MONTANA DEPARTMENT OF TRANSPORTATION
WETLAND MITIGATION MONITORING REPORT: YEAR 2016

SILICON MOUNTAIN MITIGATION SITE
SILVER BOW COUNTY, MONTANA



Prepared for:

MONTANA DEPARTMENT OF TRANSPORTATION

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Helena, Montana 59620

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December 2016

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SILICON MOUNTAIN MITIGATION SITE SILVER BOW COUNTY, MONTANA

Site-Wide Construction: 2014
MDT Project Number MT-STPX 47(24) (56)
Control Number 5034

USACE: NWO-2007-00824-MTB

prepared for

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Cover: View looking north at wetland Cell 5; approximately 20 Canada geese are on the water.

1.0 INTRODUCTION

The Silicon Mountain Aquatic Resource Mitigation 2016 Monitoring Report presents the results of the second year of postconstruction monitoring at the Silicon Mountain site. Butte Silver Bow County (BSBC) and the Montana Department of Transportation (MDT) collaborated in 2011 to provide compensatory mitigation for both stream and wetland impacts associated with the BSBC-proposed Silicon Mountain Tech Park and Port road realignment project and to serve as a mitigation bank for future transportation projects within Watershed #2 – Upper Clark Fork of the Columbia River.

The MDT Silicon Mountain site is located south of Interstate 90, west of Interstate 15, and approximately 5 miles west of Butte, Montana, within Township 3 North, Range 9 West, Section 24 Silver Bow County, Montana, as shown in Figure 1-1. The 50.1-acre site lies within the boundaries of Watershed #2 – Upper Clark Fork of the Columbia River. In 2011, BSBC purchased land Parcels 1 (18.91 acres) and 2 (26.1 acres) from the Ueland family; these parcels are located north of the new roadway alignment. BSBC collaborated with MDT and placed the property under a perpetual conservation easement to protect the wetland and stream resource attributes that were established and restored within the site. This conservation easement was extended to include approximately 0.96 acre of property previously owned by BSBC and in the immediate vicinity of the new roadway alignment. MDT secured a construction permit on approximately 2.04 acres of privately owned property south of the realignment project. The construction permit facilitated relocating and restoring the Sand Creek channel south of the new roadway for alignment with the new bridge.

This site comprises a diversity of ecosystems, including upland meadow, sagebrush steppe, emergent/scrub-shrub wetland, and riparian. Sand Creek is a small intermittent tributary to Silver Bow Creek that flows for a short duration each year during the spring runoff period and heavy precipitation events. Because of the intermittent flow and severe impacts from past land-management practices, the channel exhibits a wide variation of aggradation and degradation characteristics, is deeply incised or loses all channel dimensions in some areas, and flows subsurface for extended reaches. Deeply incised segments and scoured pools retain surface water year-round through a connection to elevated groundwater level throughout the project area. In addition to Sand Creek, Parcel 2 receives perennial surface flow from a well-defined spring that originates south of the mitigation area and flows north through the parcel into Silver Bow Creek. This spring supports a large emergent/scrub-shrub wetland complex (6.64 acres) in the eastern portion of Parcel 2.

The goals of the mitigation project include preserving, restoring, and establishing upland and wetland properties, including restoring and establishing riparian and stream habitats. Specifically, the project is intended to: (a) establish 6.77 acres of emergent and scrub/shrub wetland by excavating and creating six wetland cells; (b) protect 10.06 acres of existing emergent and scrub/shrub wetland; (c) restore upland, wetland, and riparian areas that were impacted by the new roadway alignment via seeding and planting of mostly native graminoids, shrubs, and trees; (d) restore and reconstruct approximately 3,250 linear feet of the Sand Creek channel to its historic natural condition; and (e) relocate and restore approximately 650 linear feet of the Sand Creek channel on privately owned property south of the realignment project.

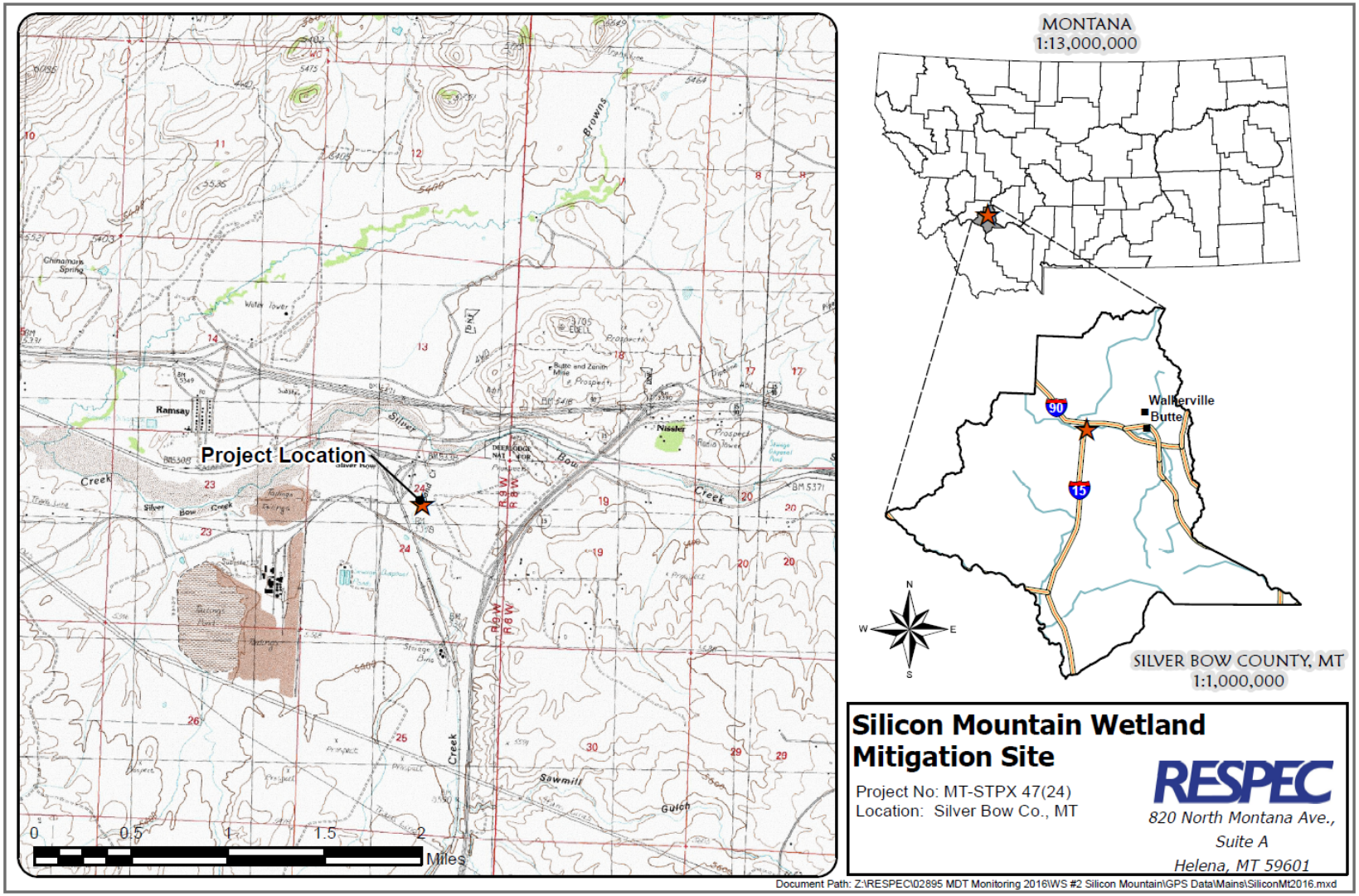


Figure 1-1. Project Location of the Silicon Mountain Site.

The project credit ratios for the wetland mitigation within the Silicon Mountain site are shown in Table 1-1. BSBC must mitigate for impacts (2.16 acres) from the Silicon Tech Park and Port project at a 2:1 ratio because the mitigation will occur concurrently with the impact. Thus, BSBC needs 4.33 acres of compensatory wetland mitigation credit for the new road alignment project. The remaining wetland and stream mitigation credits that are generated by this project will be held in reserve for MDT against future highway projects in the Upper Clark Fork Watershed. The credit ratios were based on the *Wetland Compensatory Mitigation Ratios, Montana Regulatory Program (April 2005)* [US Army Corps of Engineers, 2005]. The proposed wetland mitigation credits that are generated by this project have been approved by the US Army Corps of Engineers (USACE) and are presented below.

Table 1-1. Wetland Credit Determination for the Silicon Mountain Site

BSBC Permittee-Responsible Credit Summary					
Wetland Number	**Location**	**Mitigation Type**	**Anticipated Acres**	**Crediting Ratio**	**Credits (Acres)**
1	Parcel 1	Establishment	1.57	1:1	1.57
2	Parcel 1	Establishment	1.52	1:1	1.52
6	Parcel 1	Establishment	0.34	1:1	0.34
WL-5	Parcel 1	Preservation	3.10	4:1	0.78
WL-6	Parcel 1	Preservation	0.05	4:1	0.01
WL-7	Parcel 1	Preservation	0.22	4:1	0.06
WL-10	Parcel 2	Preservation	0.05	4:1	0.01
WL-11	Parcel 2	Preservation	0.16	4:1	0.04
Total					**4.33**
MDT Reserve Credit Summary					
Wetland Number	**Location**	**Mitigation Type**	**Anticipated Acres**	**Crediting Ratio**	**Credits (Acres)**
3	Parcel 1	Establishment	0.86	1:1	0.86
4	Parcel 2	Establishment	1.27	1:1	1.27
5	Parcel 2	Establishment	1.21	1:1	1.21
WL-12	Parcel 2	Preservation	0.44	4:1	0.11
WL-13	Parcel 2	Preservation	6.04	4:1	1.51
Both Parcels		Upland Buffer	10.80	5:1	2.16
Total					**7.12**

The construction of the Silicon Mountain mitigation project was authorized under the authority of Section 404 of the Clean Water Act via permit NWO-2012-01822-MTH and under Section 401 certification through Montana's Stream Protection Act (SPA) #MDT-R2-74-2012. MDT anticipates developing 11.45 wetland credit acres from the Silicon Mountain wetland and stream restoration project. The plan includes establishment, preservation, upland buffer, and restoration credits. The entire Silicon Mountain mitigation project encompassed creating (establishing) emergent and

scrub/shrub wetland cells, preserving existing emergent and scrub/shrub wetland, creating an upland buffer around all of the existing and created wetlands, and restoring the Sand Creek channel. The crediting objectives of the Silicon Mountain stream and wetland restoration project include the following.

1.1 WETLAND MITIGATION

- **Establishment:** Create 6.77 credit acres by excavating six wetland cells, including three on Parcel 1, two on Parcel 2, and one small cell west of the railroad tracks. Wetland establishment in Cells 1, 2, and 6 (total of 3.43 credit acres) will be credited to BSBC for mitigating impacts from the new road alignment. The remaining 3.34 credit acres from Cells 3, 4, and 5 will be held in reserve by MDT. All of the created wetlands areas will be seeded with a native wetland graminoid seed mix and planted with native willow cuttings and containerized trees and shrubs.
- **Preservation:** Preserve 10.06 acres of existing emergent marsh and scrub/shrub wetland on Parcels 1 and 2. Wetland preservation credits, which total 0.90 acre, will be credited to BSBC for mitigating impacts from the new road alignment; the remaining 1.62 credit acres will be held in reserve by MDT. The existing wetlands south of the new roadway will also be preserved within the easement area but are not included in the crediting total.
- **Upland Buffer:** Provide approximately 2.16 wetland credit acres by developing upland buffers, which will total 10.80 acres (at a 5:1 ratio), around the created and preserved wetlands on both parcels. The entire upland buffer credit will be assigned to MDT. The upland buffer areas that were disturbed during construction will be seeded with an upland seed mix that mostly consist of native grass species.
- **Credit Summary:** Establish an overall total of 11.45 acres of wetland mitigation credits from the proposed project. BSBC will be required to mitigate for impacts (2.16 acres) from the Silicon Tech Park and Port project at a 2:1 ratio, because mitigation will occur concurrently with the impact. Thus, BSBC needs 4.33 acres of compensatory wetland mitigation credit for this project. The remaining 7.12 acres will be held in reserve by MDT.

1.2 STREAM MITIGATION

- Restore approximately 4,300 linear feet of the Sand Creek channel by restoring, relocating, and enhancing approximately 3,250 linear feet north of the new roadway and approximately 650 linear feet south of the new roadway. Of the 4,300 feet of channel, MDT is seeking credit on 3,900 linear feet. Stream banks and riparian areas along the enhanced Sand Creek channel, both of which are within Parcels 1 and 2 and upstream near the new road alignment, were seeded with a mostly native riparian graminoid species mix and planted with native shrubs/trees and willow cuttings.
- Crediting Summary: The proposed roadway project will affect less than 300 linear feet of the Sand Creek channel and will not likely require mitigation. Thus, all 12,369.5 stream mitigation credits that are generated from the project will be held in reserve by MDT to offset impacts from future highway projects.

The approved performance standards for the mitigation activities are listed below [Confluence Consulting, Inc., 2013].

1. **Wetland Characteristics** must be met as follows. All of the 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 2010 *Regional Supplement to the US Army Corps of Engineers Wetland Delineation Manual for the Western Mountains, Valleys and Coast Region* (2010 Regional Supplement) [USACE, 2010], as an update to the 1987 method (1987 Wetland Manual) [Environmental Laboratory, 1987] that was used to establish baseline wetland conditions at the site.

    a. **Wetland Hydrology Success** will be achieved where wetland hydrology is present as per the technical guidelines in the 2010 Regional Supplement. Soil saturation will be present for at least 12.5 percent of the growing season.

    b. **Hydric Soil Success** will be achieved where hydric soil conditions are present (per the most recent Natural Resource Conservation Service [USDA, 2014a] criteria for hydric soils) or appear to be forming, the soil is sufficiently stable to prevent erosion, and the soil is able to support land cover. 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 achieved where combined absolute cover of facultative or wetter species is greater than or equal to 70 percent and state-listed noxious weeds do not exceed 10 percent relative cover. The following concept of "dominance," as defined in the 2010 Regional Supplement, will be applied during future routine wetland determinations in the created/restored wetlands: *"Subjectively determine the dominant species by estimating those having the largest relative basal area (woody overstory), greatest height (woody understory), greatest percentage of aerial coverage (herbaceous understory) and/or greatest number of stems (woody vines)."*

2. **Channel Restoration Success** will be evaluated in terms of revegetation success and reactivation of the historic channel. Because of the ephemeral nature of Sand Creek, success will be judged primarily on the success of revegetation and historic channel restoration efforts and the ability of Sand Creek to naturally pass flows in the newly created channel sections and restored sections on Parcels 1 and 2.

    a. Revegetation along the new Sand Creek channel corridor will be considered successful when banks are vegetated with a majority of deep-rooting riparian and wetland herbaceous and woody plant species.

    b. The intent of the stream restoration is to allow the stream to naturally migrate within the floodplain and to give it enough room to move and stabilize itself within the site.

    c. Headcut stabilization sections will be evaluated to ensure that measures are working as intended to stop further headcuts upstream.

    d. Bank stabilization sections will be evaluated through yearly inspection to determine the stability of these sections in preventing wetland cell and stream channel intercept.

3. **Vegetation Along Stream Banks** will be considered successful when banks are vegetated with a majority of deep-rooting riparian plant species having root stability indexes greater than or equal to 6.
4. **Open Water** is intended to be provided during the early spring and summer within excavated depressions. As the growing season progresses and the groundwater levels recede, emergent vegetation is expected to germinate within the majority of these depressions. Open water with submerged and floating vegetation is not anticipated at this site but could develop and will, therefore, be considered creditable.
5. **Upland Buffer Success** will be achieved when noxious weeds do not exceed 10 percent relative cover within the buffer areas on site. Any area within the creditable buffer area that is disturbed by the project construction must have at least 50 percent aerial cover of nonweed species by the end the monitoring period.
6. **Weed Control** will be based on annual monitoring of the site to determine weed species and the degree of infestation within the site, and 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. Because of long-term grazing and disturbance at this site, weed infestations, including spotted knapweed (*Centaurea stoebe*), Canada thistle (*Cirsium arvense*) and leafy spurge (*Euphorbia esula*), are prevalent on the site. Weed control in select areas will be implemented before construction to minimize the further spread of noxious weeds. MDT will monitor the wetland and upland areas for noxious weeds as part of our annual wetland monitoring program. Considering the elevated level of existing weed infestation on the site, a goal of 10 percent relative cover is considered obtainable after construction.

The restoration efforts within the Silicon Mountain site aim to reestablish a naturally sustaining aquatic ecosystem and reinstate the holistic dynamics of the Sand Creek channel and its adjacent habitat. After site construction and monitoring, the Silicon Mountain mitigation project will improve wildlife and fisheries habitat within wetland and riparian areas; improve the diversity of riparian, emergent, and scrub/shrub vegetation communities through topographic and hydrologic manipulation and planting; and restore historic wetland and stream functions to the altered landscape within the site.

2.0 METHODS

The second year of monitoring at the Silicon Mountain site was completed on June 22, 2016, on both the wetlands and streams. Monitoring activity locations were mapped using a global positioning system (GPS) and are illustrated in Figure A-2 (Appendix A). Information for the Wetland Mitigation Site Monitoring form and Wetland Determination Data forms was recorded in the field during the site investigation (Appendix B). Data-collection activities included completing a wetland delineation; wetland/open-water/aquatic habitat boundary mapping; vegetation community mapping; vegetation transect monitoring; soils, hydrology, and bird- and wildlife-use documentation; photographic documentation; stream cross sections at eight established stations; functional assessments; and a nonengineering examination of the infrastructure established within the mitigation project area.

2.1 HYDROLOGY

The presence of hydrological indicators as outlined on the Wetland Determination Data form was assessed at four 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 form (Appendix B). Hydrologic assessments allow evaluation of mitigation criteria 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 (usually 14 days or 12.5 percent or more during the growing season)” [USACE, 2010]. Systems with continuous inundation or saturation for greater than 12.5 percent of the growing season are considered wetlands. The growing season is defined for purposes of this report as the number of days where a 50 percent probability exists that the minimum daily temperature is greater than or equal to 28.5 degrees Fahrenheit [Environmental Laboratory, 1987]. The growing season recorded for the meteorological station at Butte Bert Mooney Airport, Montana (241318), which is located approximately 10.5 miles east of the project, extends from May 26 to September 13 for a total of 110 days [Western Regional Climate Center, 2016]. Areas that are defined as wetlands would require 14 days of inundation or saturation within 12 inches of the ground surface to meet the hydrology criteria and performance standards.

Soil pits that were excavated during the wetland delineation were used to evaluate groundwater levels within 18 inches of the ground surface. The data were recorded on the Wetland Determination Data form (Appendix B).

2.2 VEGETATION

The boundaries of dominant-species-based vegetation communities were determined in the field during the active growing season and subsequently delineated on the 2016 aerial photographs. Community types were named based on the predominant vegetation species that characterized each mapped polygon (Figure A-3, Appendix A). 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).

Temporal changes in vegetation were evaluated in 2016 by annually assessing static belt transects that were established in 2015 (Figure A-2, Appendix A). Vegetation composition was assessed and recorded along two approximately 10-foot wide belt transects (T-1 and T-2) that are 564 feet long and 219 feet long, respectively (Figure A-2, Appendix A). The transect locations were recorded with a resource-grade GPS unit. Spatial changes in the vegetation communities were recorded along the stationed transects. The percent aerial cover of each vegetation species within the belt transects was estimated by using the same cover classes used for the vegetation community polygon data (Appendix B). Photographs were taken at the endpoints of each transect during the monitoring event (Appendix C).

The *Montana Noxious Weed List* (July 2015), prepared by the Montana Department of Agriculture [2015], 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). The locations are denoted with the symbol "**x**", "▲", or "■," which represent 0–0.1 acre, 0.1–1 acre, or greater than 1 acre in extent, respectively. 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.

2.3 SOIL

Soil information was obtained from the *Web Soil Survey for Silver Bow County, Montana* [USDA, 2014b] and in situ soil descriptions. Soil cores were excavated using a shovel and evaluated according to procedures outlined in the 1987 Wetland Manual and 2010 Regional Supplement. A description of the soil profile, including hydric indicators when present, was recorded on the Wetland Determination Data form for each profile (Appendix B).

2.4 WETLAND DELINEATION

Waters of the US, including jurisdictional wetlands and special aquatic sites, were delineated throughout the project area in accordance with criteria established in the 1987 Wetland Manual and the 2010 Regional Supplement. The technical criteria for hydrophytic vegetation, hydric soil, and wetland hydrology that were described in the 2010 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]. The 2016 NWPL scientific and common plant names were used in this report. 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 on the Wetland Determination Data form (Appendix B).

The wetland boundary was determined in the field based on changes in plant communities and/or hydrology, as well as 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 a special aquatic site, an atypical situation, or a problem area. The wetland boundaries were surveyed using resource-grade GPS and imported into GIS format. The reported wetland areas have been calculated using GIS spatial quantification methodology.

2.5 WILDLIFE

Observations of use by mammal, reptile, amphibian, and bird species were recorded on the Wetland Mitigation Site Monitoring form during the site visit. Indirect-use indicators, including tracks, scat, burrows, eggshells, skins, feathers, and bones, were recorded. These signs were recorded while traversing the site for other required activities. Direct sampling methods, such as snap traps, live

traps, and pitfall traps, were not used. A comprehensive wildlife species list for the entire site is maintained and reported each year.

2.6 FUNCTIONAL ASSESSMENT

The 2008 MDT Montana Wetland Assessment Method (MWAM) was used to evaluate functions and values on the site during the 2016 site visit. This method provides an objective means of assigning wetlands an overall rating and provides regulators 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. MWAM forms were completed for two separate assessment areas (AA) within the mitigation site (Appendix B).

2.7 PHOTOGRAPHIC DOCUMENTATION

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

2.8 CHANNEL CROSS SECTIONS

The purpose of monitoring the channel is to evaluate and document the newly constructed channel's progress toward performance targets and determine if there is a trend toward or away from meeting the project's objectives. Channel or vegetation monitoring also identifies the effectiveness of the stream restoration by determining successful riparian area and bank stability within the newly constructed stream channel. Channel restoration success for Sand Creek largely depends on vegetation composition and establishment to perform a variety of tasks that include minimizing erosion, stabilizing banks, and providing functional deep-rooted riparian plant communities similar to those that exist in natural, undisturbed riparian systems. Stream monitoring also documents lateral and vertical adjustments of the channel over time. The Silicon Mountain monitoring plan required establishing (at a minimum) one transect per 1,000 feet of assessed stream reach to monitor channel form and function, natural channel migration, channel vertical stability (down-cutting), sediment build-up, and stream bank vegetation development. The mitigation plan [Confluence Consulting, Inc., 2013] included relocating, restoring, or enhancing approximately 4,300 linear feet of Sand Creek; therefore, a minimum of four transects were necessary for monitoring purposes. Eight monitoring cross sections were established within the project reach to document conditions in each of the relocation, restoration, and enhancement reaches of Sand Creek as outlined in Table 2-1. Endpoints of each cross section were marked with wooden stakes and flagging to facilitate locating the cross sections during summer months when vegetation cover is high. Each cross section was surveyed using a survey-grade GPS with a base station established on site to improve accuracy.

Table 2-1. Sand Creek Monitoring Cross Sections

Monitoring Cross Section	Mitigation Action	Habitat Type
1	Relocation/Restoration	Pool
2	Relocation/Restoration	Riffle
3	Restoration of historic channel	Stabilized Pool
4	Restoration of historic channel	Stabilized Pool
5	Restoration of historic channel	Riffle
6	Restoration of historic channel	Stabilized Pool
7	Enhancement of existing channel	Riffle
8	Enhancement of existing channel	Riffle

2.8.1 Parallel Vegetation Belt Transects

Belt transects were established parallel to the stream at each of the monitoring cross sections to document riparian vegetation development and community diversity within the streamside and buffer areas. The parallel belt transects were 5 feet wide and extended 12.5 feet upstream and downstream of each cross section for a total length of 25 feet. Belt transects were established on both sides of the channel. The vegetation inventory at each transect included compiling a list of all of the planted, seeded, and volunteer species observed and assigning a cover class to each species. Percent cover of all of the species within each belt transect was estimated and recorded using the following classification values: 0 (< 1 percent), 1 (1–5 percent), 2 (6–10 percent), 3 (11–20 percent), 4 (21–50 percent), and 5 (> 50 percent). Vegetation community types were assigned to each belt transect based on one or more dominant species observed. Bank stability indices were assigned to the stream bank community types using Winward [2000] stability scores.

2.8.2 Documentation of High-Water Events

Stream monitoring included documenting high-water events that were observed in the adjacent floodplain. Any debris, drift lines, or sediment deposition beyond the active channel was photo-documented.

2.8.3 Inspection of Stabilized Headcuts

Stream monitoring also included inspecting two stabilized headcuts located between constructed wetland Cell 1 and the restored Sand Creek channel. Inspecting these headcuts included photo-documentation at each stabilized area.

2.8.4 Inspection of Stabilized Banks

In an attempt to maintain bank stability along the outside meanders of Sand Creek adjacent to the created wetland cells, portions of the restored channel alignment were constructed by stacking and vegetating two coir-encapsulated soil lifts. Stabilized banks were inspected to document any lateral erosion or bank failure that could eventually lead to wetland cell intercept by the stream channel. In addition to visual inspections, three of the monitoring cross sections were established at the apex of the stabilized meander bend to capture any lateral migration at these locations.

2.9 GLOBAL POSITIONING SYSTEM DATA

Site features and survey points were collected using a resource-grade (± 1 meter) Trimble R1 GNSS GPS receiver and companion Android tablet during the 2016 monitoring season. The collected data were then transferred to a personal computer, imported into GIS, and projected in Montana State Plane Single Zone NAD 83 meters. Site features and survey points that were located with GPS included fence boundaries, photo points, transect endpoints, and wetland data points.

2.10 MAINTENANCE NEEDS

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

3.0 METHODS

3.1 HYDROLOGY

Climate data from the meteorological station at Butte Bert Mooney Airport, Montana (241318), which is located approximately 10.5 miles east of the site, recorded an average annual precipitation rate of 12.7 inches from January 1904 to August 2016 [Western Regional Climate Center, 2016]. The average monthly precipitation total from January to August for the period of record was 9.5 inches. Total precipitation recorded from January to August was 6.81 inches in 2015 and 5.40 inches in 2016. These data indicate that the region received below-average precipitation during the 2015 and 2016 growing seasons.

Approximately 9 percent of the entire site was inundated during the 2016 field survey. The average depth of surface water across the site was estimated at 1 foot with depths that ranged from 0.5 to 2 feet. The surface-water depth at the emergent vegetation and open-water boundary was estimated at 0.5 foot. Open water was present in more than 75 percent of constructed wetland Cells 1 and 5, with an average depth of approximately 2 feet. Ponded water was present across 50 percent of wetland Cell 4 during the June monitoring. Soils were saturated to the surface across wetland Cell 2 and across the remaining portion of wetland Cell 4. Stagnant water was noted primarily in the southern reach of Sand Creek, and flowing water was observed in the northern reach of Sand Creek. Other site-wide indicators of wetland hydrology included saturation, saturation visible on aerial imagery, hydrogen sulfide odor, positive FAC-neutral test, and geomorphic position. Surface-water runoff, direct precipitation, and a high seasonal groundwater table that provides the majority of water that drives wetland hydrology within the site. The northeastern portion of the site also receives perennial surface flow from a well-defined spring that originates south of the mitigation area and flows north through Parcel 2 and into Silver Bow Creek.

Two paired data points (DP-1W and DP-1U; DP-2W and DP-2U) were sampled to determine the wetland and upland boundaries. DP-1W and DP-2W are located in areas that met the wetland criteria. DP-1W is located in constructed wetland Cell 3 near the western project boundary, and DP-2W is located in constructed wetland Cell 5 near the northern project boundary. Evidence of positive

wetland hydrology at DP-1W included high groundwater, saturation to ground surface, hydrogen sulfide odor, geomorphic position, and a positive FAC-neutral test. Wetland hydrology indicators at DP-2W included saturation to ground surface, hydrogen sulfide odor, saturation visible on aerial imagery, geomorphic position, and a positive FAC-neutral test. No primary or secondary indicators of wetland hydrology were observed at DP-1U and DP-2U, which are located upslope of DP-1W and DP-2W, respectively.

3.2 VEGETATION

A comprehensive list of 134 plant species (up from 93 in 2015) that were identified on the site in 2015 and 2016 is presented in Table 3-1. Vegetation communities were identified by species composition and their associated cover classes. The community composition is provided on the Mitigation Monitoring form (Appendix B) and the community boundaries shown on Figure A-3 (Appendix A).

Eleven vegetation community types were observed in 2016, including five upland community types and six wetland community types.

- Upland Type 2 – *Descurainia sophia*/*Thlaspi arvense*
- Upland Type 3 – *Bromus inermis*/*Poa pratensis*
- Upland Type 5 – *Elymus repens*/*Bromus inermis*
- Upland Type 10 – *Artemisia tridentata*/*Poa* spp.
- Upland Type 12 – *Elymus trachycaulus*/*Poa ampla*
- Wetland Type 4 – *Carex* spp./*Juncus balticus*
- Wetland Type 6 – *Puccinellia nuttalliana*/*Deschampsia caespitosa*
- Wetland Type 7 – Open Water/Aquatic Macrophytes
- Wetland Type 8 – *Salix exigua*/*Juncus balticus*
- Wetland Type 9 – *Juncus balticus*/*Elymus repens*
- Wetland Type 11 – *Typha latifolia*.

These community types are discussed below.

Upland community Type 2 – *Descurainia sophia*/*Thlaspi arvense* represented upland areas that were disturbed by construction at the mitigation site in 2014. This community includes primarily nonnative and weedy species that are commonly found in recently disturbed and/or degraded landscapes. In 2016, the majority of this community type had transitioned into a new community type with a dominance of perennial seeded grasses that include slender wheatgrass (*Elymus trachycaulus*) and big blue grass (*Poa ampla*) or community Type 12. This new community represents a transition toward more desirable seeded species and a reduction in weedy species. In 2016, community Type 2 was mapped in recent disturbances along the new paved trail in the northern portion of the project area and the upland boundary around wetland Cell 5. Species that include herb sophia (*Descurainia sophia*) and field pennycress (*Thlaspi arvense*) were dominant, with lesser cover provided by Mexican-fireweed (*Bassia scoparia*), clasping pepperwort (*Lepidium perfoliatum*), and Canada thistle (*Cirsium arvense*).

Table 3-1. Vegetation Species Observed From 2015 Through 2016 at the Silicon Mountain Site (Page 1 of 4)

Scientific Name	Common Name	WMVC Indicator Status[a]
Achillea millefolium	Common Yarrow	FACU
Agropyron cristatum	Crested Wheatgrass	NL
Agrostis stolonifera	Spreading Bent	FAC
Algae, green	Algae, green	NL
Alopecurus aequalis	Short-Awn Meadow-Foxtail	OBL
Alopecurus pratensis	Field Meadow-Foxtail	FAC
Alyssum alyssoides	Pale or Yellow Alyssum	NL
Alyssum desestorum	Dwarf Alyssum	NL
Artemisia campestris	Pacific Wormwood	FACU
Artemisia frigida	Fringed Sage	NL
Artemisia ludovicinana	White Sagebrush	FACU
Artemisia tridentata	Big Sagebrush	NL
Astragalus agrestis	Cock's-Head	FACW
Astragalus bisulcatus	Two-Grooved Milkvetch	NL
Astragalus cicer	Chickpea Milkvetch	NL
Bassica scoparia	Mexican-Fireweed	FAC
Beckmannia syzigachne	American Slough Grass	OBL
Bromus inermis	Smooth Brome	UPL
Bromus japonicus	Japanese Brome	NL
Bromus tectorum	Cheatgrass	NL
Calamagrostis canadensis	Bluejoint	FACW
Camelina microcarpa	Little-Pod False Flax	FACU
Cardaria draba	Whitetop	NL
Carex aquatilis	Leafy Tussock Sedge	OBL
Carex nebrascensis	Nebraska Sedge	OBL
Carex praegracilis	Clustered Field Sedge	FACW
Carex simulata	Analogue Sedge	OBL
Carex utriculata	Northwest Territory Sedge	OBL
Catabrosa aquatica	Water Whorl Grass	OBL
Centaurea stoebe	Spotted Knapweed	NL
Chenopodium album	Lamb's-Quarters	FACU
Cicuta douglasii	Western Water-Hemlock	OBL
Cirsium arvense	Canadian Thistle	FAC
Cirsium foliosum	Elk Thistle	FAC
Collomia linearis	Narrowleaf Mountain Trumpet	FACU
Crepis tectorum	Narrowleaf Hawksbeard	NL
Cyrtorhynacha cymbalaria	Alkali Buttercup	OBL
Dasiphora fructicosa	Golden-Hardhack	FAC

Table 3-1. Vegetation Species Observed From 2015 Through 2016 at the Silicon Mountain Site (Page 2 of 4)

Scientific Name	Common Name	WMVC Indicator Status[(a)]
Deschampsia caespitosa	Tufted Hair Grass	FACW
Descurainia sophia	Herb Sophia	NL
Distichlis spicata	Coastal Salt Grass	FACW
Eleocharis palustris	Common Spike-Rush	OBL
Elymus canadensis	Nodding Wild Rye	FAC
Elymus cinereus	Great Basin Wild Rye	NL
Elymus lanceolatus	Streamside Wild Rye	FACU
Elymus repens	Creeping Wild Rye	FAC
Elymus trachycaulus	Slender Wild Rye	FAC
Epilobium ciliatum	Fringed Willowherb	FACW
Equisetum arvense	Field Horsetail	FAC
Ericameria nauseosa	Rubber Rabbitbrush	NL
Erigeron sp.	Fleabane	NL
Erysimum inconspicuum	Small-flowered Prairie Wallflower	NL
Euphorbia esula	Leafy Spurge	NL
Festuca ovina	Sheep Fescue	UPL
Geum macrophyllum	Large-Leaf Avens	FAC
Glyceria grandis	American Manna Grass	OBL
Glyceria striata	Fowl Manna Grass	OBL
Grindelia squarrosa	Curly-Cup Gumweed	FACU
Hesperostipa comata	Needle-and-Thread Grass	NL
Hordeum brachyantherum	Meadow Barley	FACW
Hordeum jubatum	Foxtail Barley	FAC
Hyoscyamus niger	Black Henbane	NL
Iris missouriensis	Rocky Mountain Iris	FACW
Juncus balticus	Baltic Rush	FACW
Juncus bufonius	Toad Rush	FACW
Juncus mertensianus	Mertens' Rush	OBL
Juniperus scopulorum	Rocky Mountain Juniper	NL
Koeleria macrantha	Prairie Junegrass	NL
Lemna minor	Common Duckweed	OBL
Lepidium campestre	Field Pepper-grass	NL
Lepidium perfoliatum	Clasping Pepperwort	FACU
Linaria vulgaris	Butter-and-Eggs	NL
Linum lewisii	Prairie Flax	NL
Medicago lupulina	Black Medic	FACU
Melilotus officinalis	Yellow Sweet-Clover	FACU
Mentha arvensis	American Wild Mint	FACW

Table 3-1. Vegetation Species Observed From 2015 Through 2016 at the Silicon Mountain Site (Page 3 of 4)

Scientific Name	Common Name	WMVC Indicator Status[a]
Orthocarpus tenuifolius	Thin-leaved Owl's-clover	NL
Oxytropis deflexa	Pendant-pod Locoweed	FACU
Pascopyrum smithii	Western-Wheat Grass	FACU
Penstemon nitidus	Wax-leaf Beardtongue	NL
Penstemon procerus	Pincushion Beardtongue	FAC
Phacelia hastata	Silverleaf Scorpion-weed	NL
Phalaris arundinacea	Reed Canary Grass	FACW
Phleum pratense	Common Timothy	FAC
Phlox muscoides	Moss Phlox	NL
Plantago eriopoda	Red-Wooly Plantain	FACW
Plantago major	Great Plantain	FAC
Poa ampla (= P. secunda, P. junicifolia)	Big Blue Grass	FACU
Poa compressa	Flat-stem Blue Grass	FACU
Poa palustris	Fowl Blue Grass	FAC
Poa pratensis	Kentucky Blue Grass	FAC
Polemonium pulcherrimum	Showy Jacob's-ladder	NL
Polygonum aviculare	Yard Knotweed	FAC
Potentilla anserina	Silverweed	OBL
Potentilla gracilis	Graceful Cinquefoil	FAC
Pseudoroegneria spicata	Bluebunch Wheatgrass	NL
Puccinellia nuttalliana	Nuttall's Alkali Grass	FACW
Ranunculus sp.	Buttercup	(OBL)
Ribes aureum	Golden Currant	FAC
Rorippa palustris	Bog Yellow Cress	OBL
Rumex crispus	Curly Dock	FAC
Rumex salicifolius	Willow Dock	FACW
Salix boothii	Booth's Willow	FACW
Salix exigua	Narrowleaf Willow	FACW
Salix geyerianna	Geyer Willow	FACW
Salix lutea (=S. eriocephala)	Yellow Willow	OBL
Schedonorus pratensis	Meadow False Rye Grass	FACU
Schoenocrambe linifolia	Plains Mustard	NL
Scirpus microcarpus	Red-Tinge Bulrush	OBL
Shephardia argentea	Silver Buffalo-Berry	FACU
Silene latifolia	Bladder Campion	NL
Sisymbrium altissimum	Tall Hedge-Mustard	FACU
Sisymbrium loeselii	Small Tumble-Mustard	NL

Table 3-1. Vegetation Species Observed From 2015 Through 2016 at the Silicon Mountain Site (Page 4 of 4)

Scientific Name	Common Name	WMVC Indicator Status[(a)]
Sisyrinchium montanum	Strict Blue-eyed Grass	FAC
Solidago canadensis	Canadian Goldenrod	FACU
Solidago gigantea	Late Goldenrod	FACW
Sonchus arvensis	Field Sow-Thistle	FACU
Sphaeralcea coccinea	Scarlet Globemallow	NL
Stellaria longipes	Long-Stalk Starwort	FACW
Symphyotrichum ascendens	Western American-Aster	FACU
Symphyotrichum falcatum	Rough White Prairie American-Aster	FACU
Symphyotrichum lanceolatum	White Panicle Aster	OBL
Tanacetum vulgare	Common Tansy	FACU
Taraxacum officinale	Common Dandelion	FACU
Thlaspi arvense	Field Pennycress	UPL
Tragopogon dubius	Meadow Goat's-beard	NL
Trifolium hybridum	Alsike Clover	FAC
Trifolium pratense	Red Clover	FACU
Trifolium repens	White Clover	FAC
Typha latifolia	Broad-Leaf Cattail	OBL
Valeriana edulis	Tobacco-Root	FAC
Verbascum thapsus	Great Mullein	FACU
Veronica americana	American-Brooklime	OBL
Veronica anagallis-aquatica	Blue Water Speedwell	OBL

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

Upland community Type 3 – *Bromus inermis/Poa pratensis* was identified across 14.8 acres of upland north of the new road alignment. Dominant species included smooth brome (*Bromus inermis*) and Kentucky blue grass (*Poa pratensis*), with lesser cover provided by common yarrow (*Achillea millefolium*), spotted knapweed (*Centaurea stoebe*), leafy spurge (*Euphorbia esula*), yellow sweet-clover (*Melilotus officinalis*), Great Basin wild rye (*Elymus cinereus*), creeping wild rye (*Elymus repens*), slender wild rye (*Elymus trachycaulus*), prairie junegrass (*Koeleria macrantha*), narrowleaf willow (*Salix exigua*), meadow false rye grass (*Schedonorus pratensis*), and field pennycress.

Upland community Type 5 – *Elymus repens/Bromus inermis* was observed on 1.7 acres south of the new roadway. Common species within this community included smooth brome, creeping wild rye, Canada thistle, herb sophia, leafy spurge, Baltic rush (*Juncus balticus*), late goldenrod (*Solidago gigantea)*, field pennycress, and several other species that were observed at less than 5 percent cover. Baltic rush is a volunteer species that was noticed primarily along the margins of this community adjacent to wetlands areas.

Upland community Type 10 – *Artemisia tridentata/Poa spp*. was observed across 7.3 acres in the northeastern portion of the project area. This community type (formerly Type 1 – *Artemisia tridentata/Bromus inermis*) was reevaluated in 2016 where blue grass species were determined abundant and represented the majority of the codominant grass species associated with the big sagebrush (*Artemisia tridentata*) community. Blue grass species included big blue grass (*Poa ampla; synonyms P. juncifolia, P. secunda*) and Kentucky blue grass (*Poa pratensis*). Other species included spotted knapweed*,* prairie junegrass, western wheatgrass (*Pascopyrum smithii*), bluebunch wheatgrass (*Pseudoroegneria spicata*), rubber rabbitbrush (*Ericameria nauseosa*), needle-and-thread (*Hesperostipa comata*) and Rocky Mountain juniper *(Juniperus scopulorum*).

Upland community Type 12 – *Elymus trachycaulus/Poa ampla* was identified on 4.6 acres of newly seeded upland within the old roadway alignment north of the new bridge. This area was previously characterized as Type 1 but has transitioned into perennial grasses that include slender wild rye, streamside wild rye (*Elymus lanceolatus*), big blue grass, crested wheatgrass (*Agropyron cristatum*), great basin wild rye, creeping wild rye, and clasping pepperwort. This area will continue to develop as both seeded species and encroaching other native grasses and forbs establish. The vegetation cover was estimated at 30 percent during the June 2016 monitoring. Soils were stable with no signs of erosion. Within the last year, a transition of 4.7 acres occurred from community Type 2 to community Type 12, which represents a positive trend toward perennial, desirable species.

Wetland community Type 4 – *Carex* spp*./Juncus balticus* characterized 9.5 acres of preexisting wetland that remained relatively undisturbed during construction in 2014. Species identified in this community include primarily OBL to FACW species such as leafy tussock sedge (*Carex aquatilis*), Nebraska sedge (*Carex nebrascensis*), Northwest Territory sedge (*Carex utriculata*), northern meadow sedge (*Carex praticola*), bluejoint (*Calamagrostis canadensis*), tufted hair grass (*Deschampsia caespitosa*), Baltic rush, silverweed (*Potentilla anserina*), American wild mint (*Mentha arvensis*), fowl blue grass (*Poa palustris*), Kentucky blue grass, and several other species that were observed at less than 1 percent cover.

Wetland community Type 6 – *Puccinellia nuttalliana/Deschampsia caespitosa* was identified on 3.0 acres of wetland within constructed wetland Cells 2 and 3 near the western project boundary. The vegetation was dominated by tufted hair grass, Nuttall's alkali grass (*Puccinellia nuttalliana*), American slough grass (*Beckmannia syzigachne*), fowl blue grass, spreading bent grass (*Agrostis stolonifera*), and many other species that were observed at less than 5 percent cover.

Wetland community Type 7 – Open Water/Aquatic Macrophytes characterized 3.0 acres of wetland within constructed wetland Cells 1 and 5. Open water represented more than 50 percent of this community. Common duckweed (*Lemna minor*) and green algae dominated this community, with lesser cover from American slough grass and broad-leaf cattail (*Typha latifolia*). An additional 0.5 acre of community Type 7 (existing open water) located in the far northeastern corner of the project site was also mapped during the 2016 survey. This open-water habitat is likely not new in 2016 but was simply lumped into community Type 4 in the 2015 monitoring report.

Wetland community Type 8 – *Salix exigua/Juncus balticus* represented 0.2 acre of preexisting wetland that remained relatively undisturbed from construction in 2014. This existing wetland

community is adjacent to the western project boundary and was dominated by narrowleaf willow, Baltic rush, Nebraska sedge, spreading bent (*Agrostis stolonifera*), field meadow-foxtail (*Alopecurus pratensis*), and several other species observed at less than 5 percent cover.

Wetland community Type 9 – *Juncus balticus/Elymus repens* characterized 0.04 acre south of the new roadway in a preexisting wetland area. Species observed in this community included creeping wild rye, Baltic rush, Canada thistle, fowl blue grass, silverweed, late goldenrod, white panicle aster (*Symphyotrichum lanceolatum*), and large-leaf avens (*Geum macrophyllum*) with other species that were identified at less than 1 percent cover.

Wetland community Type 11 – *Typhia latifolia* is young wetland community that is beginning to dominate small areas where shallow surface water is present during the spring and early summer. This new community represents 0.3 acre, typically within Type 6. In addition to a dominance of broad-leaf cattail, other species, including tufted hairgrass, Nuttail's alkaligrass, common spike-rush, alkali buttercup (*Cyrtorhyncha cymbalaria*) and American slough grass represented 1–5 percent of the vegetation cover. This community type will likely continue to increase within the depressional wetland cells or in areas with seasonal shallow or ponded water.

Vegetation community composition were documented along two transects (T-1 and T-2) that were established during initial monitoring at the site in 2015. The data recorded on T-1 (Wetland Mitigation Site Monitoring form, Appendix B) are summarized in tabular and graphical formats in Table 3-2 and Charts 3-1 and 3-2, respectively. T-1 extends 564 feet from south to north across constructed wetland Cells 2 and 3. The transect starts across upland community Type 12 – *Elymus trachycaulus/Poa ampla* and then alternates between wetland communities Type 6 – *Puccinellia nuttalliana/Deschampsia caespitosa*, Type 11 – *Typha latifolia*, and upland community Type 3 – *Bromus inermis/Poa pratensis*. Hydrophytic vegetation composed approximately 81.3 percent of the transect during the 2016 survey. A total of 48 species were identified, including 26 hydrophytes and 22 upland species.

Table 3-2. Data Summary for T-1 in 2015 and 2016 at the Silicon Mountain Site

Monitoring Year	2015	2016
Transect Length (feet)	**564**	**564**
Vegetation Community Transitions Along Transect	4	6
Vegetation Communities Along Transect	3	4
Hydrophytic Vegetation Communities Along Transect	1	2
Total Vegetative Species	51	48
Total Hydrophytic Species	30	26
Total Upland Species	21	22
Estimated % Total Vegetative Cover	90	90
Estimated % Unvegetated	10	10
% Transect Length Comprising Hydrophytic Vegetation Communities	80.5	81.3
% Transect Length Comprising Upland Vegetation Communities	19.5	18.7
% Transect Length Comprising Unvegetated Open Water	0	0
% Transect Length Comprising Mudflat	0	0

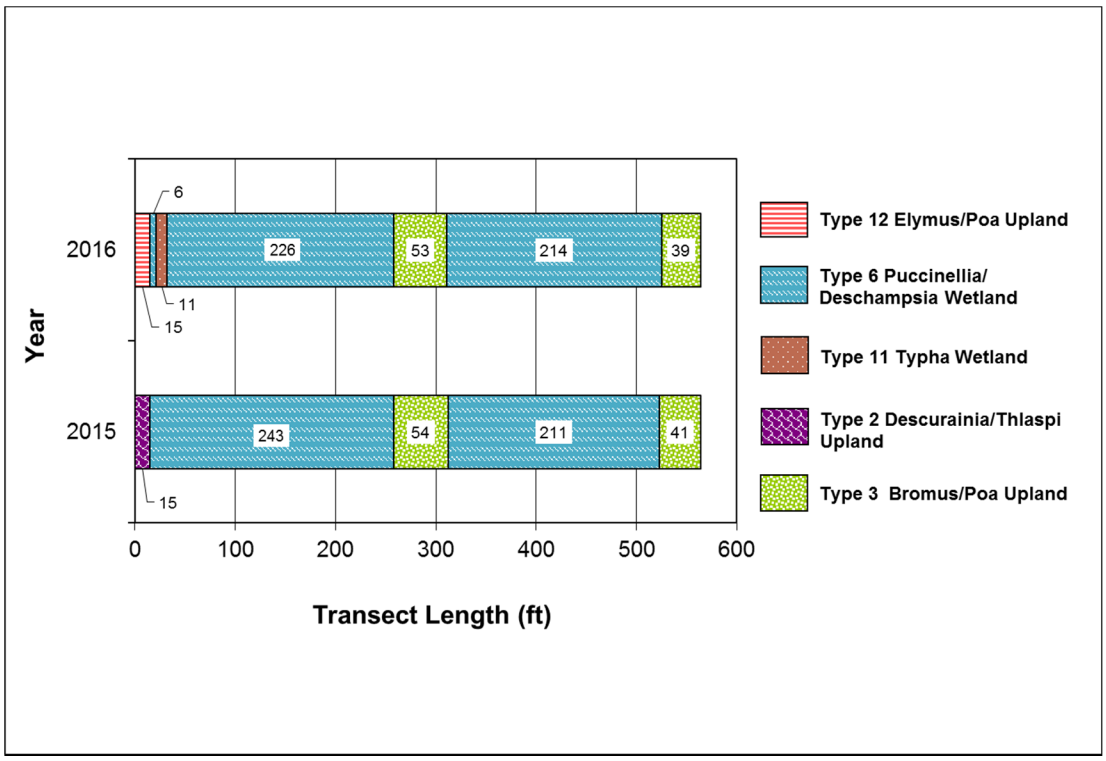


Chart 3-1. Transect Map Showing Community Types on T-1 in 2015 and 2016 From Start (0 Foot) to End (564 Feet) at the Silicon Mountain Site.

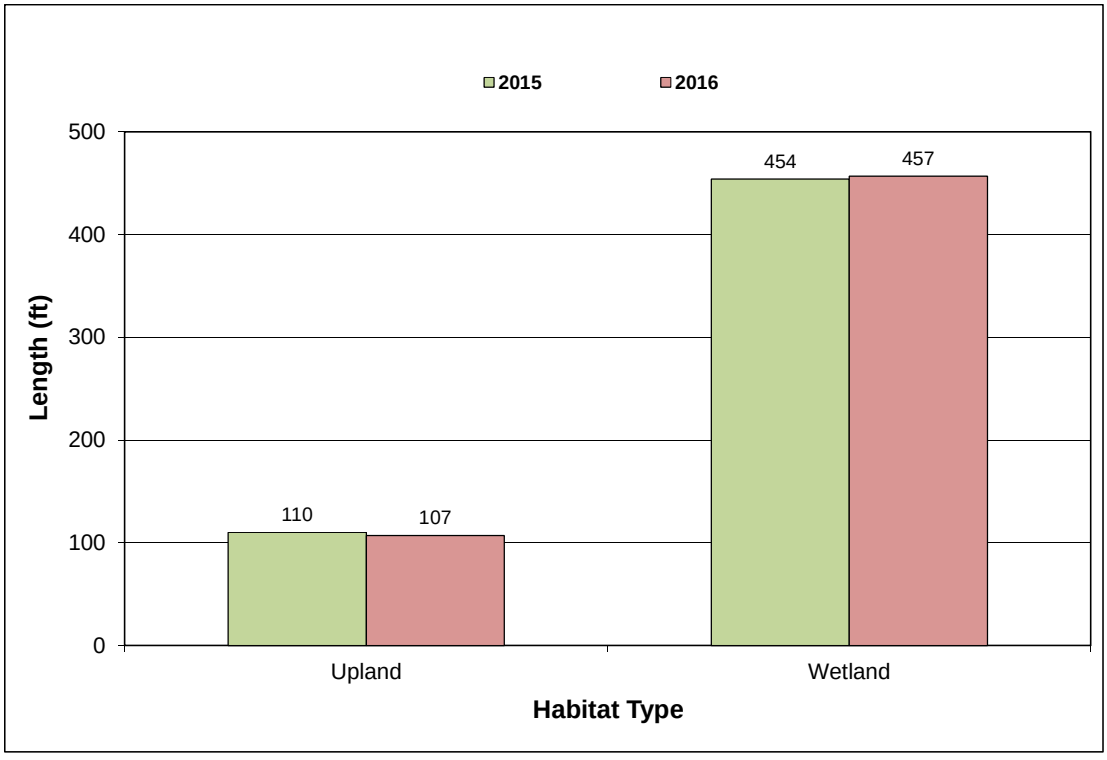


Chart 3-2. Length of Habitat Types Within T-1 in 2015 and 2016 at the Silicon Mountain Site.

Data collected on T-2 (Wetland Mitigation Site Monitoring form, Appendix B) are summarized in tabular and graphic formats in Table 3-3 and Charts 3-3 and 3-4, respectively. This 219-foot transect began in upland community Type 5 – *Elymus repens/Bromus inermis,* intersected constructed wetland Cell 4 and wetland community Type 6 – *Puccinellia nuttalliana/Deschampsia caespitosa*, and ended in upland community Type 2 – *Descurainia sophia/Thlaspi arvense*. Hydrophytic vegetation composed approximately 88.1 percent of the transect during the 2016 survey. A total of 21 species were identified, including 10 hydrophytes and 11 upland species. Bare ground represented 55 percent of the transect and was caused by excavating and seeding wetland Cell 4 in 2014. In 2016, the percent of bare ground decreased along T-2 with a corresponding increase in vegetation cover, but the size/length of the plant communities that were measured along this transect were the same in 2015 and 2016. The data suggest that this cell is progressing slowly toward a shift to higher cover values with corresponding increases in hydrophytic plant community size. Potential factors influencing this ecological transition could be related to the soil texture (soils in the area indicate a high percentage of clay) and/or inundation (areas of ponded water may accumulate and slow the development of seeded species or the establishment of nonseeded hydrophytic vegetation from local sources). Portions of this cell have been extremely wet over the past two years as noted in the wetland Cell 4 photographs (Appendix C). Vegetation cover and species composition is expected to increase as the site recovers from construction.

Table 3-3. Data Summary for T-2 in 2015 and 2016 at the Silicon Mountain Site

Monitoring Year	2015	2016
Transect Length (feet)	**219**	**219**
Vegetation Community Transitions Along Transect	2	2
Vegetation Communities Along Transect	2	3
Hydrophytic Vegetation Communities Along Transect	1	1
Total Vegetative Species	9	21
Total Hydrophytic Species	5	10
Total Upland Species	4	11
Estimated % Total Vegetative Cover	30	45
Estimated % Unvegetated	70	55
% Transect Length Comprising Hydrophytic Vegetation Communities	88.1	88.1
% Transect Length Comprising Upland Vegetation Communities	11.9	11.9
% Transect Length Comprising Unvegetated Open Water	0	0
% Transect Length Comprising Mudflat	0	0

A total of 51 infestations of state-listed Priority 2B noxious weeds were mapped at the Silicon Mountain site (Figure A-3, Appendix A). These mapped infestations include clusters or groups of noxious weed plants within an area and not individual plants. A total of 13 infestations of spotted knapweed, 15 infestations of Canada thistle, 20 infestations of leafy spurge, 1 infestation of black henbane (*Hyoscyamus niger*), and 2 infestations of butter-and-eggs (*Linaria vulgaris*) were identified in areas less than 1.0 acre in size with cover classes that range from trace (less than 1 percent) to high (greater than 26 percent). MDT has an ongoing weed-control program for their mitigation sites that includes an annual assessment of weeds that are identified at each location and treatment to contain and control identified populations.

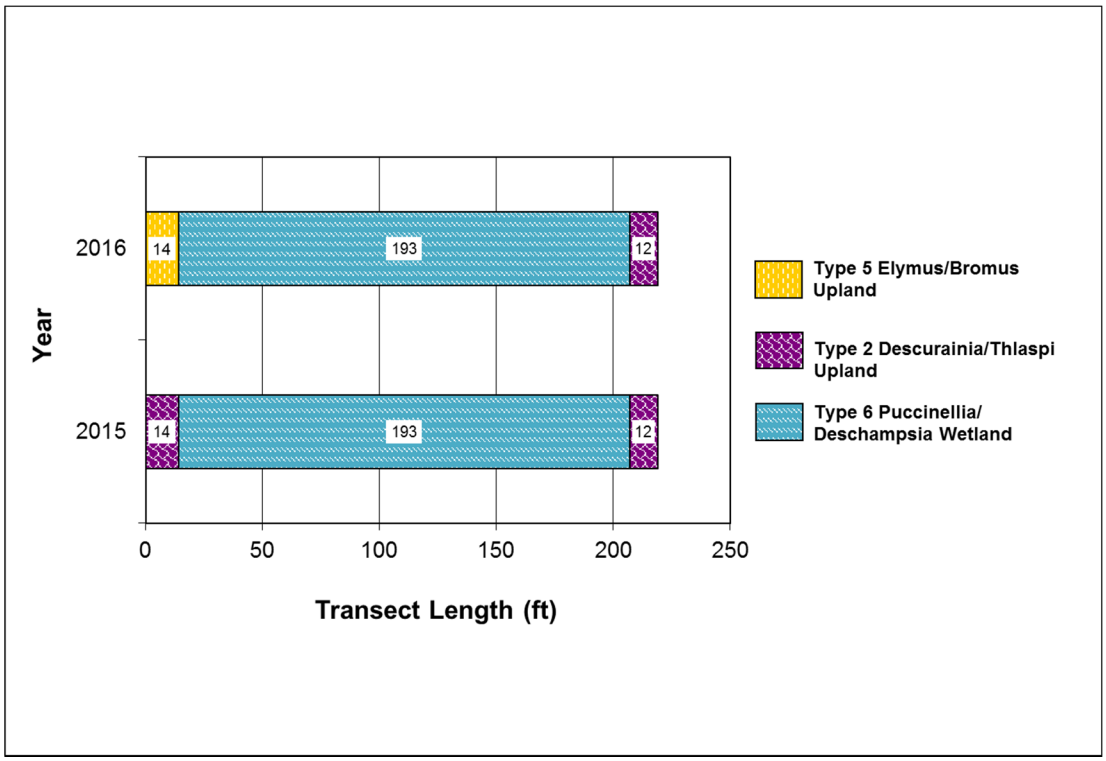


Chart 3-3. Transect Map Showing Community Types on T-2 in 2015 and 2016 From Start (0 Foot) to End (219 Feet) at the Silicon Mountain Site.

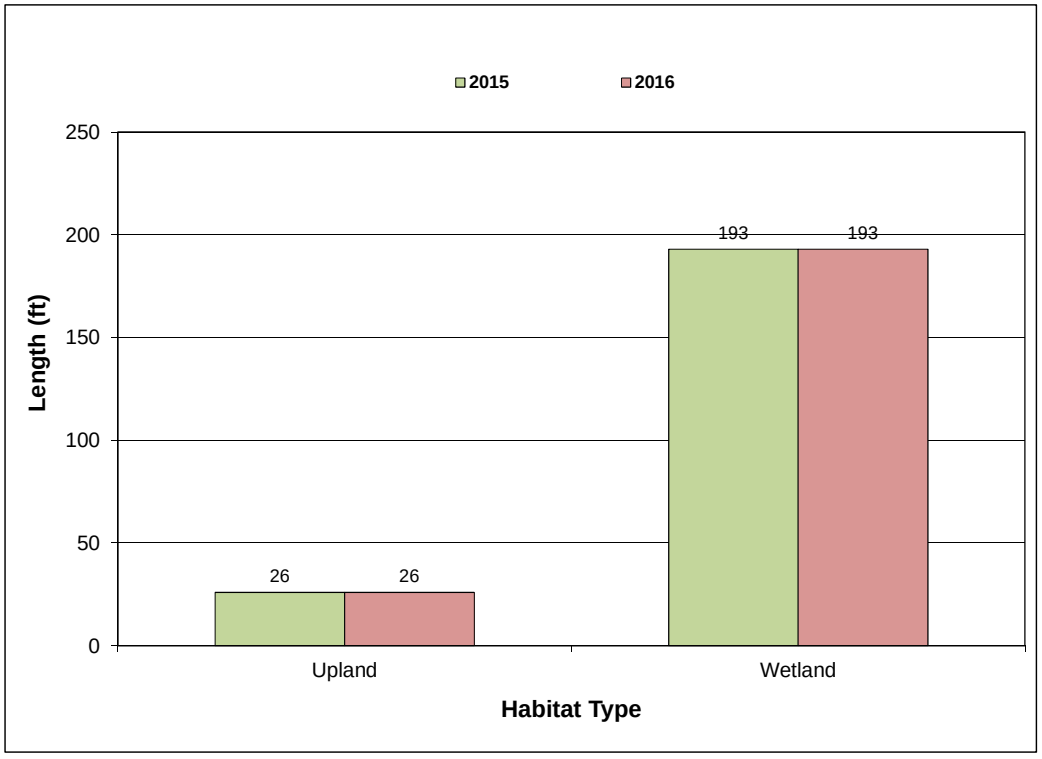


Chart 3-4. Length of Habitat Types Within T-2 in 2015 and 2016 at the Silicon Mountain Site.

MDT planted an estimated 30,000 willow cuttings and 350 containerized shrubs and trees along the stream banks of the Sand Creek channel, in riparian areas, and in small clusters around the perimeter of the excavated wetland cells (Appendix E). An estimated 13 percent of the containerized woody plantings continue to survive through the 2016 survey. An estimated 85 percent of the willow cuttings that were installed survived; young twigs off the cuttings ranged from 6 to 24 inches in length.

3.3 SOIL

The project site was mapped in the *Web Soil Survey for Butte Silver Bow County, Montana* [USDA, 2014b]. Four soil series were mapped within the monitoring area and include the Riverrun, occasionally flooded-Mannixlee complex; Varney-Anaconda loam; Mannixlee-Bonebasin complex; and Varney loam. The primary map unit on the site (approximately 65 percent) and the soil series identified for all four sample points was the Riverrun, occasionally flooded-Mannixlee complex. This dominant soil series consists of occasionally to frequently flooded, deep, poorly drained, loamy soils that occur in floodplains. The Varney-Anaconda loam was mapped across the far northern portion of the project area, and consists of deep, well-drained soils that occur on stream terraces and alluvial fans. The Varney loam was mapped across the northeastern project area and consists of deep, well-drained soils that occur in alluvial fans. The Mannixlee-Bonebasin complex was also mapped across the northeastern project area and consists of deep, poorly drained soils that occur on floodplains. The Riverrun-Mannixlee complex and Mannixlee-Bonebasin complex are included on the *Montana Hydric Soils List* [USDA, 2014c].

Soil test pits were excavated at four locations (Figure A-2, Appendix A). Paired data points (DP-1W and DP-1U) are located near the western project boundary and constructed wetland Cell 3, while DP-2W and DP-2U are located near the northern project boundary and constructed wetland Cell 5. The soil profile at DP-1W, which is located in wetland Type 6 – *Puccinellia nuttalliana/Deschampsia caespitosa*, revealed a dark gray (10YR 4/1), sandy clay loam in the upper 8 inches and a grayish-brown (10YR 5/2) clay below 8 inches. The soil profile at DP-2W, which is located in wetland Type 7 – Open Water/Aquatic Macrophytes, exhibited a very dark grayish-brown (10YR 3/2) sandy loam. No hydric soil indicators were observed for DP-1W or DP-2W, which is likely because of their location in recently constructed wetland cells where soils may be too young to have formed hydric indicators (*Problematic Hydric Soils: Recently Developed Wetlands*) [USACE, 2010]. The soil profile at DP-1U, which is located in upland Type 3 – *Bromus inermis/Poa pratensis*, exhibited a very dark, grayish-brown (10YR 3/2) sandy loam, with no hydric soil indicators observed. The soil profile at DP-2U, which is located in upland Type 2 – *Descurainia sophia/Thlaspi arvense*, revealed a very dark, grayish-brown (10 YR 3/2) loam, with no hydric soil indicators observed. As mentioned above, the paired data points occur within Riverrun, occasionally flooded-Mannixlee soil complexes. While the DP-2W and DP-2U soil pits confirmed this mapped soil type, the DP-1W and DP-1U soil pits did not.

3.4 WETLAND DELINEATION

Four data points were evaluated to confirm the wetland boundary determination in 2016 (Figure A-2, Appendix A). The completed Wetland Determination Data forms are located in Appendix B. DP-1W and DP-2W were located in areas that were classified as wetlands. The total wetland acreage

surveyed within the Silicon Mountain site in 2016 was 16.6 acres. The delineation confirmed 6.3 acres of created wetland in the excavated cells and 10.3 acres in the preserved wetland areas (Table 3-4). Uplands accounted for approximately 31.8 acres of the mitigation site, with the remaining 1.7 acres represented by the restored Sand Creek channel.

Table 3-4. Wetland Acres Delineated in 2016 at the Silicon Mountain Site

Wetland Habitat Type	2015 Acreage	2016 Acreage
Project Area	50.1	50.1
Establishment (Creation)	6.3	6.3
Preservation	10.3	10.3
Total Wetland Habitat	**16.6**	**16.6**

3.5 WILDLIFE

A list of animal species that were observed directly or indirectly in 2015 and 2016 is presented in Table 3-5 and noted on the Wetland Mitigation Site Monitoring form (Appendix B). In 2016, 18 bird species were identified on site. Birds that were observed using open water areas included Canada geese (*Branta canadensis*), cinnamon teal (*Anas cyanoptera*), common merganser (*Mergus merganser*), northern shoveler (*Anas clypeata*), and ruddy ducks (*Oxyura jamaicensis*). Other directly observed wildlife included Columbian ground squirrel (*Urocitellus columbianus*) and deer (*Odocoileus sp.*) including a fawn. Elk *(Cervus canadensis)* droppings, deer (*Odocoileus* sp.) tracks, and recent vole burrows were also observed during the 2016 site visit.

3.6 FUNCTIONAL ASSESSMENT

The 2008 MDT MWAM was used to evaluate the functional values of the created wetlands in 2015 and 2016. Two AAs were assessed in 2015 and 2016 that included created wetland Cells 2, 3, and 4, and created wetland Cells 1 and 5. In 2016, a third assessment was completed for the preservation wetlands (Table 3-6 and Appendix B). The created wetland cells were classified into separate AAs based on perennial hydrology and open water observed during the 2015 and 2016 site visits in Cells 1 and 5 and seasonal hydrology and saturation observed in Cells 2, 3, and 4. As hydrology stabilizes at the site, these AAs will likely shift in subsequent monitoring years.

The AA for created wetland Cells 2, 3, and 4 increased slightly from 3.1 acres in 2015 to 3.3 acres in 2016; was characterized by wetland community Types 6 – *Puccinellia nuttalliana/Deschampsia caespitosa* and 11 – *Typha latifolia*; and was rated as a Category III wetland with 48 percent of the total possible points in 2016. This AA received a high functional rating for sediment/nutrient/toxicant removal and moderate ratings for short- and long-term surface-water storage, production export/food chain support, groundwater discharge/recharge, and Montana Natural Heritage Program (MTNHP) species habitat. The rating for this AA is expected to increase as the disturbed areas recover when desirable vegetation cover increases and hydrology stabilizes at the site.

Table 3-5. Wildlife Species Observed From 2015 Through 2016 at the Silicon Mountain Site

Common Name	Scientific Name
Bird	
American Crow	***Corvus brachyrhynchos***
American Robin	***Turdus migratorius***
Black-billed Magpie	***Pica hudsonia***
Canada Goose	***Branta canadensis***
Cinnamon Teal	***Anas cyanoptera***
Common Grackle	***Quiscalus quiscula***
Gadwall	*Anas strepera*
Gray Partridge	***Perdix perdix***
Green-winged Teal	*Anas crecca*
House Sparrow	*Passer domesticus*
European Starling	*Styrnus vulgaris*
Brown-headed Cowbird	*Molothrus ater*
Northern Shoveler	*Anas clypeata*
Common Merganser	*Mergus merganser*
Cliff Swallow	*Hirundo pyrrhonota*
Killdeer	***Charadrius vociferus***
Lesser Scaup	*Aythya affinis*
Mallard	*Anas platyrhynchos*
Mourning Dove	*Zenaida macroura*
Red-winged Blackbird	***Agelaius phoeniceus***
Ruddy Duck	***Oxyura jamaicensis***
Sandhill Crane	***Grus canadensis***
Tree Swallow	*Tachycineta bicolor*
Unknown duckling	
Vesper Sparrow	***Pooecetes gramineus***
Western Meadowlark	*Sturnella neglecta*
Wilson's Snipe	*Gallinago delicata*
Yellow-headed Blackbird	***Xanthocephalus xanthocephalus***
Mammal	
Coyote	*Canis latrans*
Elk	***Cervus canadensis (droppings)***
Deer sp.	***Odocoileus* sp.**
Columbian Ground Squirrel	***Urocitellus columbianus***
Ground Squirrel sp.	*Urocitellus columbionos (burrow)*
Mule Deer	*Odocoileus hemionus*
Rabbit sp.	
Red Fox	*Vulpes vulpes*
Vole sp.	***Microtus sp.***

Species that were identified in 2016 are **bolded.**

Table 3-6. Functions and Values of the Silicon Mountain Site in 2015 and 2016

Function and Value Parameters From the 2008 MDT Montana Wetland Assessment Method[a]	2015 AA 1 (Created Wetland Cells 2, 3, and 4)	2015 AA 2 (Created Wetland Cells 1 and 5)	2016 AA 1 (Created Wetland Cells 2, 3, and 4)	2016 AA 2 (Created Wetland Cells 1 and 5)	2016 AA 3 (Preservation Wetlands)[b]
Listed/Proposed Threatened and Endangered (T&E) Species Habitat	Low (0.0)	Low (0.0)	Low (0.0)	Low (0.0)	Low (0.0)
MTNHP Species Habitat	Mod (0.5)	Mod (0.5)	Mod (0.5)	Mod (0.5)	Mod (0.5)
General Wildlife Habitat	Low (0.3)	Mod (0.5)	Low (0.3)	Mod (0.5)	Mod (0.5)
General Fish/Aquatic Habitat	N/A	N/A	N/A	N/A	N/A
Flood Attenuation	N/A	Mod (0.6)	Mod (0.6)	Mod (0.6)	Mod (0.6)
Short- and Long-Term Surface-Water Storage	Mod (0.6)	High (0.8)	Mod (0.6)	High (0.8)	High (0.8)
Sediment/Nutrient/Toxicant Removal	High (0.8)	Mod (0.7)	High (0.8)	Mod (0.7)	Mod (0.7)
Sediment/Shoreline Stabilization	N/A	Low (0.3)	NA	Low (0.3)	Mod (0.7)
Production Export/Food Chain Support	Mod (0.7)	Mod (0.7)	Mod (0.7)	Mod (0.7)	Mod (0.7)
Groundwater Discharge/Recharge	Mod (0.7)	High (1.0)	Mod (0.7)	High (1.0)	High (1.0)
Uniqueness	Low (0.1)	Low (0.3)	Low (0.1)	Low (0.3)	Low (0.3)
Recreation/Education Potential	Low (0.05)	Low (0.05)	Low (0.05)	Low (0.05)	Low (0.05)
Actual Points/Possible Points	**3.75/8**	**5.45/10**	**4.35/9**	**5.45/10**	**5.75/10**
% of Possible Score Achieved	**47%**	**55%**	**48%**	**55%**	**58%**
Overall Category	**III**	**III**	**III**	**III**	**III**
Total Acreage of Assessed Wetlands Within Site Boundaries (ac)	**3.1**	**3.1**	**3.3**	**3.0**	**10.3**
Functional Units (acreage × actual points)	**11.63**	**16.90**	**14.35**	**16.35**	**59.22**

(a) Berglund and McEldowney [2008].
(b) Preservation wetlands were assessed in 2016 for the first time.

The AA for created wetland Cells 1 and 5 encompassed 3.0 acres of excavated wetland cells; was characterized by wetland community Type 7 – Open Water/Aquatic Macrophytes; and was rated as a Category III wetland with 55 percent of the total possible points in 2016. This AA received high functional ratings for short- and long-term surface-water storage and groundwater discharge/recharge. Moderate ratings for were assessed for sediment/nutrient/toxicant removal, production export/food chain support, general wildlife habitat, and MTNHP species habitat. The rating for this AA is expected to increase as the disturbed areas recover and desirable vegetation cover increases.

The AA for the preservation wetlands encompassed 10.3 acres, including 0.5 acre of open water. The preservation wetlands are shown on Figure A-4, Appendix A and include community Types 4 –

Carex spp/Juncus balticus, 7 – Open Water/Aquatic Macrophytes, 8 – *Salix exigua/Juncus balticus,* and 9 – *Juncus balticus/Elymus repens*. This AA was rated as a Category III wetland with 58 percent of the total possible points for 2016. This AA received high functional ratings for short- and long-term surface-water storage and groundwater discharge/recharge. Moderate ratings for were assessed for sediment/nutrient/toxicant removal, production export/food chain support, sediment/shoreline stabilization, general wildlife habitat, and MTNHP species habitat.

3.7 PHOTOGRAPHIC DOCUMENTATION

Seven wetland photo points and ten stream photo points were initially established in the project area in 2015 (PP-1 to PP-17; Figure A-2, Appendix A). Photographs of all of the surveyed channel cross sections, wetland determination data points, and vegetation transect endpoints (T-1 and T-2) are provided in Appendix C.

3.8 STREAM MONITORING

3.8.1 Channel Cross Sections

From the channel cross-section survey and identification of the bankfull water surface elevation, parameters that are relevant to the geomorphic evolution of the channel can be calculated and compared. Geometric parameters of interest include bankfull width, maximum depth, cross-sectional area, and mean depth. From these metrics, the width to depth ratio is calculated. The width to depth (W/D) ratio is the ratio of the bankfull channel width divided by the mean bankfull depth. The W/D ratio is used in stream classification systems and is often used to compare conditions between reaches with the same stream type. A comparison of W/D ratios measured at the same location over time provides a quantitative indicator of channel overwidening and aggradation or channel incision and degradation. These two phenomena are observed responses of the channel morphology to changes in the hydrologic regime of the larger scale system related to sediment discharge, sediment particle size, stream flow, and stream slope. Increases or decreases of those four factors generally trigger a morphological response. For example, when a channel is straightened, it loses length over the same elevation drop and consequently becomes steepened. A typical morphological response is for the stream to degrade (i.e., down-cut and become incised). The down-cut channel then loses connectivity to its floodplain, where more flood flow is contained in the channel, which may accelerate channel degradation. Changes in either of the four factors generally makes a channel unstable and triggers a morphological response until a new dynamic equilibrium is reached. Significant increases or decreases in bankfull width, maximum depth, cross-sectional area, mean depth, and W/D ratio as measured over time may suggest that the channel is unstable and undergoing a morphological response toward dynamic equilibrium. Bankfull width, maximum depth, cross-sectional area, mean depth, and W/D ratio results from each of the eight cross sections are summarized in Table 3-7. Table 3-7 also shows the percent change from the previous monitoring year for each parameter.

Shortly after construction in 2015, bankfull widths ranged from 20.3 to 28.8 feet in the restored and relocated segments of the channel and ranged from 32.8 and 35.7 feet in enhanced segments of the channel. Cross-section plots and assumed bankfull water surface elevation for each initially

surveyed cross section are provided in Appendix D. Appendix D also contains plots of superimposed, surveyed cross sections from each monitoring year.

Table 3-7. Parameters for the Silicon Mountain Channel Cross Section

Monitoring Cross Section	Bankfull Width (ft)			Maximum Depth (ft)			Cross-Section Area (ft^2)			Mean Depth (ft)			W/D Ratio		
	2015	2016	%Δ	2015	2016	%Δ	2015	2016	%Δ	2015	2016	%Δ	2015	2016	%Δ
1	23.3	24.4	5%	2.2	1.7	–20%	29.4	28.1	–4%	1.3	1.2	–11%	18.4	21.2	15%
2	20.3	21.1	4%	1.1	1.6	45%	17.4	18.5	6%	0.9	0.9	–3%	23.6	24.2	2%
3	22.2	23.1	4%	3.0	3.1	5%	49.7	50.5	2%	2.2	2.2	0%	9.9	10.5	6%
4	26.4	27.8	5%	2.5	2.6	5%	46.1	49.6	8%	1.7	1.8	5%	15.1	15.6	3%
5	27.2	27.2	0%	2.5	2.5	–1%	47.5	50.2	6%	1.7	1.8	8%	15.6	14.8	–5%
6	28.8	27.2	–5%	1.9	2.3	19%	36.2	34.1	–6%	1.3	1.3	–4%	22.9	21.8	–5%
7	32.8	37.0	13%	1.8	2.1	16%	40.1	47.8	19%	1.2	1.3	8%	26.9	28.6	6%
8	35.7	37.8	6%	0.8	1.0	23%	14.8	23.4	58%	0.4	0.6	54%	86.4	61.3	–29%

ft = feet
ft^2 = square feet

In general, large-scale horizontal and vertical changes were not observed. Subtle changes (< 15 percent) that are shown in Table 3-7 between monitoring years may be attributed to many factors other than actual geomorphic changes, including the following:

- Differences in survey point quantity and spacing
- Slight deviations in point collection projection between cross-section monuments
- Settling of bioengineered banks.

Although large-scale horizontal and vertical changes were not observed, localized morphological change was observed in subsequent monitoring years from the initial survey in 2015. Most change is observed within the limits of the active channel, primarily in the form of aggradation and degradation. The channel appears to be subtly adjusting toward dynamic equilibrium with its flow and sediment load from the initially constructed condition. A potential noteworthy change occurred between 2015 and 2016 monitoring years at Cross Section 1. The channel appears to have aggraded, which is reflected in the cross-section plot and the parameters in Table 3-7. The maximum and mean depth decreased and bankfull width was more or less unchanged, which produced an increase in W/D ratio and suggests channel aggradation. A subtle observed change occurred at Cross Sections 3 and 4, which are located along a bend and characterized by pool-type morphology. The graphical plots suggest deepening pools and heightening point bars; however, the morphological parameters and percent change shown in Table 3-7 do not capture those changes, which suggests that those localized changes balance out. Deepening pool and heightening point bar adjustments were also informally observed at nonmonitored cross-section locations, as illustrated in Figure 3-1, where sand-sized material was recently deposited along the inside of a bend. Continually monitoring these cross sections will further document lateral or vertical adjustments over time.



Figure 3-1. Nonmonitored Pool Section That Illustrates Recent Deposition and Point Bar Information.

3.8.2 Vegetation Belt Transects

Vegetation communities and their associated Winward [2000] stability ratings are provided for all of the stream bank belt transects in Table 3-8. The Winward [2000] stability ratings are based on vegetation communities rather than individual species; therefore, a vegetation community was assigned to each stream bank belt transect based on one or more dominant species. If a range of stability ratings was provided for a specific community, the lowest rating was included in Table 3-8. Success criteria that are outlined in the monitoring plan state that the vegetation along the stream banks will be considered successful when the banks are vegetated with a majority of deep-rooting riparian plant species that have root stability indices greater than or equal to 6. Fourteen of the sixteen belt transects (87.5 percent) that were monitored exhibit vegetation communities with stability ratings of 6 or higher. In every case where the vegetation within a belt transect did not achieve a stability rating of 6 or higher, vegetation on the opposite bank did meet the success criteria (i.e., none of the cross sections failed to meet the stream bank vegetation criteria on both sides of the channel).

The locations of the stream cross sections are shown on Figure A-2 (Appendix A). Six stream photo points were established in 2015 for most of the stream cross-section locations. The 2015 and 2016 stream point photographs (PP-8, PP-9, PP-11, PP-12, PP-13 and PP-17) are included in Appendix C. In addition to monitoring plant communities for stability ratings, the stream cross-section monitoring and photographic documentation also records the year-to-year changes/trends in the development of the stream corridor vegetation.

Table 3-8. Stream Bank Vegetation Communities and Their Associated Stability Ratings Along Sand Creek in 2016

Stream Bank Transect (L/R)	Dominant Stream Bank Community	Community Type[(a)] Stability Rating
1L	*Salix* spp./*Trifolium* spp.	7
1R	*Salix lutea/Agrostis stolonifera*	6
2L	*Salix* spp./*Trifolium repens*	7
2R	*Salix geyeriana*	7
3L	*Salix lutea/Trifolium* spp.	6
3R	*Salix geyeriana/Epilobium ciliatum*	7
4L	*Eleocharis palustris/Scirpus microcarpus*	8
4R	*Elymus repens*	3
5L	*Eleocharis palustris*	6
5R	*Salix lutea*	6
6L	*Salix* spp./*Epilobium ciliatum*	7
6R	*Salix exigua/Trifolium* spp.	7
7L	*Salix exigua/Eleocharis palustris*	7
7R	*Epilobium ciliatum/Trifolium* spp.	5
8L	*Carex nebrascensis*	9
8R	*Carex aquatilis/Agrostis stolonifera*	9

(a) After Winward [2000].

3.8.3 Documentation of High-Water Events

Evidence of an out-of-bank event included sand deposits at the upstream extent of the project reach. Sandy deposits extended beyond the bankfull elevation where the channel transitions from a channelized segment upstream of the project reach to the reconstructed alignment away from the rail line. The sandy deposit was documented at PP-8 (Appendix C). Sandy deposits were also observed along the top of the banks near the willow cuttings throughout much of the project site, especially north of the new bridge, which indicates that the channel received a bankfull or slightly higher flow sometime in 2015 or 2016 before the monitoring events.

3.8.4 Inspection of Stabilized Headcuts

Two headcuts located between the west side of wetland Cell 1 and the restored stream channel were stabilized to prevent the wetland cell from draining. Stabilization efforts included resloping the face of the headcut to a 3:1 slope, installing rock in a trench at the base of the headcut, and installing containerized plants and cuttings at the top and bottom of the headcuts. Inspecting the two stabilized headcuts revealed no soil loss or advancing headcutting in the stabilized areas. The headcuts were well vegetated and stable. Photographic documentation of the stabilized areas is included in Appendix C.

3.8.5 Inspection of Stabilized Banks

The stabilized bank inspection did not reveal any lateral bank erosion toward the constructed wetland cells. Three cross sections were established along the banks adjacent to the wetland cells

to document any future lateral erosion. To date, the restored stream channel is not in jeopardy of intercepting the wetland cells.

3.9 MAINTENANCE NEEDS

No diversions or nesting structures are currently installed at the site. Fences that were installed around the site were in good condition at the time of the 2016 investigation.

3.9.1 Noxious Weeds

A total of 51 infestations of state-listed Priority 2B noxious weeds were mapped at the Silicon Mountain site (Figure A-3, Appendix A). A total of 13 infestations of spotted knapweed, 15 infestations of Canada thistle, 20 infestations of leafy spurge, two infestations of butter-and-eggs (*Linaria vulgaris*), and one infestation of black henbane were identified in areas less than 1.0 acre in size with cover classes that range from trace (less than 1 percent) to high (greater than 26 percent). 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. On July 8, 2016, MDT's weed contractor sprayed infestations of spotted knapweed, Canada thistle, leafy spurge, and black henbane that cover 4.5 acres across the mitigation site. Because of long-term grazing and disturbance at this site, weed control will likely be required for several more years to contain and control noxious weed populations.

3.9.2 Erosion Control

The straw/coir erosion-control blanket installed on the east side of the bridge embankment was not secured well, and the soil beneath the blanket does not appear to be revegetating successfully. Wind may have stripped away any seeds applied to this area. Securing a new layer of fabric may be necessary to prevent soil erosion in this area.

3.9.3 Willow Installation Technique

Several thousand willow sprigs were installed with approximately 18–24 inches of the stems exposed. Exposing this sprig length may result in higher mortality because they tend to generate a large number of new stems and leaves during the first two growing seasons that cannot be supported by the root growth of the plant. To date, willow sprig survival is excellent; approximately 85 percent of stems show new stem shoots and leaf growth.

3.10 CURRENT CREDIT SUMMARY

3.10.1 Wetland Mitigation Credit

Table 3-9 summarizes the current estimated wetland credits based on the USACE-approved credit ratios [USACE, 2005] and the wetland delineation completed in June 2016. A total of 27.4 acres were delineated at the Silicon Mountain site in 2016, including 6.3 acres of creation, 10.3 acres of preservation, and 10.8 acres of upland buffer. Applying the USACE-approved ratios to these values, a total of 11.03 acres of mitigation credit have been estimated in 2016; this value is very close to the targeted 11.45 acres anticipated at this site. Attaining the full target value of 11.45 credit acres is likely in subsequent monitoring years as wetland vegetation and hydrology develop further within the site.

Table 3-9. Wetland Mitigation Credits Estimated for the Silicon Mountain Site in 2015 and 2016

Compensatory Mitigation Type	Mitigation Area Description	Wetland Type[(a)]	Anticipated Mitigation Surface Area (acres)	USACE-Approved Mitigation Ratios	Anticipated Mitigation Credit (acres)	2015 Delineated Acres	2015 Mitigation Credit (acres)	2016 Delineated Acres	2016 Mitigation Credit (acres)
Creation (Establishment)	Wetland Cells 1, 2, 3, 4, and 5	Palustrine emergent, aquatic bed	6.77	1:1	6.77	6.19	6.19	6.30	6.30
Preservation	Existing wetland areas	Palustrine emergent, scrub/shrub	10.06	4:1	2.52	10.24	2.56	10.30	2.57
Upland Buffer	50-foot wide upland perimeter	N/A	10.80	5:1	2.16	10.80	2.16	10.80	2.16
Totals			**27.63**		**11.45**	**27.23**	**10.91**	**27.40**	**11.03**

(a) Cowardin et al. [1979].
Actual delineated acres exceeded the creditable acres; therefore, only the requested acreage is reported.

Table 3-10. Summary of Anticipated Stream Mitigation Credits From the Silicon Mountain Mitigation Project

Mitigation Reach	Linear Feet	Sum of Mitigation Factors[(a)]	Mitigation Credits
Reach 1	3,250	3.20	10,400
Reach 2	650	3.03	1,969.5
Total	**3,900**		**12,369.5**

(a) From Table 7 of *Silicon Mountain Aquatic Resource Mitigation Plan* [Confluence Consulting, Inc., 2013].

3.10.2 Stream Mitigation Credit

The anticipated mitigation credits produced by the Silicon Mountain mitigation project were calculated following guidelines provided in the USACE 2010 *Montana Stream Mitigation Procedure* (MTSMP). Approximately 4,300 feet of Sand Creek were addressed as part of the project, and MDT is seeking to obtain credit for 3,900 feet as outlined in Table 3-10. MDT is not seeking to obtain mitigation credits for 400 of the 4,300 feet of channel addressed within the project reach, including 100 feet that lie within the railroad right-of-way and 300 feet that was riprapped under the newly constructed bridge. MDT anticipates a total of 12,369.5 stream and riparian mitigation credits if all success criteria are met.

Reach 1 includes the restored Sand Creek channel north of the new road alignment. Reach 2 includes the restored Sand Creek channel south of the new road alignment on privately owned land. To date, the project is meeting the two success criteria established for stream mitigation components of the project. Stream mitigation criteria include channel restoration and vegetation along the stream banks. Subsequent monitoring events will document whether the site continues to achieve success as defined by these standards or if additional maintenance is needed.

3.10.3 Performance Standard Summary

Table 3-11 provides a summary of the site conditions in relation to the established performance standards and success criteria. This site meets the established performance standards with the exception of the success criteria that measure hydrophytic vegetation cover, soil stability, and its ability to support vegetation cover and noxious weed cover. All of the wetlands delineated within the Silicon Mountain site in 2016 met the three criteria outlined in the 1987 Wetland Manual and 2010 Regional Supplement but exhibited less than 70 percent desirable hydrophytic vegetation cover and more than 10 percent cover of noxious weeds. Created wetland areas alone exhibited less than 10 percent cover from noxious weeds and less than 70 percent hydrophytic vegetation cover. Upland buffer areas also exhibited more than 10 percent cover of noxious weed infestations. MDT implements weed-control measures based on the results of field surveys to minimize and/or eliminate the intrusion of state-listed noxious weed species within the site. Comprehensive site monitoring has occurred for 2 years and will be conducted for a minimum period of 5 years as determined by the USACE Montana Regulatory Office's review of annual monitoring reports for the site and attainment of wetland and stream success criteria.

Table 3-11. Summary of Performance Standards and Success Criteria at the Silicon Mountain Site in 2016 (Page 1 of 2)

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 Regional Supplement.	Y	Areas that are identified as wetland habitat within the mitigation site meet the three parameter criteria.
Wetland Hydrology	Soil saturation is present for at least 12.5 percent of the growing season.	Y	Areas that are identified as wetland habitat within the mitigation site exhibit soil saturation for a minimum 12.5 percent of growing season.
Hydric Soil	Hydric soil conditions are present or appear to be forming.	Y	Hydric soil characteristics are developing throughout a majority of the constructed wetlands.
	Soil is sufficiently stable to prevent erosion.	N	Disturbed soil is not yet stable and does exhibit minor signs of erosion around wetland Cell 5.
	Soil is able to support plant cover.	N	Plant cover is slowly establishing across recently disturbed soils.
Hydrophytic Vegetation	Success is achieved where combined absolute cover of facultative or wetter species is 70 percent.	Y	Created wetland cells support 70 percent or greater cover of hydrophytic vegetation (OBL, FACW, and FAC).
	State-listed noxious weeds do not exceed 10 percent absolute cover.	Y	Montana state-listed noxious weeds are estimated below 10 percent absolute cover within wetland areas.
Channel Restoration Success	Revegetation along the new Sand Creek channel corridor will be considered successful when banks are vegetated with a majority of deep-rooting riparian and wetland herbaceous and woody plant species.	Y	The majority of stream bank vegetation along the constructed Sand Creek channel corridor is dominated by vegetation communities with stability ratings greater than 6.
	The intent of the stream restoration is to allow for the stream to naturally migrate within the floodplain and to give it enough room to move and stabilize itself within the site.	Y	The stream has plenty of space within the floodplain for natural migration. The stream currently appears to be stable with no lateral adjustment observed after construction.
Stream Bank Vegetation	Banks are vegetated with a majority of deep-rooting riparian plant species that have root stability indexes 6.	Y	The majority of stream bank vegetation along the constructed Sand Creek channel corridor is dominated by vegetation communities with stability ratings > 6.

Table 3-11. Summary of Performance Standards and Success Criteria at the Silicon Mountain Site in 2016 (Page 2 of 2)

Performance Standards	Success Criteria	Criteria Achieved Y/N	Discussion
Open Water	The project is intended to provide seasonal open water during the spring and early summer within excavated depressions. As the growing season progresses and the groundwater levels recede, vegetation is expected to germinate within the majority of the depressions. Open water with submerged and/or floating vegetation will, therefore, be considered successful and creditable.	Y	Wetland Cells 2, 3, and 4 experience seasonal drawdown; rooted hydrophytic vegetation development has been observed; and wetland Cells 1 and 5 appear to support perennial inundation and a developing aquatic macrophyte community.
Upland Buffer	Noxious weeds do not exceed 10 percent cover within upland buffer area.	N	Noxious weed cover is more than 10 percent within the upland buffer.
	Any area that was disturbed within the creditable buffer zone must have at least 50 percent aerial cover of nonweed species by the end of the monitoring period.	Y	Disturbed areas have established greater than 50 percent cover by nonweed species.
Weed Control	Control measures will be 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.	Y	State-listed noxious weed species across the site have been monitored and mapped during each postconstruction monitoring event. MDT administers an ongoing weed-control program. Noxious weeds were sprayed in July 2016 by MDT's contractor and will continue in the following years until MDT meets this performance objective and standard.

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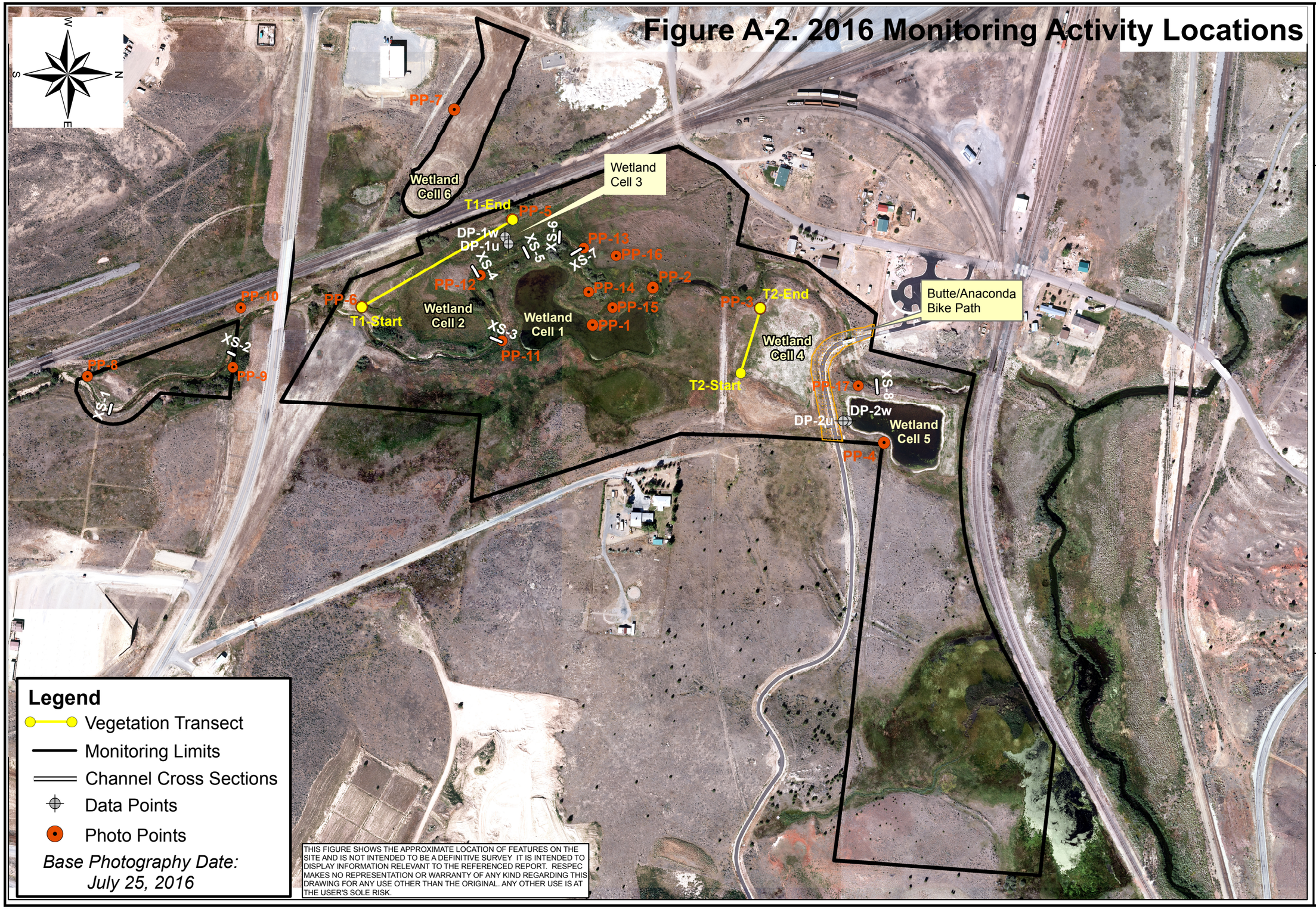
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APPENDIX A
PROJECT AREA MAPS

MDT Wetland Mitigation Monitoring
Silicon Mountain
Silver Bow County, Montana

Figure A-2. 2016 Monitoring Activity Locations



Legend

- Vegetation Transect
- Monitoring Limits
- Channel Cross Sections
- Data Points
- Photo Points

Base Photography Date: July 25, 2016

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

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

Silicon Mountain Mitigation Site
2016 Monitoring Activity Locations

0 125 250 500 750 1,000 1,250 Feet

Project:	MT-STPX 47(24)
Location:	Silver Bow Co., Montana
Date:	December 2016
Project Manager:	M. Traxler
Drawn By:	J. Rosenbaum

File: Z:\RESPEC\02895 MDT Monitoring 2016\WS #2 Silicon Mountain\GPS Data\Mains\Monitor2016.mxd

Figure A-3. 2016 Mapped Site Features

Noxious Weeds
Centaurea stoebe
Cirsium arvense
Euphorbia esula
Hyoscyamus niger
Linaria vulgaris

Infestation Size
X = <0.1 acre
▲ = 0.1 to 1 acre
■ = >1.0 acre

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

Butte/Anaconda Bike Path

Vegetation Community Types

- Descurainia sophia/Thlaspi arvense
- Bromus inermis/Poa pratensis
- Carex spp./Juncus balticus
- Elymus repens/Bromus inermis
- Puccinellia nuttalliana/Deschampsia caespitosa
- Open Water/Aquatic Macrophytes
- Salix exigua/Juncus balticus
- Juncus balticus/Elymus repens
- Artemisia tridentata/Poa spp.
- Typha latifolia
- Elymus trachycaulus/Poa ampla

Acreages	
Project Area	50.1 acres
Created Wetland	6.3 acres
Preserved Wetland	10.3 acres
Total Wetlands	16.6 acres
Uplands	31.8 acres
Stream Component	1.7 acres

Legend
Monitoring Limits
Wetland Limits
Vegetation Communities
Base Photography Date: July 25, 2016

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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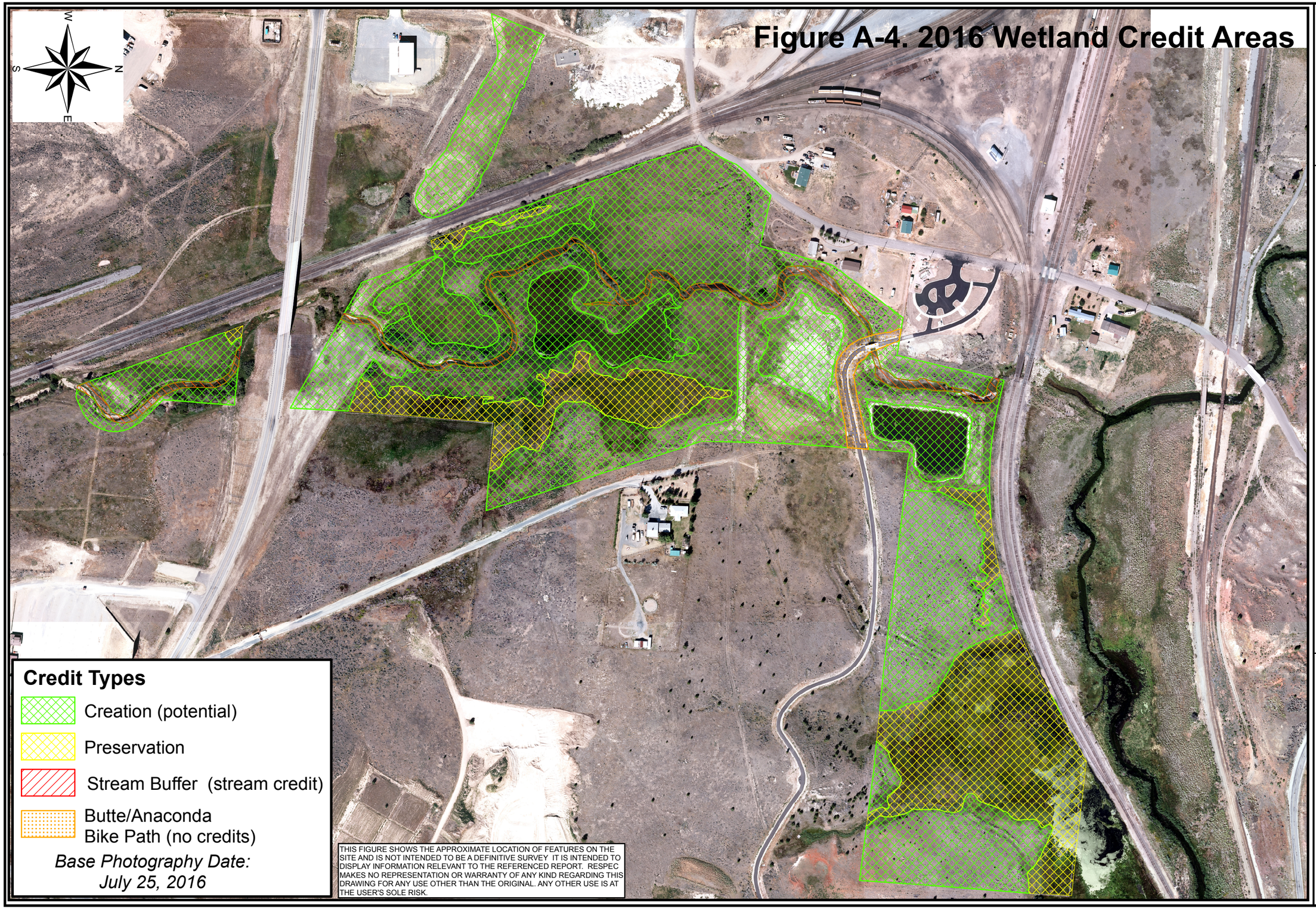
Silicon Mountain Mitigation Site
2016 Mapped Site Features

0 125 250 500 750 1,000 1,250 Feet

Project: MT-STPX 47(24)
Location: Silver Bow Co., Montana
Date: December 2016
Project Manager: M. Traxler
Drawn By: J. Rosenbaum

File: Z:\RESPEC\02895 MDT Monitoring 2016\WS #2 Silicon Mountain\GPS Data\Wains\Veg2016.mxd

Figure A-4. 2016 Wetland Credit Areas



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

Silicon Mountain Mitigation Site
2016 Wetland Credit Areas

0 125 250 500 750 1,000 1,250 Feet

Project:	MT-STPX 47(24)
Location:	Silver Bow Co., Montana
Date:	December 2016
Project Manager:	M. Traxler
Drawn By:	J. Rosenbaum

File: Z:\RESPEC\02895 MDT Monitoring 2016\WS #2 Silicon Mountain\GPS Data\Wains\CreditAcres2016.mxd

APPENDIX B
MONITORING FORMS

MDT Wetland Mitigation Monitoring
Silicon Mountain
Silver Bow County, Montana

RESPEC/MDT WETLAND MITIGATION SITE MONITORING FORM

Project Name: **Silicon Mountain** Project Number: _____
Assessment Date: **June 22, 2016** Person(s) conducting the assessment: **C. Hoschouer, C. Seibert**
Location: **5 miles west of Butte** MDT District: **Butte** Milepost: **MD 119 on I15**
Legal Description: T **3N** R **9E** Section **24**
Weather Conditions: **Partly cloudy, 70F, calm** Time of Day: **8 am**
Initial Evaluation Date: **June 23, 2015** Monitoring Year: **2** # Visits in Year: **1**
Size of evaluation area: **50.1 acres** Land use surrounding wetland: **Rail yard and private property**

HYDROLOGY

Surface Water Source: **Sand Creek and a well defined spring**
Inundation: **Present** Average Depth: **1 feet** Range of Depths: **0.5 to 2ft**
Percent of assessment area under inundation: **9%**
Depth at emergent vegetation-open water boundary: **0.5 feet**
If assessment area is not inundated then are the soils saturated within 12 inches of surface: **Yes**
Other evidence of hydrology on the site (ex. – drift lines, erosion, stained vegetation, etc.):
Ponded water present in cells 1, 4 and 5. Water present in Sand Creek channel. Wetland soils were saturated within the upper 12 inches, H2S odor, FAC-neutral test, geomorphic position and saturation visible on aerial imagery.

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

Well Number	Depth	Well Number	Depth	Well Number	Depth

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

COMMENTS / PROBLEMS:
Open water covered approximately 75 percent of wetland cells 1 and 5. Shallow surface water was present across approximately 50 percent of wetland cell 4. Two wells onsite that remained after construction are monitored by USGS.

VEGETATION COMMUNITIES

Community Number: **2** Community Title (main spp): **Descurainia sophia/Thlaspi arvens**

Dominant Species	% Cover	Dominant Species	% Cover
Descurainia sophia	3 = 11-20%	Pascopyrum smithii	1 = 1-5%
Thlaspi arvense	2 = 6-10%	Bare ground	2 = 6-10%
Lepidium perfoliatum	2 = 6-10%	Bromus tectorum	1 = 1-5%
Cirsium arvense	2 = 6-10%	Elymus cinereus	1 = 1-5%
Bassia scoparia	2 = 6-10%	Elymus repens	1 = 1-5%
Schedonorus pratensis	1 = 1-5%	Agropyrum cristatum	1 = 1-5%

Comments / Problems: **Upland community composed of mostly early successional, non-native species commonly found on disturbed landscapes.**

Community Number: **3** Community Title (main spp): **Bromus inermis/Poa pratensis**

Dominant Species	% Cover	Dominant Species	% Cover
Bromus inermis	4 = 21-50%	Elymus repens	2 = 6-10%
Poa pratensis	3 = 11-20%	Cirsium arvense	1 = 1-5%
Centaurea stoebe	2 = 6-10%	Koeleria macrantha	1 = 1-5%
Elymus cinereus	2 = 6-10%	Achilla millefolium	1 = 1-5%
Elymus trachycaulus	2 = 6-10%	Salix exigua	1 = 1-5%
Euphorbia esula	2 = 6-10%	Melilotus officinalis	1 = 1-5%

Comments / Problems: **Upland community**

Community Number: **4** Community Title (main spp): **Carex spp./Juncus balticus**

Dominant Species	% Cover	Dominant Species	% Cover
Carex nebrascensis	3 = 11-20%	Poa palustris	2 = 6-10%
Carex utriculata	2 = 6-10%	Potentilla anserina	2 = 6-10%
Carex praticola	1 = 1-5%	Calamagrostis canadensis	1 = 1-5%
Carex aquatilis	1 = 1-5%	Deschampsia caespitosa	1 = 1-5%
Juncus balticus	3 = 11-20%	Mentha arvensis	1 = 1-5%
Poa pratensis	2 = 6-10%	Cirsium arvense	1 = 1-5%

Comments / Problems: **Existing wetland community**

Community Number: **5** Community Title (main spp): **Elymus repens/Bromus inermis**

Dominant Species	% Cover	Dominant Species	% Cover
Elymus repens	4 = 21-50%	Potentilla anserina	1 = 1-5%
Bromus inermis	3 = 11-20%	Descurainia sophia	1 = 1-5%
Cirsium arvense	2 = 6-10%	Astragalus cicer	1 = 1-5%
Juncus balticus	2 = 6-10%	Elymus cinereus	1 = 1-5%
Euphorpia esula	2 = 6-10%	Elymus trachycaulus	1 = 1-5%
Solidago giganteus	2 = 6-10%	Descurainia sophia	1 = 1-5%

Comments / Problems: **Upland community south of the road alignment and overpass.**

VEGETATION COMMUNITIES (continued)

Community Number: **6** Community Title (main spp): **Puccinella nutalliana/Deschampsia caespitosa**

Dominant Species	% Cover	Dominant Species	% Cover
Puccinella nuttalliana	3 = 11-20%	Eleocharis palustris	1 = 1-5%
Deschampsia caespitosa	3 = 11-20%	Typha latifolia	1 = 1-5%
Beckmannia syzigachne	2 = 6-10%	Potentilla anserina	1 = 1-5%
Agrostis stolonifera	2 = 6-10%	Cyrtorhyncha cymbalaria	1 = 1-5%
Poa palustris	2 = 6-10%	Trifolium hybridum	1 = 1-5%
Juncus balticus	1 = 1-5%	Trifolium repens	1 = 1-5%

Comments / Problems: **Diverse wetland community type with dense cover. In some areas, this community has transitioned into community type 11.**

Community Number: **7** Community Title (main spp): **Open water/Aquatic macrophytes**

Dominant Species	% Cover	Dominant Species	% Cover
Open water	5 = > 50%		
Algae, green	3 = 11-20%		
Lemma minor	2 = 6-10%		
Beckmannia syzigachne	2 = 6-10%		
Typha latifolia	2 = 6-10%		

Comments / Problems: **Created wetland cells 1 and 5**

Community Number: **8** Community Title (main spp): **Salix exigua/Juncus balticus**

Dominant Species	% Cover	Dominant Species	% Cover
Salix exigua	4 = 21-50%	Calamagrostis canadensis	1 = 1-5%
Juncus balticus	3 = 11-20%	Hordeum jubatum	1 = 1-5%
Agrostis stolonifera	2 = 6-10%	Glyceria striata	1 = 1-5%
Carex nebrascensis	2 = 6-10%	Cicuta douglasii	1 = 1-5%
Alopecurus pratensis	2 = 6-10%		
Scirpus microcarpus	1 = 1-5%		

Comments / Problems: **Existing wetland west of wetland cell 2**

Community Number: **9** Community Title (main spp): **Juncus balticus/Elymus repens**

Dominant Species	% Cover	Dominant Species	% Cover
Juncus balticus	4 = 21-50%	Cirsium arvense	1 = 1-5%
Elymus repens	4 = 21-50%	Epilobium ciliatum	+ = < 1%
Poa palustris	2 = 6-10%	Hordeum jubatum	+ = < 1%
Symphyotrichum lanceolatus	1 = 1-5%	Rumex crispus	+ = < 1%
Potentilla anserina	1 = 1-5%	Geum macrophyllum	+ = < 1%
Solidago gigantea	1 = 1-5%		

Comments / Problems: **Small wetland in the corner of cell 6**

VEGETATION COMMUNITIES (continued)

Community Number: **10** Community Title (main spp): **Artemisia tridentata/Poa spp.**

Dominant Species	% Cover	Dominant Species	% Cover
Artemisia tridentata	3 = 11-20%	Juniperus scopulorum	2 = 6-10%
Poa ampla =juncifolia, secunda	3 = 11-20%	Koeleria macrantha	1 = 1-5%
Poa pratensis	3 = 11-20%	Bromus inermus	1 = 1-5%
Centaurea stoebe	2 = 6-10%	Stipa comata	1 = 1-5%
Pascopyrum smithii	2 = 6-10%	Ericaneria nauseosa	1 = 1-5%
Pseudoroegneria spicata	1 = 1-5%	Astragalus agrestis	1 = 1-5%

Comments / Problems: **Upland shrubland**

Community Number: **11** Community Title (main spp): **Typha latifolia**

Dominant Species	% Cover	Dominant Species	% Cover
Typha latifolia	5 = > 50%		
Deschampsia caespitosa	1 = 1-5%		
Puccinellia nuttalliana	1 = 1-5%		
Eleocharis palustris	1 = 1-5%		
Cyrtorhyncha cymbalaria	1 = 1-5%		
Beckmannia syzigachne	1 = 1-5%		

Comments / Problems: **Starting to see areas within CT6 transition to a dominance of Typha latifolia.**

Community Number: **12** Community Title (main spp): **Elymus trachycaulus/Poa ampla**

Dominant Species	% Cover	Dominant Species	% Cover
Elymus trachycaulus	3 = 11-20%	Thlaspi arvense	1 = 1-5%
Elymus lanceolatus	2 = 6-10%	Cirsium arvense	1 = 1-5%
Elymus cinereus	2 = 6-10%	Euphorbia esula	1 = 1-5%
Poa ampla = juncifolia, secunda	3 = 11-20%	Hordeum jubatum	1 = 1-5%
Melilotus officinalis	2 = 6-10%	Lepidium perifolium	1 = 1-5%
Agropyron cristatum	1 = 1-5%	Elymus repens	1 = 1-5%

Comments / Problems: **Newly seeded upland areas that are transitioning from annual weedy species to more perennial grasses.**

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

Dominant Species	% Cover	Dominant Species	% Cover

Comments / Problems: _____

Additional Activities Checklist:

☐ Record and map vegetative communities on aerial photograph.

PLANTED WOODY VEGETATION SURVIVAL

Plant Species	Number Originally Planted	Number Observed	Mortality Causes
Alnus incana		2	
Salix eriocephala		10	
Salix exigua		13	
Salix geyeriana		10	
Shepherdia argentea		9	

Comments / Problems: **An estimated 350 containerized trees and shrubs were part of the original planting. During the 2015, a total of 47 live shrubs were noted, in 2016 a total of 44 live shrubs were identified.**

MDT WETLAND MONITORING – VEGETATION TRANSECT

Site: **Silicon Mountain** Date: **June 22, 2016** Examiner: **C.Hoschouer, C. Seibert**
Transect Number: **1** Approximate Transect Length: **564 feet** Compass Direction from Start: **332˚** Note: _____

Transect Interval Length: **15 feet (station 0 to 15)**	
Vegetation Community Type: Elymus trachycaulus/Poa ampla	
Plant Species	**Cover**
Elymus trachycaulus	3 = 11-20%
Poa ampla (P. junifolia)	3 = 11-20%
Elymus cinereus	2 = 6-10%
Elymus lanceolatus	2 = 6-10%
Melilotus officinalis	2 = 6-10%
Poa pratensis	1 = 1-5%
Bromus inermis	1 = 1-5%
Elymus repens	1 = 1-5%
Thlaspi arvense	1 = 1-5%
Agropyron cristatum	1 = 1-5%
Euphorbia esula	+ = < 1%
Total Vegetative Cover:	70%

Transect Interval Length: **6 feet (station 15 to 21)**	
Vegetation Community Type: Puccinellia nuttalliana/Deschampsia caespitosa	
Plant Species	**Cover**
Puccinellia nuttalliana	3 = 11-20%
Deschampsia caespitosa	3 = 11-20%
Potentilla anserina	2 = 6-10%
Agrostis stolonifera	2 = 6-10%
Poa palustris	2 = 6-10%
Melilotus officinalis	1 = 1-5%
Typha latifolia	1 = 1-5%
Eleocharis palustris	1 = 1-5%
Poa pratensis	1 = 1-5%
Trifolium hybridum	1 = 1-5%
Cyrtorhyncha cymbalaria	1 = 1-5%
Total Vegetative Cover:	73%

Transect Interval Length: **11 feet (station 21 to 32)**	
Vegetation Community Type: Typha latifolia	
Plant Species	**Cover**
Typha latifolia	4 = 21-50%
Deschampsia caespitosa	2 = 6-10%
Glyceria striata	2 = 6-10%
Eleocharis palustris	2 = 6-10%
Beckmannia syziganchne	2 = 6-10%
Cyrtorhyncha cymbalaria	2 = 6-10%
Puccinellia nuttalliana	2 = 6-10%
Poa palustris	1 = 1-5%
Juncus balticus	1 = 1-5%
Total Vegetative Cover:	90%

Transect Interval Length: **226 feet (station 32 to 258)**	
Vegetation Community Type: P. nuttalliana/Deschampsia caespitosa	
Plant Species	**Cover**
Deschampsia caespitosa	3 = 11-20%
Puccinellia nuttalliana	2 = 6-10%
Typha latifolia	2 = 6-10%
Juncus balticus	2 = 6-10%
Potentilla anserina	2 = 6-10%
Trifolium hybridum	2 = 6-10%
Eleocharis palustris	1 = 1-5%
Carex nebrascensis	1 = 1-5%
Poa palustris	1 = 1-5%
Glyceria striata	1 = 1-5%
Alopecurus aequalis	+ = < 1%
Trifolium repens	+ = < 1%
Total Vegetative Cover:	68%

MDT WETLAND MONITORING – VEGETATION TRANSECT

Site: **Silicon Mountain** Date: **June 22, 2016** Examiner: **C. Hoschouer, C. Seibert**
Transect Number: **1** Approximate Transect Length: **564 feet** Compass Direction from Start: **332˚** Note: _____

Transect Interval Length: **53 feet (station 258 to 311)**	
Vegetation Community Type: Bromus inermis/Poa pratensis	
Plant Species	**Cover**
Bromus inermis	3 = 11-20%
Poa pratensis	2 = 6-10%
Elymus repens	2 = 6-10%
Trifolium hybridum	2 = 6-10%
Potentilla gracilis	1 = 1-5%
Astragalus cicer	1 = 1-5%
Cirsium arvense	1 = 1-5%
Elymus trachycaulus	1 = 1-5%
Rumex crispus	1 = 1-5%
Sonchus arvensis	1 = 1-5%
Achillea millefolium	1 = 1-5%
Total Vegetative Cover:	60%

Transect Interval Length: **214 feet (station 311 to 525)**	
Vegetation Community Type: Puccinellia nuttalliana/Deschampsia caespitosa	
Plant Species	**Cover**
Puccinellia nuttalliana	3 = 11-20%
Deschampsia caespitosa	3 = 11-20%
Potentilla anserina	2 = 6-10%
Agrostis stolonifera	2 = 6-10%
Poa palustris	2 = 6-10%
Melilotus officinalis	1 = 1-5%
Typha latifolia	1 = 1-5%
Eleocharis palustris	1 = 1-5%
Poa pratensis	1 = 1-5%
Trifolium hybridum	1 = 1-5%
Cyrtorhyncha cymbalaria	1 = 1-5%
Total Vegetative Cover:	73%

Transect Interval Length: **39 ft (station 525 to 564)**	
Vegetation Community Type: Bromus inermis/Poa pratensis	
Plant Species	**Cover**
Bromus inermis	3 = 11-20%
Poa pratensis	2 = 6-10%
Elymus repens	2 = 6-10%
Trifolium hybridum	2 = 6-10%
Potentilla gracilis	1 = 1-5%
Achillea millefolium	1 = 1-5%
Astragalus cicer	1 = 1-5%
Rumex crispus	1 = 1-5%
Cirsium arvense	1 = 1-5%
Sonchus arvensis	‼
Euphorbia esula	1 = 1-5%
Elymus trachycaulus	1 = 1-5%
Total Vegetative Cover:	63%

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

%

MDT WETLAND MONITORING – VEGETATION TRANSECT

Site: **Silicon Mountain** Date: **June 22, 2016** Examiner: **C. Hoschouer**
Transect Number: **2** Approximate Transect Length: **219 feet** Compass Direction from Start: **288˚** Note: **Traverses wetland cell 4**

Transect Interval Length: **14 feet (station 0 to 14)**	
Vegetation Community Type: Elymus repens/Bromus inermis	
Plant Species	**Cover**
Elymus repens	2 = 6-10%
Bromus inermis	2 = 6-10%
Elymus cinereus	2 = 6-10%
Poa pratensis	1 = 1-5%
Descurainia sophia	1 = 1-5%
Lepidium perfoliatum	1 = 1-5%
Cirsium arvense	1 = 1-5%
Euphorbia esula	1 = 1-5%
Puccinellia nuttalliana	1 = 1-5%
Bare ground	3 = 11-20%
Total Vegetative Cover:	42%

Transect Interval Length: **193 feet (station 14 to 207)**	
Vegetation Community Type: Puccinellia nuttalliana/Deschampsia caespitosa	
Plant Species	**Cover**
Puccinellia nuttalliana	4 = 21-50%
Deschampsia caespitosa	3 = 11-20%
Alopecurus aequalis	1 = 1-5%
Poa palustris	1 = 1-5%
Cyrtorhyncha cymbalaria	1 = 1-5%
Eleocharis palustris	1 = 1-5%
Carex nebrascensis	1 = 1-5%
Epilobium ciliatum	1 = 1-5%
Alopecurus arundinaceus	1 = 1-5%
Typha latifolia	+ = < 1%
Bare ground	2 = 6-10%
Total Vegetative Cover:	69%

Transect Interval Length: **12 feet (station 207 to 219)**	
Vegetation Community Type: Descurainia sophia/Thlaspi arvense	
Plant Species	**Cover**
Descurainia sophia	3 = 11-20%
Lepidium perfoliatum	2 = 6-10%
Astragalus cicer	1 = 1-5%
Cirsium arvense	1 = 1-5%
Euphorbia esula	1 = 1-5%
Sonchus arvensis	1 = 1-5%
Bare ground	3 = 11-20%
Grass seedlings	2 = 6-10%
Total Vegetative Cover:	43%

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): ___ %

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: **A comprehensive species list was compiled for each community type during the June monitoring.**

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	1-5	West side of wetland cell 1	
PP2	1-3	Outside wetland cell 1	
PP3	1-4	West side of wetland cell 4	
PP4	1-5	East side of constructed wetland cell 5	
PP5	1-2	North end of T-1, constructed wetland cell 3	
PP6	1-2	South end of T-1, constructed wetland cell 3	
PP7	1	Cell 6, west side of tracks, south of overpass	
PP8	1-2	Southern edge of cell 6 - upstream end	SW, NW
PP9	1-2	Northern edge of cell 6 - downstream end	SW, NW
PP10	1-2	West side of wetland cell 3	
PP11	1-3	Sand Creek	
PP12	1-4	Sand Creek	
PP13	1-2	Sand Creek	
PP14	1	Headcut	S
PP15	1	Headcut	
PP16	1	Headcut	
PP17	1-2	Northern end of Sand Creek	W, N
T-1-S T-1-E	1 1	South end of wetland cell 2 West side of cell 2	N S
T-2-S T-2-E	1 1	East side of wetland cell 4 West side of cell 4	W E
DP-1w DP-1u	1 1	Data point within wetland cell 3 Upland point	
DP-2w DP-2u	1 1	Data point within wetland cell 5 Upland point	

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? **NA**
If yes, do they need to be repaired? **NA**
If yes, describe the problems below and indicate if any actions were taken to remedy the problems.

Were man-made structures built or installed to impound water or control water flow into or out of the wetland? **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? **No**
If yes, type of structure: _____ How many? _____
Are the nesting structures being used? **NA**
Do the nesting structures need repairs? _____

Mammals and Herptiles

Mammal and Herptile Species	Number Observed	Indirect Indication of Use			
		Tracks	Scat	Burrows	Other
Columbian Ground Squirrel	1	☐	☐	☐	
Deer	3	☐	☐	☐	
Elk		☒	☐	☐	
Vole		☐	☐	☒	
		☐	☐	☐	
		☐	☐	☐	
		☐	☐	☐	
		☐	☐	☐	

Additional Activities Checklist:
NA Macroinvertebrate Sampling (if required)

Comments / Problems: _____

BIRD SURVEY – FIELD DATA SHEET

Site: **Silicon Mountain** Date: **6/22/16**
Survey Time: **8 am** to **8 pm**

Bird Species	#	Behavior	Habitat	Bird Species	#	Behavior	Habitat
American Crow	2	N	SS				
American Robin	3	F	WM				
Black-billed Magpie	2	L	UP				
Brown-headed Cowbird	1		UP				
Canada Goose	>20	F L	OW UP				
Cinnamon Teal	2		OW				
Cliff Swallow	1	FO					
Common Grackle	1	FO					
Common Merganser	1		OW				
European Starling	1	FO					
Gray Partridge	2	F	UP				
Killdeer	1	F	MF				
Northern Shoveler	1		OW				
Red-winged Blackbird	2		WM				
Ruddy Duck	1		OW				
Sandhill Crane	2	F	UP				
Vesper Sparrow	1		UP WM				
Yellow-headed Blackbird	1	L	WM				

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: _____

Notes: _____

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

Project/Site: Silicon Mountain **City/County:** Silver Bow **Sampling Date:** 22-Jun-16

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

Investigator(s): C. Hoschouer, C. Seibert **Section, Township, Range:** S 24 T 3N R 9W

Landform (hillslope, terrace, etc.): Valley bottom **Local relief (concave, convex, none):** flat **Slope:** 10.0 % / 5.7 °

Subregion (LRR): LRR E **Lat.:** 45.9987198 **Long.:** -112.663073 **Datum:** WGS84

Soil Map Unit Name: Riverrun, occasionally flooded-Mannixlee, frequently flooded complex **NWI classification:** PEM

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

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

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

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

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

Remarks:

Mapped as PEM on NWI however site is highly disturbed and hydrology has been altered to a constructed wetland. Field data indicate a non-wetland at this sample point. Formerly SP-02.

VEGETATION - Use scientific names of plants.

	Absolute % Cover	Dominant Species? Rel.Strat. Cover	Indicator Status
Tree Stratum (Plot size: 30 Foot Radius)			
1.	0	☐ 0.0%	
2.	0	☐ 0.0%	
3.	0	☐ 0.0%	
4.	0	☐ 0.0%	
	0	= Total Cover	
Sapling/Shrub Stratum (Plot size: 15 Foot Radius)			
1.	0	☐ 0.0%	
2.	0	☐ 0.0%	
3.	0	☐ 0.0%	
4.	0	☐ 0.0%	
5.	0	☐ 0.0%	
	0	= Total Cover	
Herb Stratum (Plot size: 5 Foot Radius)			
1. Elymus repens	30	☑ 34.5%	FAC
2. Elymus trachycaulus	30	☑ 34.5%	FAC
3. Poa pratensis	10	☐ 11.5%	FAC
4. Polemonium pulcherrimum	1	☐ 1.1%	UPL
5. Potentilla anserina	5	☐ 5.7%	OBL
6. Astragalus cicer	10	☐ 11.5%	UPL
7. Melilotus officinalis	1	☐ 1.1%	FACU
8.	0	☐ 0.0%	
9.	0	☐ 0.0%	
10.	0	☐ 0.0%	
11.	0	☐ 0.0%	
	87	= Total Cover	
Woody Vine Stratum (Plot size: 30 Foot Radius)			
1.	0	☐ 0.0%	
2.	0	☐ 0.0%	
	0	= Total Cover	

% Bare Ground in Herb Stratum: 10

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 2 (A)

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

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

Prevalence Index worksheet:

	Total % Cover of:	Multiply by:	
OBL species	5	x 1 =	5
FACW species	0	x 2 =	0
FAC species	70	x 3 =	210
FACU species	1	x 4 =	4
UPL species	11	x 5 =	55
Column Totals:	87 (A)		274 (B)

Prevalence Index = B/A = 3.149

Hydrophytic Vegetation Indicators:

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

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

Hydrophytic Vegetation Present? Yes ◉ No ○

Remarks:

Noted a few Salix exigua seedlings (<6" tall) near data point.

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

Soil

Sampling Point: DP-1U

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

Depth (inches)	Matrix Color (moist)		%	Redox Features Color (moist)		%	Type[1]	Loc[2]	Texture	Remarks
0-18	10YR	3/2	100						Sandy Loam	

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

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

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

Indicators for Problematic Hydric Soils[3]:

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

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

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ○ No ◉

Remarks:

No hydric soil indicators. Side slope of wetland.

Hydrology

Wetland Hydrology Indicators:

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

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

Secondary Indicators (minimum of two required)

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

Field Observations:

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

Wetland Hydrology Present? Yes ○ No ◉

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

No evidence of hydrology. No hydric soil indicators. Side slope of wetland cell. 10% slope.

Remarks:

Soils moist in the upper 4 inches, dry below.

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

Project/Site: Silicon Mountain **City/County:** Silver Bow **Sampling Date:** 22-Jun-16

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

Investigator(s): C. Hoschouer, C. Seibert **Section, Township, Range:** **S** 24 **T** 3N **R** 9W

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

Subregion (LRR): LRR E **Lat.:** 45.9987145 **Long.:** -112.663142 **Datum:** WGS84

Soil Map Unit Name: Riverrun, occasionally flooded-Mannixlee, frequently flooded complex **NWI classification:** PEM

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

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

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

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

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

Remarks:
PEM wetland located in cell 3. Formerly SP-01.

VEGETATION - Use scientific names of plants.

	Absolute % Cover	Dominant Species? Rel.Strat. Cover	Indicator Status
Tree Stratum (Plot size: 30 Foot Radius)			
1.	0	☐ 0.0%	
2.	0	☐ 0.0%	
3.	0	☐ 0.0%	
4.	0	☐ 0.0%	
	0	= Total Cover	
Sapling/Shrub Stratum (Plot size: 15 Foot Radius)			
1.	0	☐ 0.0%	
2.	0	☐ 0.0%	
3.	0	☐ 0.0%	
4.	0	☐ 0.0%	
5.	0	☐ 0.0%	
	0	= Total Cover	
Herb Stratum (Plot size: 5 Foot Radius)			
1. Beckmannia syzigachne	10	☐ 10.3%	OBL
2. Deschampsia caespitosa	30	☑ 30.9%	FACW
3. Juncus balticus	2	☐ 2.1%	FACW
4. Potentilla anserina	2	☐ 2.1%	OBL
5. Puccinellia nuttalliana	20	☑ 20.6%	FACW
6. Ranunculus cymbalaria	20	☑ 20.6%	OBL
7. Typha latifolia	5	☐ 5.2%	OBL
8. Hordeum brachyantherum	2	☐ 2.1%	FACW
9. Glyceria striata	5	☐ 5.2%	OBL
10. Symphyotrichum lanceolatum	1	☐ 1.0%	OBL
11.	0	☐ 0.0%	
	97	= Total Cover	
Woody Vine Stratum (Plot size: 30 Foot Radius)			
1.	0	☐ 0.0%	
2.	0	☐ 0.0%	
	0	= Total Cover	

% Bare Ground in Herb Stratum: 3

Dominance Test worksheet:

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

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

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

Prevalence Index worksheet:

	Total % Cover of:	Multiply by:	
OBL species	43	x 1 =	43
FACW species	54	x 2 =	108
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	97 (A)		151 (B)

Prevalence Index = B/A = 1.557

Hydrophytic Vegetation Indicators:

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

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

Hydrophytic Vegetation Present? Yes ◉ No ○

Remarks:
Diverse mix of hydrophytic vegetation. Deschampsia caespitosa is increasing across this wetland cell.

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

Soil

Sampling Point: DP-1W

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

Depth (inches)	Matrix Color (moist)		%	Redox Features Color (moist)		%	Type[1]	Loc[2]	Texture	Remarks
0-8	10YR	4/1	100						Sandy Clay Loam	
8-16	10YR	5/2	100						Clay	

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

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

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

Indicators for Problematic Hydric Soils[3]:

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

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

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soil Present? Yes ◉ No ○

Remarks:

Recently constructed wetland. Soils may be too young to have formed hydric indicators (Problematic Hydric Soils: Recently Developed Wetlands, USACE 2010). Clay soil at 8".

Hydrology

Wetland Hydrology Indicators:

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

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

Secondary Indicators (minimum of two required)

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

Field Observations:

Surface Water Present?	Yes ○	No ◉	Depth (inches):	
Water Table Present?	Yes ◉	No ○	Depth (inches):	14
Saturation Present? (includes capillary fringe)	Yes ◉	No ○	Depth (inches):	0

Wetland Hydrology Present? Yes ◉ No ○

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

Remarks:

Soils were saturated to the surface, water in the pit at 14 inches.

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

Project/Site: Silicon Mountain **City/County:** Silver Bow **Sampling Date:** 22-Jun-16

Applicant/Owner: MDT **State:** MT **Sampling Point:** DP-2U

Investigator(s): C. Hoschouer, C. Seibert **Section, Township, Range:** S 24 T 3N R 9W

Landform (hillslope, terrace, etc.): Valley bottom **Local relief (concave, convex, none):** flat **Slope:** 5.0 % / 2.9 °

Subregion (LRR): LRR E **Lat.:** 46.0017632 **Long.:** -112.660978 **Datum:** WGS84

Soil Map Unit Name: **NWI classification:** Upland

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

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

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

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

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

Remarks:
Formerly SP-04.

VEGETATION - Use scientific names of plants.

	Absolute % Cover	Dominant Species? Rel.Strat. Cover	Indicator Status
Tree Stratum (Plot size: 30 Foot Radius)			
1.	0	☐ 0.0%	
2.	0	☐ 0.0%	
3.	0	☐ 0.0%	
4.	0	☐ 0.0%	
	0	= Total Cover	
Sapling/Shrub Stratum (Plot size: 15 Foot Radius)			
1.	0	☐ 0.0%	
2.	0	☐ 0.0%	
3.	0	☐ 0.0%	
4.	0	☐ 0.0%	
5.	0	☐ 0.0%	
	0	= Total Cover	
Herb Stratum (Plot size: 5 Foot Radius)			
1. Cirsium arvense	5	☐ 5.9%	FAC
2. Descurainia sophia	10	☐ 11.8%	UPL
3. Hordeum jubatum	20	☑ 23.5%	FAC
4. Elymus repens	30	☑ 35.3%	FAC
5. Melilotus officinalis	20	☑ 23.5%	FACU
6.	0	☐ 0.0%	
7.	0	☐ 0.0%	
8.	0	☐ 0.0%	
9.	0	☐ 0.0%	
10.	0	☐ 0.0%	
11.	0	☐ 0.0%	
	85	= Total Cover	
Woody Vine Stratum (Plot size: 30 Foot Radius)			
1.	0	☐ 0.0%	
2.	0	☐ 0.0%	
	0	= Total Cover	

% Bare Ground in Herb Stratum: 10

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 2 (A)

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

Percent of dominant Species That Are OBL, FACW, or FAC: 66.7% (A/B)

Prevalence Index worksheet:

	Total % Cover of:	Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	55	x 3 =	165
FACU species	20	x 4 =	80
UPL species	10	x 5 =	50
Column Totals:	85 (A)		295 (B)

Prevalence Index = B/A = 3.471

Hydrophytic Vegetation Indicators:

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

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

Hydrophytic Vegetation Present? Yes ◉ No ○

Remarks:
Highly disturbed. Starting to see the transition from annual invasive species to perennial species. A lot of litter from Lepidium perfoliatum and Descurainia sophia from 2015.

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

Soil

Sampling Point: DP-2U

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

Depth (inches)	Matrix Color (moist)		%	Redox Features Color (moist)		%	Type[1]	Loc[2]	Texture	Remarks
0-16	10YR	3/2	100						Loam	

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

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

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

Indicators for Problematic Hydric Soils[3]:

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

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

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ○ No ◉

Remarks:

Soil moist in the upper 2 inches, dry below. No hydric indicators observed.

Hydrology

Wetland Hydrology Indicators:

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

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

Secondary Indicators (minimum of two required)

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

Field Observations:

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

Wetland Hydrology Present? Yes ○ No ◉

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

Remarks:

No evidence of hydrology. Sample point located on a side slope of this excavated wetland cell.

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

Project/Site: Silicon Mountain **City/County:** Silver Bow **Sampling Date:** 22-Jun-16

Applicant/Owner: MDT **State:** MT **Sampling Point:** DP-2W

Investigator(s): C. Hoschouer, C. Seibert **Section, Township, Range:** S 24 T 3N R 9W

Landform (hillslope, terrace, etc.): Valley bottom **Local relief (concave, convex, none):** concave **Slope:** 1.0 % / 0.6 °

Subregion (LRR): LRR E **Lat.:** 46.0017937 **Long.:** -112.660988 **Datum:** WGS84

Soil Map Unit Name: Riverrun, occasionally flooded-Mannixlee, frequently flooded complex **NWI classification:** Upland

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

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

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

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

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

Remarks:
NWI indicates upland, however this is a newly constructed wetland site within cell 5. Formerly SP-03.

VEGETATION - Use scientific names of plants.

	Absolute % Cover	Dominant Species? Rel.Strat. Cover	Indicator Status
Tree Stratum (Plot size: 30 Foot Radius)			
1.	0	☐ 0.0%	
2.	0	☐ 0.0%	
3.	0	☐ 0.0%	
4.	0	☐ 0.0%	
	0	= Total Cover	
Sapling/Shrub Stratum (Plot size: 15 Foot Radius)			
1.	0	☐ 0.0%	
2.	0	☐ 0.0%	
3.	0	☐ 0.0%	
4.	0	☐ 0.0%	
5.	0	☐ 0.0%	
	0	= Total Cover	
Herb Stratum (Plot size: 5 Foot Radius)			
1. Puccinellia nuttalliana	30	☑ 49.2%	FACW
2. Ranunculus cymbalaria	5	☐ 8.2%	OBL
3. Potentilla anserina	10	☑ 16.4%	OBL
4. Epilobium ciliatum	5	☐ 8.2%	FACW
5. Veronica anagallis-aquatica	5	☐ 8.2%	OBL
6. Cirsium arvense	5	☐ 8.2%	FAC
7. Sisymbrium altissimum	1	☐ 1.6%	FACU
8.	0	☐ 0.0%	
9.	0	☐ 0.0%	
10.	0	☐ 0.0%	
11.	0	☐ 0.0%	
	61	= Total Cover	
Woody Vine Stratum (Plot size: 30 Foot Radius)			
1.	0	☐ 0.0%	
2.	0	☐ 0.0%	
	0	= Total Cover	

% Bare Ground in Herb Stratum: 30

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 2 (A)

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

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

Prevalence Index worksheet:

	Total % Cover of:	Multiply by:	
OBL species	20	x 1 =	20
FACW species	35	x 2 =	70
FAC species	5	x 3 =	15
FACU species	1	x 4 =	4
UPL species	0	x 5 =	0
Column Totals:	61	(A)	109 (B)

Prevalence Index = B/A = 1.787

Hydrophytic Vegetation Indicators:

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

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

Hydrophytic Vegetation Present? Yes ◉ No ○

Remarks:
PEM.

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

Soil

Sampling Point: DP-2W

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

Depth (inches)	Matrix Color (moist)		%	Redox Features Color (moist)		%	Type[1]	Loc[2]	Texture	Remarks
0-16	10YR	3/2	100						Sandy Loam	

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

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

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

Indicators for Problematic Hydric Soils[3]:

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

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

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soil Present? Yes ◉ No ○

Remarks:

Recently constructed wetland. Soil saturated to surface. Soils may be too young to have formed hydric indicators (Problematic Hydric Soils: Recently Developed Wetlands, USACE 2010).

Hydrology

Wetland Hydrology Indicators:

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

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

Secondary Indicators (minimum of two required)

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

Field Observations:

Surface Water Present?	Yes ○	No ◉	Depth (inches):	
Water Table Present?	Yes ◉	No ○	Depth (inches):	11
Saturation Present? (includes capillary fringe)	Yes ◉	No ○	Depth (inches):	0

Wetland Hydrology Present? Yes ◉ No ○

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

Remarks:

Soil saturated to surface. Water in soil pit at 11 inches. Starting to see the encroachment of more hydrophytic vegetation around the perimeter of this wetland cell.

MDT MONTANA WETLAND ASSESSMENT FORM (revised March 2008)

1. Project Name: Silicon Mountain **2. MDT Project #:** MT-STPX 47(24) **3. Control #:** 6044000

3. Evaluation Date: 6/24/2016 **4. Evaluator(s):** C. Hoschouer **5. Wetland/Site #(s):** Created Cells 1 and 5

6. Wetland Location(s): Township 3 N, Range 9 W, Section 24; Township ___ N, Range ___ E, Section _____

Approximate Stationing or Roadposts: N/A

Watershed: 2 - Upper Clark Fork **County:** _ _ Silver Bow _____

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)
3.0 (measured, e.g. GPS)

9. Assessment Area (AA) Size (acre): _____ (visually estimated)
(see manual for determining AA) 3.0 (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	Aquatic Bed	Excavated	Permanent / Perennial	95
Depressional	Emergent Wetland	Excavated	Seasonal / Intermittent	5

Comments: _____

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

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%.	---	---	---
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%.	---	high disturbance	---

Comments (types of disturbance, intensity, season, etc.)**:** This is year 2 (2016) following construction, wetland cell 1 has been reseeded resulting in good perennial grass establishment but is very weedy. Wetland cell is slower to develop into perennial seeded species and the area surrounding this cell has been heavily disturbed with the construction of the new trail and bridge. The level of disturbance will decrease over time as the site stabilizes and becomes more vegetated.

ii. Prominent noxious, aquatic nuisance, and other exotic vegetation species: _____

iii. Provide brief descriptive summary of AA and surrounding land use/habitat: The site is a mitigation site comprised of two separate wetland cells (1 & 5) that are designed to intercept groundwater, and that appear to have a more perennial water source. They have no surface connection to one another. Cell 1 does drain into Sand Creek, but is outside of Sand Creek's active floodplain area, and so is not subject to overbank flooding.

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	mod	NA	NA	NA
1 class, but not a monoculture	---	←NO	YES→	---
1 class, monoculture (1 species comprises 90% of total cover)	---	NA	NA	NA

Comments: PAB, PEM

Wetland/Site #(s): Created Cells 1 and 5

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, MTNHP

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 Hoary bat (S3), Preble's shrew (S3)
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
S1 Species Functional Point/Rating	---	---	---	---	---	---	---
S2 and S3 Species Functional Point/Rating	---	---	---	.5M	---	---	---

Sources for documented use (e.g. observations, records): MTNHP

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)	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
☐ **Moderate Disturbance** at AA (see #12i)	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
☒ **High Disturbance** at AA (see #12i)	---	---	---	---	---	---	---	---	---	---	---	---	M	---	---	---	---	---	---	---

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**	---	---	.5M	---
☐ **Minimal**	---	---	---	---

Comments: _____

Wetland/Site #(s): Created Cells 1 and 5

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:**

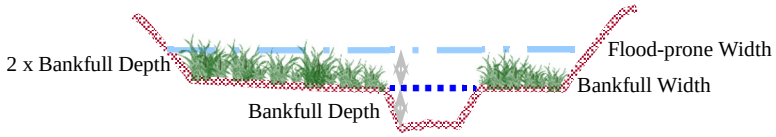
14E. FLOOD ATTENUATION ☐ **NA** (proceed to 14F)

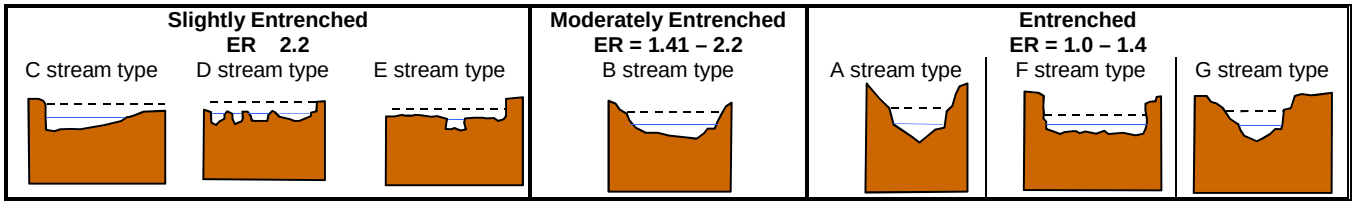
Applies only to wetlands that are subject to flooding via in-channel or overbank flow.
If wetlands in AA are not flooded from in-channel or overbank flow, check the NA box and proceed to 14F.

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.

75 / 32 = 2.34375

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**	---	---	.6M	---	---	---	---	---	---
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 is <10 acres. Wetland cell impounds water restricting return to Sand Creek. Floodprone width is greater than 75 and entrenchment ratio greater than 2.2.

Wetland/Site #(s): Created Cells 1 and 5

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

Comments: _____

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

Applies to 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%**	.3L	---	---

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	---	---	---	---	---	---	---	---	---	---	---	---	---	---	.6M	---	---	---
S/I	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
T/E/A	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

Wetland/Site #(s): Created Cells 1 and 5

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** = .7M ☐ **NO**

iv. Final Score and Rating: .7M **Comments:** Vegetated component may increase as the site develops.

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**	1H	---	---	---
☐ **Insufficient Data/Information**	---			

Comments: Wetland mitigation cells with perennial water that intercept groundwater.

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)	---	---	---	---	---	---	---	---	---
☒ **Moderate Disturbance** at AA (#12i)	---	---	---	---	---	---	---	.3L	---
☐ **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)	---	---
Private ownership with general public access (no permission required)	---	---
Private or public ownership without general public access, or requiring permission for public access	---	.05L

Comments: Site is a mitigation site that could be used for education purposes, but does not have general public access.

15. GENERAL SITE NOTES: _____

Wetland/Site #(s): Created Cells 1 and 5

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	mod 0.50	1.00	1.50	
C. General Wildlife Habitat	mod 0.50	1.00	1.50	
D. General Fish Habitat	NA	NA	0	
E. Flood Attenuation	mod 0.60	1.00	1.80	
F. Short and Long Term Surface Water Storage	high 0.80	1.00	2.40	*
G. Sediment / Nutrient / Toxicant Removal	mod 0.70	1.00	2.10	*
H. Sediment / Shoreline Stabilization	low 0.30	1.00	0.90	
I. Production Export / Food Chain Support	mod 0.70	1.00	2.10	*
J. Groundwater Discharge / Recharge	high 1.00	1.00	3.00	*
K. Uniqueness	low 0.30	1.00	0.90	
L. Recreation / Education Potential (bonus point)	low 0.05		0.15	
Total Points	**5.45**	**10**	**16.35 Total Functional Units**	
Percent of Possible Score 55% (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**

MDT MONTANA WETLAND ASSESSMENT FORM (revised March 2008)

1. Project Name: Silicon Mountain **2. MDT Project #:** MT-STPX 47(24) **3. Control #:** 6044000

3. Evaluation Date: 6/24/2016 **4. Evaluator(s):** C. Hoschouer **5. Wetland/Site #(s):** Created Cells 2, 3 and 4

6. Wetland Location(s): Township 3 N, Range 9 W, Section 24; Township ___N, Range ___E, Section _____

Approximate Stationing or Roadposts: N/A

Watershed: 2 - Upper Clark Fork **County:** _ _ Silver Bow _____

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)
3.3 (measured, e.g. GPS)

9. Assessment Area (AA) Size (acre): _____ (visually estimated)
(see manual for determining AA) 3.3 (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%.	---	---	---
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%.	---	high disturbance	---

Comments (types of disturbance, intensity, season, etc.)**:** The site was recently constructed and so has a very high disturbance level. This internal disturbance level should be reduced over time to reflect the recovery and stabilization of the site. The area surrounding the site is primarily rural, but there are roads, a residence, and some commercial activity.

ii. Prominent noxious, aquatic nuisance, and other exotic vegetation species: _____

iii. Provide brief descriptive summary of AA and surrounding land use/habitat: The AA consists of wetland cells constructed to intercept groundwater. This AA is comprised of the wetland cells (2,3,4) that have a more seasonal /intermittent water regime. Sand Creek is not included in this AA because it's the berms surrounding the cells do not allow for the creek to access these areas. The surrounding area is comprised of low rolling hills dominated by sagebrush and grasses.

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: PEM

Wetland/Site #(s): Created Cells 2, 3 and 4

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, MTNHP

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 Hoary bat (S3), Preble's shrew (S3)
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
S1 Species Functional Point/Rating	---	---	---	---	---	---	---
S2 and S3 Species Functional Point/Rating	---	---	---	.5M	---	---	---

Sources for documented use (e.g. observations, records): MTNHP

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)	---	---	---	---	---	---	---	---	---	---	---	---	E	---	---	---	---	---	---	---
☐ **Moderate Disturbance** at AA (see #12i)	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
☒ **High Disturbance** at AA (see #12i)	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	L	---	---

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	---	---	---	.3L
☐ Minimal	---	---	---	---

Comments: _____

Wetland/Site #(s): Created Cells 2, 3 and 4

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:**

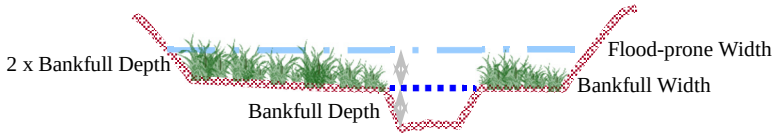
14E. FLOOD ATTENUATION ☐ **NA** (proceed to 14F)

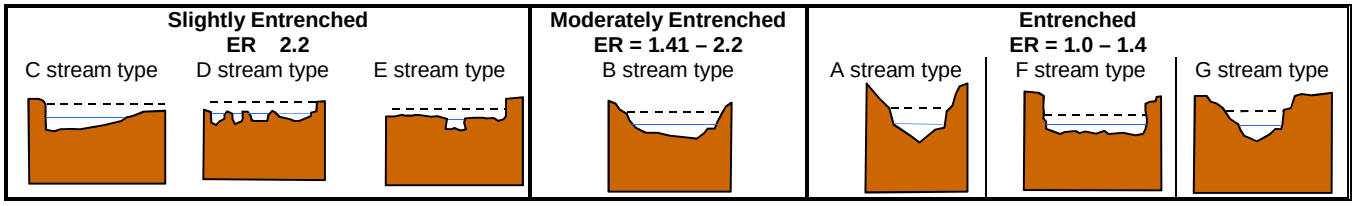
Applies only to wetlands that are subject to flooding via in-channel or overbank flow.
If wetlands in AA are not flooded from in-channel or overbank flow, check the NA box and proceed to 14F.

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.

75 / 32 = 2.34375

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**	---	---	.6M	---	---	---	---	---	---
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 is less than 10 acres. Wetland cells impound water restricting return to Sand Creek. Floodplain width is greater than 75 and entrenchment ratio greater than 2.2

Wetland/Site #(s): Created Cells 2, 3 and 4

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: Wetland cells intercept groundwater.

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**	---	.8H	---	---	---	---	---	---
AA contains **unrestricted outlet**	---	---	---	---	---	---	---	---

Comments: Cells have the potential to receive compounds through groundwater inputs.

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	---	---	---	---	---	---	---	---	.6M	---	---	---	---	---	---	---	---	---
T/E/A	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

Wetland/Site #(s): Created Cells 2, 3 and 4

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** = .7M ☐ **NO**

iv. Final Score and Rating: .7M **Comments:** Cells contain a subsurface outlet; have vegetated buffers.

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: Mitigation cells designed to intercept shallow groundwater aquifer.

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)	---	---	---	---	---	---	---	---	---
☐ **Moderate Disturbance** at AA (#12i)	---	---	---	---	---	---	---	---	---
☒ **High Disturbance** at AA (#12i)	---	---	---	---	---	---	---	---	.1L

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)	---	---
Private ownership with general public access (no permission required)	---	---
Private or public ownership without general public access, or requiring permission for public access	---	.05L

Comments: Site is a mitigation site that could be used for education purposes, but does not have general public access.

15. GENERAL SITE NOTES: _____

Wetland/Site #(s): Created Cells 2, 3 and 4

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	mod 0.50	1.00	1.65	
C. General Wildlife Habitat	low 0.30	1.00	0.99	
D. General Fish Habitat	NA	NA	0	
E. Flood Attenuation	mod 0.60	1.00	1.98	
F. Short and Long Term Surface Water Storage	mod 0.60	1.00	1.98	*
G. Sediment / Nutrient / Toxicant Removal	high 0.80	1.00	2.64	*
H. Sediment / Shoreline Stabilization	NA	NA	0	
I. Production Export / Food Chain Support	mod 0.70	1.00	2.31	*
J. Groundwater Discharge / Recharge	mod 0.70	1.00	2.31	*
K. Uniqueness	low 0.10	1.00	0.33	
L. Recreation / Education Potential (bonus point)	low 0.05		0.165	
Total Points	**4.35**	**9**	**14.35 Total Functional Units**	
Percent of Possible Score 48% (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**

MDT MONTANA WETLAND ASSESSMENT FORM (revised March 2008)

1. Project Name: Silicon Mountain **2. MDT Project #:** MT-STPX 47(24) **3. Control #:** 6044000

3. Evaluation Date: 6/24/2016 **4. Evaluator(s):** C. Hoschouer **5. Wetland/Site #(s):** Preservation

6. Wetland Location(s): Township 3 N, Range 9 W, Section 24; Township ___N, Range ___E, Section _____

Approximate Stationing or Roadposts: N/A

Watershed: 2 - Upper Clark Fork **County:** _ _ Silver Bow _____

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)
10.3 (measured, e.g. GPS)

9. Assessment Area (AA) Size (acre): _____ (visually estimated)
(see manual for determining AA) 10.3 (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	Aquatic Bed		Permanent / Perennial	5
Depressional	Emergent Wetland		Seasonal / Intermittent	94
Depressional	Scrub-Shrub Wetland		Temporary / Ephemeral	1

Comments: _____

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

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%.	---	---	---
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%.	---	high disturbance	---

Comments (types of disturbance, intensity, season, etc.)**:** The wetland mitigation site was recently constructed which consisted of substantial excavation to create new wetlands and channel re-alignment/restoration. In addition, area surrounding the existing wetlands has been disturbed from the construction of the new trail and bridge as well as the new road and overpass. The level of disturbance will decrease over time as the site stabilizes and becomes more vegetated.

ii. Prominent noxious, aquatic nuisance, and other exotic vegetation species: _____

iii. Provide brief descriptive summary of AA and surrounding land use/habitat: The AA consists of pre-existing depressional wetlands located adjacent to Sand Creek and south of Silver Bow Creek. Land use surrounding the AA includes commercial developments, agriculture (grazing/pasture), transportation (railroad and highway) and private residences.

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	mod	NA	NA	NA
1 class, but not a monoculture	---	←NO	YES→	---
1 class, monoculture (1 species comprises 90% of total cover)	---	NA	NA	NA

Comments: PEM, PSS

Wetland/Site #(s): Preservation Wetlands

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, MTNHP

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 Hoary bat (S3), Preble's shrew (S3)
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
S1 Species Functional Point/Rating	---	---	---	---	---	---	---
S2 and S3 Species Functional Point/Rating	---	---	---	.5M	---	---	---

Sources for documented use (e.g. observations, records): MTNHP

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)	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
☐ **Moderate Disturbance** at AA (see #12i)	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
☒ **High Disturbance** at AA (see #12i)	---	---	---	---	---	---	---	---	---	---	---	---	---	L	L	---	---	---	---	---

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**	---	---	.5M	---
☐ **Minimal**	---	---	---	---

Comments: _____

Wetland/Site #(s): Preservation Wetlands

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:**

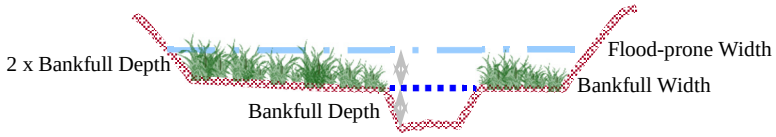
14E. FLOOD ATTENUATION ☒ **NA** (proceed to 14F)

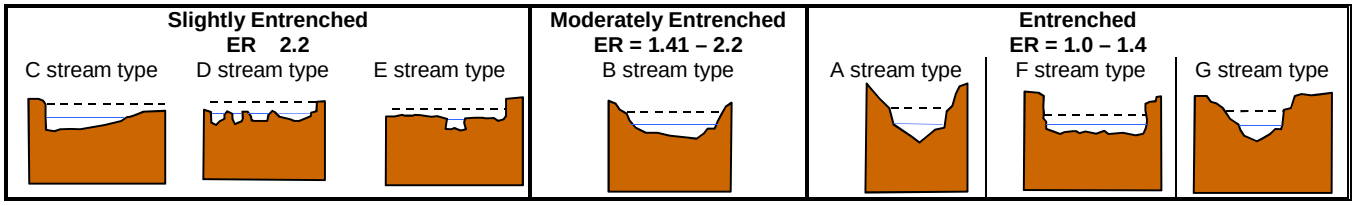
Applies only to wetlands that are subject to flooding via in-channel or overbank flow.
If wetlands in AA are not flooded from in-channel or overbank flow, check the NA box and proceed to 14F.

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.

75 / 32 = 2.34375

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**	---	---	.6M	---	---	---	---	---	---
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 flooding is less than 10 acres. Depressional wetland impound water restricting return to Sand Creek.

Wetland/Site #(s): Preservation wetlands

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

Comments: _____

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

Applies to 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%**	.7M	---	---
☐ **< 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	---	.7M	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
S/I	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
T/E/A	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

Wetland/Site #(s): Preservation Wetlands

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** = .7M ☐ **NO**

iv. Final Score and Rating: .7M **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**	1H	---	---	---
☐ **Insufficient Data/Information**	---			

Comments: Wetland pond with perennial water that intercept groundwater.

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)	---	---	---	---	---	---	---	---	---
☐ **Moderate Disturbance** at AA (#12i)	---	---	---	---	---	---	---	---	---
☒ **High Disturbance** at AA (#12i)	---	---	---	---	---	---	---	.2L	---

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)	---	---
Private ownership with general public access (no permission required)	---	---
Private or public ownership without general public access, or requiring permission for public access	---	.05L

Comments: Site is a mitigation site that could be used for education purposes, but does not have general public access.

15. GENERAL SITE NOTES: _____

Wetland/Site #(s): Preservation Wetlands

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	mod 0.50	1.00	5.15	
C. General Wildlife Habitat	mod 0.50	1.00	5.15	*
D. General Fish Habitat	NA	NA	0	
E. Flood Attenuation	mod 0.60	1.00	6.18	
F. Short and Long Term Surface Water Storage	high 0.80	1.00	8.24	*
G. Sediment / Nutrient / Toxicant Removal	mod 0.70	1.00	7.21	
H. Sediment / Shoreline Stabilization	mod 0.70	1.00	7.21	
I. Production Export / Food Chain Support	mod 0.70	1.00	7.21	*
J. Groundwater Discharge / Recharge	high 1.00	1.00	10.3	*
K. Uniqueness	low 0.20	1.00	2.06	
L. Recreation / Education Potential (bonus point)	low 0.05		0.51	
Total Points	**5.75**	**10**	**59.22 Total Functional Units**	
Percent of Possible Score 58% (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
Silicon Mountain
Silver Bow County, Montana



Photo Point: 1 Photo 1: West side of cell 1
Bearing: 333 degrees Year: 2015



Photo Point: 1 Photo 1: West side of cell 1
Bearing: 333 degrees Year: 2016



Photo Point: 1 Photo 2: West side of cell 1
Bearing: 26 degrees Year: 2015



Photo Point: 1 Photo 2: West side of cell 1
Bearing: 26 degrees Year: 2016



Photo Point: 1 Photo 3: West side of cell 1
Bearing: 86 degrees Year: 2015



Photo Point: 1 Photo 3: West side of cell 1
Bearing: 86 degrees Year: 2016



Photo Point: 1 Photo 4: West side of cell 1
Bearing: 166 degrees Year: 2015



Photo Point: 1 Photo 4: West side of cell 1
Bearing: 166 degrees Year: 2016



Photo Point: 1 Photo 5: West side of cell 1
Bearing: 202 degrees Year: 2015



Photo Point: 1 Photo 5: West side of cell 1
Bearing: 202 degrees Year: 2016



Photo Point: 2 Photo 1: Outside cell 1
Bearing: 40 degrees Year: 2015



Photo Point: 2 Photo 1: Outside cell 1
Bearing: 40 degrees Year: 2016



Photo Point: 2 Photo 2: Outside cell 1
Bearing: 86 degrees Year: 2015



Photo Point: 2 Photo 2: Outside cell 1
Bearing: 86 degrees Year: 2016



Photo Point: 2 Photo 3: Outside cell 1
Bearing: 113 degrees Year: 2015



Photo Point: 2 Photo 3: Outside cell 1
Bearing: 113 degrees Year: 2016



Photo Point: 3 Photo 1: West side of cell 4
Bearing: 314 degrees Year: 2015



Photo Point: 3 Photo 1: West side of cell 4
Bearing: 314 degrees Year: 2016



Photo Point: 3 Photo 2: West side of cell 4
Bearing: 343 degrees Year: 2015



Photo Point: 3 Photo 2: West side of cell 4
Bearing: 343 degrees Year: 2016



Photo Point: 3 Photo 3: West side of cell 4
Bearing: 66 degrees Year: 2015



Photo Point: 3 Photo 3: West side of cell 4
Bearing: 66 degrees Year: 2016

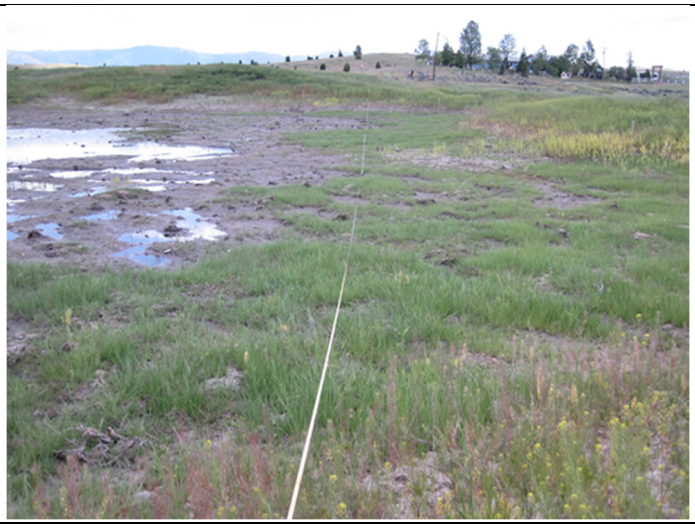


Photo Point: 3 Photo 4: West side of cell 4
Bearing: 114 degrees Year: 2015



Photo Point: 3 Photo 4: West side of cell 4
Bearing: 114 degrees Year: 2016



Photo Point: 4 Photo 1: East side of cell 5
Bearing: 220 degrees Year: 2015



Photo Point: 4 Photo 1: East side of cell 5
Bearing: 220 degrees Year: 2016



Photo Point: 4 Photo 2: East side of cell 5
Bearing: 268 degrees Year: 2015



Photo Point: 4 Photo 2: East side of cell 5
Bearing: 268 degrees Year: 2016



Photo Point: 4 Photo 3: East side of cell 5
Bearing: 321 degrees Year: 2015



Photo Point: 4 Photo 3: East side of cell 5
Bearing: 321 degrees Year: 2016

	
Photo Point: 4 Bearing: 24 degrees Photo 4: East side of cell 5 Year: 2015	Photo Point: 4 Bearing: 24 degrees Photo 4: East side of cell 5 Year: 2016
	
Photo Point: 4 Bearing: 56 degrees Photo 5: East side of cell 5 Year: 2015	Photo Point: 4 Bearing: 56 degrees Photo 5: East side of cell 5 Year: 2016
	
Photo Point: 5 Bearing: 145 degrees Photo 1: North end of cell 3 Year: 2015	Photo Point: 5 Bearing: 145 degrees Photo 1: North end of cell 3 Year: 2016



Photo Point: 5 Photo 2: North end of cell 3
Bearing: 345 degrees Year: 2015



Photo Point: 5 Photo 2: North end of cell 3
Bearing: 345 degrees Year: 2016



Photo Point: 6 Photo 1: South end of cell 2
Bearing: 326 degrees Year: 2015



Photo Point: 6 Photo 1: South end of cell 2
Bearing: 326 degrees Year: 2016



Photo Point: 6 Photo 2: South end of cell 2
Bearing: 352 degrees Year: 2015



Photo Point: 6 Photo 2: South end of cell 2
Bearing: 352 degrees Year: 2016



Photo Point: 7 Photo 1: Cell 6 west side of project
Bearing: 95 degrees Year: 2015



Photo Point: 7 Photo 1: Cell 6 west side of project
Bearing: 95 degrees Year: 2016



Photo Point: 8 Photo 1: Southern edge of project
Bearing: 213 degrees Year: 2015



Photo Point: 8 Photo 1: Southern edge of project
Bearing: 213 degrees Year: 2016



Photo Point: 8 Photo 2: Southern edge of project
Bearing: 28 degrees Year: 2015



Photo Point: 8 Photo 2: Southern edge of project
Bearing: 28 degrees Year: 2016



Photo Point: 9 Photo 1: Downstream of PP-8
Bearing: 148 degrees Year: 2015



Photo Point: 9 Photo 1: Downstream of PP-8
Bearing: 148 degrees Year: 2016



Photo Point: 9 Photo 2: Downstream of PP-8
Bearing: 356 degrees Year: 2015



Photo Point: 9 Photo 2: Downstream of PP-8
Bearing: 356 degrees Year: 2016



Photo Point: 10 Photo 1: Channel/slopes under overpass
Bearing: 312 degrees Year: 2015



Photo Point: 10 Photo 1: Channel/slopes under overpass
Bearing: 312 degrees Year: 2016



Photo Point: 10 Photo 2: Looking east across stream
Bearing: 66 degrees Year: 2015



Photo Point: 10 Photo 2: Looking east across stream
Bearing: 66 degrees Year: 2016



Photo Point: 11 Photo 1: Looking southeast upstream
Bearing: 144 degrees Year: 2015



Photo Point: 11 Photo 1: Looking southeast upstream
Bearing: 144 degrees Year: 2016



Photo Point: 11 Photo 2: Stream cross-section 3
Bearing: 178 degrees Year: 2015



Photo Point: 11 Photo 2: Stream cross-section 3
Bearing: 178 degrees Year: 2016



Photo Point: 11 Photo 3: Looking downstream
Bearing: 300 degrees Year: 2015



Photo Point: 11 Photo 3: Looking downstream
Bearing: 300 degrees Year: 2016



Photo Point: 12 Photo 1: Looking south across channel
Bearing: 216 degrees Year: 2015



Photo Point: 12 Photo 1: Looking south across channel
Bearing: 216 degrees Year: 2016



Photo Point: 12 Photo 2: Stream cross-section 4
Bearing: 284 degrees Year: 2015



Photo Point: 12 Photo 2: Stream cross-section 4
Bearing: 284 degrees Year: 2016



Photo Point: 12 Photo 3: Looking west across channel
Bearing: 270 degrees Year: 2015



Photo Point: 12 Photo 3: Looking west across channel
Bearing: 270 degrees Year: 2016



Photo Point: 12 Photo 4: Looking NW downstream
Bearing: 348 degrees Year: 2015



Photo Point: 12 Photo 4: Looking NW downstream
Bearing: 348 degrees Year: 2016



Photo Point: 13 Photo 1: Looking SE upstream
Bearing: 153 degrees Year: 2015



Photo Point: 13 Photo 1: Looking SE upstream
Bearing: 153 degrees Year: 2016

	
Photo Point: 13 Bearing: 341 degrees Photo 2: Looking NE upstream Year: 2015	Photo Point: 13 Bearing: 341 degrees Photo 2: Looking NE upstream Year: 2016
	
Photo Point: 14 Bearing: 178 degrees Photo 1: Western headcut Year: 2015	Photo Point: 14 Bearing: 178 degrees Photo 1: Western headcut Year: 2016
	
Photo Point: 15 Bearing: 189 degrees Photo 1: Eastern headcut Year: 2015	Photo Point: 15 Bearing: 189 degrees Photo 1: Eastern headcut Year: 2016

	
Photo Point: 16 Photo 1: Headcut Bearing: 270 degrees Year: 2015	Photo Point: 16 Photo 1: Headcut Bearing: 270 degrees Year: 2016
	
Photo Point: 17 Photo 1: Looking west across channel Bearing: 157 degrees Year: 2015	Photo Point: 17 Photo 1: Looking west across channel Bearing: 157degrees Year: 2016
	
Photo Point: 17 Photo 2: Looking north across channel Bearing: 356 degrees Year: 2015	Photo Point: 17 Photo 2: Looking north across channel Bearing: 356 degrees Year: 2016



Transect 1: Start Location: South end cell 2
Bearing: 305 degrees Year: 2015



Transect 1: End Location: West end of cell 2
Bearing: 177 degrees Year: 2015



Transect 1: Start Location: South end cell 2
Bearing: 305 degrees Year: 2016



Transect 1: End Location: West end of cell 2
Bearing: 177 degrees Year: 2016



Transect 2: Start
Bearing: 106 degrees
Location: West side of cell 4
Year: 2015



Transect 2: End
Bearing: 285 degrees
Location: East side of cell 4
Year: 2015



Transect 2: Start
Bearing: 106 degrees
Location: West side of cell 4
Year: 2016 (July 7th retake)



Transect 2: End
Bearing: 285 degrees
Location: East side of cell 4
Year: 2016 (July 7th retake)



Data Point: DP1W Location: East side of cell 3
Year: 2016



Data Point: DP1W Location: East side of cell 3
Year 2016



Data Point: DP1U Location: Near cell 3
Year: 2016



Data Point: DP1U Location: Near cell 3
Year: 2016



Data Point: DP2W Location: South end of cell 5
Year: 2016

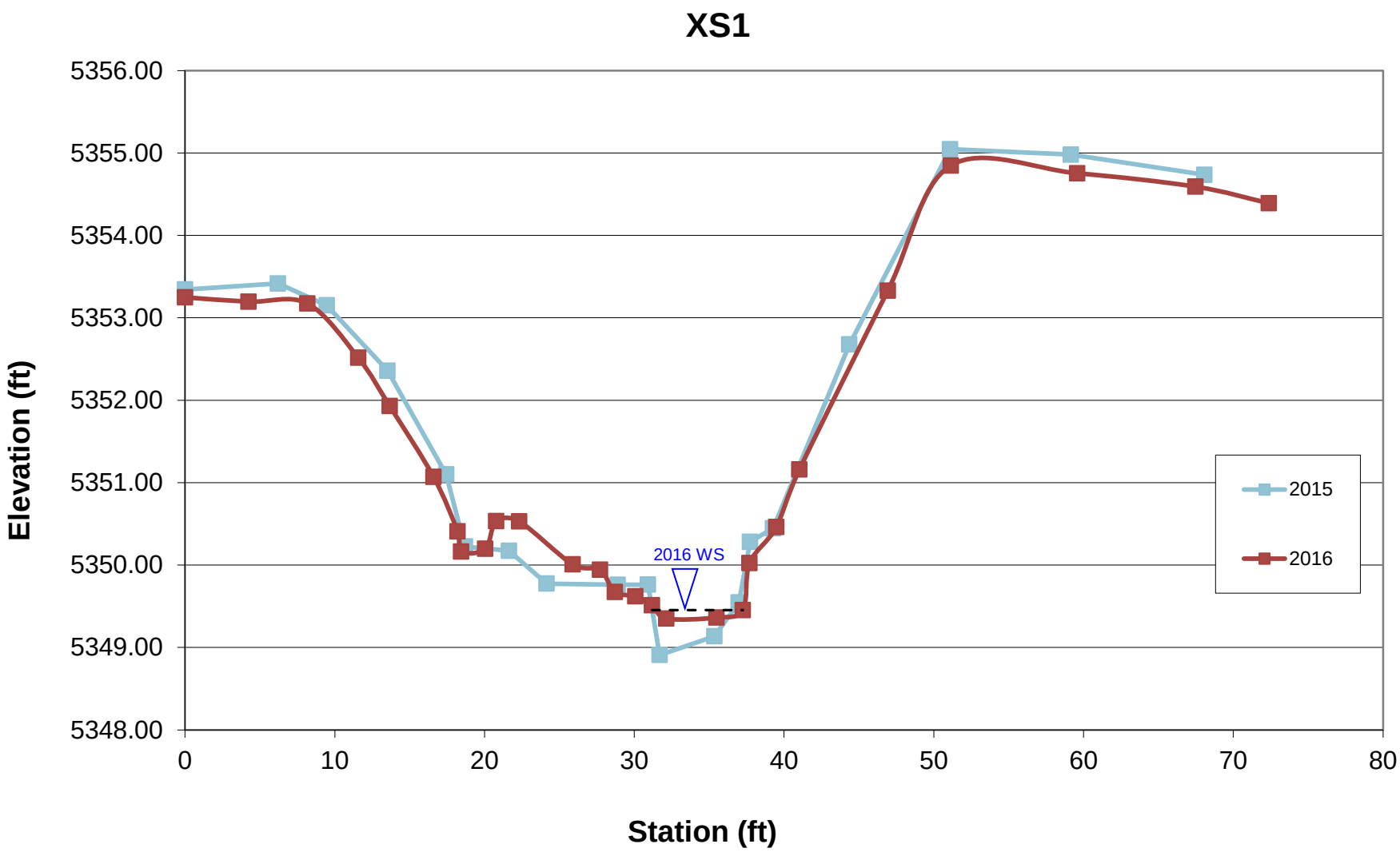


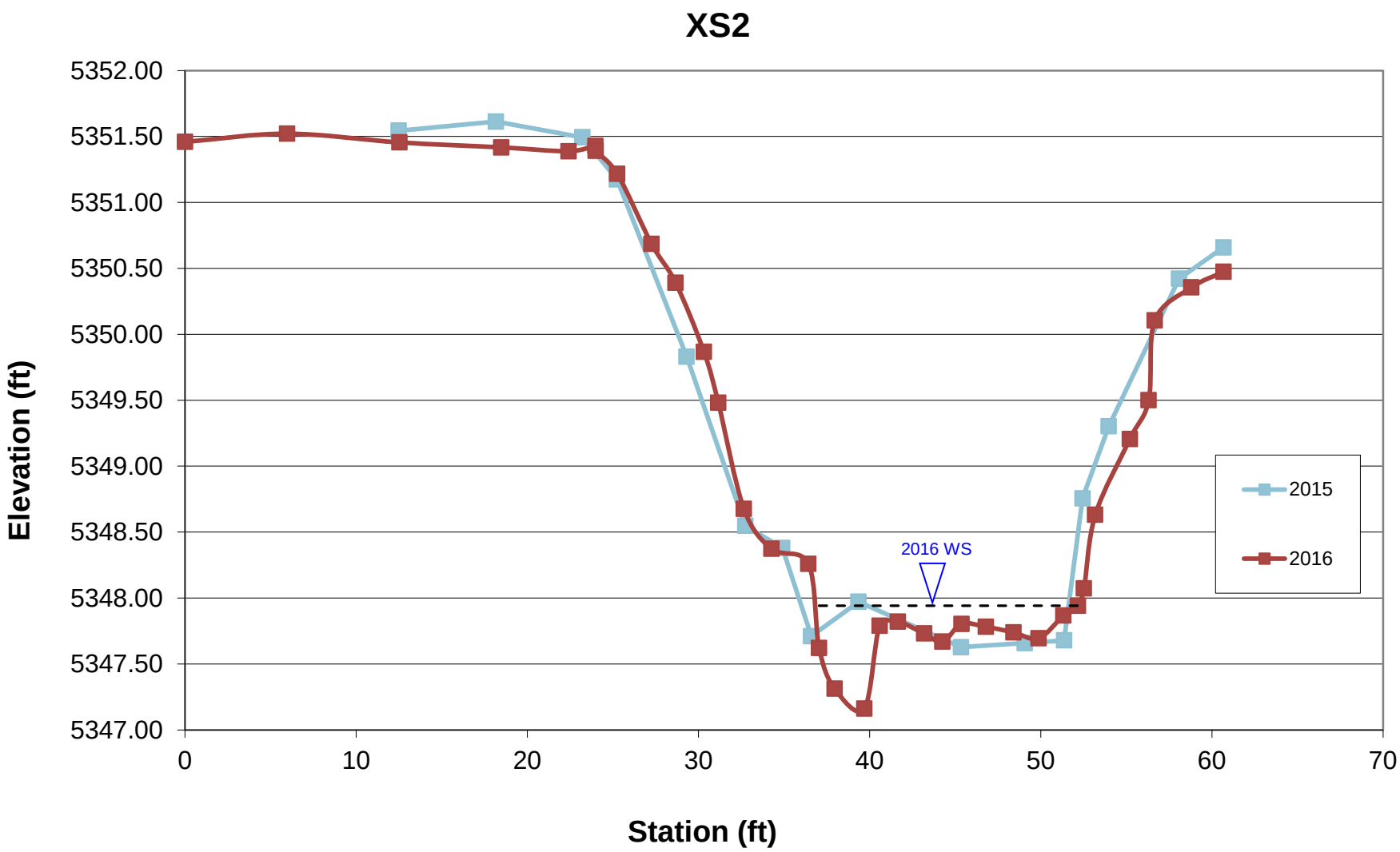
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Year: 2016

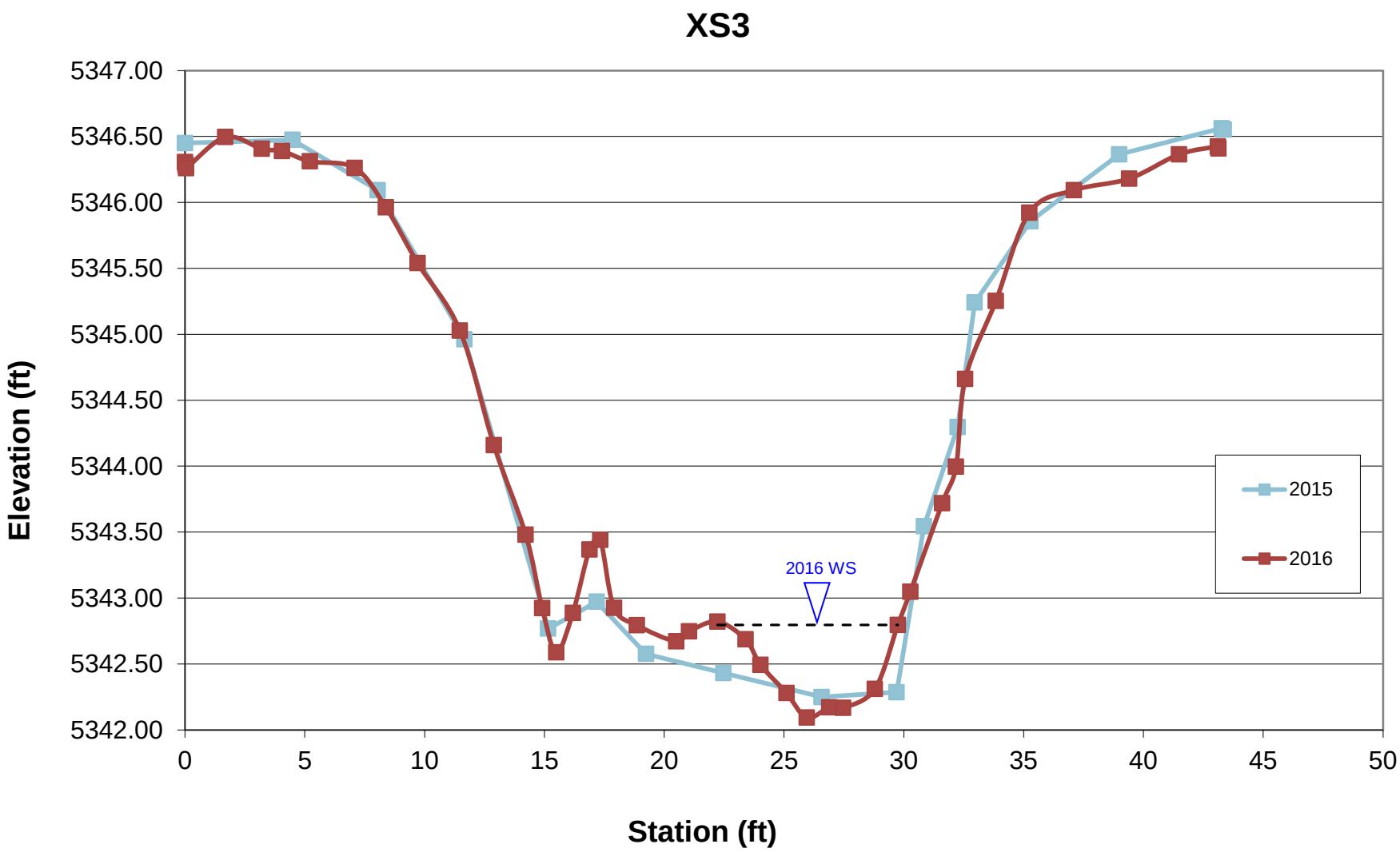
	
Data Point: DP2U Location: South end of cell 5 Year: 2016	Data Point: DP2U Location: South end of cell 5 Year 2016

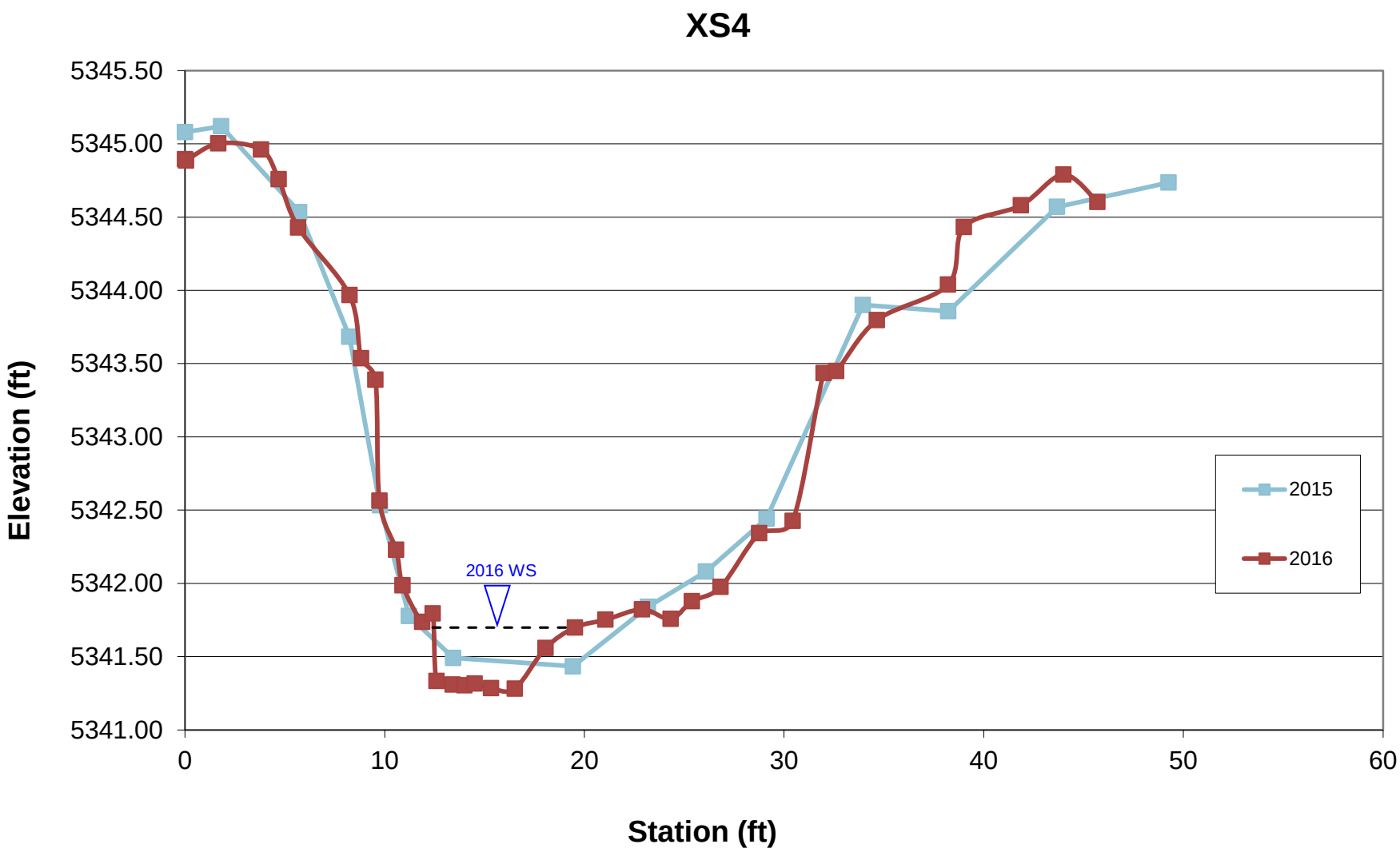
APPENDIX D
CHANNEL CROSS-SECTION PLOTS

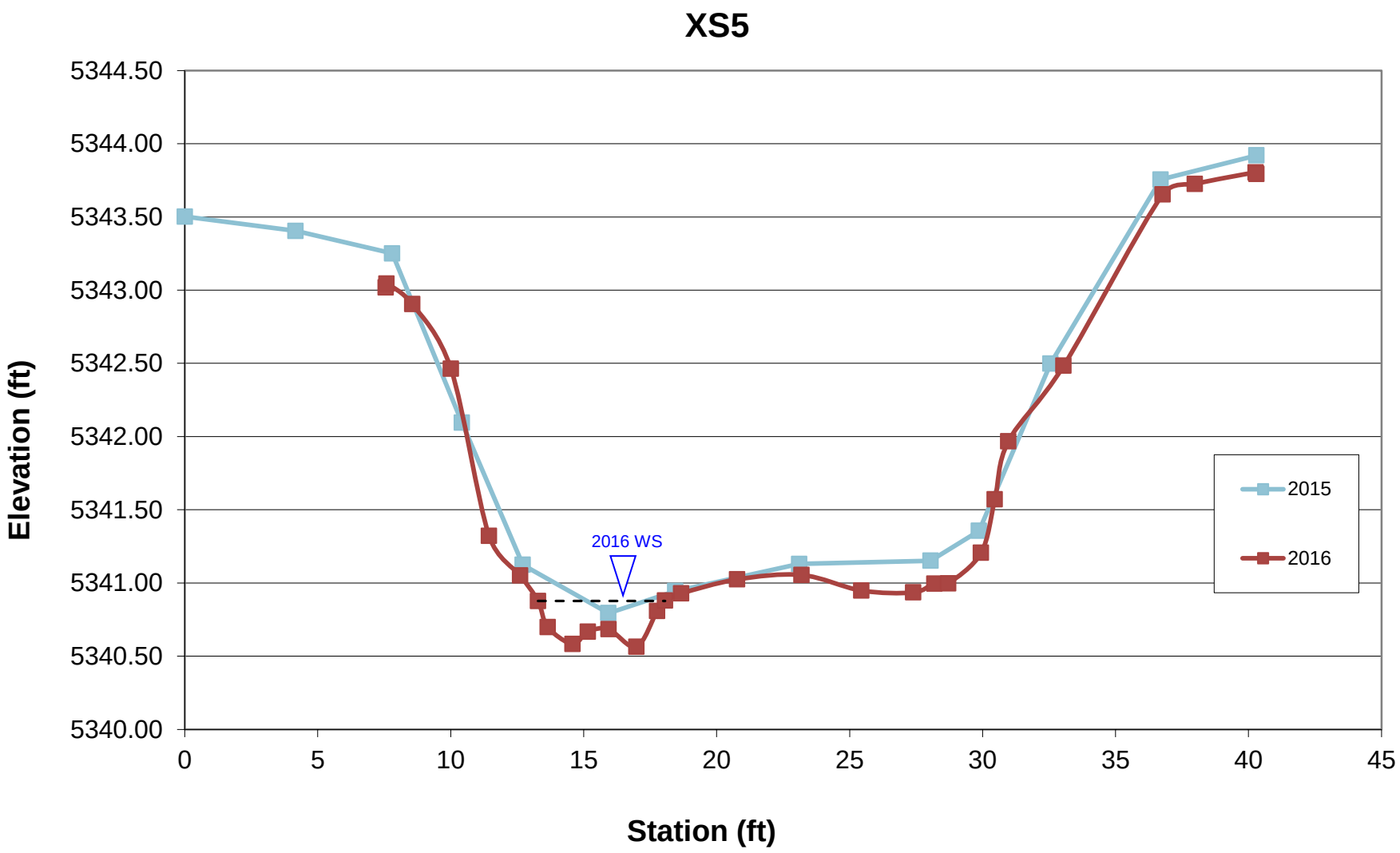
MDT Wetland Mitigation Monitoring
Silicon Mountain
Silver Bow County, Montana

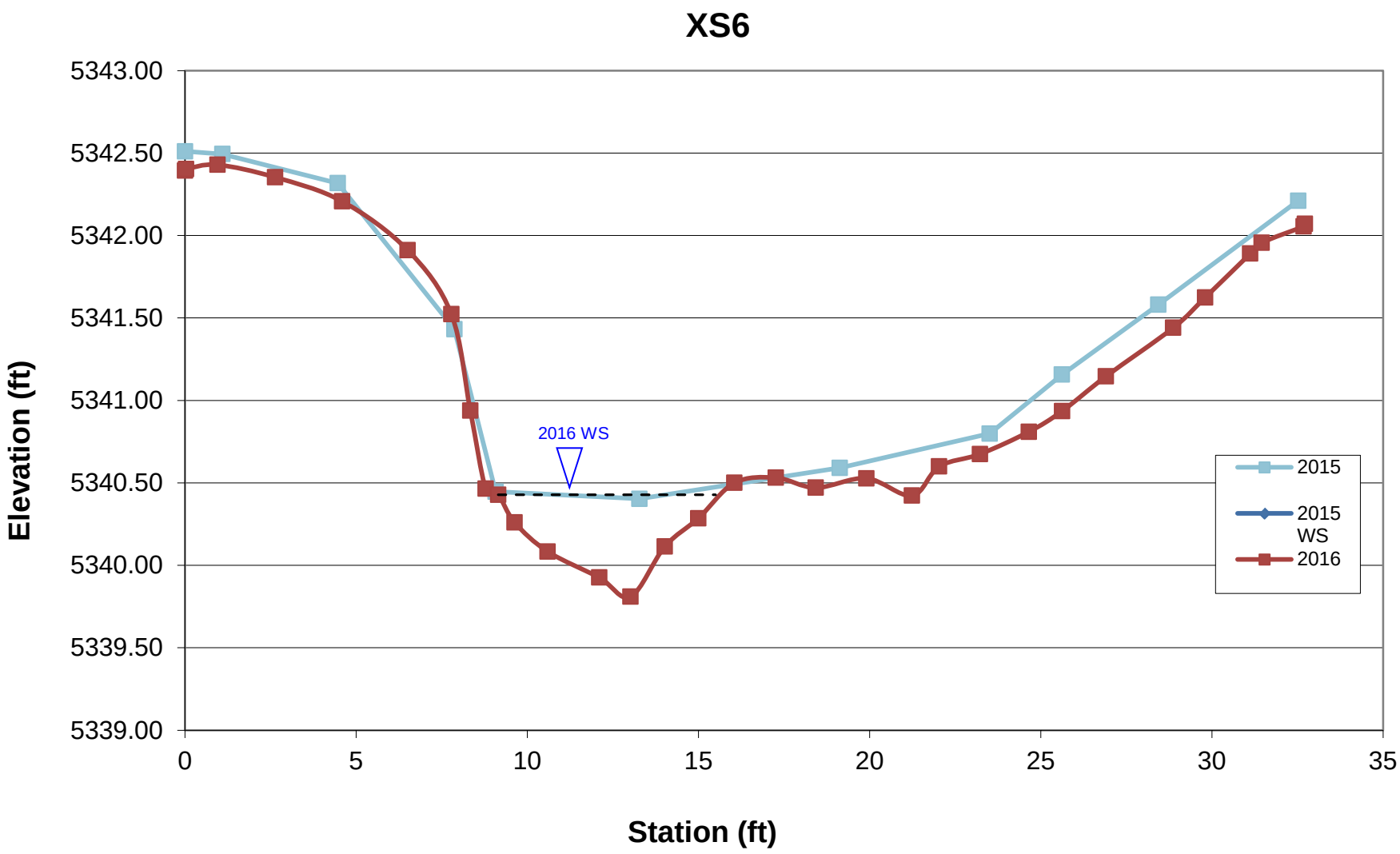

XS1
5356.00
5355.00
5354.00
5353.00
5352.00
5351.00
5350.00
5349.00
5348.00
Elevation (ft)
0
10
20
30
40
50
60
70
80
Station (ft)
2016 WS
2015
2016

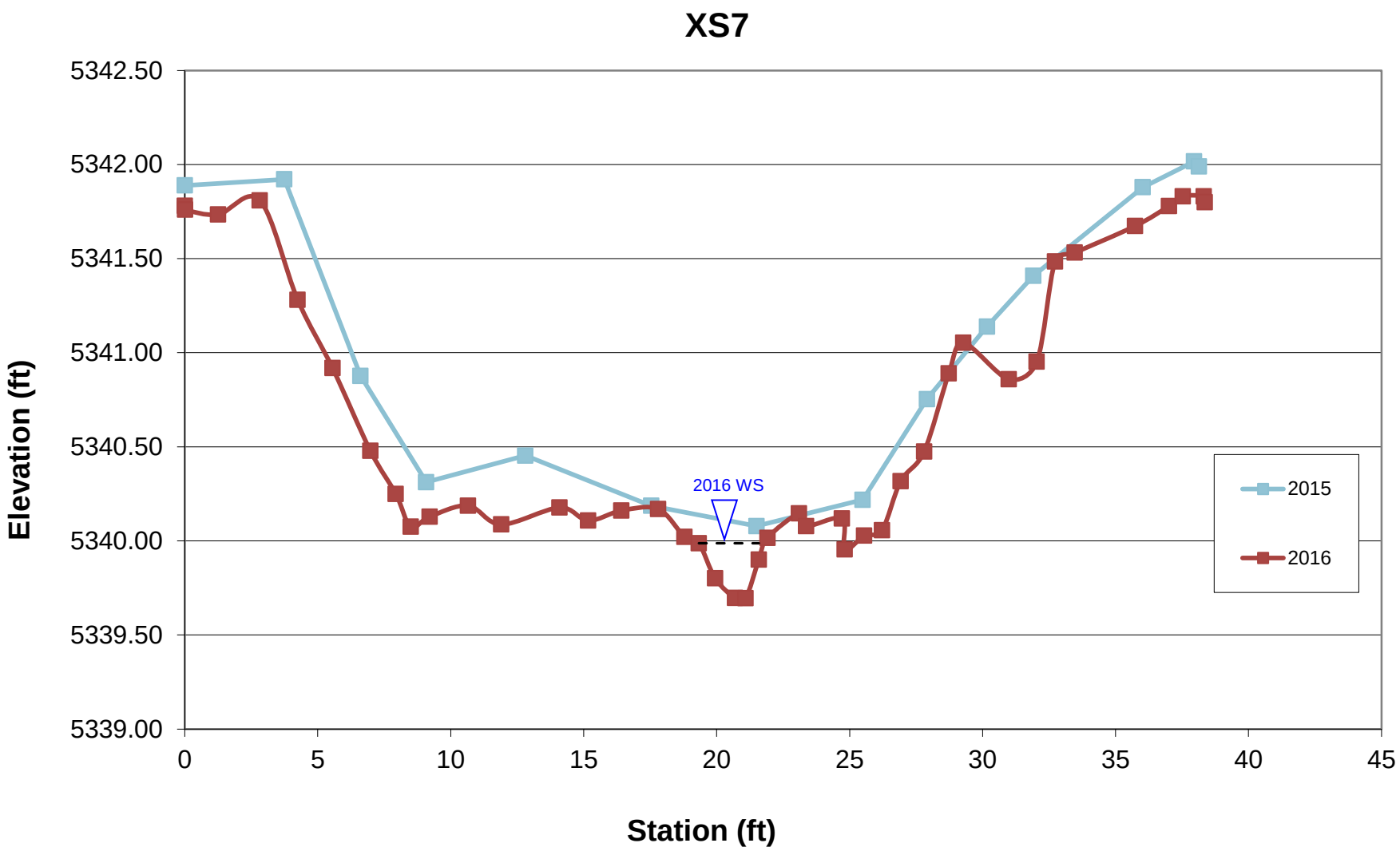

XS2
5352.00
5351.50
5351.00
5350.50
5350.00
5349.50
5349.00
5348.50
5348.00
5347.50
5347.00
Elevation (ft)
0
10
20
30
40
50
60
70
Station (ft)
2016 WS
2015
2016

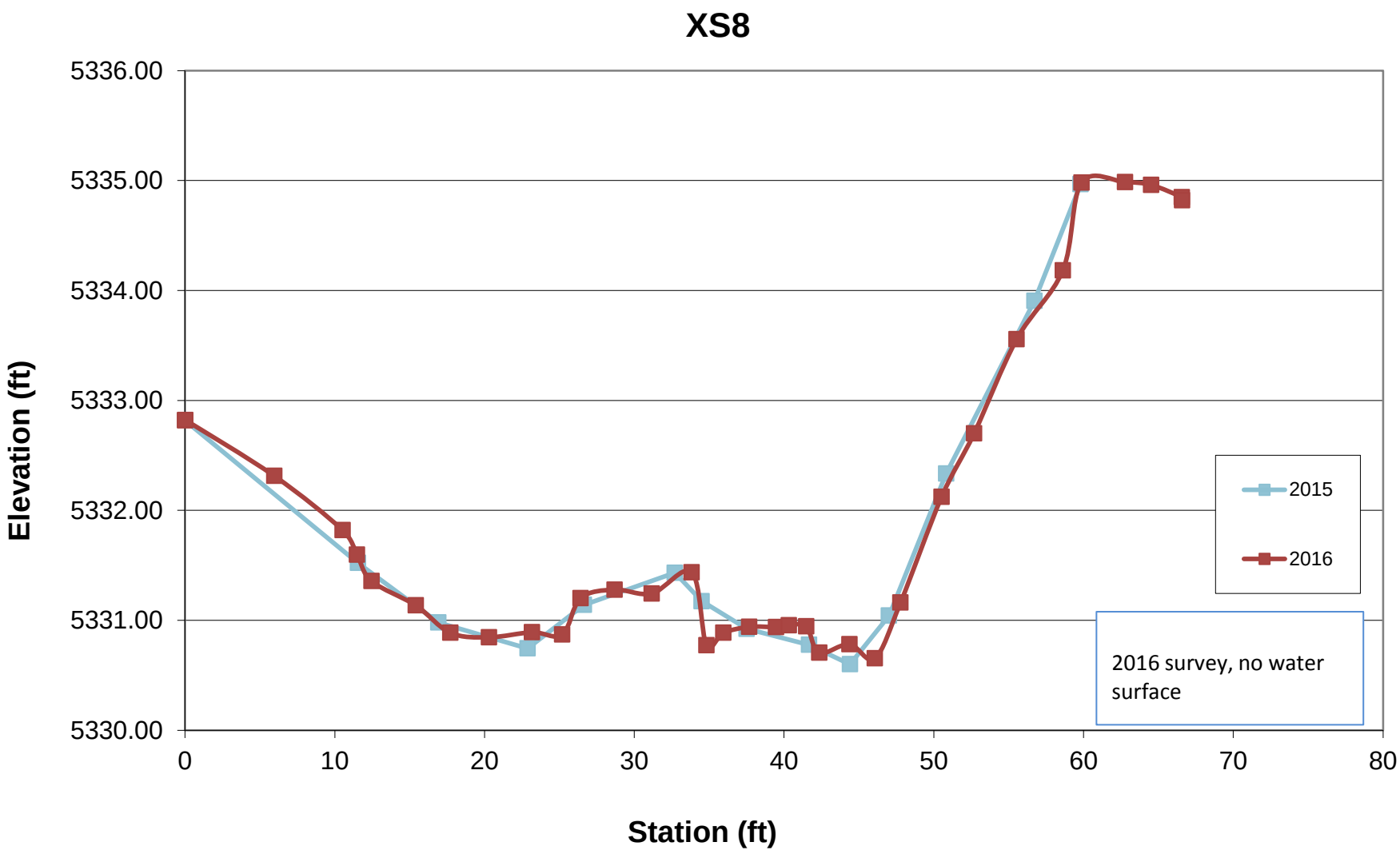

XS3
5347.00
5346.50
5346.00
5345.50
5345.00
5344.50
5344.00
5343.50
5343.00
5342.50
5342.00
0
5
10
15
20
25
30
35
40
45
50
Elevation (ft)
Station (ft)
2016 WS
2015
2016


XS4
5345.50
5345.00
5344.50
5344.00
5343.50
5343.00
5342.50
5342.00
5341.50
5341.00
Elevation (ft)
0
10
20
30
40
50
60
Station (ft)
2016 WS
2015
2016


XS5
5344.50
5344.00
5343.50
5343.00
5342.50
5342.00
5341.50
5341.00
5340.50
5340.00
Elevation (ft)
0
5
10
15
20
25
30
35
40
45
Station (ft)
2016 WS
2015
2016

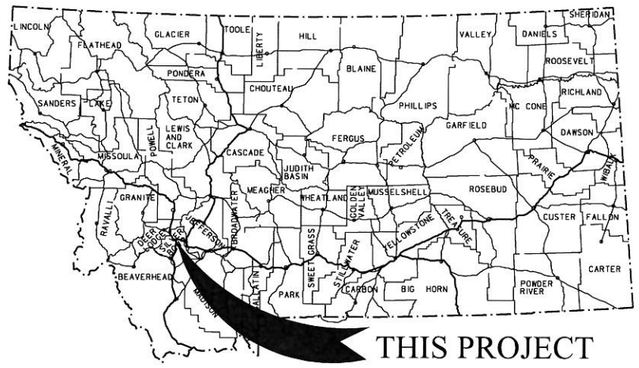

XS6
5343.00
5342.50
5342.00
5341.50
5341.00
5340.50
5340.00
5339.50
5339.00
Elevation (ft)
0
5
10
15
20
25
30
35
Station (ft)
2016 WS
2015
2015 WS
2016


XS7
5342.50
5342.00
5341.50
5341.00
5340.50
5340.00
5339.50
5339.00
Elevation (ft)
0
5
10
15
20
25
30
35
40
45
Station (ft)
2016 WS
2015
2016


XS8
5336.00
5335.00
5334.00
5333.00
5332.00
5331.00
5330.00
Elevation (ft)
0
10
20
30
40
50
60
70
80
Station (ft)
2015
2016
2016 survey, no water surface

APPENDIX E
PROJECT PLAN SHEETS

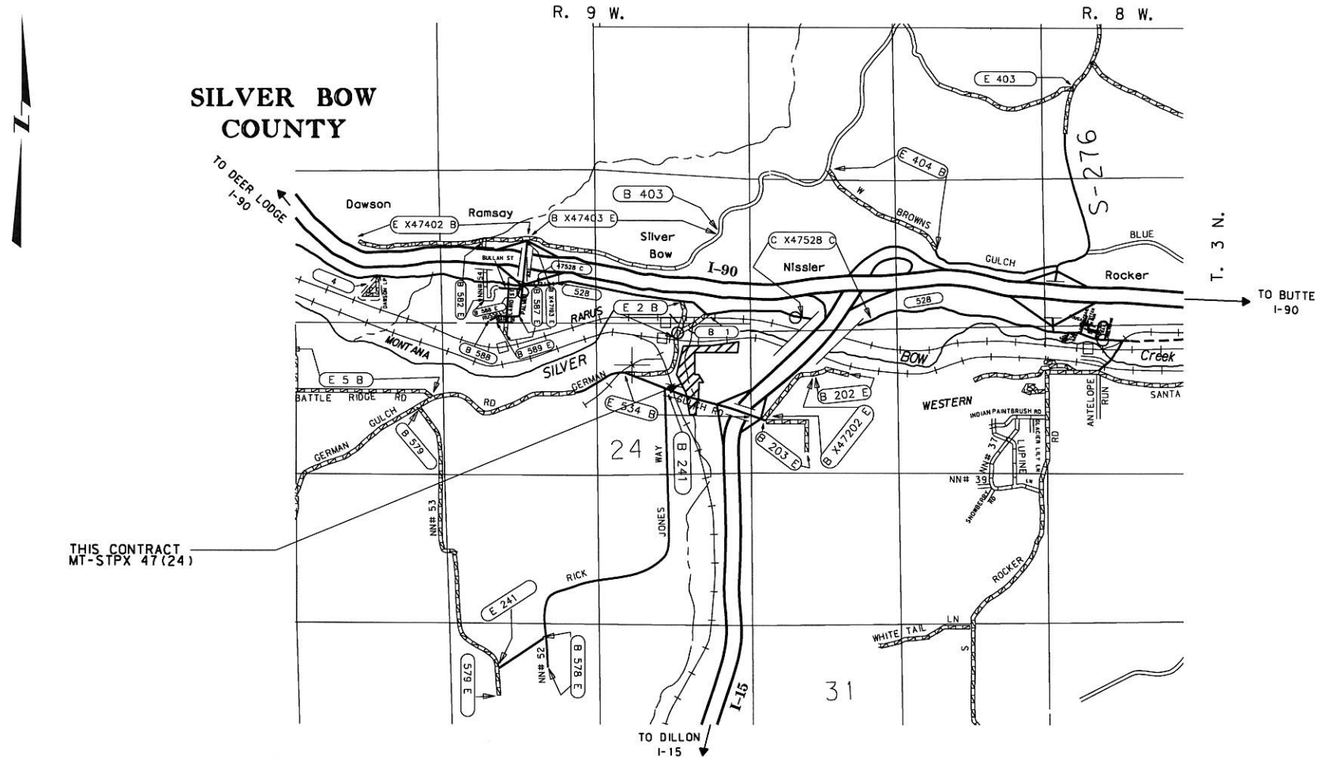
MDT Wetland Mitigation Monitoring
Silicon Mountain
Silver Bow County, Montana



MONTANA DEPARTMENT OF TRANSPORTATION

FEDERAL AID PROJECT MT-STPX 47(24)
STREAM & WETLAND MITIGATION
SILICON MTN AQUATIC RESOURCE MITIGATION SITE
SILVER BOW COUNTY

LENGTH N/A MILES



PLANS PREPARED BY
WETLAND DESIGN: ATKINS NORTH AMERICA 820 NORTH MONTANA AVE. SUITE A HELENA, MT 59601 PH: (406) 495-1377 FAX: (406) 495-1379 PLANS: ROBERT PECCIA & ASSOCIATES 825 CUSTER AVENUE P.O. BOX 5653 HELENA, MONTANA 59601 PH: (406) 447-5000 FAX: (406) 447-5036

ATKINS NORTH AMERICA, INC.	
BY _____ DATE _____	
MONTANA DEPARTMENT OF TRANSPORTATION	
RECEIVED : BY _____ _____ CONSULTANT DESIGN ENGINEER DATE	
U.S. DEPARTMENT OF TRANSPORTATION FEDERAL HIGHWAY ADMINISTRATION	
APPROVED : _____ _____ DIVISION ADMINISTRATOR DATE	

ASSOCIATED PROJECT AGREEMENT NUMBERS	
P. E.	MT-STPX 47(24)

3	MDT MONTANA DEPARTMENT OF TRANSPORTATION	c:\dgn\6044000rdtlz01.dgn	DESIGNED BY			MITIGATION PLANS	
2		5/9/2013	REVIEWED BY			UPN 6044000	
1		8:25:28 AM CPS - U0208	CHECKED BY				

CSF= 0.99929379

ATKINS

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CROSS SECTIONS

SAND CREEK	1-9

NOTES

CLEARING AND GRUBBING

CLEAR AND GRUB TO THE STAKED GRADING LIMITS. INCLUDE THE COST OF CLEARING AND GRUBBING IN THE UNIT PRICE BID FOR UNCLASSIFIED EXCAVATION.

WETLANDS

WETLANDS EXIST BEYOND THE PROJECT LIMITS. WETLAND AREAS AND PERMITTED WETLAND IMPACT AREAS WITHIN THE PROJECT LIMITS HAVE BEEN DELINEATED AND ARE SHOWN ON THE PLANS. ANY ACTION IMPACTING WETLAND AREAS WITHOUT THE APPROPRIATE PERMITTING IS THE RESPONSIBILITY OF THE CONTRACTOR.

DELINEATED WETLAND AREAS

PERMITTED WETLAND IMPACTED AREAS

MITIGATED WETLAND

UTILITIES

CALL THE UTILITIES UNDERGROUND LOCATION CENTER (1-800-424-5555) 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.

PUBLIC LAND SURVEY MONUMENTS

ALL MONUMENTS TO BE REMOVED AND RELOCATED OR RESET BY STATE FORCES.

LEVEL DATA

BEARING SOURCE

GRID – MONTANA COORDINATE SYSTEM NAD 83-1992

LEVEL DATUM SOURCE

LEVEL DATUM SOURCE IS NAVD 88. ELEVATIONS DERIVED FROM DIFFERENTIAL LEVELS HOLDING BM R314.

3	MDT MONTANA DEPARTMENT OF TRANSPORTATION	c:\dgn\6044000rdtlz01.dgn	DESIGNED BY			MITIGATION PLANS	SILICON MTN AQUATIC RESOURCE MITIGATION SITE	MT-STPX 47(24)
2		5/9/2013	REVIEWED BY					
1		8:25:31 AM CPS - U0208	CHECKED BY			SILVER BOW COUNTY	CSF= 0.99929379	SHEET 2

CONTROL DIAGRAM

SCALE: 1" = 400'

NOTE:
THIS PROJECT IS ON THE MONTANA COORDINATE SYSTEM NAD83-1992.
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 0.99929379.

CONTROL ABSTRACT

POINT NAME/NUMBER	N OR Y COORDINATE	E OR X COORDINATE	POINT ELEVATION	LOCATION AND DESCRIPTION
A6044	652,579.438	1,167,123.106	5,391.46	SET 2" ALUMINUM CAP STAMPED "A6044 2007", 3' EAST OF WITNESS POST, AT MP 0.04 ALONG PAVED ROAD L47534, 227' WEST OF WEST BRIDGE END AT VICTOR (SILVERBOW) INTERCHANGE, 192' NORTH OF PTW L47534, 8' WEST OF EDGE OF GRAVEL ROAD.
B6044	652,728.141	1,166,246.962	5,358.81	SET 2" ALUMINUM CAP STAMPED "B6044 2007", 3' NORTH OF WITNESS POST, AT MP 0.21 ALONG PAVED ROAD L47534, 103' SOUTH OF PTW L47534, 20' WEST OF EDGE OF SILVERBOW DRIVE-IN ROAD, 3.8' EAST OF NORTH/SOUTH CROSS FENCE, 6.5' NORTHWEST OF MOVIE THEATER SIGN.
C6044	653,698.175	1,166,091.077	5,352.24	SET 2" ALUMINUM CAP STAMPED "C6044 2007", 3' SOUTH OF WITNESS POST, AT MP 0.32 ALONG PAVED ROAD L47534, 1070' NORTHWEST OF PTW L47534, ALONG DEAD END GRAVEL ROAD, 17' NORTH OF CROSS FENCE CORNER POST, 17' WEST OF PTW OF GRAVEL ROAD, 112' SOUTH OF TELEPHONE POLE.
D6044	653,402.004	1,165,247.842	5,376.68	SET 2" ALUMINUM CAP STAMPED "D6044 2007", 3' NORTH OF WITNESS POST, AT MP 0.43 ALONG PAVED ROAD L47534, 20' SOUTH OF PTW L47534, 17' SOUTHEAST OF SOUTHEAST BRIDGE CORNER OVER TRACKS, 5' SOUTH OF BACK OF GUARD RAIL.
E6044	653,629.471	1,164,448.074	5,363.13	SET 2" ALUMINUM CAP STAMPED "E6044 2007", 3' NORTH OF WITNESS POST, AT MP 0.59 ALONG PAVED ROAD L47534, 140' SOUTH OF PTW L47534, 25' EAST OF EDGE OF PAVEMENT OF RICK JONES WAY, 72' SOUTH OF STOP AHEAD TRAFFIC SIGN, 32' WEST OF FENCE CORNER.
F6044	653,908.161	1,164,457.887	5,362.80	SET 2" ALUMINUM CAP STAMPED "F6044 2007", 3' SOUTH OF WITNESS POST, AT MP 0.61 ALONG PAVED ROAD L47534, 29' NORTH OF PTW L47534, 18' NORTH OF FACE OF GUARD RAIL, 37' NORTHWEST OF STOP SIGN, 42' SOUTH OF GAS LINE (6" WOOD POST).
G6044	654,482.233	1,163,575.353	5,341.86	SET 2" ALUMINUM CAP STAMPED "G6044 2007", 3' NORTH OF WITNESS POST, AT MP 0.80 ALONG PAVED ROAD L47534, 97' NORTH OF PTW L47534, 36' NORTHWEST OF SILVERBOW ROAD PTW, 16' NORTH OF SILVER BOW ROAD SIGN.



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3	MDT MONTANA DEPARTMENT OF TRANSPORTATION	c:\dgn\6044000rdtrvz01.dgn	DESIGNED BY			MITIGATION PLANS		SILICON MTN AQUATIC RESOURCE MITIGATION SITE	MT-STPX 47(24)
2		5/9/2013	REVIEWED BY			SILVER BOW COUNTY		CSF= 0.99929379 UPN 6044000	SHEET 3
1		8:25:44 AM CPS - U0208	CHECKED BY						

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SUMMARY

GRADING

STATION	cubic yards UNCL. EXC. Δ	cubic yards EXCESS EXC.	cubic yards EMB.+	REMARKS
WETLAND 1	14,695			
WETLAND 2	9,985			
WETLAND 3	5,710			
WETLAND 4	15,850			
WETLAND 5	15,125			
CHANNEL	6,355		70	SAND CREEK REALIGNMENT
CHANNEL PLUGS			20	
TOTAL	67,720	# 67,630	# 90	MT FUNDS

FOR INFORMATION ONLY, SEE ROAD PLANS
Δ INCLUDES OVEREXCAVATION FOR TOPSOIL

RANDOM RIPRAP

STATION	cubic yards RANDOM RIPRAP CL. 1		square yards COIR NETTING			REMARKS
26+10	10		20			HEAD CUT TREATMENT RT., SEE DETAIL
26+65	10		20			HEAD CUT TREATMENT RT., SEE DETAIL
TOTAL	20		#			STPX FUNDS

FOR INFORMATION ONLY, INCLUDED IN COST OF RANDOM RIPRAP

REVEGETATION & CHANNEL RESTORATION

STATION FROM	STATION TO	square yards COIR NETTING	cubic yards CHANNEL EXC.	cubic yards EMB.+		lump sum WILLOW CUTTINGS	lump sum TREE & SHRUB PLANTING	lump sum BIO-ENGINEERED BANK	REMARKS
0+00	24+29	7,708	6,355	70					SAND CREEK CHANNEL
TOTAL		#	*	*		1.0	1.0	1.0	STPX FUNDS

FOR INFORMATION ONLY, INCLUDED IN COST OF BIOENGINEERED BANK
* INCLUDED IN GRADING SUMMARY

MISCELLANEOUS ITEMS

STATION FROM	STATION TO	units	lump sum	each	REMARKS
WETLAND SITE		2,000			NOXIOUS WEED CONTROL
			1.0		ABANDON 4 WELLS, SEE SITE PLANS FOR LOCATIONS
				1	ADJUST MONITOR WELL, MODIFY P-3 CASING & REPLACE CAP
TOTAL		2,000	1.0	1	STPX FUNDS

TOPSOIL & SEEDING

STATION FROM	STATION TO	cubic yards TOPSOIL SALVAGING & PLACING *	cubic yards WETLAND SOIL SALVAGE & PLACE	acres WETLAND SEEDING UPLAND	acres WETLAND SEEDING WETLAND		acres CONDITION SEEDBED	REMARKS
WETLAND 1		2,045			1.3			
WETLAND 2		1,870			0.9			
WETLAND 3		1,065			0.8			
WETLAND 4		1,850			1.1			
WETLAND 5		1,565			1.1			
NEW CHANNEL		285	76	0.9			0.9	NEW AND STABILIZED STREAMBANKS
EXISTING WETLANDS			# 2,769					SALVAGE FROM IMPACTED WETLANDS
				4.1			4.1	DISTURBED AREA OUTSIDE NEW WETLANDS, INCL. CHANNEL
TOTAL		8,680	76	5.0	5.2		5.0	STPX FUNDS

* WETLANDS ONLY - 6" TOPSOIL AND 2" WETLAND SOIL SALVAGE AND PLACEMENT DEPTH IN BOTTOM, 6" TOPSOIL ON SIDE SLOPES
# FOR INFORMATION ONLY, SEE ROAD PLANS

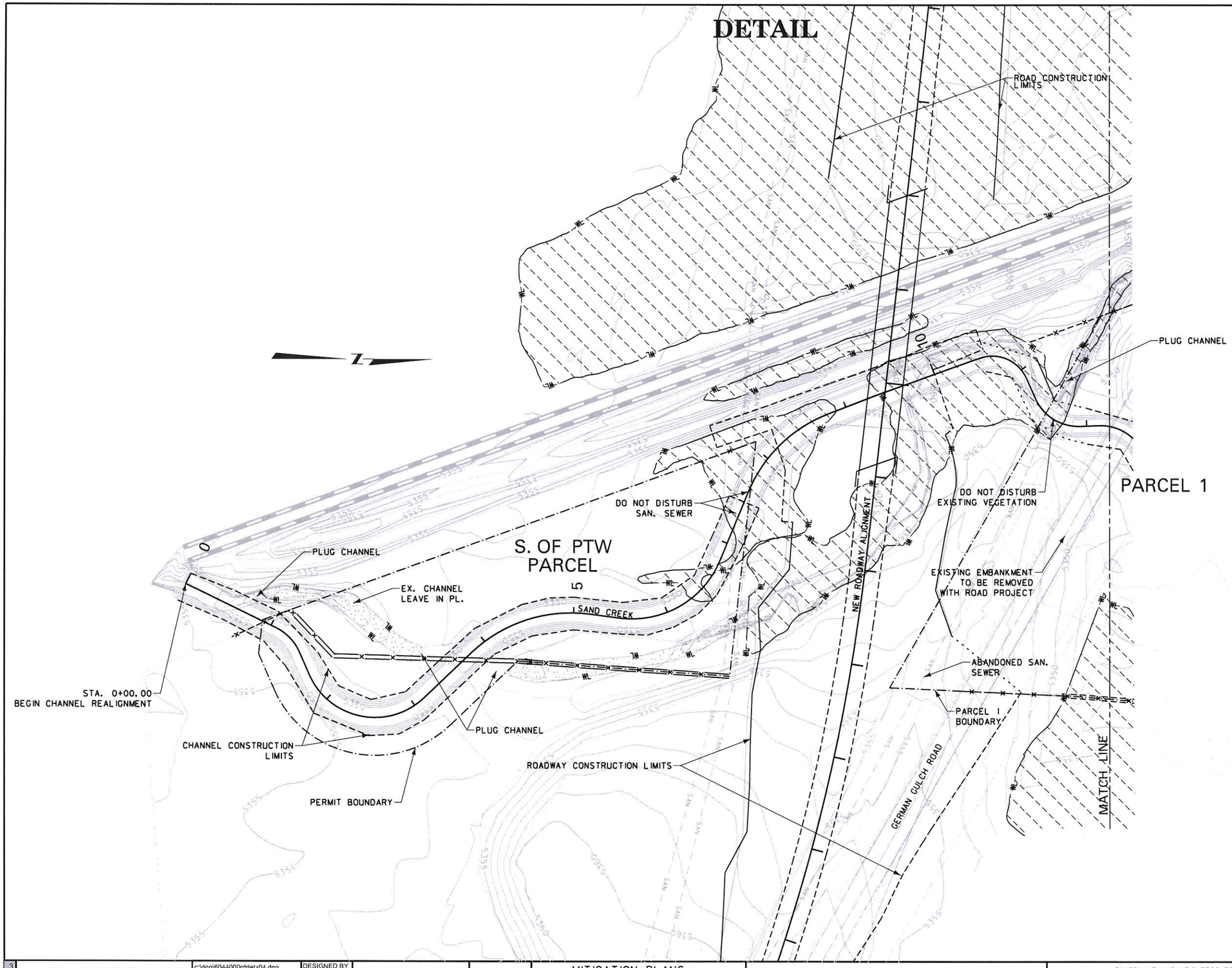
FENCING *

STATION FROM	STATION TO	linear feet FARM FENCE WILDLIFE FRIENDLY FW TY. 1	linear feet FARM FENCE WILDLIFE FRIENDLY FM TY. 1	FARM FENCE F4W @	JACKLEG FENCE - POLE	each FARM FENCE PANEL - FW SINGLE	each FARM FENCE PANEL - FW DOUBLE	each DEADMAN	linear feet FARM GATE	linear feet FARM GATE TYPE G3	REMARKS
PARCEL 1		2,543			620	3	11				
PARCEL 2		5,367			1,035	8	18			36	3 - 12' GATES
S. OF PTW PARCEL			484	110		2	5				
TOTAL		7,910	484	110	1,655	13	34	4		36	STPX FUNDS

* REMOVAL AND DISPOSAL OF EXISTING FENCE INCLUDED IN NEW FENCE BID ITEMS
@ REPLACE DISTURBED FENCE WITH NEW FENCE, MATCH EXISTING

3	MDT MONTANA DEPARTMENT OF TRANSPORTATION	c:\dgn\6044000rdsumz01.dgn	DESIGNED BY			MITIGATION PLANS	SILICON MTN AQUATIC RESOURCE MITIGATION SITE	MT-STPX 47(24)
2		5/9/2013	REVIEWED BY			SILVER BOW COUNTY	CSF= 0.99929379 / UPN 6044000	SHEET 4
1		8:25:52 AM CPS - U0208	CHECKED BY					

DETAIL



SITE PLAN
S. OF PTW PARCEL

SCALE: 1" = 100'

ATKINS

3	MDT MONTANA DEPARTMENT OF TRANSPORTATION	c:\dgn\6044000rddetz04.dgn	DESIGNED BY			MITIGATION PLANS	SILICON MTN AQUATIC RESOURCE MITIGATION SITE	MT-STPX 47(24)
2		5/9/2013	REVIEWED BY			SILVER BOW COUNTY	CSF= 0.99929379 UPN 6044000	SHEET 5
1		8:26:10 AM CPS - U0208	CHECKED BY					

ATKINS

DETAIL

PROPOSED WETLAND 6
SEE ROAD PLANS

ROAD CONSTRUCTION LIMITS

PARCEL 1

WB9
(DO NOT DISTURB)

BANK STABILIZATION #3

STA. 24+29.00
END CHANNEL RESTORATION
BEGIN CHANNEL ENHANCEMENT
(NOT THIS CONTRACT)

PROPOSED WETLAND 3

WB8
(TO BE ABANDONED)

REVEGETATION
(NOT THIS CONTRACT)

PLUG CHANNEL

GERMAN GULCH ROAD

BANK STABILIZATION #2

REVEGETATION

PROPOSED WETLAND 2

HEAD CUT TREATMENT

PROPOSED WETLAND 1

WB7
(TO BE ABANDONED)

MATCH LINE
PARCEL 2

DO NOT DISTURB
EXISTING VEGETATION

NEW ROADWAY ALIGNMENT

SAND CREEK

EXISTING EMBANKMENT
TO BE REMOVED
WITH ROAD PROJECT

WB10
(DO NOT DISTURB)

(DO NOT DISTURB)
WB11

STA. 13+30.75
END CHANNEL REALIGNMENT
BEGIN CHANNEL RESTORATION

BANK STABILIZATION #1

ABANDONED SAN. SEWER

MATCH LINE

DO NOT DISTURB EXISTING WETLANDS

PARCEL BOUNDARY

DELINEATED WETLAND
REVEGETATION ZONE
REVEGETATION ZONE (NOT THIS CONTRACT)
HEAD CUT TREATMENT
BANK STABILIZATION
EXTENT OF CELL SURFACE WATER
WB11 MONITORING WELL

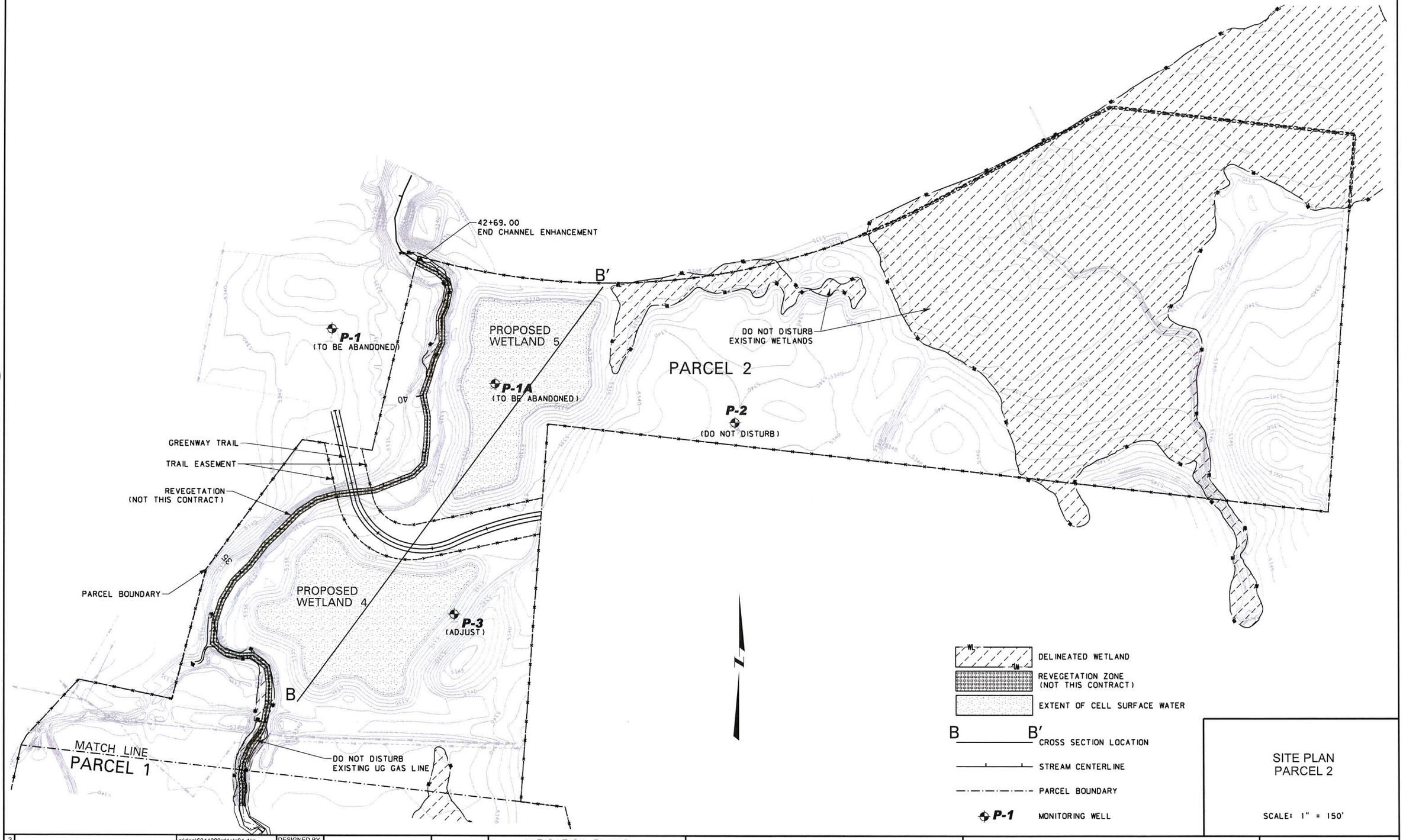
A A′ CROSS SECTION LOCATION
STREAM CENTERLINE
PARCEL BOUNDARY

SITE PLAN
PARCEL 1

SCALE: 1" = 100'

3	MDT MONTANA DEPARTMENT OF TRANSPORTATION	c:\dgn\6044000rddetz04.dgn	DESIGNED BY		MITIGATION PLANS		SILICON MTN AQUATIC RESOURCE MITIGATION SITE	MT-STPX 47(24)
2		5/9/2013	REVIEWED BY		SILVER BOW COUNTY		CSF= 0.99929379 UPN 6044000	SHEET 6
1		8:26:15 AM CPS - U0208	CHECKED BY					

DETAIL



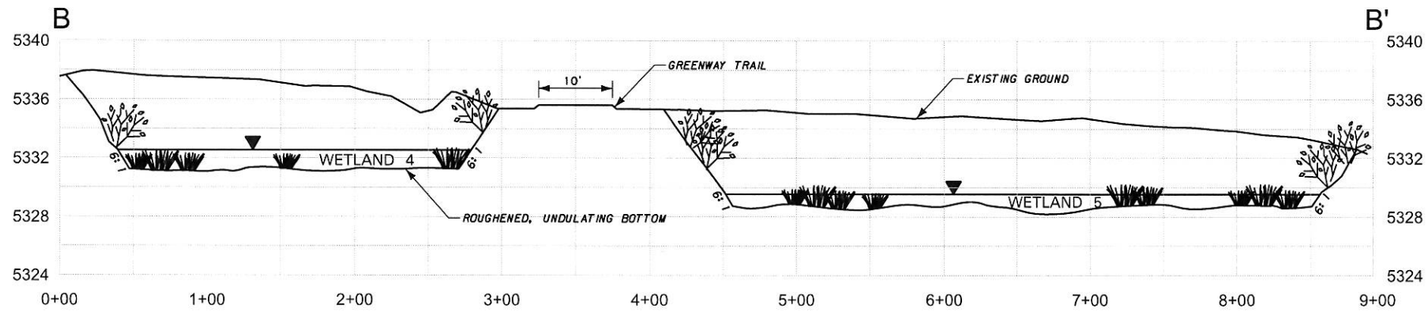
SITE PLAN
PARCEL 2

SCALE: 1" = 150'

3	MDT MONTANA DEPARTMENT OF TRANSPORTATION	c:\dgn\6044000rddetz04.dgn	DESIGNED BY		MITIGATION PLANS	SILICON MTN AQUATIC RESOURCE MITIGATION SITE	MT-STPX 47(24)
2		5/9/2013	REVIEWED BY		SILVER BOW COUNTY	CSF= 0.99929379 / UPN 6044000	SHEET 7
1		8:26:21 AM CPS - U0208	CHECKED BY				

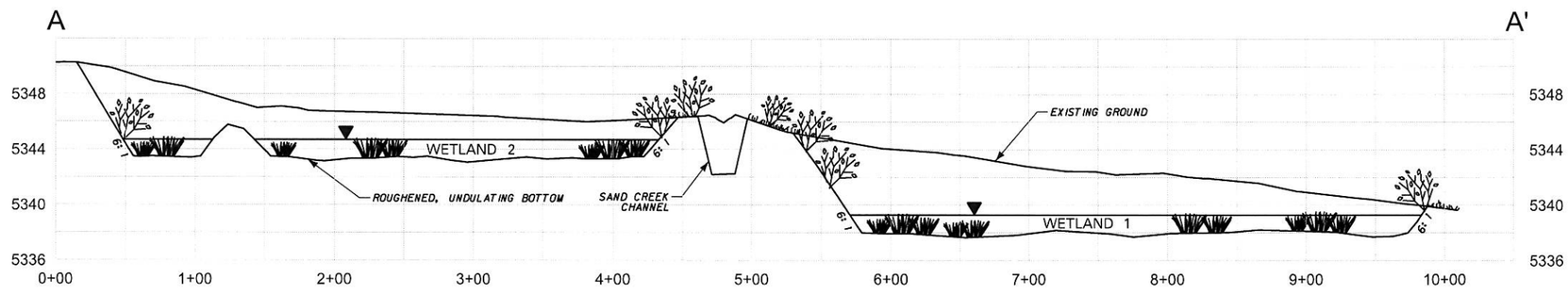
ATKINS

ATKINS



CROSS SECTION B - B'

SCALE: HORIZONTAL - 1" = 100'
VERTICAL - 1" = 10'



CROSS SECTION A – A'

SCALE: HORIZONTAL - 1" = 100'
VERTICAL - 1" = 10'

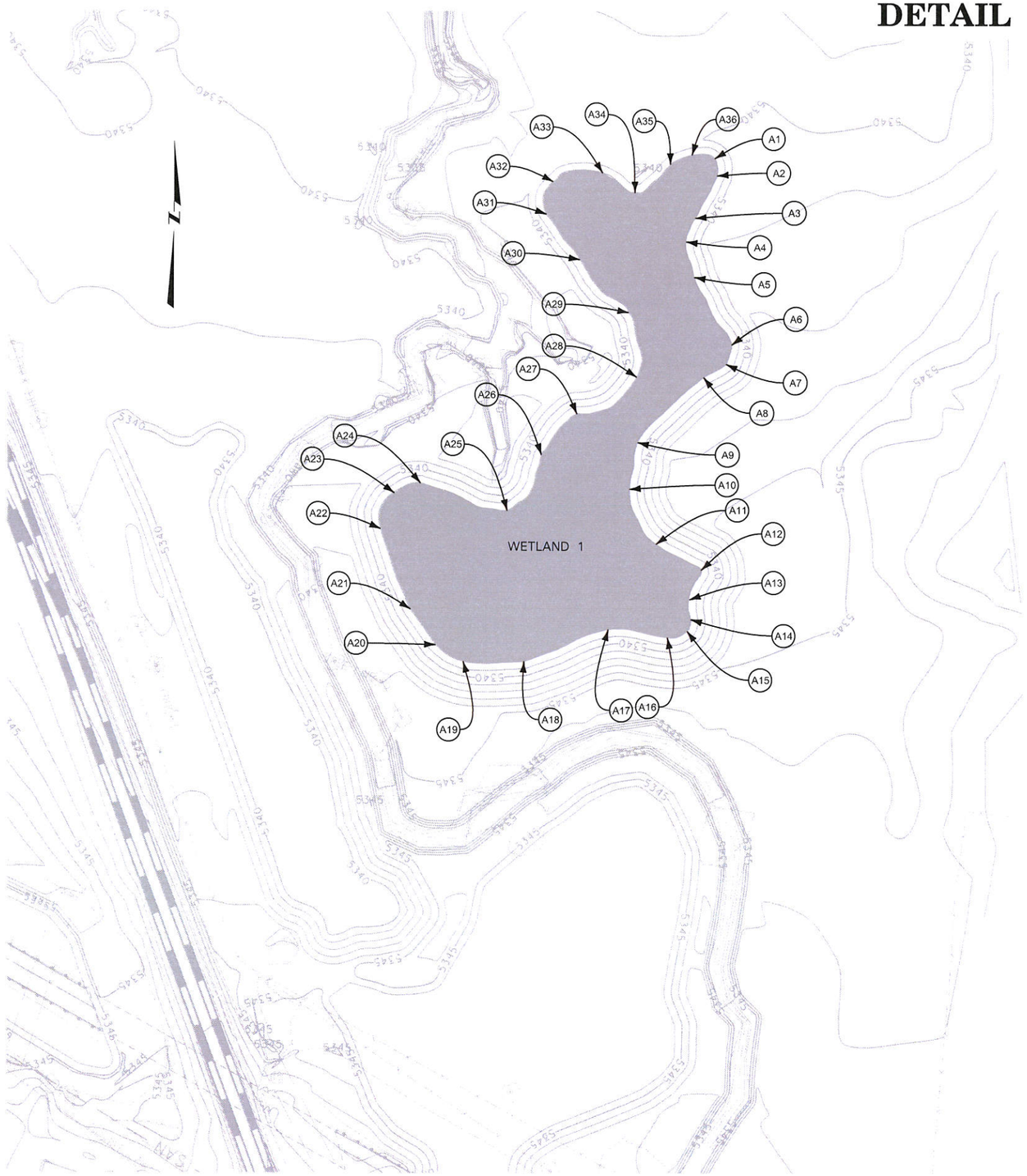
NOTES:

1. SEE SHEETS 6 & 7 FOR CROSS SECTION LOCATIONS.
2. FINISHED GROUND IS FINAL GROUND SURFACE AFTER TOPSOIL APPLICATION. DOES NOT REFLECT OVEREXCAVATION.
2. VEGETATION IS SHOWN FOR ILLUSTRATIVE PURPOSES ONLY.

WETLAND
CROSS SECTIONS

3	MDT MONTANA DEPARTMENT OF TRANSPORTATION	c:\dgn\6044000rddetz01.dgn	DESIGNED BY			MITIGATION PLANS	SILICON MTN AQUATIC RESOURCE MITIGATION SITE	MT-STPX 47(24)
2		5/9/2013	REVIEWED BY					
1		8:26:31 AM CPS - U0208	CHECKED BY			SILVER BOW COUNTY	CSF= 0.99929379 UPN 6044000	SHEET 8

DETAIL



WETLAND 1
COORDINATE TABLE

POINT	N OR Y COORDINATE	E OR X COORDINATE	FINISHED BOTTOM ELEVATION
A1	654,261.045	1,165,536.091	5338.00
A2	654,246.196	1,165,538.350	5338.00
A3	654,210.843	1,165,520.152	5338.00
A4	654,191.214	1,165,512.650	5338.00
A5	654,161.759	1,165,519.385	5338.00
A6	654,105.498	1,165,550.485	5338.00
A7	654,089.406	1,165,545.905	5338.00
A8	654,078.392	1,165,527.335	5338.00
A9	654,024.216	1,165,472.773	5338.00
A10	653,985.276	1,165,466.067	5338.00
A11	653,939.580	1,165,488.217	5338.00
A12	653,918.367	1,165,525.345	5338.00
A13	653,893.367	1,165,515.718	5338.00
A14	653,876.808	1,165,516.517	5338.00
A15	653,867.013	1,165,513.838	5338.00
A16	653,861.738	1,165,497.533	5338.00
A17	653,868.330	1,165,448.412	5338.00
A18	653,841.778	1,165,378.466	5338.00
A19	653,841.695	1,165,328.419	5338.00
A20	653,855.561	1,165,305.669	5338.00
A21	653,885.310	1,165,284.868	5338.00
A22	653,952.146	1,165,259.996	5338.00
A23	653,982.105	1,165,271.414	5338.00
A24	653,990.283	1,165,293.148	5338.00
A25	653,967.480	1,165,364.453	5338.00
A26	654,014.062	1,165,392.698	5338.00
A27	654,048.069	1,165,422.176	5338.00
A28	654,078.753	1,165,471.826	5338.00
A29	654,132.318	1,165,464.983	5338.00
A30	654,176.414	1,165,424.442	5338.00
A31	654,214.166	1,165,396.602	5338.00
A32	654,241.328	1,165,402.094	5338.00
A33	654,248.646	1,165,443.314	5338.00
A34	654,232.070	1,165,470.282	5338.00
A35	654,255.732	1,165,499.600	5338.00
A36	654,263.466	1,165,517.311	5338.00

NOTES:

WETLAND 1
DESIGN WATER ELEVATION: 5339.92
MAXIMUM DEPTH BELOW DESIGN WATER ELEVATION: 1.92'
WATER SURFACE AREA: 1.57 ac.

ALL ELEVATIONS ARE FINAL AFTER TOPSOIL REPLACEMENT. OVEREXCAVATE WETLAND BOTTOM TO ALLOW FOR 8" OF TOPSOIL/WETLAND SOIL PLACEMENT. OVEREXCAVATE WETLAND SIDES SLOPES TO ALLOW FOR 6" OF TOPSOIL PLACEMENT.

EXCAVATE ALL WETLAND SIDE SLOPES TO BE 6:1 OR FLATTER. ROUND CUT SLOPES AND BLEND WITH EXISTING TERRAIN. ROUGHEN WETLAND BOTTOM TO PROVIDE AN UNDULATING SURFACE.

WETLAND 1
GRADING PLAN

SCALE: 1" = 100'

KATKINS

3	MDT MONTANA DEPARTMENT OF TRANSPORTATION	c:\dgn\6044000rddetz02.dgn	DESIGNED BY		MITIGATION PLANS	SILICON MTN AQUATIC RESOURCE MITIGATION SITE	MT-STPX 47(24)
2		5/9/2013	REVIEWED BY		SILVER BOW COUNTY	CSF= 0.99929379 / UPN 6044000	SHEET 9
1		8:26:47 AM CPS - U0208	CHECKED BY				

DETAIL



WETLAND 2 COORDINATE TABLE			
POINT	N OR Y COORDINATE	E OR X COORDINATE	FINISHED BOTTOM ELEVATION
B1	653,734.687	1,165,473.444	5343.50
B2	653,680.626	1,165,509.361	5343.50
B3	653,563.988	1,165,491.167	5343.50
B4	653,512.343	1,165,500.145	5343.50
B5	653,476.565	1,165,446.140	5343.50
B6	653,434.316	1,165,368.036	5343.50
B7	653,401.835	1,165,368.502	5343.50
B8	653,385.599	1,165,388.451	5343.50
B9	653,349.454	1,165,379.512	5343.50
B10	653,365.577	1,165,332.314	5343.50
B11	653,415.368	1,165,310.180	5343.50
B12	653,433.255	1,165,307.534	5343.50
B13	653,457.534	1,165,275.632	5343.50
B14	653,475.950	1,165,259.950	5343.50
B15	653,511.674	1,165,246.791	5343.50
B16	653,560.112	1,165,220.547	5343.50
B17	653,570.719	1,165,234.956	5343.50
B18	653,560.605	1,165,271.464	5343.50
B19	653,566.979	1,165,310.334	5343.50
B20	653,652.574	1,165,348.397	5343.50
B21	653,697.372	1,165,399.513	5343.50
B22	653,723.155	1,165,435.252	5343.50

NOTES:

WETLAND 2
DESIGN WATER ELEVATION: 5345.17
MAXIMUM DEPTH BELOW DESIGN WATER ELEVATION: 1.67'
WATER SURFACE AREA: 1.34 ac.

ALL ELEVATIONS ARE FINAL AFTER TOPSOIL REPLACEMENT. OVEREXCAVATE WETLAND BOTTOM TO ALLOW FOR 8" OF TOPSOIL/WETLAND SOIL PLACEMENT. OVEREXCAVATE WETLAND SIDES SLOPES TO ALLOW FOR 6" OF TOPSOIL PLACEMENT.

EXCAVATE ALL WETLAND SIDE SLOPES TO BE 6:1 OR FLATTER. ROUND CUT SLOPES AND BLEND WITH EXISTING TERRAIN. ROUGHEN WETLAND BOTTOM TO PROVIDE AN UNDULATING SURFACE.

WETLAND 2
GRADING PLAN

SCALE: 1" = 100'

ATKINS

3	MDT MONTANA DEPARTMENT OF TRANSPORTATION	c:\dgn\6044000rddetz02.dgn	DESIGNED BY			MITIGATION PLANS	SILICON MTN AQUATIC RESOURCE MITIGATION SITE	MT-STPX 47(24)
2		5/9/2013	REVIEWED BY			SILVER BOW COUNTY	CSF= 0.99929379 / UPN 6044000	SHEET 10
1		8:26:55 AM CPS - U0208	CHECKED BY					

DETAIL



WETLAND 3 COORDINATE TABLE			
POINT	N OR Y COORDINATE	E OR X COORDINATE	FINISHED BOTTOM ELEVATION
C1	654,044.272	1,165,048.177	5340.00
C2	654,022.724	1,165,086.803	5340.00
C3	654,021.212	1,165,104.081	5340.00
C4	654,034.267	1,165,126.324	5340.00
C5	654,019.044	1,165,141.277	5340.00
C6	653,973.462	1,165,117.896	5340.00
C7	653,902.022	1,165,152.925	5340.00
C8	653,756.071	1,165,215.225	5340.00
C9	653,664.941	1,165,241.634	5340.00
C10	653,634.380	1,165,276.411	5340.00
C11	653,620.116	1,165,238.654	5340.00
C12	653,613.523	1,165,221.257	5340.00
C13	653,628.891	1,165,212.154	5340.00
C14	653,649.655	1,165,181.866	5340.00
C15	653,968.185	1,165,069.696	5340.00
C16	654,039.714	1,165,038.437	5340.00

NOTES:

WETLAND 3
DESIGN WATER ELEVATION: 5341.67
MAXIMUM DEPTH BELOW DESIGN WATER ELEVATION: 1.67'
WATER SURFACE AREA: 0.74 ac.

ALL ELEVATIONS ARE FINAL AFTER TOPSOIL REPLACEMENT. OVEREXCAVATE WETLAND BOTTOM TO ALLOW FOR 8" OF TOPSOIL/WETLAND SOIL PLACEMENT. OVEREXCAVATE WETLAND SIDES SLOPES TO ALLOW FOR 6" OF TOPSOIL PLACEMENT.

EXCAVATE ALL WETLAND SIDE SLOPES TO BE 6:1 OR FLATTER. ROUND CUT SLOPES AND BLEND WITH EXISTING TERRAIN. ROUGHEN WETLAND BOTTOM TO PROVIDE AN UNDULATING SURFACE.

WETLAND 3
GRADING PLAN

SCALE: 1" = 100'

ATKINS

3	MDT MONTANA DEPARTMENT OF TRANSPORTATION	c:\dgn\6044000rddetz02.dgn	DESIGNED BY		MITIGATION PLANS	SILICON MTN AQUATIC RESOURCES MITIGATION SITE	MT-STPX 47(24)
2		5/9/2013	REVIEWED BY		SILVER BOW COUNTY	CSF= 0.99929379 / UPN 6044000	SHEET 11
1		8:27:02 AM CPS - U0208	CHECKED BY				

DETAIL



WETLAND 4 COORDINATE TABLE			
POINT	N OR Y COORDINATE	E OR X COORDINATE	FINISHED BOTTOM ELEVATION
D1	654,762.818	1,165,701.607	5331.25
D2	654,745.678	1,165,684.327	5331.25
D3	654,703.089	1,165,656.647	5331.25
D4	654,659.129	1,165,618.833	5331.25
D5	654,617.522	1,165,587.010	5331.25
D6	654,584.127	1,165,578.271	5331.25
D7	654,565.593	1,165,576.895	5331.25
D8	654,564.123	1,165,547.973	5331.25
D9	654,584.799	1,165,521.801	5331.25
D10	654,593.838	1,165,491.871	5331.25
D11	654,589.318	1,165,462.229	5331.25
D12	654,576.043	1,165,442.572	5331.25
D13	654,590.502	1,165,423.398	5331.25
D14	654,635.394	1,165,418.414	5331.25
D15	654,652.635	1,165,404.820	5331.25
D16	654,671.509	1,165,364.955	5331.25
D17	654,680.624	1,165,342.442	5331.25
D18	654,698.982	1,165,338.198	5331.25
D19	654,703.784	1,165,342.461	5331.25
D20	654,714.713	1,165,388.124	5331.25
D21	654,766.155	1,165,409.718	5331.25
D22	654,780.829	1,165,407.971	5331.25
D23	654,815.773	1,165,436.797	5331.25
D24	654,822.888	1,165,456.950	5331.25
D25	654,802.092	1,165,479.119	5331.25
D26	654,775.642	1,165,503.974	5331.25
D27	654,754.830	1,165,622.075	5331.25
D28	654,758.156	1,165,656.876	5331.25
D29	654,773.706	1,165,695.634	5331.25
D30	654,771.307	1,165,703.687	5331.25

NOTES:

WETLAND 4
DESIGN WATER ELEVATION: 5332.55
MAXIMUM DEPTH BELOW DESIGN WATER ELEVATION: 1.30'
WATER SURFACE AREA: 1.53 ac.

ALL ELEVATIONS ARE FINAL AFTER TOPSOIL REPLACEMENT. OVEREXCAVATE WETLAND BOTTOM TO ALLOW FOR 8" OF TOPSOIL/WETLAND SOIL MIXTURE PLACEMENT. OVEREXCAVATE WETLAND SIDES SLOPES TO ALLOW FOR 6" OF TOPSOIL PLACEMENT.

EXCAVATE ALL WETLAND SIDE SLOPES TO BE 6:1 OR FLATTER. ROUND CUT SLOPES AND BLEND WITH EXISTING TERRAIN. ROUGHEN WETLAND BOTTOM TO PROVIDE AN UNDULATING SURFACE.

WETLAND 4
GRADING PLAN

SCALE: 1" = 100'

ATKINS

3	MDT MONTANA DEPARTMENT OF TRANSPORTATION	c:\dgn\6044000rddetz03.dgn	DESIGNED BY		MITIGATION PLANS	SILICON MTN AQUATIC RESOURCE MITIGATION SITE	MT-STPX 47(24)
2		5/9/2013	REVIEWED BY		SILVER BOW COUNTY	CSF= 0.99929379 UPN 6044000	SHEET 12
1		8:27:15 AM CPS - U0208	CHECKED BY				

DETAIL



WETLAND 5 COORDINATE TABLE			
POINT	N OR Y COORDINATE	E OR X COORDINATE	ELEVATION
E1	655,228.583	1,165,916.459	5328.75
E2	655,185.593	1,165,899.933	5328.75
E3	655,148.247	1,165,897.233	5328.75
E4	655,091.528	1,165,901.444	5328.75
E5	655,069.890	1,165,888.316	5328.75
E6	655,057.452	1,165,866.561	5328.75
E7	655,059.409	1,165,817.352	5328.75
E8	655,028.795	1,165,783.053	5328.75
E9	654,968.417	1,165,780.334	5328.75
E10	654,926.774	1,165,768.776	5328.75
E11	654,900.553	1,165,677,123	5328.75
E12	654,939.434	1,165,687.548	5328.75
E13	654,981.750	1,165,703.619	5328.75
E14	655,040.159	1,165,704.434	5328.75
E15	655,089.018	1,165,688.428	5328.75
E16	655,132.517	1,165,704.307	5328.75
E17	655,172.743	1,165,704.863	5328.75
E18	655,223.169	1,165,713.897	5328.75
E19	655,235.361	1,165,721.024	5328.75
E20	655,235.087	1,165,732.316	5328.75
E21	655,229.115	1,165,764.798	5328.75
E22	655,233.111	1,165,829.475	5328.75
E23	655,228.759	1,165,895.123	5328.75

NOTES:

WETLAND 5
DESIGN WATER ELEVATION: 5329.70
MAXIMUM DEPTH BELOW DESIGN WATER ELEVATION: 0.95'
WATER SURFACE AREA: 1.26 ac.

ALL ELEVATIONS ARE FINAL AFTER TOPSOIL REPLACEMENT. OVEREXCAVATE WETLAND BOTTOM TO ALLOW FOR 8" OF TOPSOIL/WETLAND SOIL MIXTURE PLACEMENT. OVEREXCAVATE WETLAND SIDES SLOPES TO ALLOW FOR 6" OF TOPSOIL PLACEMENT.

EXCAVATE ALL WETLAND SIDE SLOPES TO BE 6:1 OR FLATTER. ROUND CUT SLOPES AND BLEND WITH EXISTING TERRAIN. ROUGHEN WETLAND BOTTOM TO PROVIDE AN UNDULATING SURFACE.

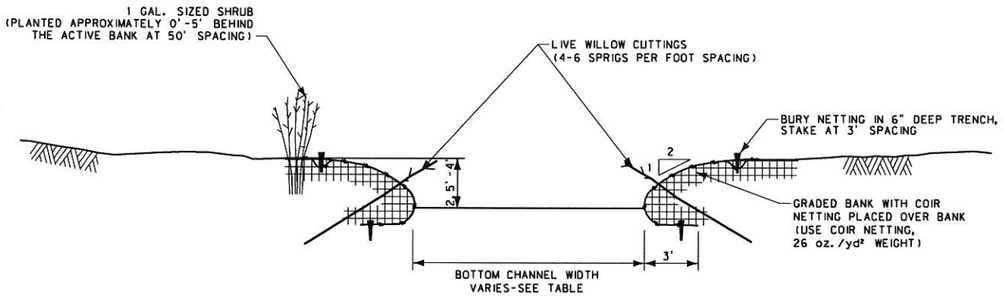
WETLAND 5
GRADING PLAN

SCALE: 1" = 100'

ATKINS

3	MDT MONTANA DEPARTMENT OF TRANSPORTATION	c:\dgn\6044000rddetz03.dgn	DESIGNED BY			MITIGATION PLANS	SILICON MTN AQUATIC RESOURCE MITIGATION SITE	MT-STPX 47(24)
2		5/9/2013	REVIEWED BY					
1		8:27:22 AM CPS - U0208	CHECKED BY			SILVER BOW COUNTY	CSF= 0.99929379 UPN 6044000	SHEET 13

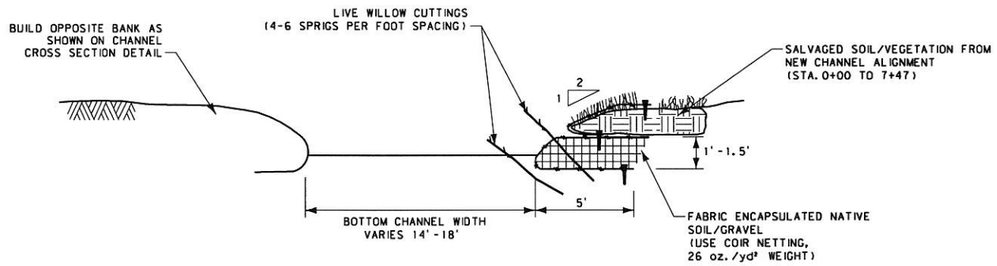
DETAIL



CHANNEL
CROSS SECTION

CHANNEL DIMENSIONS			
STATION		CHANNEL BOTTOM WIDTH (ft.)	REMARKS
FROM	TO		
0+00	6+80	18	
6+80	7+47	VARIES	TRANSITION WIDTH
7+47	10+53	22	NOT THIS CONTRACT, DO NOT DISTURB
10+53	11+33	VARIES	TRANSITION WIDTH
11+33	24+29	14	

BIOENGINEERED BANK
NEW CHANNEL - 0+00 TO 7+47, 10+53 TO 13+31
EXISTING CHANNEL - 13+31 TO 24+29
NOT TO SCALE



BANK STABILIZATION
(RIGHT OR LEFT BANK AS INDICATED)

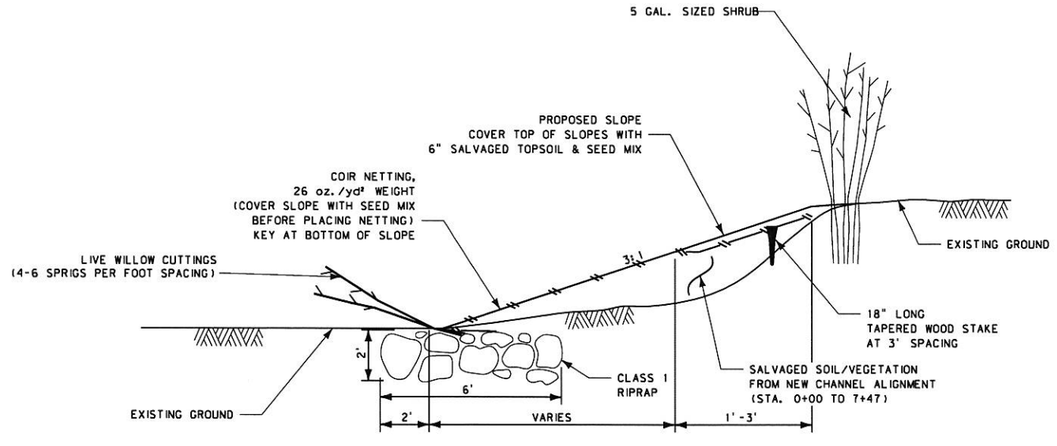
16+68.55 TO 18+64.42 RT.
19+12.75 TO 20+80.04 LT.
22+99.91 TO 23+77.57 LT.

BIOENGINEERED BANK & HEAD CUT TREATMENT QUANTITIES*				
LOCATION	square yards		cubic yards	REMARKS
	COIR NETTING #	COIR NETTING @	RANDOM RIPRAP CL. 1	
TYPICAL CHANNEL BANKS	6,453			
BANK STABILIZATION		1,255		
HEAD CUT TREATMENT	40		20	

* FOR ESTIMATING PURPOSES ONLY
# 13.1' (4 m) WIDE ROLL
@ 9.8' (3 m) WIDE ROLL

PLANTING QUANTITIES**	
SPECIES	each
WILLOW CUTTINGS	30,000
Buffaloberry (Shepherdia argentea) - 1 GALLON	200
Buffaloberry (Shepherdia argentea) - 5 GALLON	10
Black cottonwood (Populus trichocarpa)	50

** FOR ESTIMATING PURPOSES ONLY
SEE DETAILS FOR LOCATIONS



HEAD CUT
TREATMENT DETAIL
26+10 RT. & 26+65 RT.

SECTION C–C', SHEET 6

BIOENGINEERED BANK &
HEAD CUT TREATMENT

NOT TO SCALE

ATKINS

3	MDT MONTANA DEPARTMENT OF TRANSPORTATION	c:\dgn\6044000rddetz01.dgn	DESIGNED BY		MITIGATION PLANS	SILICON MTN AQUATIC RESOURCE MITIGATION SITE	MT-STPX 47(24)
2		5/9/2013	REVIEWED BY				
1		8:27:31 AM CPS - U0208	CHECKED BY		SILVER BOW COUNTY	CSF= 0.99929379 UPN 6044000	SHEET 14

UTILITY CROSSINGS
7+21.84 SAN. SEWER X-ING, APPROX. 6.5' DEEP
7+62.59 SAN SEWER X-ING, APPROX. 6.5' DEEP

CENTERLINE COORDINATE TABLE				
STATION	DESCRIPTION	N OR Y COORDINATE	E OR X COORDINATE	REMARKS
0+00.00	POT	652,334.708	1,165,585,957	BEGIN CHANNEL REALIGNMENT
1+06.24	PC	652,430.136	1,165,632,646	
1+24.62	PI	652,446.648	1,165,640,725	
1+41.47	PT	652,453.995	1,165,657,575	
1+68.24	PC	652,464,694	1,165,682.113	
2+75.41	PI	652,507.527	1,165,780,350	
3+12.26	PT	652,585.152	1,165,706.461	
3+83.15	PC	652,636.496	1,165,657,588	
4+54.61	PI	652,688.255	1,165,608.321	
5+16.52	PT	652,759.124	1,165,617.472	
5+49.36	PC	652,791.694	1,165,621,678	
6+25.98	PI	652,867.678	1,165,631.489	
6+80.12	PT	652,896.926	1,165,560.676	
7+47.27	POT	652,922.562	1,165,498.607	END CHANNEL REALIGNMENT
7+58.98	PC	652,927.034	1,165,487.782	
8+22.93	PI	652,951.445	1,165,428.679	
8+79.87	PT	653,010.990	1,165,405.367	
9+34.06	PC	653,061.428	1,165,385.563	
9+71.27	PI	653,096.432	1,165,372.938	
10+08.48	PT	653,131.437	1,165,360.315	
10+50.47	PC	653,170.934	1,165,346.071	
10+53.45	POC	653,173.768	1,165,345.156	BEGIN CHANNEL REALIGNMENT
10+88.19	PI	653,206.370	1,165,333.150	
11+10.95	PT	653.221.349	1,165,367.766	
11+32.99	PC	653.230.101	1,165,387.993	
11+67.18	PI	653,243.676	1,165,419.366	
11+92.96	PT	653,277.837	1,165,418.102	
12+13.39	PC	653,298.250	1,165,417.348	
12+50.59	PI	653,335.428	1,165,415.973	
12+77.36	PT	653,347.426	1,165,451.188	
12+93.76	PC	653,352.715	1,165,466.710	
13+13.15	PI	653,358.968	1,165,485.065	
13+30.75	PT	653,375.963	1,165.494.404	END CHANNEL REALIGNMENT

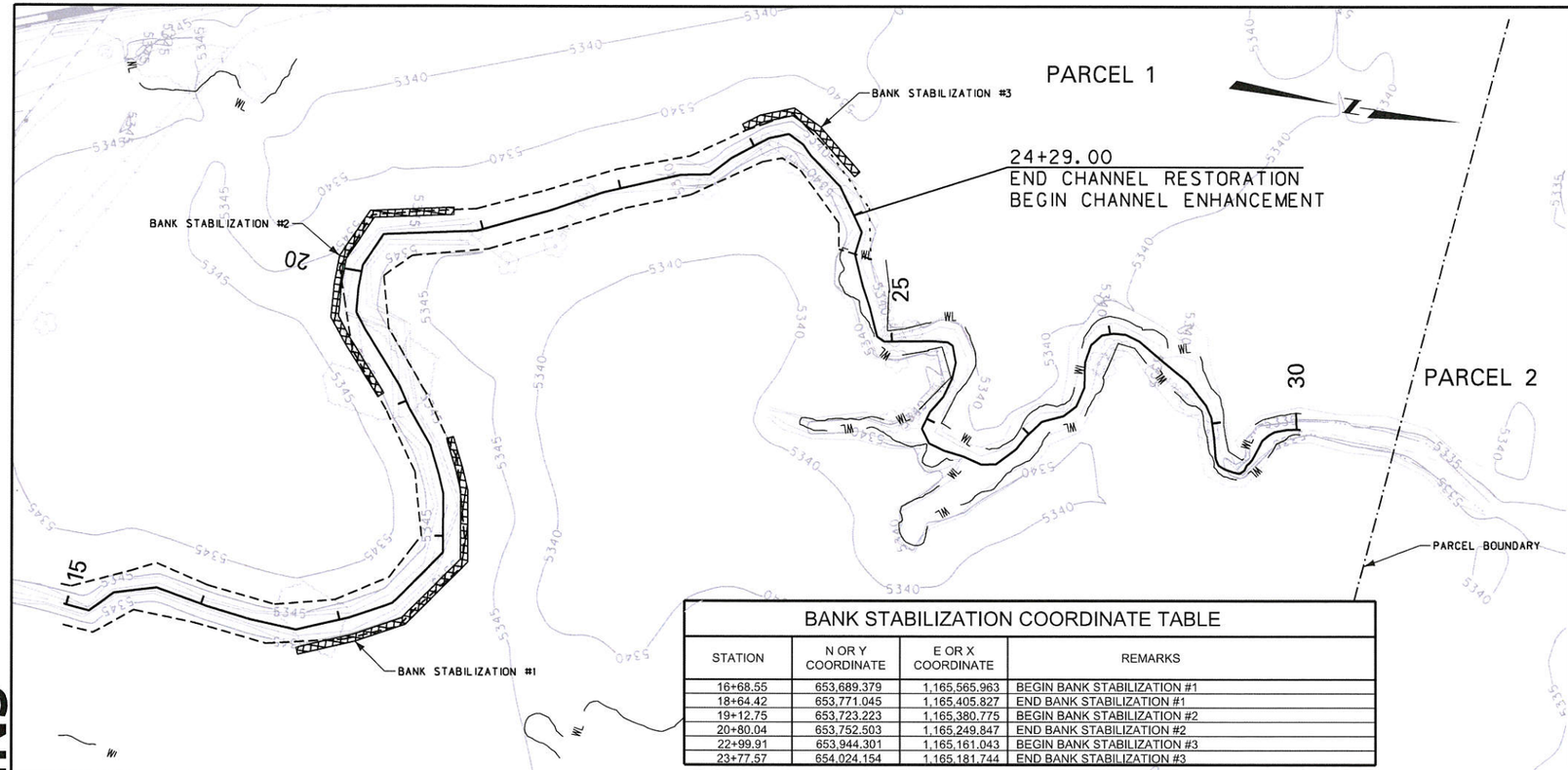
PLUG EXISTING CHANNEL
LEAVE EXISTING CHANNEL IN PLACE
PLUG EXISTING CHANNEL
CHANNEL CONSTRUCTION LIMITS
S. OF PTW PARCEL
LEAVE EXISTING CHANNEL IN PLACE
CONSTRUCTION PERMIT BOUNDARY
ROADWAY CONSTRUCTION LIMITS
NEW ROAD ALIGNMENT
0+00.00 BEGIN CHANNEL REALIGNMENT
7+47.27 END CHANNEL REALIGNMENT
10+53.45 BEGIN CHANNEL REALIGNMENT
LEAVE EXISTING CHANNEL IN PLACE
PLUG EXISTING CHANNEL
DO NOT DISTURB EXISTING VEGETATION
DO NOT DISTURB EXISTING VEGETATION
EXISTING EMBANKMENT TO BE REMOVED WITH ROAD PROJECT
13+30.75 END CHANNEL REALIGNMENT BEGIN CHANNEL RESTORATION
PARCEL 1
PARCEL BOUNDARY

CHANNEL REALIGNMENT
CONSTRUCTED WITH ROAD PROJECT NOT THIS CONTRACT
CHANNEL REALIGNMENT
CHANNEL RESTORATION
BERM REMOVED WITH SILICON MOUNTAIN TECHNOLOGY PARK PROJECT
EXISTING GROUND
PROPOSED CHANNEL PROFILE
-0.310%
-0.343%
-0.570%
7+47.27 EL. 5,347.80
10+53.45 EL. 5,346.75
13+30.75 EL. 5,345.17
CHANNEL SPLIT
DO NOT DISTURB
DO NOT DISTURB

5370
5360
5350
5340
5330
0
5
10
15

ATKINS

3	MDT MONTANA DEPARTMENT OF TRANSPORTATION	c:\dgn\6044000rdplpz01.dgn	DESIGNED BY		MITIGATION PLANS	SILICON MTN AQUATIC RESOURCE MITIGATION SITE	MT-STPX 47(24)
2		5/9/2013	REVIEWED BY			CSF= 0.99929379 UPN 6044000	SHEET 15
1		8:27:44 AM CPS - U0208	CHECKED BY		SILVER BOW COUNTY		

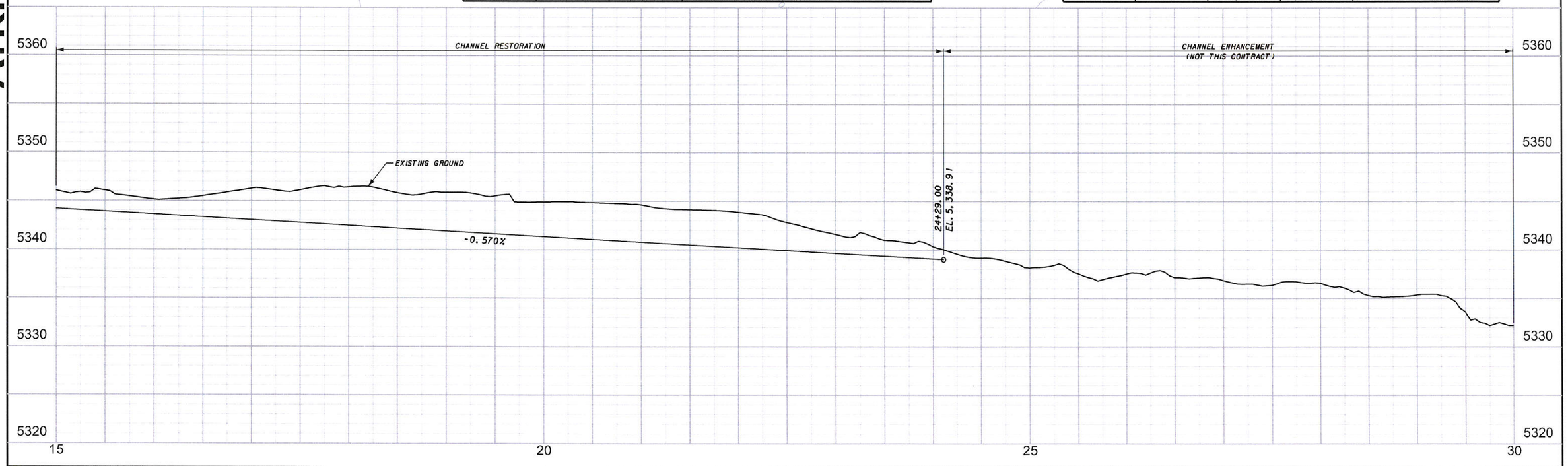


BANK STABILIZATION COORDINATE TABLE

STATION	N OR Y COORDINATE	E OR X COORDINATE	REMARKS
16+68.55	653,689.379	1,165,565.963	BEGIN BANK STABILIZATION #1
18+64.42	653,771.045	1,165,405.827	END BANK STABILIZATION #1
19+12.75	653,723.223	1,165,380.775	BEGIN BANK STABILIZATION #2
20+80.04	653,752.503	1,165,249.847	END BANK STABILIZATION #2
22+99.91	653,944.301	1,165,161.043	BEGIN BANK STABILIZATION #3
23+77.57	654,024.154	1,165,181.744	END BANK STABILIZATION #3

CENTERLINE COORDINATE TABLE

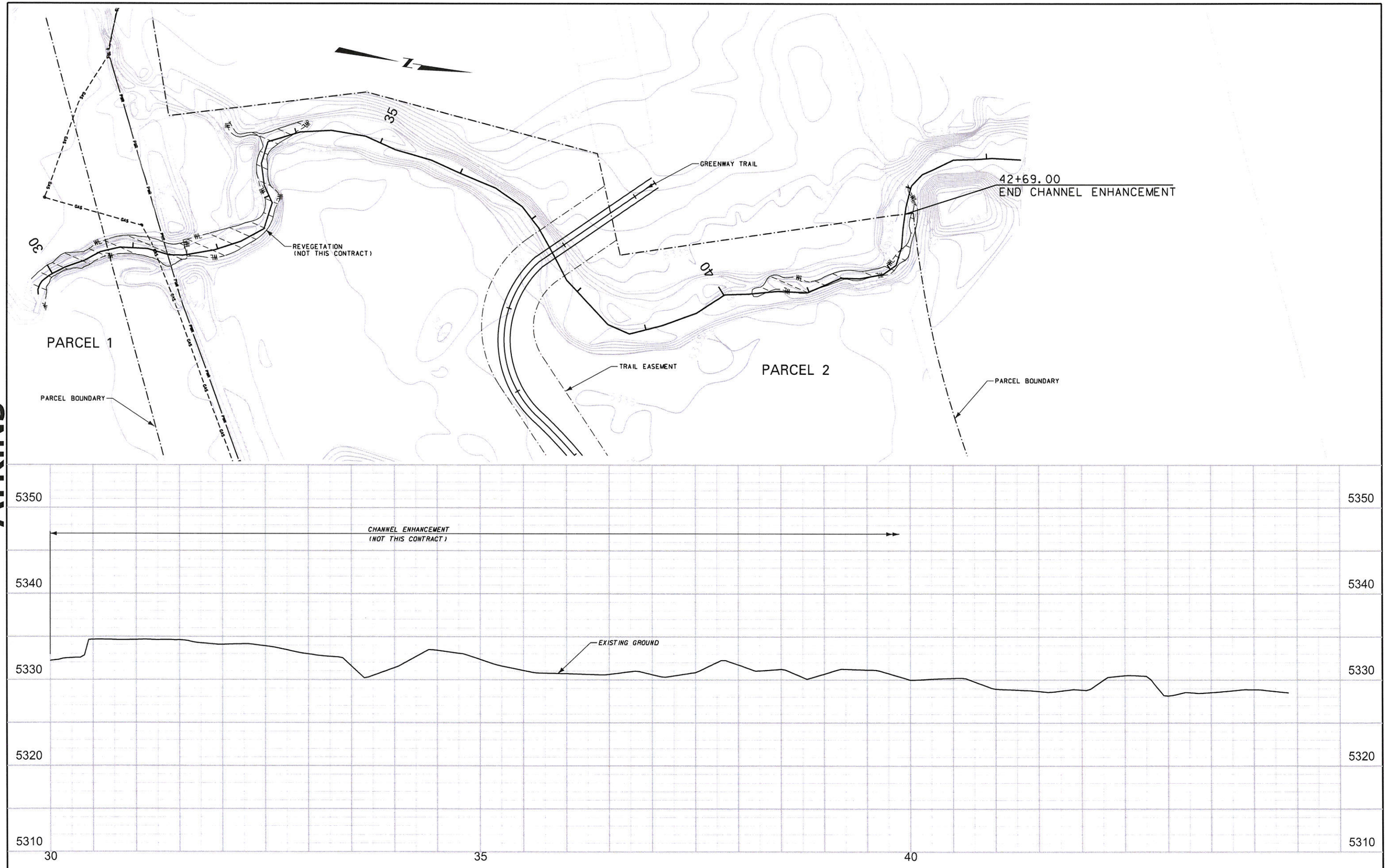
STATION	DESCRIPTION	N OR Y COORDINATE	E OR X COORDINATE	REMARKS
13+30.75	PT	653,375.963	1,165,494.404	BEGIN CHANNEL RESTORATION
13+56.77	POT	653,398.718	1,165,507.005	
13+78.58	POT	653,417.755	1,165,517.659	
14+02.40	POT	653,438.543	1,165,529.293	
14+20.46	POT	653,453.807	1,165,538.940	
14+35.47	POT	653,466.496	1,165,546.960	
14+51.95	POT	653,479.694	1,165,556.833	
14+80.60	POT	653,508.306	1,165,558.282	
15+02.63	POT	653,530.191	1,165,560.804	
15+16.25	POT	653,543.723	1,165,562.363	
15+37.66	POT	653,558.896	1,165,547.256	
15+67.61	POT	653,587.770	1,165,539.313	
15+98.00	POT	653,617.510	1,165,545.579	
16+04.11	POT	653,623.488	1,165,546.839	
16+15.91	POT	653,635.152	1,165,548.575	
16+35.85	POT	653,654.880	1,165,551.512	
16+68.55	POT	653,687.498	1,165,553.801	
16+82.08	POT	653,700.079	1,165,548.821	
17+06.05	POT	653,722.365	1,165,540.000	
17+32.62	POT	653,745.998	1,165,527.846	
17+38.47	POT	653,751.158	1,165,525.098	
17+43.06	POT	653,754.030	1,165,521.512	
17+88.51	POT	653,780.672	1,165,484.695	
18+29.69	POT	653,774.660	1,165,443.957	
18+43.19	POT	653,769.762	1,165,431.371	
18+64.42	POT	653,760.755	1,165,412.149	
18+95.09	POT	653,741.864	1,165,387.994	
19+11.91	POT	653,732.963	1,165,373.715	
19+57.76	POT	653,703.534	1,165,338.564	
19+71.17	POT	653,695.561	1,165,327.783	
19+88.15	POT	653,694.537	1,165,310.829	
20+04.61	POT	653,695.053	1,165,294.376	
20+30.58	POT	653,706.169	1,165,270.905	
20+95.42	POT	653,769.858	1,165,258.752	
21+49.10	POT	653,818.760	1,165,236.621	
21+87.56	POT	653,852.852	1,165,218.818	
22+42.83	POT	653,904.249	1,165,198.499	
22+63.35	POT	653,924.508	1,165,195.201	
22+81.91	POT	653,937.218	1,165,181.680	
23+11.65	POT	653,961.072	1,165,163.920	
23+25.87	POT	653,974.382	1,165,158.904	
23+38.39	POT	653,985.461	1,165,164.736	
23+48.10	POT	653,992.084	1,165,171.840	
23+77.57	POT	654,015.272	1,165,190.028	
24+12.92	POT	654,035.104	1,165,219.288	
24+29.00	POT	654,032.595	1,165,235.170	END CHANNEL RESTORATION



ATKINS

3	MDT MONTANA DEPARTMENT OF TRANSPORTATION	c:\dgn\6044000rdplpz01.dgn	DESIGNED BY		MITIGATION PLANS	SILICON MTN AQUATIC RESOURCE MITIGATION SITE	MT-STPX 47(24)
2		5/9/2013	REVIEWED BY		SILVER BOW COUNTY	CSF= 0.99929379 UPN 6044000	SHEET 16
1		8:27:49 AM CPS - U0208	CHECKED BY				

ATKINS



3	MDT MONTANA DEPARTMENT OF TRANSPORTATION	c:\dgn\6044000rdplpz01.dgn	DESIGNED BY			MITIGATION PLANS	SILICON MTN AQUATIC RESOURCE MITIGATION SITE	MT-STPX 47(24)
2		5/9/2013	REVIEWED BY					
1		8:27:54 AM CPS - U0208	CHECKED BY			SILVER BOW COUNTY	CSF= 0.99929379 UPN 6044000	SHEET 17

DETAIL

DO NOT DISTURB EXISTING WETLANDS

DO NOT DISTURB EXISTING WETLANDS

PARCEL BOUNDARY

BANK STABILIZATION #3

PARCEL 1

PROPOSED WETLAND 3

BANK STABILIZATION #2

PROPOSED WETLAND 2

PROPOSED WETLAND 1

MATCH LINE

PARCEL 2

SEED ADDITIONAL 10' OUTSIDE OF CONSTRUCTION LIMITS FOR CHANNEL REALIGNMENT

S. OF PTW PARCEL

GERMAN GULCH ROAD

BANK STABILIZATION #1

NEW ROADWAY ALIGNMENT SEE ROAD PLANS FOR SEEDING

DO NOT DISTURB EXISTING WETLANDS

BANK STABILIZATION

REVEGETATION ZONE

REVEGETATION ZONE (NOT THIS CONTRACT)

WETLAND SEEDING - UPLAND ALL DISTURBED UPLAND AREAS

WETLAND SEEDING - WETLAND ALL DISTURBED WETLAND AREAS

WETLAND CELL

SEE SEEDING SPECIAL PROVISIONS FOR SEED MIXTURES/PLANTINGS.
DO NOT DISTURB EXISTING WOODY VEGETATION ALONG CHANNEL.

SEEDING & PLANTING PLAN
PARCEL 1

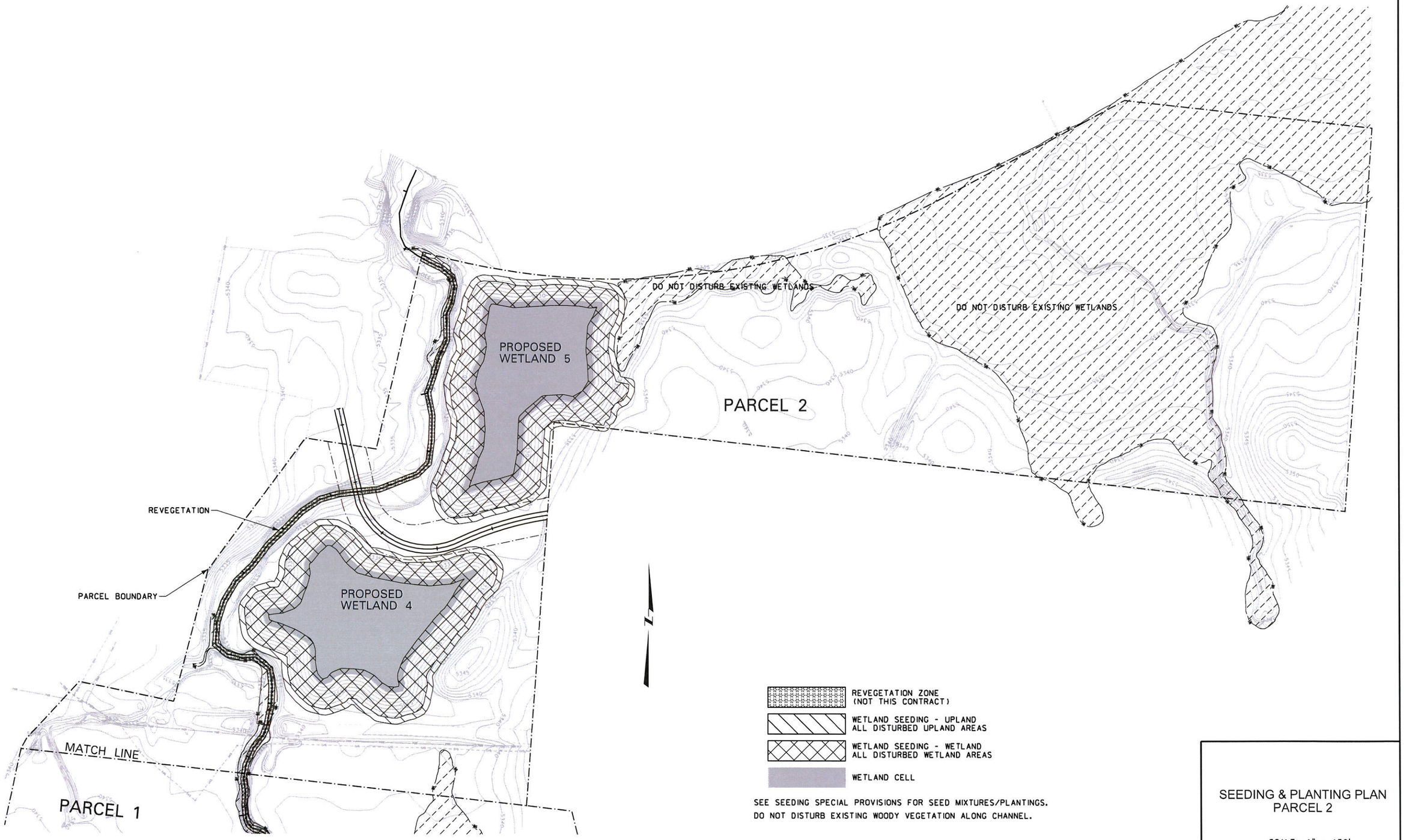
SCALE: 1" = 100'

ATKINS

3	MDT MONTANA DEPARTMENT OF TRANSPORTATION	c:\dgn\6044000rddetz05.dgn	DESIGNED BY			MITIGATION PLANS	SILICON MTN AQUATIC RESOURCE MITIGATION SITE	MT-STPX 47(24)
2		5/9/2013	REVIEWED BY			SILVER BOW COUNTY	CSF= 0.99929379 / UPN 6044000	SHEET 18
1		8:28:05 AM CPS - U0208	CHECKED BY					

ATKINS

DETAIL



SEE SEEDING SPECIAL PROVISIONS FOR SEED MIXTURES/PLANTINGS.
DO NOT DISTURB EXISTING WOODY VEGETATION ALONG CHANNEL.

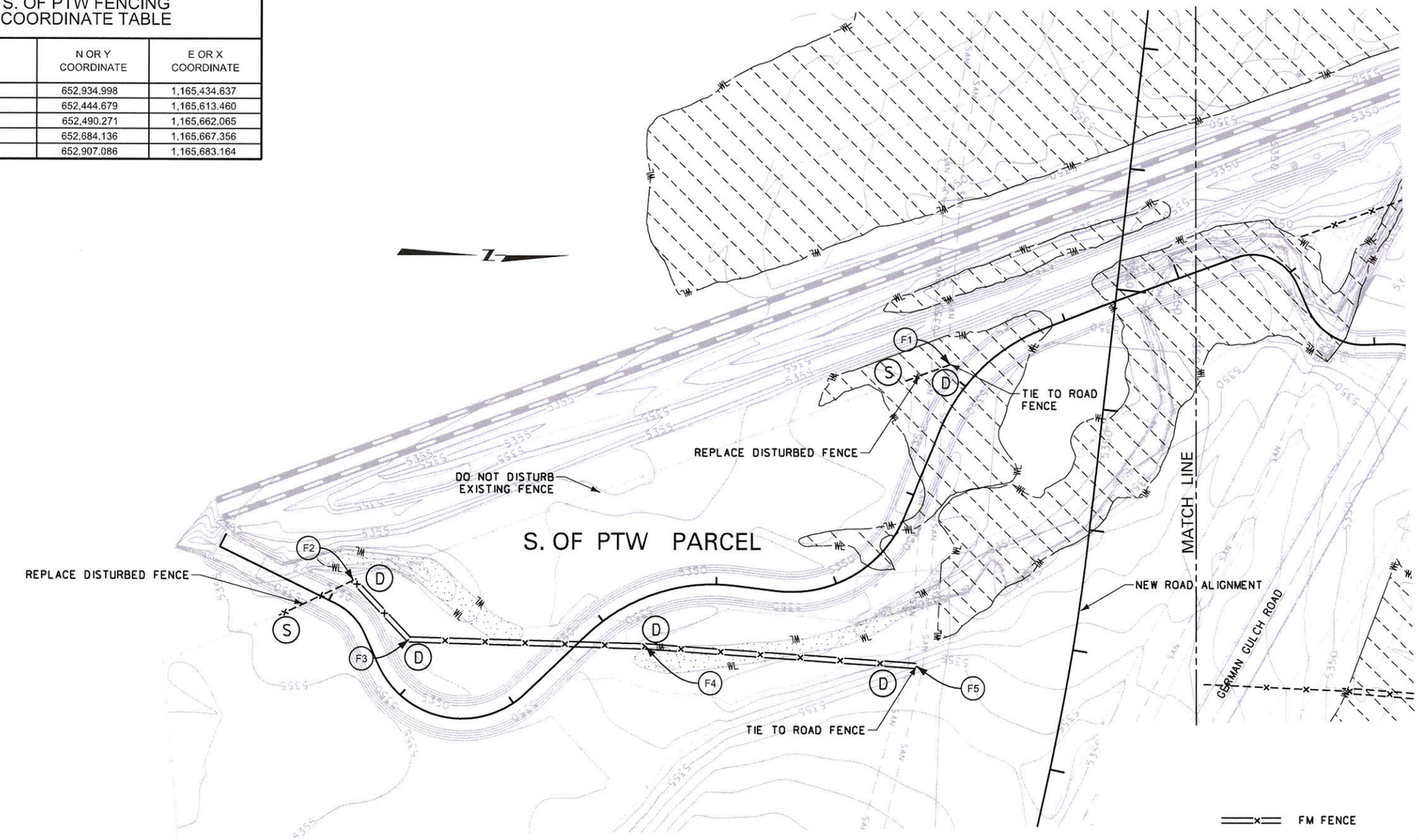
SEEDING & PLANTING PLAN
PARCEL 2

SCALE: 1" = 150'

3	MDT MONTANA DEPARTMENT OF TRANSPORTATION	c:\dgn\6044000rddetz05.dgn	DESIGNED BY			MITIGATION PLANS		SILICON MTN AQUATIC RESOURCE MITIGATION SITE	MT-STPX 47(24)
2		5/9/2013	REVIEWED BY						
1		8:28:10 AM CPS - U0208	CHECKED BY			SILVER BOW COUNTY		CSF= 0.99929379 UPN 6044000	SHEET 19

DETAIL

S. OF PTW FENCING COORDINATE TABLE		
POINT	N OR Y COORDINATE	E OR X COORDINATE
F1	652,934.998	1,165,434.637
F2	652,444.679	1,165,613.460
F3	652,490.271	1,165,662.065
F4	652,684.136	1,165,667.356
F5	652,907.086	1,165,683.164

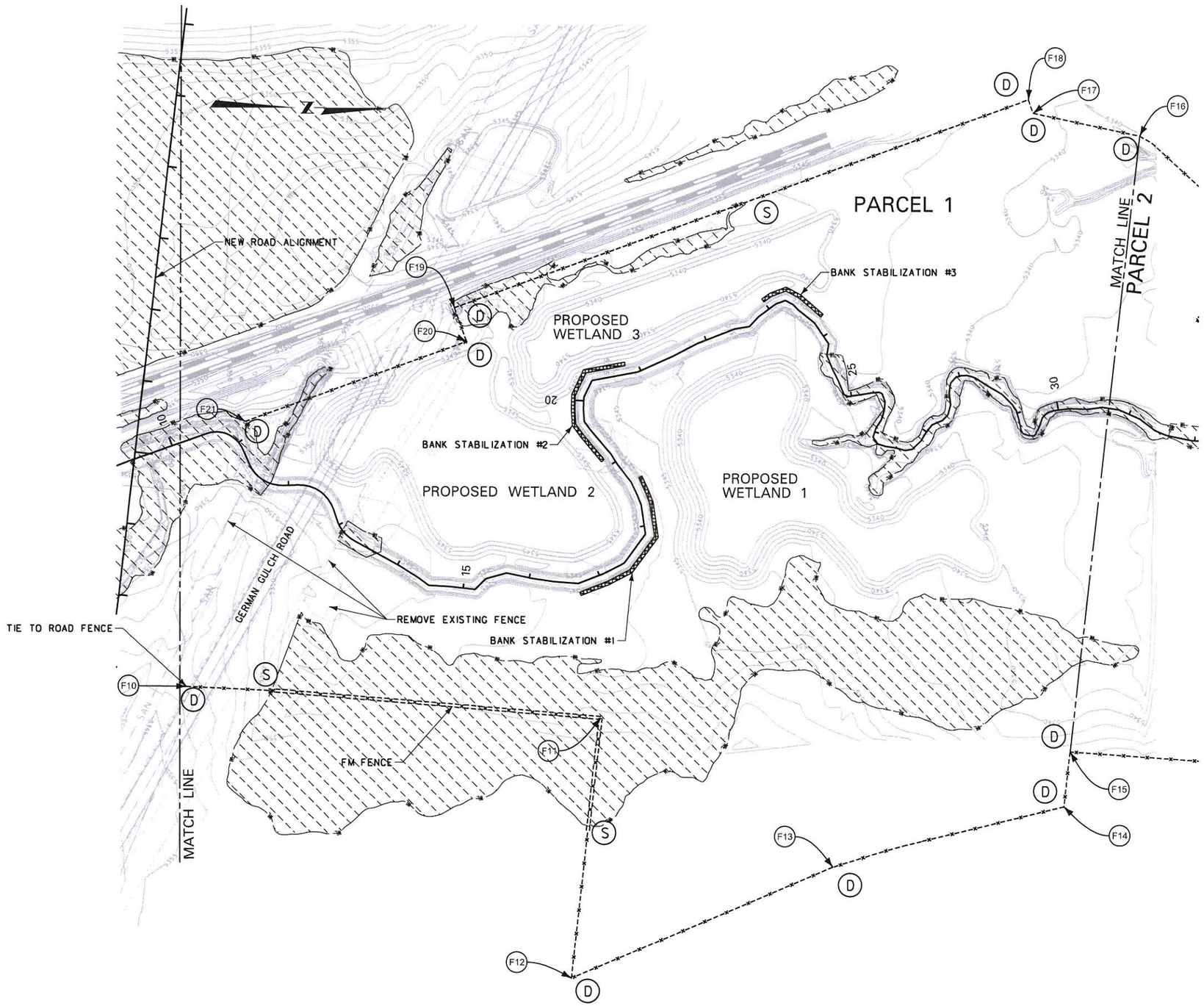


FENCING PLAN
S. OF PTW
PARCEL

SCALE: 1" = 100'

3	MDT MONTANA DEPARTMENT OF TRANSPORTATION	c:\dgn\6044000rddetz06.dgn	DESIGNED BY			MITIGATION PLANS	SILICON MTN AQUATIC RESOURCES MITIGATION SITE	MT-STPX 47(24)
2		5/9/2013	REVIEWED BY			SILVER BOW COUNTY	CSF= 0.99929379 / UPN 6044000	SHEET 20
1		8:28:21 AM CPS - U0208	CHECKED BY					

DETAIL



PARCEL 1 FENCING COORDINATE TABLE		
POINT	N OR Y COORDINATE	E OR X COORDINATE
F10	653,143.668	1,165,698.249
F11	653,718.788	1,165,740.637
F12	653,678.126	1,166,102.312
F13	654,041.245	1,165,947.411
F14	654,362.835	1,165,862.880
F15	654,371.289	1,165,786.827
F16	654,467.513	1,164,929.498
F17	654,319.424	1,164,897.740
F18	654,312.576	1,164,878.964
F19	653,514.785	1,165,169.968
F20	653,531.906	1,165,216.908
F21	653,224.501	1,165,329.010

JACKLEG FENCE - POLE

FW FENCE

(S) SINGLE PANEL

(D) DOUBLE PANEL

FENCING PLAN
PARCEL 1

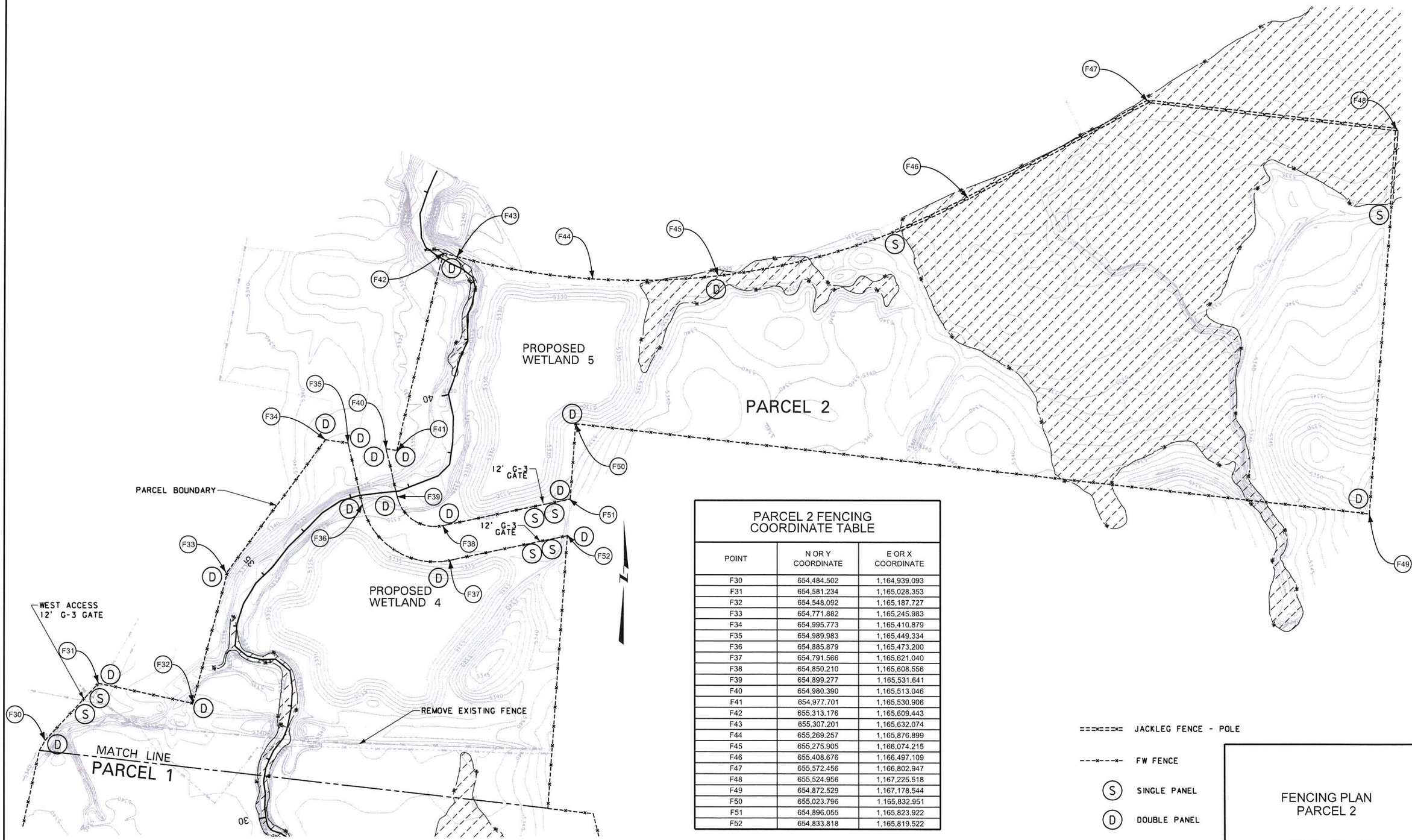
SCALE: 1" = 150'

3	MDT MONTANA DEPARTMENT OF TRANSPORTATION	c:\dgn\6044000rddetz06.dgn	DESIGNED BY			MITIGATION PLANS	SILICON MTN AQUATIC RESOURCE MITIGATION SITE	MT-STPX 47(24)
2		5/9/2013	REVIEWED BY			SILVER BOW COUNTY	CSF= 0.99929379 UPN 6044000	SHEET 21
1		8:28:25 AM CPS - U0208	CHECKED BY					

ATKINS

DETAIL

ATKINS



PARCEL 2 FENCING COORDINATE TABLE		
POINT	N OR Y COORDINATE	E OR X COORDINATE
F30	654,484.502	1,164,939.093
F31	654,581.234	1,165,028.353
F32	654,548.092	1,165,187.727
F33	654,771.882	1,165,245.983
F34	654,995.773	1,165,410.879
F35	654,989.983	1,165,449.334
F36	654,885.879	1,165,473.200
F37	654,791.566	1,165,621.040
F38	654,850.210	1,165,608.556
F39	654,899.277	1,165,531.641
F40	654,980.390	1,165,513.046
F41	654,977.701	1,165,530.906
F42	655,313.176	1,165,609.443
F43	655,307.201	1,165,632.074
F44	655,269.257	1,165,876.899
F45	655,275.905	1,166,074.215
F46	655,408.676	1,166,497.109
F47	655,572.456	1,166,802.947
F48	655,524.956	1,167,225.518
F49	654,872.529	1,167,178.544
F50	655,023.796	1,165,832.951
F51	654,896.055	1,165,823.922
F52	654,833.818	1,165,819.522

JACKLEG FENCE - POLE

FW FENCE

S SINGLE PANEL

D DOUBLE PANEL

FENCING PLAN
PARCEL 2

SCALE: 1" = 150'

3	MDT MONTANA DEPARTMENT OF TRANSPORTATION	c:\dgn\6044000rddetz06.dgn	DESIGNED BY			MITIGATION PLANS	SILICON MTN AQUATIC RESOURCE MITIGATION SITE	MT-STPX 47(24)
2		5/9/2013	REVIEWED BY			SILVER BOW COUNTY	CSF= 0.99929379 / UPN 6044000	SHEET 22
1		8:28:30 AM CPS - U0208	CHECKED BY					