MONTANA DEPARTMENT OF TRANSPORTATION
WETLAND MITIGATION MONITORING REPORT

US HIGHWAY 93 ONSITE: PETERSON PROPERTY
LAKE COUNTY, MONTANA

PROJECT COMPLETED: 2007

MONITORING REPORT #9: DECEMBER 2017



Prepared for:

VISION ZERO
zero deaths · zero serious injuries
MONTANA DEPARTMENT OF TRANSPORTATION

2701 Prospect Avenue
Helena, Montana 59620

Prepared by:

RESPEC

820 North Montana Ave, Suite A
Helena, Montana 59601

MONTANA DEPARTMENT OF TRANSPORTATION WETLAND MITIGATION MONITORING REPORT: YEAR 2017

US HIGHWAY 93 ONSITE: PETERSON PROPERTY LAKE COUNTY, MONTANA

INITIAL CONSTRUCTION: 2007

MDT Project Numbers:
NH 5-2 (120) 20 (Bouchard, Jocko Spring Creek)
NH 5-2 (122) 31 (Mission Creek, Peterson)
NH-PLH 5-2 (142) 51 (Mud Creek)

USACE: NOW-2005-90-185
CSKT: ALCO #05-3255-185,195

prepared for

Montana Department of Transportation
2701 Prospect Avenue
Helena, Montana 59620

prepared by

RESPEC
820 North Montana Avenue, Suite A
Helena, Montana 59601

December 2017

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Cover: View from Photo-Point 2 looking east toward US Highway 93 and the Mission Mountains.

1.0 INTRODUCTION

The US Highway 93, 2017 Wetland Mitigation Monitoring Report documents the ninth year of monitoring at the Peterson property. Five US Highway 93 (US 93) on-site wetland mitigation sites (Jocko Spring Creek, Mission Creek, Bouchard, Peterson, and Mud Creek) were developed in cooperation with the permitting and natural resources staff from the Confederated Salish and Kootenai Tribes (CSKT) of the Flathead Nation to mitigate for wetland impacts associated with eight segments of the US 93 Evaro-to-Polson highway reconstruction project by the Montana Department of Transportation (MDT). Monitoring was concluded at the Bouchard and Mud Creek sites in 2013. These sites were part of stream and wetland mitigation associated with improvements to US 93 North. The 2009 wetland mitigation monitoring report for the US 93 project included monitoring results for the Jocko Spring Creek and Mission Creek mitigation sites. These sites were excluded from US 93 monitoring activities in 2010 after the US Army Corps of Engineers (USACE) and the CSKT Shoreline Protection Program acknowledged that the sites had met the required mitigation goals and objectives.

The remaining wetland mitigation site, US 93 Peterson, is located in Lake County within Watershed #3 – Lower Clark Fork, north of Saint Ignatius, Montana, near milepost 35, as shown in Figure 1-1. Figures A-2 and A-3 (Appendix A) show the monitoring activity locations and mapped site features, respectively. Appendix B contains the MDT Wetland Mitigation Site Monitoring form, the USACE Routine Wetland Determination Data forms [Environmental Laboratory, 1987], and the 1999 MDT Montana Wetland Assessment Method (MWAM) forms [Berglund, 1999]. Appendix C contains photographs of the project area, and Appendix D includes the project plan sheets. Appendix E provides an explanation for the crediting scheme approved for the US 93 Evaro-to-Polson project. Appendix F contains a copy of a letter from MDT to the USACE that describes maintenance needs for the site.

1.1 IMPACTS AND MITIGATION

Wetland impacts for the US 93 Evaro-to-Polson highway reconstruction project were identified in a wetland mitigation plan prepared by Herrera Environmental Consultants (Herrera). The impact totals for this report were based on information that was included in the 2004 mitigation plan, the 2007 monitoring report, and additional clarification from MDT. The 2004 wetland mitigation plan provided wetland mitigation concepts, identified wetland community types targeted for establishment, and calculated the wetland mitigation credits expected to be obtained from each site. The mitigation plan also specified the total acres of impacts predicted for project segments 4, 6, and 7. These acres were separated into impact totals based on the CSKT- and USACE-regulated wetlands. Mitigation crediting systems vary between the two agencies and are described in more detail in this section.

The CSKT-regulated wetlands were meant to mitigate for 20.70 acres of impacts, and the USACE-regulated wetlands were meant to mitigate for 18.32 acres of impacts. Table 1-1 shows the acreage of wetlands impacted within the three project segments. Table 1-2 lists each project segment, wetland mitigation site, mitigation type, and expected CSKT and USACE wetland mitigation credits.

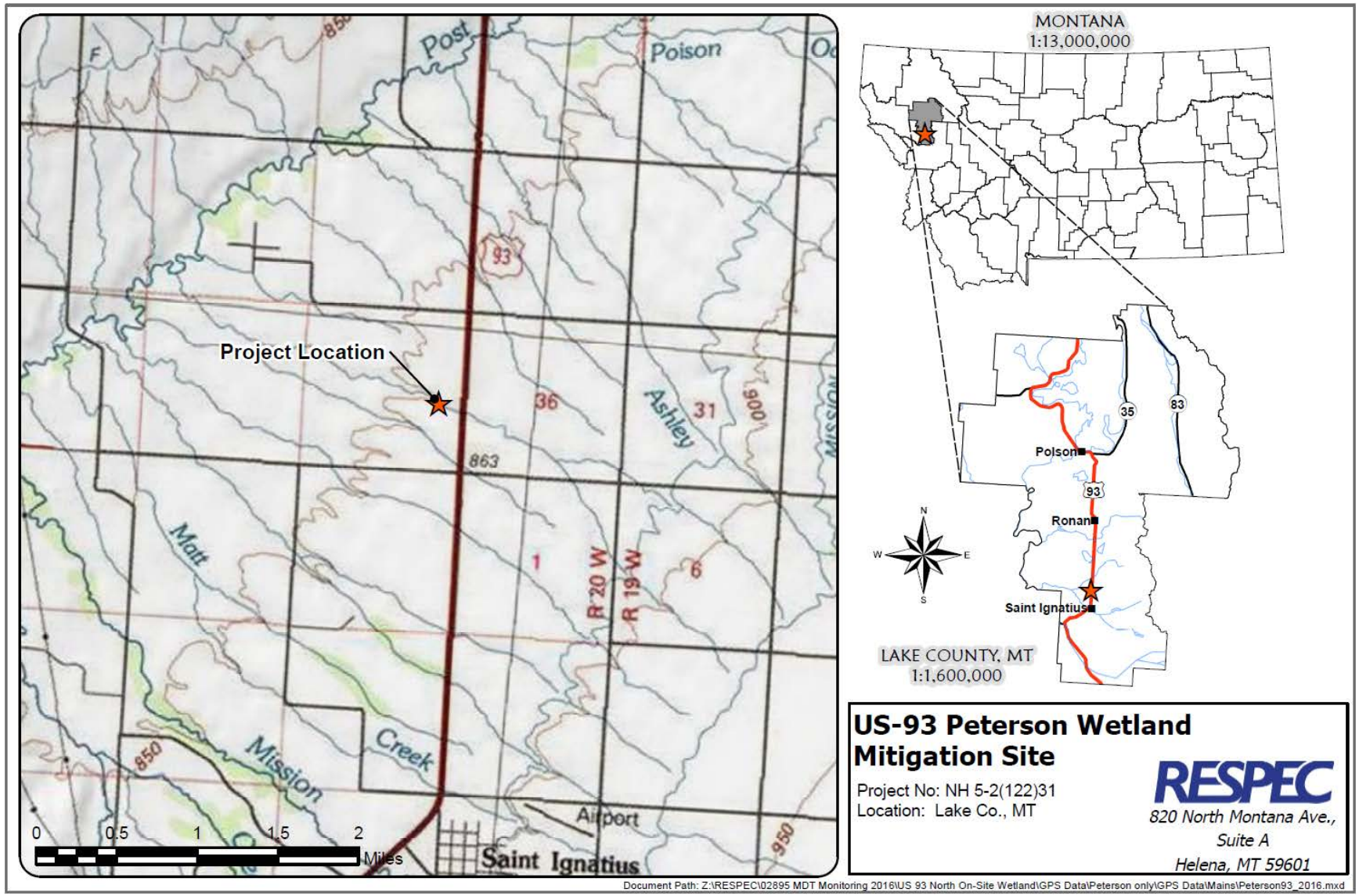


Figure 1-1. Project Location of the US 93 Peterson Site.

Table 1-1. Wetland Impacts for Project Segments 4, 6, and 7 at the US 93 Evaro-to-Polson Highway Reconstruction Project

Project Name, Location, and Number	Wetland Impacts (acres)	
	CSKT-Regulated Wetlands	USACE-Regulated Wetlands
Segment 4 White Coyote Road – South of Ravalli MDT Project Number NH 5-2(110)20, CN 0744	3.64	2.53
Segment 6 Medicine Tree (Old US 93) – Red Horn Road MDT Project Number NH 5-2(112)31, CN Q744	11.32	10.05
Segment 7 Spring Creek Road to Minesinger Trail MDT Project Number NH 5-2(113)48, CN H744	5.74	5.74
Total	**20.70**	**18.32**

Table 1-2. Wetland Mitigation for Project Segments 4, 6, and 7 at the US 93 Evaro-to-Polson Highway Reconstruction Project

Project	Wetland Mitigation Site	Expected CSKT Wetland Mitigation Credits[a], [b], [c]		Expected USACE Wetland Mitigation Credits[a], [b], [c]	
		Mitigation Type	Acre	Mitigation Type	Acre
Segment 4 White Coyote Road South of Ravalli	Bouchard	Creation	1.54	Creation	5.16
		Primary Restoration	1.58	Reestablishment	2.94
		Secondary Restoration	10.23	Rehabilitation	4.05
		Project Total	**13.35**	**Project Total**	**12.15**
	Jocko Spring Creek	Primary Restoration	1.17	Creation	2.17
		Secondary Restoration	0.32	Restoration Enhancement	0.59[d] 0.01
		Project Total	**1.49**	**Project Total**	**2.77**
Segment 6 Medicine Tree (Old US 93) Red Horn Road	Mission	Primary Restoration	0.22	Reestablishment	0.15
		Project Total	**0.22**	**Project Total**	**0.15**
	Peterson	Creation	0.64	Creation	2.14
		Secondary Restoration	0.67	Rehabilitation	0.25
		Project Total	**1.31**	**Project Total**	**2.39**
Segment 7 Spring Creek Road to Minesinger Trail	Mud Creek	Creation	0.49	Creation	1.63
		Secondary Restoration	0.28	Rehabilitation	0.15
		Project Total	**0.77[d]**	**Project Total**	**1.78[d]**

(a) Onsite Wetland Mitigation Plan, US 93 Evaro-to-Polson.
(b) Personal communication with MDT.
(c) Corrected values are presented in the 2007 US 93 mitigation monitoring report; revised figures are based on the site plan.
(d) Erroneous values for the Mud Creek and Jocko Spring Creek sites in pre-2013 monitoring reports have been corrected in this report based on surveyed acreages.

The expected credits are discussed in more detail in Section 3.9. Although the Jocko Spring Creek, Mission Creek, Mud Creek, and Bouchard sites were included in the original mitigation credit determination, the sites have since met the success criteria as acknowledged by the USACE and CSKT Shoreline Protection Program and/or guidance from MDT and are no longer monitored.

The CSKT crediting approach is based on the *Corps File Number 2001-90-416, US Highway 93: Evaro to Polson, Compensatory Wetland Mitigation Crediting* [Tillinger, 2002] that determines the final credit acres based on an equation that calculates a weighted ratio for restoration based on two variables: mitigation types and impacted wetland classes. The CSKT uses the following mitigation types to determine ratios: preservation, restoration (primary or secondary), enhancement, and creation. The varying mitigation types have a range of ratios that are applied when calculating the final crediting ratios. Table 1-3 lists the credit ratios per targeted mitigation type developed by the CSKT for the highway reconstruction project. Appendix E contains specific details on how the ratios were calculated [Tillinger, 2002].

Table 1-3. Mitigation Credit Ratios for the CSKT per Targeted Mitigation Types

Targeted Mitigation Type	Credit Ratio
Creation	3.36:1
Primary restoration	1.86:1
Secondary restoration	1.86:1

The USACE crediting approach for the US 93 project is based on a crediting system developed by Herrera Environmental Consultants, Inc. and approved by the USACE. Mitigation crediting systems and current credits are discussed for each mitigation site under the respective current credit summary sections.

1.2 MITIGATION SITES

The US 93 project originally included five on-site wetland mitigation sites located on the Flathead Indian Reservation and managed by the CSKT. The USACE and CSKT released the Jocko Spring Creek and Mission Creek sites from the requirement for additional monitoring in 2010 after the mitigation goals and objectives had been achieved. Monitoring at the Bouchard and Mud Creek sites was concluded in 2013. The following section provides a general discussion of monitoring at the remaining wetland mitigation site: the Peterson property. The discussion includes location, site topography, mitigation objectives, and targeted wetland community goals.

The 25-acre Peterson mitigation site is situated in the Project 6 segment of US 93 approximately 3 miles north of St. Ignatius and west of the highway. The site is located southwest of Milepost 36 in Section 2 of Township 16 North and Range 20 West. The Peterson site consists of a riparian and wetland corridor associated with an unnamed perennial tributary to Post Creek, dominated by herbaceous and woody vegetation. An unnamed, perennial tributary to Post Creek provides the site

hydrology. The monitoring area boundary is illustrated in Figure A-2 (Appendix A). Site plans are included in Appendix D.

The mitigation objectives include the following:

- Constructing impoundments using 12 log crib structures and earthen berms
- Excavating an oxbow basin along the outer fringe of existing wetland boundaries
- Planting shrubs and herbaceous plugs within the oxbow basin, wetland fringe, and log crib structures.

The targeted wetland types were scrub/shrub and emergent vegetation classes, which include thin-leaf alder (*Alnus incana*), red osier dogwood (*Cornus alba*), Nebraska sedge (*Carex nebrascensis*), and Baltic rush (*Juncus balticus*) communities. Revegetation was completed in October 2006.

Created wetlands within the project corridor were intended to meet the three parameter criteria for hydrology, vegetation, and soils established for wetland determination as outlined in the 1987 *Corps of Engineers Wetland Delineation Manual for the Determination of Wetlands* (1987 Wetland Manual) [Environmental Laboratory, 1987].

2.0 METHODS

The Peterson site was monitored on August 2, 2017. Information contained on the Wetland Mitigation Site Monitoring form and Wetland Determination Data forms was entered into a database for analysis and reporting (Appendix B). Monitoring activity locations at the Peterson site were mapped with a global positioning system (GPS) (Figure A-2, Appendix A). The collected information included a wetland delineation, vegetation community mapping, vegetation transect monitoring, soil and hydrology data, bird- and wildlife-use documentation, photographic documentation, planted woody species monitoring, functional assessments, and a nonengineering examination of the infrastructure established within the mitigation project area.

2.1 HYDROLOGY

The presence of hydrological indicators as outlined on the Wetland Determination Data forms was assessed at two data points within the Peterson site. Hydrologic indicators were evaluated according to features observed during the site visit. The data were recorded on the Wetland Determination Data forms (Appendix B). Hydrologic assessments allow evaluation of mitigation goals that address inundation and saturation requirements.

Technical criteria for wetland hydrology guidelines have been established as “permanent or periodic inundation, or soil saturation within 12 inches of the ground surface for a significant period (12.5 percent of the growing season) during the growing season” [USACE, 2010]. Systems with continuous inundation or saturation for greater than 12.5 percent of the growing season are classified as jurisdictional wetlands. The growing season is defined for purposes of this report as the number of days when there is a 50 percent probability that the minimum daily temperature is greater than or equal to 28 degrees Fahrenheit [Environmental Laboratory, 1987]. Temperature data from

the meteorological station at the Saint Ignatius weather station in Montana (247286), report a median (5 years in 10) growing season length of 120 days [Western Regional Climate Center, 2017a]. Areas that are defined as wetlands would require 15 days of inundation or saturation within 12 inches of the ground surface to meet the hydrology criteria. Soil pits that were excavated during the wetland delineation were used to evaluate groundwater levels within 18 inches of the ground surface. The data were recorded on the Wetland Determination Data forms (Appendix B).

Soil pits that were excavated during the wetland delineation were used to evaluate groundwater levels within 18 inches of the ground surface. The data were recorded on the Wetland Determination Data form (Appendix B). Precipitation data from the Saint Ignatius, Montana (247286) meteorological station were also reviewed and compared to long-term averages for this site. No groundwater monitoring wells were present at the Peterson site.

2.2 VEGETATION

The boundaries of general dominant-species-based vegetation communities were determined in the field during the active growing season and subsequently delineated on the 2017 aerial photographs. The percent cover of dominant species within a community type was estimated and recorded using the following values: 0 (< 1 percent), 1 (1–5 percent), 2 (6–10 percent), 3 (11–20 percent), 4 (21–50 percent), and 5 (> 50 percent) (Appendix B). Community types were named based on the predominant vegetation species that characterized each mapped polygon (Figure A-3, Appendix A).

Temporal changes in vegetation were evaluated through annual assessments of static belt transects. Vegetation composition was assessed and recorded along two vegetation belt transects (T-1 and T-2) that are approximately 10 feet wide and 144 and 325 feet long, respectively (Figure A-2, Appendix A). Transect locations were recorded with a resource-grade GPS unit. Spatial changes in the dominant vegetation communities were documented along the stationed transect. The percent cover of each vegetation species within transects was estimated using the same values and cover ranges listed for the vegetation community data (Appendix B). Photographs were taken at the endpoints of each transect during the monitoring event (Appendix C).

The *Montana Noxious Weed List* (February 2017), which was prepared by the Montana Department of Agriculture [2017], was used to categorize weeds identified within the site. The location of noxious weeds was noted in the field and mapped on the aerial photograph with noxious weed species color-coded (Figure A-3, Appendix A). Cover classes are represented by a T, L, M, or H, which represent less than 1 percent, 1–5 percent, 6–25 percent, and 26–100 percent, respectively. The total cover by noxious weeds overall across the site was estimated based on the noxious weed cover classes and project acreage.

2.3 SOIL

Soil information was obtained from the *Web Soil Survey for Lake County, Montana* and in situ soil descriptions [US Department of Agriculture, 2014]. Soil cores were excavated using a sharpshooter shovel and evaluated according to procedures outlined in the 1987 Wetland Manual and the 2010 *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains,*

Valleys, Coast Region (2010 WMVC Regional Supplement) [USACE, 2010]. A description of the soil profile, including hydric indicators when present, was recorded on the Wetland Determination Data form for each profile (Appendix B).

2.4 WETLAND DELINEATION

Waters of the US, including special aquatic sites and jurisdictional wetlands, were delineated throughout the project area in accordance with criteria established in the 1987 Wetland Manual and the 2010 WMVC Regional Supplement. The technical criteria for hydrophytic vegetation, hydric soil, and wetland hydrology described in the 1987 Wetland Manual and the 2010 WMVC Regional Supplement must be satisfied to delineate a representative area as a wetland. The name and indicator status of plant species was derived from the 2016 national wetland plant list (NWPL) [Lichvar et al., 2016]. A routine, level-2, on-site determination method [Environmental Laboratory, 1987] was used to delineate jurisdictional wetlands within the project boundaries. The information was recorded on the Wetland Determination Data forms (Appendix B).

The wetland boundary was determined in the field based on changes in plant communities and/or hydrology and changes in soil characteristics. Topographic relief boundaries within the project area were also examined and cross-referenced with soil and vegetation communities as supportive information for this delineation. Vegetation composition, soil characteristics, and hydrology were assessed at likely wetland and adjacent upland locations. If all three parameters met the criteria, the area was designated as wetland and mapped by vegetation community type. If any one of the parameters did not exhibit positive wetland indicators, the area was determined to be upland unless the site was classified as an atypical situation, potential problem area, or special aquatic site (i.e., mudflat). The wetland boundary was surveyed and identified on the 2017 aerial photographs. Wetland areas were calculated using GIS methods.

2.5 WILDLIFE

Observations and other positive indicators of use by mammal, reptile, amphibian, and bird species were recorded on the Wetland Mitigation Site Monitoring forms during each of the site visits. Indirect-use indicators, including tracks, scat, burrows, eggshells, skins, and bones, were also recorded. These signs were recorded while traversing the site for other required activities. Direct sampling methods, such as snap traps, live traps, and pitfall traps, were not used. A comprehensive wildlife species list of animals observed annually was compiled for this report.

2.6 FUNCTIONAL ASSESSMENT

The 1999 MDT MWAM [Berglund, 1999] was used to complete functional assessments at the site since monitoring began. The assessment method provides an objective means of assigning an overall rating to wetlands and a means of assessing mitigation success based on wetland functions. Functions are self-sustaining properties of a wetland ecosystem that exist in the absence of society and relate to ecological significance without regard to subjective human values [Berglund, 1999]. Field data for this assessment were collected during the site visit. One MWAM form was completed for the Peterson assessment area (AA) and is provided in Appendix B.

2.7 PHOTOGRAPHIC DOCUMENTATION

Monitoring at photo points provided supplemental information that documented wetland and upland conditions, site trends, current land uses that surround the site, and the status of the vegetation transects. Photographs were taken at established photo points throughout the site during the site visit (Appendix C). Photo-point locations were recorded with a resource-grade GPS unit (Figure A-2, Appendix A).

2.8 GLOBAL POSITIONING SYSTEM DATA

Site features and survey points were collected by using a resource-grade (± 1 meter) Trimble R1 GNSS GPS receiver and companion Android tablet during the 2017 monitoring season. The collected data were then transferred to a personal computer, imported into GIS, and projected in Montana State Plane Single Zone NAD 83 meters. Site features and survey points that were located with GPS included wetland boundaries, fence boundaries, photo points, transect endpoints, noxious weed infestations, and wetland data points.

2.9 MAINTENANCE NEEDS

Log crib structures, engineered structures, fencing, and other features were examined during the site visit for obvious signs of breaching, damage, or other problems. This examination was cursory and not an engineering-level structural inspection.

3.0 RESULTS

3.1 HYDROLOGY

The average total annual precipitation recorded at the Missoula 2WNW (245740) weather station in Montana from 1893 to August 2017 was 13.57 inches [Western Regional Climate Center, 2017b]. Between 2010 and 2016, annual precipitation was 16.15 (2010), 14.85 (2011), 15.54 (2012), 9.94 (2013), 15.86 (2014), 10.57 (2015), and 14.79 inches (2016) which indicates above-average precipitation for each year except 2013 and 2015. Precipitation for this weather station in 2017 appears to be slightly above average through August. The Montana AgriMet Weather Station-SIGM located in Saint Ignatius was used to provide supplemental precipitation data for this site from 2015 through 2017 [Bureau of Reclamation, 2017]. The long-term (1992–2017) average precipitation recorded at this station for January through August is approximately 10.85 inches. In 2017, precipitation was above that average at 13.46 inches, although most of that precipitation occurred from April to June, with little precipitation recorded in July (0.03 inch) and August (0.22 inch).

The main source of hydrology at the Peterson site is an unnamed perennial tributary of Post Creek. The mitigation site is located within a ¼-mile-long wetland corridor aligned east to west that follows the topographic gradient toward Post Creek. The project is exposed to seasonal flooding during spring runoff, seasonal high groundwater, and sustained flows during summer from irrigation returns. Immediately east of US 93 and the Peterson site is a small reservoir on private land. The landowner has the ability to manipulate flows in the channel that supplies the mitigation site. Twelve log crib structures, which were built to simulate natural beaver dams, were installed to impound water behind the structures. Each structure was designed to allow surface water to flow over the structure

(Appendix D). MDT temporarily repaired several of these structures in 2010. Approximately 5 of the 12 log crib structures were not impounding water and appeared to allow water to flow through the structure in 2014. In 2015, additional inundation was observed in the middle of the site, which suggests that the structures had filled in naturally and had expanded the flooded area. However, the western end of the site (Crib Structures 1, 2, and 3) was not retaining water as designed or expected in 2017 because these cribs have mostly failed. Loss of wetland area will likely occur if repairs are not made to these structures.

Inundation and some standing surface water behind the still-functioning log cribs near the center of the site was observed during the 2017 monitoring visit. Evidence was present of early seasonal inundation with drift lines and stained vegetation. The main stream channel that enters the site was running very low at the time of monitoring because the upstream landowner was limiting the flow of water from his reservoir. In previous monitoring years, the stream has always had flowing water that drained into the wetland complex with inundation behind the log cribs. The soils remained saturated, so groundwater is also contributing to the site hydrology.

Two data points (DP-1U and DP-1W) were assessed to determine the upland and wetland boundaries (Wetland Determination Data forms, Appendix B). DP-1W is located along the fringe of wetland on the south side. The wetland data point exhibited soils saturated to the ground surface. DP-1U is located in an upland area adjacent to the floodplain and did not show evidence of wetland hydrology.

3.2 VEGETATION

A comprehensive list of 80 species identified on the Peterson site from 2009 to 2017 is presented in Table 3-1. No new plant species were identified at the site in 2017. Five community types (three wetland and two upland) were identified and mapped at the site in 2017 (Figure A-3, Appendix A):

- Wetland Type 2 – *Phalaris arundinacea*
- Upland Type 7 – *Elymus repens/Poa pratensis*
- Wetland Type 8 – *Typha latifolia/Phalaris arundinacea*
- Upland Type 10 – *Elymus repens/Sisymbrium altissimum*
- Wetland Type 11 – *Dipsacus fullonum/Carex nebrascensis*.

The species composition is described by community type below and on the Wetland Mitigation Site Monitoring form (Appendix B).

Wetland Type 2 – *Phalaris arundinacea* (reed canary grass) was identified on 1.3 acres at the northern and eastern ends of the stream corridor. The species were dominated by reed canary grass, with less than 10 percent of aquatic macrophytes, speedwell (*Veronica* sp.), watercress (*Nasturtium officinale*), Fuller's teasel (*Dipsacus fullonum*), and Northwest Territory sedge (*Carex utriculata*).

Upland Type 7 – *Elymus repens/Poa pratensis*, which is the largest community, occupied 20.7 acres on the upland terraces north and south of the creek corridor. Dominant vegetation consisted of creeping wild rye (*Elymus repens*), Kentucky bluegrass (*Poa pratensis*), field brome (*Bromus arvensis*), smooth brome (*Bromus inermis*), and Fuller's teasel.

Table 3-1. Vegetation Species Identified From 2008 Through 2011 and From 2013 Through 2017 at the Peterson Site (Page 1 of 2)

Scientific Name	Common Name	WMVC Indicator Status [(a)]
Agropyron cristatum	Crested Wheatgrass	NL
Alnus incana	Speckled Alder	FACW
Asparagus officinalis	Asparagus	FACU
Bassia scoparia	Mexican-Fireweed	FAC
Bistorta bistortoides	American Bistort	FACW
Bromus arvensis	Field Brome	UPL
Bromus inermis	Smooth Brome	FAC
Bromus tectorum	Cheatgrass	NL
Cardaria draba	Whitetop	UPL
Carex nebrascensis	Nebraska Sedge	OBL
Carex pellita	Woolly Sedge	OBL
Carex sp.	Sedge	NL
Carex stipata	Stalk-Grain Sedge	OBL
Carex utriculata	Northwest Territory Sedge	OBL
Carex vesicaria	Lesser Bladder Sedge	OBL
Cirsium arvense	Canada Thistle	FAC
Cirsium vulgare	Bull Thistle	FACU
Cornus alba	Red Osier	FACW
Cynoglossum officinale	Gypsy-Flower	FACU
Dactylis glomerata	Orchard Grass	FACU
Descurainia sophia	Herb Sophia	NL
Dianthus spp.	Pink	NL
Dipsacus fullonum	Fuller's Teasel	FAC
Eleocharis palustris	Common Spike-Rush	OBL
Elodea spp.	Waterweed	NL
Elymus repens	Creeping Wild Rye	FAC
Epilobium ciliatum	Fringed Willowherb	FACW
Festuca spp.	Fescue	NL
Geum macrophyllum	Large-Leaf Avens	FAC
Glyceria grandis	American Mannagrass	OBL
Impatiens ecalcarata	Spurless Touch-Me-Not	FACW
Iris pseudacorus	Pale-Yellow Iris	OBL
Juncus balticus	Baltic Rush	FACW
Juncus ensifolius	Dagger-Leaf Rush	FACW
Juncus sp.	Rush	NL
Juncus tenuis	Lesser Poverty Rush	FAC
Lactuca serriola	Prickly Lettuce	FACU
Lemna minor	Common Duckweed	OBL
Lepidium campestre	Field Pepper-Grass	NL
Lepidium perfoliatum	Clasping Pepperwort	FACU
Leucanthemum vulgare	Ox-Eye Daisy	FACU
Malva neglecta	Dwarf Cheeseweed	NL
Medicago sativa	Alfalfa	UPL

Table 3-1. Vegetation Species Identified From 2008 Through 2011 and From 2013 Through 2017 at the Peterson Site (Page 2 of 2)

Scientific Name	Common Name	WMVC Indicator Status [(a)]
Melilotus officinalis	Yellow Sweet Clover	FACU
Mentha arvensis	American Wild Mint	FACW
Nasturtium officinale	Watercress	OBL
Nepeta cataria	Catnip	FACU
Oenanthe spp.	Waterdropwort	NL
Pascopyrum smithii	Western Wheatgrass	FACU
Persicaria amphibia	Water Smartweed	OBL
Phalaris arundinacea	Reed Canary Grass	FACW
Plantago lanceolata	English Plantain	FACU
Poa palustris	Fowl Bluegrass	FAC
Poa pratensis	Kentucky Bluegrass	FAC
Poa sp.	Bluegrass	NL
Persicaria amphibia	Water Smartweed	OBL
Potentilla recta	Sulphur Cinquefoil	NL
Potentilla sp.	Cinquefoil	NL
Rosa woodsii	Woods' Rose	FACU
Rumex crispus	Curly Dock	FAC
Salix bebbiana	Gray Willow	FACW
Salix drummondiana	Drummond's Willow	FACW
Salix sp.	Willow	NL
Schedonorus arundinaceus	Tall False Rye Grass	FAC
Schoenoplectus acutus	Hard-Stem Club-Rush	OBL
Scirpus microcarpus	Red-Tinge Bulrush	OBL
Silene latifolia	Bladder Campion	NL
Sisymbrium altissimum	Tall Hedge-Mustard	FACU
Solanum dulcamara	Climbing Nightshade	FAC
Sonchus arvensis	Field Sow-Thistle	FACU
Suaeda calceoliformis	Paiuteweed	FACW
Symphoricarpos albus	Common Snowberry	FACU
Thlaspi arvense	Field Pennycress	UPL
Tragopogon dubius	Meadow Goat's-Beard	NL
Trifolium pratense	Red Clover	FACU
Trifolium sp.	Clover	NL
Typha latifolia	Broad-Leaf Cattail	OBL
Verbascum blattaria	White Moth Mullein	UPL
Verbascum thapsus	Great Mullein	FACU
Veronica sp.	Speedwell	NL

(a) 2016 NWPL [Lichvar et al., 2016].
New species that were identified in 2017 are **bolded.**

Wetland Type 8 – *Typha latifolia/Phalaris arundinacea* was located on 1.7 acres that defined a majority of the riparian corridor associated with the unnamed perennial tributary. Broad-leaf cattail (*Typha latifolia*) and reed canary grass (*Phalaris arundinacea*) dominated the community in 2017.

Speckled alder (*Alnus incana*), climbing nightshade (*Solanum dulcamara*), Northwest Territory sedge (*Carex utriculata*), fringed willowherb (*Epilobium ciliatum*), watercress, and Kentucky bluegrass contributed to the total vegetation cover within the wetland community. Woody species provide an estimated 10 percent vegetative cover in this community type, with speckled alder being the most prominent woody species observed, along with red osier (Cornus alba), drummond's willow (*Salix drummondiana*), and gray willow (*Salix bebbiana*). Woody plants continue to grow and expand around the perimeter of this wetland community.

Upland Type 10 – *Elymus repens/Sisymbrium altissimum* is a 1.4-acre community located in the northeastern corner of the site. The community was dominated by creeping wild rye with minor amounts of tall hedge-mustard (*Sisymbrium altissimum*), smooth brome, and bull thistle (*Cirsium vulgare*).

Wetland Type 11 – *Dipsacus fullonum/Carex nebrascensis* covers 0.2 acre of the site. This type is located in northwestern corner of the project area and consists of wetland area with hydrology sourced by irrigation returns/seepage from adjacent property irrigation ditch. Type 11 was formerly mapped as wetland Type 2 – *Phalaris arundinacea*. Over time, vegetation within this area has changed significantly and shifted to other dominant species, including teasel and Nebraska sedge (*Carex nebrascensis*). Several other species were present at much lower cover values (1–5 percent) including clasping pepperwort (*Lepidium perfoliatum),* herb sophia *(Descurainia sophia)*, curly dock (*Rumex crispus*), and cattail (*Typha latifolia*).

Vegetation results for T-1 are detailed on the Wetland Mitigation Site Monitoring form (Appendix B) and summarized in Table 3-2 and Charts 3-1 and 3-2. Photographs of the transect start and end points are shown in Appendix C. T-1 included upland community Type 7 – *Elymus repense/Poa pretensis* and wetland Type 8 – *Typha latifolia/Phalaris arundinacea* in 2017 (Chart 3-1). The transect contained 73.6 percent hydrophytic species in 2017 and remained similar to conditions observed in 2016.

Table 3-2. Data Summary For T-1 For 2008 Through 2011 and 2013 Through 2017 at the Peterson Site

Monitoring Year	2008	2009	2010	2011	2013	2014	2015	2016	2017
Transect Length (feet)	144	144	144	144	144	144	144	144	144
Vegetation Community Transitions Along Transect	3	3	2	2	2	2	2	2	2
Vegetation Communities Along Transect	2	2	2	2	2	2	2	2	2
Hydrophytic Vegetation Communities Along Transect	1	1	1	1	1	1	1	1	1
Total Vegetative Species	19	24	25	16	17	19	15	15	15
Total Hydrophytic Species	9	14	13	10	13	15	13	12	11
Total Upland Species	10	10	12	6	4	4	2	3	4
Estimated % Total Vegetative Cover	100	87	90	95	95	95	95	96	96
Estimated % Unvegetated	0	13	10	5	5	5	5	4	4
% Transect Length Comprising Hydrophytic Vegetation Communities	45	45	45.1	55.6	70.8	70.8	73.6	73.6	73.6
% Transect Length Comprising Upland Vegetation Communities	55	55	54.9	44.4	29.2	29.2	26.4	26.4	26.4
% Transect Length Comprising Unvegetated Open Water	0	0	0	0	0	0	0	0	0
% Transect Length Comprising Mudflat	0	0	0	0	0	0	0	0	0

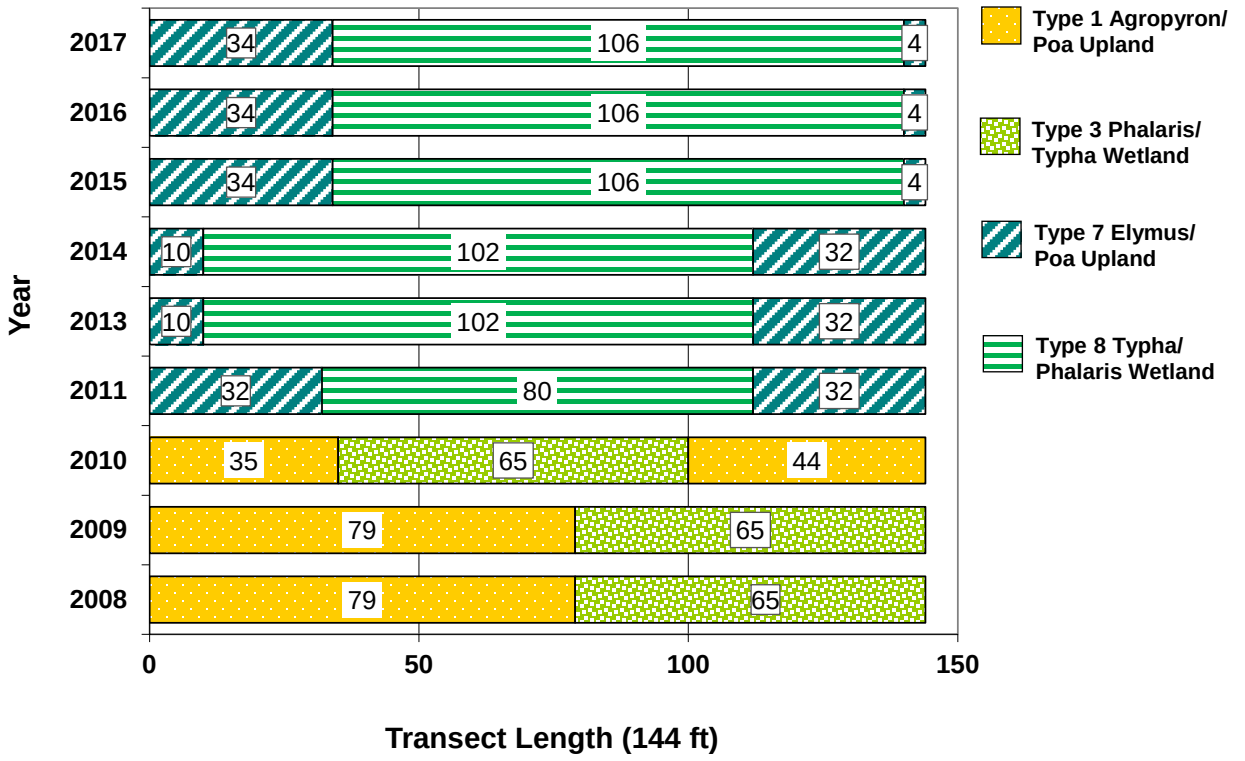


Chart 3-1. Transect Map Showing Community Types on T-1 From Start (0 Feet) to Finish (144 Feet) For 2008 Through 2011 and 2013 Through 2017 at the Peterson Site.

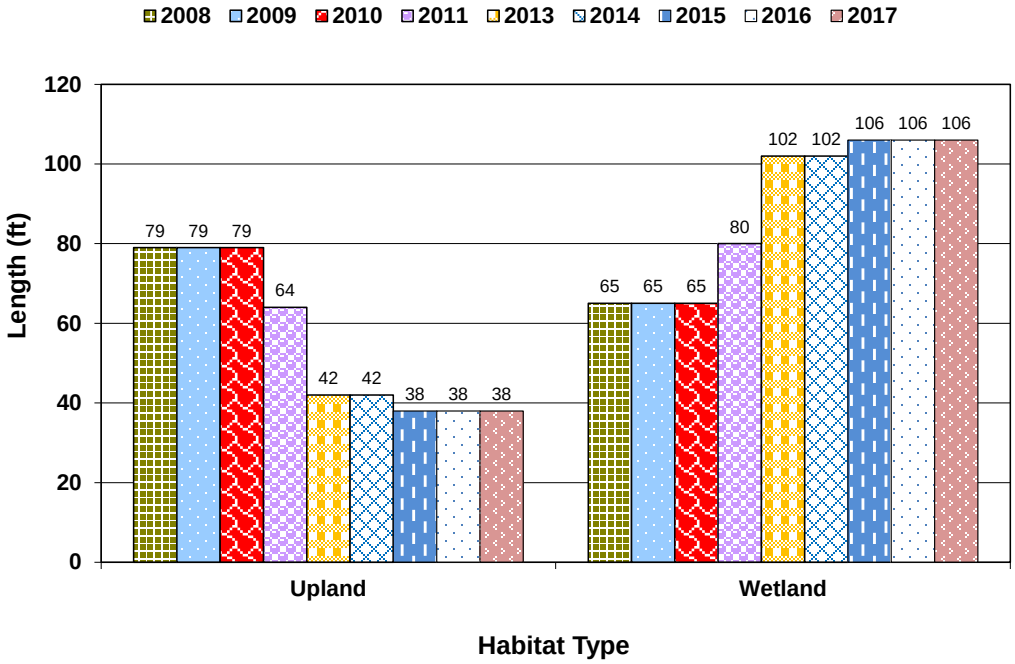


Chart 3-2. Length of Habitat Types Within T-1 For 2008 Through 2011 and 2013 Through 2017 at the Peterson Site.

Two community types were present along T-2 in 2017 and included wetland Type 8 and upland Type 7. Data for T-2 are presented in Table 3-3 and Charts 3-3 and 3-4. T-2 consisted of 67.7 percent hydrophytic vegetation communities in 2017 and remained similar to conditions observed during 2016. In past monitoring years, hydrophytic vegetation communities along this transect had fluctuated along the wetland/upland boundary. A log crib structure that impounded water failed, which reduced inundation and contributed to the decrease in the extent of wetland habitat.

Table 3-3. Data Summary For T-2 For 2008 Through 2011 and 2013 Through 2017 at the Peterson Site

Monitoring Year	2008	2009	2010	2011	2013	2014	2015	2016	2017
Transect Length (feet)	**325**	**325**	**325**	**325**	**325**	**325**	**325**	**325**	**325**
Vegetation Community Transitions Along Transect	3	3	2	3	3	3	3	3	3
Vegetation Communities Along Transect	3	3	3	3	3	2	2	2	2
Hydrophytic Vegetation Communities Along Transect	2	2	2	2	2	1	1	1	1
Total Vegetative Species	21	23	22	18	15	18	21	18	18
Total Hydrophytic Species	11	11	11	10	10	13	14	14	13
Total Upland Species	10	12	11	8	5	5	7	4	5
Estimated % Total Vegetative Cover	93	85	85	90	90	90	90	93	93
Estimated % Unvegetated	7	15	15	10	10	10	10	7	7
% Transect Length Comprising Hydrophytic Vegetation Communities	90	90	90.5	70.8	54.8	54.8	67.7	67.7	67.7
% Transect Length Comprising Upland Vegetation Communities	10	10	9.5	29.2	45.2	45.2	32.3	32.3	32.3
% Transect Length Comprising Unvegetated Open Water	0	0	0	0	0	0	0	0	0
% Transect Length Comprising Mudflat	0	0	0	0	0	0	0	0	0

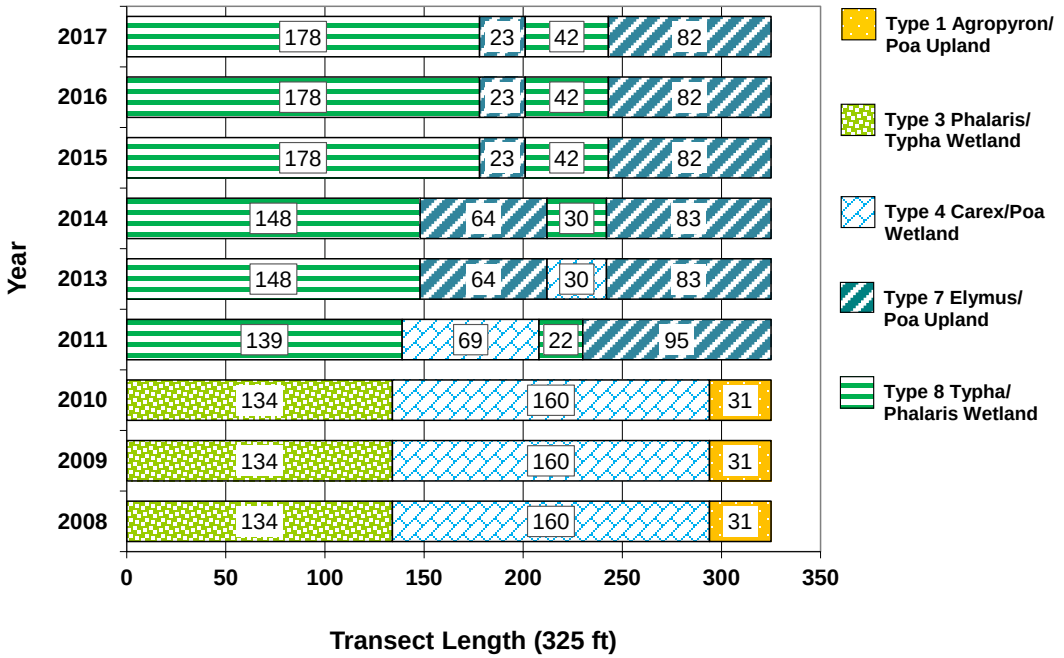


Chart 3-3. Transect Map Showing Community Types on T-2 From Start (0 Feet) to Finish (325 Feet) For 2008 Through 2011 and 2013 Through 2017 at the Peterson Site.

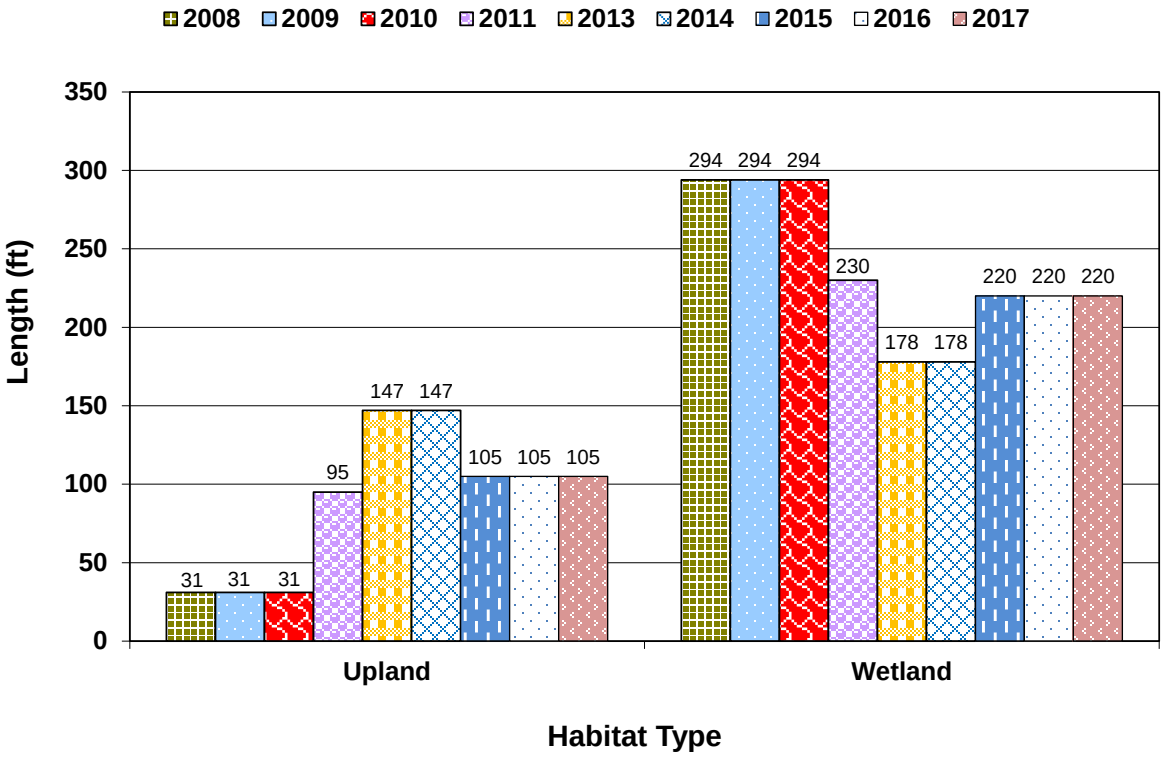


Chart 3-4. Length of Habitat Types Within T-2 For 2008 Through 2011 and 2013 Through 2017 at the Peterson Site.

The location of the Priority 2A noxious weed pale-yellow iris (*Iris pseudacorus*) and Priority 2B noxious weeds Canada thistle (*Cirsium arvense*), ox-eye daisy (*Leucanthemum vulgare*), and gypsy-flower (houndstongue, *Cynoglossum officinale*) that were observed during 2017 field monitoring were mapped on Figure A-3 (Appendix A). The percent cover of Canada thistle ranged from trace (<1 percent) to moderate (6–25 percent). Gypsy-flower, ox-eye daisy, and pale-yellow iris were found at trace (<1 percent) to low (1–5 percent) cover classes. Extensive weed control has been conducted on this site every year since 2009. Weed control has been conducted in July at this site each year since 2013 and occurred on May 21, 2017.

3.3 SOIL

The Web Soil Survey for Lake County, Montana [USDA, 2014] indicates the following soils as being mapped for the project area, including: Colake loam (0–1 percent slopes); Post silt loam (0–2 percent slopes); Post silty clay loam (2–4 percent slopes), and Ronan silty clay loam (2–8 percent slopes). Both sample points occurred in the Colake series, which are poorly drained soils that occur in swales and depressions on plains and stream terraces. This series is included on the Montana hydric soil list [US Department of Agriculture, 2015]. The Ronan series consists of very deep, well-drained soils that were not identified on either the national or Montana hydric soil lists. The map units were generally confirmed by test pit soils at wetland data points.

DP-1W met the hydric soil criteria. Test pit DP-1W displayed a black (10 YR 2/1) clay loam soil with redoximorphic concentrations that were dark yellowish brown (10YR 4/6). The soil was saturated to

the surface, which indicated a hydric soil. The profile at DP-1U revealed a very dark brown (10 YR 3/2), clay loam without redoximorphic features. No positive indicators of hydric soil were observed at DP-1U.

3.4 WETLAND DELINEATION

Two data points were collected in 2017 to determine the wetland and upland boundaries at the site (Wetland Data Determination forms, Appendix B). The wetland boundaries were delineated and mapped on Figure A-3 (Appendix A). The delineation identified 3.2 acres of wetland in 2017 and remained similar to conditions observed in 2016, as shown in Table 3-4. The current wetland boundary as presented on Figure A-3 was surveyed with a GPS during the 2017 field visit.

Table 3-4. Aquatic Habitat Acreages Delineated From 2009 Through 2011 and From 2013 Through 2017 at the Confederated Salish and Kootenai Tribes Peterson Site

Aquatic Habitat	2009	2010	2011	2013	2014	2015	2016	2017
Wetland Area (acres)	3.71	4.18	4.25	3.09	3.09	3.20	3.20	3.20

3.5 WILDLIFE

A list of wildlife species observed directly and indirectly at the site from 2008 to 2017 is presented in Table 3-5. Red-winged blackbirds (*Agelaius phonecius*) and a single common raven (*Corvus corax*) were observed in 2017. Sign and bird activity codes are noted on the Wetland Mitigation Site Monitoring form (Appendix B). Bird activity was low during the site visit. Meadow vole (*Microtus pennsylvanicus*) and vole paths were also observed in 2017. Other evidence of wildlife use included scat and tracks from deer (*Odocoileus sp.*). An adjacent landowner reported spotting a grizzly sow and cub (*Ursus arctos*) within the riparian community on the property in 2014.

3.6 FUNCTIONAL ASSESSMENT

Results of the 2004 (baseline), 2008–2011, and 2013–2017 functional assessments are summarized in Table 3-6. The 2017 MWAM form is included in Appendix B. The total aquatic habitat developed to date within the 25-acre project area is 3.2 acres.

The Peterson property was evaluated as one AA (AA-1) using the 1999 MDT MWAM. This AA was rated as a Category II wetland in 2017 with 78 percent of the total possible points and 27.52 total functional units. The AA rating in 2017 was similar to ratings determined in 2016. In 2014, this AA gained 7 percentage points because of the documented sighting of a grizzly bear on site and improving structural diversity as shrub/scrub habitat continues to develop on the site. The rating for the T&E species habitat function increased from low to high in 2014. The functional unit (FU) gain from 2014 to 2017 was 0.95. The decrease in total FUs from 2011 through 2017 corresponds with the overall decrease of wetland acreage at the Peterson site, which is presumably the result of multiple log crib structure failures. The majority of the failures occurred at the western end of the property. Functional ratings were high for listed/proposed T&E species habitat, general wildlife

Table 3-5. Wildlife Species Observed at the Peterson Site From 2008 Through 2011 and From 2013 Through 2017

Common Name	Scientific Name
Amphibian	
Columbia Spotted Frog	*Rana luteiventris*
Reptile	
Plains Garter Snake	*Thamnophis radix*
Terrestrial Garter Snake	*Thamnophis elegans*
Invertebrate	
Unk crayfish	Crayfish sp.
Mammal	
Black Bear	*Ursus americanus*
Coyote	*Canis latrans*
Deer Spp.	***Odocoileus sp.***
Grizzly Bear	*Ursus arctos*
Meadow Vole	***Microtus pennsylvanicus***
Muskrat	*Ondatra zibethicus*
Raccoon	*Procyon lotor*
White-Tailed Deer	*Odocoileus virginianus*
Bird	
American Kestrel	*Falco sparverius*
American Robin	*Turdus migratorius*
Barn Swallow	*Hirundo rustica*
Black-Billed Magpie	*Pica hudsonia*
Canada Goose	*Branta canadensis*
Cedar Waxwing	*Bombycilla cedrorum*
Common Raven	***Corvus corax***
Grasshopper Sparrow	*Ammodramus savannarum*
Gray Partridge	*Perdix perdix*
Killdeer	*Charadrius vociferus*
Mallard	*Anas platyrhynchos*
Marsh Wren	*Cistothorus palustris*
Mourning Dove	*Zenaida macroura*
Northern Harrier	*Circus cyaneus*
Red-Tailed Hawk	*Buteo jamaicensis*
Red-Winged Blackbird	***Agelaius phoeniceus***
Ring-Necked Pheasant	*Phasianus colchicus*
Short-Eared Owl	*Asio flammeus*
Song Sparrow	*Melospiza melodia*
Sora	*Porzana carolina*
Sparrow Spp.	*Passer sp.*
Vesper Sparrow	*Pooecetes gramineus*
Western Bluebird	*Sialia mexicana*
Western Meadowlark	*Sturnella neglecta*
Wilson's Snipe	*Gallinago delicata*
Yellow-Headed Blackbird	*Xanthocephalus xanthocephalus*

Species that were identified in 2017 are **bolded.**

Table 3-6. Summary of 2004 (Baseline), 2008 Through 2011, and 2013 Through 2017 Wetland Function/Value Ratings and Functional Points at the Peterson Site

Function and Value Parameters From the 1999 MDT Montana Wetland Assessment Method	2004 (Baseline) (AA-1)	2008 (AA-1)	2009 (AA-1)	2010 (AA-1)	2011 (AA-1)	2013 (AA-1)	2014 (AA-1)	2015 (AA-1)	2016 (AA-1)	2017 (AA-1)
Listed/Proposed Threatened & Endangered (T&E) Species Habitat	Low (0.3)	Low (0.3)	Low (0.3)	Low (0.3)	Low (0.3)	Low (0.3)	High (0.8)	High (0.8)	High (0.8)	High (0.8)
Montana Natural Heritage Program (MTNHP) Species Habitat	Low (0.1)	Low (0.1)	Low (0.1)	Low (0.1)	Low (0.1)	Low (0.1)	Low (0.1)	Low (0.1)	Low (0.1)	Low (0.1)
General Wildlife Habitat	Low (0.5)	Mod (0.7)	Mod (0.7)	Mod (0.7)	High (0.9)	High (0.9)	High (0.9)	High (0.9)	High (0.9)	High (0.9)
General Fish/Aquatic Habitat	Low (0.1)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Flood Attenuation	Low (0.2)	Mod (0.4)	Mod (0.4)	Mod (0.4)	Mod (0.4)	Mod (0.5)	Mod (0.5)	High (0.8)	High (0.8)	High (0.8)
Short- and Long-Term Surface-Water Storage	Mod (0.4)	High (0.8)	High (0.8)	High (0.8)	High (0.8)	High (0.8)	High (0.8)	High (0.8)	High (0.8)	High (0.8)
Sediment/Nutrient/Toxicant Removal	High (0.9)	High (0.9)	High (0.9)	High (0.9)	High (0.9)	High (1.0)	High (1.0)	High (1.0)	High (1.0)	High (1.0)
Sediment/Shoreline Stabilization	High (0.7)	High (1.0)	High (1.0)	High (1.0)	High (1.0)	High (1.0)	High (1.0)	High (1.0)	High (1.0)	High (1.0)
Production Export/Food Chain Support	High (0.8)	High (0.8)	High (0.8)	High (0.8)	High (0.8)	High (0.8)	High (0.9)	High (0.8)	High (0.8)	High (0.8)
Groundwater Discharge/Recharge	High (1.0)	High (1.0)	High (1.0)	High (1.0)	High (1.0)	High (1.0)	High (1.0)	High (1.0)	High (1.0)	High (1.0)
Uniqueness	Low (0.2)	Low (0.3)	Low (0.3)	Mod (0.4)	Mod (0.4)	Mod (0.4)	Mod (0.6)	Mod (0.4)	Mod (0.4)	Mod (0.4)
Recreation/Education Potential	Low (0.1)	Mod (0.5)	Mod (0.5)	High (1.0)	High (1.0)	High (1.0)	High (1.0)	High (1.0)	High (1.0)	High (1.0)
Actual Points/Possible Points	**5.3/12**	**6.8/11**	**6.8/11**	**7.4/11**	**7.6/11**	**7.8/11**	**8.6/11**	**8.6/11**	**8.6/11**	**8.6/11**
% of Possible Score Achieved	**44%**	**61%**	**61%**	**67%**	**69%**	**71%**	**78%**	**78%**	**78%**	**78%**
Overall Category	**III**	**III**	**III**	**II**	**II**	**II**	**II**	**II**	**II**	**II**
Total Acreage of Assessed Wetlands and Open Water within Easement (acres)	**1.26**	**3.71**	**3.71**	**4.18**	**4.25**	**3.09**	**3.09**	**3.20**	**3.20**	**3.20**
Total Functional Units (acreage × actual points) (FU)	**6.68**	**25.23**	**25.23**	**30.93**	**32.30**	**24.10**	**26.57**	**27.52**	**27.52**	**27.52**
Net Acreage Gain (acres)	**N/A**	**2.45**	**2.45**	**2.92**	**2.99**	**1.83**	**1.83**	**1.94**	**1.94**	**1.94**
Net Functional Unit Gain	**N/A**	**18.55**	**18.55**	**24.25**	**25.62**	**17.42**	**19.89**	**20.84**	**20.84**	**20.84**

habitat, flood attenuation, short- and long-term surface-water storage, sediment/shoreline stabilization, sediment/nutrient/toxicant removal, production export/food chain support, groundwater discharge/recharge, and recreation/educational potential.

In 2015, the rating for structural diversity was decreased from high to moderate because the site no longer has aquatic bed habitat; instead, the site is composed of emergent and scrub/shrub vegetation. This change caused slight decreases in the ratings for production export/aquatic food chain support and uniqueness. The rating for flood attenuation was increased in 2015 from previous years' scores based on the density of the cattail community, which effectively functioned as woody vegetation in the way it slowed floodwaters. Despite these slight modifications, the overall functional points (8.6) were the same in 2017 as in 2016.

3.7 PHOTOGRAPHIC DOCUMENTATION

Photographs of Photo-Points 1 through 7 (PP1 to PP7) (Figure A-2, Appendix A) and of the transect endpoints are shown in Appendix C.

3.8 MAINTENANCE NEEDS

The location of pale-yellow iris (a Priority 2A noxious weed) and Canada thistle, ox-eye daisy, and gypsy-flower (Priority 2B noxious weeds) that were observed during 2017 field monitoring were mapped on Figure A-3 (Appendix A). The percent cover of Canada thistle ranged from trace (<1 percent) to moderate (6–25 percent). Gypsy-flower, ox-eye daisy, and pale-yellow iris were found at trace (<1 percent) to low (1–5 percent) cover classes. Extensive weed control has been conducted on this site every year since 2009. Weed control was conducted at this site May 21, 2017. MDT will continue to complete weed-control measures based on the annual monitoring results.

In late 2015, MDT issued a contract to a local fence contractor to install new fences and gates along the southern, western, and northern boundaries of the site. This fence installation was completed in January 2016. The fences appeared to be in good condition during the 2017 monitoring, and no evidence of livestock grazing was observed within the site during the monitoring efforts.

In 2015, an increase in inundation was observed near T-1, which suggests that flow through the log crib structures in this area was being more restricted than in the previous 2 years. However, the flow through Crib Structures 1, 2, and 3 at the western end of the site was not impeded. At least four of the original log crib structures that had been constructed to mimic beaver dams have been undermined and have failed to impede water flows and spread these flows as designed across the landscape. Previous adaptive management attempts to repair the crib structures using coir bio-logs have had limited success as the identified failed structures indicate. MDT hired Robert Peccia & Associates in September 2016 to conduct an evaluation for the failing crib structures and to develop a plan to replace the failed structures. MDT has reviewed the plan and is in the process of preparing the design plans and evaluation report to the USACE and CSKT for permits to complete the fixes in 2018.

3.9 CURRENT CREDIT SUMMARY

The wetland acreage that was delineated in 2017 totaled 3.2 acres and remained similar to the 2016 area. The net acreage gain from 2004 through 2017 is 1.94 acres, and the FU gain is 20.84. Table 3-7 summarizes the 2017 estimated credits for the Peterson site. The estimated credits in 2011 were separated into individual mitigation types for creation or rehabilitation/secondary restoration. The acreages were calculated for each type, and credit ratios were applied for the two different CSKT and USACE crediting systems. The Peterson mitigation types were creation and rehabilitation under the USACE system and creation and secondary restoration under the CSKT system.

The following equation was used to calculate the USACE enhancement ratio for rehabilitation activities based on the total functional assessment point scores listed in Table 3-6. The formula was developed to measure the post-construction functional lift that was expected to occur after the mitigation site was rehabilitated.

$$\text{Enhancement factor} = \left(F_{post} - F_{pre}\right) / F_{pre}$$

$$\text{Enhancement factor} = \left(8.6 - 5.3\right) / 5.3$$

$$\text{Enhancement factor} = 0.62$$

$$\text{Enhancement ratio} = 1 / 0.62 = 1.61$$

The site has earned 2.73 USACE credit acres and 1.25 CSKT credit acres to date. These 2017 credit estimates exceed the USACE projected credit for the project (2.39 credit acres) but still fall short of the CSKT projected credit (1.31 credit acres) for the site.

No quantitative performance measures or success criteria were established for this site. Created wetlands within the project corridor were intended to meet the three parameter criteria for hydrology, vegetation, and soils established for wetland determination as outlined in the 1987 Wetland Manual. All of the wetlands that were delineated within the site in 2017 met the three parameter criteria for hydrology, vegetation, and soils and satisfied the indicated measure of success for this site.

Table 3-7. Credit Summary for the Peterson Site (Part 1 of 2)

Targeted Mitigation Type	Projected Credit (acre)		Credit Ratio		2009 Wetland (acre)	2009 Credit (acre)		2010 Wetland (acre)	2010 Credit (acre)		2011 Wetland (acre)	2011 Credit (acre)		2013 Wetland (acre)	2013 Credit (acre)	
	USACE	CSKT	USACE	CSKT		USACE	CSKT		USACE	CSKT		USACE	CSKT		USACE	CSKT
Creation	2.14	0.64	1:1	3.36:1	2.46	2.46	0.73	2.93	2.93	0.87	3.00	3.00	0.89	1.84	1.84	0.55
Rehabilitation/ secondary restoration	0.25	0.67	3.57:1 (2009) 2.50:1 (2010) 2.33:1 (2011)	1.86:1	1.25	0.35	0.67	1.25	0.50	0.67	1.25	0.54	0.67	1.25	0.59	0.67
Total	**2.39**	**1.31**	**–**	**–**	**3.71**	**2.81**	**1.40**	**4.18**	**3.43**	**1.54**	**4.25**	**3.54**	**1.56**	**3.09**	**2.43**	**1.22**

Table 3-7. Credit Summary for the Peterson Site (Part 2 of 2)

Targeted Mitigation Type	Credit Ratio		2014 Wetland (acre)	2014 Credit (acre)		2015 Wetland (acre)	2015 Credit (acre)		2016 Wetland (acre)	2016 Credit (acre)		2017 Wetland (acre)	2017 Credit (acre)	
	USACE	CSKT		USACE	CSKT		USACE	CSKT		USACE	CSKT		USACE	CSKT
Creation	1:1	3.36:1	1.84	1.84	0.55	1.95	1.95	0.58	1.95	1.95	0.58	1.95	1.95	0.58
Rehabilitation/ secondary restoration	2.12:1[(a)] (2013) 1.61:1[(a)] (2014) 1.61:1 (2015) 1.61:1 (2016)	1.86:1	1.25	0.78	0.67	1.25	0.78	0.67	1.25	0.78	0.67	1.25	0.78	0.67
Total	**–**	**–**	**3.09**	**2.62**	**1.22**	**3.20**	**2.73**	**1.25**	**3.20**	**2.73**	**1.25**	**3.20**	**2.73**	**1.25**

(a) Corrected enhancement ratio.

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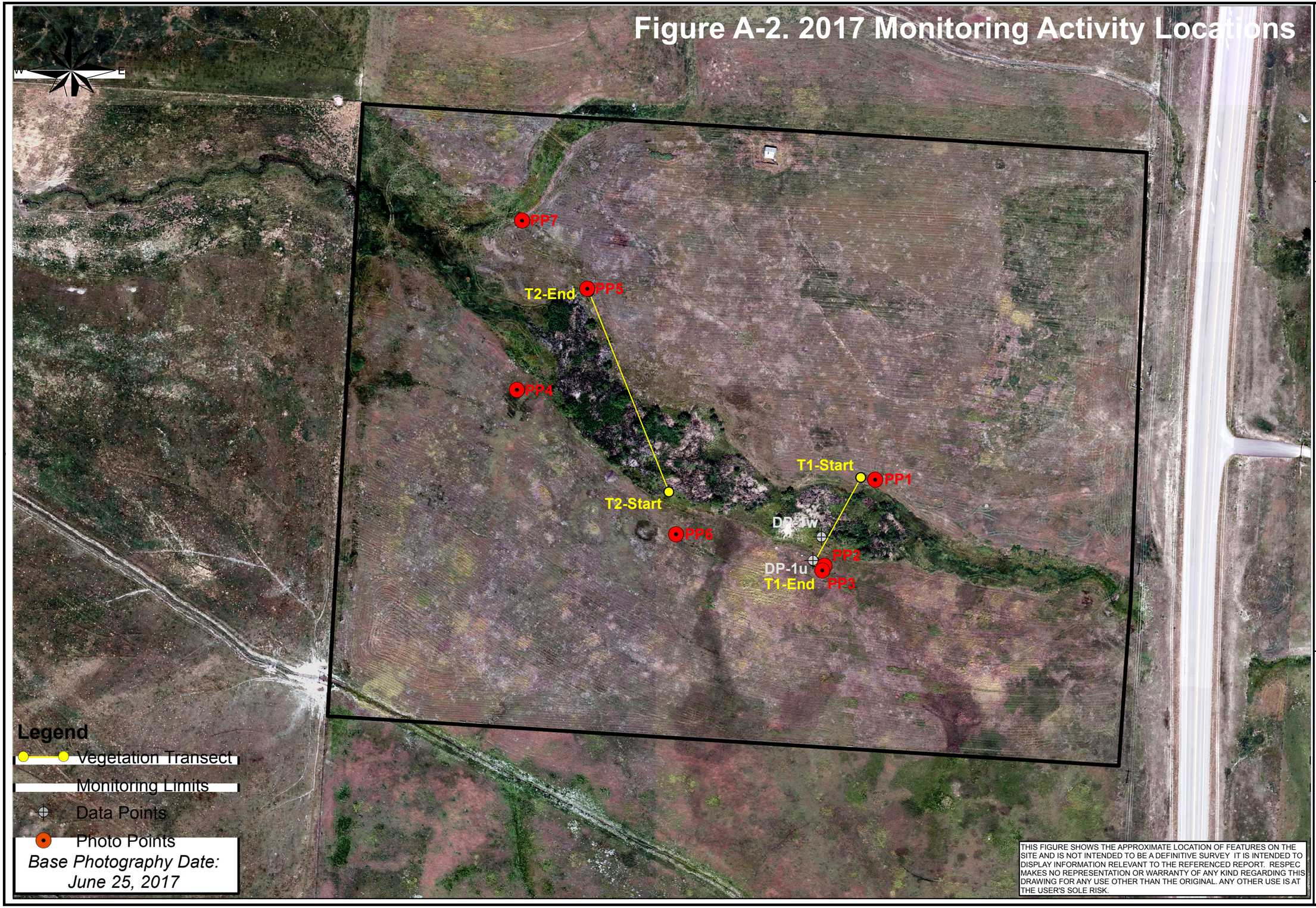
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APPENDIX A
PROJECT AREA MAPS

MDT Wetland Mitigation Monitoring
US Highway 93 Onsite: Peterson Property
Lake County, Montana

Figure A-2. 2017 Monitoring Activity Locations



THIS FIGURE SHOWS THE APPROXIMATE LOCATION OF FEATURES ON THE SITE AND IS NOT INTENDED TO BE A DEFINITIVE SURVEY IT IS INTENDED TO DISPLAY INFORMATION RELEVANT TO THE REFERENCED REPORT. RESPEC MAKES NO REPRESENTATION OR WARRANTY OF ANY KIND REGARDING THIS DRAWING FOR ANY USE OTHER THAN THE ORIGINAL. ANY OTHER USE IS AT THE USER'S SOLE RISK.

RESPEC
820 North Montana Ave.,
Suite A
Helena, MT 59601

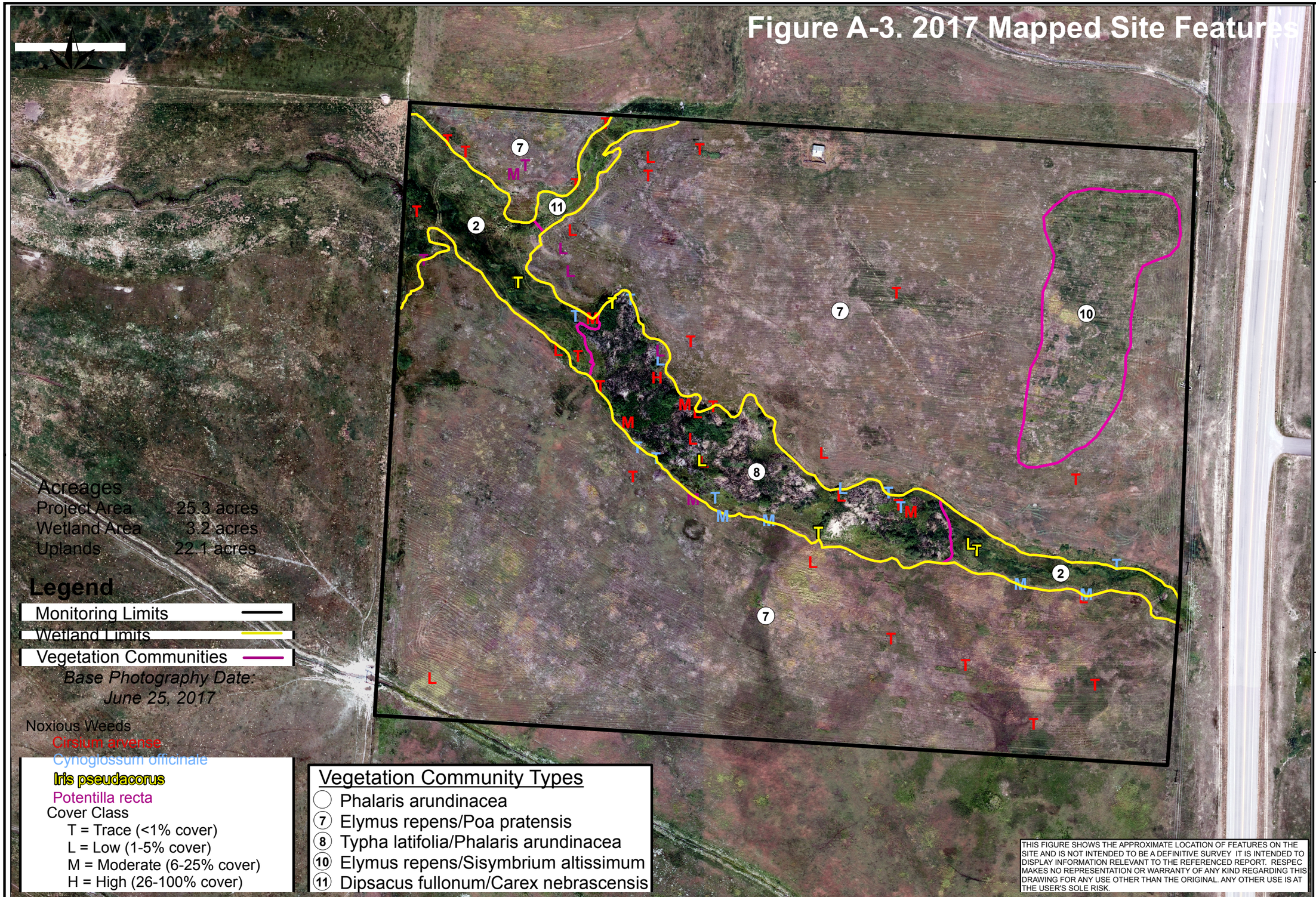
US-93 Peterson Mitigation Site
2017 Monitoring Activity Locations

0 60 120 240 360 480 600 Feet

Project:	NH 5-2 (122) 31
Location:	Lake Co., Montana
Date:	December 2017
Project Manager:	M. Traxler
Drawn By:	J. Rosenbaum

File: Z:\RESPEC\02895 MDT Monitoring 2016 - 2018\US 93 North On-Site Wetland\GPS Data\Peterson only\GPS Data\Mains\Monitor2017.mxd

Figure A-3. 2017 Mapped Site Features



RESPEC
820 North Montana Ave.,
Suite A
Helena, MT 59601

US-93 Peterson Mitigation Site
2017 Mapped Site Features

0 60 120 240 360 480 600 Feet

Project:	NH 5-2 (122) 31
Location:	Lake Co., Montana
Date:	December 2017
Project Manager:	M. Traxler
Drawn By:	J. Rosenbaum

File: Z:\RESPEC\02895 MDT Monitoring 2016 - 2018\US 93 North On-Site Wetland\GPS Data\Peterson only\GPS Data\Mains\Veg2017.mxd

APPENDIX B
MONITORING FORMS

MDT Wetland Mitigation Monitoring
US Highway 93 Onsite: Peterson Property
Lake County, Montana

RESPEC / MDT WETLAND MITIGATION SITE MONITORING FORM

Project Name: **US 93 North Peterson** Project Number: **NH 5-2 (122) 31**
Assessment Date: **August 2, 2017** Person(s) conducting the assessment: **Kevin Schroeder**
Location: **St. Ignatius** MDT District: **Missoula** Milepost: **35.5**
Legal Description: T **19N** R **20W** Section **35**
Weather Conditions: **Smokey & 85 degrees** Time of Day: **12 pm**
Initial Evaluation Date: **August 15, 2008** Monitoring Year: **9** # Visits in Year: **1**
Size of evaluation area: **25 acres** Land use surrounding wetland: **Residential & agriculture**

HYDROLOGY

Surface Water Source: **Unnamed tributary to Post Creek; irrigation ditch diversion**
Inundation: **Present** Average Depth: **.5 feet** Range of Depths: **0**
Percent of assessment area under inundation: **05%**
Depth at emergent vegetation-open water boundary: **0 feet**
If assessment area is not inundated then are the soils saturated within 12 inches of surface: **Yes**
Other evidence of hydrology on the site (ex. – drift lines, erosion, stained vegetation, etc.):
Drift lines & stained vegetation

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:
There is some evidence that the site was more heavily inundated earlier in the season with drift lines and stained vegetation. The water flow in the stream entering the site was also minimal.

VEGETATION COMMUNITIES

Community Number: **2** Community Title (main spp): **Phalaris arundinacea**

Dominant Species	% Cover	Dominant Species	% Cover
Phalaris arundinacea	5 = > 50%	Juncus balticus	1 = 1-5%
Carex utriculata	2 = 6-10%	Poa palustris	1 = 1-5%
Dipsacus fullonum	2 = 6-10%	Solanum dulcamara	1 = 1-5%
Nasturtium officinale	2 = 6-10%	Iris pseudacorus	1 = 1-5%
Veronica sp.	2 = 6-10%	Impatiens ecalcarata	1 = 1-5%
Cirsium arvense	1 = 1-5%	Alnus incana	1 = 1-5%

Comments / Problems: _____

Community Number: **7** Community Title (main spp): **Elymus repens / Poa pratensis**

Dominant Species	% Cover	Dominant Species	% Cover
Elymus repens	5 = > 50%	Juncus balticus	1 = 1-5%
Poa pratensis	3 = 11-20%	Pascopyrum smithii	1 = 1-5%
Bromus inermis	2 = 6-10%	Rosa woodsii	1 = 1-5%
Carex nebrascensis	2 = 6-10%	Sisymbrium altissimum	1 = 1-5%
Dipsacus fullonum	2 = 6-10%	Sonchus arvensis	1 = 1-5%
Cirsium arvense	1 = 1-5%	Phalaris arundinacea	+ = < 1%

Comments / Problems: _____

Community Number: **8** Community Title (main spp): **Typha latifolia / Phalaris arundinacea**

Dominant Species	% Cover	Dominant Species	% Cover
Typha latifolia	5 = > 50%	Poa pratensis	2 = 6-10%
Phalaris arundinacea	3 = 11-20%	Solanum dulcamara	2 = 6-10%
Alnus incana	2 = 6-10%	Cirsium arvense	1 = 1-5%
Carex utriculata	2 = 6-10%	Dipsacus fullonum	1 = 1-5%
Epilobium ciliatum	2 = 6-10%	Lemna minor	1 = 1-5%
Nasturtium officinale	2 = 6-10%	Mentha arvensis	1 = 1-5%

Comments / Problems: _____

Community Number: **10** Community Title (main spp): **Elymus repens / Sisymbrium altissimum**

Dominant Species	% Cover	Dominant Species	% Cover
Elymus repens	3 = 11-20%		
Bromus inermis	1 = 1-5%		
Sisymbrium altissimum	1 = 1-5%		
Cirsium vulgare	+ = < 1%		

Comments / Problems: _____

VEGETATION COMMUNITIES (continued)

Community Number: **11** Community Title (main spp): **Dipsacus fullonum / Carex nebrascensis**

Dominant Species	% Cover	Dominant Species	% Cover
Dipsacus fullonum	5 = > 50%	Carex stipata	1 = 1-5%
Carex nebrascensis	3 = 11-20%		
Lepidium perfoliatum	1 = 1-5%		
Descurainia sophia	1 = 1-5%		
Rumex crispus	+ = < 1%		
Typha latifolia	1 = 1-5%		

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: _____

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

Dominant Species	% Cover	Dominant Species	% Cover

Comments / Problems: _____

PLANTED WOODY VEGETATION SURVIVAL

Plant Species	Number Originally Planted	Number Observed	Mortality Causes
Alnus incana	1163		
Betula occidentalis	817		
Cornus alba	408		
Crataegus douglassii			
Ribes hudsonianum	245		
Rosa woodsii	450		
Salix exigua	408		

Comments / Problems: **No planted woody vegetation survival was assessed during 2017. Woody plants were evaluated based on an ocular observation. Alnus incana has the highest woody plant density and is thriving. Rosa woodsii and Cornus alba are present along the wetland / upland boundary.**

MDT WETLAND MONITORING – VEGETATION TRANSECT

Site: **US 93 North Peterson** Date: **August 2, 2017** Examiner: **K. Schroeder**
Transect Number: **1** Approximate Transect Length: **144 feet** Compass Direction from Start: **210˚** Note: _____

Transect Interval Length: **34 Feet (Station 0-34)**	
Vegetation Community Type: **7 - Elymus repens / Poa pratensis**	
Plant Species	**Cover**
Elymus repens	4 = 21-50%
Poa pratensis	4 = 21-50%
Dipsacus fullonum	1 = 1-5%
Cirsium arvense	+ = < 1%
Rosa woodsii	+ = < 1%
Descurainia sophia	+ = < 1%
Total Vegetative Cover:	95%

Transect Interval Length: **106 Feet (Station 34-140)**	
Vegetation Community Type: 8 - Typha latifolia/Phalaris arundinacea	
Plant Species	**Cover**
Typha latifolia	5 = > 50%
Carex utriculata	2 = 6-10%
Solanum dulcamara	2 = 6-10%
Descurainia sophia	2 = 6-10%
Rorippa nasturtium-aquaticum	2 = 6-10%
Phalaris arundinacea	1 = 1-5%
Dipsacus fullonum	1 = 1-5%
Veronica americana	1 = 1-5%
Cirsium arvense	1 = 1-5%
Poa pratensis	+ = < 1%
Alnus incana	+ = < 1%
Total Vegetative Cover:	98%

Transect Interval Length: **4 Feet (Station 140-144)**	
Vegetation Community Type: 7 - Elymus repens / Poa pratensis	
Plant Species	**Cover**
Poa pratensis	5 = > 50%
Elymus repens	2 = 6-10%
Descurainia sophia	2 = 6-10%
Sonchus arvensis	1 = 1-5%
Total Vegetative Cover:	95%

Transect Interval Length:	
Vegetation Community Type:	
Plant Species	**Cover**
Total Vegetative Cover:	%

MDT WETLAND MONITORING – VEGETATION TRANSECT

Site: **US 93 North Peterson** Date: **August 2, 2017** Examiner: **K. Schroeder**
Transect Number: **2** Approximate Transect Length: **325 feet** Compass Direction from Start: **340˚** Note: _____

Transect Interval Length: **178 Feet (Station 0-178)**	
Vegetation Community Type: 8 - Typha latifolia / Phalaris arundinacea	
Plant Species	**Cover**
Typha latifolia	5 = > 50%
Solanum dulcamara	3 = 11-20%
Phalaris arundinacea	2 = 6-10%
Alnus incana	2 = 6-10%
Carex nebrascensis	1 = 1-5%
Dipsacus fullonum	1 = 1-5%
Nasturtium officinale	1 = 1-5%
Rosa woodsii	1 = 1-5%
Lemna minor	1 = 1-5%
Cirsium arvense	+ = < 1%
Total Vegetative Cover:	95%

Transect Interval Length: **23 Feet (Station 178-201)**	
Vegetation Community Type: 7 - Elymus repens / Poa pratensis	
Plant Species	**Cover**
Poa pratensis	5 = > 50%
Elymus repens	+ = < 1%
Cynoglossum officinale	+ = < 1%
Total Vegetative Cover:	95%

Transect Interval Length: **42 Feet (Station 201-243)**	
Vegetation Community Type: 8 - Typha latifolia / Phalaris arundinacea	
Plant Species	**Cover**
Typha latifolia	5 = > 50%
Carex nebrascensis	2 = 6-10%
Impatiens ecalcarata	2 = 6-10%
Alnus incana	1 = 1-5%
Lemna minor	1 = 1-5%
Epilobium ciliatum	1 = 1-5%
Nasturtium officinale	1 = 1-5%
Poa palustris	+ = < 1%
Geum macrophyllum	+ = < 1%
Total Vegetative Cover:	95%

Transect Interval Length: **82 Feet (Station 243-325)**	
Vegetation Community Type: 7 - Elymus repens / Poa pratensis	
Plant Species	**Cover**
Poa pratensis	5 = > 50%
Elymus repens	3 = 11-20%
Dipsacus fullonum	1 = 1-5%
Sisymbrium altissimum	1 = 1-5%
Cirsium arvense	1 = 1-5%
Total Vegetative Cover:	90%

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): ___ %

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: _____

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 (°)
PP1		Photo Point 1, Photo 1:47.36153786/-114.0988284	215
PP1		Photo Point 1, Photo 2:47.36153786/-114.0988284	135
PP2		Photo Point 2, Photo 1:47.36116942/-114.0991046	45
PP2		Photo Point 2, Photo 2:47.36116942/-114.0991046	35
PP2		Photo Point 2, Photo 3:47.36116942/-114.0991046	110
PP3		Photo Point 3, Photo 1:47.36114968/-114.0991175	45
PP4		Photo Point 4, Photo 1:47.36182067/-114.1010364	30
PP5		Photo Point 5, Photo 1:47.3622544/-114.1006455	175
PP6		Photo Point 6, Photo 1:47.36126306/-114.1000175	315
DP-1U		Upland Soil Pit #1:47.36118848/-114.0991764	
DP-1W		Wetland Soil Pit #1: 47.3612882/-114.0991342	

Comments / Problems: _____

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: _____

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? **NA**
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? **NA**
If no, describe the problems below.

Comments / Problems: **During the site visit no indunation was present behind the log crib structures. The cribs were looked at for obvious signs of breaching due to voids, undercuts, etc. Some signs of this were noted towards the lower end but without flowing water in the site at the time of the survey, it was difficult to pinpoint obvious locations where the cribs were not working as intended.**

WILDLIFE

Birds

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

Mammals and Herptiles

Mammal and Herptile Species	Number Observed	Indirect Indication of Use			
		Tracks	Scat	Burrows	Other
Deer		☒	☒	☐	
Meadow Vole		☐	☐	☒	
		☐	☐	☐	
		☐	☐	☐	
		☐	☐	☐	
		☐	☐	☐	
		☐	☐	☐	
		☐	☐	☐	

Additional Activities Checklist:
NA Macroinvertebrate Sampling (if required)

Comments / Problems: _____

BIRD SURVEY – FIELD DATA SHEET

Site: **US 93 North Peterson** Date: **8/2/17**
Survey Time: **12 pm** to **4 pm**

Bird Species	#	Behavior	Habitat	Bird Species	#	Behavior	Habitat
Red-winged Blackbird	5	L	MA SS				
Raven	1	FO					

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: **Smoky & hot (85°F)**

Notes: **Very little bird activity during the monitoring visit.**

WETLAND DETERMINATION DATA FORM - Western Mountains, Valleys, and Coast Region

Project/Site: US93 North Peterson **City/County:** Lake **Sampling Date:** 02-Aug-17

Applicant/Owner: MDT **State:** MT **Sampling Point:** DP-1U

Investigator(s): RESPEC - K. Schroeder, PWS **Section, Township, Range:** S 35 T 19N R 20W

Landform (hillslope, terrace, etc.): Hillside **Local relief (concave, convex, none):** none **Slope:** 0.0 % / 0.0 °

Subregion (LRR): LRR E **Lat.:** 47.361203 **Long.:** -114.099166 **Datum:** NAD 83

Soil Map Unit Name: Colake silt loam, 0-1% slopes **NWI classification:**

Are climatic/hydrologic conditions on the site typical for this time of year? Yes ○ No ○ **(If no, explain in Remarks.)**

Are Vegetation ☐ **, Soil** ☐ **, or Hydrology** ☐ **significantly disturbed?** **Are "Normal Circumstances" present?** Yes ◉ No ○

Are Vegetation ☐ **, Soil** ☐ **, or Hydrology** ☐ **naturally problematic?** **(If needed, explain any answers in Remarks.)**

Summary of Findings - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ○ No ◉	**Is the Sampled Area within a Wetland?** Yes ○ No ◉
Hydric Soil Present? Yes ○ No ◉	
Wetland Hydrology Present? Yes ○ No ◉	

Remarks:
Sampling point considered within an upland area.

VEGETATION - Use scientific names of plants.

	Absolute % Cover	Dominant Species? Rel.Strat. Cover	Indicator Status
Tree Stratum (Plot size: 30 Foot Radius)			
1.	0	☐ 0.0%	
2.	0	☐ 0.0%	
3.	0	☐ 0.0%	
4.	0	☐ 0.0%	
	0	= Total Cover	
Sapling/Shrub Stratum (Plot size: 15 Foot Radius)			
1.	0	☐ 0.0%	
2.	0	☐ 0.0%	
3.	0	☐ 0.0%	
4.	0	☐ 0.0%	
5.	0	☐ 0.0%	
	0	= Total Cover	
Herb Stratum (Plot size: 5 Foot Radius)			
1. Elymus repens	45	☑ 46.9%	FACU
2. Poa pratensis	40	☑ 41.7%	FACU
3. Cynoglossum officinale	10	☐ 10.4%	FACU
4. Cirsium arvense	1	☐ 1.0%	FACU
5.	0	☐ 0.0%	
6.	0	☐ 0.0%	
7.	0	☐ 0.0%	
8.	0	☐ 0.0%	
9.	0	☐ 0.0%	
10.	0	☐ 0.0%	
11.	0	☐ 0.0%	
	96	= Total Cover	
Woody Vine Stratum (Plot size: 30 Foot Radius)			
1.	0	☐ 0.0%	
2.	0	☐ 0.0%	
	0	= Total Cover	

% Bare Ground in Herb Stratum: 5

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of dominant Species That Are OBL, FACW, or FAC: 0.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	96	x 4 =	384
UPL species	0	x 5 =	0
Column Totals:	96 (A)		384 (B)

Prevalence Index = B/A = 4.000

Hydrophytic Vegetation Indicators:

- ☐ **1 - Rapid Test for Hydrologic Vegetation**
- ☐ **2 - Dominance Test is > 50%**
- ☐ **3 - Prevalence Index is ≤3.0** [1]
- ☐ **4 - Morphological Adaptations** [1] **(Provide supporting data in Remarks or on a separate sheet)**
- ☐ **5 - Wetland Non-Vascular Plants** [1]
- ☐ **Problematic Hydrophytic Vegetation** [1] **(Explain)**

[1] **Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.**

Hydrophytic Vegetation Present? Yes ○ No ◉

Remarks:
No hydrophytic vegetation indicators present.

*Indicator suffix = National status or professional decision assigned because Regional status not defined by FWS.

Soil

Sampling Point: DP-1U

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)		%	Redox Features Color (moist)		%	Type[1]	Loc[2]	Texture	Remarks
0-12	10YR	3/2	100						Clay Loam	soil dry

[1]Type: C=Concentration. D=Depletion. RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining. M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Muck Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1) (except in MLRA 1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ☐ 2 cm Muck (A10)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ○ No ◉

Remarks:

No hydric soil indicator present. Soils sample was moistened prior to color profile.

Hydrology

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres on Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Stunted or Stressed Plants (D1) (LRR A)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Water-Stained Leaves (B9) (MLRA 1, 2, 4A, and 4B)
- ☐ Drainage Patterns (B10)
- ☐ Dry Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-neutral Test (D5)
- ☐ Raised Ant Mounds (D6) (LRR A)
- ☐ Frost Heave Hummocks (D7)

Field Observations:

Surface Water Present?	Yes ○ No ◉	Depth (inches):	
Water Table Present?	Yes ○ No ◉	Depth (inches):	
Saturation Present? (includes capillary fringe)	Yes ○ No ◉	Depth (inches):	

Wetland Hydrology Present? Yes ○ No ◉

Describe Recorded Data (stream gauge, monitor well, aerial photos, previous inspections), if available:

Remarks:

No hydrology indicators present.

WETLAND DETERMINATION DATA FORM - Western Mountains, Valleys, and Coast Region

Project/Site: US93 North Peterson **City/County:** Lake **Sampling Date:** 02-Aug-17

Applicant/Owner: MDT **State:** MT **Sampling Point:** DP-1W

Investigator(s): RESPEC - K. Schroeder, PWS **Section, Township, Range:** S 35 T 19N R 20W

Landform (hillslope, terrace, etc.): Floodplain **Local relief (concave, convex, none):** concave **Slope:** 2.0 % / 1.1 °

Subregion (LRR): LRR E **Lat.:** 47.361245 **Long.:** -114.099139 **Datum:** NAD 83

Soil Map Unit Name: Colake silt loam, 0-1% slopes **NWI classification:**

Are climatic/hydrologic conditions on the site typical for this time of year? Yes ○ No ○ **(If no, explain in Remarks.)**

Are Vegetation ☐ **, Soil** ☐ **, or Hydrology** ☐ **significantly disturbed?** **Are "Normal Circumstances" present?** Yes ◉ No ○

Are Vegetation ☐ **, Soil** ☐ **, or Hydrology** ☐ **naturally problematic?** **(If needed, explain any answers in Remarks.)**

Summary of Findings - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ◉ No ○	**Is the Sampled Area within a Wetland?** Yes ◉ No ○
Hydric Soil Present? Yes ◉ No ○	
Wetland Hydrology Present? Yes ◉ No ○	

Remarks:
Sampling point considered within an wetland area. Wetland dominated by emergent vegetation type.

VEGETATION - Use scientific names of plants.

	Absolute % Cover	Dominant Species? Rel.Strat. Cover	Indicator Status
Tree Stratum (Plot size: 30 Foot Radius)			
1.	0	☐ 0.0%	
2.	0	☐ 0.0%	
3.	0	☐ 0.0%	
4.	0	☐ 0.0%	
	0	= Total Cover	
Sapling/Shrub Stratum (Plot size: 15 Foot Radius)			
1. Alnus incana	10	☑ 90.9%	FACW
2. Rosa woodsii	1	☐ 9.1%	FACU
3.	0	☐ 0.0%	
4.	0	☐ 0.0%	
5.	0	☐ 0.0%	
	11	= Total Cover	
Herb Stratum (Plot size: 5 Foot Radius)			
1. Typha angustifolia	40	☑ 40.0%	OBL
2. Geum macrophyllum	30	☑ 30.0%	FACW
3. Descurainia sophia	15	☐ 15.0%	UPL
4. Dipsacus fullonum	10	☐ 10.0%	FACU
5. Cirsium arvense	5	☐ 5.0%	FACU
6.	0	☐ 0.0%	
7.	0	☐ 0.0%	
8.	0	☐ 0.0%	
9.	0	☐ 0.0%	
10.	0	☐ 0.0%	
11.	0	☐ 0.0%	
	100	= Total Cover	
Woody Vine Stratum (Plot size: 30 Foot Radius)			
1.	0	☐ 0.0%	
2.	0	☐ 0.0%	
	0	= Total Cover	

% Bare Ground in Herb Stratum: 0

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	40	**x 1 =**	40
FACW species	40	**x 2 =**	80
FAC species	0	**x 3 =**	0
FACU species	16	**x 4 =**	64
UPL species	15	**x 5 =**	75
Column Totals:	111	**(A)**	259 **(B)**

Prevalence Index = B/A = 2.333

Hydrophytic Vegetation Indicators:

- ☑ **1 - Rapid Test for Hydrologic Vegetation**
- ☑ **2 - Dominance Test is > 50%**
- ☑ **3 - Prevalence Index is ≤3.0** [1]
- ☐ **4 - Morphological Adaptations** [1] **(Provide supporting data in Remarks or on a separate sheet)**
- ☐ **5 - Wetland Non-Vascular Plants** [1]
- ☐ **Problematic Hydrophytic Vegetation** [1] **(Explain)**

[1] **Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.**

Hydrophytic Vegetation Present? Yes ◉ No ○

Remarks:
Vegetation meets hydrophytic criteria.

*Indicator suffix = National status or professional decision assigned because Regional status not defined by FWS.

Soil

Sampling Point: DP-1W

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)		%	Redox Features Color (moist)		%	Type[1]	Loc[2]	Texture	Remarks
0-2	10YR	4/1	100						Clay Loam	Fragments/roots
2-16	10YR	2/1	98	10YR	4/6	20	C	M	Clay Loam	

[1]Type: C=Concentration. D=Depletion. RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining. M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Muck Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1) (except in MLRA 1)
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ☐ 2 cm Muck (A10)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soil Present? Yes ◉ No ○

Remarks:

Meets depleted matrix hydric soil indicator.

Hydrology

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☑ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☑ Drift deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres on Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Stunted or Stressed Plants (D1) (LRR A)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☑ Water-Stained Leaves (B9) (MLRA 1, 2, 4A, and 4B)
- ☐ Drainage Patterns (B10)
- ☐ Dry Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☑ FAC-neutral Test (D5)
- ☐ Raised Ant Mounds (D6) (LRR A)
- ☐ Frost Heave Hummocks (D7)

Field Observations:

Surface Water Present?	Yes ○	No ◉	Depth (inches):	
Water Table Present?	Yes ◉	No ○	Depth (inches):	5
Saturation Present? (includes capillary fringe)	Yes ◉	No ○	Depth (inches):	0

Wetland Hydrology Present? Yes ◉ No ○

Describe Recorded Data (stream gauge, monitor well, aerial photos, previous inspections), if available:

Remarks:

Hydrology indicators present with soil saturated to ground surface and a high water table. Drift deposits and water-stained leaves observed at the site.

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

1. Project Name: US 93 North Peterson **2. Project #:** NH 5-2(122)31 **Control #:** _____

3. Evaluation Date: 8/2/2017 **4. Evaluator(s):** RESPEC- K. Schroeder **5. Wetland / Site #(s):** AA-1

6. Wetland Location(s) i. T: 19 N **R:** 20 W **S:** 35 **T:** __ N **R:** __ E **S:** _____

ii. Approx. Stationing / Mileposts: ~RP 35.5 US93 North

iii. Watershed: 4 - Flathead **GPS Reference No. (if applies):** _____

Other Location Information: Lake County

7. A. Evaluating Agency MDT

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

B. Purpose of Evaluation:

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

9. Assessment Area (total acres): _____ (visually estimated)
3.2 (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	Palustrine	None	Emergent Wetland	Permanently Flooded	Impounded	75
Riverine	Palustrine	None	Scrub-Shrub Wetland	Permanently Flooded	Impounded	10
Riverine	Palustrine	None	Emergent Wetland	Seasonally Flooded	Impounded	10
Riverine	Riverine	Lower Perennial	Unconsolidated Bottom	Permanently Flooded	Excavated	5

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

Comments: Site is a combination of PEM/PSS wetland and Riverine unconsolidated bottom associated with the small stream channel entering the site.

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 includes an unnamed perennial stream channel and adjacent wetlands, including those associated with a stream diversion that enters mitigation site from the north. Wetlands within AA constructed in 2006 and managed in a natural state. Adjacent AA is subject to grazing.

ii. Prominent weedy, alien, & introduced species: Cirsium arvense; Cirsium vulgare; Potentilla recta; & Iris pseudocorus.

iii. Briefly describe AA and surrounding land use / habitat: Rangeland to the north, south, and west; US93 corridor to the east.

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: Emergent and scrub/shrub vegetation types.

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	Grizzly Bear (LT)
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	---	---	.8 (M)	---	---	---	---

If documented, list the source (e.g., observations, records, etc.)**:** USFWS T & E list & adjacent landowner observation in 2014

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	Great Blue Heron (S3)
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.)**:** MTNHP

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	--	--	--	--
Moderate	.9 (H)	--	--	--
Low	--	--	--	--

Comments: General wildlife rated high based on low disturbance to the area and moderate habitat use.

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.	--	--	--	--	--	--	--	--	--

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	--	--	--	--
Non-game fish	--	--	--	--
No fish	--	--	--	--

Comments: General fish habitat rating determined Not Applicable due to impassable barriers (log cribs) that prevent fish from using A

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**	--	--	--	.8 (H)	--	--	--	--	--
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:** Log crib structures were installed as beaver dam analogues to spread flow out and create wetland habitat. The dense cattail marsh works to slow flood waters and function similarly to woody vegetation, so the score was increased from 0.5 to 0.8.

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**	--	--	--	.8 (H)	--	--	--	--	--
Wetlands in AA flood or pond **< 5 out of 10 years**	--	--	--	--	--	--	--	--	--

Comments: Log crib structures impound and store water.

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**	1 (H)	--	--	--	--	--	--	--
AA contains **unrestricted outlet**	--	--	--	--	--	--	--	--

Comments: The AA routinely floods, is dominated by emergent vegetation, and has a restricted outlet created by log crib structures.

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 %	1 (H)	--	--
35-64 %	--	--	--
< 35 %	--	--	--

Comments: Cattails, reed canarygrass

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	--	--	--	--	--	--	--	--	.8H	--	--	--	--	--	--	--	--	--
S/I	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
T/E/A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Comments: The aquatic bed transitioned to emergent and scrub-shrub vegetation.

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	1 (H)
No Discharge/Recharge indicators present	--
Available Discharge/Recharge information inadequate to rate AA D/R potential	--

Comments: Majority of site hydrology from surface water but appears to be some groundwater influence as well

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 (0.1) 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	1(H)	--	--
Private ownership	--	--	--

Comments: _____

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	high	0.80	1	2.56
B. MT Natural Heritage Program Species Habitat	low	0.10	1	0.32
C. General Wildlife Habitat	high	0.90	1	2.88
D. General Fish/Aquatic Habitat	N/A	0.00	--	0.00
E. Flood Attenuation	high	0.80	1	2.56
F. Short and Long Term Surface Water Storage	high	0.80	1	2.56
G. Sediment/Nutrient/Toxicant Removal	high	1.00	1	3.20
H. Sediment/Shoreline Stabilization	high	1.00	1	3.20
I. Production Export/Food Chain Support	high	0.80	1	2.56
J. Groundwater Discharge/Recharge	high	1.00	1	3.20
K. Uniqueness	moderate	0.40	1	1.28
L. Recreation/Education Potential	high	1.00	1	3.20
	Total:	**8.60**	**11.00**	27.52
		Percent of Total Possible Points:	**78%** (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
PROJECT AREA PHOTOGRAPHS

MDT Wetland Mitigation Monitoring
US Highway 93 Onsite: Peterson Property
Lake County, Montana

US93 Peterson: Photo Point Photographs



Photo Point: 1 Location: Transect 1 Start
Bearing: 215 degrees Year: 2009



Photo Point: 1 Location: Transect 1 Start
Bearing: 215 degrees Year: 2013



Photo Point: 1 Location: Transect 1 Start
Bearing: 215 degrees Year: 2014



Photo Point: 1 Location: Transect 1 Start
Bearing: 215 degrees Year: 2015

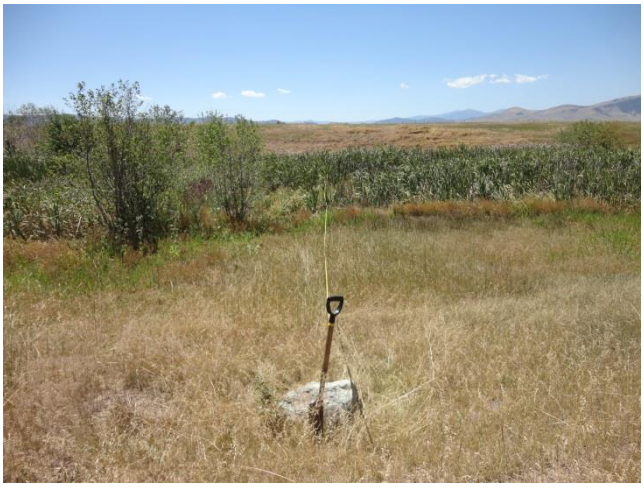


Photo Point: 1 Location: Transect 1 Start
Bearing: 215 degrees Year: 2016



Photo Point: 1 Location: Transect 1 Start
Bearing: 215 degrees Year: 2017

US93 Peterson: Photo Point Photographs



Photo Point: 1 Location: PP1
Bearing: 175 degrees Year: 2009



Photo Point: 1 Location: PP1
Bearing: 135 degrees Year: 2013



Photo Point: 1 Location: PP1
Bearing: 135 degrees Year: 2014



Photo Point: 1 Location: PP1
Bearing: 135 degrees Year: 2015



Photo Point: 1 Location: PP1
Bearing: 135 degrees Year: 2016



Photo Point: 1 Location: PP1
Bearing: 135 degrees Year: 2017

US93 Peterson: Photo Point Photographs



Photo Point: 2 Location: Transect 1 End
Bearing: 45 degrees Year: 2009



Photo Point: 2 Location: Transect 1 End
Bearing: 45 degrees Year: 2011



Photo Point: 2 Location: Transect 1 End
Bearing: 45 degrees Year: 2014



Photo Point: 2 Location: Transect 1 End
Bearing: 45 degrees Year: 2015

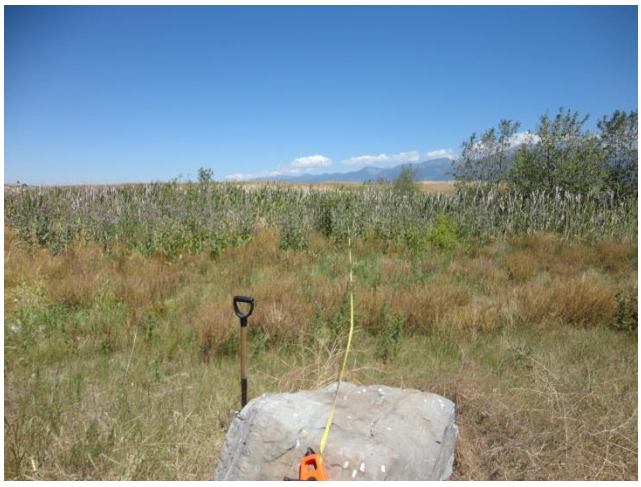


Photo Point: 2 Location: Transect 1 End
Bearing: 45 degrees Year: 2016

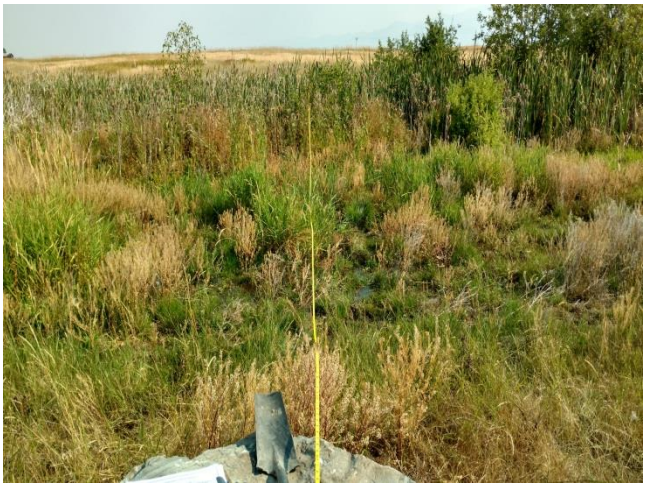


Photo Point: 2 Location: Transect 1 End
Bearing: 45 degrees Year: 2017

US93 Peterson: Photo Point Photographs



Photo Point: 2 Location: PP2
Bearing: 35 degrees Year: 2009



Photo Point: 2 Location: PP2
Bearing: 35 degrees Year: 2010



Photo Point: 2 Location: PP2
Bearing: 35 degrees Year: 2014



Photo Point: 2 Location: PP2
Bearing: 35 degrees Year: 2015

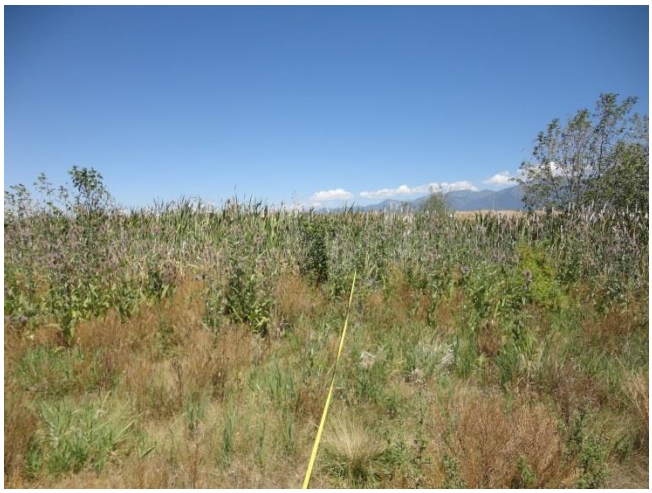


Photo Point: 2 Location: PP2
Bearing: 35 degrees Year: 2016



Photo Point: 2 Location: PP2
Bearing: 35 degrees Year: 2017

US93 Peterson: Photo Point Photographs



Photo Point: 2 Location: PP2
Bearing: 110 degrees Year: 2009



Photo Point: 2 Location: PP2
Bearing: 110 degrees Year: 2013



Photo Point: 2 Location: PP2
Bearing: 110 degrees Year: 2014



Photo Point: 2 Location: PP2
Bearing: 110 degrees Year: 2015



Photo Point: 2 Location: PP2
Bearing: 110 degrees Year: 2016



Photo Point: 2 Location: PP2
Bearing: 110 degrees Year: 2017

US93 Peterson: Photo Point Photographs



Photo Point: 3 Location: Transect 1 End
Bearing: 45 degrees Year: 2009



Photo Point: 3 Location: Transect 1 End
Bearing: 45 degrees Year: 2013



Photo Point: 3 Location: Transect 1 End
Bearing: 45 degrees Year: 2014



Photo Point: 3 Location: Transect 1 End
Bearing: 45 degrees Year: 2014



Photo Point: 3 Location: Transect 1 End
Bearing: 45 degrees Year: 2016

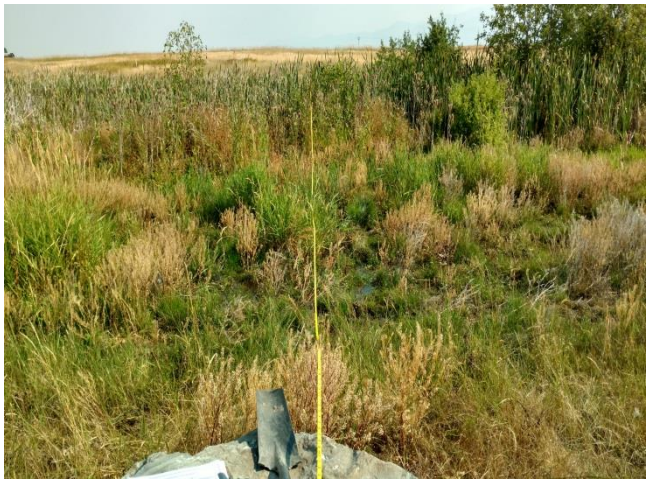


Photo Point: 3 Location: Transect 1 End
Bearing: 45 degrees Year: 2017

US93 Peterson: Photo Point Photographs



Photo Point: 4 Location: Looking across T-2
Bearing: 30 degrees Year: 2009



Photo Point: 4 Location: Looking across T-2
Bearing: 30 degrees Year: 2009



Photo Point: 4 Location: Looking across T-2
Bearing: 30 degrees Year: 2014



Photo Point: 4 Location: Looking across T-2
Bearing: 30 degrees Year: 2015



Photo Point: 4 Location: Looking across T-2
Bearing: 30 degrees Year: 2016



Photo Point: 4 Location: Looking across T-2
Bearing: 30 degrees Year: 2017

US93 Peterson: Photo Point Photographs



Photo Point: 5 Location: Wetland Boundary
Bearing: 175 degrees Year: 2009



Photo Point: 5 Location: Wetland Boundary
Bearing: 175 degrees Year: 2013



Photo Point: 5 Location: Wetland Boundary
Bearing: 175 degrees Year: 2014



Photo Point: 5 Location: Wetland Boundary
Bearing: 175 degrees Year: 2015



Photo Point: 5 Location: Wetland Boundary
Bearing: 175 degrees Year: 2016



Photo Point: 5 Location: Wetland Boundary
Bearing: 175 degrees Year: 2017

US93 Peterson: Photo Point Photographs



Photo Point: 6 Location: Transect 2 Start
Bearing: 315 degrees Year: 2009



Photo Point: 6 Location: Transect 2 Start
Bearing: 315 degrees Year: 2013



Photo Point: 6 Location: Transect 2 Start
Bearing: 315 degrees Year: 2014



Photo Point: 6 Location: Transect 2 Start
Bearing: 315 degrees Year: 2015



Photo Point: 6 Location: Transect 2 Start
Bearing: 315 degrees Year: 2016



Photo Point: 6 Location: Transect 2 Start
Bearing: 315 degrees Year: 2017

US93 Peterson: Data Point Photographs

	
Data Point: DP-1U Year: 2017	Data Point: DP-1W Year: 2017

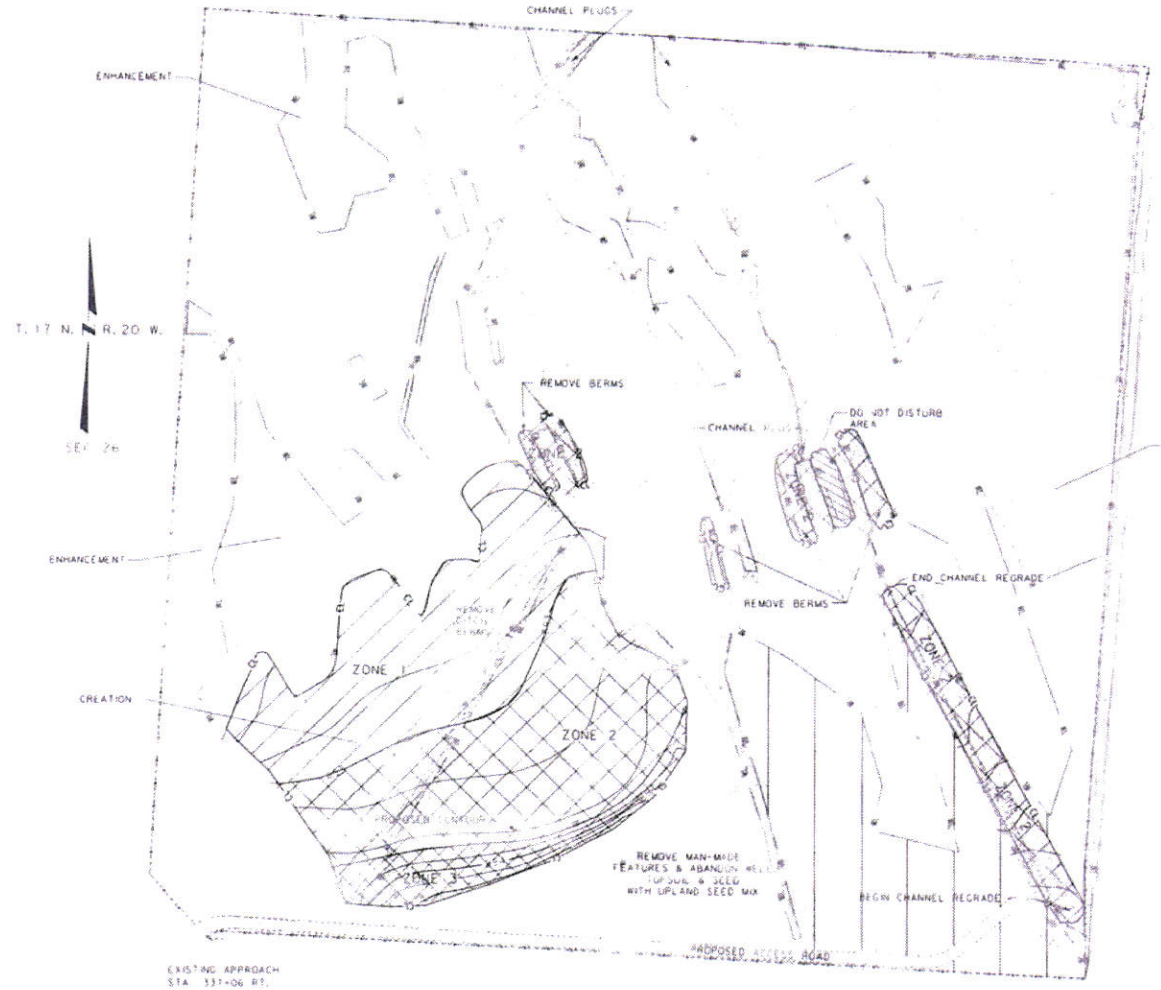
APPENDIX D
PROJECT PLAN SHEETS

MDT Wetland Mitigation Monitoring
US Highway 93 Onsite: Peterson Property
Lake County, Montana

DETAIL

STATE	PROJECT NUMBER	SHEET NO.
MONTANA	NH 5-2412(12)0	L-5A

CSF - 0.9992(6)00

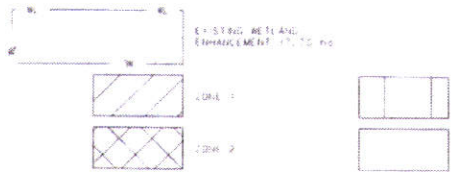


PLANTING NOTES:

1. PLANT WOODY & HERBACEOUS MATERIAL IN THE SPECIFIC HYDROLOGIC REGIME LISTED IN THE PLANT LIST (PLANTING ZONES 1-3).
2. USE 64 mm POT PERENNIAL HERBACEOUS PLANT MATERIAL IN WETLAND CREATION AREAS.
3. USE NUMBER ONE CONTAINER SHRUB MATERIAL FOR WETLAND PLANTINGS, EXCEPT FOR THE WILLOW (SALIX) SPECIES.
4. PLANT WILLOW (SALIX) SPECIES WITH 250 mm CYLINDER CONTAINER STOCK.
5. INSTALL SPRING PLANTED PERENNIAL PLANTS AND SHRUBS NO LATER THAN APRIL 15.
6. PLANT FALL PLANTED SHRUBS BETWEEN SEPTEMBER 15 AND OCTOBER 15.
7. SEED BETWEEN OCTOBER 1 AND APRIL 15 PROVIDED THE GROUND IS NOT FROZEN.
8. PLACE WOOD CHIP MULCH AROUND ALL #1 CONTAINER SHRUBS TO A DEPTH OF 150 mm AT THE SURFACE, 0.6 m IN DIAMETER, SURROUNDING THE BASE OF THE PLANT.
9. SEED UPLAND AREAS DISTURBED DURING WETLAND CONSTRUCTION IN THE WETLAND MITIGATION AREA WITH THE FESCUE PRAIRIE MIX DEVELOPED FOR HIGHWAY 93 ROADSIDE SEEDING.
10. PLACE WETLAND CREATION SHRUBS AT 1.2 m ON CENTER. SEE WETLAND PLANTING DETAIL.
11. APPLY SEED BY BROADCAST METHODS. RAKE OR HARROW THE SEED.
12. PLACE WETLAND CREATION HERBACEOUS PLUGS AT 0.5 m ON CENTER.

GENERAL NOTES:

1. PRIOR TO CONSTRUCTION COMMENCING, CONDUCT A PRE CONSTRUCTION MEETING ON THE SITE BETWEEN THE CONTRACTOR, PROJECT MANAGER, MDT STAFF, WETLANDS SPECIALIST AND WETLANDS ECOLOGIST TO DISCUSS THE DESIGN INTENT OF THE WETLANDS.
2. PLANT SCRUB/SHRUB, HERBACEOUS EMERGENT AND HERBACEOUS WET MEADOW SPECIES FOR WETLAND COMMUNITIES TO BE ESTABLISHED IN WETLAND CREATION AREAS.
3. PLACE PLANT MATERIAL IN THE APPROPRIATE ZONE AS DESCRIBED IN THE PLANT ANNOTATION COLUMN "PLANTING ZONE".
4. PLANT ZONES SHOWN ON THE PLANTING PLAN ARE APPROXIMATE AND MAY CHANGE BASED ON CONDITIONS AFTER FINAL GRADING.



CONTOURS:

MAJOR INTERVAL 1.0 m
MINOR INTERVAL 0.5 m

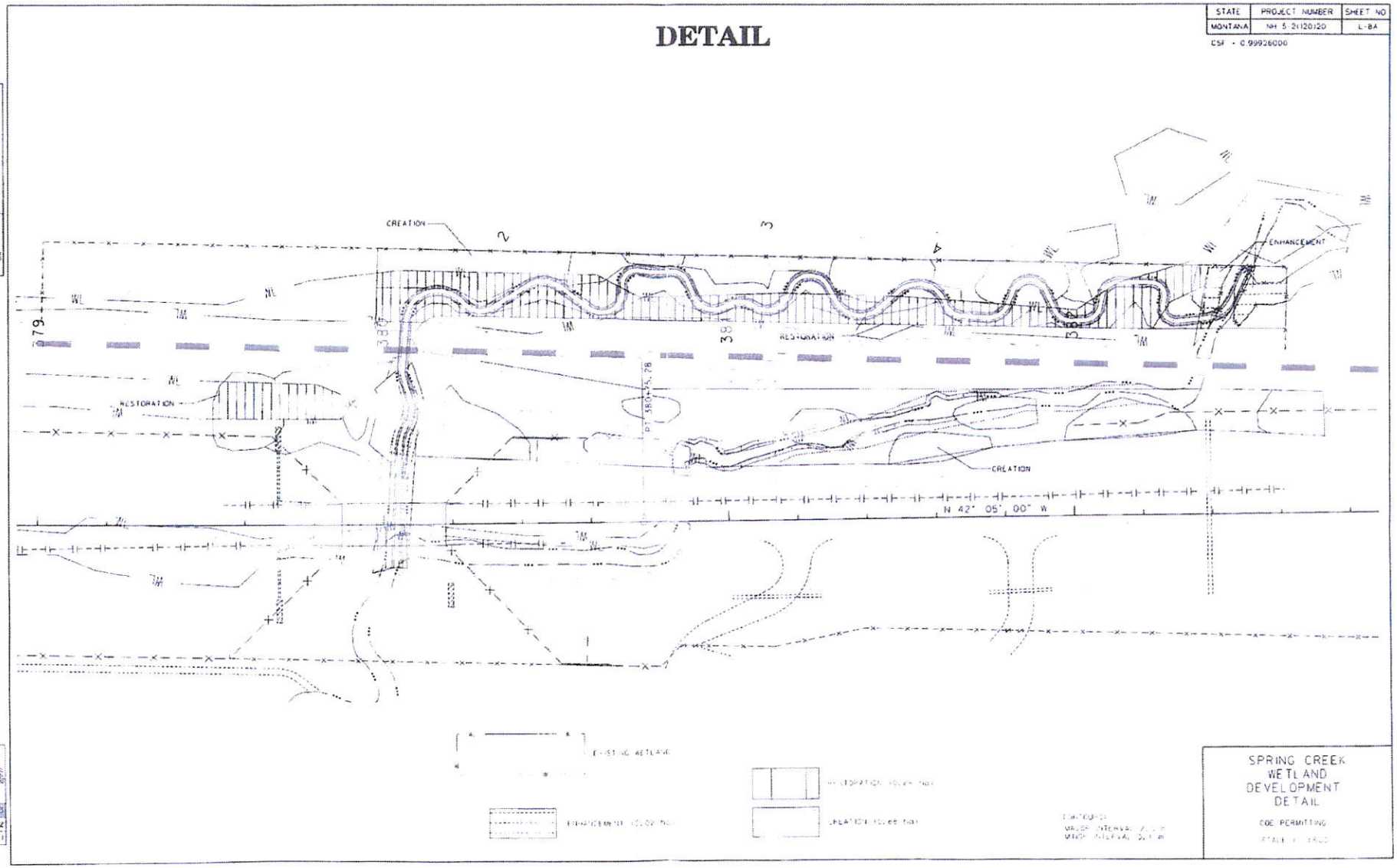
SEE CONSTRUCTION PLANS FOR GRADING, WETLAND CREATION & RESTORATION DETAILS

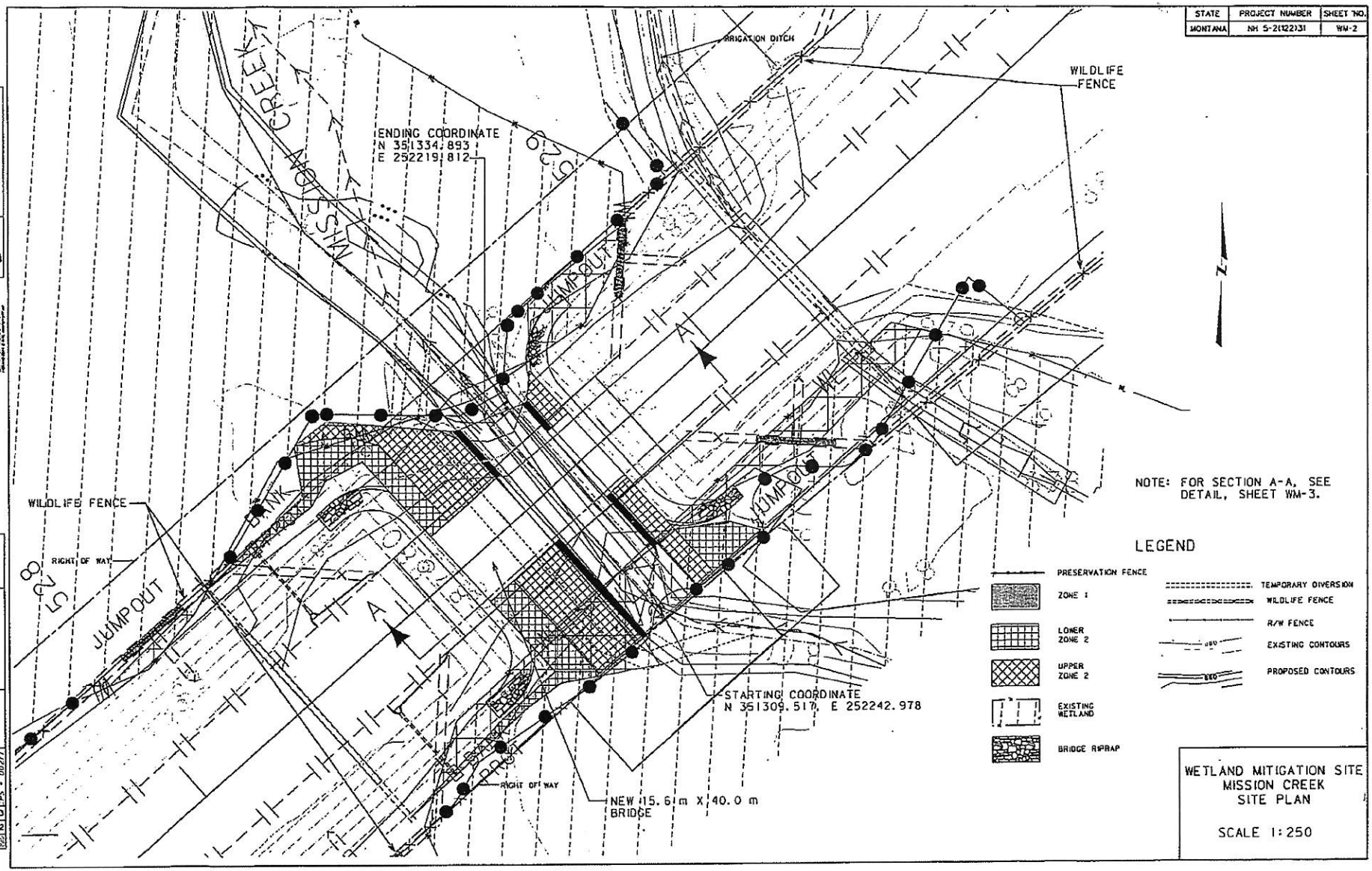
BOUCHARD WETLAND DEVELOPMENT DETAIL

404 PERMITTING

SCALE: 1" = 100'

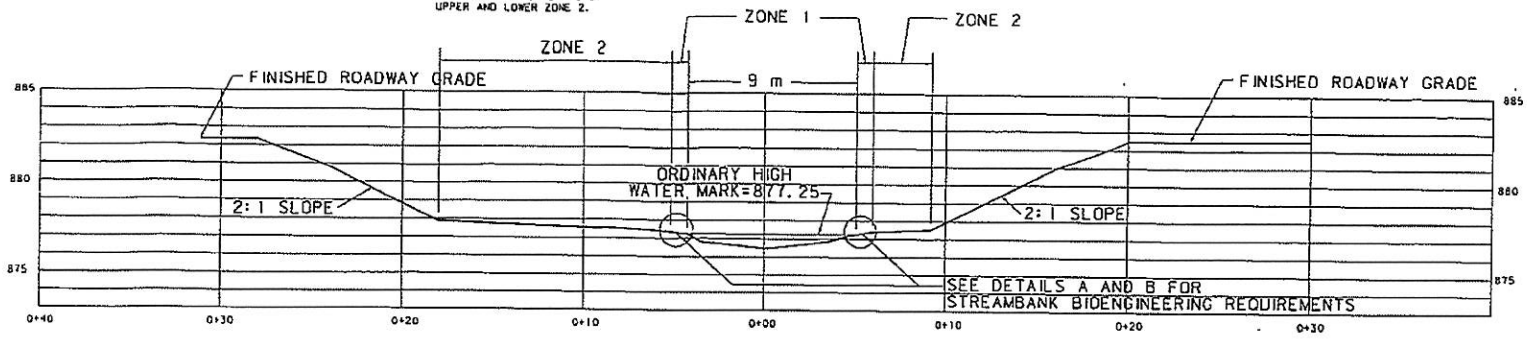
GEOM ENVIRONMENTAL CONSULTING, INC.


DETAIL
STATE
PROJECT NUMBER
SHEET NO
MONTANA
NH 5 2(120)20
L-BA
CSF = 0.99926000
CREATION
ENHANCEMENT
RESTORATION
RESTORATION
CREATION
N 42° 05' 00" W
EXISTING WETLAND
SPRING CREEK
WETLAND
DEVELOPMENT
DETAIL
COE PERMITTING
GEOM ENVIRONMENTAL CONSULTING, INC.


STATE
MONTANA
PROJECT NUMBER
NH 5-2(122)31
SHEET NO.
WM-2
IRRIGATION DITCH
WILDLIFE FENCE
ENDING COORDINATE
N 351334.893
E 252219.812
MISSION CREEK
JUMPOUT
WILDLIFE FENCE
RIGHT OF WAY
BANK
STARTING COORDINATE
N 351309.517, E 252242.978
NEW 15.6 m X 40.0 m BRIDGE
NOTE: FOR SECTION A-A, SEE DETAIL, SHEET WM-3.
LEGEND
PRESERVATION FENCE
ZONE 1
LOWER ZONE 2
UPPER ZONE 2
EXISTING WETLAND
BRIDGE RIPRAP
TEMPORARY DIVERSION
WILDLIFE FENCE
R/W FENCE
EXISTING CONTOURS
PROPOSED CONTOURS
WETLAND MITIGATION SITE
MISSION CREEK
SITE PLAN
SCALE 1:250

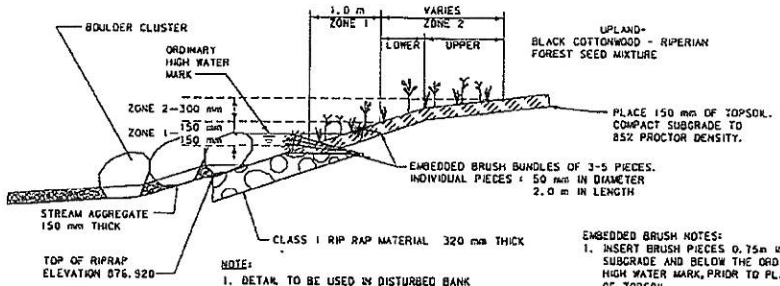
STATE	PROJECT NUMBER	SHEET NO.
MONTANA	NH 5-2(122)31	WM-4

NOTE:
SEE DETAIL A FOR LIMITS OF UPPER AND LOWER ZONE 2.



SECTION A-A
TYPICAL SECTION

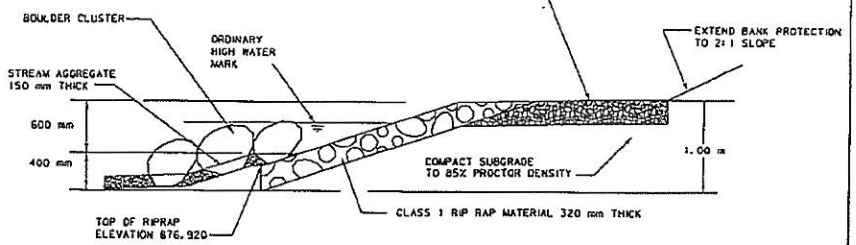
BOULDER CLUSTER NOTE:
1. PLACE NINE (0.6-0.75 m DIAMETER) BOULDERS IN EACH BOULDER GROUP. PLACE GROUPS ON ALTERNATE SIDES OF THE CHANNEL AT 6 m INTERVALS. EMBED BOULDERS APPROXIMATELY 0.2 m INTO THE RIPRAP OR STREAMBED MATERIAL.



NOTE:
1. DETAIL TO BE USED IN DISTURBED BANK AREAS UPSTREAM AND DOWNSTREAM FROM BRIDGE. EXTEND 2.0 m UNDERNEATH THE BRIDGE DRIPLINE.
2. USE DETAIL ON BOTH BANKS OF CREEK IN ZONE ONE.

DETAIL A — STREAM BANK BIOENGINEERING DETAIL - UPSTREAM AND DOWNSTREAM FROM MISSION CREEK BRIDGE
SCALE: NTS

EMBEDDED BRUSH NOTES:
1. INSERT BRUSH PIECES 0.75m INTO SUBGRADE AND BELOW THE ORDINARY HIGH WATER MARK, PRIOR TO PLACEMENT OF TOPSOIL.
2. SPACE PIECES AT 1.0m INTERVALS.
3. COMPACT SUBGRADE AROUND PIECES TO 85% OF PROCTOR.
4. TOPSOIL SHALL BE PLACED SUCH THAT 1.0m OF THE PIECES EXTEND FROM THE FINISHED STREAM BANK.



NOTE:
1. DETAIL TO BE USED IN DISTURBED BANK AREAS UNDER MISSION CREEK BRIDGE. OUTER LIMITS OF DETAIL ARE 2.0 m INSIDE BRIDGE DRIP LINE.
2. USE DETAIL ON BOTH BANKS OF CREEK
3. NO PLANTINGS.

DETAIL B — STREAM BANK BIOENGINEERING DETAIL - UNDER MISSION CREEK BRIDGE
SCALE: NTS

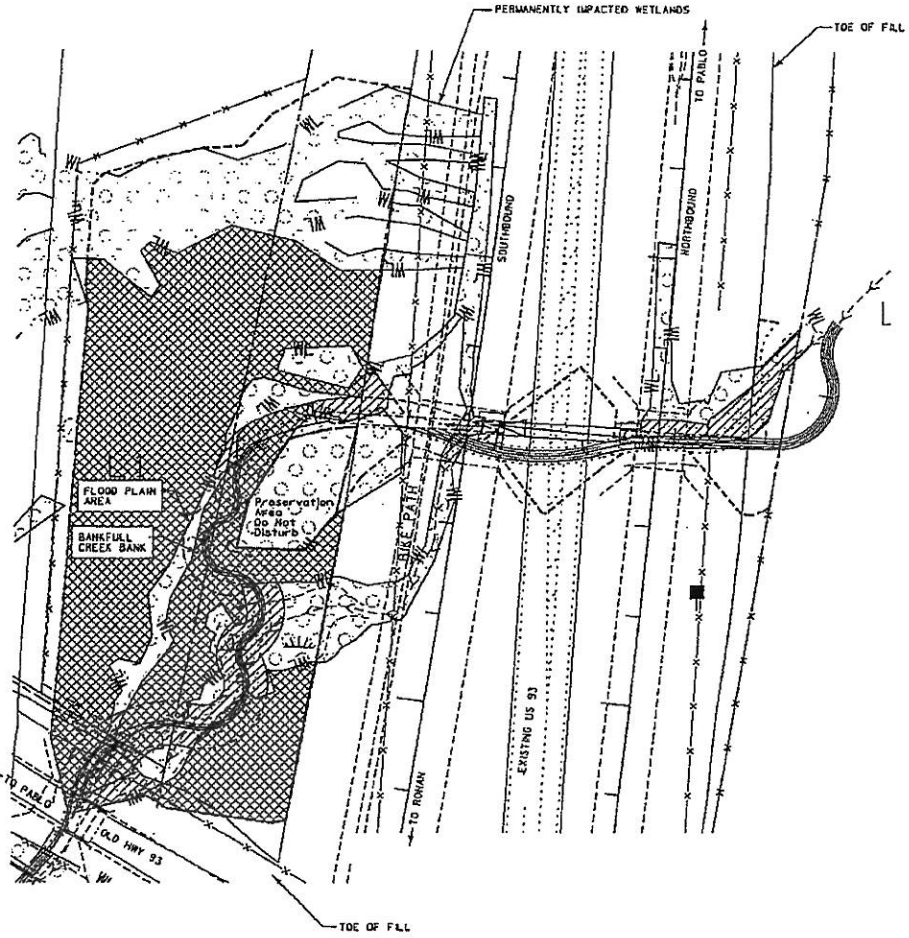
WETLAND MITIGATION SITE
MISSION CREEK
CHANNEL DETAILS

SCALE N. T. S.

STATE	PROJECT NUMBER	SHEET NO.
MONTANA	NH 5-2(123)48	12

CSF = 0.99930000

DETAIL
MUD CREEK
WETLAND IMPACTS AND MITIGATION AREAS



Types of Compensatory Mitigation	Definition1	Corps Ratio2
Preservation	Protection in perpetuity.	NA
Creation	Establishment of a wetland or other aquatic resource where one did not formerly exist	1:1
Re-establishment (Corps)	Restoration of wetland characteristics to existing non-wetland areas that were historically wetlands	1:1
Rehabilitation	Restoration of wetland functions at existing wetland areas that exist in a substantially degraded state.	Based on expected functional shift. A minimum 1.5:1 ratio applies
Enhancement (Corps)	Altering the physical characteristics for land management - CSKT) of a jurisdictional wetland such that it permanently modifies and improves on or more specific functions.	Based on expected functional shift. a minimum 3:1 ratio applies
Re-establishment (Corps)	Restoration of wetland functions characteristics to existing non-wetland areas that were historically wetlands	

1. Source for Corps: Letter from Todd Tillinger (Corps) to Tom Parker (Herrera) dated December 18, 2002.
2. Ratios based on Memorandum from Herrera Environmental Consultants to US Army Corps of Engineers dated December 3, 2002 and the subsequent response from the Corps in a letter from Todd Tillinger to Herrera Environmental Consultants dated December 18, 2002.

LEGEND

- EXISTING WETLANDS
- WETLAND MITIGATION BOUNDARY
- PERMANENTLY IMPACTED WETLAND = 8647.79 m²
- TEMPORARILY IMPACTED WETLAND
- CREATED WETLAND = 25 017 m²

Total Mitigation Area
Total area = 36072 m²
Existing Wetland area = 11055 m² (Enhancement)
Existing Upland area = 25017 m² (New Wetland)
Wetland area permanently impacted 8647.79 m²

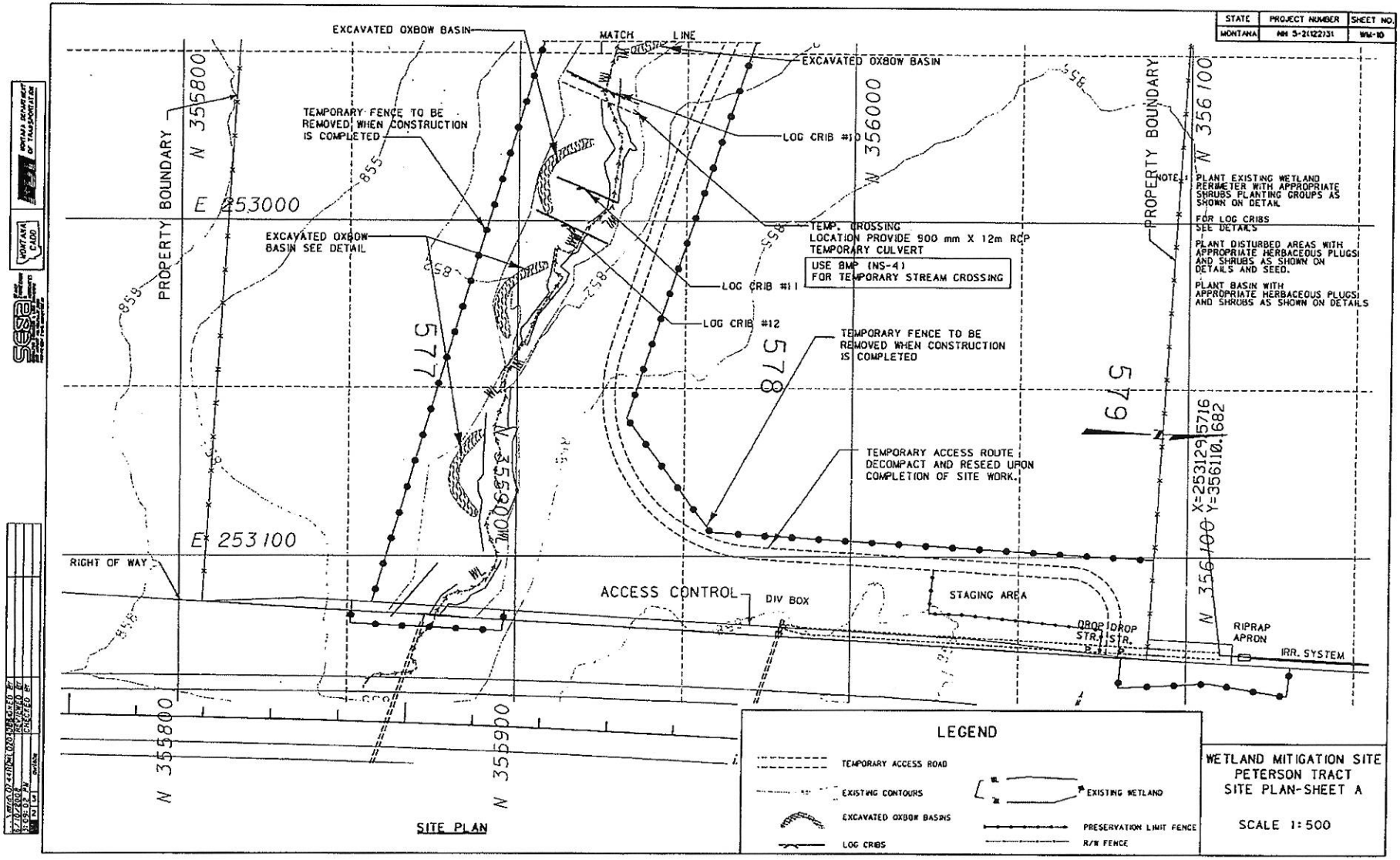
MONTANA CARD

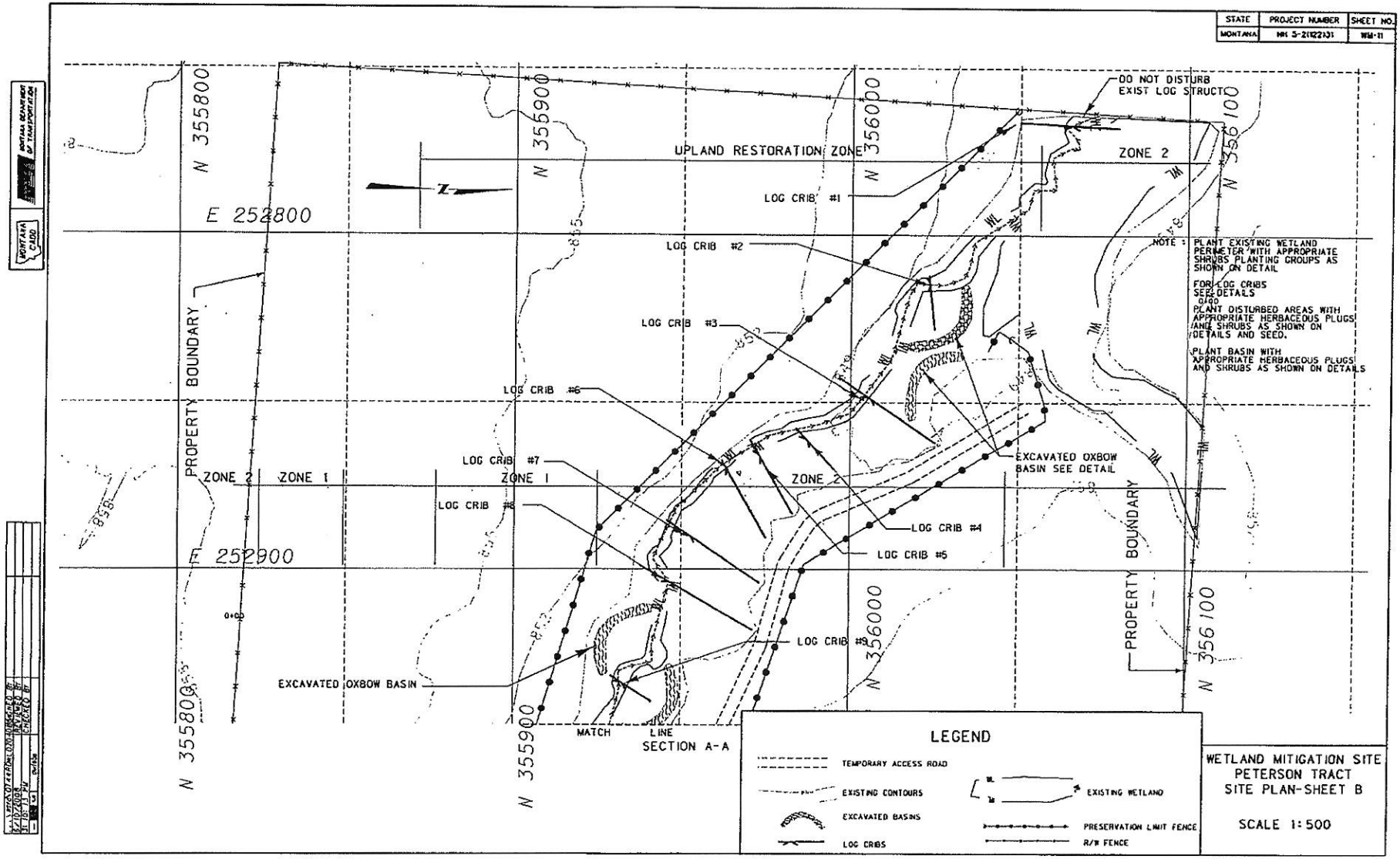
MONTANA DEPARTMENT OF TRANSPORTATION

CartersBurgess

h744\rdwh744rdetail04.dgn

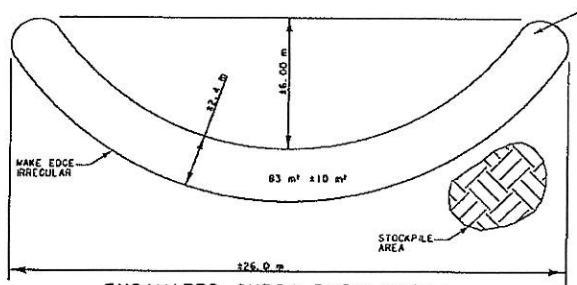
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DATE	
SCALE	


EXCAVATED OXBOW BASIN
MATCH LINE
EXCAVATED OXBOW BASIN
TEMPORARY FENCE TO BE REMOVED WHEN CONSTRUCTION IS COMPLETED
LOG CRIB #10
N 356000
PROPERTY BOUNDARY
N 356100
E 253000
EXCAVATED OXBOW BASIN SEE DETAIL
TEMP. CROSSING LOCATION PROVIDE 900 mm X 12m RCP TEMPORARY CULVERT
USE BMP (NS-4) FOR TEMPORARY STREAM CROSSING
LOG CRIB #11
LOG CRIB #12
TEMPORARY FENCE TO BE REMOVED WHEN CONSTRUCTION IS COMPLETED
NOTE:
PLANT EXISTING WETLAND PERIMETER WITH APPROPRIATE SHRUBS PLANTING GROUPS AS SHOWN ON DETAIL
FOR LOG CRIBS SEE DETAILS
PLANT DISTURBED AREAS WITH APPROPRIATE HERBACEOUS PLUGS AND SHRUBS AS SHOWN ON DETAILS AND SEED.
PLANT BASIN WITH APPROPRIATE HERBACEOUS PLUGS AND SHRUBS AS SHOWN ON DETAILS
577
578
579
X=253129.5716
Y=356110.682
TEMPORARY ACCESS ROUTE DECOMPACT AND RESEED UPON COMPLETION OF SITE WORK.
E 253100
RIGHT OF WAY
ACCESS CONTROL
DIV BOX
STAGING AREA
DROP STR.
DROP STR.
RIPRAP APRON
IRR. SYSTEM
N 355800
N 355900
SITE PLAN
LEGEND
TEMPORARY ACCESS ROAD
EXISTING CONTOURS
EXCAVATED OXBOW BASINS
LOG CRIBS
EXISTING WETLAND
PRESERVATION LIMIT FENCE
R/W FENCE
WETLAND MITIGATION SITE
PETERSON TRACT
SITE PLAN-SHEET A
SCALE 1:500
STATE
MONTANA
PROJECT NUMBER
SHEET NO.
WM-10


STATE
PROJECT NUMBER
SHEET NO.
MONTANA
WM-11
DO NOT DISTURB EXIST LOG STRUCT
UPLAND RESTORATION ZONE
ZONE 2
LOG CRIB #1
LOG CRIB #2
LOG CRIB #3
LOG CRIB #6
LOG CRIB #7
LOG CRIB #8
LOG CRIB #4
LOG CRIB #5
LOG CRIB #9
EXCAVATED OXBOW BASIN SEE DETAIL
EXCAVATED OXBOW BASIN
PROPERTY BOUNDARY
ZONE 1
N 355800
N 355900
N 356000
N 356100
E 252800
E 252900
MATCH LINE
SECTION A-A
NOTE :
PLANT EXISTING WETLAND PERIMETER WITH APPROPRIATE SHRUBS PLANTING GROUPS AS SHOWN ON DETAIL
FOR LOG CRIBS SEE DETAILS
PLANT DISTURBED AREAS WITH APPROPRIATE HERBACEOUS PLUGS AND SHRUBS AS SHOWN ON DETAILS AND SEED.
PLANT BASIN WITH APPROPRIATE HERBACEOUS PLUGS AND SHRUBS AS SHOWN ON DETAILS
LEGEND
TEMPORARY ACCESS ROAD
EXISTING CONTOURS
EXCAVATED BASINS
LOG CRIBS
EXISTING WETLAND
PRESERVATION LIMIT FENCE
R/W FENCE
WETLAND MITIGATION SITE
PETERSON TRACT
SITE PLAN-SHEET B
SCALE 1:500

PETERSON TRACT WETLAND MITIGATION DETAILS

STATE	PROJECT NUMBER	SHEET NO.
MONTANA	NH 5-2112(31)	WM-7



EXCAVATED OXBOW BASIN DETAIL

7 LOCATIONS

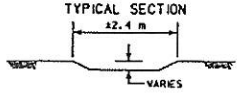
NOTE:

EXCAVATE APPROXIMATELY 12-18 m³ PER SITE AS DIRECTED BY PROJECT MANAGER. INCLUDE 100 mm OF TOPSOIL BELOW FINISHED GRADE

SALVAGE & PLACE 8 m³ OF TOPSOIL PER SITE

VARY DEPTH BETWEEN 150mm AND 300 mm

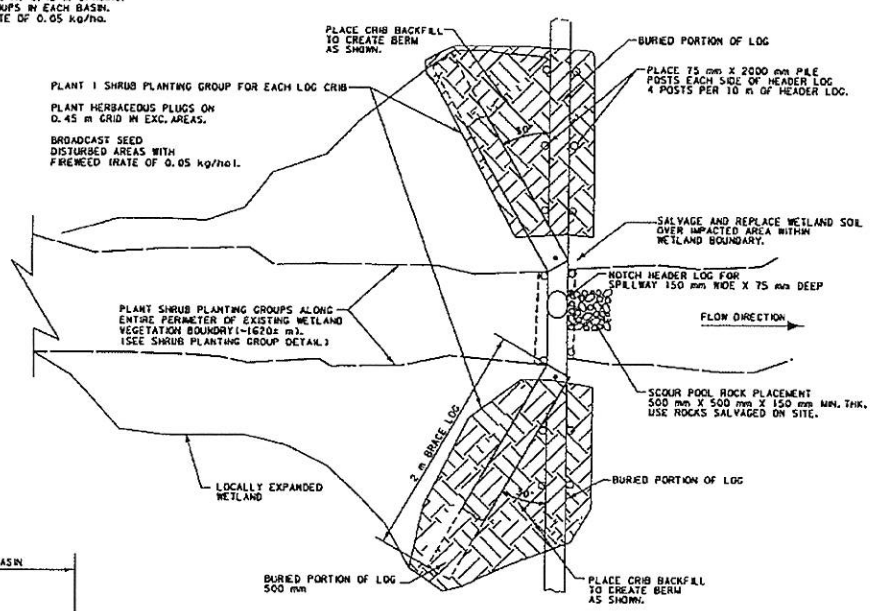
MINIMUM OF 2 m OF SEPARATION BETWEEN EXCAVATION AREA AND ZONE 1



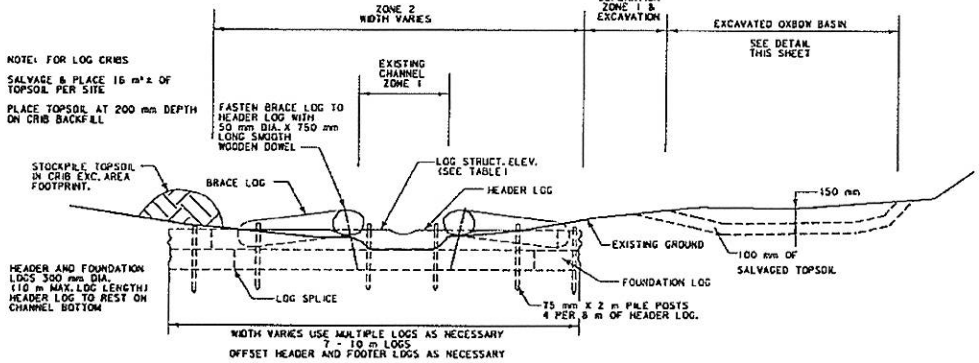
NOTE:

SEE SHEET WM-6 FOR PLANTING GROUP AND PLANTING DETAILS.

SEE SHEET WM-4 FOR LOG CRIB AND OXBOW SUMMARY.



PLAN VIEW - LOG CRIB



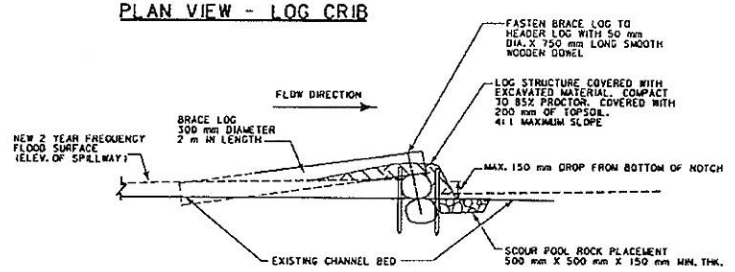
NOTE: FOR LOG CRIBS

SALVAGE & PLACE 16 m³± OF TOPSOIL PER SITE

PLACE TOPSOIL AT 200 mm DEPTH ON CRIB BACKFILL

SECTION VIEW - LOG CRIB

LOOKING DOWNSTREAM
SEE SUMMARY INFORMATION ON WM-4



PROFILE VIEW - LOG CRIB

WETLAND MITIGATION SITE
PETERSON TRACT
LOG CRIB AND OXBOW DETAILS

SCALE N. T. S.

APPENDIX E
MITIGATION CREDITING SYSTEMS

MDT Wetland Mitigation Monitoring
US Highway 93 Onsite: Peterson Property
Lake County, Montana

U.S. ARMY CORPS OF ENGINEERS
HELENA REGULATORY OFFICE
10 WEST 15TH STREET, SUITE 2200
HELENA, MONTANA 59626

December 18, 2002

REPLY TO
ATTENTION OF:

Helena Regulatory Office
(406) 441-1375 Phone
(406) 441-1380 Fax

Subject: Corps File Number 2001-90-416
US Highway 93: Evaro to Polson
Compensatory Wetland Mitigation Crediting

Mr. Tom Parker
Herrera Environmental Consultants, Inc.
101 East Broadway, Suite 610
Missoula, Montana 59802

Dear Mr. Parker:

The purpose of this letter is to outline a compensatory wetland mitigation crediting scheme for the Montana Department of Transportation (MDT) Evaro – Polson US 93 project. The project is being split into at least nine separate segments for the purposes of design and construction, but the corridor was the subject of a single integrated Environmental Impact Statement.

1. Compensatory mitigation must be developed for all unavoidable, non-isolated aquatic impacts on the entire Evaro-Polson project. Unavoidable impacts and a compensatory mitigation package will be reviewed on a watershed and corridor basis for all design segments.

2. All compensatory mitigation sites recognized by the US Army Corps of Engineers (Corps) must be protected by a perpetual conservation easement or similar permanent land use restriction.

3. Use the methods in the 1987 Corps Wetland Delineation Manual to determine whether or not an area is a wetland.

4. All compensatory mitigation for the corridor should be within the limits of the watershed described by USGS Hydrologic Unit Code 17010212, Lower Flathead River, Montana.

5. All wetland impacts must be assessed using the 1999 MDT Montana Wetland Assessment Method.

6. Wetland compensatory mitigation ratios will be based on use of the 1999 MDT Montana Wetland Assessment Method to assign a functional score. The baseline (pre-project) mitigation site assessment score will be compared to the post-project rating, as described in your December 3, 2002 Draft Memorandum to this office. The basis for awarding credit will be the same for on- and off-site mitigation areas. While the crediting method presented was generally acceptable, a review of the proposal has resulted on the following limits on mitigation crediting:

    7.1 **Creation:** The establishment of a wetland or other aquatic resource where one did not formerly exist. Creation of wetlands will result in a mitigation ratio of 1:1, with one acre of satisfactory wetland creation compensating for one acre of unavoidable wetland impact.

7.2 **Restoration:** Re-establishment of wetland and/or other aquatic resource characteristics and function(s) at a site where there were wetlands existed historically, but have been modified so that they are now considered non-wetland or exist in a substantially degraded state.

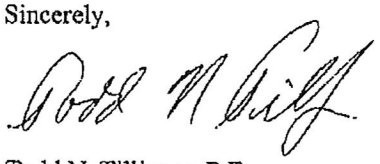
7.2.1 **Restoration (re-establishment)** of wetland characteristics to existing non-wetland areas that were historically wetlands will also result in a mitigation ratio of 1:1, with one acre of satisfactory wetland restoration of this type compensating for one acre of unavoidable wetland impact.

7.2.2 **Restoration (rehabilitation)** of wetland functions at existing wetland areas that exist in a substantially degraded state will result in a mitigation ratio of not less than 1½:1, with a minimum of one and a half acres of satisfactory wetland restoration of this type required to compensate for one acre of unavoidable wetland impact. For example, if the calculated crediting ratio for this type of site was calculated at 1.84:1, that is the ratio that would be used. If the calculation showed 1.34:1, the limit of 1½:1 would be used.

7.3 **Enhancement:** Altering the physical characteristics of an existing jurisdictional wetland such that it permanently modifies and improves one or more specific wetland functions with no corresponding decrease in any other functions. Examples include restoring normal hydrology to a partially drained wetland, or restoring a high level of species diversity to a monotypic plant community. Enhancement of existing wetland areas that are not substantially degraded will result in a mitigation ratio of not less than 3:1, with a minimum of three acres of satisfactory wetland enhancement of this type required to compensate for one acre of unavoidable wetland impact. For example, if the calculated crediting ratio for this type of site was calculated at 4.23:1, that is the ratio that would be used. If the calculation showed 2.23:1, the limit of 3:1 would be used.

This information is provided in response to our recent meeting and the December 3, 2002 Draft Memorandum on US 93 Wetland Mitigation Crediting provided by Herrera, Inc. Additional input from this office will be provided as necessary and as the plan for mitigation crediting matures. If you have questions feel free to call me at (406) 441-1375, and reference Corps File Number 2001-90-416.

Sincerely,



Todd N. Tillinger, P.E.
Project Manager

Cc: Gordon Stockstad – MDT Environmental Services, Helena, Montana
Scott Jackson – U.S. Fish and Wildlife Service, Helena, Montana
Craig Genzlinger – U.S. Federal Highway Administration, Helena, Montana
Steve Potts – U.S. Environmental Protection Agency, Helena, Montana

Herrera Environmental Consultants, Inc.

Memorandum

To	U.S. Army Corps of Engineers, Helena Office
cc	Montana Department of Transportation
From	Tom Parker, Herrera Environmental Consultants
Date	December 3, 2002
Subject	US 93 Wetland Mitigation Crediting

Introduction

Compensatory wetland mitigation, as credited by the Army Corps of Engineers, is often evaluated based on area ratios of mitigated wetlands to impacted wetlands. *Mitigated wetlands* include all wetland areas that are created, enhanced or preserved to compensate for impacted wetlands. Created wetlands are often credited at a 1:1 ratio, while existing wetlands that are enhanced or preserved may be credited at ratios ranging from 3:1 to 10:1.

Many opportunities exist along the US 93 corridor to enhance existing wetlands using combinations of active re-vegetation, land management change, weed management and other restoration actions. Often, it is difficult to determine the appropriate wetland credit ratio that should be assigned for a given wetland enhancement project. A quantitative basis for calculating appropriate enhancement ratios would benefit all participants in the wetland regulatory process. We understand that the regulatory agency has final authority to determine wetland mitigation credits.

Proposed Approach

We propose using the MDT Wetland Functional Assessment Method (MDT 1999) as a tool to measure the projected shift in wetland functions and values based on wetland mitigation activities. This method, which was used to assess functions and values of impacted wetlands along the corridor, evaluates 12 wetland functions and values (Tables 1 and 2). Using the procedure documented in MDT (1999), a wetland specialist assigns scores of 0 or 0.1 (low) to 1.0 (high) to each of the 12 categories at a particular site. These scores are totaled, resulting in a functional score for the site.

An evaluator measures projected shift in wetland functions and values by first assessing existing conditions on the site, then estimating changes in scores that would occur as a result of mitigation activities, and finally calculating the difference between these scores.

The shift in wetland function at a mitigation site could then be used to determine a crediting ratio for enhancement projects. Using this approach, the process for calculating wetland mitigation credits at a given site would have two components. First, a wetland creation component, assuming a 1:1 ratio for created wetlands, would be equal to the number of created wetland acres at a mitigation site. This creation component could be expressed as:

$A_{created}$ = Created wetland acres (1)

Second, an enhancement component would be the number of existing wetland acres to be enhanced, multiplied by an enhancement factor. The enhancement factor represents the ratio of functional shift (the difference between pre-project functional score and projected post-project functional score) to the pre-project functional score. The enhancement factor can be expressed as:

$$\text{Enhancement factor} = \left(\frac{F_{post} - F_{pre}}{F_{pre}} \right) \quad (2)$$

where:

F_{post} = Projected post-mitigation project functional score
F_{pre} = Pre-project functional score

Note: *The enhancement ratio is the inverse* $\left(\frac{1}{X}\right)$ *of the enhancement factor. The enhancement ratio is the term most frequently used to discuss crediting ratios for wetland mitigation projects. For example, an enhancement factor of 0.25 would be equal to an enhancement ratio of 4:1. This means that four enhanced acres at a particular site would be worth one acre of credit to offset wetland acres impacted by the project.*

The enhancement component of the equation can then be expressed as:

$$A_{existing}\left(\frac{F_{post} - F_{pre}}{F_{pre}} \right) \quad (3)$$

where:

$A_{existing}$ = Existing wetland acres to be enhanced
F_{post} = Projected post-mitigation project functional score
F_{pre} = Pre-project functional score

The following equation, which includes both a creation and enhancement component, can then be used to calculate wetland mitigation credits expressed as acres:

$$A_{credited} = A_{created} + A_{existing}\left(\frac{F_{post} - F_{pre}}{F_{pre}}\right) \quad (4)$$

where:

$A_{credited}$ = Wetland mitigation credits expressed as acres
$A_{created}$ = Wetland creation acres
$A_{existing}$ = Existing wetland acres to be enhanced
F_{post} = Projected post-mitigation project functional score
F_{pre} = Pre-project functional score

To demonstrate how these equations can be applied in the context of US 93 wetland mitigation, we have selected two proposed wetland mitigation sites as examples. The Bouchard property (Example 1) is a 40-acre parcel north of Arlee. The Ludwig property (Example 2) includes slightly less than 20 acres and is two miles north of St. Ignatius.

Example 1

The Bouchard property has been acquired recently by MDT. This site is near the headwaters of Spring Creek and supports a mixture of upland, emergent wetland and scrub/shrub wetland. A proposed wetland mitigation project at this site will include approximately 8 acres of wetland creation and up to 20 acres of wetland enhancement. A summary of pre- and post-project wetland functional scores is provided in Table 1.

Table 1. Expected change in wetland functions and values, Bouchard site.

	Functional Points Pre-Project	Functional Points Post-Project	Factors Affecting Score
A. Listed/proposed T&E species habitat	.3	.3	No populations in area, not likely corridor
B. Habitat for S1, S2, or S3 plants or animals	.1	.1	No populations in area
C. General wildlife habitat	.8	1	Decreased disturbance
D. General fish/aquatic habitat	N/A	N/A	Not historic fish habitat
E. Flood attenuation	N/A	N/A	No channel
F. Short- and long-term surface water storage	.8	.8	Seasonal surface water
G. Sediment/nutrient/toxicant retention and removal	N/A	N/A	Does not receive excess sediment, nutrient, toxicant inputs
H. Sediment/shoreline stabilization	N/A	N/A	No channel
I. Production export/food chain support	.9	.9	Vegetation at site already diverse
J. Ground water discharge/recharge	1	1	Discharge/recharge indicators present
K. Uniqueness	.6	.8	Decreased disturbance
L. Recreation/education potential	.1	1	Decreased disturbance
Totals	4.6	5.9	

The following example assumes that 8 ($A_{created}$) new wetland acres are created and the functional score of 20 ($A_{existing}$) existing wetland acres shifts from 4.6 (F_{pre}) to 5.9 (F_{post}). Using Equation (2):

$$\text{Enhancement factor} = \left(\frac{F_{post} - F_{pre}}{F_{pre}}\right) = \left(\frac{5.9 - 4.6}{4.6}\right) = 0.28$$

In this case, the enhancement factor equals 0.28. The corresponding enhancement ratio (1/0.28) would be 3.5 and would be expressed as 3.5 to 1, indicating 3.5 acres of enhancement replaces 1 impacted wetland acre.

Next, applying equation (3), it is possible to calculate the mitigation credits for the 20 acres of existing wetland that would be enhanced at the Bouchard site:

$$A_{existing}\left(\frac{F_{post} - F_{pre}}{F_{pre}}\right) = 20(0.28) = 5.6 \text{ acres of credit for enhancement portion}$$

Finally, applying equation (4), it is possible to calculate total mitigation credits at the Bouchard site.

$$A_{credited} = A_{created} + A_{existing}\left(\frac{F_{post} - F_{pre}}{F_{pre}}\right) = 8 + 20(0.28) = \textbf{13.65 total acres of credit}$$

Example 2

The Montana Department of Transportation has requested an assessment of wetland mitigation potential on the Ludwig property north of St. Ignatius, Montana. Because the decision to acquire this property partly depends upon how many wetland mitigation credits it is feasible to generate there, we decided to use the Ludwig property as an example of how one might use a functional score approach to calculate an appropriate crediting ratio for enhancement projects. Tables 1 and 2 include summaries of functional scores for (1) existing conditions and (2) estimated post-mitigation project conditions at each of the two proposed mitigation projects on the Ludwig property. A tributary to Post Creek runs through the property and was assessed as one wetland site (Table 2). The second wetland site consists of a created stock pond and small adjacent wetlands supported by the pond (Table 3). Both sites are impacted by livestock grazing and altered hydrology.

Stream Site. The Post Creek portion of the site would increase from an estimated 1.3 ($A_{existing}$) acres of wetland to 5.2 acres, resulting in 3.9 ($A_{created}$) created wetland acres. From Table 2, the functional score would shift from 5.4 (F_{pre}) to 9.5 (F_{post}). Using Equation (2):

$$\text{Enhancement factor} = \left(\frac{F_{post} - F_{pre}}{F_{pre}}\right) = \left(\frac{9.5 - 5.4}{5.4}\right) = 0.76$$

Table 2. Expected change in wetland functions and values, Ludwig property, Post Creek Tributary.

MDT Assessment Method Functions and Values	Functional Points Pre-Project	Functional Points Post-Project	Factors Affecting Score
A. Listed/proposed T&E species	.3	.8	Grizzly, Sus/inc. to Doc/secondary
B. Habitat for S1, S2, or S3 plants or animals	.1	.7	Grizzly, Sus/inc. to Doc/secondary
C. General wildlife habitat	.5	.9	Increased cover
D. General fish/aquatic habitat	.1	.3	Increased cover and connectivity, but unlikely fish habitat
E. Flood attenuation	.2	.7	Increased size, woody component
F. Short- and long-term surface water storage	.4	.8	Increased size
G. Sediment/nutrient/toxicant removal	.9	.9	Close to highway, cattle removal
H. Sediment/shoreline stabilization	.7	1	Increase deep binding root mass
I. Production export/food chain support	.9	1	Increased size
J. Ground water discharge/recharge	1	1	
K. Uniqueness	.2	.4	Shift to shrub community
L. Recreation/education potential	.1	1	Not likely site
Total Functional Points	5.4	9.5	

Table 3. Expected change in wetland functions and values, Ludwig property, stock pond and adjacent wetlands.

MDT Assessment Functions and Values	Functional Points Pre-Project	Functional Points Post-Project	Factors Affecting Score
A. Listed/proposed T&E species	.3	.7	Grizzly bear use adjacent areas, increased cover may increase use
B. Habitat for S1, S2, or S3 plants or animals	.2	.2	No known occurrence
C. General wildlife habitat	.3	.9	Increased cover
D. General fish/aquatic habitat	N/A	N/A	No habitat
E. Flood attenuation	N/A	N/A	No overbank flow
F. Short- and long-term surface water storage	.7	.8	
G. Sediment/nutrient/toxicant removal	1	1	Close to highway, cattle removal
H. Sediment/shoreline stabilization	N/A	N/A	
I. Production export/food chain support	.6	.7	Increased structural diversity
J. Ground water discharge/recharge	1	1	
K. Uniqueness	.1	.4	Shift to shrub
L. Recreation/education potential	.1	1	Not likely site
Total Functional Points	4.3	6.7	

In this case, the enhancement factor equals 0.76. The corresponding enhancement ratio (1/0.76) would be 1.32 and would be expressed as 1.32 to 1, indicating 1.32 acres of enhancement replaces 1 impacted wetland acre.

Next, applying equation (3), it is possible to calculate the mitigation credits for the 1.3 acres of existing wetland that would be enhanced at the Ludwig stream channel site:

$$A_{existing}\left(\frac{F_{post}-F_{pre}}{F_{pre}}\right) = 1.3(0.76) \quad = 0.98 \text{ acres of credit for enhancement portion}$$

Finally, applying equation (4), it is possible to calculate total mitigation credits at the Ludwig stream channel site.

$$A_{credited} = A_{created} + A_{existing}\left(\frac{F_{post}-F_{pre}}{F_{pre}}\right) = 3.9+1.3(0.76) \quad = \textbf{4.9 total acres of credit}$$

Stock Pond Site. The stock pond portion of the site would increase from an estimated 0.35 ($A_{existing}$) acres of wetland to 1.8 acres, resulting in 1.45 ($A_{created}$) created wetland acres. From Table 3, the functional score would shift from 4.3 (F_{pre}) to 6.7 (F_{post}). Using Equation (2):

$$\text{Enhancement factor} = \left(\frac{F_{post}-F_{pre}}{F_{pre}}\right) \qquad = \left(\frac{6.7-4.3}{4.3}\right) \qquad = 0.56$$

In this case, the enhancement factor equals 0.56. The corresponding enhancement ratio (1/0.56) would be 1.79 and would be expressed as 1.79 to 1, indicating 1.79 acres of enhancement replaces 1 impacted wetland acre.

Next, applying equation (3), it is possible to calculate the mitigation credits for the 0.35 acres of existing wetland that would be enhanced at the Ludwig stock pond site:

$$A_{existing}\left(\frac{F_{post}-F_{pre}}{F_{pre}}\right) = 0.35(0.56) \quad = 0.20 \text{ acres of credit for enhancement portion}$$

Finally, applying equation (4), it is possible to calculate total mitigation credits at the Ludwig stock pond site.

$$A_{credited} = A_{created} + A_{existing}\left(\frac{F_{post}-F_{pre}}{F_{pre}}\right) = 1.45 + 0.35(0.56) = \textbf{1.64 total acres of credit}$$

CSKT Mitigation Ratios from Wetlands Conservation Plan (pre-project only)

Prepared by Tom Parker, Ecologist, Herrera Environmental Consultants, Inc.
May 2, 2002

Impacted Wetland Type	Mitigation Type			
	Preservation	*Restoration*	*Enhancement*	*Creation*
Forested and Shrub	3:1	2.5:1	4:1	4:1
Emergent and Open Water	2:1	1.5:1	3:1	3:1

Equation for calculating required mitigation acres based on CSKT Mitigation Guidelines.

Required mitigation acres = $P(3\ I_{sf} + 2\ I_{oe}) + R(2.5\ I_{sf} + 1.5\ I_{oe}) + E(4\ I_{sf} + 3\ I_{oe}) + C(4\ I_{sf} + 3\ I_{oe})$

Where:
I_{sf} = # of scrub/shrub or forested impact acres = 18
I_{oe} = # of emergent or open water impact acres = 32

P = estimated **Preservation** proportion of mitigation area
R = estimated **Restoration** proportion of mitigation area
E = estimated **Enhancement** proportion of mitigation area
C = estimated **Creation** proportion of mitigation area

Example 1: To find required mitigation acres, assuming that mitigation projects will be distributed as follows based on area: Preservation = 30 percent; Restoration = 50 percent; Enhancement = 10 percent; Creation = 10 percent.

.3 (3*18 + 2*32) + .5(2.5*18+1.5*32) + .1(3*18 + 4*32) + .1(3*18 + 4*32) = 104.2 required acres

Example 2: To find required mitigation acres, assuming that mitigation projects will be distributed as follows based on area: Preservation = 10 percent; Restoration = 90 percent; Enhancement = 0 percent; Creation = 0 percent.

.1 (3*18 + 2*32) + .9(2.5*18+1.5*32) + 0(3*18 + 4*32) + 0(3*18 + 4*32) = 96.0 required acres

Example 3: Given 18 impacted acres (36% of total) of shrub or forested and 32 impacted acres (64 percent of total) of open water or emergent, what is the weighted ratio for restoration projects?

2.5(.36) + 1.5(.64) = 1.86

Therefore: A 20-acre restoration project will mitigate for 20/1.86 =10.75 impacted acres.