MONTANA DEPARTMENT OF TRANSPORTATION
WETLAND MITIGATION MONITORING REPORT

JTX – TUNNICLIFF RANCH MITIGATION SITE
BIG HORN COUNTY, MONTANA

PROJECT COMPLETED: 2015

MONITORING REPORT #2: DECEMBER 2017



Prepared for:

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

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MONTANA DEPARTMENT OF TRANSPORTATION WETLAND MITIGATION MONITORING REPORT: YEAR 2017

JTX – TUNNICLIFF RANCH MITIGATION SITE BIG HORN COUNTY, MONTANA

INITIAL CONSTRUCTION: 2015

MDT Project Number STPX STWS (056)
Control Number 7286

USACE: NWO-2010-01938-MTH

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December 2017

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TABLE OF CONTENTS

1.0 INTRODUCTION 1

2.0 METHODS 6

2.1 HYDROLOGY 6
2.2 VEGETATION 6
2.3 SOIL 7
2.4 WETLAND DELINEATION 7
2.5 WILDLIFE 8
2.6 FUNCTIONAL ASSESSMENT 8
2.7 PHOTOGRAPHIC DOCUMENTATION 8
2.8 GLOBAL POSITIONING SYSTEM DATA 8
2.9 MAINTENANCE NEEDS 9

3.0 RESULTS 9

3.1 HYDROLOGY 9
3.2 VEGETATION 10
3.3 SOIL 16
3.4 WETLAND DELINEATION 17
3.5 WILDLIFE 17
3.6 FUNCTIONAL ASSESSMENT 17
3.7 PHOTOGRAPHIC DOCUMENTATION 19
3.8 MAINTENANCE NEEDS 19
3.9 CURRENT CREDIT SUMMARY 19

4.0 REFERENCES 22

LIST OF TABLES

TABLE PAGE

1-1 Wetland Credit Determination for the JTX – Tunnicliff Ranch Site 3
3-1 Vegetation Species Observed From 2016 Through 2017 at the JTX – Tunnicliff Ranch Site 11
3-2 Data Summary for T-1 From 2016 Through 2017 at the JTX – Tunnicliff Ranch Site 13
3-3 Data Summary for T-2 From 2016 Through 2017 at the JTX – Tunnicliff Ranch Site 14
3-4 Woody Planting Survival at the JTX – Tunnicliff Ranch Site in 2017 16
3-5 Wildlife Species Observed in 2017 at the JTX – Tunnicliff Ranch Site 18
3-6 Montana Wetland Assessment Method Summary for the JTX – Tunnicliff Ranch Site in 2017 18
3-7 Wetland Mitigation Credits Estimated for the JTX – Tunnicliff Ranch Site in 2017 20
3-8 Summary of Performance Standards and Success Criteria Compared to Existing Site Conditions 21

LIST OF FIGURES

FIGURE PAGE

1-1 Project Location of the JTX – Tunnicliff Ranch Site 2

LIST OF CHARTS

CHART PAGE

3-1 Transect Map Showing Community Types on T-1 From 2016 Through 2017 From Start (0 Feet) to Finish (792 Feet) at the JTX – Tunnicliff Ranch Site 13

3-2 Length of Habitat Types Within T-1 From 2016 Through 2017 at the JTX – Tunnicliff Ranch Site 14

3-3 Transect Map Showing Community Types on T-2 From 2016 Through 2017 From Start (0 Feet) to Finish (900 Feet) at the JTX – Tunnicliff Ranch Site 15

3-4 Length of Habitat Types Within T-2 From 2016 Through 2017 at the JTX – Tunnicliff Ranch Site 15

LIST OF APPENDICES

APPENDIX A. PROJECT AREA MAPS A-1

APPENDIX B. MONITORING FORMS B-1

APPENDIX C. PROJECT AREA PHOTOGRAPHS C-1

APPENDIX D. PROJECT PLAN SHEETS D-1

Cover: View looking east from Photo-Point 3.

1.0 INTRODUCTION

The JTX – Tunnicliff Ranch 2017 Wetland Mitigation Monitoring Report presents the results of the second year of post-construction monitoring at the JTX – Tunnicliff Ranch mitigation area after project construction in 2015. This Montana Department of Transportation (MDT) wetland mitigation project is located in Sections 10 and 15, Township 1 North, Range 33 East, Big Horn County, Montana. This privately owned property is located approximately 4.8 miles north of Hardin, Montana, and is adjacent to the western boundaries of the Montana Fish, Wildlife, and Parks (MFWP) Grant Marsh Wildlife Management Area (WMA) and Fishing Access Site (FAS) along the Bighorn River, as illustrated in Figure 1-1. The site is intended to provide 29.60 acres of compensatory wetland mitigation credits for wetland impacts associated with the proposed Hardin North project and to serve as a mitigation bank for future transportation projects in Watershed #14 – Middle Yellowstone. The US Army Corps of Engineers (USACE) permit #NWO-2010-01938-MTH approved the JTX – Tunnicliff project and proposed crediting that was presented in the *JTX-Tunnicliff Final Wetland Mitigation Plan, Watershed #14 – Middle Yellowstone River Basin, Big Horn County, Montana* [MDT, 2015]. The objectives of this project include establishing (creating) emergent and scrub/shrub wetlands, riparian floodplain habitat, and a 100-foot-wide upland buffer.

The JTX – Tunnicliff Ranch site is a 50-acre parcel of land within the larger JTX – Tunnicliff Ranch property. The landowner contacted MDT with an interest in using a portion of his ranch to serve as a compensatory wetland mitigation site. MDT staff met with the landowner in the fall of 2011. MDT staff then conducted some on-site field investigations in the spring of 2012 with the staff from the USACE's Billings office to assess the potential for developing a wetland mitigation site on the ranch. This proposed mitigation area is approximately 50 acres in size; topographically, the property was previously graded for agricultural production, and a series of irrigation and lateral ditches had been constructed across the site. Three irrigation supply ditches formerly ran through the site before construction along with as many as nine lateral distribution ditches. The entire parcel is fenced and has access gates in the northeastern and southeastern corners of the site.

This project is meant to create and restore the site similar to a riparian floodplain wetland ecosystem that has relic river channel depressional wetlands and woody riparian buffer habitat found within the southern portions of the JTX – Tunnicliff Ranch site and at the Grant Marsh FAS/WMA within the Bighorn River valley. Specifically, the wetland project was designed to restore the riparian wetland habitat that had been converted to farmland; improve wildlife habitat diversity within the property; increase potential flood and stormwater retention within the Bighorn River floodplain; and increase the wetland/riparian floodplain habitats within the Bighorn River Watershed.

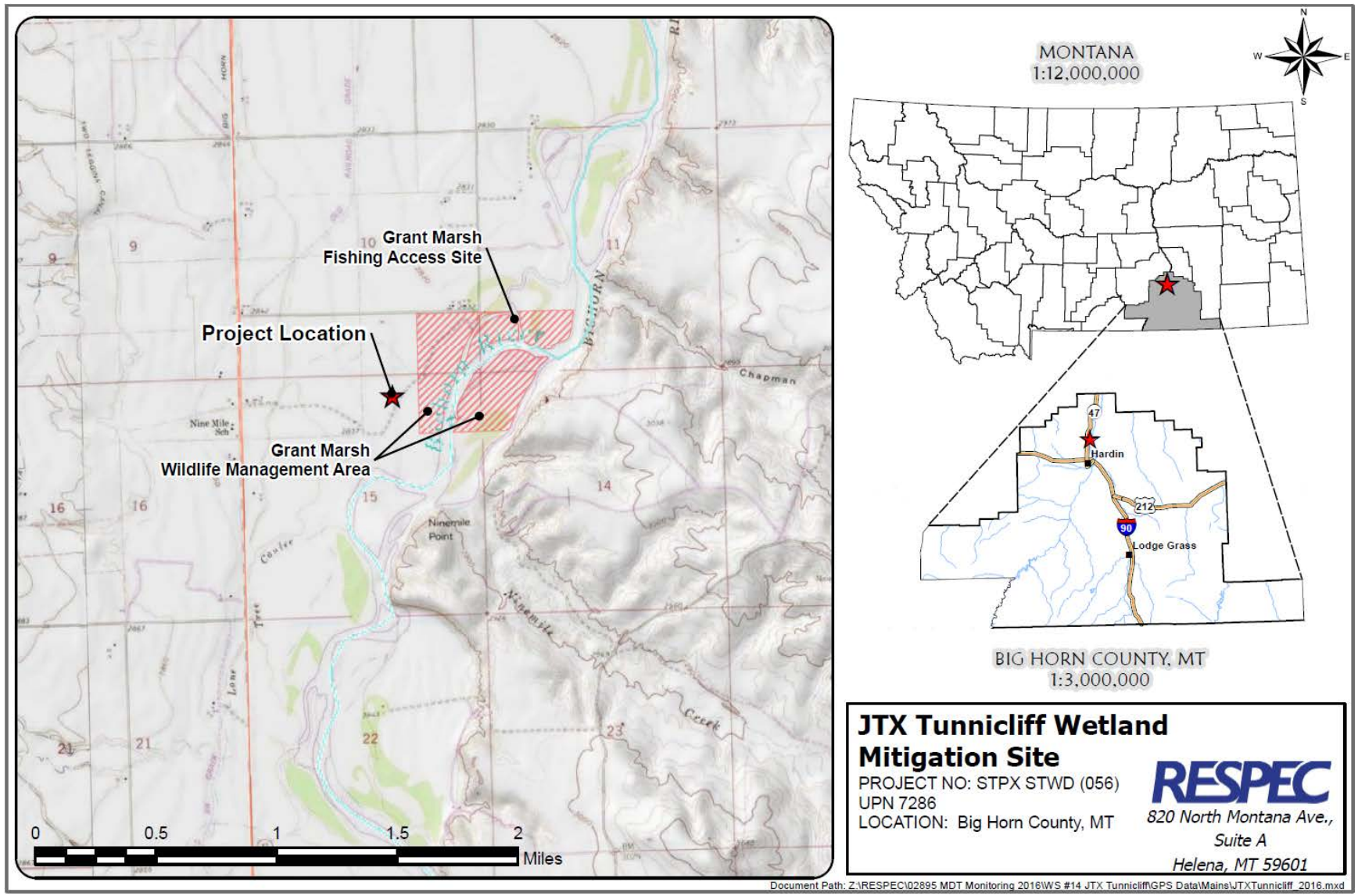


Figure 1-1. Project Location of the JTX – Tunnicliff Ranch Site.

The project objectives as described in the *JTX-Tunnicliff Final Wetland Mitigation Plan, Watershed #14 – Middle Yellowstone River Basin, Big Horn County, Montana* include creating the following:

- 26.85 acres of depressional emergent and scrub/shrub wetlands that will be seasonally inundated by groundwater and flood events from the adjacent Bighorn River. Thirteen small, excavated depressions, which range in surface area from 0.33 to 1.50 acres, were designed to mimic relic river/flood channels that are found along many natural riverine systems. The average water depths within these excavated depressions are anticipated to be between 0.0 and 1.0 foot, with some, small 1.0- to 2.0-foot pools. A variety of emergent hydrophytes is expected to establish in these depressions and along the seasonally inundated and saturated margins adjacent to the depressions.
- 2.73 acres of scrub/shrub wetland and riparian habitat is anticipated to develop around the drier perimeter of these excavated depressions that will be subject to seasonal high-water levels in the spring (because of late-summer irrigation) and during flood events along the Bighorn River. As part of the project, eight woody plant enclosures are planned for areas adjacent to the created wetlands cells in an effort to promote woody plant development within the site.
- 10.98 acres of upland buffer will be developed along the entire perimeter of the site; this area will also be planted with native herbaceous species commonly found within the riparian areas in the Bighorn River Valley.

Table 1-1 provides the compensatory credits by mitigation type and includes a brief description of each credit type, approved mitigation ratios, and anticipated mitigation credits, assuming that the site develops to full potential. A maximum of 29.60 mitigation credits would be anticipated at the JTX – Tunnicliff Ranch site.

Table 1-1. Wetland Credit Determination for the JTX – Tunnicliff Ranch Site

Compensatory Mitigation Type	Mitigation Area Description	Proposed Wetland Type[(a)]	Mitigation Surface Area (acres)	USACE-Approved Mitigation Ratios	Anticipated Mitigation Credit (acres)
Base Bid Credits					
Creation (Establishment)	Depressional wetland	Palustrine emergent and palustrine scrub/shrub	26.85	1:1	26.85
Creation (Reestablishment)	Woody plant enclosures	Palustrine scrub/shrub	2.73	5:1	0.55
Upland buffer	100-foot wide perimeter	N/A	10.98	5:1	2.20
Preservation	Pre-project wetlands	Palustrine emergent	0.03	1:1	0.03
Temporary impacts	N/A	N/A	0.00	None	0.00
Total Mitigation Credit					**29.63**

(a) Cowardin et al. [1979].

Project construction began in the fall of 2015 and finished in the winter of 2016. Revegetation efforts were completed in the spring of 2016. Project construction consisted of excavating a series of 13 cells that range in size from 0.33 to 1.50 acres. Eight woody plant enclosures were constructed around the periphery of excavated cells to establish scrub/shrub wetland and riparian habitat in these areas. Approximately 1,650 containerized woody plantings were planted within the eight enclosures.

The USACE-approved performance standards for the JTX – Tunnicliff Ranch wetland mitigation site are listed below.

1. **Wetland Characteristics** for all of the restored, created, enhanced, and preserved wetlands within the project limits will meet the three parameter criteria for hydrology, vegetation, and soils established for determining wetland areas as outlined in the 1987 *Corps of Engineers Wetland Delineation Manual* (1987 Wetland Manual) [Environmental Laboratory, 1987] and the 2010 *Regional Supplement to the Corps of Engineers Manual: Great Plains Region (Version 2.0)* (2010 GP Regional Supplement) [USACE, 2010]. The 1987 Wetland Manual's methodology was used to establish baseline wetland conditions on site.
    a. **Wetland Hydrology Success** will be achieved where wetland hydrology is present as per the technical guidelines in the 1987 Wetland Manual and the 2010 GP Regional Supplement. Wetland hydrology will be confirmed by periodically observing surface water across the site and saturated soil conditions during the annual mid-season monitoring event. Soil saturation will be determined based on primary and secondary hydrology indicators as provided in Table 10 of Chapter 4 of the 2010 GP Regional Supplement. The presence of primary indicators observed during fieldwork will be used to make a formal determination as to hydrologic success within the established wetland.
    b. **Hydric Soil Success** will be achieved where hydric soil conditions are present (per the most recent Natural Resource Conservation Service [NRCS] definitions for hydric soil) or appear to be forming, the soil is sufficiently stable to prevent erosion, and the soil is able to support plant cover. Soil sampling will be conducted during the course of the monitoring period to determine if wetland areas are exhibiting characteristics of hydric soils per the 1987 Wetland Manual. Because typical hydric soil indicators may require long periods to form, a lack of distinctive hydric soil features will not be considered a failure if hydrologic and vegetation success is achieved.
    c. **Hydrophytic Vegetation Success** will be determined by delineating the developing wetlands by using the technical guidelines established in the 1987 Wetland Manual and the 2010 GP Regional Supplement. Hydrophytic vegetation success will be achieved where combined relative aerial cover of facultative or wetter species is 70 percent or greater and state-listed noxious weeds do not exceed 5 percent cover. The hydrophytic vegetation indicator procedures established in the 2010 GP Regional Supplement will be used to determine dominance. These procedures will be applied during future routine wetland determinations in the created/restored wetlands and results will be documented on the Wetland Determination Data forms (Appendix B). Vegetation communities will be identified according to their strata (i.e., trees, sapling/shrub, herbaceous, and woody

vine), and the percent aerial coverage of each plant species within those stratum will be recorded.

   d. **Woody Plants** will be considered successful where they exceed 50 percent survival after 5 years. Natural colonization of woody plant species from nearby sources is anticipated after construction activities are complete. The rate and extent of natural woody plant colonization will depend on factors such as planting locations, habitat availability, animal activity, seed sources, and other natural selection factors. The site must possess the potential to support the species that will be initially planted and in the planned enclosure locations. This site will not be considered a failure if the hydrology changes and/or if the planted woody species are subject to excessive saturation or drying that reduces their numbers.

2. **Open-Water Areas** are intended to be provided by the project to provide seasonal open water during the spring and early summer within excavated depressions. Open water will, therefore, be considered successful and creditable as wetland vegetation establishes in the form of either emergent, floating, and/or submerged hydrophytes.
3. **Upland Buffer** success will be achieved when noxious weeds do not exceed 5 percent cover within the buffer area on site. Any area within the creditable buffer area that is disturbed by project construction must have at least 50 percent aerial cover of non-noxious weed species by the end of the monitoring period.
4. **Weed Control** will be implemented based on annual monitoring of the site to determine weed species and the degree of infestation within the site. Control measures based on the monitoring results will be implemented by MDT to minimize and/or eliminate the intrusion of state-listed noxious weed species within the site. Success will be achieved where less than 5 percent absolute cover of noxious weed species occurs across the site.
5. **Fencing** on the proposed mitigation site has been installed along the easement boundaries to protect the integrity of the wetland from disturbance that may be detrimental to the site. Fencing installed along the southern and eastern perimeter of the site has been designed to be wildlife-friendly to allow for wildlife movement into and out of the wetland complex. Fence along the northern and western side of the property are not wildlife-friendly at the landowner's request.
6. **Monitoring** for this MDT site will be based on the MDT standard monitoring protocols that are used for all of the MDT sites for a minimum period of 5 years (or longer as determined by the USACE Montana Regulatory Office's review of annual monitoring reports for the site and whether or not the site has met the wetland success criteria). The site will be monitored annually beginning with the first full growing season after construction.

Figures A-2 and A-3 (Appendix A) of this report show the site monitoring activity locations and mapped site features, respectively. The MDT Wetland Mitigation Site Monitoring form, USACE Wetland Determination Data forms [USACE, 2010], and the 2008 MDT Montana Wetland Assessment Method (MWAM) forms [Berglund and McEldowney, 2008] are included in Appendix B. Project area photographs are included in Appendix C, and the MDT plan sheets for the JTX – Tunnicliff Ranch site are provided in Appendix D.

2.0 METHODS

An initial site visit with MDT staff was completed on June 15, 2016. During this site visit, the vegetation transects and photo-point locations were established for the first time. The second year of monitoring was conducted on July 25, 2017. Information for the Wetland Mitigation Site Monitoring form and Wetland Determination Data forms was recorded in the field during the site investigation (Appendix B). Monitoring activity sites were located with a global positioning system (GPS) and are illustrated on Figure A-2 (Appendix A). Data-collection activities included a wetland delineation, vegetation community mapping, vegetation transect monitoring, soil and hydrology data collection, bird- and wildlife-use documentation, photographic documentation, functional assessment, and a non-engineering 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 established within the project area. The hydrologic indicators were evaluated according to features observed in situ 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 considered jurisdictional wetlands. The growing season is defined for purposes of this report as the number of days when a 50 percent probability exists that the minimum daily temperature is greater than or equal to 28.5 degrees Fahrenheit (°F) [Environmental Laboratory, 1987]. Temperature data recorded for the meteorological station at the Hardin, Montana (243915), which is located approximately 8 miles south of the JTX – Tunnicliff Ranch site, have a median (5 years in 10) growing season length of 156 days. Areas that are defined as wetlands would require 19.5 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 18–20 inches of the ground surface. The data were recorded on the Wetland Determination Data forms (Appendix B). Additionally, the US Geological Survey (USGS) is conducting periodic groundwater level monitoring at two on-site wells (Figure A-2, Appendix A). Groundwater data are collected in real time and can be tracked online. Precipitation data from the Hardin, Montana (243915) meteorological station were also reviewed and compared to long-term averages for this 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).

Vegetation composition was assessed and recorded along two vegetation belt transects (T-1 and T-2) that are approximately 10 feet wide and 792 and 900 feet long, respectively (Figure A-2, Appendix A). The transect endpoints were recorded with a resource-grade GPS unit. Spatial changes in the dominant vegetation communities were recorded along the stationed transect. The percent aerial cover of each vegetation species within the belt transect was estimated using the same values and cover ranges that were used for the vegetation community polygon data (Appendix B). Photographs were taken at the transect endpoints during the monitoring event (Appendix C).

The *Montana Noxious Weed List* (July 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.

Eight woody plant enclosures (labeled PE 1 through 8) are shown on Figure A-3 (Appendix A) and were monitored for woody plant survival in 2017. Each PE was walked while recording live and dead woody stems by species if known. Total estimated survival was calculated for each PE.

2.3 SOIL

Soil information was obtained from the *Web Soil Survey for Big Horn County, Montana* and soil descriptions accessed from the NRCS official soil description website [US Department of Agriculture, 2016]. Soil cores were excavated by using a Montana sharpshooter shovel and evaluated according to procedures outlined in the 1987 Wetland Manual and the 2010 GP Regional Supplement. A description of the soil profile, including hydric soil 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 GP Regional Supplement. The technical criteria for hydrophytic vegetation, hydric soil, and wetland hydrology described in the 2010 GP Regional Supplement must be satisfied to delineate a representative area as jurisdictional. 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 areas within the project boundaries. The information was recorded onto 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 with GPS technology and identified on the 2017 aerial photographs. Wetland areas were estimated 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 list of wildlife species observed on the sites each year is compiled and updated annually in each report.

2.6 FUNCTIONAL ASSESSMENT

The MDT MWAM [Berglund and McEldowney, 2008] will be used to evaluate functions and values at this site. This method provides an objective means of assigning an overall rating to wetlands and provides regulators with 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 and McEldowney, 2008]. Field data for this assessment were collected during the site visit. An MWAM was completed in 2017 (Appendix B).

2.7 PHOTOGRAPHIC DOCUMENTATION

Monitoring at photo points provided supplemental information that documented wetland, upland, and transect conditions; site trends; and current land uses that surround the site. Photographs were taken at established photo points throughout the mitigation 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 (units in meters). Site features and survey points that were located with GPS included wetland boundaries, fence boundaries, plant enclosures, photo points, transect endpoints, noxious weed infestations, and wetland data points.

2.9 MAINTENANCE NEEDS

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

3.0 RESULTS

3.1 HYDROLOGY

Climate data from the meteorological station at Hardin, Montana (243915) [Western Regional Climate Center, 2017], which is located approximately 8 miles south of the site, recorded an average annual precipitation rate of 12.65 inches from 1948 to 2016. Annual precipitation in recent years was 17.02 inches (2010), 15.86 inches (2011), 6.19 inches (2012), 15.3 inches (2013), 11.7 inches (2014),12.06 inches (2015), and 18.68 inches in 2016. These data indicate that 2012, 2014, and 2015 were below the long-term average for precipitation, and 2010, 2011, 2013, and 2016 were above average. Precipitation in 2017 from January through August totaled 9.12 inches at the Hardin, Montana (243915) meteorological station. This 8-month total is approximately ¼ inch above the long-term average (8.85 inches) recorded at the Hardin, Montana (243915) meteorological station.

Groundwater is expected to be the primary hydrologic source for wetland development across the site, with precipitation and periodic overbank flooding from the nearby Bighorn River supplementing hydrology at the site. The Bighorn River near this project did not overtop its bank at any point during the spring of 2017. Groundwater monitoring that was completed by the USGS in 2016 and 2017 shows groundwater levels at or above the design wetland cell elevation of 2,832 feet from October 2016 through late June 2017. Groundwater remained within 12 inches of the ground surface from late June through mid-July. Data from the continuous ground water monitor installed at the site will be compared to ground surface elevations in the bottom of the excavated cells in future years to continually track the depth to groundwater in these areas.

During the July 25, 2017, site visit, no standing surface water was noted within the project site; however, several of the 13 excavated cells exhibited saturation within 12 inches of the soil surface and salt crusts were visible in several cells. Precipitation data [US Climate Data, 2016] for nearby Hardin, Montana, shows January to July mean precipitation from 1949 through 2017 is 8.02 inches; during 2017, 8.18 inches of precipitation were recorded from January to July, slightly above average. Therefore, the lack of inundation during the July 25, 2017, survey was not caused by drought but likely reflects normal late-summer conditions. The day before the 2017 survey, temperatures were near 100°F.

Two data points were established at the site in 2017 to monitor wetland development at the site. DP-1W is located in a low spot within excavated Cell 4, and DP-1U is located on the upland slope adjacent to Cell 4. No moisture was noted to a depth of 16 inches in DP-1W; however, hydrogen sulfide odor was detected. Soils associated with DP-1U were very dry and crumbly to 10 inches; the soil was extremely dry and hard on the slope.

3.2 VEGETATION

Monitoring year 2017 marked the second year of monitoring at the JTX – Tunnicliff Ranch site. A total of 55 plant species have been identified at the site in the two years of monitoring. Twenty new species were observed in 2017 and are bolded Table 3-1. One new species, Russian knapweed (*Acroptilon repens*), is a priority 2B noxious weed in Montana. Six upland community types and one wetland community type were identified and mapped at the site in 2017 (Figure A-3, Appendix A). Three very small wetlands were identified within the monitoring area but are not described below as their own community type because of their small size (total 0.3 acre). Dominant plant species that were observed within each community are listed on the Wetland Mitigation Site Monitoring form (Appendix B). The vegetation community types identified on the site in 2017 are as follows:

- Upland Type 6 – *Pascopyrum smithii/Poa pratensis*
- Upland Type 7 – *Schedonorus pratensis*
- Upland Type 8 – *Thinopyrum intermedium*
- Wetland Type 9 – *Schoenoplectus* spp.
- Upland Type 10 – *Chenopodium album*
- Upland Type 11 – *Thinopyrum intermedium/Chenopodium album*
- Upland Type 12 – *Elaeagnus angustifolia/Thinopyrum intermedium.*

Upland Type 6 – *Pascopyrum smithii/Poa pratensis* was mapped across 1.4 acres of the project area in the southeastern corner of the mitigation site. This edge area was formerly overgrazed pasture and is dominated by western wheatgrass (*Pascopyrum smithii*) and field brome (*Bromus arvensis*). This area was left undisturbed during site construction and is expected to remain as an upland community.

Upland Type 7 – *Schedonorus pratensis* (false meadow rye) community is located along the southwest boundary of the mitigation site and includes Russian knapweed (*Acriptilon repens*) and Kentucky bluegrass (*Poa pratensis*). This community type covers 2.2 acres of preexisting upland grassland that remained relatively undisturbed during the 2015/2016 construction.

Upland Type 8 – Intermediate wheatgrass (*Thinopyrum intermedium*) is the dominant vegetation community within the mitigation site covering 36.8 acres. Percent cover of the intermediate wheatgrass is nearly 100 percent throughout most of this community type.

Wetland Type 9 – *Schoenoplectus* spp. (3.86 acres) was mapped in excavated cells that are developing wetland characteristics: Cells 4, 5, 6, 7, 8, 9, 11, 12, and 13 include a dominant Type 9 community. Cell 1 includes a very small developing wetland less than 100 square feet. Rush species observed in this community type include saltmarsh club-rush (*Schoenoplectus maritimus*) three-square **(***Schoenoplectus pungens*), and chairmaker's club-rush (Schoenoplectus americanus).

Upland Type 10 – *Chenopodium album* (lamb's-quarters) (1.72) was mapped in Cells 3 and 10 and appears to be the pioneer community type before the development of a wetland community. Schoenoplectus species and inland salt grass (*Distichlis spicata*) were observed at less than 1 percent coverage and are expected to increase by 2018.

Table 3-1. Vegetation Species Observed From 2016 Through 2017 at the JTX – Tunnicliff Ranch Site (Page 1 of 2)

Scientific Name	Common Name	GP Indicator Status[(a)]
Acer negundo	Box Elder	FAC
Acroptilon repens	**Russian Knapweed**	**NL**
Agropyron cristatum	Crested Wheatgrass	NL
Alopecurus arundinaceus	Creeping Meadow Foxtail	FACW
Arctium lappa	**Greater Burdock**	**NL**
Asclepias speciosa	**Showy Milkweed**	**FAC**
Bassia scoparia	Mexican-Fireweed	FACU
Brassica sp.		
Bromus arvensis (aponicas)	Field Brome	FACU
Bromus inermis	Smooth Brome	UPL
Carex sp.	Sedge	
Chenopodium album	**Lamb's-Quarters**	**FACU**
Cirsium arvense	Canada Thistle	FACU
Convolvulus arvensis	Field Bindweed	NL
Crataegus douglasii	Douglas Hawthorne	FAC
Cynoglossum officinale	Gypsy-Flower	FACU
Dactylis glomerata	**Orchardgrass**	**FACU**
Distichlis spicata	**Coastal Salt Grass**	**FACW**
Echinocystis lobata	**Wild Cucumber**	**FAC**
Elaeagnus angustifolia	Russian Olive	FACU
Elaeagnus commutata	Silverberry	UPL
Elymus repens	Creeping Wild Rye	FACU
Elymus trachycaulus	Slender Wild Rye	FACU
Equisetum arvense	**Field Horsetail**	**FAC**
Fraxinus pennsylvanica	Green Ash	FAC
Glycyrrhiza lepidota	**American Licorice**	**FACU**
Hordeum jubatum	Foxtail Barley	FACW
Iva axillaris	**Deer-Root**	**FAC**
Juncus balticus	**Baltic Rush**	**FACW**
Lepidium perfoliatum	Clasping Pepperwort	FAC
Leynus cinereus	Great Basin Lyme Grass	UPL
Medicago lupulina	Black Medick	FACU
Medicago sativa	**Alfalfa**	**UPL**
Melilotis albus	**White Sweet Clover**	**NL**
Melilotis officinalis	**Yellow Sweet Clover**	**FACU**
Pascopyrum smithii	Western Wheatgrass	FACU
Poa secunda	Curly Bluegrass	FACU
Populus deltoides	Eastern Cottonwood	FAC
Prunus virginiana	Common Chokecherry	FACU

Table 3-1. Vegetation Species Observed From 2016 Through 2017 at the JTX – Tunnicliff Ranch Site (Page 2 of 2)

Scientific Name	Common Name	GP Indicator Status[(a)]
Puccinellia nuttaliana	**Nutall's Alkali Grass**	**OBL**
Quercus macrocarpa	Bur Oak	FACU
Rosa woodsii	Wood's Rose	FACU
Rumex crispus	Curly Dock	FAC
Schedonorus pratensis	False Meadow Rye	FACU
Schoenoplectus americanus.	**Chairmaker's Club-rush**	**OBL**
Schoenoplectus maritimus	**Saltmarsh Club-Rush**	**OBL**
Schoenoplectus pungens	**Three-Square**	**OBL**
Shepherdia argentea	Silver Buffalo-Berry	UPL
Sporobolus airoides	**Alkali-Sacaton**	**FAC**
Symphoricarpos albus	Common Snowberry	UPL
Taraxacum officinale	Common Dandelion	FACU
Thinopyrum intermedium	Intermediate Wheatgrass	NL
Tragopogon dubius	Meadow Goat's-Beard	NL
Trifolium fragiferum	**Strawberry-Head Clover**	**FAC**
Trifolium repens	**White Clover**	**FACU**
Typha latifolia	**Broad-Leaf Cattail**	**OBL**

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

Upland Type 11 – *Thinopyrum intermedium/Chenopodium album* (0.55 acre) was observed in Cell 2. Over 50 percent of the intermediate wheatgrass was dead because of inundation.

Upland Type 12 – *Elaeagnus angustifolia/Thinopyrum intermedium* (3.49 acres) includes the Russian olive (*Elaeagnus angustifolia*) riparian upland area in the southeastern corner and southern boundary of the mitigation site. Two very small emergent wetlands in the bottom of the existing ditch were mapped by MDT before construction and were confirmed in the first year of monitoring. Because of the very small size of these wetlands (< 0.02 acre), they were not broken out as their own community but rather included in Type 12. Species associated with these two small wetlands include creeping meadow foxtail (*Alopecurus arundinaceus*) and sedge (*Carex* sp.).

Vegetation cover was measured along two transects (T-1 and T-2) at the JTX – Tunnicliff Ranch site during the 2017 monitoring event (Figure A-2, Appendix A). Photographs of the transect end points are provided in Appendix C. Table 3-2 and Charts 3-1 and 3-2 summarize the data for T-1 (Wetland Mitigation Site Monitoring form, Appendix B). T-1 is 792 feet long and intersected upland vegetation community Type 8 – *Thinopyrum intermedium* and wetland community Type 9 – *Schoenoplectus* spp.; 47 percent of the transect crossed wetland habitat.

Table 3-2. Data Summary for T-1 From 2016 Through 2017 at the JTX – Tunnicliff Ranch Site

Monitoring Year	2016	2017
Transect Length (feet)	792	792
Vegetation Community Transitions Along Transect	1	6
Vegetation Communities Along Transect	2	2
Hydrophytic Vegetation Communities Along Transect	0	1
Total Vegetative Species	10	21
Total Hydrophytic Species	2	8
Total Upland Species	8	13
Estimated % Total Vegetative Cover	75	60
Estimated % Unvegetated	25	40
% Transect Length Comprising Hydrophytic Vegetation Communities	0	47
% Transect Length Comprising Upland Vegetation Communities	100	53
% Transect Length Comprising Unvegetated Open Water	0	0
% Transect Length Comprising Mudflat	0	0

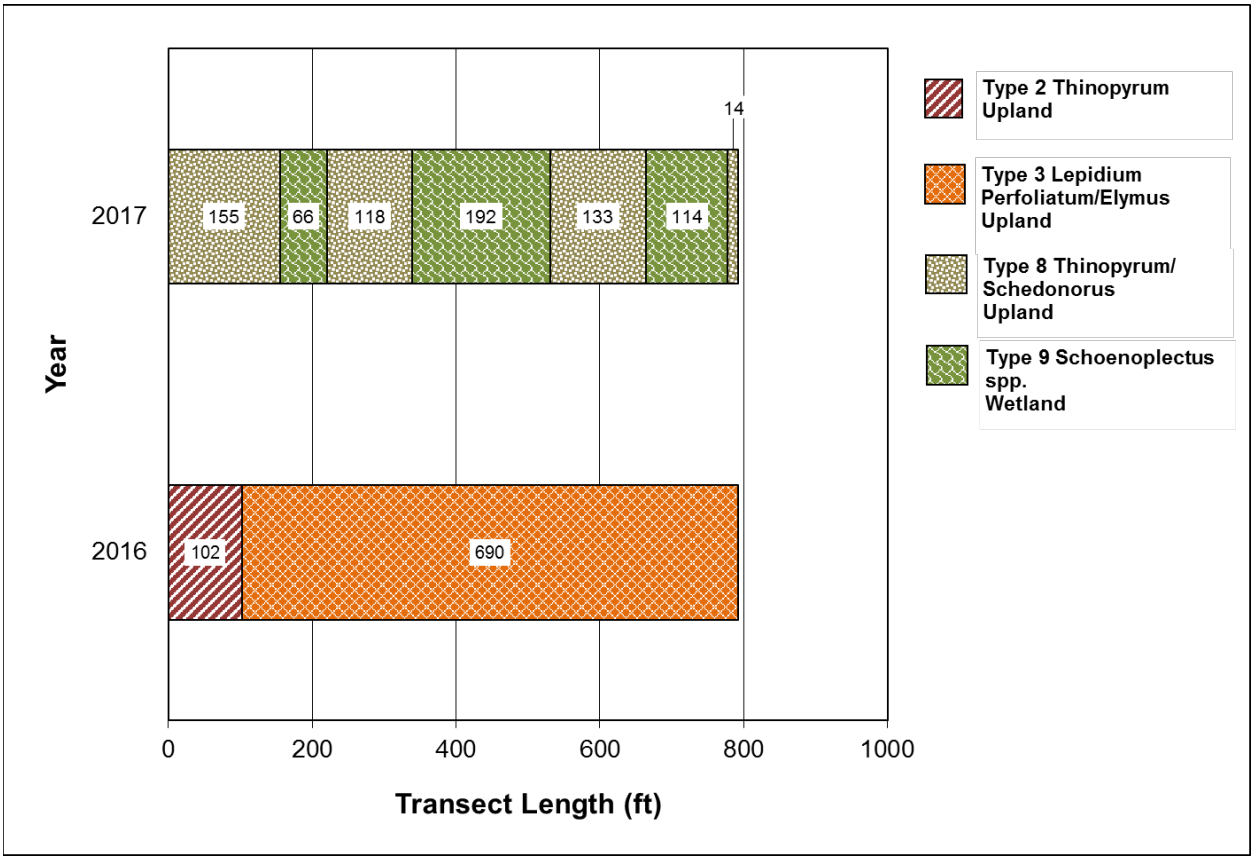


Chart 3-1. Transect Map Showing Community Types on T-1 From 2016 Through 2017 From Start (0 Feet) to Finish (792 Feet) at the JTX – Tunnicliff Ranch Site.

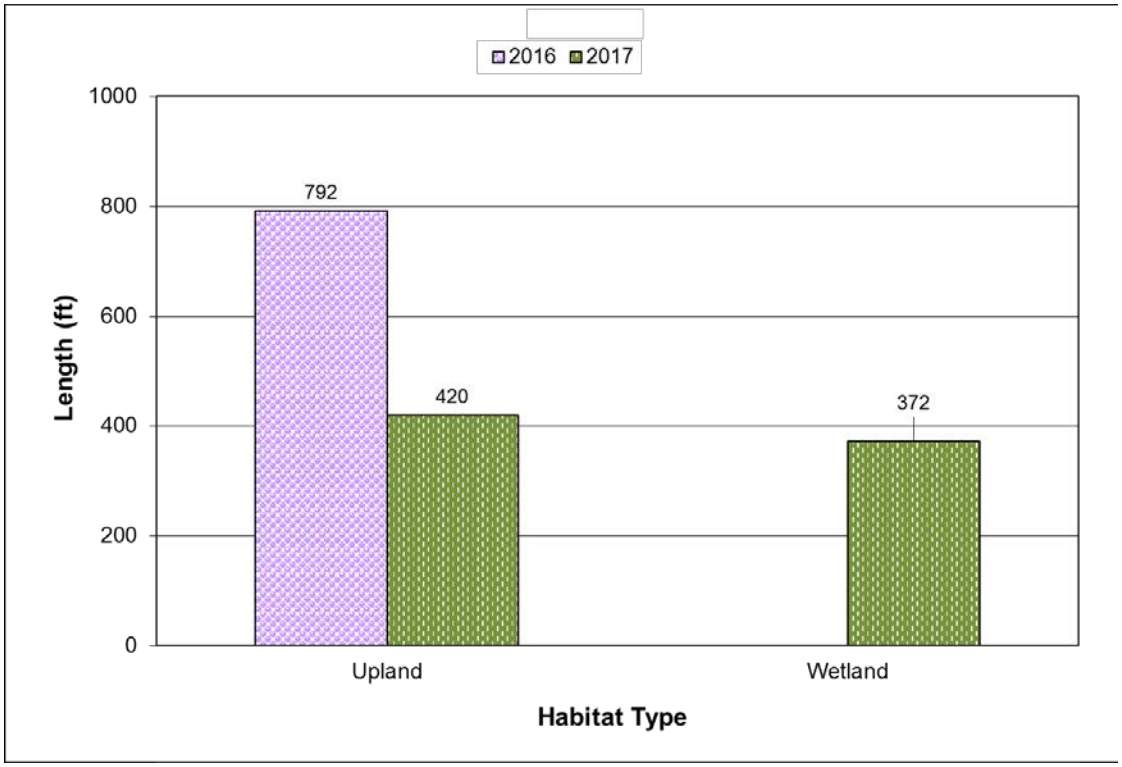


Chart 3-2. Length of Habitat Types Within T-1 From 2016 Through 2017 at the JTX – Tunnicliff Ranch Site.

Data collected on T-2 (Wetland Mitigation Site Monitoring form, Appendix B) are summarized in tabular and graphical formats in Table 3-3 and Charts 3-3 and 3-4, respectively. T-2 is 900 feet long and intersects upland community Types 8 and 10, and wetland community Type 9; 12 percent of the transect crossed wetland habitat.

Table 3-3. Data Summary for T-2 From 2016 Through 2017 at the JTX – Tunnicliff Ranch Site

Monitoring Year	2016	2017
Transect Length (feet)	900	900
Vegetation Community Transitions Along Transect	1	6
Vegetation Communities Along Transect	2	3
Hydrophytic Vegetation Communities Along Transect	0	1
Total Vegetative Species	12	11
Total Hydrophytic Species	0	5
Total Upland Species	12	6
Estimated % Total Vegetative Cover	60	60
Estimated % Unvegetated	40	40
% Transect Length Comprising Hydrophytic Vegetation Communities	0	12
% Transect Length Comprising Upland Vegetation Communities	100	88
% Transect Length Comprising Unvegetated Open Water	0	0
% Transect Length Comprising Mudflat	0	0

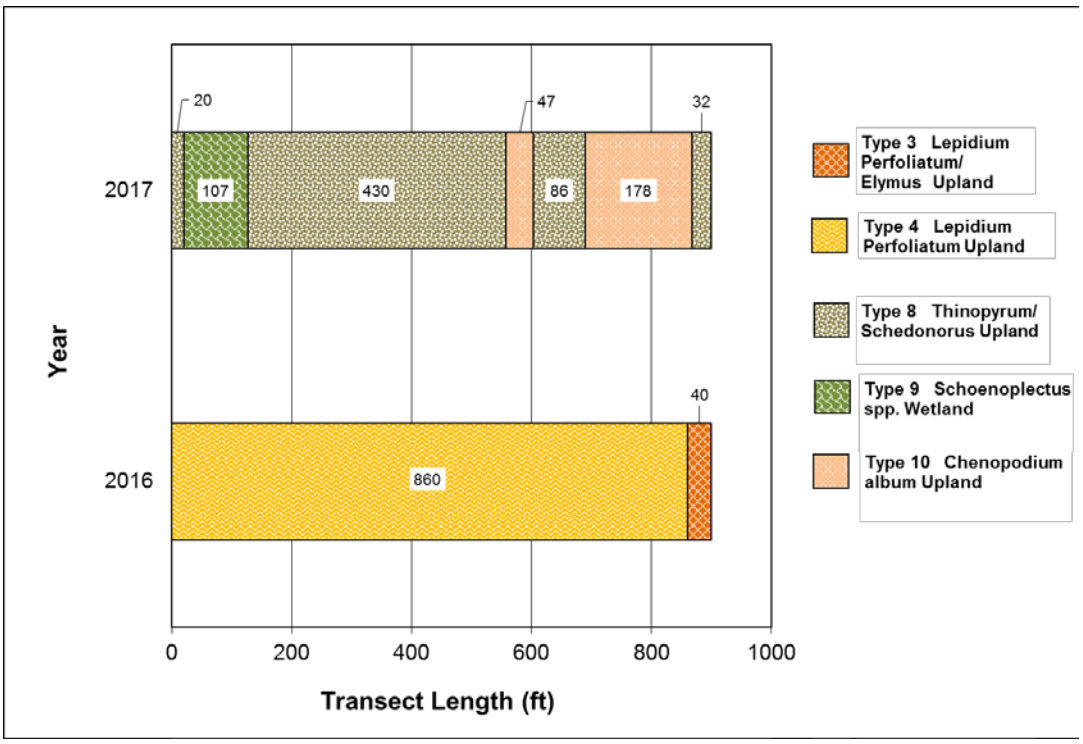


Chart 3-3. Transect Map Showing Community Types on T-2 From 2016 Through 2017 From Start (0 Feet) to Finish (900 Feet) at the JTX – Tunnicliff Ranch Site.

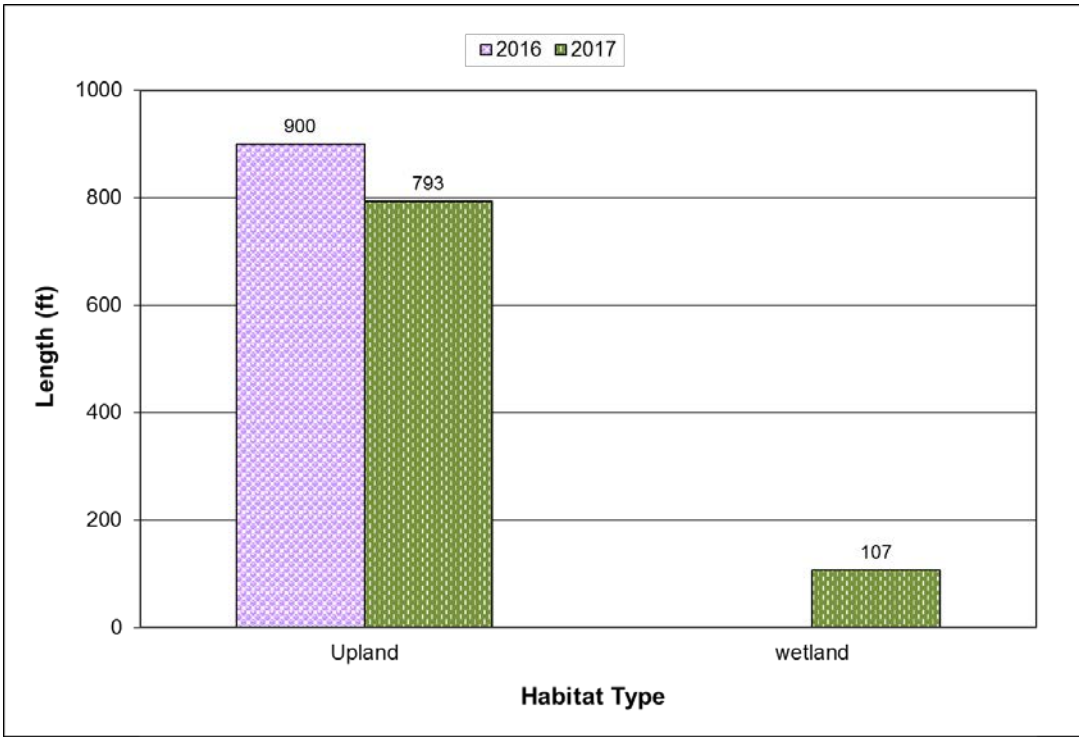


Chart 3-4. Length of Habitat Types Within T-2 From 2016 Through 2017 at the JTX – Tunnicliff Ranch Site.

A total of three infestations of state-listed Priority 2B noxious weeds were identified and mapped at the JTX – Tunnicliff Ranch site in 2017 (Figure A-3, Appendix A). Noxious species observed in 2017 include Canada thistle (*Cirsium arvense*) and Russian knapweed (*Acroptilon repens*) and did not exceed 5 percent cover site-wide. Noxious weed infestations have decreased since 2016.

Eight woody plant enclosures (PE-1 through PE-8) are shown on Figure A-3 (Appendix A) and were monitored for woody plant survival in 2017. Each PE was walked while recording live woody stems. A total of 1,650 containerized woody plants were installed in the eight plant enclosures in 2016. Woody species planted at the site include silver buffalo-berry (*Sheperdia argentea*), Douglas hawthorne (*Crataegus douglasii*), silverberry (*Elaeaganus commutate*), common chokecherry (*Prunus virginiana*), plains cottonwood (*Populus deltoids*), box elder (*Acer negundo*), and bur oak (*Quercus macrocarpa*). All plantings were in 1-gallon containers except for cottonwood, which were in 5-gallon containers. Table 3-4 lists each PE, the number of alive stems counted, and percent survival. An individual planting was considered dead if no live leaves were observed on the stem and no resprouting from the base was observed.

Table 3-4. Woody Planting Survival at the JTX – Tunnicliff Ranch Site in 2017

Planting Area	Number of Live Stems in 2016	Number of Live Stems in 2017
PE-1	12	0
PE-2	35	14
PE-3	21	13
PE-4	70	35
PE-5	91	65
PE-6	78	77
PE-7	41	17
PE-8	100	31
Total	448	**252**
Percent Survival[(a)]	27	15

(a) Percent Survival = number of live stems divided by 1,650 plantings.

A total of 252 live stems were counted, and overall survival is estimated to be 15 percent. Wildlife fencing around each enclosure was effective in keeping deer away from plantings; no other signs of browse from rabbits or other small mammals was noted. Despite the weed fabric that was installed around each woody plant, various grasses and forbs were outcompeting many of the plantings. The largest number of live plants was observed in PE-4 (35), PE-5 (65), and PE-6 (77); plants tended to be closer to the saturation line in these cells. A lack of irrigation may be causing the high mortality rate.

3.3 SOIL

The Web Soil Survey for Big Horn County [US Department of Agriculture, 2016] indicates two soil series occurring within the project site. These soil complexes are identified as the Halverson-

Lohmiller soils, wet (Hh), and Kyle Clay, saline (Kw) soils. The Haverson and Lohmiller series is a well-drained soil, while the Kyle Clay is rated as moderately well-drained. Undisturbed soil profiles in the project area typically are represented by a shallow surface organic layer underlain by sand, silt, clay, and gravels/cobbles several feet below the surface. The entire wetland development area was disturbed during construction with excavated wetland cells that had bottom elevations several feet below the surrounding terrain. In excavated areas, gypsum crystals are common in the soil, which is precipitated out at the surface because of seasonally elevated groundwater in the area.

Soil test pits were excavated at two locations (Figure A-2). DP-1U and DP-1W were located adjacent to and within excavated Cell 4, respectively. Cell 4 is located in an area mapped in the Kyle Clay, saline (Kw) series. The soil profile at DP-1W, which is located in Cell 4, revealed a dark gray (10YR 4/1), sand/sandy gravel with a hydrogen sulfide order. The soil in this area was not saturated or moist during the July monitoring event. Wetland vegetation has developed in Cell 4. The soil profile at DP-1U revealed a brown (7.5 YR 4/3), very hard silt loam to a depth of 10 inches. No hydric soil indicators were observed for DP-1U.

3.4 WETLAND DELINEATION

During the July monitoring event, all of the excavated wetland cells and graded areas that connect the cells were surveyed for developing wetland habitat. In 2017, a total of 3.86 acres of emergent wetland was delineated within wetland cells 4, 5, 6, 7, 8, 9, 11, 12, and 13. No wetland had yet developed in wetland cells 1, 2, 3, and 10 or in the graded areas between cells (Figure A-3, Appendix A). Soils within the excavated cells were mostly moist to the surface in some cells, which is likely because of the groundwater influence. Figure A-3 (Appendix A) shows the plan view footprint of the 13 excavated cells. Additional wetland habitat is expected to develop in low-lying areas between cells but largely depends on seasonally high groundwater.

Before construction, MDT had identified two small wetlands in the southeastern corner of the site and a smaller area along the eastern boundary, which altogether totaled 0.03 acre. These small wetlands were identified and mapped during the 2016 and 2017 monitoring events (Figure A-3, Appendix A).

3.5 WILDLIFE

A comprehensive list of wildlife species that have been directly or indirectly observed since monitoring began in 2016 is presented in Table 3-5 and noted on the Wetland Mitigation Site Monitoring form (Appendix B). Six bird species, bolded in table 3-5 were identified in 2017. Four of the seven bird boxes that had been installed around the perimeter of the site were being used in 2017 by house wrens (*Troglodyetes aedon*) and tree swallows (*Tachycineta bicolor*).

3.6 FUNCTIONAL ASSESSMENT

The 2017 results of the functional assessments are summarized in Table 3-6. The completed JTX – Tunnicliff Ranch Site MWAM form is provided in Appendix B. The site was evaluated as one AA and encompassed 3.86 acres. This site achieved 44 percent of the possible score and 15.3 functional units in 2017. As deep-rooted wetland vegetation continues to develop, ratings are expected to increase from moderate to high for several of the function and value variables.

Table 3-5. Wildlife Species Observed in 2017 at the JTX – Tunnicliff Ranch Site

Common Name	Scientific Name
Birds	
American Goldfinch	*Spinus tristus*
American Kestrel	*Falco sparverius*
American Robin	*Turdus migratorius*
Brown Thrasher	*Toxostoma rufum*
Eastern Kingbird	*Tyrannus tyrannus*
European Starling	*Sturnus vulgaris*
House Wren	***Troglodytes aedon***
Lazuli Bunting	***Passerina amoena***
Red-breasted Nuthatch	***Sitta canadensis***
Red-tailed Hawk	*Buteo jamaicensis*
Ring-necked Pheasant	***Phasianus colchicus***
Tree Swallow	*Tachycineta bicolor*
Western Kingbird	***Tyrannus verticalis***
Western Meadowlark	***Sturnella neglecta***
Yellow Warbler	*Dendroica petechia*
Mammals	
Coyote (tracks)	*Canis latrans*
Deer (tracks)	*Odocoileus* sp.
Striped Skunk	*Mephitis mephitis*

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

Table 3-6. Montana Wetland Assessment Method Summary for the JTX – Tunnicliff Ranch Site in 2017

Function and Value Parameters From the 2008 Montana Wetland Assessment Method	2017
Listed/Proposed Threatened & Endangered (T&E) Species Habitat	Low (0.0)
Montana Natural Heritage Program (MTNHP) Species Habitat	Low (0.1)
General Wildlife Habitat	Mod (0.4)
General Fish/Aquatic Habitat	N/A
Flood Attenuation	Mod (0.5)
Short- and Long-Term Surface-Water Storage	Mod (0.6)
Sediment/Nutrient/Toxicant Removal	Mod (0.7)
Sediment/Shoreline Stabilization	N/A
Production Export/Food Chain Support	Mod (0.4)
Groundwater Discharge/Recharge	Mod (0.7)
Uniqueness	Mod (0.4)
Recreation/Education Potential (bonus points)	High (0.2)
Actual Points/Possible Points	**4.0/9**
% of Possible Score Achieved	**44%**
Overall Category	**III**
Total Acreage of Assessed Wetlands Within Site Boundaries	**3.86**
Functional Units (acreage × actual points)	**15.3**

3.7 PHOTOGRAPHIC DOCUMENTATION

Photographs that were taken at Photo-Points 1–4 (PP1 to PP4), and transect endpoints are provided in Appendix C.

3.8 MAINTENANCE NEEDS

No man-made water-control structures were installed within the JTX – Tunnicliff Ranch site. The perimeter fence that was installed around the site was in good condition at the time of the 2017 investigation. Seven bluebird boxes were installed on the site, and all appeared to be in good condition.

As noted in the vegetation section of this report, three infestations of state-listed Priority 2B noxious weeds were mapped at the JTX – Tunnicliff Ranch site (Figure A-3, Appendix A). MDT has an ongoing weed-control program for their mitigation sites that includes an annual assessment of weeds that were identified at each location and treatment to contain and control identified populations. The number of noxious weed species and cover has decreased since 2016 because of weed control measures conducted by the MDT in 2017.

3.9 CURRENT CREDIT SUMMARY

As of July 2017 the JTX – Tunnicliff Ranch site had developed 3.86 acres of emergent wetland within 9 of the 13 excavated cells. Credited at 1:1, the site is currently receiving 3.86 acres of credit for wetland development. Wetlands have not yet developed in four of the excavated cells or in graded areas between cells. Wetlands are expected to continue to develop across the site. Planted woody species survival is estimated at 15 percent in the 8 PEs across the site as of the July 2017 monitoring event. The woody plant enclosures total 2.3 acres in size and are credited at 5:1 for a total credit of 0.47 acre. Additional credits from the site include 0.03 acre for preservation of existing wetlands on the site before construction and 2.66 acres of upland buffer credit. Total credits for the site in 2017 are 7.02 acres. Table 3-7 summarizes the current estimated wetland credits based on the USACE-approved credit ratios [USACE, 2005] and the wetland delineation that was completed in July 2017.

Table 3-8 provides a summary of the site conditions in relation to the established performance standards and success criteria. All of the performance standards and success criteria will continue to be monitored annually.

Table 3-7. Wetland Mitigation Credits Estimated for the JTX – Tunnicliff Ranch Site in 2017

Compensatory Mitigation Type	Mitigation Area Description	Wetland Type[(a)]	Anticipated Mitigation Surface Area (acres)	USACE-Approved Mitigation Ratios	Anticipated Mitigation Credit (acres)	2016 Delineated Acres	2016 Mitigation Credit (acres)	2017 Delineated Acres	2017 Mitigation Credit (acres)
Creation (Establishment)	Depressional wetlands	Palustrine emergent and palustrine scrub/shrub	26.85	1:1	26.85	0.0	0.0	3.86	3.86
Creation (Reestablishment)	Woody plant enclosures	Palustrine scrub/shrub	2.73	5:1	0.55	2.3	0.5	2.33	0.47
Preservation	Pre-project Wetlands	Palustrine Emergent	0.03	1:1	0.03	0.03	0.03	0.03	0.03
Upland Buffer	100-foot wide upland perimeter	N/A	10.98	5:1	2.2	0.0	0.0	13.32	2.66
Totals			**40.6**		**29.63**	**2.3**	**0.5**	**19.51**	**7.02**

(a) Cowardin et al. [1979].

Table 3-8. Summary of Performance Standards and Success Criteria Compared to Existing Site Conditions

Performance Standards	Success Criteria	Criteria Achieved Y/N	Discussion
Wetland Characteristics	The three parameter criteria for hydrology, vegetation, and soils are met as outlined in the 1987 Wetland Manual and 2010 GP Regional Supplement.	Y	Nine of the thirteen excavated cells have developed a dominant wetland community. 3.86 acres of wetland had developed at the site at the time of the 2017 monitoring event.
Wetland Hydrology	Soil saturation is present for at least 12.5 percent of the growing season.	Y	Almost all excavated cells, particularly the nine that had developed a dominant hydrophytic community, are exhibiting positive primary and secondary hydrologic indicators.
Hydric Soil	Hydric soil conditions are present or appear to be forming.	Y	Excavated cells within the recently constructed mitigation site are beginning to exhibit some hydric soil development (e.g., sulfidic odor).
	Soil is sufficiently stable to prevent erosion.	Y	Disturbed soil is stable and does not exhibit signs of erosion.
	Soil is able to support plant cover.	Y	Plant cover has continued to develop across disturbed soils.
Hydrophytic Vegetation	Wetlands are delineated as hydrophytic by using technical guidelines.	Y	Nine of the 13 excavated cells had developed wetlands as of the 2017 monitoring event. A very small wetland area is also developing in Cell 1. The remaining cells showed signs of a declining upland vegetation cover because of a high water table.
	Noxious weeds do not exceed 5 percent cover.	Y	Noxious weeds were identified in 3 locations in 2017 across the site but do not exceed 5 percent cover in the excavation areas or the surrounding undisturbed habitat in 2017.
	Hydrophytic vegetation success will include achieving a minimum overall vegetation cover of 80 percent in created wetland areas within 5 years after site construction.	N	A dominant wetland community Type 9 has developed in excavated Cells 4, 5, 6, 7, 8, 9, 11, 12, and 13. A very small wetland area (<100 square feet) has developed in Cell 1.Vegetative cover within developing wetlands ranged from 10 to 50 percent in 2017.
Woody Plants	Plantings exceed 50 percent survival after 5 years.	N	Approximately 27 percent of the woody plantings observed appeared alive in 2016; that percentage dropped to 15% in 2017, which does not meet the 50 percent survival criteria. Woody plants were stressed following planting in the spring of 2016. Future monitoring is required to determine survival.
Upland Buffer	Noxious weeds do not exceed 5 percent cover within the buffer areas on site.	Y	Noxious weed cover did not exceed 5 percent cover in the upland buffer in 2017. MDT has implemented a weed control program and has a contractor who sprayed the site in 2017.
	Any disturbed area within the creditable buffer zone must have at least 50 percent aerial cover of nonweed species by the end of the monitoring period.	Y	Upland buffers that surround the developing wetland areas within the site exhibited greater than 50 percent aerial cover of nonweed species.
Fencing	Wildlife-friendly fencing is installed along the easement boundaries.	Y	Wildlife-friendly fencing has been installed around the easement boundaries and is in good condition.

4.0 REFERENCES

Berglund, J. and R. McEldowney, 2008. *MDT Montana Wetland Assessment Method,* PBS&J Project B43075.00, prepared by Post, Buckley, Schuh, & Jernigan, Helena, MT, for the Montana Department of Transportation, Helena, MT.

Cowardin, L. M., V. Carter, F. C. Golet, and E. T. LaRoe, 1979. *Classification of Wetlands and Deepwater Habitats of the United States,* FWS/OBS-79-31, prepared by the US Department of the Interior, Fish and Wildlife Service, Washington, DC.

Environmental Laboratory, 1987. *Corps of Engineers Wetlands Delineation Manual,* Program Technical Report Y-87-1, prepared by Environmental Laboratory, Department of the Army, Waterways Experiment Station, Corps of Engineers, Vicksburg, MS, for the Department of the Army, US Army Corps of Engineers, Washington, DC.

Lichvar, R. W., D. L. Banks, W. N. Kirchner, and N. C. Melvin, 2016. "The National Wetland Plant List: 2016 Wetland Ratings," *Phytoneuron*, Vol. 2016-30, No. 1–17.

Montana Department of Agriculture, 2017. "Montana Noxious Weed List," *mt.gov,* retrieved November 7, 2017, from *http://agr.mt.gov/Portals/168/Documents/Weeds/2017%20Noxious%20Weed%20List.pdf*

Montana Department of Transportation, 2015. *JTX-Tunnicliff Final Wetland Mitigation Plan, Watershed #14 – Middle Yellowstone River Basin, Big Horn County, Montana*, prepared by the Montana Department of Transportation, Helena, MT.

US Army Corps of Engineers, 2005. "Montana Mitigation Information," *army.mil*, retrieved October 10, 2016 from *http://www.nwo.usace.army.mil/Missions/Regulatory-Program/Montana/Mitigation/*

US Army Corps of Engineers, 2010. *Regional Supplement to the Corps of Engineers Wetland Delineation Manual, Great Plains Region (Version 2.0),* ERDC/El TR-10-3, J. S. Wakely, R. W. Lichvar, and C. V. Noble (eds.), prepared by the US Army Corps of Engineers, US Army Engineer Research and Development Center, Environmental Laboratory, Vicksburg, MS.

US Climate Data, 2016. "Climate Hardin – Montana," *usclimatedata.com*, retrieved December 30, 2016, from *http://www.usclimatedata.com/climate/hardin/montana/united-states/usmt0153/2016/6*

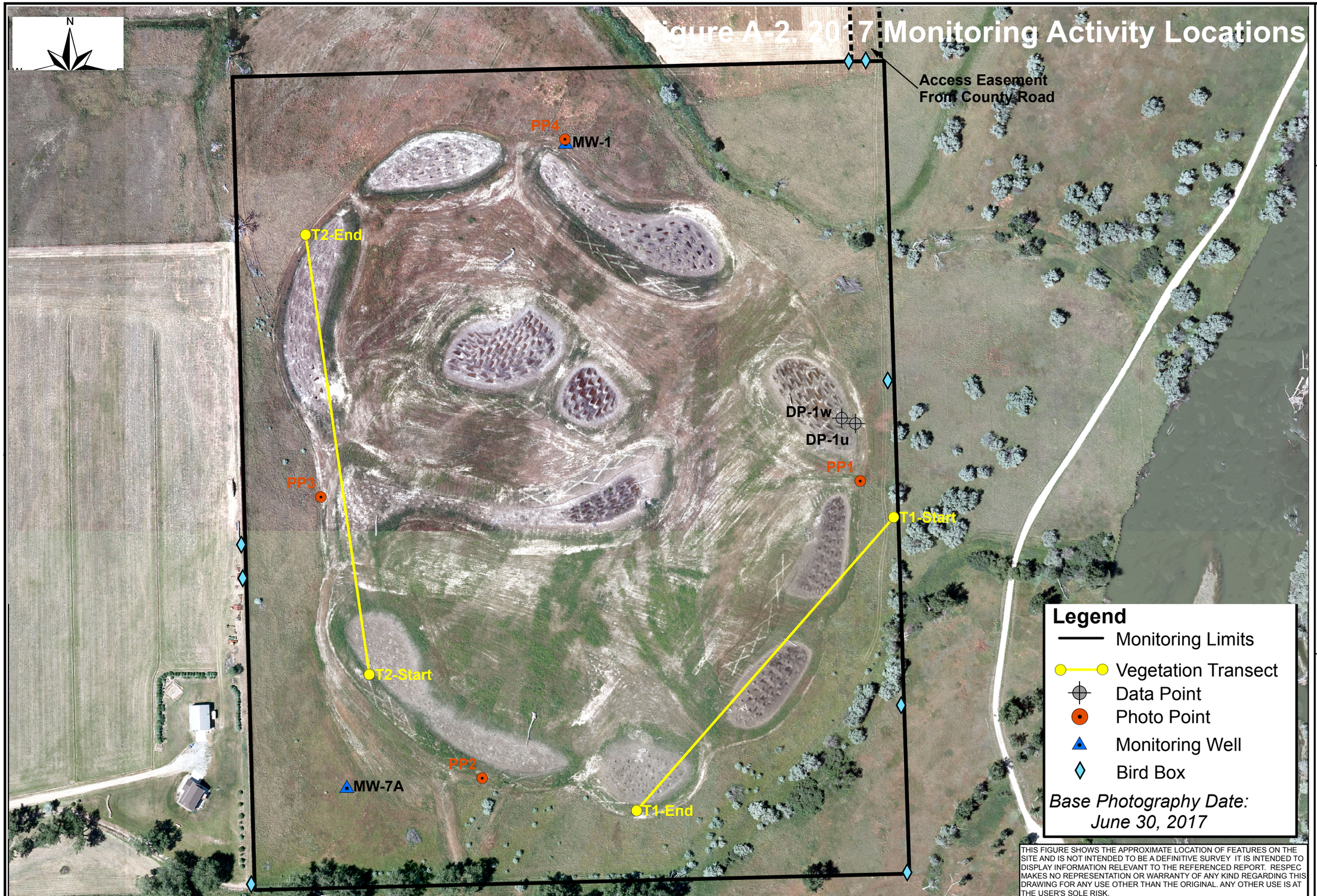
US Department of Agriculture, 2016. "Web Soil Survey for Big Horn County, Montana," *usda.gov,* retrieved June 20, 2016, from *http://websoilsurvey.nrcs.usda.gov/app/*

Western Regional Climate Center, 2017. "Monthly Sum Precipitation at Hardin, Montana (243915)" *dri.edu*, retrieved September 18, 2017, from *http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?mt0802*

APPENDIX A
PROJECT AREA MAPS

MDT Wetland Mitigation Monitoring
JTX – Tunnicliff Ranch
Big Horn 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.

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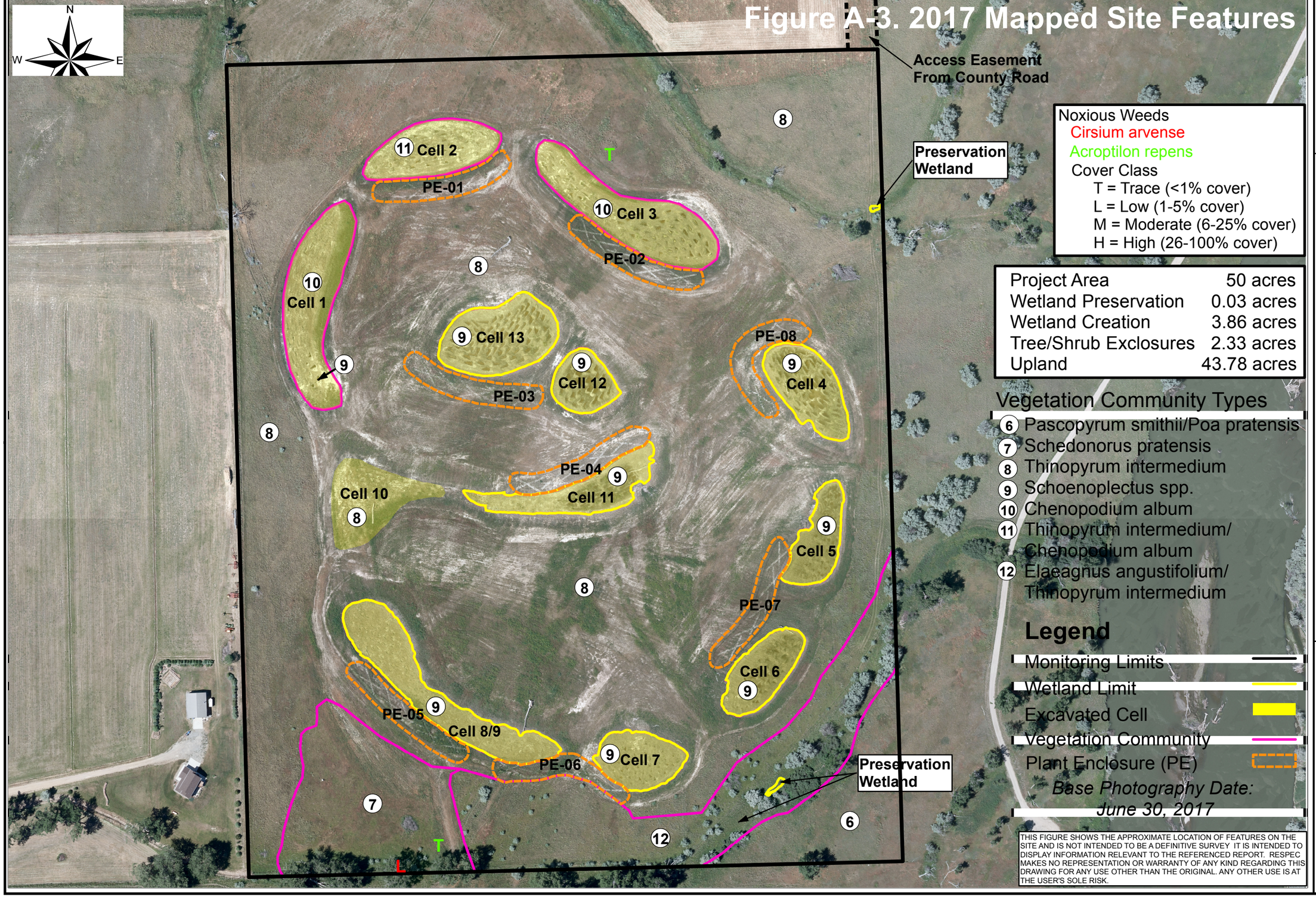
JTX Tunnicliff Wetland Mitigation Site
2017 Monitoring Activity Locations

0 80 160 320 480 640 800 Feet

Project: STPX STWD(056) UPN7286
Location: Big Horn Co., Montana
Date: December 2017
Project Manager: M. Traxler
Drawn By: J. Rosenbaum

File: Z:\RESPEC\02895 MDT Monitoring 2016 - 2018\WS #14 JTX Tunnicliff\GPS Data\Mains\Monitor2017.mxd

Figure A-3. 2017 Mapped Site Features



Noxious Weeds
- Cirsium arvense
- Acroptilon repens

Cover Class
- T = Trace (<1% cover)
- L = Low (1-5% cover)
- M = Moderate (6-25% cover)
- H = High (26-100% cover)

Project Area	50 acres
Wetland Preservation	0.03 acres
Wetland Creation	3.86 acres
Tree/Shrub Exclosures	2.33 acres
Upland	43.78 acres

Vegetation Community Types

6. Pascopyrum smithii/Poa pratensis
7. Schedonorus pratensis
8. Thinopyrum intermedium
9. Schoenoplectus spp.
10. Chenopodium album
11. Thinopyrum intermedium/ Chenopodium album
12. Elaeagnus angustifolium/ Thinopyrum intermedium

Legend

- Monitoring Limits
- Wetland Limit
- Excavated Cell
- Vegetation Community
- Plant Enclosure (PE)

Base Photography Date: June 30, 2017

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JTX Tunnicliff Wetland Mitigation Site
2017 Mapped Site Features

0 80 160 320 480 640 800 Feet

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APPENDIX B
MONITORING FORMS

MDT Wetland Mitigation Monitoring
JTX – Tunnicliff Ranch
Big Horn County, Montana

RESPEC/MDT WETLAND MITIGATION SITE MONITORING FORM

Project Name: **JTX-Tunnicliff** Project Number: **STPX STWD (056)**
Assessment Date: **July 25, 2017** Person(s) conducting the assessment: **Bacon/Hoschouer**
Location: **Hardin** MDT District: **Billings** Milepost: _____
Legal Description: T **1N** R **33E** Section **10** **T** **1N** **R** **33E** Section **15**
Weather Conditions: **Sunny and hot** Time of Day: **6-9PM;7AM-1PM**
Initial Evaluation Date: **June 15, 2016** Monitoring Year: **2** # Visits in Year: **1**
Size of evaluation area: **50 acres** Land use surrounding wetland: **Rural agricultural and Big Horn RiverFloodplain.**

HYDROLOGY

Surface Water Source: **Groundwater**
Inundation: **Absent** Average Depth: _____ Range of Depths: _____
Percent of assessment area under inundation: **<1%**
Depth at emergent vegetation-open water boundary: **<0.1 feet**
If assessment area is not inundated then are the soils saturated within 12 inches of surface: **No**
Other evidence of hydrology on the site (ex. – drift lines, erosion, stained vegetation, etc.):

_____

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

Well Number	Depth	Well Number	Depth	Well Number	Depth
1	**6.16**				
7A	**				

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:
****Well 7A had a mysterious-looking plug in the cap and top of pipe, bentonite?**

VEGETATION COMMUNITIES

Community Number: **5** Community Title (main spp): **Elaeagnus angustifolium/Bromus inermis**

Dominant Species	% Cover	Dominant Species	% Cover
Elaeagnus angustifolia	5 = > 50%	Fraxinus pennsylvanica	1 = 1-5%
Bromus inermis	4 = 21-50%	Carex sp.	1 = 1-5%
Symphoricarpos albus	2 = 6-10%	Alopecurus arundinaceus	1 = 1-5%
Thinopyrum intermedium	2 = 6-10%		
Sheperdia argentea	2 = 6-10%		
Cynoglossum officinale	1 = 1-5%		

Comments / Problems: **Converted to CT-12 by 2017**

Community Number: **6** Community Title (main spp): **Pascopyrum smithii/Poa pratensis**

Dominant Species	% Cover	Dominant Species	% Cover
Poa pratensis	4 = 21-50%		
Thinopyrum intermedium	1 = 1-5%		
Bromus arvense	3 = 11-20%		
Acroptilon repens	4 = 21-50%		
Pascopyrum smithii	4 = 21-50%		

Comments / Problems: **Acroptilon repens is a noxious weed, MDT will spray.**

Community Number: **7** Community Title (main spp): **Schedonorus pratensis**

Dominant Species	% Cover	Dominant Species	% Cover
Schedonorus pratensis	5 = > 50%	Bromus inermis	+ = < 1%
Dactylis glomerata	1 = 1-5%	Medicago sativa	+ = < 1%
Thinopyrum intermedium	+ = < 1%	Melilotis officinalis	+ = < 1%
Poa pratensis	1 = 1-5%	Glycerrhiza lepidota	+ = < 1%
Bromus arvensis	+ = < 1%	Trifolium fragiferum	+ = < 1%
Elaeagnus angustifolia	+ = < 1%	Arctium lappa	+ = < 1%

Comments / Problems: _____

Community Number: **8** Community Title (main spp): **Thinopyrum intermedium**

Dominant Species	% Cover	Dominant Species	% Cover
Thinopyrum intermedium	5 = > 50%	Glycerrhiza lepidota	1 = 1-5%
Iva axillaris	1 = 1-5%	Sporobolus airoides	1 = 1-5%
Acroptilon repens	1 = 1-5%	Lepidium perfoliatum	1 = 1-5%
Bromus arvensis	1 = 1-5%	Asclepias speciosa	+ = < 1%
Elymus repens	1 = 1-5%	Chenopodium album	+ = < 1%
Schedonorus pratensis	1 = 1-5%	Melilotus albus	1 = 1-5%

Comments / Problems: **Distichlis spicata-<1; Poa pratensis-1; Hordeum jubatum-<1**

VEGETATION COMMUNITIES (continued)

Community Number: **9** Community Title (main spp): **Schoenoplectus spp.**

Dominant Species	% Cover	Dominant Species	% Cover
Schoenoplectus maritimus	2 = 6-10%	Schoenoplectus pungens	+ = < 1%
Thinopyrum intermedium	+ = < 1%	Beckmannia syzigachne	+ = < 1%
Juncus balticus	1 = 1-5%	Bare Ground (dried mud)	5 = > 50%
Thinopyrum intermedium	+ = < 1%	Schoenoplectus americanus	+ = < 1%
Chenopodium album	1 = 1-5%		
Hordeum jubatum	+ = < 1%		

Comments / Problems: **Standing dead THIINT >50% (drown-out), 'bare ground' % includes the standing dead litter % cover; CT-9 is a PEM wetland community.**

Community Number: **10** Community Title (main spp): **Chenopodium album**

Dominant Species	% Cover	Dominant Species	% Cover
Schoenoplectus maritimus	+ = < 1%		
Elymus repens	+ = < 1%		
Chenopodium album	2 = 6-10%		
Hordeum jubatum	1 = 1-5%		
Bare Ground (dried mud)	5 = > 50%		
Distichlis spicata	+ = < 1%		

Comments / Problems: **Standing dead THIINT >50% (drown-out), 'bare ground' % includes the standing dead litter % cover**

Community Number: **11** Community Title (main spp): **Thinopyrum intermedium/Chenopodium album**

Dominant Species	% Cover	Dominant Species	% Cover
Chenopodium album	2 = 6-10%		
Thinopyrum intermedium	2 = 6-10%		
Bassia scoparia	+ = < 1%		
Bare Ground	5 = > 50%		

Comments / Problems: **Standing dead THIINT >50% (drown-out), 'bare ground' % includes the standing dead litter % cover**

Community Number: **12** Community Title (main spp): **Elaeagnus angustifolium/Thinopyrum intermedium**

Dominant Species	% Cover	Dominant Species	% Cover
Elaeagnus angustifolia	3 = 11-20%	Fraxinus pennsylvanica	1 = 1-5%
Bromus inermis	1 = 1-5%	Carex sp.	1 = 1-5%
Symphoricarpos albus	1 = 1-5%	Alopecurus arundinaceus	1 = 1-5%
Thinopyrum intermedium	5 = > 50%	Salix fragilis	1 = 1-5%
Sheperdia argentea	2 = 6-10%	Echinocystis lobata	1 = 1-5%
Cynoglossum officinale	+ = < 1%	Acroptilon repens*	1 = 1-5%

Comments / Problems: ***Noxious weed; Schedonorus pratensis-1; Mellilotis officinale-1; Poa pratensis-1;Populus deltoides-1; Bromus arvensis-1; Grindelia squarrosa-<1; Dactylis glomerata-<1 (note 2016 BROINE was dominant grass, converted to THIINT by 2017)**

PLANTED WOODY VEGETATION SURVIVAL

Plant Species	Number Originally Planted	Number LIVE Observed	Mortality Causes
PA-1		0	All PA: grass and weedy forb competition and lack of
PA-2		14	irrigation
PA-3		13	
PA-4		35	
PA-5		65	
PA-6		77	
PA-7		17	
PA-8		31	
TOTAL LIVE		252	15% Survival (of original 1650 stems planted)

Plant Species	Number Originally Planted
Sheperdia argentea	400
Crataegus douglasii	400
Elaeaganus commutate	400
Prunus virginiana	400
Populus deltoids	25
Acer negundo	10
Quercus macrocarpa	15

Comments / Problems: 1,650 containerized woody plants were installed in the 8 planting areas. All planting were in 1 gallon containers except for cottonwood which were in 5 gallon containers. In spite of weed fabric being installed, various grasses and weedy forbs (yellow and white sweet clvoer) are competing with many of the plantings.

MDT WETLAND MONITORING – VEGETATION TRANSECT

Site: **Tunnicliff** Date: **July 25, 2017** Examiner: **RESPEC (Bacon/Hoschouer)**
Transect Number: **1** Approximate Transect Length: **792 feet** Compass Direction from Start: **200˚** Note: _____

Transect Interval Length: **155 feet (Station 0-155)**	
Vegetation Community Type: 8 - Thinopyrum intermedium	
Plant Species	**Cover**
Thinopyrum intermedium	5 = > 50%
Schedonorus pratensis	+ = < 1%
Taraxacum officinale	+ = < 1%
Medicago lupulina	+ = < 1%
Bare Ground	2 = 6-10%
Melilotus albus	1 = 1-5%
Poa pratensis	+ = < 1%
Bromus inermis	+ = < 1%
Melilotus officinalis	+ = < 1%
Convulvulus arvensis	+ = < 1%
Equisetum arvense	+ = < 1%
Total Vegetative Cover:	90%

Transect Interval Length: **66 feet (Station 155-221)**	
Vegetation Community Type: 9 – Schoenoplectus spp.	
Plant Species	**Cover**
Juncus balticus	1 = 1-5%
Schoenoplectus maritimus	1 = 1-5%
Typha latifolia	2 = 6-10%
Hordeum jubatum	+ = < 1%
Chenopodium album	+ = < 1%
Bare Ground (mud and standing dead THIINT)	5 = > 50%
Total Vegetative Cover:	20%

Transect Interval Length: **118 feet (Station 221-339)**	
Vegetation Community Type: 8 - Thinopyrum intermedium	
Plant Species	**Cover**
Thinopyrum intermedium	5 = > 50%
Medicago sativa	+ = < 1%
Bromus arvense	+ = < 1%
Schedonorous pratensis	+ = < 1%
Bare Ground	2 = 6-10%
Melilotus albus	+ = < 1%
Poa pratensis	+ = < 1%
Bromus inermis	+ = < 1%
Melilotus officinalis	+ = < 1%
Total Vegetative Cover:	90%

Transect Interval Length: **192 feet (Station 339-531)**	
Vegetation Community Type: 9 – Schoenoplectus spp.	
Plant Species	**Cover**
Schoenoplectus maritimus	2 = 6-10%
Juncus balticus	+ = < 1%
Rumex crispus	+ = < 1%
Thinopyrum intermedium	+ = < 1%
Chenopodium album	1 = 1-5%
Hordeum jubatum	+ = < 1%
Beckmannia syzigachne	+ = < 1%
Bare Ground (mud)	5 = > 50%
Total Vegetative Cover:	10%

MDT WETLAND MONITORING – VEGETATION TRANSECT

Site: **Tunnicliff** Date: **July 25, 2017** Examiner: **RESPEC (Bacon/Hoschouer)**
Transect Number: **1** Approximate Transect Length: **792 feet** Compass Direction from Start: **200˚** Note: _____

Transect Interval Length: **133 feet (Station 531-664)**	
Vegetation Community Type: 8 - Thinopyrum intermedium	
Plant Species	**Cover**
Thinopyrum intermedium	5 = > 50%
Schedonorus pratensis	+ = < 1%
Taraxacum officinale	+ = < 1%
Medicago lupulina	+ = < 1%
Bare Ground	1 = 1-5%
Melilotus albus	1 = 1-5%
Poa pratensis	+ = < 1%
Bromus inermis	+ = < 1%
Melilotus officinalis	+ = < 1%
Hordeum jubatum	+ = < 1%
Trifolium repens	1 = 1-5%
Total Vegetative Cover:	95%

Transect Interval Length: **114 feet (Station 664-778**	
Vegetation Community Type: 9 – Schoenoplectus spp.	
Plant Species	**Cover**
Juncus balticus	1 = 1-5%
Schoenoplectus maritimus	4 = 21-50%
Typha latifolia	+ = < 1%
Hordeum jubatum	1 = 1-5%
Chenopodium album	3 = 11-20%
Bare Ground	5 = > 50%
Beckmannia syzigachne	+ = < 1%
Total Vegetative Cover:	50%

Transect Interval Length: **14 feet (Station 778-792)**	
Vegetation Community Type: 8 - Thinopyrum intermedium	
Plant Species	**Cover**
Thinopyrum intermedium	5 = > 50%
Trifolium repens	+ = < 1%
Hordeum jubatum	+ = < 1%
Schedonorous pratensis	+ = < 1%
Bare Ground	3 = 11-20%
Trifolium eriocephalum (requires confirmation 2018)	+ = < 1%
Total Vegetative Cover:	85%

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

MDT WETLAND MONITORING – VEGETATION TRANSECT

Site: **Tunnicliff** Date: **July 25, 2017** Examiner: **RESPEC (Bacon/Hoschouer)**
Transect Number: **2** Approximate Transect Length: **900 feet** Compass Direction from Start: **330˚** Note: _____

Transect Interval Length: **20 feet (Station 0-20)**	
Vegetation Community Type: 8 – Thinopyrum intermedium	
Plant Species	**Cover**
Thinopyrum intermedium	5 = > 50%
Hordeum jubatum	1 = 1-5%
Puccinellia nuttalliana	1 = 1-5%
Chenopodium album	+ = < 1%
Bare Ground	5 = > 50%
Total Vegetative Cover:	50%

Transect Interval Length: **107 feet (Station 20-127)**	
Vegetation Community Type: 9 – Schoenoplectus spp.	
Plant Species	**Cover**
Chenopodium album	5 = > 50%
Schoenoplectus maritimus	1 = 1-5%
Rumex crispus	+ = < 1%
Bare Ground	3 = 11-20%
Alopecurus arundinaceus	+ = < 1%
Total Vegetative Cover:	80%

Transect Interval Length: **430 feet (Station 127-557)**	
Vegetation Community Type: 8 - Thinopyrum intermedium	
Plant Species	**Cover**
Thinopyrum intermedium	5 = > 50%
Hordeum jubatum	+ = < 1%
CLOVER	1 = 1-5%
Chenopodium album	1 = 1-5%
Bare Ground	2 = 6-10%
Total Vegetative Cover:	90%

Transect Interval Length: **47 feet (Station 557-604)**	
Vegetation Community Type: 10 - Chenopodium album	
Plant Species	**Cover**
Chenopodium album	2 = 6-10%
Hordeum jubatum	1 = 1-5%
Schoenoplectus maritimus	+ = < 1%
Bare Ground (Standing dead THIINT)	5 = > 50%
Elymus repens	+ = < 1%
Total Vegetative Cover:	50%

MDT WETLAND MONITORING – VEGETATION TRANSECT

Site: **Tunnicliff** Date: **July 25, 2017** Examiner: **RESPEC (Bacon/Hoschouer)**
Transect Number: **2** Approximate Transect Length: **900 feet** Compass Direction from Start: **330˚** Note: _____

Transect Interval Length: **86 feet (Station 604-690)**	
Vegetation Community Type: 8 - Thinopyrum/Schedonorus	
Plant Species	**Cover**
Thinopyrum intermedium	5 = > 50%
Chenopodium album	2 = 6-10%
Bare Ground	1 = 1-5%
Total Vegetative Cover:	95%

Transect Interval Length: **178 feet (Station 690-868)**	
Vegetation Community Type: 10 - Chenopodium album	
Plant Species	**Cover**
Chenopodium album	5 = > 50%
Hordeum jubatum	+ = < 1%
Bare Ground (Standing dead THIINT)	5 = > 50%
Total Vegetative Cover:	50%

Transect Interval Length: **32 feet (Station 868-900)**	
Vegetation Community Type: 8 - Thinopyrum intermedium	
Plant Species	**Cover**
Bromus arvense	1 = 1-5%
Lepidium perfoliatum	+ = < 1%
Thinopyrum intermedium	5 = > 50%
Chenopodium album	+ = < 1%
Melilotus albus	1 = 1-5%
Bare Ground (litter)	2 = 6-10%
Total Vegetative Cover:	90%

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

MDT WETLAND MONITORING – VEGETATION TRANSECT

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

Percent of perimeter developing wetland vegetation (excluding dam/berm structures): **10%**

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: **9 of the 13 cells qualify as wetland: saturated or other signs of hydrology and dominany wetland vegetation.**

PHOTOGRAPHS

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 & Lat/Long	Compass Reading (°)
PP-1		Photo Point 1, Photo 1: 45.83945617/-107.5966157	320
PP-1		Photo Point 1, Photo 2: 45.83945617/-107.5966157	270
PP-1		Photo Point 1, Photo 3: 45.83945617/-107.5966157	220
PP-1		Photo Point 1 (Pano): 45.83945617/-107.5966157	
PP-2		Photo Point 2, Photo 1: 45.83785325/-107.5996803	315
PP-2		Photo Point 2, Photo 2: 45.83785325/-107.5996803	0
PP-2		Photo Point 2, Photo 3: 45.83785325/-107.5996803	45
PP-2		Photo Point 2 (Pano): 45.83785325/-107.5996803	
PP-3		Photo Point 3, Photo 1: 45.83943906/-107.6009084	140
PP-3		Photo Point 3, Photo 2: 45.83943906/-107.6009084	100
PP-3		Photo Point 3, Photo 3: 45.83943906/-107.6009084	45
PP-3		Photo Point 3 (Pano): 45.83943906/-107.6009084	
PP-4		Photo Point 4, Photo 1: 45.84139478/-107.5988983	105
PP-4		Photo Point 4, Photo 2: 45.84139478/-107.5988983	160
PP-4		Photo Point 4, Photo 3: 45.84139478/-107.5988983	240
PP-4		Photo Point 4 (Pano): 45.84139478/-107.5988983	
T-1 start		Transect 1 start: 45.8392488/-107.5963573	200
T-1 end		Transect 1 end: 45.83765226/-107.5984577	50
T-2 start		Transect 2 start: 45.83844422/-107.6005579	330
T-2 end		Transect 2 end: 45.84089981/-107.6009804	160
DP-1w		Wetland soil pit: 45.839807/-107.569752	
DP-1u		Upland soil pit: 45.839775/-107.596643	

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:

- ☒ Upland/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.
- ☒ Bird nest boxes.

Comments / Problems: _____

WETLAND DELINEATION

(attach COE delineation forms)

At each site conduct these checklist items:

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

Comments / Problems: _____

FUNCTIONAL ASSESSMENT

- ☒ Complete and attach full MDT Montana Wetland Assessment Method field forms.

Comments / Problems: _____

MAINTENANCE

Were man-made nesting structure installed at this site? **Yes**
If yes, do they need to be repaired? **No**
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? **NA**
If yes, are the structures working properly and in good working order? **NA**
If no, describe the problems below.

Comments / Problems:

WILDLIFE

Birds

Were man-made nesting structures installed? **Yes**
If yes, type of structure: **box** How many? **7**
Are the nesting structures being used? **Yes**
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 and Deer tracks	2	☒	☒	☐	
		☐	☐	☐	
		☐	☐	☐	
		☐	☐	☐	
		☐	☐	☐	
		☐	☐	☐	
		☐	☐	☐	
		☐	☐	☐	

Additional Activities Checklist:
NA Macroinvertebrate Sampling (if required)

Comments / Problems: Bird boxes 2, 3, 6, 8 had stick nests, although not sure if the nests were removed after 2016. Could not determine if nest boxes 1, 3, 5 were used. Box 7 appeared empty.

BIRD SURVEY – FIELD DATA SHEET

Site: **Tunnicliff** Date: **7/24/17**
Survey Time: ***** to _____

Bird Species	#	Behavior	Habitat	Bird Species	#	Behavior	Habitat
House Wren	1		UP				
Ring-necked Pheasant	1		UP				
Western Kingbird	1		UP				
Western Meadowlark	1		UP				
Red-breasted Nuthatch	1		UP				
Lazuli Bunting	1		UP				

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: **warm, sunny**

Notes: **Behavior: unknown, late in breeding season, however species were identified by song.**
DATE: * 7/24: 6:30PM-8:30PM; 7/25: 7AM-1PM

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: JTX - Tunnicliff City/County: Hardin/Big Horn Sampling Date: 7/24/17

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

Investigator(s): L. Bacon, C. Hoschouer Section, Township, Range: S34 T7N R39E

Landform (hillside, terrace, etc.): depression Local relief (concave, convex, none): concave Slope (%): 0

Subregion (LRR): LRR G Lat: 45.839775 Long: -107.596643 Datum: WGS84

Soil Map Unit Name: Kyle clay, saline (Kw) NWI classification: PEM

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

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X 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 X	**Is the Sampled Area within a Wetland?** **Yes** ____ **No** X
Hydric Soil Present?	Yes ____	No X	
Wetland Hydrology Present?	Yes ____	No X	

Remarks:
DP-1u on slope above depression; very dry, soils very hard.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: ____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	____	=Total Cover	
Sapling/Shrub Stratum (Plot size: ____)			
1.			
2.			
3.			
4.			
5.			
	____	=Total Cover	
Herb Stratum (Plot size: ____)			
1. *Thinopyrum intermedium*	25	Yes	UPL
2. *Elymus repens*	15	Yes	FACU
3. *Bromus arvensis*	10	No	FACU
4. *Bromus ciliatus*	3	No	FAC
5. *Chenopodium album*	2	No	FACU
6.			
7.			
8.			
9.			
10.			
	55	=Total Cover	
Woody Vine Stratum (Plot size: ____)			
1.			
2.			
	____	=Total Cover	

% Bare Ground in Herb Stratum 45

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	3	x 3 =	9
FACU species	27	x 4 =	108
UPL species	25	x 5 =	125
Column Totals:	55 (A)		242 (B)
Prevalence Index = B/A =			4.40

Hydrophytic Vegetation Indicators:

____ 1 - Rapid Test for Hydrophytic 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)

X 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** X

Remarks:
No wetland veg dominance on slopes around excavated areas.

SOIL

Sampling Point: DP-1u

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-10	7.5YR 4/3	100					Loamy/Clayey	silty

[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)
- ___ Stratified Layers (A5) **(LRR F)**
- ___ 1 cm Muck (A9) **(LRR F, G, H)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) **(LRR G, H)**
- ___ 5 cm Mucky Peat or Peat (S3) **(LRR F)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16) **(MLRA 72 & 73 of LRR H)**

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR I, J)**
- ___ Coast Prairie Redox (A16) **(LRR F, G, H)**
- ___ Dark Surface (S7) **(LRR G)**
- ___ High Plains Depressions (F16) **(LRR H outside of MLRA 72 & 73)**
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ___ **No** X

Remarks:

No hydric soil indicators present. Soil very hard, no hydrology at this height above excavated area.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is 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)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) **(where not tilled)**
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) **(where tilled)**
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) **(LRR F)**

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): ___

Water Table Present? Yes ___ No X Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): ___

Wetland Hydrology Present? **Yes** ___ **No** X

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

Remarks:

No hydrology indicators present. Very dry slopes above excavated depression.

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: JTX - Tunnicliff City/County: Hardin/Big Horn Sampling Date: 7/24/17

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

Investigator(s): L. Bacon, C. Hoschouer Section, Township, Range: S34 T7N R39E

Landform (hillside, terrace, etc.): depression Local relief (concave, convex, none): concave Slope (%): 0

Subregion (LRR): LRR G Lat: 45.839807 Long: -107.569752 Datum: WGS84

Soil Map Unit Name: Kyleclay, saline (Kw) NWI classification: PEM

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

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X 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 X	No ____	**Is the Sampled Area within a Wetland?** **Yes** X **No** ____
Hydric Soil Present?	Yes X	No ____	
Wetland Hydrology Present?	Yes X	No ____	

Remarks:
DP-1w located in Cell-4, qualifies as a wetland as cell has a domiant hydrophytic veg communtiy and saturated soils. Hydric soils remain problematic due to new construction, as expected and as is normal for new sites.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: ____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	____	=Total Cover	
Sapling/Shrub Stratum (Plot size: ____)			
1.			
2.			
3.			
4.			
5.			
	____	=Total Cover	
Herb Stratum (Plot size: ____)			
1. *Thinopyrum intermedium*	20	Yes	UPL
2. *Schoenoplectus maritimus*	10	Yes	OBL
3. *Beckmannia syzigachne*	2	No	OBL
4. *Lepidium perfoliatum*	2	No	FAC
5.			
6.			
7.			
8.			
9.			
10.			
	34	=Total Cover	
Woody Vine Stratum (Plot size: ____)			
1.			
2.			
	____	=Total Cover	

% Bare Ground in Herb Stratum 65

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

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

Percent of Dominant Species That Are OBL, FACW, or FAC: 50.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	12	x 1 =	12
FACW species	0	x 2 =	0
FAC species	2	x 3 =	6
FACU species	0	x 4 =	0
UPL species	20	x 5 =	100
Column Totals:	34 (A)		118 (B)
Prevalence Index = B/A =			3.47

Hydrophytic Vegetation Indicators:

____ 1 - Rapid Test for Hydrophytic 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)

X Problematic Hydrophytic Vegetation[1] (Explain)

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

Hydrophytic Vegetation Present? **Yes** X **No** ____

Remarks:
Bare ground is mud. Excavated area has a dominance of hydrophytic vegetation, this DP happens to be in area where THIINT has not completely drowned out.

SOIL

Sampling Point: DP-1w

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-2	10YR 2/1	100					Sandy	sandy loam
2-16	10YR 4/1	100					Sandy	silt gravelly

[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)
- _X_ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) **(LRR F)**
- ___ 1 cm Muck (A9) **(LRR F, G, H)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) **(LRR G, H)**
- ___ 5 cm Mucky Peat or Peat (S3) **(LRR F)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16) **(MLRA 72 & 73 of LRR H)**

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR I, J)**
- ___ Coast Prairie Redox (A16) **(LRR F, G, H)**
- ___ Dark Surface (S7) **(LRR G)**
- ___ High Plains Depressions (F16) **(LRR H outside of MLRA 72 & 73)**
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (F22)
- _X_ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: ___

Depth (inches): ___

Hydric Soil Present? **Yes** _X_ **No** ___

Remarks:
New construction, do not expect to see any hydric soil indicators for several years; soil saturated to surface and dominant hydrophytic veg in excavated area.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is 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)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- _X_ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) **(where not tilled)**
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- _X_ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) **(where tilled)**
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- _X_ Geomorphic Position (D2)
- _X_ FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) **(LRR F)**

Field Observations:

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

Wetland Hydrology Present? **Yes** _X_ **No** ___

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

Remarks:
Excavated areas with dominant hdyrophytic vegetation and saturated soils quailfy as wetlands in this newly constructed mitigation site: Cells-2, 4, 5, 6, 7, 8, 9, 12, 13 are CT-9, a dominant wetland communtiy. Cell-10 has a 15x15' area of dominant wetland vegetation and saturated soils.

MDT MONTANA WETLAND ASSESSMENT FORM (revised March 2008)

1. Project Name: JTX-Tunnicliff **2. MDT Project #:** STPX STWD (056) **3. Control #:** 7286

3. Evaluation Date: 7/25/2017 **4. Evaluator(s):** Lynn Bacon **5. Wetland/Site #(s):** Tunnicliff

6. Wetland Location(s): Township 1 N, Range 33 E, Section 10; Township 1 N, Range 33 E, Section 15

Approximate Stationing or Roadposts: NA

Watershed: 14 - Middle Yellowstone **County:** Big Horn _ _ _____

7. Evaluating Agency: RESPEC for MDT

Purpose of Evaluation:

- ☐ **Wetland potentially affected by MDT project**
- ☐ **Mitigation wetlands; pre-construction**
- ☒ **Mitigation wetlands; post-construction**
- ☐ **Other** _____

8. Wetland Size (acre): _____ (visually estimated)
3.86 (measured, e.g. GPS)

9. Assessment Area (AA) Size (acre): _____ (visually estimated)
(see manual for determining AA) 3.86 (measured, e.g. GPS)

10. CLASSIFICATION OF WETLAND AND AQUATIC HABITATS IN AA (See manual for definitions.)

HGM Class (Brinson)	Class (Cowardin)	Modifier (Cowardin)	Water Regime	% OF AA
Depressional	Emergent Wetland	Excavated	Seasonal / Intermittent	100

Comments: _____

11. ESTIMATED RELATIVE ABUNDANCE (of similarly classified sites within the same Major Montana Watershed Basin; see manual.)
abundant

12. GENERAL CONDITION OF AA

i. Disturbance: Use matrix below to select the appropriate response; see manual for Montana listed noxious weed and aquatic nuisance vegetation species lists.

Conditions within AA	Predominant Conditions Adjacent to (within 500 feet of) AA		
	Managed in predominantly natural state; is not grazed, hayed, logged, or otherwise converted; does not contain roads or buildings; and noxious weed or ANVS cover is ≤15%.	Land not cultivated, but may be moderately grazed or hayed or selectively logged; or has been subject to minor clearing; contains few roads or buildings; noxious weed or ANVS cover is ≤30%.	Land cultivated or heavily grazed or logged; subject to substantial fill placement, grading, clearing, or hydrological alteration; high road or building density; or noxious weed or ANVS cover is >30%.
AA occurs and is managed in predominantly natural state; is not grazed, hayed, logged, or otherwise converted; does not contain roads or occupied buildings; and noxious weed or ANVS cover is ≤15%.	low disturbance	---	---
AA not cultivated, but may be moderately grazed or hayed or selectively logged; or has been subject to relatively minor clearing, fill placement, or hydrological alteration; contains few roads or buildings; noxious weed or ANVS cover is ≤30%.	---	---	---
AA cultivated or heavily grazed or logged; subject to relatively substantial fill placement, grading, clearing, or hydrological alteration; high road or building density; or noxious weed or ANVS cover is >30%.	---	---	---

Comments (types of disturbance, intensity, season, etc.)**:** AA vegetation recovering from construction disturbance; disturbance other than wetland construction is zero except for wildlife use and wetland monitoring.

ii. Prominent noxious, aquatic nuisance, and other exotic vegetation species: All noxious weeds have decreased: Convolvulus arvensis, Cirsium arvense. Russian knapweed observed in 2017, a new noxious species.

iii. Provide brief descriptive summary of AA and surrounding land use/habitat: FAS, large parcel homesites, ranching.

13. STRUCTURAL DIVERSITY (Based on number of "Cowardin" ***vegetated*** classes present [do not include unvegetated classes]; see #10 above.)

Existing # of "Cowardin" Vegetated Classes in AA	Initial Rating	Is current management preventing (passive) existence of additional vegetated classes?		Modified Rating
≥3 (or 2 if one is forested) classes	---	NA	NA	NA
2 (or 1 if forested) classes	---	NA	NA	NA
1 class, but not a monoculture	mod	←NO	YES→	---
1 class, monoculture (1 species comprises ≥90% of total cover)	---	NA	NA	NA

Comments: Shrubs and trees planted, none located in wetland areas at this time.

Wetland/Site #(s): Tunnicliff

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

i. AA is Documented (D) or Suspected (S) to contain: Check box based on definitions in manual.

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

ii. Rating: Based on the strongest habitat chosen in 14A(i) above, select the corresponding functional point and rating.

Highest Habitat Level	Doc/Primary	Sus/Primary	Doc/Secondary	Sus/Secondary	Doc/Incidental	Sus/Incidental	None
Functional Point/Rating	---	---	---	---	---	---	0L

Sources for documented use (e.g. observations, records): USFWS T&E list for Big Horn County

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

i. AA is Documented (D) or Suspected (S) to contain: Check box based on definitions in manual.

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 ☐ S

ii. Rating: Based on the strongest habitat chosen in 14A(i) above, select the corresponding functional point and rating.

Highest Habitat Level	Doc/Primary	Sus/Primary	Doc/Secondary	Sus/Secondary	Doc/Incidental	Sus/Incidental	None
S1 Species Functional Point/Rating	---	---	---	---	---	---	---
S2 and S3 Species Functional Point/Rating	---	---	---	---	---	.1L	---

Sources for documented use (e.g. observations, records): Suitable great blue heron habitat

14C. GENERAL WILDLIFE HABITAT RATING

i. Evidence of Overall Wildlife Use in the AA: Check substantial, moderate, or low based on supporting evidence.

☐ ***Substantial:*** Based on any of the following [check].
- ☐ 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
- ☐ interview with local biologist with knowledge of the AA

☒ ***Minimal:*** Based on any of the following [check].
- ☒ few or no wildlife observations during peak use periods
- ☒ little to no wildlife sign
- ☐ sparse adjacent upland food sources
- ☐ interview with local biologist with knowledge of AA

☐ ***Moderate:*** Based on any of the following [check].
- ☐ 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
- ☐ interview with local biologist with knowledge of the AA

ii. Wildlife Habitat Features: Working from top to bottom, check appropriate AA attributes in matrix to arrive at rating. Structural diversity is from #13. For class cover to be considered evenly distributed, the most and least prevalent **vegetated** classes must be within 20% of each other in terms of their percent composition of the AA (see #10). Abbreviations for surface water durations are as follows: P/P = permanent/perennial; S/I = seasonal/intermittent; T/E = temporary/ephemeral; and A = absent [see manual for further definitions of these terms].

Structural Diversity (see #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 #12i)	---	---	---	---	---	---	---	---	---	H	---	---	---	---	---	---	---	---	---	---
☐ **Moderate Disturbance** at AA (see #12i)	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
☐ **High Disturbance** at AA (see #12i)	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

iii. Rating: Use the conclusions from i and ii above and the matrix below to select the functional point and rating.

Evidence of Wildlife Use (i)	**Wildlife Habitat Features Rating (ii)**			
	☐ **Exceptional**	☒ **High**	☐ **Moderate**	☐ **Low**
☐ **Substantial**	---	---	---	---
☐ **Moderate**	---	---	---	---
☒ **Minimal**	---	.4M	---	---

Comments: Very few signs of wildlife observed in wetland depressions during field survey.

Wetland/Site #(s): Tunnicliff

14D. GENERAL FISH HABITAT ☒ **NA** (proceed to 14E)

If the AA is not used by fish, fish use is not restorable due to habitat constraints, or is not desired from a management perspective [such as fish entrapped in a canal], then check the NA box and proceed to 14E.

Assess this function if the AA is used by fish or the existing situation is "correctable" such that the AA could be used by fish [i.e., fish use is precluded by perched culvert or other barrier].

Type of Fishery: ☐ Cold Water (**CW**) ☐ Warm Water (**WW**) **Use the CW or WW guidelines in the manual to complete the matrix.**

i. Habitat Quality and Known / Suspected Fish Species in AA: Use matrix to select the functional point and rating.

Duration of Surface Water in AA	☐ **Permanent / Perennial**						☐ **Seasonal / Intermittent**						☐ **Temporary / Ephemeral**					
Aquatic Hiding / Resting / Escape Cover	☐ **Optimal**		☐ **Adequate**		☐ **Poor**		☐ **Optimal**		☐ **Adequate**		☐ **Poor**		☐ **Optimal**		☐ **Adequate**		☐ **Poor**	
Thermal Cover: optimal / suboptimal	**O**	**S**	**O**	**S**	**O**	**S**	**O**	**S**	**O**	**S**	**O**	**S**	**O**	**S**	**O**	**S**	**O**	**S**
FWP Tier I fish species	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
FWP Tier II or **Native Game** fish species	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
FWP Tier III or **Introduced Game** fish	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
FWP Non-Game Tier IV or **No** fish species	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

Sources used for identifying fish spp. potentially found in AA: _____

ii. Modified Rating: NOTE: Modified score cannot exceed 1.0 or be less than 0.1.

a) Is fish use of the AA significantly reduced by a culvert, dike, or other man-made structure or activity, ***or*** *is the waterbody included on the current final MDEQ list of waterbodies in need of TMDL development with listed "Probable Impaired Uses" including cold or warm water fishery or aquatic life support,* ***or*** *do aquatic nuisance plant or animal species (see* ***Appendix E****) occur in fish habitat?* ☐ **YES**, reduce score in **i** by 0.1 = __ or ☒ **N0**

b) Does the AA contain a documented spawning area or other critical habitat feature (i.e., sanctuary pool, upwelling area; specify in comments) for native fish or introduced game fish? ☐ **YES**, add to score in **i** or **iia** 0.1 = __ or ☒ **N0**

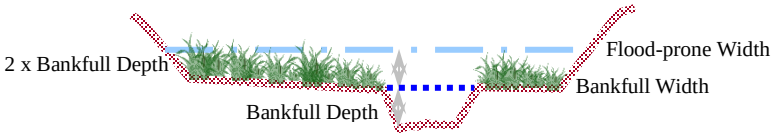
iii. Final Score and Rating: _ **Comments:** _____

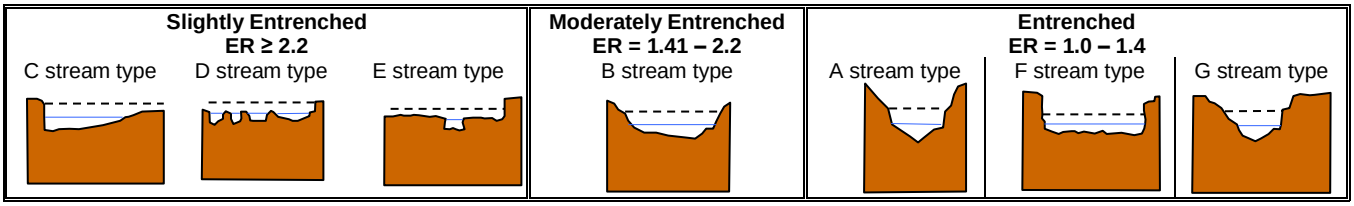
14E. FLOOD ATTENUATION ☐ **NA** (proceed to 14F)

Applies only to wetlands that are subject to flooding via in-channel or overbank flow.
If wetlands in AA are not flooded from in-channel or overbank flow, check the NA box and proceed to 14F.

Entrenchment Ratio (ER) Estimation (see manual for additional guidance). Entrenchment ratio = (flood-prone width) / (bankfull width).
Flood-prone width = estimated horizontal projection of where 2 X maximum bankfull depth elevation intersects the floodplain on each side of the stream.

_____ / _____ = _____
flood prone width / bankfull width = entrenchment ratio





i. Rating: Working from top to bottom, use the matrix below to select the functional point and rating.

Estimated or Calculated Entrenchment (Rosgen 1994, 1996)	☐ Slightly Entrenched C, D, E stream types			☒ Moderately Entrenched B stream type			☐ Entrenched A, F, G stream types		
Percent of Flooded Wetland Classified as Forested and/or Scrub/Shrub	☐ 75%	☐ 25-75%	☐ <25%	☐ 75%	☐ 25-75%	☒ <25%	☐ 75%	☐ 25-75%	☐ <25%
AA contains **no outlet or restricted outlet**	---	---	---	---	---	.5M	---	---	---
AA contains **unrestricted outlet**	---	---	---	---	---	---	---	---	---

ii. Are ≥10 acres of wetland in the AA subject to flooding AND are man-made features which may be significantly damaged by floods located within 0.5 mile downstream of the AA? ☐ YES ☒ NO **Comments:** AA subject to periodic flooding from Bighorn River

Wetland/Site #(s): Tunnicliff

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 the NA box and proceed to 14G.

i. Rating: Working from top to bottom, use the matrix below to select the functional point and rating. Abbreviations for surface water durations are as follows: P/P = permanent/perennial; S/I = seasonal/intermittent; and T/E = temporary/ephemeral [see manual for further definitions of these terms].

Estimated Maximum Acre Feet of Water Contained in Wetlands within the AA that are Subject to Periodic Flooding or Ponding	☐ **>5 acre feet**			☒ **1.1 to 5 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**	---	---	---	---	.6M	---	---	---	---
Wetlands in AA flood or pond **< 5 out of 10 years**	---	---	---	---	---	---	---	---	---

Comments: 3.86 acres of wetlands have developed as of 2017

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

Applies to wetland with potential to receive 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 the NA box and proceed to 14H.

i. Rating: Working from top to bottom, use the matrix below to select the functional point and rating.

Sediment, Nutrient, and Toxicant Input Levels within AA	**AA receives or surrounding land use has potential to deliver sediments, nutrients, or compounds at levels such that other functions are not substantially impaired. Minor sedimentation, sources of nutrients or toxicants, or signs of eutrophication present.**				**Waterbody is 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 / Ponding in AA	☐ **Yes**	☐ **No**	☒ **Yes**	☐ **No**	☐ **Yes**	☐ **No**	☐ **Yes**	☐ **No**
AA contains **no or restricted outlet**	---	---	.7M	---	---	---	---	---
AA contains **unrestricted outlet**	---	---	---	---	---	---	---	---

Comments: _____

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

Applies only if AA occurs on or within the banks of a river, stream, or other natural or man-made drainage, or on the shoreline of a standing water body which is subject to wave action.
If 14H does not apply, check the NA box and proceed to 14I.

% Cover of Wetland Streambank or Shoreline by Species with Stability Ratings of ≥6 (see Appendix F).	**Duration of Surface Water Adjacent to Rooted Vegetation**		
	☐ **Permanent / Perennial**	☐ **Seasonal / Intermittent**	☐ **Temporary / Ephemeral**
☐ **≥ 65%**	---	---	---
☐ **35-64%**	---	---	---
☐ **< 35%**	---	---	---

Comments: _____

14I. PRODUCTION EXPORT / FOOD CHAIN SUPPORT

i. Level of Biological Activity: Synthesis of wildlife and fish habitat rates (select).

General Fish Habitat Rating (14Diii)	**General Wildlife Habitat Rating (14Ciii)**		
	☐ **E/H**	☒ **M**	☐ **L**
☐ **E/H**	---	---	---
☐ **M**	---	---	---
☐ **L**	---	---	---
☒ **NA**	---	M	---

ii. Rating: Working from top to bottom, use the matrix below to select the functional point and rating. Factor A = acreage of vegetated wetland component in the AA; Factor B = level of biological activity rating from above (14Ii); Factor C = whether or not the AA contains a surface or subsurface outlet; the final three rows pertain to the duration of surface water in the AA, where P/P, S/I, and T/E were previously defined, and A = "absent" [see manual for further definitions of these terms].

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	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**
P/P	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
S/I	---	---	---	---	---	---	---	---	---	.3L	---	---	---	---	---	---	---	---
T/E/A	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

Wetland/Site #(s): Tunnicliff

14I. PRODUCTION EXPORT / FOOD CHAIN SUPPORT (continued)

iii. Modified Rating: Note: Modified score cannot exceed 1.0 or be less than 0.1.

Vegetated Upland Buffer: Area with ≥ 30% plant cover, ≤ 15% noxious weed or ANVS cover, AND that is not subjected to periodic mechanical mowing or clearing (unless for weed control).
Is there an average ≥ 50-foot wide vegetated upland buffer around ≥ 75% of the AA's perimeter? ☒ **YES**, add 0.1 to score in **ii** = ___ ☐ **NO**

iv. Final Score and Rating: .4M **Comments:**

14J. GROUNDWATER DISCHARGE / RECHARGE
Check the appropriate indicators in i and ii below.

i. Discharge Indicators
- ☐ The AA is a slope wetland.
- ☒ Springs or seeps 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.
- ☐ Shallow water table and the site is saturated to the surface.
- ☐ Other: _____

ii. Recharge Indicators
- ☒ Permeable substrate present without underlying impeding layer.
- ☐ Wetland contains inlet but no outlet.
- ☐ Stream is a known 'losing' stream. Discharge volume decreases.
- ☐ Other: _____

iii. Rating: Use the information from i and ii above and the table below to select the functional point and rating.

Criteria	Duration of Saturation at AA Wetlands ***FROM GROUNDWATER DISCHARGE*** or ***WITH WATER THAT IS RECHARGING THE GROUNDWATER SYSTEM***			
	☐ **P/P**	☒ **S/I**	☐ **T**	☐ **None**
☒ **Groundwater Discharge or Recharge**	---	.7M	---	---
☐ **Insufficient Data/Information**	---			

Comments: The site was designed to have shallow excavations that utilize a high groundwater table as the primary source of wetland hydrology.

14K. UNIQUENESS

i. Rating: Working from top to bottom, use the matrix below to select the functional point and rating.

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 (#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 ☐ NA (proceed to Overall Summary and Rating page)
Affords 'bonus' points if AA provides a recreational or educational opportunity.

i. Is the AA a known or potential recreational or educational site? ☒ **YES**, go to ii. ☐ **NO**, check the NA box.

ii. Check categories that apply to the AA: ☒ Educational/Scientific Study ☐ Consumptive Recreational ☐ Non-consumptive recreational ☐ Other: _____

iii. Rating: Use the matrix below to select the functional point and rating.

Known or Potential Recreational or Educational Area	Known	Potential
Public ownership or public easement with general public access (no permission required)	.2H	---
Private ownership with general public access (no permission required)	---	---
Private or public ownership without general public access, or requiring permission for public access	---	---

Comments: _____

15. GENERAL SITE NOTES: _____

Wetland/Site #(s): Tunnicliff

Function & Value Variables	Rating – Actual Functional Points	Possible Functional Points	Functional Units: Actual Points x Estimated AA Acreage	Indicate the Four Most Prominent Functions with an Asterisk
A. Listed / Proposed T&E Species Habitat	low 0.00	1.00	0	
B. MT Natural Heritage Program Species Habitat	low 0.10	1.00	0.4	
C. General Wildlife Habitat	mod 0.40	1.00	1.5	
D. General Fish Habitat	NA	NA	0	
E. Flood Attenuation	mod 0.50	1.00	1.9	
F. Short and Long Term Surface Water Storage	mod 0.60	1.00	2.3	*
G. Sediment / Nutrient / Toxicant Removal	mod 0.70	1.00	2.7	*
H. Sediment / Shoreline Stabilization	NA	NA	0	
I. Production Export / Food Chain Support	mod 0.40	1.00	1.5	*
J. Groundwater Discharge / Recharge	mod 0.70	1.00	2.7	*
K. Uniqueness	mod 0.40	1.00	1.5	
L. Recreation / Education Potential (bonus point)	high 0.20		0.8	
Total Points	**4.0**	**9**	**15.3 Total Functional Units**	
Percent of Possible Score 44% (round to nearest whole number)				

Category I Wetland: (must satisfy **one** of the following criteria; otherwise go 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 possible score > 80% (round to nearest whole #).

Category II Wetland: (Criteria for Category I not satisfied **and** meets any **one** of the following criteria; otherwise go to Category IV)
- ☐ Score of 1 functional point for MT Natural Heritage Program Species Habitat; **or**
- ☐ Score of .9 or 1 functional point for General Wildlife Habitat; **or**
- ☐ Score of .9 or 1 functional point for General Fish 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 possible score > 65% (round to nearest whole #).

☒ **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 go to Category III)
- ☐ "Low" rating for Uniqueness; **and**
- ☐ Vegetated wetland component < 1 acre (do not include upland vegetated buffer); **and**
- ☐ Percent of possible score < 35% (round to nearest whole #).

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

☐ **I** ☐ **II** ☒ **III** ☐ **IV**

APPENDIX C
PROJECT AREA PHOTOGRAPHS

MDT Wetland Mitigation Monitoring
JTX – Tunnicliff Ranch
Big Horn County, Montana

JTX Tunnicliff: Photo Point Photographs



Photo Point: 1 Location: East side of property
Bearing: 320 degrees Year: 2016



Photo Point: 1 Location: East side of property
Bearing: 320 degrees Year: 2017



Photo Point: 1 Location: East side of property
Bearing: 270 degrees North Year: 2016



Photo Point: 1 Location: East side of property
Bearing: 270 degrees North Year: 2017



Photo Point: 1 Location: East side of property
Bearing: 220 degrees Year: 2016



Photo Point: 1 Location: East side of property
Bearing: 220 degrees Year: 2017

JTX Tunnicliff: Photo Point Photographs



Photo Point: 2 Location: South side of property
Bearing: 315 degrees Year: 2016



Photo Point: 2 Location: South side of property
Bearing: 315 degrees Year: 2017



Photo Point: 2 Location: South side of property
Bearing: 0 degrees Year: 2016



Photo Point: 2 Location: South side of property
Bearing: 0 degrees Year: 2017



Photo Point: 2 Location: South side of property
Bearing: 45 degrees Year: 2016



Photo Point: 2 Location: South side of property
Bearing: 45 degrees Year: 2017

JTX Tunnicliff: Photo Point Photographs



Photo Point: 3 Location: West side of property
Bearing: 140 degrees Year: 2016



Photo Point: 3 Location: West side of property
Bearing: 140 degrees Year: 2017



Photo Point: 3 Location: West side of property
Bearing: 100 degrees Year: 2016



Photo Point: 3 Location: West side of property
Bearing: 100 degrees Year: 2017



Photo Point: 3 Location: West side of property
Bearing: 45 degrees Year: 2016



Photo Point: 3 Location: West side of property
Bearing: 45 degrees Year: 2017

JTX Tunnicliff: Photo Point Photographs



Photo Point: 4 Location: North side of property
Bearing: 105 degrees Year: 2016



Photo Point: 4 Location: North side of property
Bearing: 105 degrees Year: 2017



Photo Point: 4 Location: North side of property
Bearing: 160 degrees Year: 2016



Photo Point: 4 Location: North side of property
Bearing: 160 degrees Year: 2017



Photo Point: 4 Location: North side of property
Bearing: 240 degrees Year: 2016



Photo Point: 4 Location: North side of property
Bearing: 160 degrees Year: 2017

JTX Tunnicliff: Photo Point Photographs



Transect 1: Start
Bearing: 200 degrees
Location: SE corner of property
Year: 2016



Transect 1: Start
Bearing: 200 degrees
Location: SE corner of property
Year: 2017



Transect 1: End
Bearing: 50 degrees
Location: SE corner of property
Year: 2016



Transect 1: End
Bearing: 50 degrees
Location: SE corner of property
Year: 2017



Transect 2: Start
Bearing: 330 degrees
Location: West side of property
Year: 2016



Transect 2: Start
Bearing: 330 degrees
Location: West side of property
Year: 2017

JTX Tunnicliff: Transect and Data Point Photographs



Transect 2: End
Bearing: 160 degrees
Location: West side of property
Year: 2016



Transect 2: End
Bearing: 160 degrees
Location: West side of property
Year: 2017



DP-1W
Year: 2017
Location: Cell 4



DP-1U
Year: 2017
Location: Dry Slope Cell 4

JTX Tunnicliff: Photo Point Panoramic Photographs



Photo Point 1 Pano; Year 2017



Photo Point 2 Pano; Year 2017



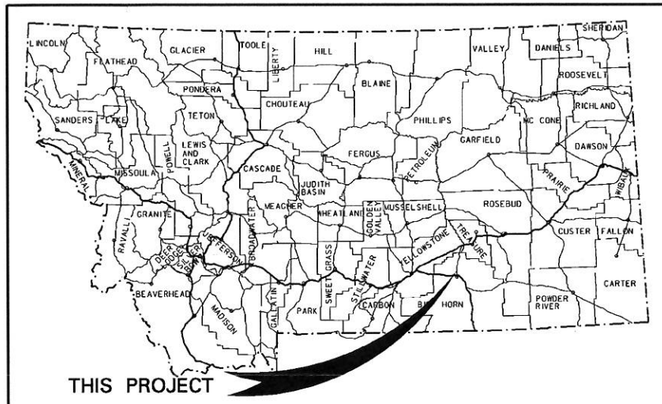
Photo Point 3 Pano; Year 2017



Photo Point 4 Pano; Year 2017

APPENDIX D
PROJECT PLAN SHEETS

MDT Wetland Mitigation Monitoring
JTX – Tunnicliff Ranch
Big Horn County, Montana

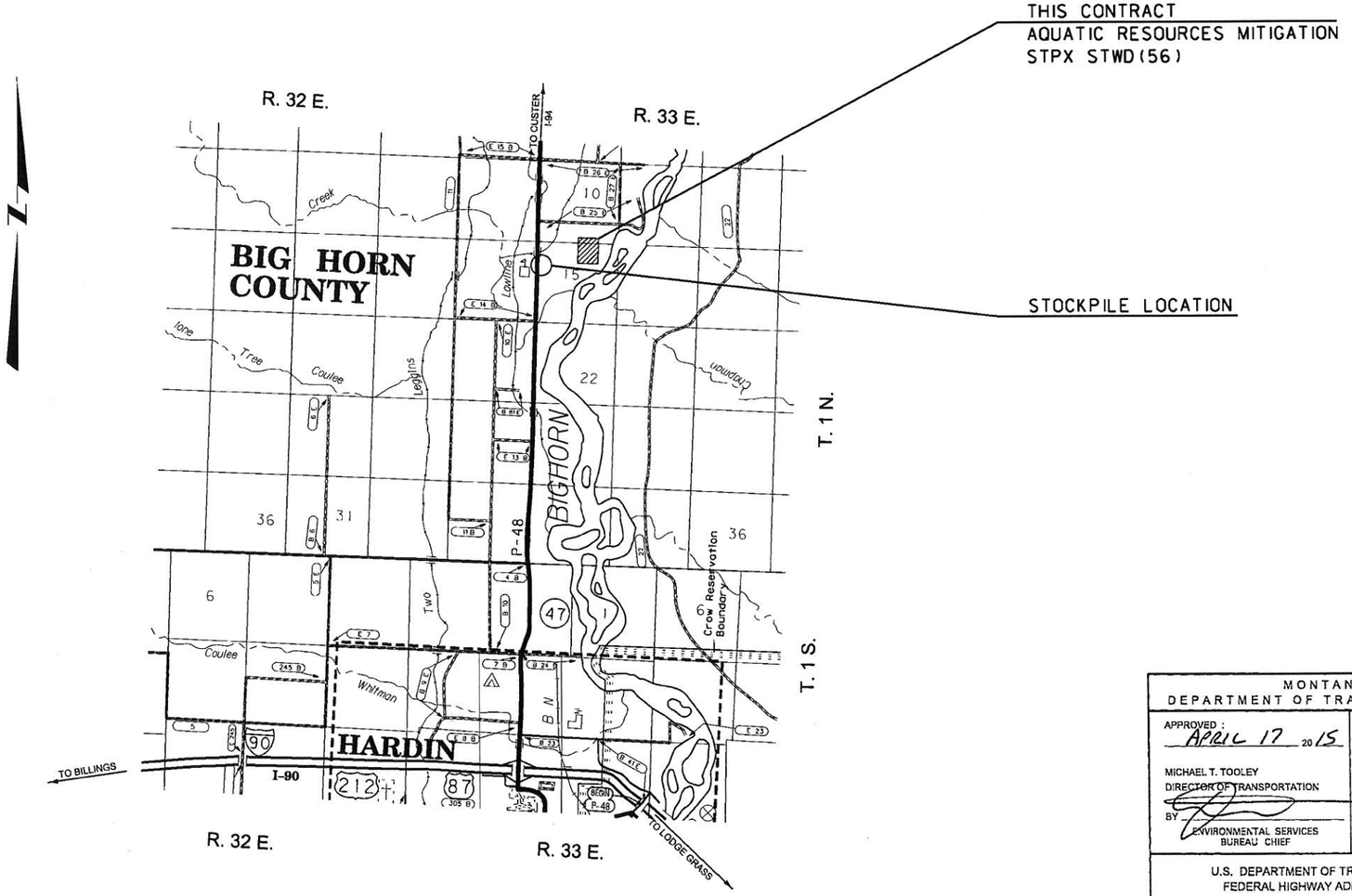


MONTANA DEPARTMENT OF TRANSPORTATION

FEDERAL AID PROJECT NO. STPX STWD(56)

WS #14 – AQUATIC MITIGATION

BIG HORN COUNTY



ASSOCIATED PROJECT AGREEMENT NUMBERS	
R / W & I.C.	STPX STWD(302)
P. E.	STPX STWD(56)

MONTANA DEPARTMENT OF TRANSPORTATION

APPROVED : APRIL 17 20 15

MICHAEL T. TOOLEY
DIRECTOR OF TRANSPORTATION

BY _____
ENVIRONMENTAL SERVICES BUREAU CHIEF

MONTANA REGISTERED PROFESSIONAL ENGINEER
THOMAS S. MARTIN 11228PE

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

APPROVED : _____
DIVISION ADMINISTRATOR — DATE

3	MDT MONTANA DEPARTMENT OF TRANSPORTATION	c:\dgn\7286000enttl001.dgn	DESIGNED BY	WADE SALYARDS, PE	3/18/2015	WETLAND PLANS
2		5/6/2015	REVIEWED BY			
1		1:25:01 PM CPS - U2623	CHECKED BY			UPN NUMBER 7286000

TABLE OF CONTENTS

ROAD PLANS	SHEET NO.
TITLE SHEET	1
TABLE OF CONTENTS	2
NOTES	2
LEVEL DATA	2
CONTROL DIAGRAM	3
CONTROL ABSTRACT	3
SUMMARIES	4-5
GRADING	4
SURFACING	4
TOPSOIL AND SEEDING	4
ABANDON WELL	4
CULVERTS	5
CULVERT SUMMARY RECAP	5
FENCING	5
CLEARING AND GRUBBING	5
DETAILS	6-15
SITE PLAN	6
SEEDING AND REVEGETATION PLAN	7
STOCKPILE LOCATION	8
STOCKPILE APPROACH DETAIL	9
STAKEOUT POINTS WL-1 & WL-2	10
STAKEOUT POINTS WL-3 & WL-4	11
STAKEOUT POINTS WL-5, WL-6 & WL-7	12
STAKEOUT POINTS WL-8 & WL-9	13
STAKEOUT POINTS WL-10 & WL-11	14
STAKEOUT POINTS WL-12, WL-13 & BM-1	15

NOTES

UTILITIES

CALL THE UTILITIES UNDERGROUND LOCATION CENTER (811) OR OTHER NOTIFICATION SYSTEM FOR THE MARKING AND LOCATION OF ALL LINES AND SERVICE BEFORE EXCAVATING. ALL CLEARANCES OR DEPTHS PROVIDED FOR UTILITIES ARE FROM EXISTING GROUND LINE.

WETLANDS

WETLANDS EXIST ADJACENT TO THE PROJECT AND MAY EXIST BEYOND THE PROJECT LIMITS. WETLAND AREAS WITHIN THE PROJECT LIMITS HAVE BEEN DELINEATED AND ARE SHOWN ON THE PLANS. NO PERMITS HAVE BEEN OBTAINED FOR WORK OUTSIDE OF THE PROJECT CONSTRUCTION LIMITS. ANY ACTION IMPACTING WETLAND AREAS OUTSIDE OF THE PERMANENT IMPACT AREAS SHOWN IS THE RESPONSIBILITY OF THE CONTRACTOR.



DELINEATED WETLAND AREAS

WETLAND DELINEATION TABLE

WETLAND DESIGNATION	WETLAND AREA (ACRES)		REMARKS
	DELINEATED AREA	IMPACTED AREA (PERM.)	
EWL-1	0.01	0.00	
EWL-2	0.04	0.00	
TOTAL	0.05	0.00	

** TEMPORARY WETLAND IMPACTS ASSOCIATED WITH CONTRACTOR OPERATIONS ARE TO BE PERMITTED BY CONTRACTOR.

MONITOR WELLS

SEE SITE PLAN FOR LOCATIONS OF MONITOR WELLS ON THE PROJECT. DO NOT DISTURB ON-SITE MONITOR WELLS UNLESS NOTED OTHERWISE . WELLS THAT ARE ABANDONED AND THEN REPLACED ARE NOT MEASURED FOR PAYMENT. (SEE SPECIAL PROVISIONS)

DESIGN CHANGES

ANY DESIGN CHANGES MADE DURING CONSTRUCTION MUST BE APPROVED BY THE MDT AQUATIC MITIGATION ENGINEER (406-444-7273)

SOILS INFORMATION

SOILS INFORMATION IS INCLUDED WITH THE SPECIAL PROVISIONS FOR THIS PROJECT.

PERMANENT APPROACHES - COUNTY ROAD & STOCKPILE

CONSTRUCT APPROACHES TO A 48' FINISHED TOP ON A 58' SUBGRADE UNLESS NOTED OTHERWISE IN THE PLANS.

PROVIDE THE FOLLOWING SURFACING:
0.75' CRUSHED AGGREGATE COURSE

TEMPORARY ACCESS ROAD

PROVIDE A TEMPORARY ACCESS ROAD TO ENSURE ADEQUATE CAPACITY AND WIDTH FOR EQUIPMENT ACCESS TO AND FROM THE SITE. SEE SPECIAL PROVISIONS.

SURVEY DATA

DTM FILES FORMATTED FOR TRIMBLE, LEICA AND TOPCON SURVEY CONTROLLERS ARE AVAILABLE UPON REQUEST. MDT DOES NOT GUARANTEE THE ACCURACY AND COMPLETENESS OF THE SUPPLIED DTM FILES. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO ENSURE THAT THE FINISHED GRADES MATCH THE GRADES AND ELEVATIONS INDICATED IN THE PLANS.
CONTACT THE MDT AQUATIC MITIGATION ENGINEER (406-444-7273)

DO NOT DISTURB

DO NOT DISTURB EXISTING WETLANDS, EXISTING IRRIGATION SUPPLY DITCHES AND MONITORING WELLS UNLESS NOTED OTHERWISE.

HIGH GROUNDWATER ELEVATIONS

HIGH GROUNDWATER ELEVATIONS SHOWN ON THE PLANS ARE BASED ON MONITORING WELL DATA AND ARE FOR INFORMATIONAL PURPOSES ONLY. THE CONTRACTOR IS RESPONSIBLE FOR INTERPRETING THE GROUNDWATER DATA AND DETERMINING THE PROBABLE GROUNDWATER ELEVATION FOR THE TIME PERIOD OF CONSTRUCTION. (SEE SPECIAL PROVISIONS)

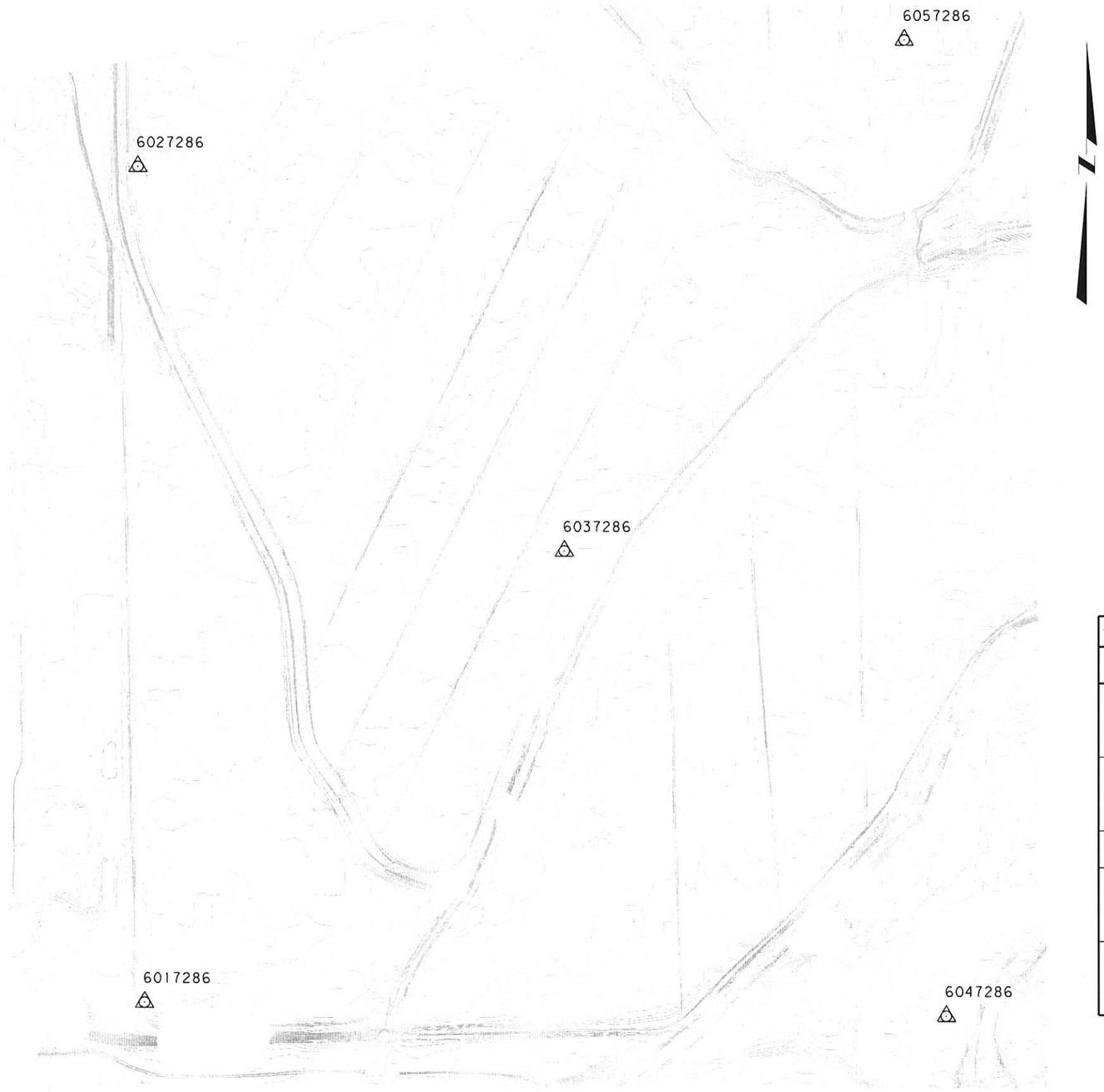
LEVEL DATA

BEARING SOURCE

GRID -- MONTANA COORDINATE SYSTEM NAD83-2011.
THE HARDIN - NORTH (NORTH SECTION) PROJECT NO. STPP 48-1(31)2 IS ON A SEPARATE AND DIFFERENT COORDINATE SYSTEM.

LEVEL DATUM SOURCE

NAVD88 (GNSS DERIVED ELEVATIONS USING GEOID 12 AND HOLDING BMS BIL1A, V487, WR28, AND Z487



CONTROL DIAGRAM

SCALE: N/A

NOTE:
THIS PROJECT IS ON THE MONTANA COORDINATE SYSTEM NAD83-2011.
NORTHING AND EASTING COORDINATES ARE EXPRESSED IN UNITS OF INTERNATIONAL FEET AND ELEVATIONS ARE IN UNITS OF U.S. SURVEY FEET.

DIMENSIONS SHOWN ON THE PLANS ARE GRID. ALL SURVEY AND STAKING REQUIRE THE USE OF A COMBINATION SCALE FACTOR (CSF) TO CONVERT GRID DIMENSIONS TO GROUND DIMENSIONS (GRID DISTANCE / CSF = GROUND DISTANCE).
THE CSF FOR THIS PROJECT IS 0.99946705.

CONTROL ABSTRACT

POINT NAME/NUMBER	N OR Y COORDINATE	E OR X COORDINATE	POINT ELEVATION	LOCATION AND DESCRIPTION
6017286	584,661.165	2,452,173.344	2837.83	SET A 2 INCH ALUMINUM CAP ON A 5/8 INCH BY 30 INCH REBAR FLUSH WITH GROUND STAMPED 6017286 2012 NORTH OF HARDIN, ACCESS AT MP 7.84 ON US HWY 47 0.35 MILES EAST ON GRANT MARSH ROAD 0.44 MILES SOUTH ON COTTONWOOD ROAD TO DRIVEWAY TO TWO STORY GREY HOUSE APPROX 200.0 FT EAST OF GREY HOUSE 24.2 FT EAST OF WITNESS POST IN N/S FENCE SET 26 MAR 2012
6027286	586,024.605	2,452,159.552	2836.55	SET A 2 INCH ALUMINUM CAP ON A 5/8 INCH BY 30 INCH REBAR FLUSH WITH GROUND STAMPED 6027286 2012 WALK IN ACCESS FROM POINT 6017286, SET IN NW CORNER OF PASTURE 33.0 FT EAST OF FENCE CORNER 9.0 FT SOUTH OF WITNESS POST IN E/W FENCE SET 26 MAR 2012
6037286	585,399.115	2,452,856.386	2836.88	SET A 2 INCH ALUMINUM CAP ON A 5/8 INCH BY 30 INCH REBAR FLUSH WITH GROUND STAMPED 6037286 2012 APPROX 1000.0 FT NE OF CONTROL POINT 6017286 IN CENTER OF PASTURE 3.2 FT EAST OF WITNESS POST SET 26 MAR 2012
6047286	584,642.907	2,453,479.262	2837.64	SET A 2 INCH ALUMINUM CAP ON A 5/8 INCH BY 30 INCH REBAR FLUSH WITH GROUND STAMPED 6047286 2012 ACCESS AT MP 7.84 ON US HWY 47 0.98 MILES EAST ON GRANT MARSH ROAD 0.54 MILES SOUTH ON FISHING ACCESS TO END OF ROAD APPROX 200.0 FT WEST OF END OF FISHING ACCESS ROAD 15.0 FT NORTH OF FENCE CORNER 15.0 FT NORTH OF E/W FENCE 3.6 FT WEST OF WITNESS POST IN N/S FENCE SET 26 MAR 2012
6057286	586,235.362	2,453,410.658	2835.13	SET A 2 INCH ALUMINUM CAP ON A 5/8 INCH BY 30 INCH REBAR FLUSH WITH GROUND STAMPED 6057286 2012 WALK IN ACCESS FROM POINT 6017286, SET IN NE CORNER OF PASTURE 7.7 FT SW OF WESTERN BRACE POST 25.0 FT WEST OF N/S FENCE 5.2 FT SOUTH OF WITNESS POST IN E/W FENCE SET 26 MAR 2012

SUMMARY

GRADING

STATION	cubic yards			REMARKS
	UNCL. EXC.	EXCESS EXC.	EMB.+	
	107,401			
			15	WETLAND BERM
			24,150	TOPSOIL REPLACEMENT - WETLAND & BERM AREAS
	30		220	FARM FIELD APP. - ACCESS ROAD
	30		420	FARM FIELD APP. - STOCKPILE ACCESS
			5	DITCH BLOCK - NW CORNER
TOTAL	107,461	# 82,651	# 24,810	

FOR INFORMATION ONLY

SURFACING

linear feet				FOR	AGGREGATE cubic yards			REMARKS
GROSS	NET	+	-		CR. TOP SURF. TY. B GR. 3	CRUSHED AGG. COURSE	TRAFFIC GRAVEL	
				COUNTY RD APPROACH		107		
				STOCKPILE APPROACH		218		
0.00	0.00	~	~		~	325	~	

TOPSOIL & SEEDING

FOR	cubic yards	acres SEED			lump sum		REMARKS
	TOPSOIL SALVAGING & PLACING	WETLAND SEEDING - UPLAND	WETLAND SEEDING - WETLAND	SUPPLEMENTAL WETLAND MIX #	REVEGETATION	TREE & SHRUB PLANTING	
WETLAND CELLS & BERM AREAS	24,150					1.0	SALVAGE TOPSOIL TO DEPTH OF 0.5 FT.
STOCKPILE					1.0		INCLUDES MULCH
SEEDING AT ELEV. 2832 & LOWER			4.7	4.7			
SEEDING BETWEEN ELEV. 2832 & ELEV. 2835.5			22.1				
SEEDING ABOVE ELEV. 2835.5		1.1					
TOTAL	24,150	1.1	26.8	~	1.0	1.0	

FOR INFORMATION ONLY - INCLUDED IN OTHER ITEMS

ABANDON WELL

ABANDON WELL	REMARKS
EACH	
5	Project Site

SUMMARY

CULVERTS (INCLUDED IN CULVERT SUMMARY RECAP)

LOCATION	BASIC BID ITEMS		PIPE OPTIONS in			END SECTIONS		linear feet	SKEW ANGLE	CULVERT IN PL. in x ft	REMARKS
	CULVERT PIPE in	linear feet LENGTH OF PIPE	STEEL - 2 2/3 x 1/2 CORR. CONCRETE ALUMINUM - 2 2/3 x 1/2 CORR.	CLASS OR THK.	COATING #	LEFT	RIGHT	HEIGHT OF COVER			
COUNTY ROAD APPROACH	18	68	18 CSP 18 RCP 18 CAP	0.079 CL. 3 0.075	NONE NONE NONE	FETS FETS FETS	FETS FETS FETS	1.5			
STOCKPILE ACCESS APPROACH	18	68	18 RCP	CL. 3	NONE	SQ.	SQ.	0.5			
TOTAL	~	~	~	~	~	~	~	~	~	~	

FENCING

LOCATION	linear feet			each			linear feet		REMARKS
	FARM FENCE TYPE F5W	FENCE SPECIAL DESIGN	FENCE WILDLIFE FRIENDLY FW	FARM FENCE PANEL SINGLE	FARM FENCE PANEL DOUBLE	DEADMAN	FARM GATE TYPE G2	FARM GATE TYPE G3	
WETLAND AREA			2,977.3	5	3	1	16		SOUTH AND EAST SIDE ONLY
WETLAND AREA	2,972.7			4		1	16		NORTH AND WEST SIDE ONLY
ACCESS ROAD	1,041.8			7	1			*16	
STOCKPILE APPROACH	66.2			*2			*16		
EXCLOSURES		5,100.0							
TOTAL	4,080.7	5,100.0	2,977.3	18	4	2	48	16	

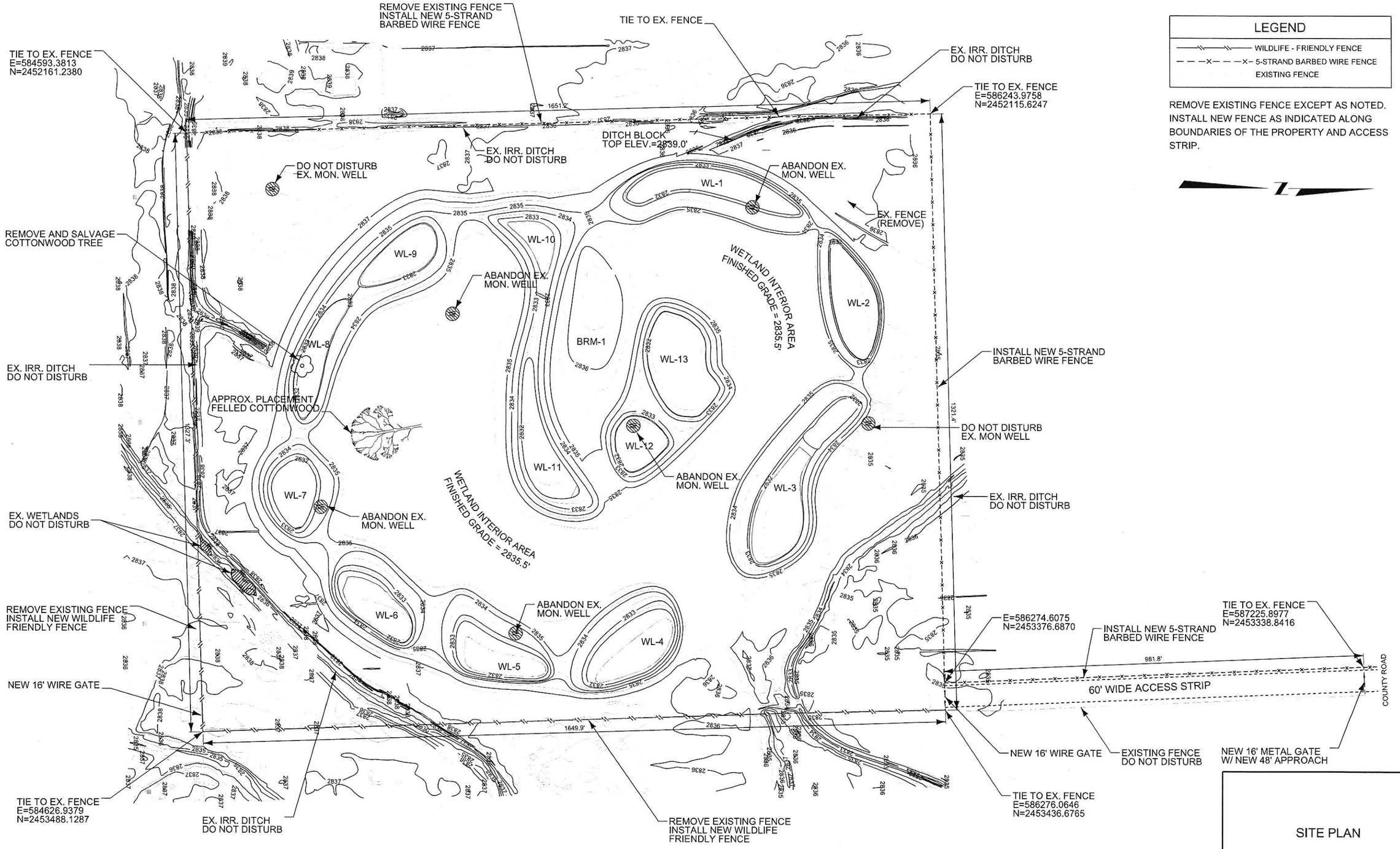
* INSTALL WHEN HAULING IS COMPLETE

CULVERT SUMMARY RECAP

BASIC BID	linear feet NEW PIPE (TOTAL)
18"	68
18" RCP CL 3	68
TOTAL	~

CLEARING & GRUBBING

STATION FROM	STATION TO	acres CLEARING AND GRUBBING	REMARKS
		31.7	Project Site
TOTAL		31.7	



LEGEND
WILDLIFE - FRIENDLY FENCE
5-STRAND BARBED WIRE FENCE
EXISTING FENCE

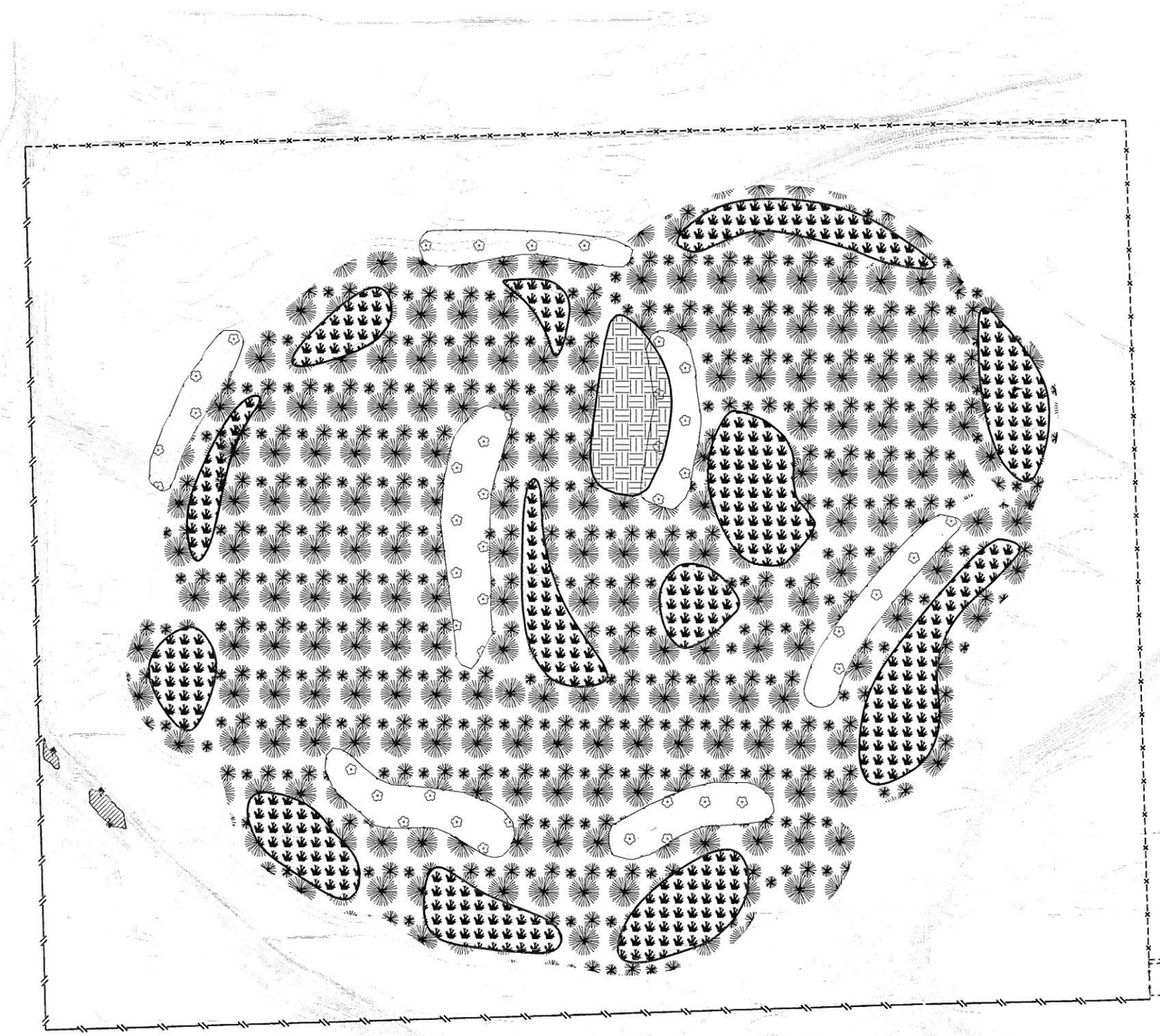
REMOVE EXISTING FENCE EXCEPT AS NOTED. INSTALL NEW FENCE AS INDICATED ALONG BOUNDARIES OF THE PROPERTY AND ACCESS STRIP.

NOTE: ENSURE PROPERTY BOUNDARIES ARE FENCED TO PREVENT THE NEIGHBORING LIVESTOCK FROM ACCESSING THE PROJECT SITE.

SITE PLAN

NO SCALE

3	MDT MONTANA DEPARTMENT OF TRANSPORTATION	c:\dgn\7286000enpln001.dgn	DESIGNED BY	WADE SALYARDS, PE	3/18/2015	WETLAND PLANS	WS #14 AQUATIC MITIGATION / PROJECT NO. STPX STWD (56)
2		6/10/2015	REVIEWED BY				CSF = 0.99946705 / UPN 7286000 / SHEET 6 OF 15
1		11:36:43 AM CPS - U2623	CHECKED BY			BIG HORN COUNTY	



WETLAND AND SUPPLEMENTAL WETLAND MIX
4.725 ACRES

WETLAND MIX
22.126 ACRES

UPLAND SEED MIX
1.102 ACRES

TREE & SHRUB PLANTING AREAS (SEEDING ALSO INCLUDED IN THIS AREA) (EXCLOSURES) *
2.725 ACRES

DELINEATED WETLAND AREAS

*NOTE: THE PERIMETER OF THE EXCLOSURES SHOWN ARE APPROXIMATE LOCATIONS. THE FINAL BOUNDARIES WILL BE MARKED IN THE FIELD BY THE PM/BOTANIST. EXCLOSURES TO BE ERECTED IN THE SPRING DURING TREE AND SHRUB PLANTING.

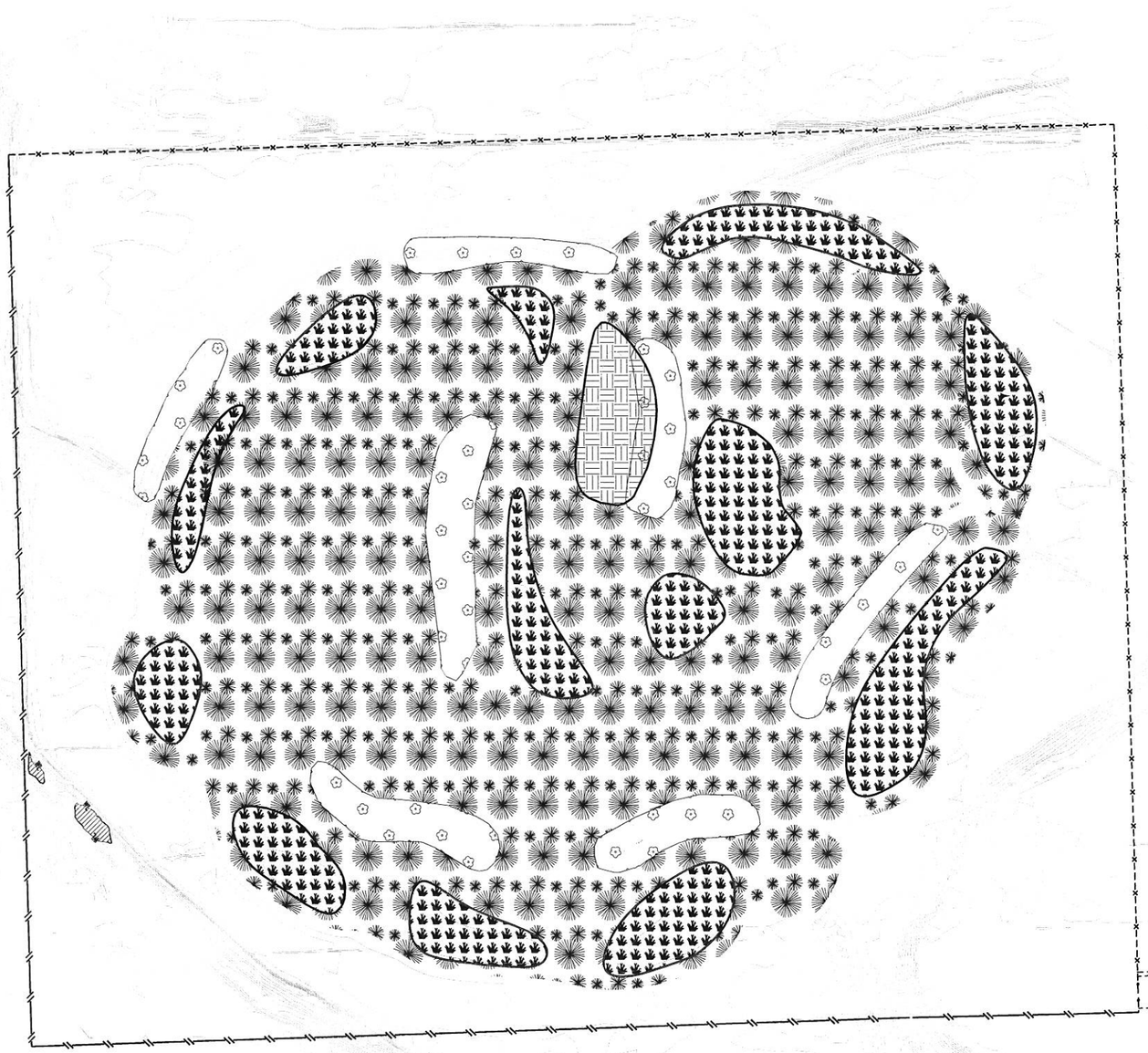
NOTE: REVEGETATE AND RE-SEED AREAS DISTURBED OUTSIDE THE CONSTRUCTION LIMITS.

N

SEEDING AND REVEGETATION PLAN

(NO SCALE)

3	MDT MONTANA DEPARTMENT OF TRANSPORTATION	c:\dgn\7286000enpln001.dgn	DESIGNED BY	LOUISE STONER	12/22/2014	WETLAND PLANS	WS #14 AQUATIC MITIGATION	PROJECT NO. STPX STWD (56)
2		6/10/2015	REVIEWED BY	WADE SALYARDS, PE	3/18/2015		CSF = 0.99946705 / UPN 7286000	SHEET 7 OF 15
1		11:36:48 AM CPS - U2623	CHECKED BY			BIG HORN COUNTY		



WETLAND AND SUPPLEMENTAL WETLAND MIX
4.725 ACRES

WETLAND MIX
22.126 ACRES

UPLAND SEED MIX
1.102 ACRES

TREE & SHRUB PLANTING AREAS (SEEDING ALSO INCLUDED IN THIS AREA)
(EXCLOSURES) *
2.725 ACRES

DELINEATED WETLAND AREAS

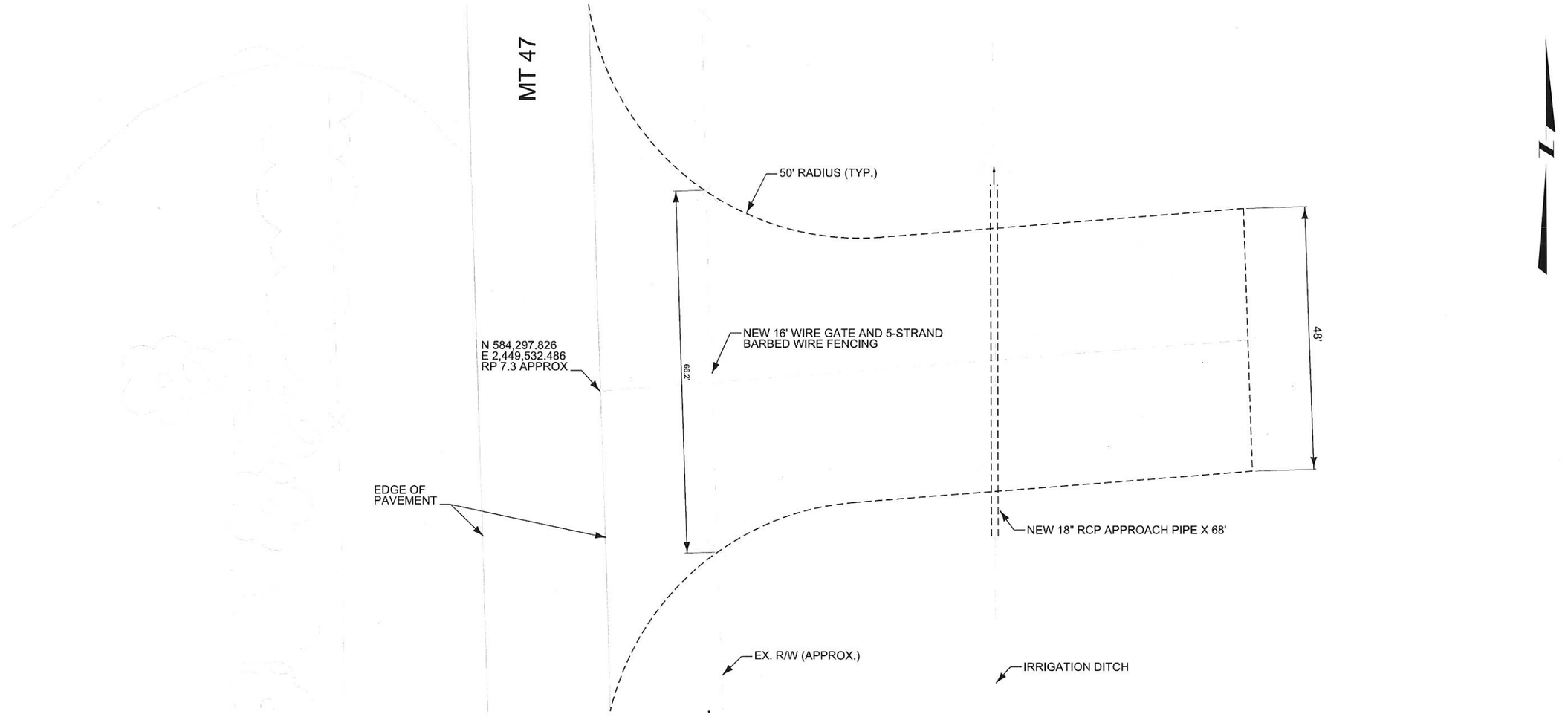
*NOTE: THE PERIMETER OF THE EXCLOSURES SHOWN ARE APPROXIMATE LOCATIONS.
THE FINAL BOUNDARIES WILL BE MARKED IN THE FIELD BY THE PM/BOTANIST.
EXCLOSURES TO BE ERECTED IN THE SPRING DURING TREE AND SHRUB PLANTING.

NOTE: REVEGETATE AND RE-SEED AREAS DISTURBED OUTSIDE THE CONSTRUCTION LIMITS.

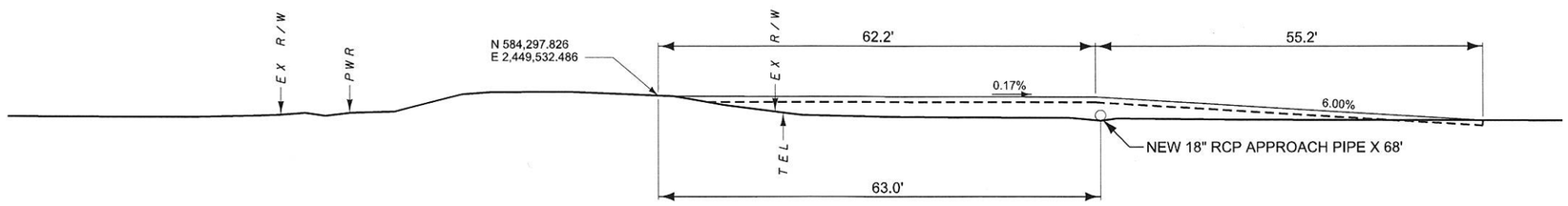
SEEDING AND
REVEGETATION PLAN

(NO SCALE)

3	MDT MONTANA DEPARTMENT OF TRANSPORTATION	c:\dgn\7286000enpln001.dgn	DESIGNED BY	LOUISE STONER	12/22/2014	WETLAND PLANS	WS #14 AQUATIC MITIGATION	PROJECT NO. STPX STWD (56)
2		6/10/2015	REVIEWED BY	WADE SALYARDS, PE	3/18/2015		CSF = 0.99946705 / UPN 7286000	SHEET 7 OF 15
1		11:36:48 AM CPS - U2623	CHECKED BY			BIG HORN COUNTY		



PLAN VIEW



SECTION VIEW

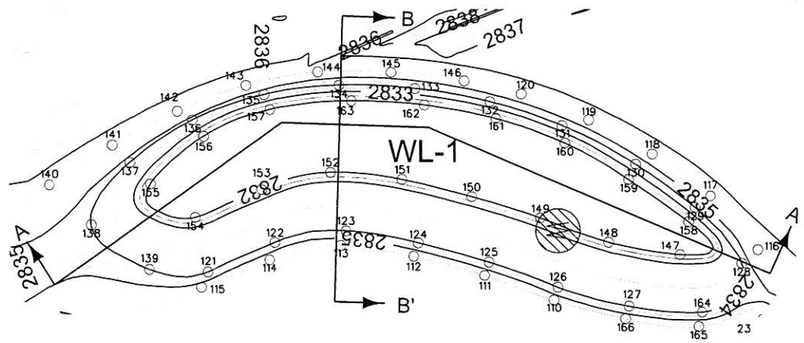
NOTE: STOCKPILE APPROACH LOCATION IS APPROXIMATELY AT RP 7.3 OR STATION 390+65 OF THE HARDIN-NORTH PROJECT (STPP 48-1(30)1).

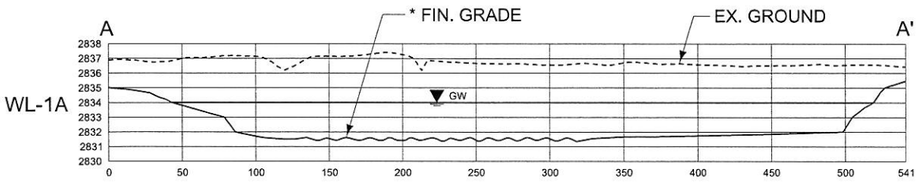
STOCKPILE SITE APPROACH DETAIL

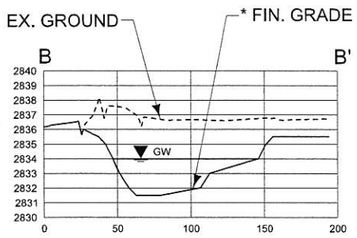
NO SCALE

3	MDT MONTANA DEPARTMENT OF TRANSPORTATION	c:\dgn\7286000enpln001.dgn	DESIGNED BY	LOUISE STONER	10/20/2014	WETLAND PLANS	WS #14 AQUATIC MITIGATION	PROJECT NO. STPX STWD (56)
2		6/10/2015	REVIEWED BY	WADE SALYARDS, PE	3/18/2015			
1		11:44:17 AM CPS - U2623	CHECKED BY			BIG HORN COUNTY	CSF = 0.99946705 UPN 7286000	SHEET 9 OF 15

NOTE: GW DESIGNATES DESIGN HIGH WATER ELEVATION.
FOR INFORMATIONAL PURPOSES ONLY.

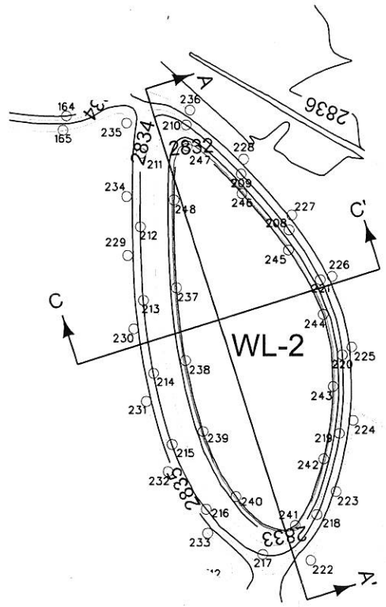


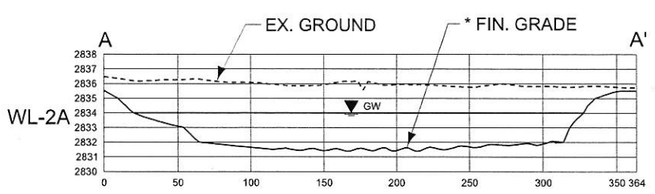


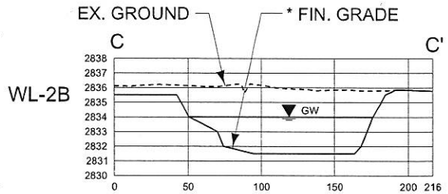


CELL WL-1 COORDINATES			
Point	North	East	Elevation
110	585,845.986	2,452,369.844	2,835.50
111	585,798.850	2,452,353.200	2,835.50
112	585,750.594	2,452,340.255	2,835.50
113	585,701.180	2,452,332.992	2,835.50
114	585,652.560	2,452,342.843	2,835.50
115	585,606.143	2,452,361.423	2,835.50
116	585,984.132	2,452,335.571	2,835.50
117	585,952.005	2,452,299.078	2,835.50
118	585,912.515	2,452,270.662	2,835.50
119	585,869.690	2,452,247.517	2,835.50
120	585,824.330	2,452,229.909	2,835.50
121	585,610.530	2,452,351.070	2,834.00
122	585,656.097	2,452,331.011	2,834.00
123	585,704.737	2,452,323.074	2,834.00
124	585,753.808	2,452,331.060	2,834.00
125	585,801.830	2,452,344.205	2,834.00
126	585,848.620	2,452,361.186	2,834.00
127	585,896.647	2,452,374.022	2,834.00
128	585,972.997	2,452,344.852	2,834.00
129	585,941.476	2,452,306.964	2,834.00
130	585,901.362	2,452,277.517	2,834.00
131	585,851.813	2,452,251.453	2,834.00
132	585,802.778	2,452,235.203	2,834.00
133	585,751.898	2,452,226.210	2,834.00
134	585,700.279	2,452,224.106	2,834.00
135	585,649.059	2,452,230.524	2,834.00
136	585,600.449	2,452,247.789	2,834.00
137	585,557.731	2,452,276.701	2,834.00
138	585,531.539	2,452,319.053	2,834.00
139	585,570.896	2,452,349.334	2,834.00

CELL WL-1 COORDINATES			
Point	North	East	Elevation
140	585,503.584	2,452,291.840	2,835.50
141	585,545.725	2,452,264.959	2,835.50
142	585,590.069	2,452,241.923	2,835.50
143	585,636.772	2,452,224.253	2,835.50
144	585,685.832	2,452,215.109	2,835.50
145	585,735.777	2,452,215.161	2,835.50
146	585,785.408	2,452,220.885	2,835.50
147	585,931.081	2,452,338.953	2,832.00
148	585,882.948	2,452,330.631	2,832.00
149	585,836.930	2,452,314.195	2,832.00
150	585,790.249	2,452,299.704	2,832.00
151	585,742.771	2,452,288.072	2,832.00
152	585,694.217	2,452,283.403	2,832.00
153	585,647.120	2,452,295.060	2,832.00
154	585,602.064	2,452,313.965	2,832.00
155	585,571.793	2,452,291.296	2,832.00
156	585,607.972	2,452,258.875	2,832.00
157	585,653.077	2,452,240.742	2,832.00
158	585,936.973	2,452,316.686	2,832.00
159	585,896.585	2,452,287.927	2,832.00
160	585,853.612	2,452,263.299	2,832.00
161	585,806.961	2,452,246.637	2,832.00
162	585,758.271	2,452,237.425	2,832.00
163	585,708.787	2,452,234.613	2,832.00
164	585,946.158	2,452,377.984	2,834.00
165	585,943.733	2,452,387.680	2,835.50
166	585,894.307	2,452,382.583	2,835.50







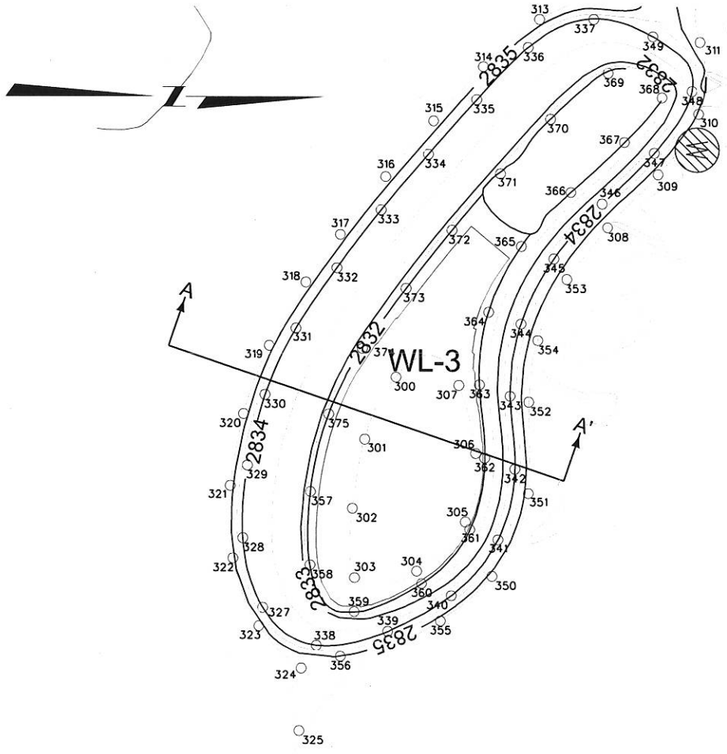
CELL WL-2 COORDINATES			
Point	North	East	Elevation
208	586,097.595	2,452,455.275	2,834.00
209	586,065.218	2,452,417.198	2,834.00
210	586,027.997	2,452,383.959	2,834.00
211	585,997.391	2,452,403.284	2,834.00
212	585,996.678	2,452,453.266	2,834.00
213	585,998.591	2,452,503.215	2,834.00
214	586,005.439	2,452,552.705	2,834.00
215	586,017.993	2,452,601.053	2,834.00
216	586,041.126	2,452,645.064	2,834.00
217	586,079.410	2,452,675.689	2,834.00
218	586,116.305	2,452,648.571	2,834.00
219	586,132.071	2,452,593.386	2,834.00
220	586,133.964	2,452,540.018	2,834.00
221	586,118.987	2,452,489.014	2,834.00
222	586,112.157	2,452,679.723	2,835.50
223	586,129.592	2,452,632.875	2,835.50
224	586,141.359	2,452,584.452	2,835.50

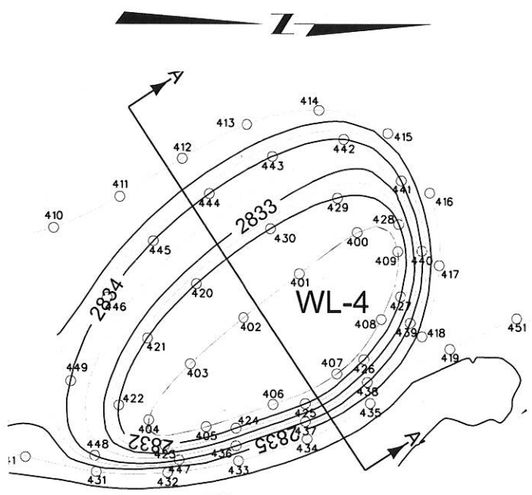
CELL WL-2 COORDINATES			
Point	North	East	Elevation
225	586,140.334	2,452,534.579	2,835.50
226	586,127.047	2,452,486.737	2,835.50
227	586,099.559	2,452,445.068	2,835.50
228	586,067.033	2,452,407.122	2,835.50
229	585,987.975	2,452,472.757	2,835.50
230	585,991.996	2,452,522.577	2,835.50
231	586,000.510	2,452,571.834	2,835.50
232	586,015.316	2,452,619.533	2,835.50
233	586,042.059	2,452,661.405	2,835.50
234	585,987.297	2,452,432.766	2,835.50
235	585,987.384	2,452,382.783	2,835.50
236	586,030.807	2,452,373.810	2,835.50
237	586,021.049	2,452,494.624	2,832.00
238	586,027.128	2,452,543.930	2,832.00
239	586,039.032	2,452,592.160	2,832.00
240	586,061.228	2,452,636.395	2,832.00
241	586,101.616	2,452,655.918	2,832.00
242	586,120.973	2,452,610.642	2,832.00
243	586,127.612	2,452,561.483	2,832.00
244	586,120.830	2,452,512.476	2,832.00
245	586,097.172	2,452,468.927	2,832.00
246	586,065.736	2,452,430.444	2,832.00
247	586,028.725	2,452,398.284	2,832.00
248	586,019.637	2,452,434.922	2,832.00

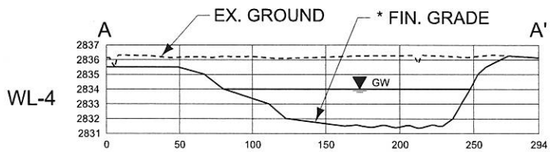
* FINISHED GRADE ELEVATIONS DO NOT INCLUDE TOPSOIL PLACEMENT. ROUGHEN AND UNDULATE THE BOTTOM.

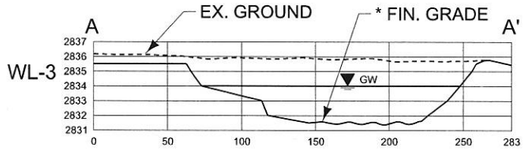
3	MDT MONTANA DEPARTMENT OF TRANSPORTATION	c:\dgn\7286000enplp001.dgn	DESIGNED BY	LOUISE STONER	10/24/2014	WETLAND PLANS	WS #14 AQUATIC MITIGATION	PROJECT NO. STPX STWD (56)
2		6/10/2015	REVIEWED BY	WADE SALYARDS, PE	3/18/2015			
1		11:44:52 AM CPS - U2623	CHECKED BY			BIG HORN COUNTY	CSF = 0.99946705 UPN 7286000	SHEET 10 OF 15

NOTE: GW DESIGNATES DESIGN HIGH WATER ELEVATION.
FOR INFORMATIONAL PURPOSES ONLY.









CELL WL-4 COORDINATES			
Point	North	East	Elevation
400	585,641.446	2,453,239.196	2,831.50
401	585,602.429	2,453,267.291	2,831.50
402	585,564.581	2,453,296.996	2,831.50
403	585,528.112	2,453,328.355	2,831.50
404	585,499.686	2,453,366.445	2,831.50
405	585,538.898	2,453,371.092	2,831.50
406	585,584.583	2,453,356.024	2,831.50
407	585,627.679	2,453,335.177	2,831.50
408	585,657.671	2,453,298.180	2,831.50
409	585,668.948	2,453,252.110	2,831.50
410	585,434.708	2,453,235.881	2,835.50
411	585,479.902	2,453,214.683	2,835.50
412	585,522.736	2,453,188.900	2,835.50
413	585,567.031	2,453,165.842	2,835.50
414	585,615.755	2,453,156.304	2,835.50
415	585,662.278	2,453,171.991	2,835.50
416	585,690.712	2,453,212.381	2,835.50
417	585,697.129	2,453,261.625	2,835.50
418	585,685.221	2,453,309.916	2,835.50
419	585,704.316	2,453,318.444	2,835.50
420	585,532.337	2,453,273.979	2,832.00
421	585,498.873	2,453,310.974	2,832.00
422	585,479.024	2,453,356.372	2,832.00
423	585,510.609	2,453,383.519	2,832.00
424	585,559.189	2,453,372.154	2,832.00
425	585,606.325	2,453,355.489	2,832.00
426	585,645.879	2,453,325.483	2,832.00
427	585,670.761	2,453,282.719	2,832.00
428	585,669.658	2,453,233.703	2,832.00
429	585,628.226	2,453,215.869	2,832.00
430	585,583.010	2,453,236.699	2,832.00
431	585,463.545	2,453,401.695	2,835.50
432	585,512.521	2,453,402.318	2,835.50
433	585,560.898	2,453,394.409	2,835.50
434	585,607.581	2,453,379.447	2,835.50
435	585,650.087	2,453,355.275	2,835.50
436	585,559.197	2,453,384.108	2,834.00
437	585,606.431	2,453,367.724	2,834.00
438	585,648.161	2,453,340.905	2,834.00
439	585,677.231	2,453,300.684	2,834.00
440	585,685.264	2,453,251.835	2,834.00
441	585,671.293	2,453,204.130	2,834.00
442	585,632.530	2,453,176.008	2,834.00
443	585,584.371	2,453,187.578	2,834.00
444	585,541.269	2,453,212.779	2,834.00
445	585,502.967	2,453,244.837	2,834.00
446	585,471.151	2,453,283.309	2,834.00
447	585,520.434	2,453,393.738	2,834.00
448	585,462.496	2,453,390.689	2,834.00
449	585,446.214	2,453,339.987	2,834.00
450	585,798.461	2,453,285.614	2,835.50
451	585,749.827	2,453,297.738	2,835.50

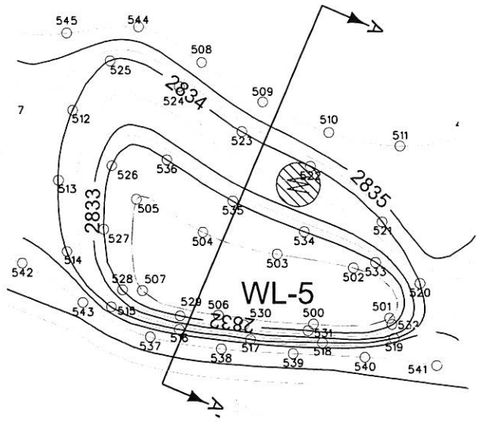
CELL WL-3 COORDINATES			
Point	North	East	Elevation
300	585,900.228	2,452,955.499	2,831.50
301	585,879.003	2,452,997.754	2,831.50
302	585,870.578	2,453,044.713	2,831.50
303	585,872.037	2,453,091.883	2,831.50
304	585,914.009	2,453,087.394	2,831.50
305	585,947.192	2,453,053.971	2,831.50
306	585,954.230	2,453,007.431	2,831.50
307	585,942.865	2,452,961.154	2,831.50
308	586,043.729	2,452,853.901	2,835.50
309	586,078.385	2,452,817.883	2,835.50
310	586,106.260	2,452,776.843	2,835.50
311	586,107.302	2,452,728.012	2,835.50
312	586,044.665	2,452,697.103	2,835.50
313	585,997.714	2,452,712.328	2,835.50
314	585,959.734	2,452,744.612	2,835.50
315	585,925.941	2,452,781.459	2,835.50
316	585,893.376	2,452,819.396	2,835.50
317	585,862.491	2,452,858.710	2,835.50
318	585,839.128	2,452,891.171	2,835.50
319	585,814.331	2,452,934.138	2,835.50
320	585,796.840	2,452,980.528	2,835.50
321	585,787.942	2,453,029.326	2,835.50
322	585,789.712	2,453,078.747	2,835.50
323	585,807.101	2,453,124.810	2,835.50
324	585,835.762	2,453,153.499	2,835.50
325	585,834.156	2,453,195.935	2,835.50

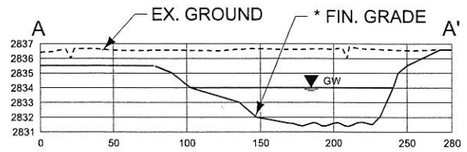
CELL WL-3 COORDINATES			
Point	North	East	Elevation
326	585,824.724	2,453,243.721	2,835.50
327	585,809.804	2,453,112.249	2,834.00
328	585,796.300	2,453,064.947	2,834.00
329	585,799.488	2,453,015.529	2,834.00
330	585,811.521	2,452,967.434	2,834.00
331	585,832.285	2,452,922.450	2,834.00
332	585,860.140	2,452,881.396	2,834.00
333	585,890.288	2,452,841.984	2,834.00
334	585,922.395	2,452,804.148	2,834.00
335	585,955.291	2,452,766.992	2,834.00
336	585,989.953	2,452,731.563	2,834.00
337	586,034.537	2,452,712.306	2,834.00
338	585,845.992	2,453,137.936	2,834.00
339	585,894.310	2,453,128.355	2,834.00
340	585,937.592	2,453,104.025	2,834.00
341	585,969.088	2,453,066.042	2,834.00
342	585,980.547	2,453,018.012	2,834.00
343	585,977.340	2,452,968.383	2,834.00
344	585,984.793	2,452,919.387	2,834.00
345	586,007.220	2,452,875.149	2,834.00
346	586,039.984	2,452,837.806	2,834.00
347	586,075.825	2,452,803.308	2,834.00
348	586,101.691	2,452,761.366	2,834.00
349	586,074.918	2,452,724.099	2,834.00
350	585,965.008	2,453,090.889	2,835.50

CELL WL-3 COORDINATES			
Point	North	East	Elevation
351	585,989.677	2,453,034.593	2,835.50
352	585,990.030	2,452,972.459	2,835.50
353	586,016.000	2,452,889.071	2,835.50
354	585,996.218	2,452,930.557	2,835.50
355	585,930.206	2,453,121.222	2,835.50
356	585,862.281	2,453,145.350	2,835.50
357	585,842.058	2,453,033.402	2,832.00
358	585,841.739	2,453,083.237	2,832.00
359	585,871.755	2,453,115.016	2,832.00
360	585,917.340	2,453,095.828	2,832.00
361	585,950.065	2,453,059.058	2,832.00
362	585,960.209	2,453,010.542	2,832.00
363	585,956.820	2,452,960.699	2,832.00
364	585,963.073	2,452,911.383	2,832.00
365	585,985.096	2,452,866.772	2,832.00
366	586,018.769	2,452,829.988	2,832.00
367	586,055.381	2,452,795.948	2,832.00
368	586,081.170	2,452,765.670	2,832.00
369	586,044.289	2,452,749.004	2,832.00
370	586,005.046	2,452,780.206	2,832.00
371	585,971.051	2,452,817.392	2,832.00
372	585,938.406	2,452,855.770	2,832.00
373	585,907.136	2,452,895.275	2,832.00
374	585,877.567	2,452,936.062	2,832.00
375	585,854.449	2,452,980.692	2,832.00

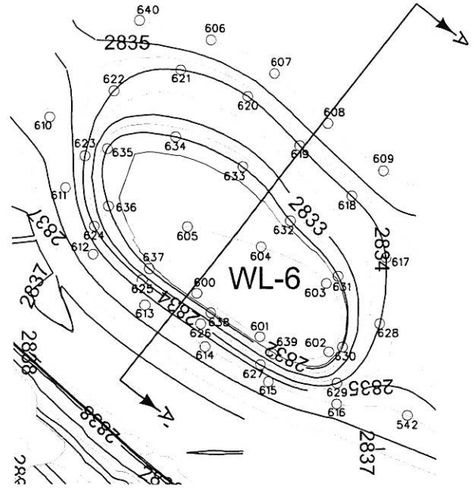
* FINISHED GRADE ELEVATIONS DO NOT INCLUDE TOPSOIL PLACEMENT. ROUGHEN AND UNDULATE THE BOTTOM.

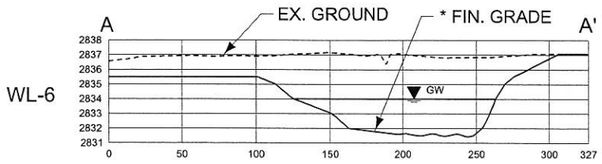
3	MDT MONTANA DEPARTMENT OF TRANSPORTATION	c:\dgn\7286000enplp001.dgn	DESIGNED BY	LOUISE STONER	10/24/2014	WETLAND PLANS	WS #14 AQUATIC MITIGATION / PROJECT NO. STPX STWD (56)
2		6/10/2015	REVIEWED BY	WADE SALYARDS, PE	3/18/2015		
1		11:45:00 AM CPS - U2623	CHECKED BY			BIG HORN COUNTY	CSF = 0.99946705 / UPN 7286000 / SHEET 11 OF 15



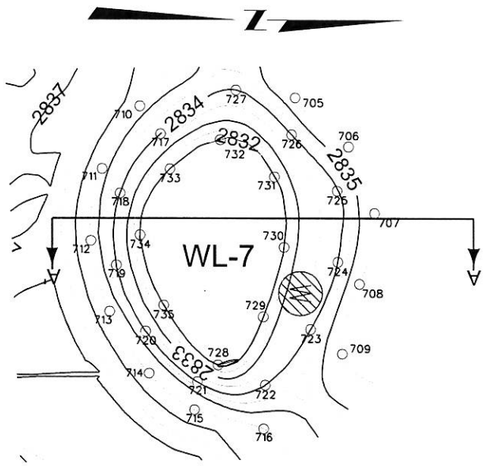


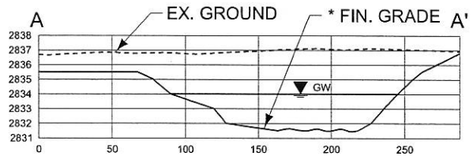
CELL WL-5 COORDINATES			
Point	North	East	Elevation
500	585,331.746	2,453,363.651	2,831.50
501	585,383.760	2,453,359.472	2,831.50
502	585,359.181	2,453,325.499	2,831.50
503	585,307.091	2,453,316.222	2,831.50
504	585,256.589	2,453,301.213	2,831.50
505	585,211.474	2,453,278.838	2,831.50
506	585,267.041	2,453,357.501	2,831.50
507	585,215.201	2,453,340.974	2,831.50
508	585,256.258	2,453,185.555	2,835.50
509	585,297.831	2,453,212.556	2,835.50
510	585,342.748	2,453,233.386	2,835.50
511	585,391.311	2,453,242.382	2,835.50
512	585,168.027	2,453,218.245	2,834.00
513	585,158.110	2,453,265.967	2,834.00
514	585,163.743	2,453,314.363	2,834.00
515	585,193.961	2,453,351.997	2,834.00
516	585,240.237	2,453,367.281	2,834.00
517	585,288.818	2,453,374.098	2,834.00
518	585,337.801	2,453,376.350	2,834.00
519	585,386.621	2,453,373.286	2,834.00
520	585,404.341	2,453,335.736	2,834.00
521	585,378.856	2,453,294.083	2,834.00
522	585,330.065	2,453,256.524	2,834.00
523	585,283.451	2,453,232.772	2,834.00
524	585,241.073	2,453,202.119	2,834.00
525	585,193.915	2,453,184.603	2,834.00
526	585,194.680	2,453,256.059	2,832.00
527	585,188.872	2,453,299.358	2,832.00
528	585,201.599	2,453,340.463	2,832.00
529	585,240.893	2,453,358.085	2,832.00
530	585,284.347	2,453,364.213	2,832.00
531	585,328.043	2,453,368.123	2,832.00
532	585,385.200	2,453,363.660	2,832.00
533	585,374.278	2,453,321.685	2,832.00
534	585,325.710	2,453,300.832	2,832.00
535	585,277.100	2,453,280.033	2,832.00
536	585,232.284	2,453,251.940	2,832.00
537	585,220.440	2,453,372.391	2,835.50
538	585,268.802	2,453,380.440	2,835.50
539	585,317.768	2,453,383.741	2,835.50
540	585,366.793	2,453,386.082	2,835.50
541	585,415.524	2,453,391.613	2,835.50
542	585,133.236	2,453,322.288	2,835.50
543	585,174.460	2,453,349.099	2,835.50
544	585,213.579	2,453,161.230	2,835.50
545	585,164.321	2,453,165.553	2,835.50





CELL WL-6 COORDINATES			
Point	North	East	Elevation
600	584,989.793	2,453,239.741	2,831.50
601	585,032.502	2,453,269.142	2,831.50
602	585,079.779	2,453,279.326	2,831.50
603	585,078.198	2,453,232.906	2,831.50
604	585,033.535	2,453,208.086	2,831.50
605	584,983.503	2,453,194.624	2,831.50
606	584,999.935	2,453,067.330	2,835.50
607	585,043.403	2,453,090.116	2,835.50
608	585,079.489	2,453,124.120	2,835.50
609	585,117.167	2,453,156.274	2,835.50
610	584,890.669	2,453,120.069	2,835.50
611	584,901.275	2,453,168.149	2,835.50
612	584,919.899	2,453,213.416	2,835.50
613	584,954.802	2,453,247.870	2,835.50
614	584,995.260	2,453,275.915	2,835.50
615	585,038.336	2,453,299.704	2,835.50
616	585,085.070	2,453,314.704	2,835.50
617	585,118.766	2,453,215.349	2,834.00
618	585,095.607	2,453,173.443	2,834.00
619	585,060.451	2,453,139.229	2,834.00
620	585,024.767	2,453,105.667	2,834.00
621	584,979.426	2,453,087.955	2,834.00
622	584,934.524	2,453,102.247	2,834.00
623	584,914.657	2,453,146.487	2,834.00
624	584,920.811	2,453,194.328	2,834.00
625	584,953.262	2,453,230.659	2,834.00
626	584,992.222	2,453,260.498	2,834.00
627	585,032.817	2,453,288.034	2,834.00
628	585,114.476	2,453,260.082	2,834.00
629	585,085.366	2,453,300.554	2,834.00
630	585,089.048	2,453,276.055	2,832.00
631	585,086.136	2,453,227.931	2,832.00
632	585,054.002	2,453,190.299	2,832.00
633	585,020.944	2,453,153.552	2,832.00
634	584,975.794	2,453,133.520	2,832.00
635	584,929.990	2,453,141.654	2,832.00
636	584,930.640	2,453,180.746	2,832.00
637	584,957.853	2,453,223.140	2,832.00
638	584,999.109	2,453,252.926	2,832.00
639	585,041.729	2,453,280.773	2,832.00
640	584,952.130	2,453,054.171	2,835.50



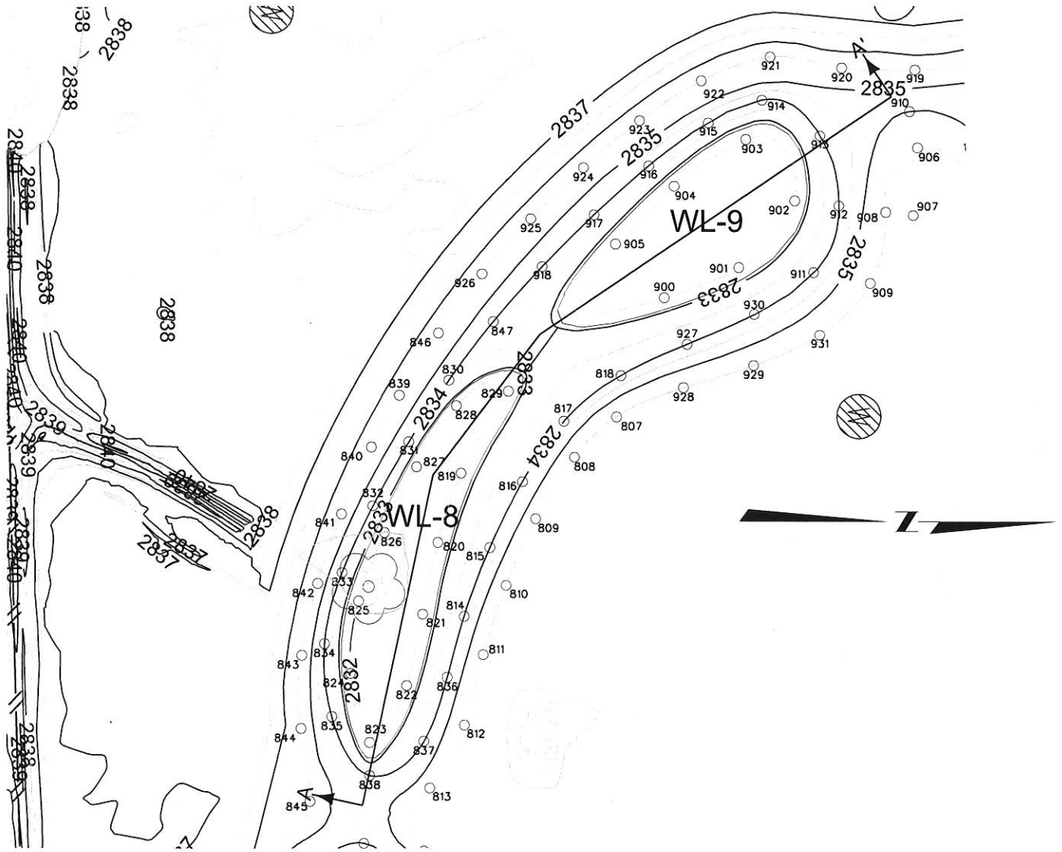


CELL WL-7 COORDINATES			
Point	North	East	Elevation
705	584,886.033	2,452,855.717	2,835.50
706	584,922.279	2,452,889.212	2,835.50
707	584,940.089	2,452,934.393	2,835.50
708	584,929.629	2,452,982.481	2,835.50
709	584,917.928	2,453,029.911	2,835.50
710	584,779.727	2,452,861.483	2,835.50
711	584,754.037	2,452,904.144	2,835.50
712	584,746.261	2,452,953.017	2,835.50
713	584,758.975	2,453,001.121	2,835.50
714	584,785.736	2,453,043.100	2,835.50
715	584,816.634	2,453,067.898	2,835.50
716	584,864.076	2,453,080.754	2,835.50
717	584,793.618	2,452,880.393	2,834.00
718	584,766.147	2,452,920.739	2,834.00
719	584,763.520	2,452,969.643	2,834.00
720	584,783.330	2,453,014.626	2,834.00
721	584,818.619	2,453,048.860	2,834.00
722	584,865.149	2,453,051.163	2,834.00
723	584,896.411	2,453,013.294	2,834.00
724	584,914.861	2,452,967.595	2,834.00
725	584,914.474	2,452,919.155	2,834.00
726	584,883.464	2,452,880.905	2,834.00
727	584,845.269	2,452,850.484	2,834.00
728	584,832.725	2,453,037.450	2,832.00
729	584,863.889	2,453,004.686	2,832.00
730	584,878.161	2,452,957.488	2,832.00
731	584,871.561	2,452,909.644	2,832.00
732	584,834.457	2,452,884.380	2,832.00
733	584,799.975	2,452,904.251	2,832.00
734	584,779.751	2,452,949.139	2,832.00
735	584,795.577	2,452,996.856	2,832.00

NOTE: GW DESIGNATES DESIGN HIGH WATER ELEVATION.
FOR INFORMATIONAL PURPOSES ONLY.

* FINISHED GRADE ELEVATIONS DO NOT INCLUDE TOPSOIL PLACEMENT. ROUGHEN AND UNDULATE THE BOTTOM.

3	MDT MONTANA DEPARTMENT OF TRANSPORTATION	c:\dgn\7286000enplp001.dgn	DESIGNED BY	LOUISE STONER	10/24/2014	WETLAND PLANS	
2		6/10/2015	REVIEWED BY	WADE SALYARDS, PE	3/18/2015		WS #14 AQUATIC MITIGATION / PROJECT NO. STPX STWD (56)
1		11:45:07 AM CPS - U2623	CHECKED BY			BIG HORN COUNTY	CSF = 0.99946705 / UPN 7286000 / SHEET 12 OF 15

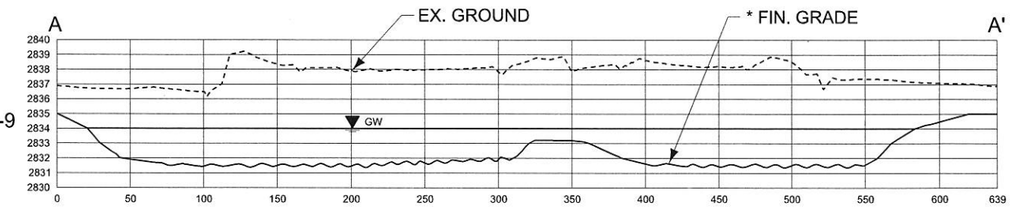


NOTE: GW DESIGNATES DESIGN HIGH WATER ELEVATION.
FOR INFORMATIONAL PURPOSES ONLY.

CELL WL-8 COORDINATES			
Point	North	East	Elevation
807	585,017.344	2,452,560.469	2,835.50
808	584,988.613	2,452,587.941	2,835.50
809	584,962.149	2,452,629.798	2,835.50
810	584,942.030	2,452,675.105	2,835.50
811	584,926.536	2,452,722.229	2,835.50
812	584,913.531	2,452,770.114	2,835.50
813	584,889.966	2,452,812.800	2,835.50
814	584,913.506	2,452,696.176	2,834.00
815	584,931.148	2,452,649.420	2,834.00
816	584,953.253	2,452,604.602	2,834.00
817	584,981.486	2,452,563.444	2,834.00
818	585,020.386	2,452,532.452	2,834.00
819	584,911.587	2,452,598.845	2,832.50
820	584,895.753	2,452,645.981	2,832.50
821	584,885.428	2,452,694.680	2,832.50
822	584,874.341	2,452,743.202	2,832.50
823	584,849.257	2,452,781.942	2,832.50
824	584,836.312	2,452,735.053	2,832.50
825	584,841.929	2,452,685.801	2,832.50
826	584,859.517	2,452,639.281	2,832.50
827	584,881.372	2,452,594.569	2,832.50
828	584,908.469	2,452,552.909	2,832.50
829	584,943.809	2,452,543.140	2,832.50
830	584,903.408	2,452,535.641	2,834.00
831	584,876.128	2,452,577.529	2,834.00
832	584,851.695	2,452,621.140	2,834.00
833	584,830.727	2,452,666.506	2,834.00
834	584,818.774	2,452,714.874	2,834.00
835	584,823.591	2,452,764.406	2,834.00
836	584,901.952	2,452,737.571	2,834.00
837	584,886.029	2,452,781.025	2,834.00
838	584,849.208	2,452,804.383	2,834.00
839	584,869.770	2,452,545.907	2,835.50
840	584,850.765	2,452,581.094	2,835.50
841	584,830.333	2,452,626.706	2,835.50
842	584,814.182	2,452,673.990	2,835.50
843	584,803.539	2,452,722.793	2,835.50
844	584,802.963	2,452,772.515	2,835.50
845	584,808.933	2,452,821.986	2,835.50
846	584,896.335	2,452,503.565	2,835.50
847	584,933.689	2,452,495.873	2,834.00

CELL WL-9 COORDINATES			
Point	North	East	Elevation
900	585,050.111	2,452,479.507	2,832.50
901	585,100.744	2,452,459.066	2,832.50
902	585,139.185	2,452,413.658	2,832.50
903	585,105.732	2,452,372.042	2,832.50
904	585,056.935	2,452,403.792	2,832.50
905	585,016.909	2,452,443.084	2,832.50
906	585,223.091	2,452,377.645	2,835.50
907	585,220.094	2,452,423.543	2,835.50
908	585,201.319	2,452,421.373	2,835.50
909	585,190.779	2,452,469.635	2,835.50
910	585,217.774	2,452,352.968	2,835.00
911	585,151.974	2,452,462.270	2,834.00
912	585,169.480	2,452,417.035	2,834.00
913	585,156.581	2,452,369.507	2,834.00
914	585,116.785	2,452,345.270	2,834.00
915	585,080.171	2,452,360.807	2,834.00
916	585,039.728	2,452,390.082	2,834.00
917	585,002.341	2,452,423.262	2,834.00
918	584,966.817	2,452,458.438	2,834.00
919	585,221.536	2,452,324.684	2,835.50
920	585,171.625	2,452,323.344	2,835.50
921	585,122.452	2,452,315.952	2,835.50
922	585,075.476	2,452,332.131	2,835.50
923	585,033.511	2,452,359.191	2,835.50
924	584,995.118	2,452,391.196	2,835.50
925	584,959.196	2,452,425.962	2,835.50
926	584,926.088	2,452,463.403	2,835.50
927	585,065.553	2,452,511.125	2,834.00
928	585,063.005	2,452,540.506	2,835.50
929	585,110.701	2,452,525.521	2,835.50
930	585,111.218	2,452,490.794	2,834.00
931	585,156.120	2,452,504.852	2,835.50

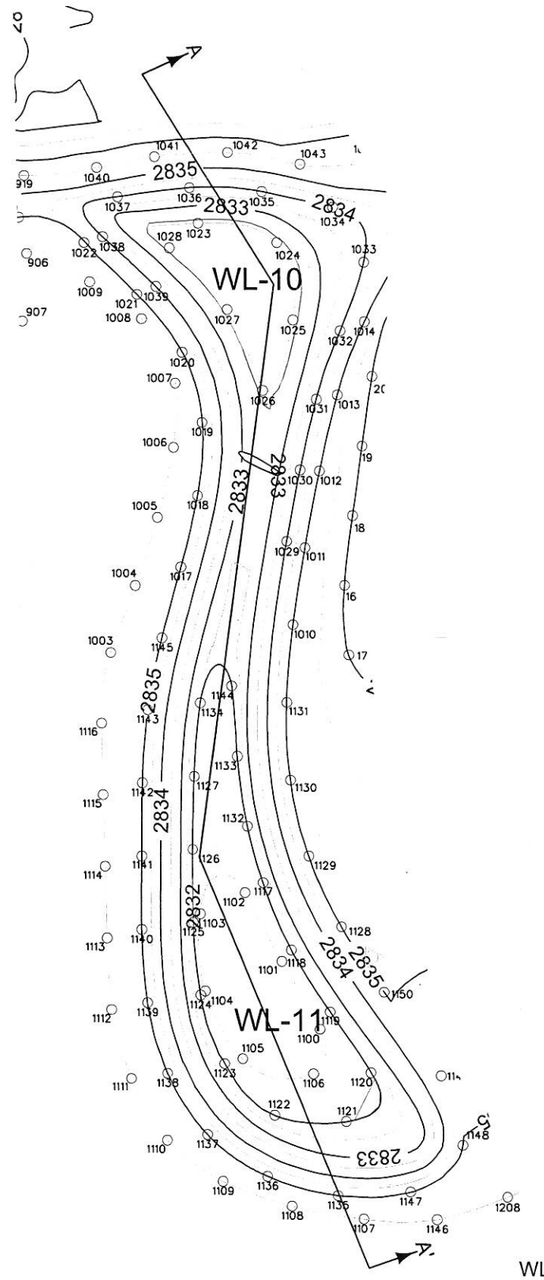
WL-8 & WL-9



* FINISHED GRADE ELEVATIONS DO NOT INCLUDE TOPSOIL PLACEMENT. ROUGHEN AND UNDULATE THE BOTTOM.

3	MDT MONTANA DEPARTMENT OF TRANSPORTATION	c:\dgn\7286000enplp002.dgn	DESIGNED BY	LOUISE STONER	10/24/2014	WETLAND PLANS		WS #14 AQUATIC MITIGATION / PROJECT NO. STPX STWD (56)
2		6/10/2015	REVIEWED BY	WADE SALYARDS, PE	3/18/2015			
1		11:45:30 AM CPS - U2623	CHECKED BY			BIG HORN COUNTY		CSF = 0.99946705 / UPN 7286000 / SHEET 13 OF 15

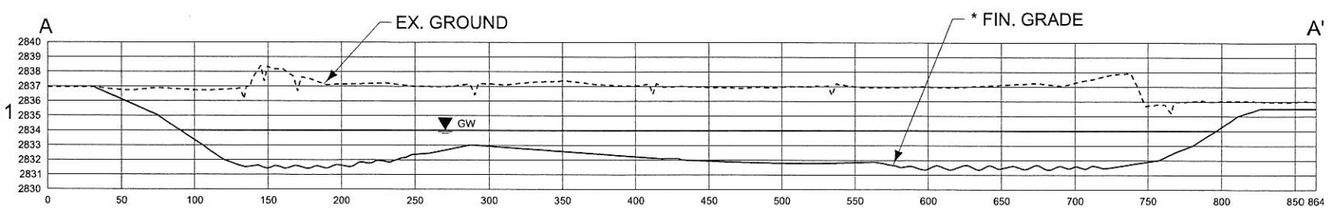
NOTE: GW DESIGNATES DESIGN HIGH WATER ELEVATION.
FOR INFORMATIONAL PURPOSES ONLY.



CELL WL-10 COORDINATES			
Point	North	East	Elevation
1000	585,395.364	2,452,409.205	2,831.50
1001	585,364.513	2,452,367.915	2,831.50
1002	585,372.224	2,452,405.894	2,831.50
1003	585,301.027	2,452,421.705	2,835.50
1004	585,266.115	2,452,396.768	2,835.50
1005	585,453.059	2,452,423.514	2,835.50
1006	585,298.043	2,452,405.151	2,835.50
1007	585,262.331	2,452,370.103	2,835.50
1008	585,340.115	2,452,356.846	2,835.50
1009	585,393.535	2,452,369.832	2,835.50
1010	585,404.362	2,452,422.473	2,835.00
1011	585,359.475	2,452,415.454	2,835.00
1012	585,320.295	2,452,373.675	2,835.00
1013	585,436.536	2,452,429.723	2,835.00
1014	585,452.733	2,452,383.060	2,835.00
1015	585,431.692	2,452,345.824	2,835.00
1017	585,327.496	2,452,590.583	2,835.00
1018	585,339.127	2,452,541.923	2,835.00
1019	585,342.353	2,452,492.149	2,835.00
1020	585,328.755	2,452,444.449	2,835.00
1021	585,298.043	2,452,405.151	2,835.00
1022	585,262.331	2,452,370.103	2,835.00
1023	585,340.115	2,452,356.846	2,832.50
1024	585,393.535	2,452,369.832	2,832.50
1025	585,404.362	2,452,422.473	2,832.50
1026	585,383.588	2,452,470.462	2,832.50
1027	585,359.475	2,452,415.454	2,832.50
1028	585,320.295	2,452,373.675	2,832.50
1029	585,399.622	2,452,573.017	2,834.00
1030	585,408.869	2,452,524.444	2,834.00
1031	585,420.041	2,452,476.280	2,834.00
1032	585,436.536	2,452,429.723	2,834.00
1033	585,452.733	2,452,383.060	2,834.00
1034	585,431.692	2,452,345.824	2,834.00
1035	585,383.386	2,452,335.294	2,834.00
1036	585,334.140	2,452,332.684	2,834.00
1037	585,285.089	2,452,338.875	2,834.00
1038	585,274.878	2,452,366.035	2,834.00
1039	585,311.001	2,452,399.796	2,834.00
1040	585,271.107	2,452,319.041	2,835.50
1041	585,310.360	2,452,311.617	2,835.50
1042	585,360.223	2,452,308.701	2,835.50
1043	585,409.439	2,452,316.541	2,835.50
1044	585,458.819	2,452,313.355	2,835.50

CELL WL-11 COORDINATES			
Point	North	East	Elevation
1100	585,421.552	2,452,905.709	2,831.50
1101	585,395.517	2,452,859.534	2,831.50
1102	585,370.512	2,452,812.781	2,831.50
1103	585,340.172	2,452,827.233	2,831.50
1104	585,343.501	2,452,879.791	2,831.50
1105	585,368.669	2,452,925.896	2,831.50
1106	585,416.941	2,452,936.056	2,831.50
1107	585,451.346	2,453,034.628	2,835.50
1108	585,402.126	2,453,026.034	2,835.50
1109	585,355.113	2,453,009.285	2,835.50
1110	585,317.183	2,452,981.280	2,835.50
1111	585,292.677	2,452,939.215	2,835.50
1112	585,279.340	2,452,892.415	2,835.50
1113	585,276.477	2,452,843.656	2,835.50
1114	585,275.297	2,452,794.806	2,835.50
1115	585,274.003	2,452,745.960	2,835.50
1116	585,273.114	2,452,697.105	2,835.50
1117	585,382.871	2,452,805.923	2,832.00
1118	585,401.994	2,452,851.817	2,832.00
1119	585,428.418	2,452,893.962	2,832.00
1120	585,456.284	2,452,935.196	2,832.00
1121	585,439.358	2,452,968.354	2,832.00
1122	585,390.381	2,452,964.200	2,832.00
1123	585,356.413	2,452,929.246	2,832.00
1124	585,340.294	2,452,882.535	2,832.00
1125	585,335.337	2,452,833.039	2,832.00
1126	585,335.005	2,452,783.269	2,832.00
1127	585,336.256	2,452,733.508	2,832.00
1128	585,436.270	2,452,835.865	2,835.00
1129	585,414.077	2,452,787.604	2,835.00
1130	585,401.806	2,452,735.954	2,835.00
1131	585,399.333	2,452,682.880	2,835.00
1132	585,372.194	2,452,767.407	2,832.00
1133	585,365.475	2,452,719.704	2,832.00
1134	585,340.567	2,452,683.291	2,832.00
1135	585,433.632	2,453,018.809	2,835.00
1136	585,385.486	2,453,005.798	2,835.00
1137	585,344.644	2,452,977.458	2,835.00
1138	585,317.449	2,452,935.734	2,835.00
1139	585,303.818	2,452,887.714	2,835.00
1140	585,299.976	2,452,837.855	2,835.00
1141	585,300.097	2,452,787.811	2,835.00
1142	585,300.664	2,452,737.771	2,835.00
1143	585,304.444	2,452,687.899	2,835.00
1144	585,361.919	2,452,671.646	2,832.00
1145	585,314.419	2,452,638.888	2,835.00
1146	585,501.154	2,453,035.087	2,835.50
1147	585,483.295	2,453,016.267	2,835.00
1148	585,518.526	2,452,984.443	2,835.00
1149	585,503.982	2,452,937.255	2,835.00
1150	585,465.384	2,452,880.383	2,835.00

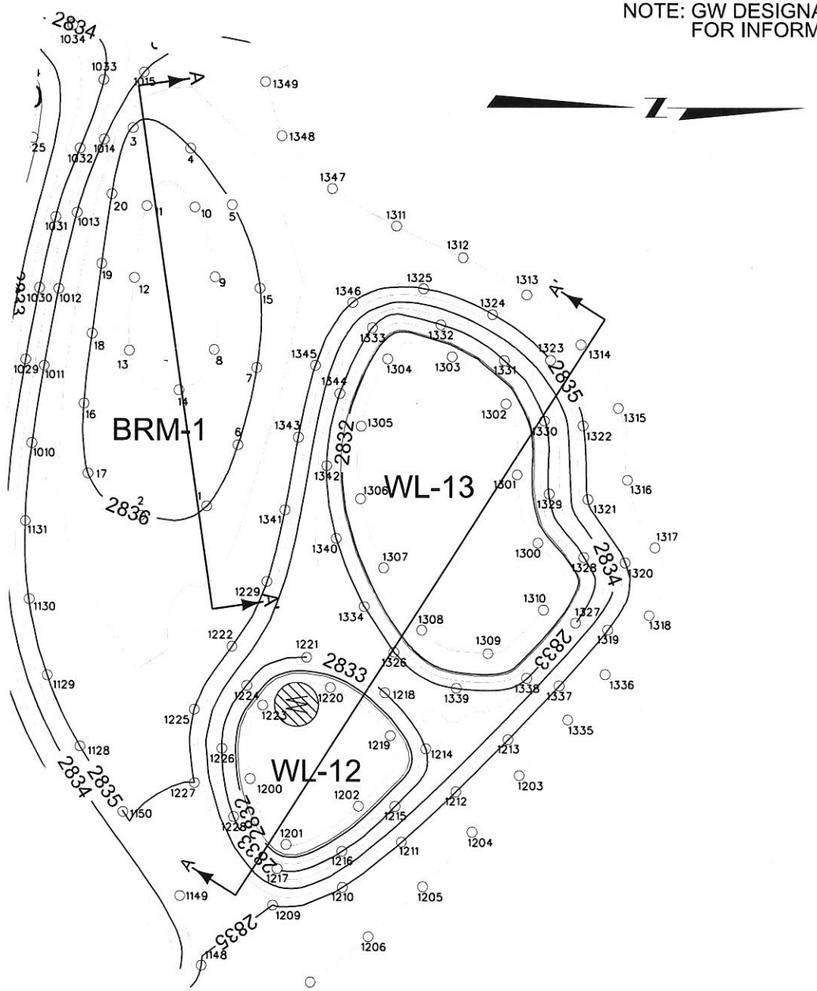
WL-10 & WL-11

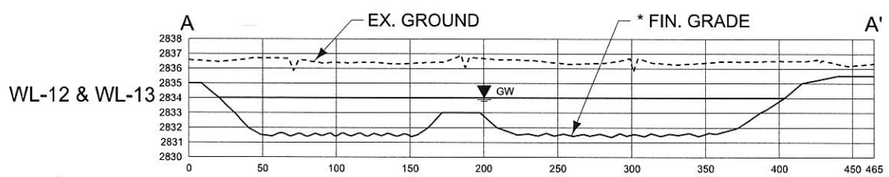


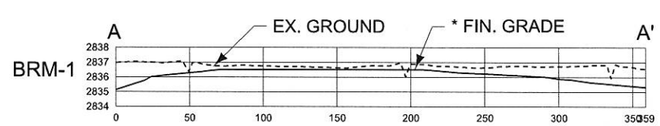
* FINISHED GRADE ELEVATIONS DO NOT INCLUDE TOPSOIL PLACEMENT. ROUGHEN AND UNDULATE THE BOTTOM.

3	MDT MONTANA DEPARTMENT OF TRANSPORTATION	c:\dgn\7286000enplp002.dgn	DESIGNED BY	LOUISE STONER	10/24/2014	WETLAND PLANS		WS #14 AQUATIC MITIGATION / PROJECT NO. STPX STWD (56)
2		6/10/2015	REVIEWED BY	WADE SALYARDS, PE	3/18/2015			
1		11:45:36 AM CPS - U2623	CHECKED BY			BIG HORN COUNTY		CSF = 0.99946705 / UPN 7286000 / SHEET 14 OF 15

NOTE: GW DESIGNATES DESIGN HIGH WATER ELEVATION.
FOR INFORMATIONAL PURPOSES ONLY.







CELL WL-12 & 13 COORDINATES			
Point	North	East	Elevation
1200	585,551.710	2,452,857.770	2,831.50
1201	585,575.966	2,452,902.503	2,831.50
1202	585,625.179	2,452,876.424	2,831.50
1203	585,733.868	2,452,855.454	2,835.50
1204	585,701.886	2,452,893.886	2,835.50
1205	585,668.384	2,452,930.980	2,835.50
1206	585,631.720	2,452,964.957	2,835.50
1207	585,592.394	2,452,995.817	2,835.50
1208	585,548.676	2,453,019.734	2,835.50
1209	585,566.888	2,452,943.627	2,835.00
1210	585,614.257	2,452,931.498	2,835.00
1211	585,653.976	2,452,900.791	2,835.00
1212	585,690.773	2,452,866.550	2,835.00
1213	585,726.338	2,452,831.027	2,835.00
1214	585,670.515	2,452,837.315	2,833.00
1215	585,649.809	2,452,876.528	2,833.00
1216	585,613.945	2,452,907.062	2,833.00
1217	585,569.950	2,452,918.913	2,833.00
1218	585,643.006	2,452,799.363	2,833.00
1219	585,646.649	2,452,828.472	2,831.50
1220	585,606.259	2,452,795.822	2,831.50
1221	585,590.060	2,452,775.351	2,833.00
1222	585,539.470	2,452,767.891	2,835.00
1223	585,560.230	2,452,807.848	2,831.50
1224	585,549.497	2,452,794.441	2,833.00
1225	585,513.823	2,452,810.791	2,835.00
1226	585,532.649	2,452,837.237	2,833.00
1227	585,513.869	2,452,860.586	2,835.00
1228	585,540.562	2,452,883.555	2,833.00
1229	585,563.106	2,452,723.807	2,835.00
1300	585,746.684	2,452,697.385	2,831.50
1301	585,732.743	2,452,651.069	2,831.50
1302	585,725.228	2,452,602.935	2,831.50
1303	585,688.593	2,452,570.929	2,831.50
1304	585,645.143	2,452,572.368	2,831.50
1305	585,627.220	2,452,618.192	2,831.50
1306	585,626.731	2,452,667.448	2,831.50
1307	585,642.280	2,452,714.425	2,831.50
1308	585,667.799	2,452,756.690	2,831.50
1309	585,712.807	2,452,772.630	2,831.50
1310	585,750.362	2,452,742.943	2,831.50
1311	585,651.121	2,452,482.214	2,835.50
1312	585,696.269	2,452,503.684	2,835.50
1313	585,739.386	2,452,528.860	2,835.50
1314	585,775.798	2,452,562.689	2,835.50
1315	585,801.112	2,452,605.733	2,835.50
1316	585,807.307	2,452,654.656	2,835.50
1317	585,825.981	2,452,700.584	2,835.50
1318	585,821.855	2,452,746.663	2,835.50
1319	585,793.726	2,452,756.478	2,835.00
1320	585,805.625	2,452,710.839	2,835.00
1321	585,780.477	2,452,667.814	2,835.00
1322	585,777.191	2,452,617.689	2,835.00
1323	585,755.360	2,452,573.258	2,835.00
1324	585,716.208	2,452,542.263	2,835.00
1325	585,669.385	2,452,524.815	2,835.00
1326	585,649.072	2,452,771.753	2,833.00
1327	585,771.926	2,452,751.838	2,833.00
1328	585,777.570	2,452,707.201	2,833.00
1329	585,754.363	2,452,664.083	2,833.00
1330	585,751.097	2,452,614.440	2,833.00
1331	585,724.141	2,452,573.488	2,833.00
1332	585,680.985	2,452,549.201	2,833.00
1333	585,634.867	2,452,551.266	2,833.00
1334	585,629.113	2,452,740.797	2,833.00
1335	585,766.606	2,452,817.663	2,835.50
1336	585,792.009	2,452,786.772	2,835.50
1337	585,760.874	2,452,794.503	2,835.00
1338	585,738.963	2,452,789.326	2,833.00
1339	585,691.177	2,452,796.176	2,833.00
1340	585,610.320	2,452,694.479	2,833.00
1341	585,575.425	2,452,675.111	2,835.00
1342	585,603.931	2,452,645.026	2,833.00
1343	585,584.612	2,452,625.690	2,835.00
1344	585,612.768	2,452,595.963	2,833.00
1345	585,596.326	2,452,576.845	2,835.00
1346	585,621.547	2,452,534.150	2,835.00
1347	585,608.041	2,452,456.925	2,835.50
1348	585,573.712	2,452,421.054	2,835.50
1349	585,562.533	2,452,384.268	2,835.50

BERM BRM-1 COORDINATES			
Point	North	East	Elevation
1	585,522.288	2,452,672.581	2,836.00
2	585,477.391	2,452,679.014	2,836.00
3	585,472.484	2,452,415.714	2,836.00
4	585,511.564	2,452,429.542	2,836.00
5	585,539.877	2,452,467.937	2,836.00
6	585,543.718	2,452,630.969	2,836.00
7	585,556.352	2,452,578.442	2,836.00
8	585,527.526	2,452,566.257	2,836.50
9	585,528.184	2,452,516.918	2,836.50
10	585,514.477	2,452,469.504	2,836.50
11	585,481.986	2,452,468.702	2,836.50
12	585,473.363	2,452,517.487	2,836.50
13	585,469.881	2,452,566.954	2,836.50
14	585,503.409	2,452,593.732	2,836.50
15	585,558.653	2,452,524.557	2,835.50
16	585,439.068	2,452,602.880	2,835.50
17	585,441.758	2,452,650.373	2,835.50
18	585,444.643	2,452,555.374	2,835.50
19	585,451.217	2,452,507.983	2,835.50
20	585,458.198	2,452,460.653	2,835.50

* FINISHED GRADE ELEVATIONS DO NOT INCLUDE TOPSOIL PLACEMENT. ROUGHEN AND UNDULATE THE BOTTOM.

3	MDT MONTANA DEPARTMENT OF TRANSPORTATION	c:\dgn\7286000enplp002.dgn	DESIGNED BY	LOUISE STONER	10/24/2014	WETLAND PLANS	
2		6/10/2015	REVIEWED BY	WADE SALYARDS, PE	5/18/2015		
1		11:45:41 AM CPS - U2623	CHECKED BY			BIG HORN COUNTY	

WS #14 AQUATIC MITIGATION		PROJECT NO. STPX STWD (56)
CSF = 0.99946705	UPN 7286000	SHEET 15 OF 15