized Root Channels in Upper 12 Inches**
	NO **Water-Stained Leaves**
	NO **Local Soil Survey Data**
	YES **FAC-Neutral Test**
	NO **Other(Explain in Remarks)**

Remarks:
Water inundates T-1 from 14 feet to end.

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

Project/Site: Little Muddy Creek Wetland Mitigation 2006	**Project No:** B43054	**Date:** 23-Aug-2006
Applicant/Owner: -Montana Department of Transportation-		**County:** Cascade
Investigators: Andrea Pipp		**State:** Montana
		Plot ID: Soil Pit 2b

SOILS

Map Unit Name (Series and Phase): Absher-Noble Complex, 0-5% slopes
Map Symbol: 10 **Drainage Class:** moderately well drained **Mapped Hydric Inclusion?**
Taxonomy (Subgroup): Fine montmorillonitic Borollic Natragid **Field Observations Confirm Mapped Type?** Yes (No)
Profile Description

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Color (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc
0-12	A	2.5YR5/2	2.5Y5/1 10YR2/1	Many Faint	Clay

Hydric Soil Indicators:

NO **Histosol**	NO **Concretions**
NO **Histic Epipedon**	NO **High Organic Content in Surface Layer in Sandy Soils**
NO **Sulfidic Odor**	NO **Organic Streaking in Sandy Soils**
NO **Aquic Moisture Regime**	NO **Listed on Local Hydric Soils List**
NO **Reducing Conditions**	NO **Listed on National Hydric Soils List**
YES **Gleyed or Low Chroma Colors**	NO **Other (Explain in Remarks)**

Remarks:
The soil is actually layered. There are two matrix colors: 2.5YR5/2 and 2.5Y5/1. The 2.5Y5/1 color is directly below the very narrow 10YR2/1 layer. The colors in the organic layer are leached causing the soil below to darken.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? (Yes) No	**Is the Sampling Point within the Wetland?** (Yes) No
Wetland Hydrology Present? (Yes) No	
Hydric Soils Present? (Yes) No	

Remarks:
From 14 feet to end on T-1, all three criteria are met for wetland determination.

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

Project/Site: Little Muddy Creek Wetland Mitigation 2006	**Project No:** B43054	**Date:** 23-Aug-2006
Applicant/Owner: -Montana Department of Transportation-		**County:** Cascade
Investigators: Andrea Pipp		**State:** Montana
		Plot ID: Soil Pit 3

Do Normal Circumstances exist on the site? (Yes) No	**Community ID:** Emergent
Is the site significantly disturbed (Atypical Situation:)? Yes (No)	**Transect ID:**
Is the area a potential Problem Area? Yes (No)	**Field Location:**
(If needed, explain on the reverse side)	On peninsula east of PP-5.

VEGETATION (USFWS Region No. 9)

Dominant Plant Species(Latin/Common)	Stratum	Indicator	Plant Species(Latin/Common)	Stratum	Indicator
Polygonum aviculare	Herb	FACW-			
Knotweed,Prostrate					

Percent of Dominant Species that are OBL, FACW or FAC: (excluding FAC-) 1/1 = 100.00%

FAC Neutral: 1/1 = 100.00%
Numeric Index: 2/1 = 2.00

Remarks:
Typha latifolia present in very small scattered groups.

HYDROLOGY

NO Recorded Data(Describe in Remarks):
- N/A Stream, Lake or Tide Gauge
- N/A Aerial Photographs
- N/A Other

YES No Recorded Data

Field Observations

Depth of Surface Water:	N/A *(in.)*
Depth to Free Water in Pit:	N/A *(in.)*
Depth to Saturated Soil:	= 1.0 *(in.)*

Wetland Hydrology Indicators

Primary Indicators
- NO Inundated
- YES Saturated in Upper 12 Inches
- NO Water Marks
- NO Drift Lines
- NO Sediment Deposits
- NO Drainage Patterns in Wetlands

Secondary Indicators
- NO Oxidized Root Channels in Upper 12 Inches
- NO Water-Stained Leaves
- NO Local Soil Survey Data
- YES FAC-Neutral Test
- NO Other(Explain in Remarks)

Remarks:
The top inch of soil is dry, hard, and cracked.

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

Project/Site: Little Muddy Creek Wetland Mitigation 2006	**Project No:** B43054	**Date:** 23-Aug-2006
Applicant/Owner: -Montana Department of Transportation-		**County:** Cascade
Investigators: Andrea Pipp		**State:** Montana
		Plot ID: Soil Pit 3

SOILS

Map Unit Name (Series and Phase): Absher-Noble Complex, 0-5% slopes
Map Symbol: 10 **Drainage Class:** moderately well drained **Mapped Hydric Inclusion?**
Taxonomy (Subgroup): Fine montmorillonitic Borollic Natragid **Field Observations Confirm Mapped Type?** Yes (No)
Profile Description

Depth (Inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Color (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc
0-12	A	2.5Y4/2	7.5YR4/6	Many Faint	Clay

Hydric Soil Indicators:

- NO Histosol
- NO Histic Epipedon
- NO Sulfidic Odor
- NO Aquic Moisture Regime
- NO Reducing Conditions
- YES Gleyed or Low Chroma Colors
- NO Concretions
- NO High Organic Content in Surface Layer in Sandy Soils
- NO Organic Streaking in Sandy Soils
- NO Listed on Local Hydric Soils List
- NO Listed on National Hydric Soils List
- NO Other (Explain in Remarks)

Remarks:
Within 0-12 there is a thin layer of organic 10YR2/1 (depth not recorded).

WETLAND DETERMINATION

Hydrophytic Vegetation Present? (Yes) No	Is the Sampling Point within the Wetland? (Yes) No
Wetland Hydrology Present? (Yes) No	
Hydric Soils Present? (Yes) No	

Remarks:

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

Project/Site:	Little Muddy Creek Wetland Mitigation 2006	**Project No:** B43054	**Date:** 23-Aug-2006
Applicant/Owner:	-Montana Department of Transportation-		**County:** Cascade
Investigators:	Andrea Pipp		**State:** Montana
			Plot ID: Soil Pit 4

Do Normal Circumstances exist on the site?	(Yes) No	**Community ID:** Emergent
Is the site significantly disturbed (Atypical Situation:)?	Yes (No)	**Transect ID:**
Is the area a potential Problem Area? (If needed, explain on the reverse side)	Yes (No)	**Field Location:** West of PP-5.

VEGETATION (USFWS Region No. 9)

Dominant Plant Species(Latin/Common)	Stratum	Indicator	Plant Species(Latin/Common)	Stratum	Indicator
Typha latifolia	Herb	OBL			
Cattail,Broad-Leaf					

Percent of Dominant Species that are OBL, FACW or FAC: (excluding FAC-) 1/1 = 100.00%

FAC Neutral: 1/1 = 100.00%
Numeric Index: 1/1 = 1.00

Remarks:
Sisymbrium spp. also dominant, but it completed their life cycle earlier in the season.

HYDROLOGY

NO Recorded Data(Describe in Remarks):
- N/A Stream, Lake or Tide Gauge
- N/A Aerial Photographs
- N/A Other

YES No Recorded Data

Field Observations

Depth of Surface Water:	N/A *(in.)*
Depth to Free Water in Pit:	N/A *(in.)*
Depth to Saturated Soil:	= 0.5 *(in.)*

Wetland Hydrology Indicators

Primary Indicators
- NO Inundated
- YES Saturated in Upper 12 Inches
- NO Water Marks
- NO Drift Lines
- NO Sediment Deposits
- NO Drainage Patterns in Wetlands

Secondary Indicators
- NO Oxidized Root Channels in Upper 12 Inches
- NO Water-Stained Leaves
- NO Local Soil Survey Data
- YES FAC-Neutral Test
- NO Other(Explain in Remarks)

Remarks:

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

Project/Site:	Little Muddy Creek Wetland Mitigation 2006	**Project No:** B43054	**Date:** 23-Aug-2006
Applicant/Owner:	-Montana Department of Transportation-		**County:** Cascade
Investigators:	Andrea Pipp		**State:** Montana
			Plot ID: Soil Pit 4

SOILS

Map Unit Name (Series and Phase): Absher-Noble Complex, 0-5% slopes
Map Symbol: 10 **Drainage Class:** moderately well drained **Mapped Hydric Inclusion?**
Taxonomy (Subgroup): Fine montmorillonitic Borollic Natragid **Field Observations Confirm Mapped Type?** Yes (No)
Profile Description

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Color (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc
0-12	A	5Y3/1	7.5YR4/6	Many Faint	Clay

Hydric Soil Indicators:

- NO Histosol
- NO Histic Epipedon
- NO Sulfidic Odor
- NO Aquic Moisture Regime
- NO Reducing Conditions
- YES Gleyed or Low Chroma Colors
- NO Concretions
- NO High Organic Content in Surface Layer in Sandy Soils
- NO Organic Streaking in Sandy Soils
- NO Listed on Local Hydric Soils List
- NO Listed on National Hydric Soils List
- NO Other (Explain in Remarks)

Remarks:

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	(Yes) No	Is the Sampling Point within the Wetland? (Yes) No
Wetland Hydrology Present?	(Yes) No	
Hydric Soils Present?	(Yes) No	

Remarks:

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

Project/Site: Little Muddy Creek Wetland Mitigation 2006	**Project No:** B43054	**Date:** 23-Aug-2006
Applicant/Owner: -Montana Department of Transportation-		**County:** Cascade
Investigators: Andrea Pipp		**State:** Montana
		Plot ID: Soil Pit 5

Do Normal Circumstances exist on the site?	(Yes) No	**Community ID:** Emergent
Is the site significantly disturbed (Atypical Situation:)?	Yes (No)	**Transect ID:**
Is the area a potential Problem Area?	Yes (No)	**Field Location:**
(If needed, explain on the reverse side)		West of PP-5; North of Pit #4.

VEGETATION (USFWS Region No. 9)

Dominant Plant Species(Latin/Common)	Stratum	Indicator	Plant Species(Latin/Common)	Stratum	Indicator
Hordeum jubatum	Herb	FAC+			
Barley,Fox-Tail					

Percent of Dominant Species that are OBL, FACW or FAC: (excluding FAC-) 1/1 = 100.00%

FAC Neutral: 0/0 = 0.00%
Numeric Index: 3/1 = 3.00

Remarks:
Area is dominated by Hordeum that has already flowered and seed. Interspersed throughout area is a new crop of Hordeum has emerged that is in peak flower.

HYDROLOGY

NO Recorded Data(Describe in Remarks):
- N/A Stream, Lake or Tide Gauge
- N/A Aerial Photographs
- N/A Other

YES No Recorded Data

Field Observations

Depth of Surface Water:	N/A *(in.)*
Depth to Free Water in Pit:	N/A *(in.)*
Depth to Saturated Soil:	= 2.0 *(in.)*

Wetland Hydrology Indicators

Primary Indicators
- NO Inundated
- YES Saturated in Upper 12 Inches
- NO Water Marks
- NO Drift Lines
- NO Sediment Deposits
- NO Drainage Patterns in Wetlands

Secondary Indicators
- NO Oxidized Root Channels in Upper 12 Inches
- NO Water-Stained Leaves
- NO Local Soil Survey Data
- NO FAC-Neutral Test
- NO Other(Explain in Remarks)

Remarks:

WetForm[im]

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

Project/Site: Little Muddy Creek Wetland Mitigation 2006	**Project No:** B43054	**Date:** 23-Aug-2006
Applicant/Owner: -Montana Department of Transportation-		**County:** Cascade
Investigators: Andrea Pipp		**State:** Montana
		Plot ID: Soil Pit 5

SOILS

Map Unit Name (Series and Phase): Absher-Noble Complex, 0-5% slopes
Map Symbol: 10 **Drainage Class:** moderately well drained **Mapped Hydric Inclusion?**
Taxonomy (Subgroup): Fine montmorillonitic Borollic Natragid **Field Observations Confirm Mapped Type?** Yes (No)
Profile Description

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Color (Munsell Moist)	Mottle Abundance/Contrast		Texture, Concretions, Structure, etc
0-12	A	2.5Y4/1	N/A	N/A	N/A	Clay

Hydric Soil Indicators:

NO Histosol	NO Concretions
NO Histic Epipedon	NO High Organic Content in Surface Layer in Sandy Soils
NO Sulfidic Odor	NO Organic Streaking in Sandy Soils
NO Aquic Moisture Regime	NO Listed on Local Hydric Soils List
NO Reducing Conditions	NO Listed on National Hydric Soils List
YES Gleyed or Low Chroma Colors	NO Other (Explain in Remarks)

Remarks:

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	(Yes) No	Is the Sampling Point within the Wetland? (Yes) No
Wetland Hydrology Present?	(Yes) No	
Hydric Soils Present?	(Yes) No	

Remarks:

WetForm[im]

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

Project/Site: Little Muddy Creek Wetland Mitigation 2006	**Project No:** B43054	**Date:** 23-Aug-2006
Applicant/Owner: -Montana Department of Transportation-		**County:** Cascade
Investigators: Andrea Pipp		**State:** Montana
		Plot ID: Soil Pit 6

Do Normal Circumstances exist on the site?	(Yes) No	**Community ID:** Emergent
Is the site significantly disturbed (Atypical Situation:)?	Yes (No)	**Transect ID:**
Is the area a potential Problem Area?	Yes (No)	**Field Location:**
(If needed, explain on the reverse side)		Inlet channel at bridge crossing.

VEGETATION (USFWS Region No. 9)

Dominant Plant Species(Latin/Common)	Stratum	Indicator	Plant Species(Latin/Common)	Stratum	Indicator
Rumex maritimus	Herb	FACW+	*Hordeum jubatum*	Herb	FAC+
Dock,Golden			Barley,Fox-Tail		

Percent of Dominant Species that are OBL, FACW or FAC: (excluding FAC-) 2/2 = 100.00%

FAC Neutral: 1/1 = 100.00%
Numeric Index: 5/2 = 2.50

Remarks:
Salix whips present, but not dominant.

HYDROLOGY

NO Recorded Data(Describe in Remarks):
- N/A Stream, Lake or Tide Gauge
- N/A Aerial Photographs
- N/A Other

YES No Recorded Data

Field Observations

Depth of Surface Water:	N/A *(in.)*
Depth to Free Water in Pit:	N/A *(in.)*
Depth to Saturated Soil:	= 0.0 *(in.)*

Wetland Hydrology Indicators

Primary Indicators
- NO Inundated
- YES Saturated in Upper 12 Inches
- NO Water Marks
- NO Drift Lines
- NO Sediment Deposits
- NO Drainage Patterns in Wetlands

Secondary Indicators
- NO Oxidized Root Channels in Upper 12 Inches
- NO Water-Stained Leaves
- NO Local Soil Survey Data
- YES FAC-Neutral Test
- NO Other(Explain in Remarks)

Remarks:

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

Project/Site: Little Muddy Creek Wetland Mitigation 2006	**Project No:** B43054	**Date:** 23-Aug-2006
Applicant/Owner: -Montana Department of Transportation-		**County:** Cascade
Investigators: Andrea Pipp		**State:** Montana
		Plot ID: Soil Pit 6

SOILS

Map Unit Name (Series and Phase): Absher-Noble Complex, 0-5% slopes
Map Symbol: 10 **Drainage Class:** moderately well drained **Mapped Hydric Inclusion?**
Taxonomy (Subgroup): Fine montmorillonitic Borollic Natragid **Field Observations Confirm Mapped Type?** Yes (No)
Profile Description

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Color (Munsell Moist)	Mottle Abundance/Contrast		Texture, Concretions, Structure, etc
0-0.5	Oi	10YR2/1	N/A	N/A	N/A	Organic
0.5-12	A	2.5Y4/1	N/A	N/A	N/A	Clay

Hydric Soil Indicators:

- NO Histosol
- NO Histic Epipedon
- NO Sulfidic Odor
- NO Aquic Moisture Regime
- NO Reducing Conditions
- YES Gleyed or Low Chroma Colors
- NO Concretions
- NO High Organic Content in Surface Layer in Sandy Soils
- NO Organic Streaking in Sandy Soils
- NO Listed on Local Hydric Soils List
- NO Listed on National Hydric Soils List
- NO Other (Explain in Remarks)

Remarks:

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	(Yes) No	Is the Sampling Point within the Wetland? (Yes) No
Wetland Hydrology Present?	(Yes) No	
Hydric Soils Present?	(Yes) No	

Remarks:

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

Project/Site:	Little Muddy Creek Wetland Mitigation 2006	**Project No:** B43054	**Date:** 23-Aug-2006
Applicant/Owner:	-Montana Department of Transportation-		**County:** Cascade
Investigators:	Andrea Pipp		**State:** Montana
			Plot ID: Soil Pit 7

Do Normal Circumstances exist on the site? (Yes) No	**Community ID:** Emergent
Is the site significantly disturbed (Atypical Situation:)? Yes (No)	**Transect ID:**
Is the area a potential Problem Area? Yes (No)	**Field Location:**
(If needed, explain on the reverse side)	Northwest area of site.

VEGETATION **(USFWS Region No. 9)**

Dominant Plant Species(Latin/Common)	Stratum	Indicator	Plant Species(Latin/Common)	Stratum	Indicator
Typha latifolia	Herb	OBL	*Chenopodium glaucum*	Herb	FAC
Cattail,Broad-Leaf			Goosefoot,Oakleaf		
Hordeum jubatum	Herb	FAC+			
Barley,Fox-Tail					

Percent of Dominant Species that are OBL, FACW or FAC:	**FAC Neutral:** 1/1 = 100.00%
(excluding FAC-) 3/3 = 100.00%	**Numeric Index:** 7/3 = 2.33

Remarks:
Elymus varnensis present, and either golden yellow and bent over OR rotten gray and bent over.

HYDROLOGY

NO **Recorded Data(Describe in Remarks):**
- N/A **Stream, Lake or Tide Gauge**
- N/A **Aerial Photographs**
- N/A **Other**

YES **No Recorded Data**

Field Observations

Depth of Surface Water:	N/A *(in.)*
Depth to Free Water in Pit:	N/A *(in.)*
Depth to Saturated Soil:	<= 4.0 *(in.)*

Wetland Hydrology Indicators

Primary Indicators
- NO **Inundated**
- YES **Saturated in Upper 12 Inches**
- NO **Water Marks**
- NO **Drift Lines**
- NO **Sediment Deposits**
- NO **Drainage Patterns in Wetlands**

Secondary Indicators
- NO **Oxidized Root Channels in Upper 12 Inches**
- NO **Water-Stained Leaves**
- NO **Local Soil Survey Data**
- YES **FAC-Neutral Test**
- NO **Other(Explain in Remarks)**

Remarks:

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

Project/Site:	Little Muddy Creek Wetland Mitigation 2006	**Project No:** B43054	**Date:** 23-Aug-2006
Applicant/Owner:	-Montana Department of Transportation-		**County:** Cascade
Investigators:	Andrea Pipp		**State:** Montana
			Plot ID: Soil Pit 7

SOILS

Map Unit Name (Series and Phase): Lallie Silty Clay Loam
Map Symbol: 119 **Drainage Class:** **Mapped Hydric Inclusion?**
Taxonomy (Subgroup): Frigid Typic fluvaquents **Field Observations Confirm Mapped Type?** Yes (No)
Profile Description

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Color (Munsell Moist)	Mottle Abundance/Contrast		Texture, Concretions, Structure, etc
0-12	A	2.5Y4/1	7.5YR4/6	N/A	N/A	Clay

Hydric Soil Indicators:
- NO **Histosol**
- NO **Histic Epipedon**
- NO **Sulfidic Odor**
- NO **Aquic Moisture Regime**
- NO **Reducing Conditions**
- YES **Gleyed or Low Chroma Colors**
- NO **Concretions**
- NO **High Organic Content in Surface Layer in Sandy Soils**
- NO **Organic Streaking in Sandy Soils**
- NO **Listed on Local Hydric Soils List**
- NO **Listed on National Hydric Soils List**
- NO **Other (Explain in Remarks)**

Remarks:

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	(Yes) No	**Is the Sampling Point within the Wetland?** (Yes) No
Wetland Hydrology Present?	(Yes) No	
Hydric Soils Present?	(Yes) No	

Remarks:

WetForm[tm]

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

Project/Site:	Little Muddy Creek Wetland Mitigation 2006	**Project No:** B43054	**Date:** 23-Aug-2006
Applicant/Owner:	-Montana Department of Transportation-		**County:** Cascade
Investigators:	Andrea Pipp		**State:** Montana
			Plot ID: Soil Pit 8

Do Normal Circumstances exist on the site?	(Yes) No	**Community ID:** Emergent
Is the site significantly disturbed (Atypical Situation:)?	Yes (No)	**Transect ID:**
Is the area a potential Problem Area?	Yes (No)	**Field Location:**
(If needed, explain on the reverse side)		**Outlet Channel**

VEGETATION (USFWS Region No. 9)

Dominant Plant Species(Latin/Common)	Stratum	Indicator	Plant Species(Latin/Common)	Stratum	Indicator
Alisma gramineum	Herb	OBL	*Hordeum jubatum*	Herb	FAC+
Water-Plantain,Narrow-Leaf			Barley,Fox-Tail		
Typha latifolia	Herb	OBL			
Cattail,Broad-Leaf					

Percent of Dominant Species that are OBL, FACW or FAC: (excluding FAC-) 3/3 = 100.00%

FAC Neutral: 2/2 = 100.00%

Numeric Index: 5/3 = 1.67

Remarks:

HYDROLOGY

NO **Recorded Data(Describe in Remarks):**
- N/A **Stream, Lake or Tide Gauge**
- N/A **Aerial Photographs**
- N/A **Other**

YES **No Recorded Data**

Field Observations

Depth of Surface Water:	N/A *(in.)*
Depth to Free Water in Pit:	= 0.5 *(in.)*
Depth to Saturated Soil:	= 0.0 *(in.)*

Wetland Hydrology Indicators

Primary Indicators
- NO **Inundated**
- YES **Saturated in Upper 12 Inches**
- NO **Water Marks**
- NO **Drift Lines**
- NO **Sediment Deposits**
- NO **Drainage Patterns in Wetlands**

Secondary Indicators
- NO **Oxidized Root Channels in Upper 12 Inches**
- NO **Water-Stained Leaves**
- NO **Local Soil Survey Data**
- YES **FAC-Neutral Test**
- NO **Other(Explain in Remarks)**

Remarks:

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

Project/Site:	Little Muddy Creek Wetland Mitigation 2006	**Project No:** B43054	**Date:** 23-Aug-2006
Applicant/Owner:	-Montana Department of Transportation-		**County:** Cascade
Investigators:	Andrea Pipp		**State:** Montana
			Plot ID: Soil Pit 8

SOILS

Map Unit Name (Series and Phase): Absher-Noble Complex, 0-5% slopes

Map Symbol: 10 **Drainage Class:** moderately well drained **Mapped Hydric Inclusion?**

Taxonomy (Subgroup): Fine montmorillonitic Borollic Natragid **Field Observations Confirm Mapped Type?** Yes (No)

Profile Description

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Color (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc
0-12	A	2.5Y4/1	10YR4/6	Many Faint	Clay

Hydric Soil Indicators:
- NO **Histosol**
- NO **Histic Epipedon**
- NO **Sulfidic Odor**
- NO **Aquic Moisture Regime**
- NO **Reducing Conditions**
- YES **Gleyed or Low Chroma Colors**
- NO **Concretions**
- NO **High Organic Content in Surface Layer in Sandy Soils**
- NO **Organic Streaking in Sandy Soils**
- NO **Listed on Local Hydric Soils List**
- NO **Listed on National Hydric Soils List**
- NO **Other (Explain in Remarks)**

Remarks:

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	(Yes) No	**Is the Sampling Point within the Wetland?** (Yes) No
Wetland Hydrology Present?	(Yes) No	
Hydric Soils Present?	(Yes) No	

Remarks:

WetForm™

MDT MONTANA WETLAND ASSESSMENT FORM (revised May 25, 1999)

1. Project Name: Little Muddy Creek Wetland Mitigation Site **2. Project #:** STPX 7(38) **Control #:** 5033

3. Evaluation Date: 8/23/2006 **4. Evaluator(s):** A. Pipp **5. Wetland / Site #(s):** All Wetlands

6. Wetland Location(s) i. T: 19 N **R:** 1 E **S:** 30, 31, 32 **T:** __ N **R:** __ E **S:** _____

ii. Approx. Stationing / Mileposts: _____

iii. Watershed: 7 - Missouri / Sun / Smith **GPS Reference No. (if applies):** _____

Other Location Information: Approximately 9 miles southwest of Ulm, MT. Along the Little Muddy Creek.

7. A. Evaluating Agency MDT

B. Purpose of Evaluation:

- ☐ Wetlands potentially affected by MDT project
- ☐ Mitigation wetlands; pre-construction
- ☒ Mitigation wetlands; post-construction
- ☐ Other

8. Wetland Size (total acres): _____ (visually estimated)
102.45 (measured, e.g. GPS)

9. Assessment Area (total acres): _____ (visually estimated)
188.25 (measured, e.g. GPS)

Comments: _____

10. CLASSIFICATION OF WETLAND AND AQUATIC HABITATS IN AA

HGM CLASS [1]	SYSTEM [2]	SUBSYSTEM [2]	CLASS [2]	WATER REGIME [2]	MODIFIER [2]	% OF AA
Riverine	Lacustrine	Littoral	Aquatic Bed	Permanently Flooded	Excavated/Impounded	27
Riverine	Lacustrine	Littoral	Emergent Wetland	Seasonally Flooded	Excavated/Impounded	27
Riverine	Lacustrine	Littoral	Unconsolidated Bottom	Permanently Flooded	Excavated/Impounded	40
Riverine	Lacustrine	Littoral	Unconsolidated Shore	Seasonally Flooded	Excavated/Impounded	6

[1] = Smith et al. 1995. [2] = Cowardin et al. 1979.

Comments:

11. ESTIMATED RELATIVE ABUNDANCE (of similarly classified sites within the same Major Montana Watershed Basin)
Common **Comments:** ____

12. GENERAL CONDITION OF AA

i. Regarding Disturbance: (Use matrix below to select appropriate response.)

Conditions Within AA	Predominant Conditions Adjacent (within 500 Feet) To AA		
	Land managed in predominantly natural state; is not grazed, hayed, logged, or otherwise converted; does not contain roads or buildings.	Land not cultivated, but moderately grazed or hayed or selectively logged or has been subject to minor clearing; contains few roads or buildings.	Land cultivated or heavily grazed or logged; subject to substantial fill placement, grading, clearing, or hydrological alteration; high road or building density.
AA occurs and is managed in predominantly a natural state; is not grazed, hayed, logged, or otherwise converted; does not contain roads or occupied buildings.	low disturbance	---	---
AA not cultivated, but moderately grazed or hayed or selectively logged or has been subject to relatively minor clearing, or fill placement, or hydrological alteration; contains few roads or buildings.	---	---	---
AA cultivated or heavily grazed or logged; subject to relatively substantial fill placement, grading, clearing, or hydrological alteration; high road or building density.	---	---	---

Comments: (types of disturbance, intensity, season, etc.) AA is now managed for wildlife habitat. Adjacent to AA the fields are in CRP.

ii. Prominent weedy, alien, & introduced species: Cirsium arvense occurs in a few dense patches. Kochia scoparia is common.

iii. Briefly describe AA and surrounding land use / habitat: AA has been excavated and flooded to pond water for waterfowl habitat. Surrounding land use was cultivated crop fields that are now in the CRP program.

13. STRUCTURAL DIVERSITY (Based on 'Class' column of #10 above.)

Number of 'Cowardin' Vegetated Classes Present in AA	≥3 Vegetated Classes or ≥ 2 if one class is forested	2 Vegetated Classes or 1 if forested	≤ 1 Vegetated Class
Select Rating	---	Moderate	---

Comments: _____

14A. HABITAT FOR FEDERALLY LISTED OR PROPOSED THREATENED OR ENDANGERED PLANTS AND ANIMALS

i. AA is Documented (D) or Suspected (S) to contain (check box):

Primary or Critical habitat **(list species)**	☐ D ☐ S	_____
Secondary habitat **(list species)**	☐ D ☒ S	Bald Eagle
Incidental habitat **(list species)**	☐ D ☐ S	_____
No usable habitat	☐ D ☐ S	_____

ii. Rating (Based on the strongest habitat chosen in 14A(i) above, find the corresponding rating of High (H), Moderate (M), or Low (L) for this function.

Highest Habitat Level	doc/primary	sus/primary	doc/secondary	sus/secondary	doc/incidental	sus/incidental	none
Functional Point & Rating	---	---	---	.7 (M)	---	---	---

If documented, list the source (e.g., observations, records, etc.)**:** Bald Eagles have been observed along Little Muddy Creek. In 2006 the landowner has seen Bald Eagles in vicinity of the site.

14B. HABITAT FOR PLANTS AND ANIMALS RATED AS S1, S2, OR S3 BY THE MONTANA NATURAL HERITAGE PROGRAM.
Do not include species listed in 14A(i).

i. AA is Documented (D) or Suspected (S) to contain (check box):

Primary or Critical habitat **(list species)**	☐ D ☐ S	_____
Secondary habitat **(list species)**	☐ D ☐ S	_____
Incidental habitat **(list species)**	☐ D ☒ S	Ferruginous Hawk, Black Tern, Peregrine Falcon
No usable habitat	☐ D ☐ S	_____

ii. Rating: Based on the strongest habitat chosen in 14B(i) above, find the corresponding rating of High (H), Moderate (M), or Low (L) for this function.

Highest Habitat Level	doc/primary	sus/primary	doc/secondary	sus/secondary	doc/incidental	sus/incidental	none
Functional Point & Rating	---	---	---	---	---	.1 (L)	---

If documented, list the source (e.g., observations, records, etc.)**:** Ferruginous Hawk observed flying above site in May 2006.

14C. GENERAL WILDLIFE HABITAT RATING

i. Evidence of overall wildlife use in the AA: Check either substantial, moderate, or low.

☒ **Substantial** (based on any of the following)
- ☒ observations of abundant wildlife #s or high species diversity (during any period)
- ☐ abundant wildlife sign such as scat, tracks, nest structures, game trails, etc.
- ☒ presence of extremely limiting habitat features not available in the surrounding area
- ☐ interviews with local biologists with knowledge of the AA

☐ **Low** (based on any of the following)
- ☐ few or no wildlife observations during peak use periods
- ☐ little to no wildlife sign
- ☐ sparse adjacent upland food sources
- ☐ interviews with local biologists with knowledge of AA

☐ **Moderate** (based on any of the following)
- ☐ observations of scattered wildlife groups or individuals or relatively few species during peak periods
- ☐ common occurrence of wildlife sign such as scat, tracks, nest structures, game trails, etc.
- ☐ adequate adjacent upland food sources
- ☐ interviews with local biologists with knowledge of the AA

ii. Wildlife Habitat Features: Working from top to bottom, select the AA attribute to determine the exceptional (E), high (H), moderate (M), or low (L) rating. Structural diversity is from 13. For class cover to be considered evenly distributed, vegetated classes must be within 20% of each other in terms of their percent composition in the AA (see 10). Duration of Surface Water: P/P = permanent/perennial; S/I = seasonal/intermittent; T/E = temporary/ephemeral; A= absent.

Structural Diversity (from 13)	☐**High**								☒**Moderate**								☐**Low**			
Class Cover Distribution (all vegetated classes)	☐**Even**				☐**Uneven**				☒**Even**				☐**Uneven**				☐**Even**			
Duration of Surface Water in ≥ 10% of AA	**P/P**	**S/I**	**T/E**	**A**	**P/P**	**S/I**	**T/E**	**A**	**P/P**	**S/I**	**T/E**	**A**	**P/P**	**S/I**	**T/E**	**A**	**P/P**	**S/I**	**T/E**	**A**
Low disturbance at AA (see 12)	--	--	--	--	--	--	--	--	E	--	--	--	--	--	--	--	--	--	--	--
Moderate disturbance at AA (see 12)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
High disturbance at AA (see 12)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

iii. Rating: Use 14C(i) and 14C(ii) above and the matrix below to arrive at the functional point and rating of exceptional (E), high (H), moderate (M), or low (L) for this function.

Evidence of Wildlife Use from 14C(i)	**Wildlife Habitat Features Rating** from 14C(ii)			
	☒ **Exceptional**	☐ **High**	☐ **Moderate**	☐ **Low**
Substantial	1 (E)	--	--	--
Moderate	--	--	--	--
Low	--	--	--	--

Comments: _____

14D. GENERAL FISH / AQUATIC HABITAT RATING ☐ **NA** (proceed to 14E)

If the AA is not or was not historically used by fish due to lack of habitat or excessive gradient, then check the NA box above.
Assess if the AA is used by fish or the existing situation is "correctable" such that the AA could be used by fish [*e.g.* fish use is precluded by perched culvert or other barrier, etc.]. If fish use occurs in the AA but is not desired from a resource management perspective (*e.g.* fish use within an irrigation canal], then Habitat Quality [14D(i)] below should be marked as "Low", applied accordingly in 14D(ii) below, and noted in the comments.

i. Habitat Quality: Pick the appropriate AA attributes in matrix to determine the quality rating of exceptional (E), high (H), moderate (M), or low (L).

Duration of Surface Water in AA	☒**Permanent/Perennial**			☐**Seasonal / Intermittent**			☐**Temporary / Ephemeral**		
Cover - % of waterbody in AA containing cover objects (*e.g.* submerged logs, large rocks & boulders, overhanging banks, floating-leaved vegetation)	**>25%**	**10-25%**	**<10%**	**>25%**	**10-25%**	**<10%**	**>25%**	**10-25%**	**<10%**
Shading - >75% of streambank or shoreline of AA contains riparian or wetland scrub-shrub or forested communities	--	--	--	--	--	--	--	--	--
Shading – 50 to 75% of streambank or shoreline of AA contains riparian or wetland scrub-shrub or forested communities.	--	--	--	--	--	--	--	--	--
Shading - < 50% of streambank or shoreline of AA contains riparian or wetland scrub-shrub or forested communities.	--	--	M	--	--	--	--	--	--

ii. Modified Habitat Quality: Is fish use of the AA precluded or significantly reduced by a culvert, dike, other man-made structure or activity **or** is the waterbody included on the 'MDEQ list of waterbodies in need of TMDL development' with 'Probable Impaired Uses' listed as cold or warm water fishery or aquatic life support**?**
☐ **Y** ☐ **N** If yes, reduce the rating from 14D(i) by one level and check the modified habitat quality rating: ☐ E ☐ H ☐ M ☒ L

iii. Rating: Use the conclusions from 14D(i) and 14D(ii) above and the matrix below to arrive at the functional point and rating of exceptional (E), high (H), moderate (M), or low (L).

Types of Fish Known or Suspected within AA	**Modified Habitat Quality** from 14D(ii)			
	☐ **Exceptional**	☐ **High**	☐ **Moderate**	☒ **Low**
Native game fish	--	--	--	--
Introduced game fish	--	--	--	.4 (M)
Non-game fish	--	--	--	--
No fish	--	--	--	--

Comments: Carp have been found in Little Muddy Creek prior to construction of the mitigation site. It is possible that carp or other fish species could get trapped inside the mitigation site when water flows from Little Muddy Creek.

14E. FLOOD ATTENUATION ☐ **NA** (proceed to 14F)

Applies only to wetlands subject to flooding via in-channel or overbank flow. If wetlands in AA do not flood from in-channel or overbank flow, then check NA.

i. Rating: Working from top to bottom, mark the appropriate attributes to arrive at the functional point and rating of high (H), moderate (M), or low (L) for this function.

Estimated wetland area in AA subject to periodic flooding	☒ **≥ 10 acres**			☐ **<10, >2 acres**			☐ **≤2 acres**		
% of flooded wetland classified as forested, scrub/shrub, or both	**75%**	**25-75%**	**<25%**	**75%**	**25-75%**	**<25%**	**75%**	**25-75%**	**<25%**
AA contains **no outlet or restricted outlet**	--	--	.6 (M)	--	--	--	--	--	--
AA contains **unrestricted outlet**	--	--	--	--	--	--	--	--	--

ii. Are residences, businesses, or other features which may be significantly damaged by floods located within 0.5 miles downstream of the AA? (check)
☒**Y** ☐**N** **Comments:** One residence occurs within 0.5 miles downstream of the project site.

14F. SHORT AND LONG TERM SURFACE WATER STORAGE ☐ **NA** (proceed to 14G)

Applies to wetlands that flood or pond from overbank or in-channel flow, precipitation, upland surface flow, or groundwater flow.
If no wetlands in the AA are subject to flooding or ponding, then check NA above.

i. Rating: Working from top to bottom, use the matrix below to arrive at the functional point and rating of high (H), moderate (M), or low (L) for this function.
P/P = permanent/perennial; S/I = seasonal/intermittent; T/E = temporary/ephemeral.

Estimated maximum acre feet of water contained in wetlands within the AA that are subject to periodic flooding or ponding**.**	☒ **>5 acre feet**			☐ **<5, >1 acre feet**			☐ **≤1 acre foot**		
Duration of surface water at wetlands within the AA	**P/P**	**S/I**	**T/E**	**P/P**	**S/I**	**T/E**	**P/P**	**S/I**	**T/E**
Wetlands in AA flood or pond **≥ 5 out of 10 years**	1 (H)	--	--	--	--	--	--	--	--
Wetlands in AA flood or pond **< 5 out of 10 years**	--	--	--	--	--	--	--	--	--

Comments: _____

14G. SEDIMENT/NUTRIENT/TOXICANT RETENTION AND REMOVAL ☐ **NA** (proceed to 14H)

Applies to wetlands with the potential to receive excess sediments, nutrients, or toxicants through influx of surface or ground water or direct input.
If no wetlands in the AA are subject to such input, check NA above.

i. Rating Working from top to bottom, use the matrix below to arrive at the functional point and rating of high (H), moderate (M), or low (L) for this function.

Sediment, Nutrient, and Toxicant Input Levels Within AA	AA receives or surrounding land use has potential to deliver low to moderate levels of sediments, nutrients, or compounds such that other functions are not substantially impaired. Minor sedimentation, sources of nutrients or toxicants, or signs of eutrophication present.				Waterbody on MDEQ list of waterbodies in need of TMDL development for "probable causes" related to sediment, nutrients, or toxicants **or** AA receives or surrounding land use has potential to deliver high levels of sediments, nutrients, or compounds such that other functions are substantially impaired. Major sedimentation, sources of nutrients or toxicants, or signs of eutrophication present.			
% cover of wetland vegetation in AA	☐ **≥ 70%**		☒ **< 70%**		☐ **≥ 70%**		☐ **< 70%**	
Evidence of flooding or ponding in AA	☐ **Yes**	☐ **No**	☒ **Yes**	☐ **No**	☐ **Yes**	☐ **No**	☐ **Yes**	☐ **No**
AA contains **no or restricted outlet**	--	--	.7 (M)	--	--	--	--	--
AA contains **unrestricted outlet**	--	--	--	--	--	--	--	--

Comments: _____

14H. SEDIMENT/SHORELINE STABILIZATION ☐ **NA** (proceed to 14I)

Applies only if AA occurs on or within the banks of a river, stream, or other natural or man-made drainage, or on the shoreline of a standing water body that is subject to wave action. If this does not apply, then check NA above.

i. Rating: Working from top to bottom, use the matrix below to arrive at the functional point and rating exceptional (E), high (H), moderate (M), or low (L) for this function.

% Cover of wetland streambank or shoreline by species with deep, binding rootmasses.	Duration of Surface Water Adjacent to Rooted Vegetation		
	☒Permanent / Perennial	☐Seasonal / Intermittent	☐Temporary / Ephemeral
≥ 65 %	--	--	--
35-64 %	--	--	--
< 35 %	.3 (L)	--	--

Comments: _____

14I. PRODUCTION EXPORT / FOOD CHAIN SUPPORT

i. Rating: Working from top to bottom, use the matrix below to arrive at the functional point and rating of high (H), moderate (M), or low (L) for this function. **A** = acreage of vegetated component in the AA. **B** = structural diversity rating from #13. **C** = Yes (Y) or No (N) as to whether or not the AA contains a surface or subsurface outlet. **P/P** = permanent/perennial; **S/I** = seasonal/intermittent; **T/E/A**= temporary/ephemeral/absent.

A	☒ Vegetated component >5 acres						☐ Vegetated component 1-5 acres						☐ Vegetated component <1 acre					
B	☐ High		☒ Moderate		☐ Low		☐ High		☐ Moderate		☐ Low		☐ High		☐ Moderate		☐ Low	
C	☐Y	☐N	☒Y	☐N	☐Y	☐N	☐Y	☐N	☐Y	☐N	☐Y	☐N	☐Y	☐N	☐Y	☐N	☐Y	☐N
P/P	--	--	.9H	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
S/I	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
T/E/A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Comments: _____

14J. GROUNDWATER DISCHARGE / RECHARGE (DR) (Check the indicators in i & ii below that apply to the AA.)

i. ☐ **Discharge Indicators**

- ☐ Springs are known or observed.
- ☐ Vegetation growing during dormant season / drought.
- ☐ Wetland occurs at the toe of a natural slope.
- ☐ Seeps are present at the wetland edge.
- ☐ AA permanently flooded during drought periods.
- ☐ Wetland contains an outlet, but no inlet.
- ☐ Other _____

ii. ☐ **Recharge Indicators**

- ☐ Permeable substrate presents without underlying impeding layer.
- ☐ Wetland contains inlet but not outlet.
- ☐ Other _____

iii. Rating: Use information from 14J(i) and 14J(ii) above and the table below to arrive at the functional point and rating of high (H) or low (L) for this function.

Criteria	Functional Point and Rating
AA has known Discharge/Recharge area or one or more indicators of D/R present	--
No Discharge/Recharge indicators present	0.1 (L)
Available Discharge/Recharge information inadequate to rate AA D/R potential	--

Comments: Site filled and maintained by surface water.

14K. UNIQUENESS

i. Rating: Working from top to bottom, use the matrix below to arrive at the functional point and rating of high (H), moderate (M), or low (L) for this function.

Replacement Potential	AA contains fen, bog, warm springs or mature (>80 yr-old) forested wetland or plant association listed as "S1" by the MTNHP.			AA does not contain previously cited rare types and structural diversity (#13) is high or contains plant association listed as "S2" by the MTNHP.			AA does not contain previously cited rare types or associations and structural diversity (#13) is low-moderate.		
Estimated Relative Abundance from 11	☐rare	☐common	☐abundant	☐rare	☐common	☐abundant	☐rare	☒common	☐abundant
Low disturbance at AA (12i)	--	--	--	--	--	--	--	.4M	--
Moderate disturbance at AA (12i)	--	--	--	--	--	--	--	--	--
High disturbance at AA (12i)	--	--	--	--	--	--	--	--	--

Comments: _____

14L. RECREATION / EDUCATION POTENTIAL

i. Is the AA a known recreational or educational site? ☐ **Yes** [**Rate** ☐ **High (1.0)**, then proceed to 14L(ii) only] ☒ **No** [Proceed to 14L(iii)]

ii. Check categories that apply to the AA: ☒ Educational / scientific study ☐ Consumptive rec. ☐ Non-consumptive rec. ☐ Other

iii. Based on the location, diversity, size, and other site attributes, is there a strong potential for recreational or educational use?

☒ **Yes** [Proceed to 14L (ii) and then 14L(iv)] ☐ **No** [Rate as low in 14L(iv)]

iv. Rating Use the matrix below to arrive at the functional point and rating of high (H), moderate (M), or low (L) for this function.

Ownership	Disturbance at AA from 12(i)		
	☒ Low	☐ Moderate	☐ High
Public ownership	--	--	--
Private ownership	.7(M)	--	--

Comments: Site located near Cascade and Ulm, providing potential educational opportunities.

FUNCTION, VALUE SUMMARY, AND OVERALL RATING

Function and Value Variables	Rating	Actual Functional Points	Possible Functional Points	Functional Units (Actual Points x Estimated AA Acreage)
A. Listed/Proposed T&E Species Habitat	moderate	0.70	1	
B. MT Natural Heritage Program Species Habitat	low	0.10	1	
C. General Wildlife Habitat	exceptional	1.00	1	
D. General Fish/Aquatic Habitat	moderate	0.40	1	
E. Flood Attenuation	moderate	0.60	1	
F. Short and Long Term Surface Water Storage	high	1.00	1	
G. Sediment/Nutrient/Toxicant Removal	moderate	0.70	1	
H. Sediment/Shoreline Stabilization	low	0.30	1	
I. Production Export/Food Chain Support	high	0.90	1	
J. Groundwater Discharge/Recharge	low	0.10	1	
K. Uniqueness	moderate	0.40	1	
L. Recreation/Education Potential	moderate	0.7	1	
	Total:	**6.90**	**12.00**	____
		Percent of Total Possible Points:	**58%** (Actual / Possible) x 100 [rd to nearest whole #]	

Category I Wetland: (Must satisfy **one** of the following criteria. If not satisfied, proceed to Category II.)
- ☐ Score of 1 functional point for Listed/Proposed Threatened or Endangered Species; **or**
- ☐ Score of 1 functional point for Uniqueness; **or**
- ☐ Score of 1 functional point for Flood Attenuation **and** answer to Question 14E(ii) is "yes"; **or**
- ☐ Percent of total Possible Points is > 80%.

Category II Wetland: (Criteria for Category I not satisfied **and** meets any **one** of the following Category II criteria. If not satisfied, proceed to Category IV.)
- ☐ Score of 1 functional point for Species Rated S1, S2, or S3 by the MT Natural Heritage Program; **or**
- ☒ Score of .9 or 1 functional point for General Wildlife Habitat; **or**
- ☐ Score of .9 or 1 functional point for General Fish/Aquatic Habitat; **or**
- ☐ "High" to "Exceptional" ratings for **both** General Wildlife Habitat **and** General Fish / Aquatic Habitat; **or**
- ☐ Score of .9 functional point for Uniqueness; **or**
- ☐ Percent of total possible points is > 65%.

☐ **Category III Wetland:** (Criteria for Categories I, II, or IV not satisfied.)

Category IV Wetland: (Criteria for Categories I or II are not satisfied **and** all of the following criteria are met; If not satisfied, return to Category III.)
- ☐ "Low" rating for Uniqueness; **and**
- ☐ "Low" rating for Production Export / Food Chain Support; **and**
- ☐ Percent of total possible points is < 30%.

OVERALL ANALYSIS AREA (AA) RATING: (Check appropriate category based on the criteria outlined above.)

☐ **I** ☒ **II** ☐ **III** ☐ **IV**

Appendix C

2006 REPRESENTATIVE PHOTOGRAPHS

MDT Wetland Mitigation Monitoring
Little Muddy Creek
Cascade County, Montana

2006 LITTLE MUDDY WETLAND MITIGATION SITE

Photo 1: At Photo Point 1 looking in the 136˚ direction.

Photo 2: At Photo Point 1 looking in the 210˚ direction.

Photo 3: View is of the outflow behind Photo Point 1 in the 40˚ direction. Outflow is of Type 12 – *Alisma* wetland.

Photo 4: At Photo Point 2 looking in the 180˚ direction.

Photo 5: At Photo Point 3 looking in the 130˚ direction at the inlet channel and the Type 7 - *Rumex* wetland fringe.

Photo 6: At Photo Point 4 looking in the 71˚ direction at the inlet control structure with the diversion structure in background.

2006 LITTLE MUDDY WETLAND MITIGATION SITE

Photo 7: View is of the inlet channel at Photo Point 4 in the 208˚ direction. Inlet has Type 7 - *Rumex* wetland fringe.

Photo 8: View is of Type 8 - *Polygonum / Potamogeton* wetland near Photo Point 5. Sprigs of *Polygonum aviculare* have colonized inundated land.

Photo 9: At Photo Point 6 looking in the 317˚ direction with Square Butte in the background.

Photo 12: View is northwest at Type 9 – *Polygonum aviculare. P. aviculare, T. latifolia,* and algae have colonized saturated soils.

Photo 10: View is in the 10˚ direction at the start of Transect 1.

Photo 11: View is in the 266˚ direction at the start of Transect 2. *Rumex maritimus* is along shore.

Photo 13: View is east within Type 10 – *Typha latifolia* wetland. Dense *T. latifolia* and *Sisymbrium* have colonized this area.

Photo 14: View is southwest within Type 10a – *Typha latifolia*. Wetland plants are emerging within the former dry upland habitat.

Appendix D

PROJECT PLAN SHEET

MDT Wetland Mitigation Monitoring
Little Muddy Creek
Cascade County, Montana

PT	UTM U.S. FT. NORTH	EAST
1	17,206,802.93	1,479,211.74
2	17,206,824.09	1,479,186.24
3	17,207,097.31	1,479,866.03
4	17,208,211.15	1,479,827.45
5	17,208,211.15	1,479,315.49
6	17,209,777.74	1,479,315.49
7	17,209,777.74	1,480,148.29
8	17,210,102.92	1,480,302.56
9	17,210,876.66	1,478,550.35
10	17,212,252.48	1,477,267.61
11	17,212,307.25	1,477,184.31
12	17,212,550.94	1,477,137.32
13	17,212,746.02	1,477,182.36
14	17,212,971.41	1,477,278.90
15	17,213,023.25	1,477,338.50
16	17,213,177.52	1,477,751.03
17	17,213,152.97	1,477,796.21
18	17,213,041.30	1,477,730.02
19	17,213,080.43	1,477,895.22
20	17,212,944.10	1,477,385.42
21	17,212,712.19	1,477,266.74
22	17,212,361.50	1,477,265.48
23	17,212,321.77	1,477,326.05
24	17,210,948.45	1,478,614.35
25	17,210,665.53	1,479,318.72
26	17,210,498.84	1,479,714.77
27	17,209,818.99	1,481,718.34
28	17,209,301.53	1,483,119.54
29	17,209,252.94	1,484,082.10
30	17,209,833.31	1,484,093.44
31	17,209,827.70	1,484,152.56
32	17,209,249.76	1,484,123.82
33	17,209,240.83	1,484,296.98
34	17,209,003.66	1,484,314.61
35	17,207,988.54	1,484,320.98
36	17,207,933.46	1,484,135.82
37	17,207,807.48	1,482,747.38
38	17,207,138.63	1,480,886.36

STAGE-STORAGE DATA

ELEVATION	AREA	VOLUME
3364.0	.30	8.0
3365.0	9.5	5.8
3366.0	40.9	30.2
3367.0	72.8	86.0
3368.0	155.8	290.8
FULL SERVICE LEVEL 3369.0	216.2	386.8

HORIZONTAL CONTROL - IS MONTANA UTM ZONE 12 COORDINATES DESCRIBED IN FEET AND CALIBRATED TO USCGS TRIANGULATION STATION STAMPED "MUDDY CREEK HEAD,1949". THIS IS A FIRST ORDER CONTROL POINT FROM GPS INFORMATION TAKEN WITH TRIMBLE 4400 GPS RECEIVERS ON NOVEMBER 30, 1999 FROM WGS84 ELLIPSOID.

VERTICAL CONTROL - WAS CALIBRATED FROM GPS INFORMATION TO USCGS BENCH MARK "DE38 1961" WHICH IS A SECOND ORDER CLASS 0 BENCH MARK WITH A PUBLISHED ELEVATION OF 3465.83 FEET ON THE NAVD 88.

DUCKS UNLIMITED INC.
GREAT PLAINS REGIONAL OFFICE

PROJECT NO. MT-0192-001
LITTLE MUDDY WETLAND
PROJECT TOPOGRAPHY
CONSTRUCTION FEATURES

DESIGNED BY: R.C.S.
DRAWN BY: K TSP
SURVEYED BY: G.L.J.
CHECKED BY: BRK

DATE: 6-27-2000
SHEET NO. 2 OF 10
APPROVED BY:
APPROVED BY:

Appendix E

BIRD SURVEY PROTOCOL
GPS PROTOCOL

MDT Wetland Mitigation Monitoring
Little Muddy Creek
Cascade County, Montana

BIRD SURVEY PROTOCOL

The following is an outline of the MDT Wetland Mitigation Site Monitoring Bird Survey Protocol. Though each site is vastly different, the bird survey data collection methods must be standardized to a certain degree to increase repeatability. An Area Search within a restricted time frame will be used to collect the following data: a bird species list, density, behavior, and habitat-type use. There will be some decisions that team members must make to fit the protocol to their particular site. Each of the following sections and the desired result describes the protocol established to reflect bird species use over time.

Species Use within the Mitigation Wetland: Survey Method

Result: To conduct a bird survey of the wetland mitigation site within a restricted period of time and the budget allotment.

Sites that can be circumambulated or walked throughout.

These types of sites will include ponds, enhanced historic river channels, wet meadows, and any area that can be surveyed from the entirety of its perimeter or walked throughout. If the wetland is not uncomfortably inundated, conduct several "meandering" transects through the site in an orderly fashion (record the number and approximate location/direction of the transects in the field notebook; they do not have to be formalized or staked). If a very small portion of the site cannot be crossed due to inundation, this method will also apply. Though the sizes of the site vary, each site will require surveying to the fullest extent possible within a set time limit. The optimum times to conduct the survey are in the morning hours. Conduct the survey from sunrise to no later than 11:00 AM. (Note: some sites may have to be surveyed in the late afternoon or evening due to time constraints or weather; if this is the case, record the time of day and include this information in your report discussion.) If the survey is completed before 11:00 AM and no additions are being made to the list, then the task is complete. The overall limiting factor regarding the number of hours that are spent conducting this survey is the number of budgeted hours; this determination must be made by site by each individual.

In many cases, binoculars will be the only instrument that is needed to identify and count the birds using the wetland. If the wetland includes deep water habitat that can not be assessed with binoculars, then a scope and tripod are necessary. If this is the case, establish as many lookout posts as necessary from key vantage points to collect the data. Depending on the size of the open water, more time may be spent viewing the mitigation area from these vantage points than is spent walking the peripheries of more shallow-water wetlands.

Sites that cannot be circumambulated.

These types of sites will include large-bodied waters, such as reservoirs, particularly those with deep water habitat (>6 ft) close to the shore and no wetland development in that area of the shoreline. If one area of the reservoir was graded in such a way to create or enhance the development of a wetland, then that will be the area in which the ambulatory bird survey is conducted. The team member must then determine the length of the shoreline that will be surveyed during each visit.

As stated above in the ambulatory site section, these large sites most likely will have to be surveyed from established vantage points.

Species Use within the Mitigation Wetland: Data Recording

Result: A complete list of bird species using the site, an estimate of bird densities and associated behaviors, and identification of habitat use.

1. Bird Species List

Record the bird species on the Bird Survey - Field Data Sheet using the appropriate 4-letter code of the common name. The coding uses the first two letters of the first two words of the birds' common name or if one name, the first four (4) letters. For example, mourning dove is coded MODO and mallard is MALL. If an unknown individual is observed, use the following protocol and define your abbreviation at the bottom of the field data sheet: unknown shorebird: UNSB; unknown brown bird (UNBR); unknown warbler (UNWA); unknown waterfowl (UNWF). For a flyover of a flock of unknown species, use a term that describes the birds' general characteristics and include the approximate flock size in parentheses; do not fill in the habitat column. For example, a flock of black, medium-sized birds could be coded: UNBB / FO (25). You may also note on the data sheet if that particular individual is using a constructed nest box.

2. Bird Density

In the office, sum the Bird Survey – Field Data Sheet data by species and by behavior. Record this data in the Bird Summary Table.

3. Bird Behavior

Bird behavior must be identified by what is known. When a species is simply observed, the behavior that it is immediately exhibiting is what is recorded. Only behaviors that have discreet descriptive terms should be used. The following terms are recommended: breeding pair individual (BP); foraging (F); flyover (FO); loafing (L; e.g. sleeping, roosting, floating with head tucked under wing are loafing behaviors); and, nesting (N). If more behaviors are observed that do have a specific descriptive word, use them and we will add it to the protocol; descriptive words or phrases such as "migrating" or "living on site" are unknown behaviors.

4. Bird Species Habitat Use

We are interested in what bird species are using which particular habitat within the mitigation wetlands. This data is easily collected by simply recording what habitat the species was initially observed. Use the following broad category habitat classifications: aquatic bed (AB - rooted floating, floating-leaved, or submergent vegetation); forested (FO); marsh (MA – cattail, bulrush, emergent vegetation, etc. with surface water); open water (OW – primarily unvegetated); scrub-shrub (SS); and upland buffer (UP); wet meadow (WM – sedges, rushes, grasses with little to no surface water). If other categories are observed onsite that are not suggested here, we will make a new category next year.

GPS Mapping and Aerial Photo Referencing Procedure

The wetland boundaries, photograph location points and sampling locations were field located with mapping grade Trimble Geo III GPS units. The data was collected with a minimum of three positions per feature using Course/Acquisition code. The collected data was then transferred to a PC and differentially corrected to the nearest operating Community Base Station. The corrected data was then exported to ACAD drawings in Montana State Plain Coordinates NAD 83 international feet.

The GPS positions collected and processed had a 68% accuracy of 7 feet except in isolated areas of Tasks .008 and .011, where it went to 12 feet. This is within the 1 to 5 meter range listed as the expected accuracy of the mapping grade Trimble GPS.

Aerial reference points were used to position the aerial photographs. This positioning did not remove the distortion inherent in all photos; this imagery is to be used as a visual aide only. The located wetland boundaries were given a final review by the wetland biologist and adjustments were made if necessary.

Any relationship of features located to easement or property lines are not to be construed from these figures. These relationships can only be determined with a survey by a licensed surveyor.