



City of Billings

Landfill Expansion

Wetlands and Stream Delineation Report

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Prepared for:

City of Billings

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Introduction

This report describes the methods and findings of wetlands and streams for the proposed City of Billings Landfill Expansion Project. The report was prepared by HDR Engineering, Inc. (HDR) biologists, and is intended to provide documentation of existing stream and wetland conditions in the project area to support applicable state and local agency permitting for the project.

1.1 Project Background and Setting

The team of Great West Engineering and HDR Engineering has been hired by the City of Billings to prepare a Solid Waste Management Plan. The scope of the project includes an evaluation of the existing facilities and master planning activities, which also includes examining the feasibility of expanding the landfill to City property adjacent the existing landfill. As part of the Solid Waste Management Plan, and to support future licensing requirements for landfill expansion, environmental documentation has been prepared that is anticipated to be used by the Montana Department of Environmental Quality (DEQ) for preparation of formal environmental assessment to comply with requirements per the Administrative rules of Montana (ARM) 17.4.601 and the agency's Procedural Rules for implementing Montana Environmental Policy Act (MEPA). This Wetland and Stream Delineation Report is one of several technical reports being prepared for this project.

The project is located in Yellowstone County, Montana, just south of the City of Billings (Figure 1). In particular, the project area is located in Section 29, Township 1 South, Range 26 East, Montana Principal Meridian, and is centered at latitude 45° 43' 08" North and longitude 108° 32' 06" West. The proposed landfill expansion site is located on approximately 370 acres of City-owned land immediately southeast of the existing Billings Landfill. The project site extends from just south of the intersection of Hillcrest Road and Montana State Highway 416 (Blue Creek Road) south approximately 1 mile to the Section 29 boundary line.

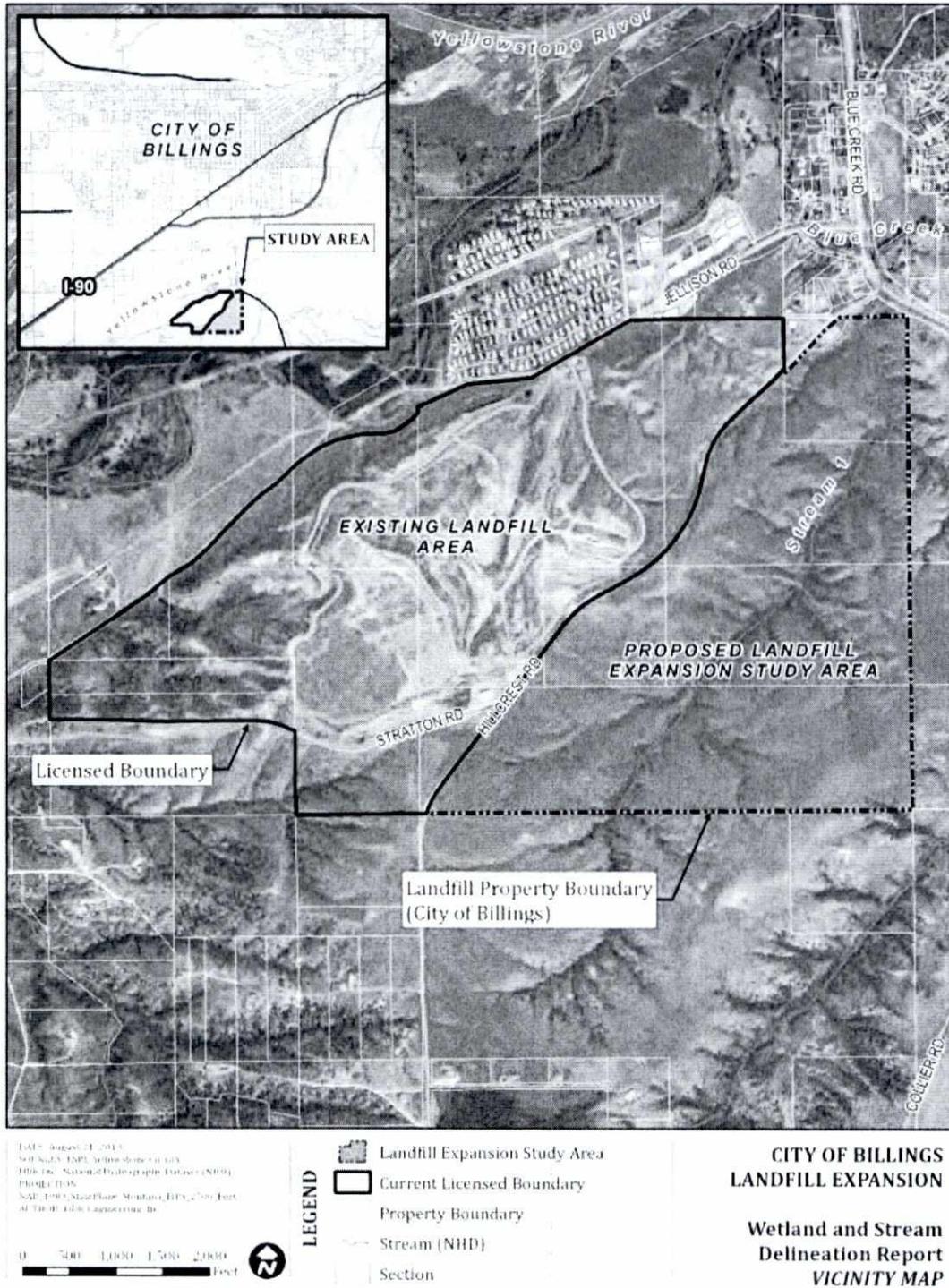


Figure 1. Project Vicinity Map

Methods

2.1 Study Area

The study area encompasses the project limits discussed in Section 1.1 and depicted on Figure 1. Wetlands and streams outside the study area were not formally delineated; these areas were assessed based on characteristics visible from public rights-of-way and on information obtained from existing documents and studies, maps, and aerial photographs.

Streams and potential wetlands in the study area were identified through a two-step process. HDR biologists first reviewed existing documents, including soil surveys, wetland and stream inventories, aerial photographs, and other reports that concern wetlands and streams in the project vicinity. After this review, HDR biologists completed a thorough field investigation of the study area that included wetland and stream identification, delineation, and classification.

2.2 Review of Existing Information

Existing documents reviewed for this wetland and stream study included the following:

- Soil Survey of Yellowstone County Area, Montana (USDA NRCS 2012)
- U.S. Fish and Wildlife Service (USFWS 2012) National Wetland Inventory Web site
- Federal Emergency Management Agency (FEMA 1981) Flood Insurance Rate Map for Unincorporated Yellowstone County
- Montana Fish Wildlife and Parks (2012) Montana Fisheries Information System (MFISH)
- Montana Natural Heritage Program Database (2012)

These documents provide background information on the soils, hydrology, land use, streams, and potential wetlands in the study area.

2.3 Field Investigation

Field investigation consisted of an initial field reconnaissance on October 7, 2012. The reconnaissance was followed by a more detailed investigation of streams and potential wetlands in the study area, which was conducted on October 8 and 9, 2012. In the week prior to the field investigation, Billings had received approximately 1.5 inches of rainfall (National Oceanic and Atmospheric Administration [NOAA] National Weather Service [NWS] 2012). Temperatures were generally within normal ranges for early October. Precipitation over the preceding two months was below the normal range for Billings, with only a trace of precipitation in the month of September (NOAA NWS 2012, USDA NRCS 2002).

Wetlands

HDR staff investigated the project site for wetlands using the three parameter methods described in the *Corps of Engineers Wetland Delineation Manual* (Environmental Laboratory 1987), as updated by the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Great Plains Region* (U.S. Army Corps of Engineers [USACE] 2010). A detailed description of the field methods used in this study is provided in Appendix A. Due to field time constraints, paired sample plots were not gathered at some of the minor wetlands along Stream 1 and at Wetland 5. Mapping of these wetlands was based on the

presence of hydrophytic vegetation communities comparable to those observed in other delineated wetlands.

Wetland boundary and data plot locations in the study area were marked in the field using a Trimble GeoXT 2005 GPS device, which is capable of sub meter accuracy. The resulting data were incorporated into project base maps as well as the previous survey data.

Streams

In order to determine the ordinary high water mark (OHWM) of streams in the study area, HDR utilized USACE (2005) guidance for OHWM identification. USACE (2005) defines “ordinary high water mark” as: “that line on the shore established by the fluctuations of water and indicated by physical characteristics such as a clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas.” HDR staff looked for physical indicators including, but not limited to, a natural line impressed on the bank, destruction of terrestrial vegetation, presence of litter and debris, vegetation matted down, bent or absent, scour, and bed and banks. Due to field time constraints, the OHWM of portions of Stream 1 and the first-order drainages to Stream 1 (1 East through 15 East and 1 West through 7 West) were not fully delineated. Rather, the centerline of Stream 1 was mapped through most of the project area, and the upstream limits of observable bed and bank were mapped for the first-order drainages.

Results

3.1 General Site Conditions

The project site is located just south of the city of Billings in unincorporated Yellowstone County (Figure 1). The project site is located in the Missouri Plateau, Unglaciaded Section of the Great Plains Province of the Interior Plains (USDA NRCS 2013). It is an area of old plateaus and terraces that have been eroded. Slopes generally are gently rolling to steep and wide belts of steeply sloping badlands border a few of the larger river valleys. Nearly the entire project site is mapped as Lismas Clay, 15 to 35 percent slopes (USDA NRCS 2012). These soils are characterized as shallow, well-drained, moderately steep calcerous clay soils on upland (Meshnick 1972). Topographically, the project area consists of an upland plain, dissected by a large second-order drainage (Stream 1) that discharges to Blue Creek, a tributary of the Yellowstone River. Numerous first-order drainages are located throughout the project area and all drain to Stream 1. Surface elevation in the study area ranges from 3200 feet to 3500 feet above mean sea level.

Montana Natural Heritage Program (2013) land cover atlas maps the upland plains in the study area as Big Sagebrush Steppe and Great Plains Mixed Grass Prairie. Predominant species in these areas include Wyoming and basin big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*, *Artemisia tridentata* ssp. *tridentata*); grazed areas are dominated by exotics such as Kentucky bluegrass (*Poa pratensis*), smooth brome (*Bromus inermis*), and Japanese brome (*Bromus japonicus*), as well as western wheatgrass (*Pascopyrum smithii*) and crested wheatgrass (*Agropyron cristatum*) (MNHP 2013). Portions of Stream 1 and the tertiary drainages are mapped as Great Plains Ponderosa Pine Woodland and Savanna, and Great Plains Wooded Draw and Ravine, and Great Plains Riparian. Predominant species in these land cover types include narrowleaf cottonwood (*Populus angustifolia*) and Plains cottonwood (*Populus deltoides*) in floodplains, Rocky Mountain juniper (*Juniperus scopulorum*) in the draws and ravines, and ponderosa pine (*Pinus ponderosa*) near the upward extent of the drainages. Uplands outside of the secondary and tertiary drainages are currently used as horse pastures. Current uses of the property include a corral and a watering tank for horses, a watering tank and several pipes, and a power station in the northwest corner of the project area. Linear man-made features include a power transmission/distribution line and several undeveloped roads and two-tracks.

3.2 Wetlands

HDR staff identified 14 wetlands in the study area that collectively cover an area of 2.41 ac. With the exception of Wetlands 5 and 6, all other wetlands identified in the study area adjoin Stream 1 landward of its top of bank. Wetlands were distinguished from adjoining uplands by the presence of indicators for wetland hydrology, hydric soils, and hydrophytic vegetation. Table 1 summarizes the size, hydrogeomorphic (HGM) and Cowardin classification of these wetlands found within the project area. Figure 2 shows an overview of the wetlands and waterbodies in the study area, and detailed maps of wetlands and streams delineated on the project site are shown in Appendix C. Wetland delineation data sheets for wetlands within the study area are provided in Appendix B, detailed wetland delineation maps are in Appendix C, and site photos are provided in Appendix D.

Table 1. Summary of Wetlands in the Study Area

Wetland Name	Wetland area on Project Site	Hydrogeomorphic (HGM) Classification ^a	Cowardin Classification ^b	Wetland Delineation Paired Sample Plots Completed in October 2012?
1	1.32 ac	Riverine	PEM1/PAB1	Yes
1a	0.02 ac	Riverine	PEM1	No
2	0.40 ac	Riverine	PEM1/PAB1	Yes
2a	0.03 ac	Riverine	PEM1	No
2b	0.02 ac	Riverine	PEM1	No
2c	0.02 ac	Riverine	PEM1	No
3	0.10 ac	Riverine	PEM1	Yes
4	0.05 ac	Riverine	PEM1	No
4a	0.03 ac	Riverine	PEM1	No
5	0.01 ac	Depressional	PEM1	No
6	0.30 ac	Slope	PEM1	Yes
7	0.09 ac	Riverine	PEM1	No
7a	0.01 ac	Riverine	PEM1	No
7b	0.01 ac	Riverine	PEM1	No

^a Montana Department of Transportation (2008)

^b Cowardin et al. (1979).

PEM1 = palustrine emergent, persistent; PAB1 = palustrine aquatic bed, algal

Wetland 1

Palustrine emergent persistent

1.32 acre total

Wetland 1 is an impounded riverine wetland located along Stream 1, located in the south portion of the site (Appendix C, Maps 9 and 11). Wetland 1 receives seasonal overbank flow from Stream 1 and surface flows from other seasonal drainages that discharge into the floodplain of Stream 1. Water in Wetland 1 is impounded by a road berm along the north wetland boundary of the wetland; one culvert is located in the road berm at an elevation at least 6 feet higher than the high water line observed in the wetland. The north portion of Wetland 1 corresponds to a PABFh wetland mapped in the NWI (USFWS 2012).

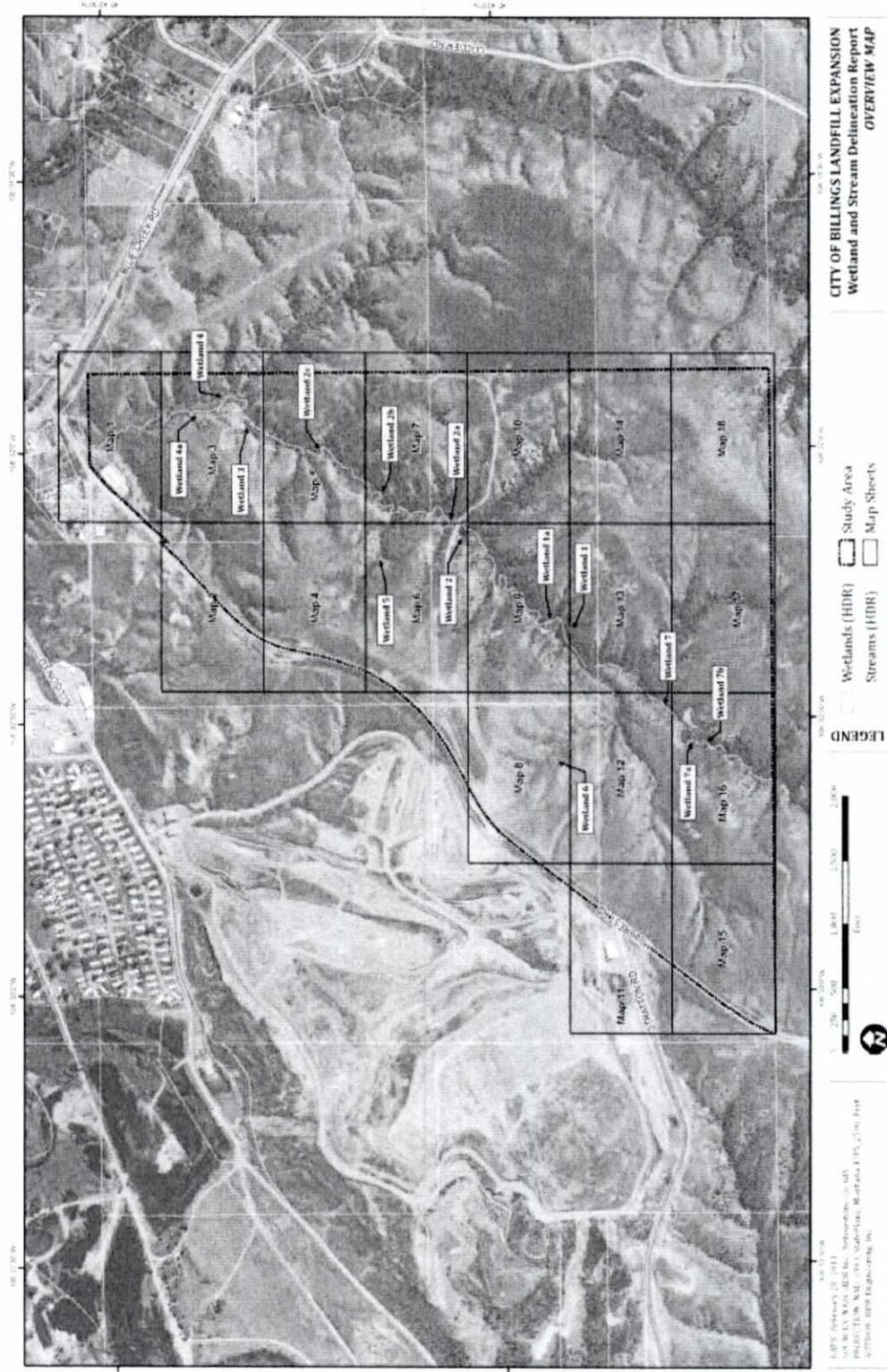


Figure 2. Study Area Overview Map

Wetland 1 is a palustrine, emergent wetland. In the north portion of the wetland, a narrow band of emergent vegetation dominated by twoscale saltbush (*Atriplex micrantha*) and rough cocklebur (*Xanthium strumarium*) surrounds an inundated and unvegetated depression where water ponds behind the road berm. Common spikerush (*Eleocharis palustris*) is predominant in the south-central portion of the wetland, and inland bluegrass (*Poa interior*) was predominant in the southwest arm of the wetland. Twoscale saltbush and rough cocklebur are introduced annuals that are not listed on the National Wetland Plant List (USACE 2013); however, hydrophytic vegetation is presumed to be present due to hydric soil and wetland hydrology indicators. Predominance of common spikerush and inland bluegrass in the south portion of the wetland meets the hydrophytic vegetation criteria. At the time of the wetland delineation, the depression in the north portion of the wetland was inundated to a depth of 10 inches. In the south portion of the wetland, saturation was present within 12 inches of the surface. Both of these observations are primary indicators for wetland hydrology. The typical soil profiles observed in the wetland met the hydric soil criteria for Depleted Matrix.

Wetland 2

Palustrine emergent persistent

0.40 acre total

Wetland 2 is another impounded riverine wetland located along Stream 1, located in the south portion of the site (Appendix C, Maps 6 and 9). Wetland 2 receives seasonal overbank flow from Stream 1 and surface flows from other seasonal drainages that discharge into the wetland. Water in Wetland 2 is impounded by a road berm along the north wetland boundary of the wetland; one culvert is located in the road berm at an elevation at least 6 feet higher than the high water line observed in the wetland; this culvert likely acts as a high-flow outlet during extreme precipitation events. The north portion of Wetland 2 corresponds to a PABFh wetland mapped in the NWI (USFWS 2012).

Wetland 2 is a palustrine, emergent wetland that also has a narrow band of twoscale saltbrush surrounding an unvegetated depression. At the time of the wetland delineation, no inundation, high water table or saturation was observed. However, aerial photos of Wetland 2 indicate that Wetland 2 is inundated through early summer, and aquatic invertebrates were observed in the unvegetated depression. Both of these are primary indicators of wetland hydrology, therefore wetland hydrology is assumed to be present during the early part of the growing season. The typical soil profile observed in the wetland met the hydric soil criteria for Depleted Matrix.

Wetland 3

Palustrine emergent persistent

0.10 acre total

Wetland 3 is a partially impounded riverine wetland located along Stream 1, located in the north portion of the site (Appendix C, Map 3). Wetland 3 receives seasonal overbank flow from Stream 1 and surface flows from other seasonal drainages that discharge into the wetland. Surface water in Wetland 3 is partially impounded by a shallow two-track berm located along the north wetland boundary; however, one culvert located under the two-track occurs at a low enough elevation in relation to Wetland 3 that it likely allows flow-through of surface water from Wetland 3.

Wetland 3 is a palustrine, emergent wetland dominated by fox-tail barley (*Hordeum jubatum*) and common spikerush, with other grass and emergent species. At the time of the wetland delineation, no inundation, high water table or saturation was observed. However, oxidized rhizospheres on living roots, a primary indicator of wetland hydrology, were observed. The typical soil profile observed in the wetland met the hydric soil criteria for Depleted Matrix.

Minor Wetlands Associated with Stream 1 (Wetlands 2a, 2b, 2c, 4, 7, 7a and 7b)

Several other small wetlands adjoining Stream 1 were identified; the approximate boundaries of these wetlands were mapped (Appendix C, Maps 3, 5, 6, 9, 12 and 16); however, formal sample plots were not established due to field time constraints. These wetlands were dominated by hydrophytic vegetation such as common spikerush, fox-tail barley, and narrowleaf cattail (*Typha angustifolia*). Primary indicators of wetland hydrology included water-stained leaves; secondary indicators of wetland hydrology included drainage patterns and geomorphic position.

Wetland 5

Palustrine emergent persistent

0.10 acre total

Wetland 5 is a depressional wetland located upslope of Drainage 4 West on the west-central portion of the project site (Appendix C, Map 6). Wetland 5 likely receives hydrology from surface and subsurface flows from surrounding uplands. There was no distinct outlet observed in Wetland 5; however, some sheetflow likely discharges to Drainage 4 West during large precipitation events. Due to field time constraints, formal wetland delineation plots were not established at this wetland. Wetland 5 is a palustrine, emergent wetland dominated by narrowleaf cattail. At the time of the wetland delineation, no inundation, high water table or saturation was observed. However, water-stained leaves, which is a primary indicator of wetland hydrology, were observed in the wetland.

Wetland 6

Palustrine emergent persistent

0.30 acre total

Wetland 6 is a slope wetland, located upslope from the southwest corner of Wetland 1 (Appendix C, Maps 8 and 9). Wetland 6 receives subsurface groundwater discharge from seeps, and surface water discharges through a defined channel downslope and east of Wetland 6, ultimately draining to Wetland 1. Surface flow was visible in the channel during the October 2012 wetland delineation.

Wetland 6 is a palustrine, emergent wetland dominated by saltmarsh club-rush (*Schoenoplectus maritimus*), and twoscale saltbush, with scattered toad rush (*Juncus bufonius*) and fox-tail barley, most of which appeared grazed. At the time of the wetland delineation, inundation to a depth of 1 inch was observed in pockets throughout Wetland 6, and free water was present within 10 inches of the surface. Salt crust was also observed on some of the emergent and grass stems. All of these observations are primary indicators of wetland hydrology. The typical soil profile observed in the wetland met the hydric soil criteria for Depleted Matrix.

3.3 Streams

The study area is located in the Blue Creek Watershed, located in the Upper Yellowstone-Lake Basin Watershed (USGS HUC 17010204) (USEPA 2012). Table 2 summarizes the size and primary characteristics of streams and drainages identified in the study area (Figure 2).

Table 2. Summary of Streams in the Study Area

Stream/ Tributary Name	Tributary to	USACE Jurisdiction ^{a,b}	Stream Characteristics in Project Reach	Average Width in Study Area (ft) ^e	Approximate Length in Study Area (ft) ^e
Stream 1	Blue Creek	RPW	<ul style="list-style-type: none"> Seasonal, second-order stream No fish presence documented in project reach of stream^c 	5-10	8,770
Drainage 1 East	Stream 1	Tributary to RPW ^d	<ul style="list-style-type: none"> Seasonal, first-order drainage No fish presence documented in project reach of stream 	2-3	139
Drainage 2 East	Stream 1	Tributary to RPW	<ul style="list-style-type: none"> Seasonal, first-order drainage No fish presence documented in project reach of stream 	1	210
Drainage 3 East	Stream 1	Tributary to RPW	<ul style="list-style-type: none"> Seasonal, first-order drainage No fish presence documented in project reach of stream 	<1	38
Drainage 4 East	Stream 1	Tributary to RPW	<ul style="list-style-type: none"> Seasonal, first-order drainage No fish presence documented in project reach of stream 	2	525
Drainage 5 East	Stream 1	Tributary to RPW	<ul style="list-style-type: none"> Seasonal, first-order drainage No fish presence documented in project reach of stream 	<1	150
Drainage 6 East	Stream 1	Tributary to RPW	<ul style="list-style-type: none"> Seasonal, first-order drainage No fish presence documented in project reach of stream 	3	272

Table 2. Continued

Stream/ Tributary Name	Tributary to	USACE Jurisdiction ^{a,b}	Stream Characteristics in Project Reach	Average Width in Study Area (ft) ^e	Approximate Length in Study Area (ft) ^e
Drainage 7 East	Stream 1	Tributary to RPW	<ul style="list-style-type: none"> Seasonal, first-order drainage No fish presence documented in project reach of stream 	2	111
Drainage 8 East	Stream 1	Tributary to RPW	<ul style="list-style-type: none"> Seasonal, first-order drainage No fish presence documented in project reach of stream 	2	328
Drainage 9 East	Stream 1	Tributary to RPW	<ul style="list-style-type: none"> Seasonal, first-order drainage No fish presence documented in project reach of stream 	4	198
Drainage 10 East	Stream 1	Tributary to RPW	<ul style="list-style-type: none"> Seasonal, first-order drainage No fish presence documented in project reach of stream 	2	445
Drainage 11 East	Stream 1	Tributary to RPW	<ul style="list-style-type: none"> Seasonal, first-order drainage No fish presence documented in project reach of stream 	2	198
Drainage 12 East	Stream 1	Tributary to RPW	<ul style="list-style-type: none"> Seasonal, first-order drainage No fish presence documented in project reach of stream 	7	318
Drainage 13 East	Stream 1	Tributary to RPW	<ul style="list-style-type: none"> Seasonal, first-order drainage No fish presence documented in project reach of stream 	2	581
Drainage 14 East	Stream 1	Tributary to RPW	<ul style="list-style-type: none"> Seasonal, first-order drainage No fish presence documented in project reach of stream 	<1	114
Drainage 15 East	Stream 1	Tributary to RPW	<ul style="list-style-type: none"> Seasonal, first-order drainage No fish presence documented in project reach of stream 	1	104

Table 2. Continued

Stream/ Tributary Name	Tributary to	USACE Jurisdiction^{a,b}	Stream Characteristics in Project Reach	Average Width in Study Area (ft)^e	Approximate Length in Study Area (ft)^e
Drainage 1 West	Stream 1	Tributary to RPW	<ul style="list-style-type: none"> • Seasonal, first-order drainage • No fish presence documented in project reach of stream 	1	107
Drainage 2 West	Stream 1	Tributary to RPW	<ul style="list-style-type: none"> • Seasonal, first-order drainage • No fish presence documented in project reach of stream 	1-3	490
Drainage 3 West	Stream 1	Tributary to RPW	<ul style="list-style-type: none"> • Seasonal, first-order drainage • No fish presence documented in project reach of stream 	1-3	362
Drainage 4 West	Stream 1	Tributary to RPW	<ul style="list-style-type: none"> • Seasonal, first-order drainage • No fish presence documented in project reach of stream 	2	168
Drainage 5 West	Stream 1	Tributary to RPW	<ul style="list-style-type: none"> • Seasonal, first-order drainage • No fish presence documented in project reach of stream 	1	207
Drainage 6 West	Stream 1	Tributary to RPW	<ul style="list-style-type: none"> • Seasonal, first-order drainage • No fish presence documented in project reach of stream 	2-3	339
Drainage 7 West	Stream 1	Tributary to RPW	<ul style="list-style-type: none"> • Seasonal, first-order drainage • No fish presence documented in project reach of stream 	1-2	178

^a RPW = Relatively Permanent Water; non navigable tributary with relatively permanent flow year-round or continuous flow seasonally (eg, typically ≥3 months) (USEPA 2007)

^b Non-RPW = non-navigable tributary that is not relatively permanent

^c All drainages were dry at the time of the October site visit; however, a determination on whether the drainages were RPW or non-RPW could not be made

^d Montana Fish Wildlife and Parks 2013

^e Average widths and approximate lengths were determined based on existing survey data and field observations.

Stream 1

Stream 1 is a second-order stream that originates south of the project boundary and flows 1.5 miles north/northeast through the project site, discharging to Blue Creek through culverts under Blue Creek Road (Figure 2). Stream 1 is not documented to support fish species (MFWP 2013).

Stream 1 has on average a bankfull width of 5-10 feet and has an overall gradient of approximately 2%. The confinement of the stream varies throughout the project reach, ranging from relatively confined to relatively open. The streambanks are relatively shallow and gently-sloped; overbank flow appears to mainly occur concurrent with wetlands found along the drainage. Stream substrate mainly consists of silts, as well as pebbles and small cobbles. There was no surface water flow in any part of the channel during the October 2012 field investigation. It is likely that during springtime flows, aquatic habitat consists of low-gradient riffles, with large, deep pools at the two impoundments associated with Wetlands 1 and 2.

Riparian vegetation communities associated with Stream 1 within the study area consists mainly of two habitat types as defined in the Classification and Management of Montana's Riparian and Wetland Sites (Hansen et al. 1995): (1) Green ash/common chokecherry and habitat type and (2) Rocky Mountain Juniper/Red-Osier Dogwood habitat type. The Green Ash/Common Chokecherry type is a major deciduous riparian habitat type in the Great Plains region of central and eastern Montana, and attracts wildlife for thermal cover, nesting habitat, water source, late summer and winter forage, travel corridors, and hiding cover. The Rocky Mountain Juniper/Red-Osier Dogwood habitat type is less widespread, it does however provide good to excellent structural diversity for both thermal and hiding cover.

Seasonal First-Order Drainages (1 East through 15 East and 1 West through 7 West)

The project site contains 22 first-order seasonal drainages that discharge to Stream 1 (Appendix C, Maps 1 through 18). None of these streams are documented to support fish species (MFWP 2013). Due to field time constraints the ordinary high water mark was not delineated on each drainage; however, the upstream limit of discernible bed and bank was inventoried for each drainage. The average bankfull width of the drainages was between 1 to 3 feet, and average gradient was at least 5%. Drainage substrate mainly consisted of sediment and pebbles. There was no surface water flow in any of the drainages during the October 2012 field visit. Overhanging vegetation along each drainage mainly consisted of Rocky Mountain juniper and Ponderosa pine; little to no margin vegetation was observed. These drainages likely provide both thermal and hiding cover comparable to the Rocky Mountain Juniper riparian habitat in Stream 1.

3.4 Jurisdictional Status/Conclusions

The wetlands and streams documented within the study area and described in this report are all located upstream and have a direct connection to Blue Creek. Blue Creek is a Relatively Permanent Water, or RPW, that directly flows into the Yellowstone River. The US Army Corps of Engineers (USACE) has designated the Yellowstone River as a Traditional Navigable Water, or TNW. Both RPWs and TNWs are jurisdictional under the Clean Water Act. Stream 1, and all adjacent wetlands, including Wetlands 5 and 6, have adjacency to RPWs, and therefore are likely subject to jurisdiction under Section 404 of the Clean Water Act. The USACE is ultimately responsible for all jurisdictional determinations.

This report describes the wetland delineation process as well as the extent and types of wetlands found in the study area that are preliminarily determined to be subject to the jurisdiction of the USACE under authority of Section 404 of the Clean Water Act or under authority of Section 10 of the Rivers and Harbors Act of 1899. By federal law (Clean Water Act) and associated policy, it is necessary to avoid project impacts to wetlands wherever practicable, minimize impact where impact is not avoidable, and in some cases mitigate for the impact.

Permitting activities are not anticipated at this point in project development. The current conceptual design indicates that all wetlands (2.41 acres) would likely be impacted by construction of the expanded landfill facilities. Because the proposed project would affect both wetlands and streams, both wetland and stream mitigation will likely be required to offset adverse impacts. As the project develops, it is likely that a Section 404 Individual Permit will be required for unavoidable impacts to wetlands and streams located within the study area. The permitting process, and required mitigation, if applicable, will be determined at a later date through coordination with the USACE.

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Appendix A – Wetland Delineation Methodology

Wetlands are defined as areas saturated or inundated by surface or groundwater at a frequency and duration sufficient to support, and which under normal circumstances do support, a prevalence of vegetation adapted for life in saturated soil conditions. The methods used to delineate the on-site wetlands conform to methods described in the *Washington State Wetland Identification and Delineation Manual* (Ecology 1997), the *Corps of Engineers Wetland Delineation Manual* (Environmental Laboratory 1987), and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Great Plains Region* (USACE 2010). All delineated wetlands were instrument-surveyed and mapped on project base maps.

To be considered a wetland, an area must have hydrophytic vegetation, hydric soils, and wetland hydrology. HDR staff collected data on these parameters in areas representative of typical site conditions. Staff collected additional data in associated uplands, as needed, to confirm wetland and stream boundaries. Wetland boundaries and wetland data plot locations in the study area were marked with sequentially-numbered flagging.

Vegetation

The dominant plants and their wetland indicator status were evaluated to determine if the vegetation was hydrophytic. To determine which plants were dominant at a sample plot biologists applied the 50/20 rule per USACE recommendations. Under this guidance absolute cover estimates were made for each species found rooted within the sample plot, for each vegetative strata found in the habitat (tree, sapling/shrub, herb, and woody vine). The species that had the most cover was included along with the next species until the absolute cover of these totaled more than 50% of the total absolute cover. Any other species that represented at least 20% of the total absolute cover was also included as a dominant species for that vegetative strata.

Sample plots varied in size depending on site topography and habitat complexity. The objective of establishing a plot was to depict particular plant associations that reflect specific water regimes or other ecological factors. So, on steep-sided riparian areas, a plot may consist of a narrow strip along the waters edge or within a floodplain a plot may be a standard 30-foot circle.

Hydrophytic vegetation is defined as vegetation adapted to wetland conditions. To meet the hydrophytic vegetation criterion, more than 50 percent of the dominant plants in each stratum must be Facultative, Facultative Wetland, or Obligate, based on the wetland indicator category assigned to each plant species by USACE (2013). Table A-1 lists the definitions of the indicator categories.

**Table A-1. Definitions of Wetland Plant Indicator Categories
used to Determine the Presence of Hydrophytic Vegetation**

Wetland Indicator Category	Symbol	Definition
Obligate Wetland Plants	OBL	Plants that almost always (> 99% of the time) occur in wetlands, but which may rarely (< 1% of the time) occur in non-wetlands.
Facultative Wetland Plants	FACW	Plants that often (67 to 99% of the time) occur in wetlands, but sometimes (1 to 33% of the time) occur in non-wetlands.
Facultative Plants	FAC	Plants with a similar likelihood (34 to 66% of the time) of occurring in both wetlands and non-wetlands.
Facultative Upland Plants	FACU	Plants that sometimes (1 to 33% of the time) occur in wetlands, but occur more often (67 to 99% of the time) in non-wetlands.
Upland Plants	UPL	Plants that rarely (< 1% of the time) occur in wetlands, and almost always (> 99% of the time) occur in non-wetlands.

Source: Lichvar et al. (2012).

HDR biologists identified plants to species in the field and estimated percent cover of dominant plants. Scientific and common plant names follow currently accepted nomenclature. Names are consistent with PLANTS Database (USDA NRCS 2013b). During the field investigation, staff observed and recorded the dominant plant species on data sheets for each data plot.

Soils

Generally, an area must contain hydric soils to be a wetland. Hydric soil forms when soils are saturated, flooded, or ponded long enough during the growing season to develop anaerobic conditions in the upper part (12 inches). Biological activities in saturated soil result in reduced oxygen concentrations and organisms turn to anaerobic processes for metabolism. Over time, anaerobic biological processes result in certain soil color patterns, which are used as indicators of hydric soil. Typically, low-chroma colors are formed in the soil matrix, and bright-colored redoximorphic features form within the matrix. Other important hydric soil indicators include organic matter accumulations in the surface horizon, reduced sulfur odors, and organic matter staining in the subsurface (USDA NRCS 2010).

HDR staff examined soils by excavating sample pits to a depth of 20 inches to observe soil profiles, colors, and textures. In some case, a shallower soil pit was adequate to document hydric soil indicators. Munsell color charts (Munsell Color 2009) were used to describe soil colors.

Hydrology

HDR Engineering, Inc. staff examined the area for evidence of hydrology. Wetland hydrology criteria were considered to be satisfied if it appeared that the soil was seasonally inundated or saturated to the surface for a consecutive number of days greater than or equal to 12.5 percent of the growing season (Environmental Laboratory 1987). The growing season generally begins when the soil reaches a temperature of 41 degrees Fahrenheit in the zone of root penetration or when certain indicators of plant biological activity are evident (USACE 2010). The growing season in the project area can be

approximated using the long-term climatological data reported in WETS tables available from the USDA NRCS National Water and Climate Center (2002). At Billings WSO, the growing season is estimated to occur between April 18 and October 7 (172 days).

Wetland hydrology indicators are divided into two categories – primary and secondary indicators (USACE 2010). Primary indicators of hydrology include surface inundation, high water table, saturated soils, algal mat or crusts, and inundation visible on aerial imagery. The presence of one primary indicator is sufficient to conclude that wetland hydrology is present. If the absence of a primary indicator, observation of two or more secondary indicators is required to conclude that wetland hydrology is present. Secondary indicators of hydrology include surface soils cracks, sparsely vegetated concave surface, and geomorphic position (USACE 2010).

Appendix B – Wetland Delineation Data Sheets

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: Billings Landfill Expansion City/County: Yellowstone Co. Sampling Date: 10/8/12
 Applicant/Owner: City of Billings State: MT Sampling Point: SP 1-1 (W)
 Investigator(s): L. Danielski / T. Schick Section, Township, Range: S29 T15 R26E
 Landform (hillslope, terrace, etc.): depression Local relief (concave, convex, none): Concave Slope (%):
 Subregion (LRR): G - Western Great Plains Lat: 45.7152 Long: -108.5388 Datum: NAD83
 Soil Map Unit Name: LN USMAS clay NWI classification: POW
 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 <input type="checkbox"/> No <input checked="" type="checkbox"/>	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Hydric Soil Present?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	
Wetland Hydrology Present?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	
Remarks: <u>Sample plot is near lowest point in unvegetated portion of wetland.</u>		

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: <u>N/A</u>)	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet:
1. _____	_____	_____	_____	Number of Dominant Species That Are OBL, FACW, or FAC (excluding FAC-): _____ (A) Total Number of Dominant Species Across All Strata: _____ (B) Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
_____ = Total Cover				Prevalence Index worksheet: Total % Cover of: _____ Multiply by: _____ OBL species _____ x 1 = _____ FACW species _____ x 2 = _____ FAC species _____ x 3 = _____ FACU species _____ x 4 = _____ UPL species _____ x 5 = _____ Column Totals: _____ (A) _____ (B) Prevalence Index = B/A = _____
Sapling/Shrub Stratum (Plot size: <u>N/A</u>) 1. _____ 2. _____ 3. _____ 4. _____ 5. _____				
_____ = Total Cover				
Herb Stratum (Plot size: <u>5'x</u>) 1. _____ 2. _____ 3. _____ 4. _____ 5. _____ 6. _____ 7. _____ 8. _____ 9. _____ 10. _____				
_____ = Total Cover				
Woody Vine Stratum (Plot size: _____) 1. _____ 2. _____				
_____ = Total Cover				Hydrophytic Vegetation Indicators: <input type="checkbox"/> 1 - Rapid Test for Hydrophytic Vegetation <input type="checkbox"/> 2 - Dominance Test is >50% <input type="checkbox"/> 3 - Prevalence Index is ≤3.0 ¹ <input type="checkbox"/> 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain) ¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
% Bare Ground in Herb Stratum _____				
_____ = Total Cover				Hydrophytic Vegetation Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
Remarks: <u>No vegetation within sampled area. Area upslope of unvegetated portion dominated by <i>Atriplex heterosperma</i> & <i>Xanthium strumarium</i> photo out (Schick)</u>				

SOIL

Sampling Point: 1-1 (WL)

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

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-8	2.5Y 4/2		10YR 4/6	12	C	M	clay	
8-20	2.5Y 4/1		7.5YR 4/6	20	C	M	clay	

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

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

- Histosol (A1)
- Histic Epipedon (A2)
- Black Histic (A3)
- Hydrogen Sulfide (A4)
- Stratified Layers (A5) (LRR F)
- 1 cm Muck (A9) (LRR F, G, H)
- Depleted Below Dark Surface (A11)
- Thick Dark Surface (A12)
- Sandy Mucky Mineral (S1)
- 2.5 cm Mucky Peat or Peat (S2) (LRR G, H)
- 5 cm Mucky Peat or Peat (S3) (LRR F)
- Sandy Gleyed Matrix (S4)
- Sandy Redox (S5)
- Stripped Matrix (S6)
- Loamy Mucky Mineral (F1)
- Loamy Gleyed Matrix (F2)
- Depleted Matrix (F3)
- Redox Dark Surface (F6)
- Depleted Dark Surface (F7)
- Redox Depressions (F8)
- High Plains Depressions (F16) (MLRA 72 & 73 of LRR H)

Indicators for Problematic Hydric Soils³:

- 1 cm Muck (A9) (LRR I, J)
- Coast Prairie Redox (A16) (LRR F, G, H)
- Dark Surface (S7) (LRR G)
- High Plains Depressions (F16) (LRR H outside of MLRA 72 & 73)
- Reduced Vertic (F18)
- Red Parent Material (TF2)
- Very Shallow Dark Surface (TF12)
- Other (Explain in Remarks)

³Indicators 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: Soils compressed from livestock foot traffic. Tar-like substance at surface.

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

Secondary Indicators (minimum of two required)

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

Field Observations:

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

Wetland Hydrology Present? Yes No

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

Remarks: Approximately 8"-10" of water in lowest portion of depression.

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: Billings Landfill Expansion City/County: Yellowstone Co Sampling Date: 10/8/12
 Applicant/Owner: City of Billings State: MT Sampling Point: SP 1-2 (v)
 Investigator(s): L. Danielski / J. Schuck Section, Township, Range: S29 T1S R26E
 Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): Convex Slope (%): ~15
 Subregion (LRR): G-Western Great Plains Lat: 45.7154 Long: -108.5389 Datum: NAD83
 Soil Map Unit Name: Ln Lismas clay NWI classification: POW

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 <input type="checkbox"/> No <input checked="" type="checkbox"/> Hydric Soil Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Wetland Hydrology Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Is the Sampled Area within a Wetland? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
Remarks: <u>Sample plot is located upslope of the northeast portion of the wetland. Area does not meet indicators for 2 out of 3 criteria</u>	

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: <u>30'x</u>)	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet:
1. <u>Juniperus osteosperma</u>	<u>25%</u>	<u>YES</u>	<u>UPL</u>	Number of Dominant Species That Are OBL, FACW, or FAC (excluding FAC-): <u>0</u> (A) Total Number of Dominant Species Across All Strata: <u>3</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>0</u> (A/B)
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
<u>25%</u> = Total Cover				Prevalence Index worksheet: Total % Cover of: _____ Multiply by: _____ OBL species _____ x 1 = _____ FACW species _____ x 2 = _____ FAC species _____ x 3 = _____ FACU species <u>55%</u> x 4 = <u>220</u> UPL species <u>60%</u> x 5 = <u>300</u> Column Totals: <u>115%</u> (A) <u>550</u> (B) Prevalence Index = B/A = <u>4.78</u>
<u>T</u> = Total Cover				
Sapling/Shrub Stratum (Plot size: <u>15'x</u>)				
1. <u>Symphoricarpos albus</u>	<u>T</u>	<u>NO</u>	<u>UPL</u>	
2. <u>Artemisia tridentata</u>	<u>T</u>	<u>NO</u>	<u>UPL</u>	
<u>T</u> = Total Cover				
Herb Stratum (Plot size: <u>5'x</u>)				
1. <u>Elymus repens</u>	<u>50%</u>	<u>YES</u>	<u>FACU</u>	
2. <u>Panicum spp.</u>	<u>30%</u>	<u>YES</u>	<u>UPL</u>	
3. <u>Artemisia cana</u>	<u>5%</u>	<u>NO</u>	<u>FACU</u>	
4. <u>Festuca spp</u>	<u>5%</u>	<u>NO</u>	<u>UPL</u>	
<u>90%</u> = Total Cover				
Woody Vine Stratum (Plot size: _____)				
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
_____ = Total Cover				
% Bare Ground in Herb Stratum _____				
Hydrophytic Vegetation Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>				

Remarks: Vegetation does not meet dominance or prevalence test.

SOIL

Sampling Point: SPI-2 (17)

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

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-12	10YR 4/2	95	7.5YR 4/6	5-6	C	M	sandy clay loam	
12-22	2.5Y 4/1	95	10YR 4/6	5-7	C	M	sandy clay loam	

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

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

- Histosol (A1)
- Histic Epipedon (A2)
- Black Histic (A3)
- Hydrogen Sulfide (A4)
- Stratified Layers (A5) (LRR F)
- 1 cm Muck (A9) (LRR F, G, H)
- Depleted Below Dark Surface (A11)
- Thick Dark Surface (A12)
- Sandy Mucky Mineral (S1)
- 2.5 cm Mucky Peat or Peat (S2) (LRR G, H)
- 5 cm Mucky Peat or Peat (S3) (LRR F)
- Sandy Gleyed Matrix (S4)
- Sandy Redox (S5)
- Stripped Matrix (S6)
- Loamy Mucky Mineral (F1)
- Loamy Gleyed Matrix (F2)
- Depleted Matrix (F3)
- Redox Dark Surface (F6)
- Depleted Dark Surface (F7)
- Redox Depressions (F8)
- High Plains Depressions (F16) (MLRA 72 & 73 of LRR H)

Indicators for Problematic Hydric Soils³:

- 1 cm Muck (A9) (LRR I, J)
- Coast Prairie Redox (A16) (LRR F, G, H)
- Dark Surface (S7) (LRR G)
- High Plains Depressions (F16) (LRR H outside of MLRA 72 & 73)
- Reduced Vertic (F18)
- Red Parent Material (TF2)
- Very Shallow Dark Surface (TF12)
- Other (Explain in Remarks)

³Indicators 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:

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

Secondary Indicators (minimum of two required)

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

Field Observations:

Surface Water Present? Yes No 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, monitoring well, aerial photos, previous inspections), if available:

Remarks: No 1° or 2° indicators of wetland hydrology.

Photo pt / soil plot: 002

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: Billings Landfill Expansion City/County: Yellowstone Co. Sampling Date: 10/8/12
 Applicant/Owner: City of Billings State: MT Sampling Point: SP 1-4(WL)
 Investigator(s): L. Danielski / J. Schick Section, Township, Range: S29 T1S R26E
 Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): _____ Slope (%): _____
 Subregion (LRR): G - Western Great Plains Lat: 45.7152 Long: -108.5287 Datum: NAD83
 Soil Map Unit Name: Ln Usmaas Clay NWI classification: PEM-1

Are climatic / hydrologic conditions on the site typical for this time of year? Yes No _____ (If no, explain in Remarks.)
 Are Vegetation N, Soil N, or Hydrology N significantly disturbed? Are "Normal Circumstances" present? Yes No _____
 Are Vegetation N, Soil N, or Hydrology N 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 <input checked="" type="checkbox"/> No _____ Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____ Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No _____
Remarks: <u>Sample plot in SW portion of wetland. Indicators for all 3 criteria were met.</u>	

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet:
1. _____	_____	_____	_____	Number of Dominant Species That Are OBL, FACW, or FAC (excluding FAC-): <u>1</u> (A) Total Number of Dominant Species Across All Strata: <u>3</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>33%</u> (A/B)
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
_____ = Total Cover				Prevalence Index worksheet: Total % Cover of: _____ Multiply by: OBL species _____ x 1 = _____ FACW species _____ x 2 = _____ FAC species <u>25%</u> x 3 = <u>75</u> FACU species <u>25%</u> x 4 = <u>100</u> UPL species <u>10%</u> x 5 = <u>50</u> Column Totals: <u>60%</u> (A) <u>225</u> (B) Prevalence Index = B/A = <u>3.75</u>
Sapling/Shrub Stratum (Plot size: _____) 1. <u>Symphoricarpos albus</u> <u>10%</u> <u>YES</u> <u>UPL</u>				
2. _____ _____ _____ _____ 3. _____ _____ _____ _____ 4. _____ _____ _____ _____ 5. _____ _____ _____ _____				
_____ = Total Cover				
Herb Stratum (Plot size: _____) 1. <u>Festuca pratensis</u> <u>25%</u> <u>YES</u> <u>FACU</u> 2. <u>Poa interior</u> <u>25%</u> <u>YES</u> <u>FAC</u>				
3. _____ _____ _____ _____ 4. _____ _____ _____ _____ 5. _____ _____ _____ _____ 6. _____ _____ _____ _____ 7. _____ _____ _____ _____ 8. _____ _____ _____ _____ 9. _____ _____ _____ _____ 10. _____ _____ _____ _____				
_____ = Total Cover				
Woody Vine Stratum (Plot size: _____) 1. _____ _____ _____ _____ 2. _____ _____ _____ _____				
_____ = Total Cover				
% Bare Ground in Herb Stratum <u>10</u> _____ = Total Cover				
Remarks: <u>Hydrophytic vegetation assumed based on presence of hydric soils + hydrology.</u>				
Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____				

SOIL

Sampling Point: SP1-4

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

Depth (inches)	Matrix		Redox Features			Loc ²	Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹			
0-13	Gley 13/N	50	10YR 5/6	7	C	M	Silty clay	
	2.5Y 5/1	50						
13-22	Gley 13/N		10YR 5/6	20	C	M	Silty clay	
	2.5Y 5/1							

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

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)		Indicators for Problematic Hydric Soils ³ :
<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> Sandy Gleyed Matrix (S4)	<input type="checkbox"/> 1 cm Muck (A9) (LRR I, J)
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Sandy Redox (S5)	<input type="checkbox"/> Coast Prairie Redox (A16) (LRR F, G, H)
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> Stripped Matrix (S6)	<input type="checkbox"/> Dark Surface (S7) (LRR G)
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Loamy Mucky Mineral (F1)	<input type="checkbox"/> High Plains Depressions (F16)
<input type="checkbox"/> Stratified Layers (A5) (LRR F)	<input type="checkbox"/> Loamy Gleyed Matrix (F2)	<input type="checkbox"/> (LRR H outside of MLRA 72 & 73)
<input type="checkbox"/> 1 cm Muck (A9) (LRR F, G, H)	<input type="checkbox"/> Depleted Matrix (F3)	<input type="checkbox"/> Reduced Vertic (F18)
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/> Redox Dark Surface (F6)	<input type="checkbox"/> Red Parent Material (TF2)
<input type="checkbox"/> Thick Dark Surface (A12)	<input type="checkbox"/> Depleted Dark Surface (F7)	<input type="checkbox"/> Very Shallow Dark Surface (TF12)
<input type="checkbox"/> Sandy Mucky Mineral (S1)	<input type="checkbox"/> Redox Depressions (F8)	<input type="checkbox"/> Other (Explain in Remarks)
<input type="checkbox"/> 2.5 cm Mucky Peat or Peat (S2) (LRR G, H)	<input type="checkbox"/> High Plains Depressions (F16)	³ Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.
<input type="checkbox"/> 5 cm Mucky Peat or Peat (S3) (LRR F)	<input type="checkbox"/> (MLRA 72 & 73 of LRR H)	

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes No

Remarks:
 Plastic bag found @ approx 16" deep and 8". Redox also appears in crumbling concentrations. Soil appears to have been disturbed.

HYDROLOGY

Wetland Hydrology Indicators:		Secondary Indicators (minimum of two required)
<u>Primary Indicators (minimum of one required; check all that apply)</u>		
<input checked="" type="checkbox"/> Surface Water (A1)	<input type="checkbox"/> Salt Crust (B11)	<input type="checkbox"/> Surface Soil Cracks (B6)
<input type="checkbox"/> High Water Table (A2)	<input type="checkbox"/> Aquatic Invertebrates (B13)	<input checked="" type="checkbox"/> Sparsely Vegetated Concave Surface (B8)
<input type="checkbox"/> Saturation (A3)	<input type="checkbox"/> Hydrogen Sulfide Odor (C1)	<input checked="" type="checkbox"/> Drainage Patterns (B10)
<input type="checkbox"/> Water Marks (B1)	<input type="checkbox"/> Dry-Season Water Table (C2)	<input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3)
<input type="checkbox"/> Sediment Deposits (B2)	<input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) (where not tilled)	<input type="checkbox"/> Crayfish Burrows (C8)
<input type="checkbox"/> Drift Deposits (B3)	<input type="checkbox"/> Presence of Reduced Iron (C4)	<input type="checkbox"/> Saturation Visible on Aerial Imagery (C9)
<input type="checkbox"/> Algal Mat or Crust (B4)	<input type="checkbox"/> Thin Muck Surface (C7)	<input checked="" type="checkbox"/> Geomorphic Position (D2)
<input type="checkbox"/> Iron Deposits (B5)	<input type="checkbox"/> Other (Explain in Remarks)	<input type="checkbox"/> FAC-Neutral Test (D5)
<input type="checkbox"/> Inundation Visible on Aerial Imagery (B7)		<input type="checkbox"/> Frost-Heave Hummocks (D7) (LRR F)
<input type="checkbox"/> Water-Stained Leaves (B9)		

Field Observations:

Surface Water Present? Yes No Depth (inches): _____

Water Table Present? Yes No Depth (inches): _____

Saturation Present? Yes No Depth (inches): to 12"

(includes capillary fringe)

Wetland Hydrology Present? Yes No

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

Remarks:
 shallow aquitard also present.
 Saturation in upper 12" of profile indicates wetland hydrology

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: Billings Landfill Expansion City/County: Yellowstone Co. Sampling Date: 10/8/12
 Applicant/Owner: City of Billings State: MT Sampling Point: SP 1-5 (V)
 Investigator(s): L. Danielski / J. Schick Section, Township, Range: S29 T1S R26E
 Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): _____ Slope (%): _____
 Subregion (LRR): A - Western Great Plains Lat: 45.7152 Long: -108.5290 Datum: NAD 83
 Soil Map Unit Name: Ln - Lismas clay NWI classification: N/A
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes _____ No _____ (If no, explain in Remarks.)
 Are Vegetation N, Soil N, or Hydrology N significantly disturbed? Are "Normal Circumstances" present? Yes No _____
 Are Vegetation N, Soil N, or Hydrology N 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 <input checked="" type="checkbox"/> Hydric Soil Present? Yes _____ No <input checked="" type="checkbox"/> Wetland Hydrology Present? Yes _____ No <input checked="" type="checkbox"/>	Is the Sampled Area within a Wetland? Yes _____ No <input checked="" type="checkbox"/>
Remarks: <u>Area lacks indicators for all 3 criteria</u>	

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet:
1. _____	_____	_____	_____	Number of Dominant Species That Are OBL, FACW, or FAC (excluding FAC-): <u>0</u> (A) Total Number of Dominant Species Across All Strata: <u>1</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>0</u> (A/B)
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
_____ = Total Cover				Prevalence Index worksheet: Total % Cover of: _____ Multiply by: _____ OBL species _____ x 1 = _____ FACW species _____ x 2 = _____ FAC species _____ x 3 = _____ FACU species <u>60%</u> x 4 = <u>240</u> UPL species _____ x 5 = _____ Column Totals: <u>60</u> (A) <u>240</u> (B) Prevalence Index = B/A = <u>4</u>
Sapling/Shrub Stratum (Plot size: _____) 1. _____ 2. _____ 3. _____ 4. _____ 5. _____				
_____ = Total Cover				
Herb Stratum (Plot size: _____) 1. <u>Elymus repens</u> <u>60%</u> <u>YES</u> <u>FACU</u> 2. _____ 3. _____ 4. _____ 5. _____ 6. _____ 7. _____ 8. _____ 9. _____ 10. _____				
<u>60%</u> = Total Cover				
Woody Vine Stratum (Plot size: _____) 1. _____ 2. _____				
_____ = Total Cover				
% Bare Ground in Herb Stratum <u>40</u>				
Hydrophytic Vegetation Indicators: <input type="checkbox"/> 1 - Rapid Test for Hydrophytic Vegetation <input type="checkbox"/> 2 - Dominance Test is >50% <input type="checkbox"/> 3 - Prevalence Index is ≤3.0 ¹ <input type="checkbox"/> 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> 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 <input checked="" type="checkbox"/>				
Remarks: <u>Heavily grazed hillslope</u> <u>Vegetation does not meet dominance or prevalence test</u>				

SOIL

Sampling Point: SPI-5

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

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-20	2.5YR 4/2	100					sandy clay loam	

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

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

- Histosol (A1)
- Histic Epipedon (A2)
- Black Histic (A3)
- Hydrogen Sulfide (A4)
- Stratified Layers (A5) (LRR F)
- 1 cm Muck (A9) (LRR F, G, H)
- Depleted Below Dark Surface (A11)
- Thick Dark Surface (A12)
- Sandy Mucky Mineral (S1)
- 2.5 cm Mucky Peat or Peat (S2) (LRR G, H)
- 5 cm Mucky Peat or Peat (S3) (LRR F)
- Sandy Gleyed Matrix (S4)
- Sandy Redox (S5)
- Stripped Matrix (S6)
- Loamy Mucky Mineral (F1)
- Loamy Gleyed Matrix (F2)
- Depleted Matrix (F3)
- Redox Dark Surface (F6)
- Depleted Dark Surface (F7)
- Redox Depressions (F8)
- High Plains Depressions (F16) (MLRA 72 & 73 of LRR H)

Indicators for Problematic Hydric Soils³:

- 1 cm Muck (A9) (LRR I, J)
- Coast Prairie Redox (A16) (LRR F, G, H)
- Dark Surface (S7) (LRR G)
- High Plains Depressions (F16) (LRR H outside of MLRA 72 & 73)
- Reduced Vertic (F18)
- Red Parent Material (TF2)
- Very Shallow Dark Surface (TF12)
- Other (Explain in Remarks)

³Indicators 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: Soils do not meet hydric soil indicators.

photo 25

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

Secondary Indicators (minimum of two required)

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

Field Observations:

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

Wetland Hydrology Present? Yes _____ No

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

Remarks: No 1^o or 2^o indicators

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: Billings Landfill Expansion City/County: Yellowstone Co. Sampling Date: 10/8/12
 Applicant/Owner: City of Billings State: MT Sampling Point: WL2-1
 Investigator(s): L. DANIELSKI / J. SCHICK Section, Township, Range: S24 T15 R26E
 Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): CONCAVE Slope (%): 3-5%
 Subregion (LRR): A - Western Great Plains Lat: 45.71559 Long: -108.53865 Datum: WGS1984
 Soil Map Unit Name: LN-Lismas clay NWM classification: PAR-1
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes No (If no, explain in Remarks.)
 Are Vegetation N, Soil N, or Hydrology N significantly disturbed? Are "Normal Circumstances" present? Yes No
 Are Vegetation N, Soil N, or Hydrology N 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 <input checked="" type="checkbox"/> No <input type="checkbox"/> Hydric Soil Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Remarks: <u>Area meets indicators for all 3 criteria</u> <u>Located in north portion of wetland.</u>	

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: <u>30'r</u>)	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet:
1. _____	_____	_____	_____	Number of Dominant Species That Are OBL, FACW, or FAC (excluding FAC-): <u>0</u> (A) Total Number of Dominant Species Across All Strata: <u>2</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>0</u> (A/B)
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
_____ = Total Cover				Prevalence Index worksheet: Total % Cover of: _____ Multiply by: OBL species _____ x 1 = _____ FACW species _____ x 2 = _____ FAC species _____ x 3 = _____ FACU species <u>2%</u> x 4 = <u>8</u> UPL species <u>5%</u> x 5 = <u>25</u> Column Totals: <u>7%</u> (A) <u>33</u> (B) Prevalence Index = B/A = <u>4.71</u>
Sapling/Shrub Stratum (Plot size: <u>15'r</u>) 1. _____ 2. _____ 3. _____ 4. _____ 5. _____ _____ = Total Cover				
Herb Stratum (Plot size: <u>5'r</u>) 1. <u>Atriplex micrantha</u> <u>5%</u> <u>YAS</u> <u>UPL</u> 2. <u>Artemisia biennis</u> <u>2%</u> <u>YAS</u> <u>FACU</u> 3. <u>Xanthium strumarium</u> <u>T</u> <u>NO</u> <u>FAC</u> 4. _____ 5. _____ 6. _____ 7. _____ 8. _____ 9. _____ 10. _____ _____ = Total Cover				
Woody Vine Stratum (Plot size: _____) 1. _____ 2. _____ _____ = Total Cover				
% Bare Ground in Herb Stratum <u>95%</u> _____ = Total Cover				

Hydrophytic Vegetation Indicators:
 1 - Rapid Test for Hydrophytic Vegetation
 2 - Dominance Test is >50%
 3 - Prevalence Index is ≤3.0¹
 4 - Morphological Adaptations¹ (Provide supporting data in Remarks or on a separate sheet)
 Problematic Hydrophytic Vegetation¹ (Explain)
¹Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes No

Remarks: The plant community is dominated by FACU or UPL plants; however, because hydric soils and primary indicators of wetland hydrology were observed, the plant community is determined to be hydrophytic.

SOIL

Sampling Point: WL2-1

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

Depth (inches)	Matrix		Redox Features			Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹		
0-12	2.5Y 4/1		7.5YR 4/6	10	C	M	silt clay
12-16	5Y 4/1		7.5YR 4/6	15	C	M	extremely hard layer/compact

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

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)		Indicators for Problematic Hydric Soils ³ :
<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> Sandy Gleyed Matrix (S4)	<input type="checkbox"/> 1 cm Muck (A9) (LRR I, J)
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Sandy Redox (S5)	<input type="checkbox"/> Coast Prairie Redox (A16) (LRR F, G, H)
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> Stripped Matrix (S6)	<input type="checkbox"/> Dark Surface (S7) (LRR G)
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Loamy Mucky Mineral (F1)	<input type="checkbox"/> High Plains Depressions (F16)
<input type="checkbox"/> Stratified Layers (A5) (LRR F)	<input type="checkbox"/> Loamy Gleyed Matrix (F2)	<input type="checkbox"/> (LRR H outside of MLRA 72 & 73)
<input type="checkbox"/> 1 cm Muck (A9) (LRR F, G, H)	<input checked="" type="checkbox"/> Depleted Matrix (F3)	<input type="checkbox"/> Reduced Vertic (F18)
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/> Redox Dark Surface (F6)	<input type="checkbox"/> Red Parent Material (TF2)
<input type="checkbox"/> Thick Dark Surface (A12)	<input type="checkbox"/> Depleted Dark Surface (F7)	<input type="checkbox"/> Very Shallow Dark Surface (TF12)
<input type="checkbox"/> Sandy Mucky Mineral (S1)	<input type="checkbox"/> Redox Depressions (F8)	<input type="checkbox"/> Other (Explain in Remarks)
<input type="checkbox"/> 2.5 cm Mucky Peat or Peat (S2) (LRR G, H)	<input type="checkbox"/> High Plains Depressions (F16)	³ Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.
<input type="checkbox"/> 5 cm Mucky Peat or Peat (S3) (LRR F)	<input type="checkbox"/> (MLRA 72 & 73 of LRR H)	

Restrictive Layer (if present):
 Type: _____
 Depth (inches): _____

Hydric Soil Present? Yes No

Remarks: Soils meet Depleted Matrix
photos 26, 27

HYDROLOGY

Wetland Hydrology Indicators:		Secondary Indicators (minimum of two required)
Primary Indicators (minimum of one required; check all that apply)		
<input type="checkbox"/> Surface Water (A1)	<input type="checkbox"/> Salt Crust (B11)	<input checked="" type="checkbox"/> Surface Soil Cracks (B6)
<input type="checkbox"/> High Water Table (A2)	<input checked="" type="checkbox"/> Aquatic Invertebrates (B13)	<input checked="" type="checkbox"/> Sparsely Vegetated Concave Surface (B8)
<input type="checkbox"/> Saturation (A3)	<input type="checkbox"/> Hydrogen Sulfide Odor (C1)	<input type="checkbox"/> Drainage Patterns (B10)
<input type="checkbox"/> Water Marks (B1)	<input type="checkbox"/> Dry-Season Water Table (C2)	<input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3)
<input type="checkbox"/> Sediment Deposits (B2)	<input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) (where not tilled)	<input type="checkbox"/> Crayfish Burrows (C8)
<input type="checkbox"/> Drift Deposits (B3)	<input type="checkbox"/> Presence of Reduced Iron (C4)	<input checked="" type="checkbox"/> Saturation Visible on Aerial Imagery (C9)
<input type="checkbox"/> Algal Mat or Crust (B4)	<input type="checkbox"/> Thin Muck Surface (C7)	<input checked="" type="checkbox"/> Geomorphic Position (D2)
<input type="checkbox"/> Iron Deposits (B5)	<input type="checkbox"/> Other (Explain in Remarks)	<input type="checkbox"/> FAC-Neutral Test (D5)
<input checked="" type="checkbox"/> Inundation Visible on Aerial Imagery (B7)		<input type="checkbox"/> Frost-Heave Hummocks (D7) (LRR F)
<input type="checkbox"/> Water-Stained Leaves (B9)		

Field Observations:

Surface Water Present? Yes No Depth (inches): _____

Water Table Present? Yes No Depth (inches): _____

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

Wetland Hydrology Present? Yes No

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

Remarks: shallow aquitard present.
Presence of 1° + A° indicators of wetland hydrology are present

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: Billings Landfill Expansion City/County: Yellowstone Co Sampling Date: 10/8/12
 Applicant/Owner: City of Billings State: MT Sampling Point: SP 2-2 (U)
 Investigator(s): L. Danielski / J. Schick Section, Township, Range: S29 T15 R26E
 Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): convex Slope (%): ~5-10
 Subregion (LRR): G - Western Great Plains Lat: 45.7173 Long: -108.5355 Datum: WGS1984
 Soil Map Unit Name: _____ NWI classification: upland grass
 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 <u>X</u>	Is the Sampled Area within a Wetland? Yes _____ No <u>X</u>
Hydric Soil Present?	Yes _____	No <u>X</u>	
Wetland Hydrology Present?	Yes _____	No <u>X</u>	
Remarks: <u>Sample plot located upslope of the NE portion of the site</u>			

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet:																
1. _____	_____	_____	_____	Number of Dominant Species That Are OBL, FACW, or FAC (excluding FAC-): <u>1</u> (A) Total Number of Dominant Species Across All Strata: <u>3</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>33%</u> (A/B)																
2. _____	_____	_____	_____																	
3. _____	_____	_____	_____																	
4. _____	_____	_____	_____																	
_____ = Total Cover				Prevalence Index worksheet: <table style="width:100%; border-collapse: collapse;"> <tr> <td style="width:50%;">Total % Cover of:</td> <td style="width:50%;">Multiply by:</td> </tr> <tr> <td>OBL species _____</td> <td>x 1 = _____</td> </tr> <tr> <td>FACW species _____</td> <td>x 2 = _____</td> </tr> <tr> <td>FAC species <u>10</u></td> <td>x 3 = <u>30</u></td> </tr> <tr> <td>FACU species <u>30</u></td> <td>x 4 = <u>120</u></td> </tr> <tr> <td>UPL species _____</td> <td>x 5 = _____</td> </tr> <tr> <td>Column Totals: <u>40</u> (A)</td> <td><u>150</u> (B)</td> </tr> <tr> <td colspan="2" style="text-align: center;">Prevalence Index = B/A = <u>3.75</u></td> </tr> </table>	Total % Cover of:	Multiply by:	OBL species _____	x 1 = _____	FACW species _____	x 2 = _____	FAC species <u>10</u>	x 3 = <u>30</u>	FACU species <u>30</u>	x 4 = <u>120</u>	UPL species _____	x 5 = _____	Column Totals: <u>40</u> (A)	<u>150</u> (B)	Prevalence Index = B/A = <u>3.75</u>	
Total % Cover of:	Multiply by:																			
OBL species _____	x 1 = _____																			
FACW species _____	x 2 = _____																			
FAC species <u>10</u>	x 3 = <u>30</u>																			
FACU species <u>30</u>	x 4 = <u>120</u>																			
UPL species _____	x 5 = _____																			
Column Totals: <u>40</u> (A)	<u>150</u> (B)																			
Prevalence Index = B/A = <u>3.75</u>																				
Sapling/Shrub Stratum (Plot size: _____) 1. _____ 2. _____ 3. _____ 4. _____ 5. _____ _____ = Total Cover																				
Herb Stratum (Plot size: _____) 1. <u>Artemisia cana</u> <u>15%</u> <u>Y</u> <u>FACU</u> 2. <u>Atriplex micrantha</u> <u>10%</u> <u>Y</u> <u>UPL</u> 3. <u>Elymus repens</u> <u>15%</u> <u>Y</u> <u>FACU</u> 4. _____ 5. _____ 6. _____ 7. _____ 8. _____ 9. _____ 10. _____ _____ = Total Cover																				
Woody Vine Stratum (Plot size: _____) 1. _____ 2. _____ _____ = Total Cover																				
% Bare Ground in Herb Stratum <u>100</u> _____ = Total Cover																				
Hydrophytic Vegetation Indicators: ___ 1 - Rapid Test for Hydrophytic Vegetation ___ 2 - Dominance Test is >50% ___ 3 - Prevalence Index is ≤3.0 ¹ ___ 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) ___ 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 <u>X</u>																				
Remarks: <u>Vegetation does not meet dominance or prevalence test</u>																				

SOIL

Sampling Point: _____

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

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-8	7.5 YR 4/2	98	10YR 4/6	2	C	M	Silty clay loam	
8-18+	7.5 YR 4/1	98	10YR 4/6	2	C	M	silty clay loam	

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

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)		Indicators for Problematic Hydric Soils ³ :
<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> Sandy Gleyed Matrix (S4)	<input type="checkbox"/> 1 cm Muck (A9) (LRR I, J)
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Sandy Redox (S5)	<input type="checkbox"/> Coast Prairie Redox (A16) (LRR F, G, H)
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> Stripped Matrix (S6)	<input type="checkbox"/> Dark Surface (S7) (LRR G)
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Loamy Mucky Mineral (F1)	<input type="checkbox"/> High Plains Depressions (F16)
<input type="checkbox"/> Stratified Layers (A5) (LRR F)	<input type="checkbox"/> Loamy Gleyed Matrix (F2)	(LRR H outside of MLRA 72 & 73)
<input type="checkbox"/> 1 cm Muck (A9) (LRR F, G, H)	<input type="checkbox"/> Depleted Matrix (F3)	<input type="checkbox"/> Reduced Vertic (F18)
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/> Redox Dark Surface (F6)	<input type="checkbox"/> Red Parent Material (TF2)
<input type="checkbox"/> Thick Dark Surface (A12)	<input type="checkbox"/> Depleted Dark Surface (F7)	<input type="checkbox"/> Very Shallow Dark Surface (TF12)
<input type="checkbox"/> Sandy Mucky Mineral (S1)	<input type="checkbox"/> Redox Depressions (F8)	<input type="checkbox"/> Other (Explain in Remarks)
<input type="checkbox"/> 2.5 cm Mucky Peat or Peat (S2) (LRR G, H)	<input type="checkbox"/> High Plains Depressions (F16)	³ Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.
<input type="checkbox"/> 5 cm Mucky Peat or Peat (S3) (LRR F)	(MLRA 72 & 73 of LRR H)	

Restrictive Layer (if present):
 Type: _____
 Depth (inches): _____

Hydric Soil Present? Yes _____ No

Remarks: Soils do not meet indicators for hydric soils

HYDROLOGY

Wetland Hydrology Indicators:		Secondary Indicators (minimum of two required)
<u>Primary Indicators (minimum of one required; check all that apply)</u>		
<input type="checkbox"/> Surface Water (A1)	<input type="checkbox"/> Salt Crust (B11)	<input type="checkbox"/> Surface Soil Cracks (B6)
<input type="checkbox"/> High Water Table (A2)	<input type="checkbox"/> Aquatic Invertebrates (B13)	<input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)
<input type="checkbox"/> Saturation (A3)	<input type="checkbox"/> Hydrogen Sulfide Odor (C1)	<input type="checkbox"/> Drainage Patterns (B10)
<input type="checkbox"/> Water Marks (B1)	<input type="checkbox"/> Dry-Season Water Table (C2)	<input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3)
<input type="checkbox"/> Sediment Deposits (B2)	<input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) (where not tilled)	<input type="checkbox"/> Crayfish Burrows (C8)
<input type="checkbox"/> Drift Deposits (B3)	<input type="checkbox"/> Presence of Reduced Iron (C4)	<input type="checkbox"/> Saturation Visible on Aerial Imagery (C9)
<input type="checkbox"/> Algal Mat or Crust (B4)	<input type="checkbox"/> Thin Muck Surface (C7)	<input type="checkbox"/> Geomorphic Position (D2)
<input type="checkbox"/> Iron Deposits (B5)	<input type="checkbox"/> Other (Explain in Remarks)	<input type="checkbox"/> FAC-Neutral Test (D5)
<input type="checkbox"/> Inundation Visible on Aerial Imagery (B7)		<input type="checkbox"/> Frost-Heave Hummocks (D7) (LRR F)
<input type="checkbox"/> Water-Stained Leaves (B9)		
Field Observations:		
Surface Water Present? Yes _____ No <input checked="" type="checkbox"/>	Depth (inches): _____	Wetland Hydrology Present? Yes _____ No <input checked="" type="checkbox"/>
Water Table Present? Yes _____ No <input checked="" type="checkbox"/>	Depth (inches): _____	
Saturation Present? Yes _____ No <input checked="" type="checkbox"/> (includes capillary fringe)	Depth (inches): _____	

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

Remarks: No 1° or 2° indicators of hydrology

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: Billings Landfill Expansion City/County: Yellowstone Co. Sampling Date: 10/9/12
 Applicant/Owner: City of Billings State: MT Sampling Point: SP3 - WL
 Investigator(s): L. DANIELSKI / J. SCHICK Section, Township, Range: S29 T18 R20E
 Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): concave Slope (%): 2-4%
 Subregion (LRR): G - Western Great Plains Lat: 45.72182 Long: -108.53280 Datum: NAD83
 Soil Map Unit Name: Ln - LISMAS clay NWI classification: PEM - 1
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes No (If no, explain in Remarks.)
 Are Vegetation N, Soil N, or Hydrology N significantly disturbed? Are "Normal Circumstances" present? Yes No
 Are Vegetation N, Soil N, or Hydrology N 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 <input checked="" type="checkbox"/> No <input type="checkbox"/> Hydric Soil Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Remarks: <u>Area has indicators for all 3 criteria.</u> <u>Sample plot located near South end of Wetland 3</u>	

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet:
1. _____	_____	_____	_____	Number of Dominant Species That Are OBL, FACW, or FAC (excluding FAC-): <u>2</u> (A) Total Number of Dominant Species Across All Strata: <u>2</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>100%</u> (A/B)
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
_____ = Total Cover				Prevalence Index worksheet: Total % Cover of: _____ Multiply by: OBL species <u>32</u> x 1 = <u>32</u> FACW species <u>53</u> x 2 = <u>106</u> FAC species _____ x 3 = _____ FACU species _____ x 4 = _____ UPL species <u>15</u> x 5 = <u>75</u> Column Totals: <u>100</u> (A) <u>213</u> (B) Prevalence Index = B/A = <u>2.13</u>
Sapling/Shrub Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status	
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
_____ = Total Cover				
Herb Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status	Hydrophytic Vegetation Indicators: ___ 1 - Rapid Test for Hydrophytic Vegetation <input checked="" type="checkbox"/> 2 - Dominance Test is >50% <input checked="" type="checkbox"/> 3 - Prevalence Index is ≤3.0 ¹ ___ 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) ___ Problematic Hydrophytic Vegetation ¹ (Explain) ¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
1. <u>Hordeum jubatum</u>	<u>50%</u>	<u>YES</u>	<u>FACW</u>	
2. <u>Elymus canadensis</u>	<u>30%</u>	<u>YES</u>	<u>OBL</u>	
3. <u>Elymus spp.</u>	<u>15%</u>	<u>NO</u>	<u>UPL</u>	
4. <u>Alopecurus pratensis</u>	<u>3%</u>	<u>NO</u>	<u>FACW</u>	
5. <u>Typha angustifolia</u>	<u>2%</u>	<u>NO</u>	<u>OBL</u>	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
9. _____	_____	_____	_____	
10. _____	_____	_____	_____	
<u>100%</u> = Total Cover				
Woody Vine Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status	Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	% Bare Ground in Herb Stratum _____ = Total Cover
Remarks: <u>Area meets dominance + prevalence test.</u>				

SOIL

Sampling Point: SP3-1

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

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-2	10YR 4/1		7.5YR 5/8	7	C	PL	silty clay loam	
2-10	7.5YR 4/1		7.5YR 4/6	20	C	PL & M	silty clay loam	
10-16	10YR 4/1		10YR 5/8	10	C	PL & M	silty clay loam	

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

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)		Indicators for Problematic Hydric Soils ³ :
<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> Sandy Gleyed Matrix (S4)	<input type="checkbox"/> 1 cm Muck (A9) (LRR I, J)
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Sandy Redox (S5)	<input type="checkbox"/> Coast Prairie Redox (A16) (LRR F, G, H)
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> Stripped Matrix (S6)	<input type="checkbox"/> Dark Surface (S7) (LRR G)
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Loamy Mucky Mineral (F1)	<input type="checkbox"/> High Plains Depressions (F16)
<input type="checkbox"/> Stratified Layers (A5) (LRR F)	<input type="checkbox"/> Loamy Gleyed Matrix (F2)	<input type="checkbox"/> (LRR H outside of MLRA 72 & 73)
<input type="checkbox"/> 1 cm Muck (A9) (LRR F, G, H)	<input checked="" type="checkbox"/> Depleted Matrix (F3)	<input type="checkbox"/> Reduced Vertic (F18)
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/> Redox Dark Surface (F6)	<input type="checkbox"/> Red Parent Material (TF2)
<input type="checkbox"/> Thick Dark Surface (A12)	<input type="checkbox"/> Depleted Dark Surface (F7)	<input type="checkbox"/> Very Shallow Dark Surface (TF12)
<input type="checkbox"/> Sandy Mucky Mineral (S1)	<input type="checkbox"/> Redox Depressions (F8)	<input type="checkbox"/> Other (Explain in Remarks)
<input type="checkbox"/> 2.5 cm Mucky Peat or Peat (S2) (LRR G, H)	<input type="checkbox"/> High Plains Depressions (F16)	³ Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.
<input type="checkbox"/> 5 cm Mucky Peat or Peat (S3) (LRR F)	(MLRA 72 & 73 of LRR H)	

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes No

Remarks: Soils meet Depleted Matrix Indicators

photo 36 & 37

HYDROLOGY

Wetland Hydrology Indicators:		Secondary Indicators (minimum of two required)
Primary Indicators (minimum of one required; check all that apply)		
<input type="checkbox"/> Surface Water (A1)	<input type="checkbox"/> Salt Crust (B11)	<input type="checkbox"/> Surface Soil Cracks (B6)
<input type="checkbox"/> High Water Table (A2)	<input type="checkbox"/> Aquatic Invertebrates (B13)	<input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)
<input type="checkbox"/> Saturation (A3)	<input type="checkbox"/> Hydrogen Sulfide Odor (C1)	<input checked="" type="checkbox"/> Drainage Patterns (B10)
<input type="checkbox"/> Water Marks (B1)	<input type="checkbox"/> Dry-Season Water Table (C2)	<input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3)
<input type="checkbox"/> Sediment Deposits (B2)	<input checked="" type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) (where not tilled)	<input type="checkbox"/> Crayfish Burrows (C8)
<input type="checkbox"/> Drift Deposits (B3)	<input type="checkbox"/> Presence of Reduced Iron (C4)	<input type="checkbox"/> Saturation Visible on Aerial Imagery (C9)
<input type="checkbox"/> Algal Mat or Crust (B4)	<input type="checkbox"/> Thin Muck Surface (C7)	<input checked="" type="checkbox"/> Geomorphic Position (D2)
<input type="checkbox"/> Iron Deposits (B5)	<input type="checkbox"/> Other (Explain in Remarks)	<input type="checkbox"/> FAC-Neutral Test (D5)
<input type="checkbox"/> Inundation Visible on Aerial Imagery (B7)		<input type="checkbox"/> Frost-Heave Hummocks (D7) (LRR F)
<input type="checkbox"/> Water-Stained Leaves (B9)		

Field Observations:

Surface Water Present? Yes No Depth (inches): _____

Water Table Present? Yes No Depth (inches): _____

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

Wetland Hydrology Present? Yes No

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

Remarks: 1° + 2° indicators of wetland hydrology are present

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: Billings Landfill Expansion City/County: Yellowstone CO. Sampling Date: 10/9/12
 Applicant/Owner: City of Billings State: MT Sampling Point: SP3-2 (UPL)
 Investigator(s): L. Danielski / J. Schick Section, Township, Range: S29 T4S R26E
 Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): _____ Slope (%): _____
 Subregion (LRR): 6 - Western Great Plains Lat: 45.72183 Long: -108.53277 Datum: NAD83
 Soil Map Unit Name: Ln - Lismas clay NWI classification: N/A
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes No _____ (If no, explain in Remarks.)
 Are Vegetation N, Soil N, or Hydrology N significantly disturbed? Are "Normal Circumstances" present? Yes No _____
 Are Vegetation N, Soil N, or Hydrology N 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 <input checked="" type="checkbox"/>	Is the Sampled Area within a Wetland?	Yes _____	No <input checked="" type="checkbox"/>
Hydric Soil Present?	Yes _____	No <input checked="" type="checkbox"/>			
Wetland Hydrology Present?	Yes _____	No <input checked="" type="checkbox"/>			
Remarks: <u>Upland SP ~ 2-3' upslope of wetland</u> <u>Area lacks indicators for all 3 criteria.</u>					

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: <u>30'</u>)	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet:	
1. <u>Populus deltoides (overhang)</u>	<u>15</u>	<u>YES</u>	<u>FAC</u>	Number of Dominant Species That Are OBL, FACW, or FAC (excluding FAC-):	<u>2</u> (A)
2. _____	_____	_____	_____	Total Number of Dominant Species Across All Strata:	<u>5</u> (B)
3. _____	_____	_____	_____	Percent of Dominant Species That Are OBL, FACW, or FAC:	<u>40%</u> (A/B)
4. _____	_____	_____	_____	Prevalence Index worksheet:	
<u>15</u> = Total Cover				Total % Cover of:	Multiply by:
Sapling/Shrub Stratum (Plot size: _____)				OBL species _____ x 1 = _____	
1. <u>Juniperus osteosperma</u>	<u>40</u>	<u>YES</u>	<u>UPL</u>	FACW species _____ x 2 = _____	
2. <u>Rosa woodsii</u>	<u>5</u>	<u>NO</u>	<u>FACU</u>	FAC species <u>55</u> x 3 = <u>165</u>	
3. _____	_____	_____	_____	FACU species <u>65</u> x 4 = <u>260</u>	
4. _____	_____	_____	_____	UPL species <u>40</u> x 5 = <u>200</u>	
5. _____	_____	_____	_____	Column Totals: <u>160</u> (A) <u>625</u> (B)	
<u>45</u> = Total Cover				Prevalence Index = B/A = <u>3.9</u>	
Herb Stratum (Plot size: _____)				Hydrophytic Vegetation Indicators:	
1. <u>Bromus arvensis</u>	<u>40</u>	<u>YES</u>	<u>FACU</u>	___ 1 - Rapid Test for Hydrophytic Vegetation	
2. <u>Agrostis capillaris</u>	<u>40</u>	<u>YES</u>	<u>FAC</u>	___ 2 - Dominance Test is >50%	
3. <u>Elymus repens</u>	<u>20</u>	<u>YES</u>	<u>FACU</u>	___ 3 - Prevalence Index is ≤3.0 ¹	
4. _____	_____	_____	_____	___ 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet)	
5. _____	_____	_____	_____	___ Problematic Hydrophytic Vegetation ¹ (Explain)	
6. _____	_____	_____	_____	¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.	
7. _____	_____	_____	_____	Hydrophytic Vegetation Present? Yes _____ No <input checked="" type="checkbox"/>	
8. _____	_____	_____	_____		
9. _____	_____	_____	_____		
10. _____	_____	_____	_____		
<u>100</u> = Total Cover					
Woody Vine Stratum (Plot size: _____)					
1. _____	_____	_____	_____		
2. _____	_____	_____	_____		
_____ = Total Cover					
% Bare Ground in Herb Stratum _____					
Remarks: <u>Area is heavily grazed.</u> <u>Area does not meet dominance or prevalence test</u>					

SOIL

Sampling Point: SP3-2

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

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-18"	10YR4/1	99	5YR4/8	1	C	M	SILTYCLAY	

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

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)		Indicators for Problematic Hydric Soils ³ :
<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> Sandy Gleyed Matrix (S4)	<input type="checkbox"/> 1 cm Muck (A9) (LRR I, J)
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Sandy Redox (S5)	<input type="checkbox"/> Coast Prairie Redox (A16) (LRR F, G, H)
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> Stripped Matrix (S6)	<input type="checkbox"/> Dark Surface (S7) (LRR G)
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Loamy Mucky Mineral (F1)	<input type="checkbox"/> High Plains Depressions (F16)
<input type="checkbox"/> Stratified Layers (A5) (LRR F)	<input type="checkbox"/> Loamy Gleyed Matrix (F2)	<input type="checkbox"/> (LRR H outside of MLRA 72 & 73)
<input type="checkbox"/> 1 cm Muck (A9) (LRR F, G, H)	<input type="checkbox"/> Depleted Matrix (F3)	<input type="checkbox"/> Reduced Vertic (F18)
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/> Redox Dark Surface (F6)	<input type="checkbox"/> Red Parent Material (TF2)
<input type="checkbox"/> Thick Dark Surface (A12)	<input type="checkbox"/> Depleted Dark Surface (F7)	<input type="checkbox"/> Very Shallow Dark Surface (TF12)
<input type="checkbox"/> Sandy Mucky Mineral (S1)	<input type="checkbox"/> Redox Depressions (F8)	<input type="checkbox"/> Other (Explain in Remarks)
<input type="checkbox"/> 2.5 cm Mucky Peat or Peat (S2) (LRR G, H)	<input type="checkbox"/> High Plains Depressions (F16)	³ Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.
<input type="checkbox"/> 5 cm Mucky Peat or Peat (S3) (LRR F)	<input type="checkbox"/> (MLRA 72 & 73 of LRR H)	

Restrictive Layer (if present):
 Type: _____
 Depth (inches): _____

Hydric Soil Present? Yes _____ No

Remarks: Soils do not meet hydric soil indicators
 photo 38

HYDROLOGY

Wetland Hydrology Indicators:	
Primary Indicators (minimum of one required; check all that apply)	Secondary Indicators (minimum of two required)
<input type="checkbox"/> Surface Water (A1)	<input type="checkbox"/> Surface Soil Cracks (B6)
<input type="checkbox"/> High Water Table (A2)	<input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)
<input type="checkbox"/> Saturation (A3)	<input type="checkbox"/> Drainage Patterns (B10)
<input type="checkbox"/> Water Marks (B1)	<input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3)
<input type="checkbox"/> Sediment Deposits (B2)	<input type="checkbox"/> (where tilled)
<input type="checkbox"/> Drift Deposits (B3)	<input type="checkbox"/> Crayfish Burrows (C8)
<input type="checkbox"/> Algal Mat or Crust (B4)	<input type="checkbox"/> Saturation Visible on Aerial Imagery (C9)
<input type="checkbox"/> Iron Deposits (B5)	<input type="checkbox"/> Geomorphic Position (D2)
<input type="checkbox"/> Inundation Visible on Aerial Imagery (B7)	<input type="checkbox"/> FAC-Neutral Test (D5)
<input type="checkbox"/> Water-Stained Leaves (B9)	<input type="checkbox"/> Frost-Heave Hummocks (D7) (LRR F)
<input type="checkbox"/> Salt Crust (B11)	
<input type="checkbox"/> Aquatic Invertebrates (B13)	
<input type="checkbox"/> Hydrogen Sulfide Odor (C1)	
<input type="checkbox"/> Dry-Season Water Table (C2)	
<input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) (where not tilled)	
<input type="checkbox"/> Presence of Reduced Iron (C4)	
<input type="checkbox"/> Thin Muck Surface (C7)	
<input type="checkbox"/> Other (Explain in Remarks)	

Field Observations:

Surface Water Present? Yes _____ No Depth (inches): _____

Water Table Present? Yes _____ No Depth (inches): _____

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

Wetland Hydrology Present? Yes _____ No

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

Remarks: No 1° or 2° indicators

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: Billings Landfill Expansion City/County: YELLOWSTONE CO. Sampling Date: 10/9/12
 Applicant/Owner: CITY OF BILLINGS State: MT Sampling Point: 6-1 (WL)
 Investigator(s): L. DANIELSKI / J. SCHICK Section, Township, Range: S29 T1S R26E
 Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): _____ Slope (%): _____
 Subregion (LRR): H- WESTERN GREAT PLAINS Lat: 45.71588 Long: -108.54308 Datum: WGS1984
 Soil Map Unit Name: Lh-LISMAS CLAY NWI classification: PEM-1
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes No _____ (If no, explain in Remarks.)
 Are Vegetation N, Soil N, or Hydrology N significantly disturbed? Are "Normal Circumstances" present? Yes No _____
 Are Vegetation N, Soil N, or Hydrology N 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 <input checked="" type="checkbox"/> No _____ Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____ Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No _____
Remarks: <u>Wetland in swale, discharge coming from hill slope</u> <u>Area has indicators for all 3 criteria</u>	

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet:
1. _____				Number of Dominant Species That Are OBL, FACW, or FAC (excluding FAC-): <u>1</u> (A) Total Number of Dominant Species Across All Strata: <u>2</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>50%</u> (A/B)
2. _____				
3. _____				
4. _____				
_____ = Total Cover				Prevalence Index worksheet: Total % Cover of: _____ Multiply by: _____ OBL species <u>65</u> x 1 = <u>65</u> FACW species <u>5</u> x 2 = <u>10</u> FAC species _____ x 3 = _____ FACU species _____ x 4 = _____ UPL species <u>30</u> x 5 = <u>150</u> Column Totals: <u>100</u> (A) <u>225</u> (B) Prevalence Index = B/A = <u>2.25</u>
Sapling/Shrub Stratum (Plot size: _____) 1. _____ 2. _____ 3. _____ 4. _____ 5. _____ _____ = Total Cover				
Herb Stratum (Plot size: _____) 1. <u>Schoenoplectus maritimus</u> <u>60</u> <u>YES</u> <u>OBL</u> 2. <u>Atriplex micrantha</u> <u>30</u> <u>YES</u> <u>UPL</u> 3. <u>Juncus bufonius</u> <u>5</u> <u>NO</u> <u>OBL</u> 4. <u>Hordeum jubatum</u> <u>5</u> <u>NO</u> <u>FACW</u> 5. _____ 6. _____ 7. _____ 8. _____ 9. _____ 10. _____ _____ = Total Cover				
Woody Vine Stratum (Plot size: _____) 1. _____ 2. _____ _____ = Total Cover				
% Bare Ground in Herb Stratum _____ = Total Cover				
Remarks: <u>Grazed vegetation.</u> <u>Vegetation meets prevalence test and SP has hydric soil + wetland hydrology.</u>				

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: Billings Landfill Expansion City/County: Yellowstone Co. Sampling Date: 10/9/12
 Applicant/Owner: City of Billings State: MT Sampling Point: SP6-2(2)
 Investigator(s): L. DANIELSKI / J. SCHICK Section, Township, Range: S29 T4S R26E
 Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): CONVEX Slope (%): 5
 Subregion (LRR): G - Western Great Plains Lat: 45.71562 Long: -108.54287 Datum: NAD83
 Soil Map Unit Name: Ln-Lismas clay NWI classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes No (If no, explain in Remarks.)
 Are Vegetation Y, Soil N, or Hydrology N significantly disturbed? Are "Normal Circumstances" present? Yes No
 Are Vegetation N, Soil N, or Hydrology N 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 <input checked="" type="checkbox"/> No <input type="checkbox"/> Hydric Soil Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Wetland Hydrology Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Is the Sampled Area within a Wetland? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
Remarks: <u>area is significantly grazed & disturbed.</u> <u>Indicators for 2 of 3 criteria are not present</u>	

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: <u>30'v</u>)	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet:
1. _____	_____	_____	_____	Number of Dominant Species That Are OBL, FACW, or FAC (excluding FAC-): <u>1</u> (A) Total Number of Dominant Species Across All Strata: <u>1</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>1</u> (A/B)
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
_____ = Total Cover				Prevalence Index worksheet: Total % Cover of: _____ Multiply by: _____ OBL species _____ x 1 = _____ FACW species _____ x 2 = _____ FAC species <u>30</u> x 3 = <u>90</u> FACU species _____ x 4 = _____ UPL species _____ x 5 = _____ Column Totals: <u>30</u> (A) <u>90</u> (B) Prevalence Index = B/A = <u>3</u>
Sapling/Shrub Stratum (Plot size: <u>15'v</u>)				
1. <u>Artemisia tridentata</u>	<u>T</u>	<u>NO</u>	<u>UPL</u>	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
_____ = Total Cover				
Herb Stratum (Plot size: <u>5v'</u>)				
1. <u>Panicum virgatum</u>	<u>30</u>	<u>YES</u>	<u>FAC</u>	
2. <u>Festuca pratensis</u>	<u>T</u>	<u>NO</u>	<u>FACU</u>	
3. <u>Grindelia squarrosa</u>	<u>T</u>	<u>NO</u>	<u>UPL</u>	
4. <u>Opuntia polyacantha</u>	<u>T</u>	<u>NO</u>	<u>UPL</u>	
5. <u>Artemisia cana</u>	<u>T</u>	<u>NO</u>	<u>FACU</u>	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
9. _____	_____	_____	_____	
10. _____	_____	_____	_____	
<u>30</u> = Total Cover				
Woody Vine Stratum (Plot size: _____)				
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
_____ = Total Cover				
% Bare Ground in Herb Stratum _____				
_____ = Total Cover				
Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>				
Remarks: <u>Vegetation meets dominance & prevalence test.</u>				

SOIL

Sampling Point: SP6-2

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

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-3	10YR 4/2		—	—	—	—	Silty clay loam	
3-10	10YR 5/2		—	—	—	—	Silty clay loam	
10-16	10YR 5/2	80	—	—	—	—	Silty clay loam	
	10YR 9/1	20	—	—	—	—		Salt concentrations

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

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

- Histosol (A1)
- Histic Epipedon (A2)
- Black Histic (A3)
- Hydrogen Sulfide (A4)
- Stratified Layers (A5) (LRR F)
- 1 cm Muck (A9) (LRR F, G, H)
- Depleted Below Dark Surface (A11)
- Thick Dark Surface (A12)
- Sandy Mucky Mineral (S1)
- 2.5 cm Mucky Peat or Peat (S2) (LRR G, H)
- 5 cm Mucky Peat or Peat (S3) (LRR F)
- Sandy Gleyed Matrix (S4)
- Sandy Redox (S5)
- Stripped Matrix (S6)
- Loamy Mucky Mineral (F1)
- Loamy Gleyed Matrix (F2)
- Depleted Matrix (F3)
- Redox Dark Surface (F6)
- Depleted Dark Surface (F7)
- Redox Depressions (F8)
- High Plains Depressions (F16) (MLRA 72 & 73 of LRR H)

Indicators for Problematic Hydric Soils³:

- 1 cm Muck (A9) (LRR I, J)
- Coast Prairie Redox (A16) (LRR F, G, H)
- Dark Surface (S7) (LRR G)
- High Plains Depressions (F16) (LRR H outside of MLRA 72 & 73)
- Reduced Vertic (F18)
- Red Parent Material (TF2)
- Very Shallow Dark Surface (TF12)
- Other (Explain in Remarks)

³Indicators 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:

Soils do not meet hydric soil indicators

photo 42

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

Secondary Indicators (minimum of two required)

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

Field Observations:

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

Wetland Hydrology Present? Yes _____ No

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

Remarks: No positive hydrology indicators

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: Billings Landfill expansion City/County: Yellowstone CO, Sampling Date: 10/8/12
 Applicant/Owner: City of Billings State: MT Sampling Point: 3 (in wet)
 Investigator(s): L. Darnowski/J. Schick Section, Township, Range: S29 T1S R26E
 Landform (hillslope, terrace, etc.): SWALE Local relief (concave, convex, none): CONCAVE Slope (%): 2
 Subregion (LRR): 4- WESTERN GREAT PLAINS Lat: 45.7218 Long: -108.5325 Datum: WGS1984
 Soil Map Unit Name: L1 LISMAS CLAY NWI classification: PEM-1
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes No (If no, explain in Remarks.)
 Are Vegetation N, Soil N, or Hydrology N significantly disturbed? Are "Normal Circumstances" present? Yes No
 Are Vegetation N, Soil N, or Hydrology N 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 <input checked="" type="checkbox"/> No <input type="checkbox"/> Hydric Soil Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Remarks: <u>Late season investigation, hydrology likely present in spring.</u> <u>Area has indicators for all 3 criteria</u>	

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet:
1. _____	_____	_____	_____	Number of Dominant Species That Are OBL, FACW, or FAC (excluding FAC-): <u>0</u> (A) Total Number of Dominant Species Across All Strata: <u>3</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>0</u> (A/B)
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
_____ = Total Cover				Prevalence Index worksheet: Total % Cover of: _____ Multiply by: _____ OBL species <u>0</u> x 1 = _____ FACW species <u>0</u> x 2 = _____ FAC species <u>0</u> x 3 = _____ FACU species <u>40%</u> x 4 = <u>160</u> UPL species <u>22%</u> x 5 = <u>110</u> Column Totals: <u>62%</u> (A) <u>270</u> (B) Prevalence Index = B/A = <u>4.35</u>
Sapling/Shrub Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status	
1. <u>Symphoricarpos albus</u>	<u>2%</u>	<u>YES</u>	<u>UPL</u>	
2. <u>ROSA</u>	<u>T</u>	<u>NO</u>	<u>UPL</u>	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
_____ = Total Cover				
Herb Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status	
1. <u>Carex deweyana</u>	<u>30%</u>	<u>YES</u>	<u>FACU</u>	
2. <u>Oryzopsis sp.</u>	<u>20%</u>	<u>YES</u>	<u>UPL</u>	
3. <u>Elymus repens</u>	<u>10%</u>	<u>NO</u>	<u>FACU</u>	
4. <u>Solidago canadensis</u>	<u>T</u>	<u>NO</u>	<u>FACU</u>	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
9. _____	_____	_____	_____	
10. _____	_____	_____	_____	
<u>60%</u> = Total Cover				
Woody Vine Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status	
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
_____ = Total Cover				
% Bare Ground in Herb Stratum <u>40%</u> _____ = Total Cover				
Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>				
Remarks: <u>Problematic vegetation - dominant vegetation is not FAC or better. flowered, presence of hydric soils & wetland hydrology inc</u>				

SOIL

Sampling Point: 3

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

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-2	2.5Y4/1	90	7.5YR4/6	10	C	M	Sandy clay loam	Highly compacted
2-16	2.5Y4/1	97	7.5YR4/6	3	C	M	Sandy clay loam	Highly compacted

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

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)		Indicators for Problematic Hydric Soils ³ :
<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> Sandy Gleyed Matrix (S4)	<input type="checkbox"/> 1 cm Muck (A9) (LRR I, J)
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Sandy Redox (S5)	<input type="checkbox"/> Coast Prairie Redox (A16) (LRR F, G, H)
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> Stripped Matrix (S6)	<input type="checkbox"/> Dark Surface (S7) (LRR G)
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Loamy Mucky Mineral (F1)	<input type="checkbox"/> High Plains Depressions (F16)
<input type="checkbox"/> Stratified Layers (A5) (LRR F)	<input type="checkbox"/> Loamy Gleyed Matrix (F2)	<input type="checkbox"/> (LRR H outside of MLRA 72 & 73)
<input type="checkbox"/> 1 cm Muck (A9) (LRR F, G, H)	<input checked="" type="checkbox"/> Depleted Matrix (F3)	<input type="checkbox"/> Reduced Vertic (F18)
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/> Redox Dark Surface (F6)	<input type="checkbox"/> Red Parent Material (TF2)
<input type="checkbox"/> Thick Dark Surface (A12)	<input type="checkbox"/> Depleted Dark Surface (F7)	<input type="checkbox"/> Very Shallow Dark Surface (TF12)
<input type="checkbox"/> Sandy Mucky Mineral (S1)	<input type="checkbox"/> Redox Depressions (F8)	<input type="checkbox"/> Other (Explain in Remarks)
<input type="checkbox"/> 2.5 cm Mucky Peat or Peat (S2) (LRR G, H)	<input type="checkbox"/> High Plains Depressions (F16)	³ Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.
<input type="checkbox"/> 5 cm Mucky Peat or Peat (S3) (LRR F)	<input type="checkbox"/> (MLRA 72 & 73 of LRR H)	

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes No

Remarks: Soils meet Depleted Matrix indicators

photo # 7

HYDROLOGY

Wetland Hydrology Indicators:		Secondary Indicators (minimum of two required)
<u>Primary Indicators (minimum of one required; check all that apply)</u>		
<input type="checkbox"/> Surface Water (A1)	<input type="checkbox"/> Salt Crust (B11)	<input checked="" type="checkbox"/> Surface Soil Cracks (B6)
<input type="checkbox"/> High Water Table (A2)	<input type="checkbox"/> Aquatic Invertebrates (B13)	<input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)
<input type="checkbox"/> Saturation (A3)	<input type="checkbox"/> Hydrogen Sulfide Odor (C1)	<input type="checkbox"/> Drainage Patterns (B10)
<input type="checkbox"/> Water Marks (B1)	<input type="checkbox"/> Dry-Season Water Table (C2)	<input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3)
<input type="checkbox"/> Sediment Deposits (B2)	<input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) (where not tilled)	<input type="checkbox"/> Crayfish Burrows (C8)
<input type="checkbox"/> Drift Deposits (B3)	<input type="checkbox"/> Presence of Reduced Iron (C4)	<input type="checkbox"/> Saturation Visible on Aerial Imagery (C9)
<input type="checkbox"/> Algal Mat or Crust (B4)	<input type="checkbox"/> Thin Muck Surface (C7)	<input checked="" type="checkbox"/> Geomorphic Position (D2)
<input type="checkbox"/> Iron Deposits (B5)	<input type="checkbox"/> Other (Explain in Remarks)	<input type="checkbox"/> FAC-Neutral Test (D5)
<input type="checkbox"/> Inundation Visible on Aerial Imagery (B7)		<input type="checkbox"/> Frost-Heave Hummocks (D7) (LRR F)
<input type="checkbox"/> Water-Stained Leaves (B9)		
Field Observations:		
Surface Water Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Depth (inches): _____	Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Water Table Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Depth (inches): _____	
Saturation Present? (includes capillary fringe) Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Depth (inches): _____	

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

Remarks: Presence of 2° indicators for wetland hydrology.

Appendix C – Wetland Delineation Maps

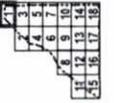


108°33'W

N. 43.327°

N. 43.327°

CITY OF BILLINGS LANDFILL EXPANSION
Wetland and Stream Delineation Report
MAP I



MAP
LOCATION

- Stream Centerline
- Wetland Boundary
- △ Culvert

- GPS Field Data
- ◆ Sample Plot
- Edge of Streambank

- Streambank
- Study Area

- Wetlands (HDR)
- Stream Centerline
- Stream Centerline (approximate)

LEGEND



DATE: August 21, 2013
 SOURCES: ESRI, HDR, Inc., Yellowstone Co. GIS
 PROJECTION: NAD_1983_StatePlane_Montana_FIPS_2500_Feet
 AUTHOR: HDR Engineering, Inc.



**CITY OF BILLINGS LANDFILL EXPANSION
Wetland and Stream Delineation Report
MAP 2**



MAP
LOCATION

- Stream Centerline
- Wetland Boundary
- △ Culvert

- GPS Field Data
- Sample Plot
- Edge of Streambank

- Streambank
- Study Area

- Wetlands (HDR)
- Stream Centerline
- Stream Centerline (approximate)

LEGEND

DATE: August 31, 2013
 SOURCE: ESRI, HDR, Inc., Yellowstone Co. GIS
 PROJECTION: NAD_1983_StatePlane_Montana_FIPS_2500_Feet
 AUTHOR: HDR Engineering, Inc.



108° 17' 0" W

108° 17' 0" W

**CITY OF BILLINGS LANDFILL EXPANSION
Wetland and Stream Delineation Report
MAP 3**

1	2	3
4	5	6
7	8	9
10	11	12
13	14	15
16	17	18

MAP LOCATION

- Stream Centerline
- Wetland Boundary
- △ Culvert

- GPS Field Data
- Sample Plot
- Edge of Streambank

- Streambank
- Study Area

- Wetlands (HDR)
- Stream Centerline
- Stream Centerline (approximate)

LEGEND



DATE: August 21, 2013
 BY: Jennifer Co. Williams
 PROJECTION: NAD 1983 StatePlane_Montana_FIPS_2500_Feet
 AUTHOR: HDR Engineering, Inc.



CITY OF BILLINGS LANDFILL EXPANSION
Wetland and Stream Delineation Report
MAP 4



MAP
LOCATION

- Stream Centerline
- Wetland Boundary
- △ Culvert

- GPS Field Data
- ◆ Sample Point
- Edge of Streambank

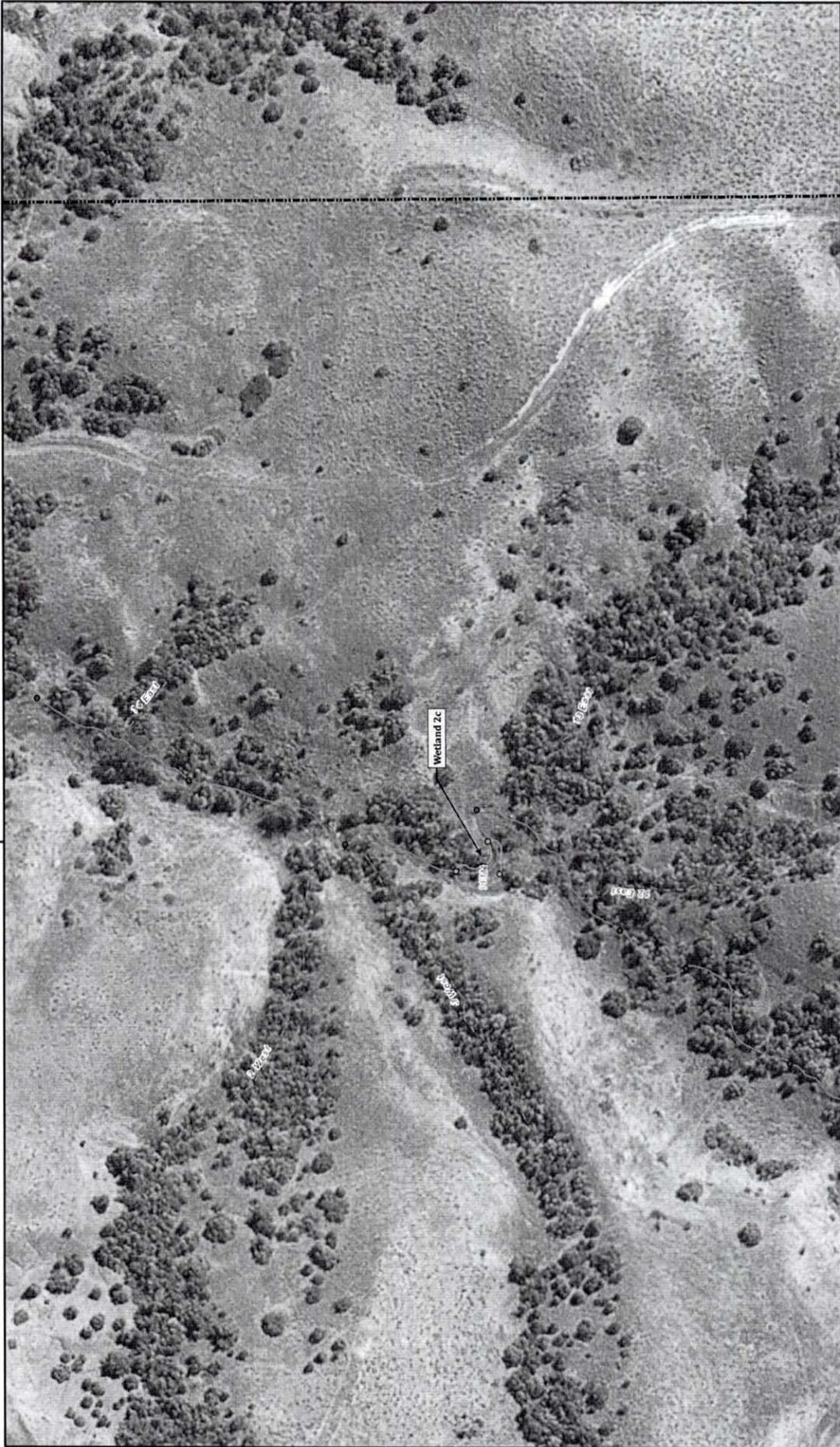
- Streambank
- Study Area

- Wetlands (HDR)
- Stream Centerline
- Stream Centerline (approximate)

LEGEND



DATE: August 21, 2013
 SOURCES: ESRI, HDR, Inc., Yellowstone Co. GIS
 PROJECTION: NAD_1983_StatePlane_Montana_FIPS_2500_Feet
 AUTHOR: HDR Engineering, Inc.



108°12'0"W

108°12'0"W

DATE: August 21, 2013
 SURVEYOR: HDR, Inc., Yellowstone Co, GIS
 PROJECTION: NAD 1983 StatePlane_Montana_FIPS_2500_Feet
 AUTHOR: HDR Engineering, Inc.



LEGEND

- Wetlands (HDR)
- Stream Centerline
- Stream Centerline (approximate)

- Streambank
- Study Area

- GPS Field Data
- Sample Plot
- Edge of Streambank

- Stream Centerline
- Wetland Boundary
- Culvert

MAP LOCATION



**CITY OF BILLINGS LANDFILL EXPANSION
 Wetland and Stream Delineation Report
 MAP 5**



CITY OF BILLINGS LANDFILL EXPANSION
Wetland and Stream Delineation Report
MAP 6

1	2	3
4	5	6
7	8	9
10	11	12
13	14	15
16	17	18
19	20	21
22	23	24
25	26	27
28	29	30
31	32	33
34	35	36
37	38	39
40	41	42
43	44	45
46	47	48
49	50	51
52	53	54
55	56	57
58	59	60
61	62	63
64	65	66
67	68	69
70	71	72
73	74	75
76	77	78
79	80	81
82	83	84
85	86	87
88	89	90
91	92	93
94	95	96
97	98	99
100	101	102

MAP LOCATION

- Stream Centerline
- Wetland Boundary
- △ Culvert

- Streambank
- Study Area
- GPS Field Data
- Sample Plot
- Edge of Streambank

- Wetlands (HDR)
- Stream Centerline
- Stream Centerline (approximate)

LEGEND

DATE: August 21, 2013
 DRAFTER: Willmetts Co. GIS
 PROJECT: WAD 1983 StatePlane_Montana_FIPS_2500_Feet
 AUTHOR: HDR Engineering, Inc.



DATE: August 31, 2011
 SOURCE: ESRI, HDR, Inc., Wetstone Co., GIS
 PROJECTION: NAD 1983 StatePlane_Montana_FIPS_2500_Feet
 AUTHOR: HDR Engineering, Inc.

0 25 50 100 150 200
 Feet

LEGEND

- Wetlands (HDR)
- Stream Centerline (HDR)
- Stream Centerline (approximate)
- Streambank Study Area
- Streambank
- GPS Field Data Sample Plot
- Edge of Streambank
- Stream Centerline
- Wetland Boundary
- Culvert

MAP LOCATION

1	2	3
4	5	6
7	8	9
10	11	12
13	14	15
16	17	18

CITY OF BILLINGS LANDFILL EXPANSION
Wetland and Stream Delineation Report
 MAP 7



108° 12' 30" W

45° 43' 0" N

108° 12' 30" W

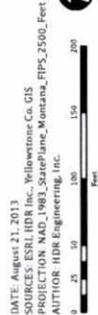
CITY OF BILLINGS LANDFILL EXPANSION
Wetland and Stream Delineation Report
MAP 8



MAP LOCATION

- Stream Centerline
- Wetland Boundary
- △ Culvert
- GPS Field Data
- Sample Plot
- Edge of Streambank
- Streambank
- Study Area
- Wetlands (HDR)
- Stream Centerline
- Stream Centerline (approximate)

LEGEND



DATE: August 21, 2013
 SOURCES: ESRI, HDR, Inc., Wellstone Co., GIS
 PROJECTION: NAD_1983_StatePlane_Montana_FIPS_2500_Feet
 AUTHOR: HDR Engineering, Inc.

N.011.59



CITY OF BILLINGS LANDFILL EXPANSION
Wetland and Stream Delineation Report
MAP 9

1	2	3	4	5
6	7	8	9	10
11	12	13	14	15
16	17	18	19	20

MAP
LOCATION

- Stream Centerline
- Wetland Boundary
- △ Culvert

- Streambank
- Streambank Study Area
- GPS Field Data
- Sample Plot
- Edge of Streambank

- Wetlands (HDR)
- Stream Centerline
- Stream Centerline (approximate)

LEGEND

DATE: August 21, 2013
 PROJECT: City of Billings, Wetlands GIS
 PROJECTION: NAD_1983_StatePlane_Montana_FIPS_2500_Feet
 AUTHOR: HDR Engineering, Inc.



CITY OF BILLINGS LANDFILL EXPANSION
Wetland and Stream Delineation Report
MAP 10



MAP
LOCATION

- Stream Centerline
- Wetland Boundary
- △ Culvert

- Streambank
- Study Area
- GPS Field Data
- Sample Plot
- Edge of Streambank

- Wetlands (HDR)
- Stream Centerline
- Stream Centerline (approximate)

LEGEND

DATE: August 21, 2013
 SOURCE: ES&L HDR, Inc., Yellowstone Co., GIS
 PROJECTION: NAD 1983 StatePlane_Montana_FIPS_2500_Feet
 AUTHOR: HDR Engineering, Inc.



**CITY OF BILLINGS LANDFILL EXPANSION
Wetland and Stream Delineation Report
MAP 12**



MAP
LOCATION

- Stream Centerline
- Wetland Boundary
- △ Culvert

- Streambank
- Study Area
- GPS Field Data
- Sample Plot
- Edge of Streambank

- LEGEND**
- Wetlands (HDR)
 - Stream Centerline
 - Stream Centerline (approximate)

DATE: August 21, 2013
 SOURCES: ESRI, HDR, Inc., Willawood Co. GIS
 PROJECTION: NAD_1983_StatePlane_Montana_FIPS_2500_Feet
 AUTHOR: HDR Engineering, Inc.



**CITY OF BILLINGS LANDFILL EXPANSION
Wetland and Stream Delineation Report
MAP 1.3**



MAP
LOCATION

- Stream Centerline
- Wetland Boundary
- △ Culvert

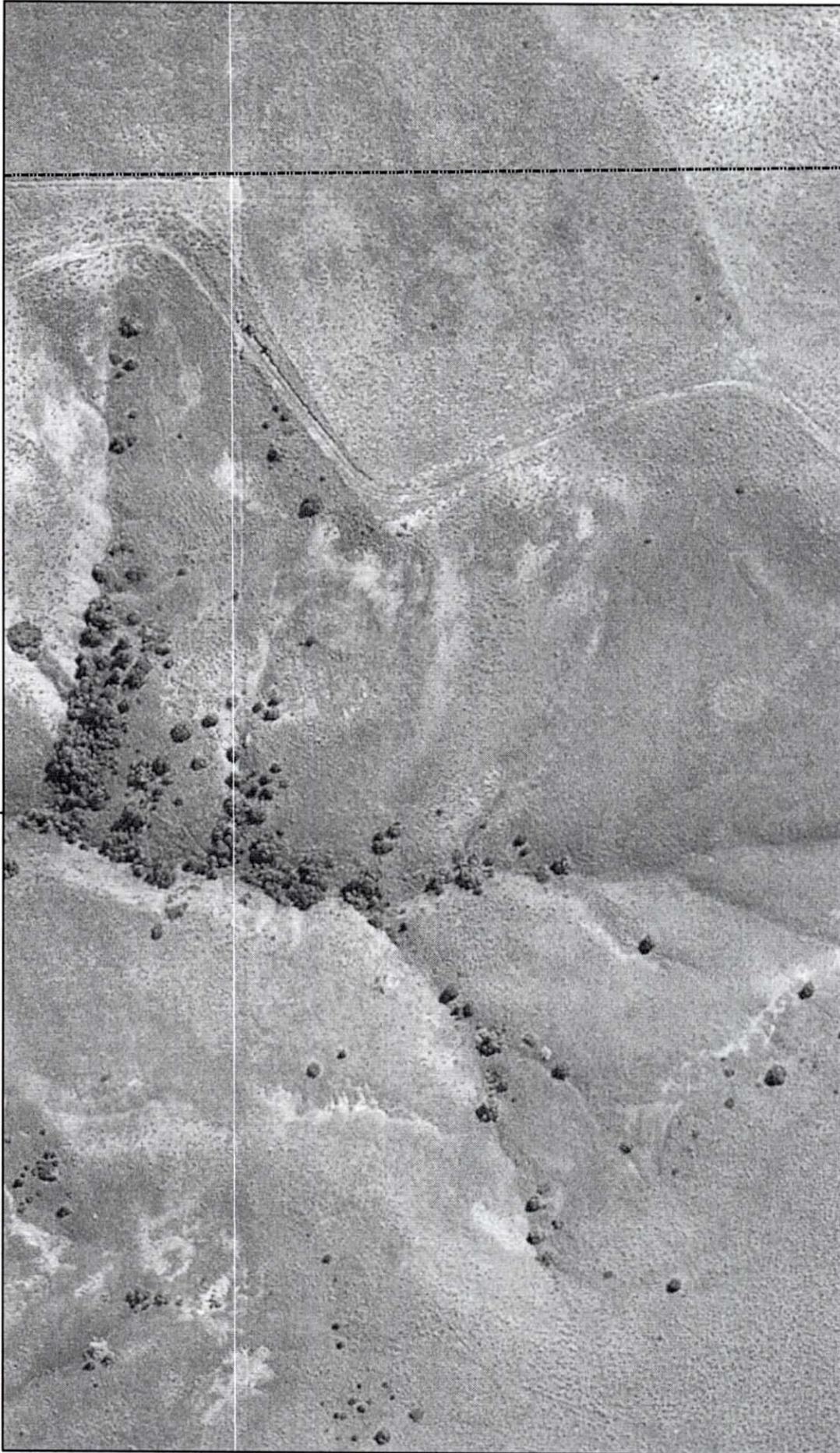
- GPS Field Data
- Sample Plot
- Edge of Streambank

- Streambank
- Study Area

- Wetlands (HDR)
- Stream Centerline
- Stream Centerline (approximate)

LEGEND

DATE: August 21, 2013
 SOURCES: ESRI, HDR, Inc., Yellowstone Co. GIS
 PROJECTION: NAD_1983_StatePlane_Montana_FIPS_2500_Feet
 AUTHOR: HDR Engineering, Inc.



DATE: August 21, 2013
 SOURCES: ESSI, HDR, Inc., Yellowstone Co. GIS
 PROJECTION: NAD_1983_StatePlane_Montana_FIPS_2500_Feet
 AUTHOR: HDR Engineering, Inc.

0 25 50 100 150 200
 Feet

N

LEGEND

- Wetlands (HDR)
- Stream Centerline
- Stream Centerline (approximate)
- Streambank Study Area
- GPS Field Data
- Sample Plot
- Edge of Streambank
- Stream Centerline
- Wetland Boundary
- Culvert

MAP LOCATION

11	12	13
7	8	9
4	5	6
1	2	3
18	17	16
15	14	13
12	11	10
9	8	7
6	5	4
3	2	1

CITY OF BILLINGS LANDFILL EXPANSION
Wetland and Stream Delineation Report
MAP 14

108°11'0"W



108°11'0"W

DATE: August 21, 2013
 BY: ESSLI, HDR, Inc. Yellowstone Co. GIS
 PROJECTION: NAD_1983_StatePlane_Montana_NPS_2500_Feet
 AUTHOR: HDR Engineering, Inc.

LEGEND

- Wetlands (HDR)
- Stream Centerline
- Stream Centerline (approximate)

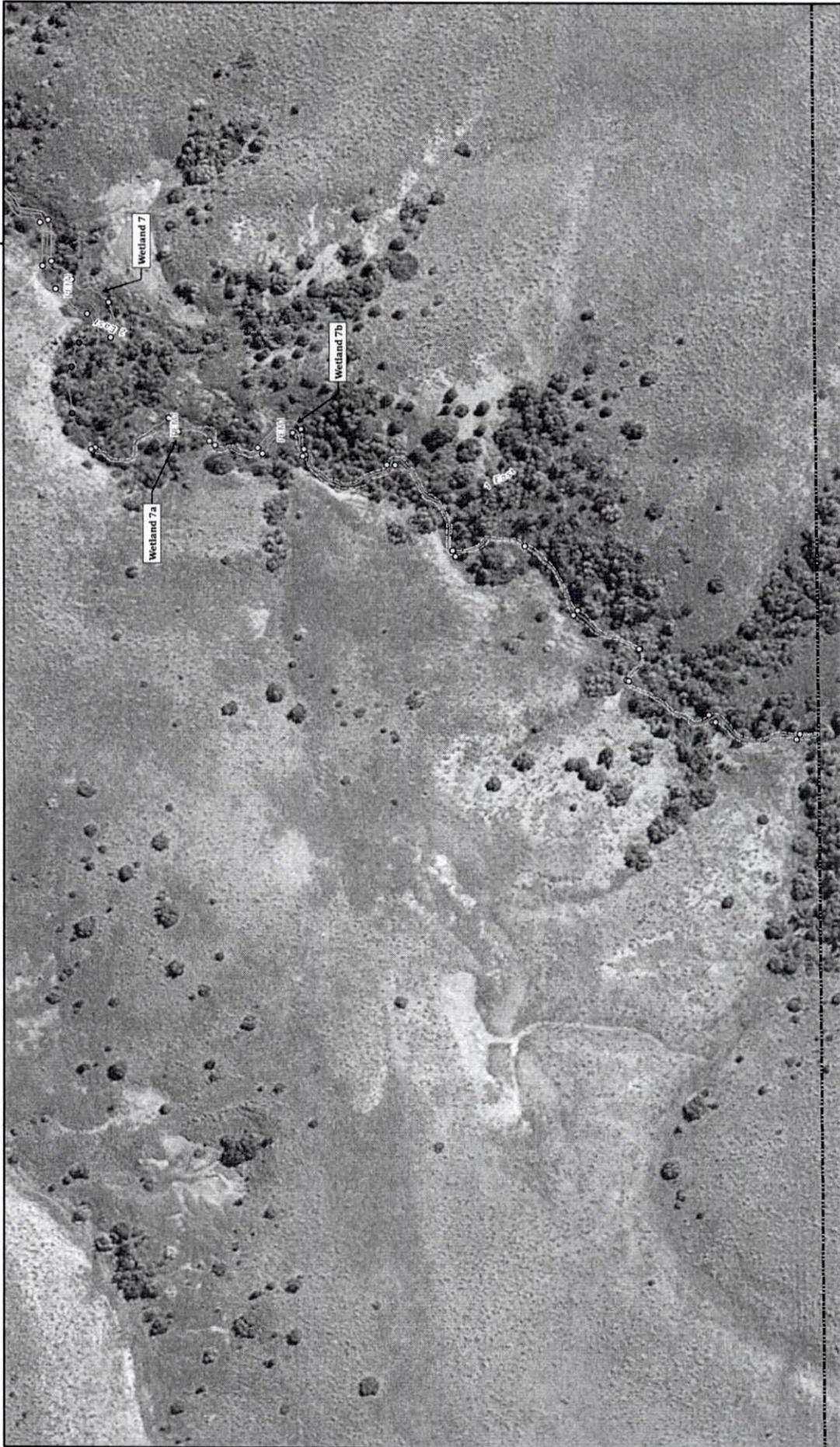
- Streambank Study Area
- GPS Field Data Sample Plot
- Edge of Streambank

- Stream Centerline
- Wetland Boundary
- Culvert

MAP LOCATION



CITY OF BILLINGS LANDFILL EXPANSION
Wetland and Stream Delineation Report
MAP 15



CITY OF BILLINGS LANDFILL EXPANSION
Wetland and Stream Delineation Report
MAP 16

1	2	3
4	5	6
7	8	9
10	11	12
13	14	15
16	17	18
19	20	21
22	23	24
25	26	27
28	29	30

MAP LOCATION

- Stream Centerline
- Wetland Boundary
- △ Culvert

- GPS Field Data
- Sample Plot
- Edge of Streambank

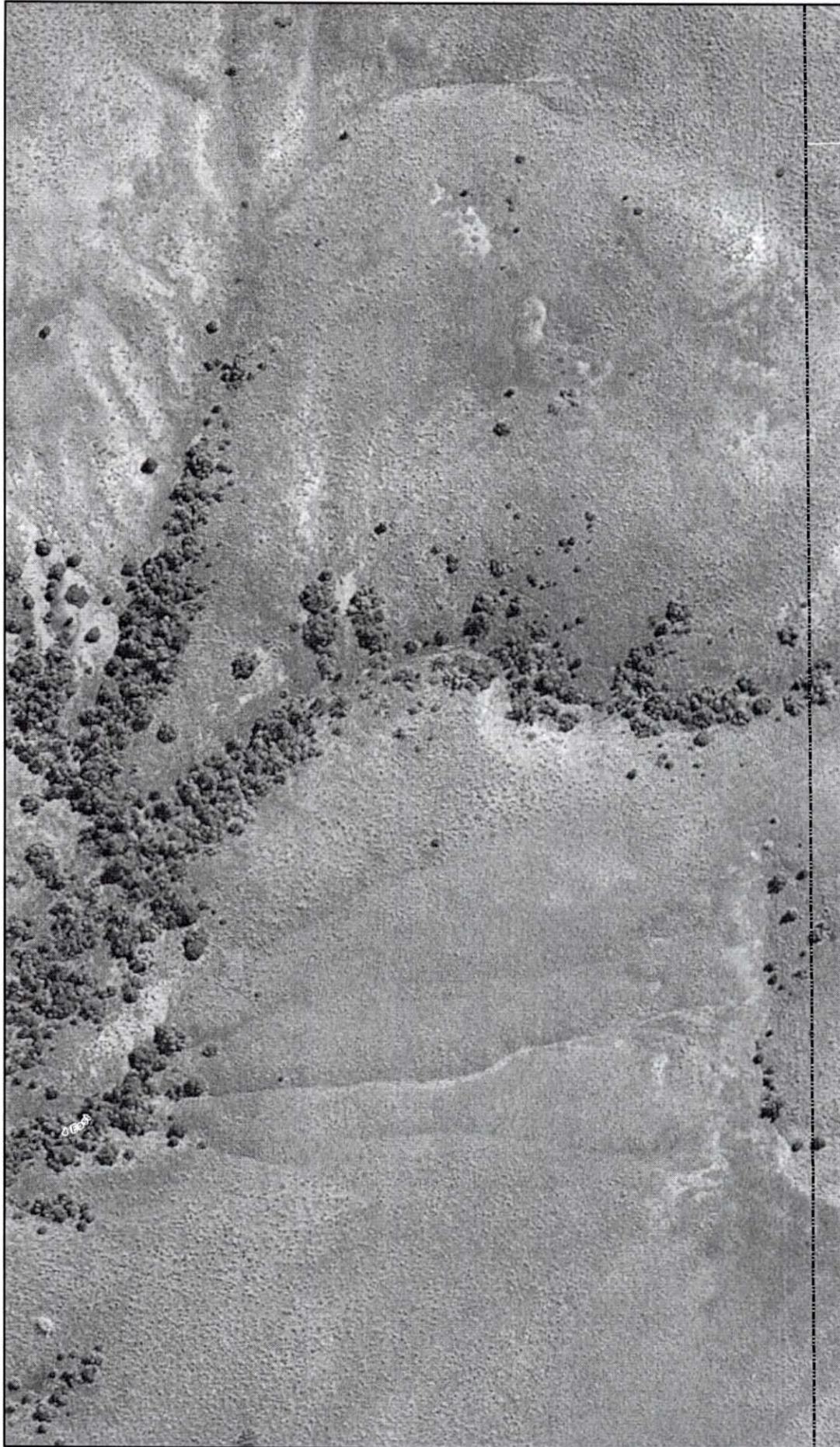
- Streambank
- Study Area

- Wetlands (HDR)
- Stream Centerline
- Stream Centerline (approximate)

LEGEND

DATE: August 21, 2013
 SOURCES: ESRI, HDR Inc., Wellstone Co. GIS
 PROJECTION: NAD_1983_StatePlane_Montana_FIPS_2500_Feet
 AUTHOR: HDR Engineering, Inc.



**CITY OF BILLINGS LANDFILL EXPANSION
Wetland and Stream Delineation Report
MAP 17**



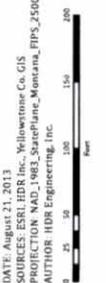
MAP
LOCATION

- Stream Centerline
- Wetland Boundary
- △ Culvert

- GPS Field Data
- Sample Plot
- Edge of Streambank

- Streambank
- Study Area

- Wetlands (HDR)
- Stream Centerline
- Stream Centerline (approximate)



DATE: August 21, 2013
 SOURCES: ES&I HDR, Inc., Yellowstone Co. GIS
 PROJECTION: NAD 1983 StatePlane_Montana_FIPS_2500_Feet
 AUTHOR: HDR Engineering, Inc.



108° 12' 00" W

108° 12' 00" W

CITY OF BILLINGS LANDFILL EXPANSION
Wetland and Stream Delineation Report
MAP 18

1	2	3
4	5	6
7	8	9
10	11	12
13	14	15
16	17	18
19	20	21
22	23	24
25	26	27

MAP
LOCATION

- Stream Centerline
- Wetland Boundary
- △ Culvert

- GPS Field Data
- Sample Plot
- Edge of Streambank

- Streambank
- Study Area

- Wetlands (HDR)
- Stream Centerline
- Stream Centerline (approximate)

LEGEND



DATE: August 31, 2013
 SOURCES: ES&I HDR, Inc., Yellowstone Co. GIS
 PROJECTION: NAD 1983 StatePlane_Montana_FIPS_2500_Feet
 AUTHOR: HDR Engineering, Inc.

Appendix D – Site Photos

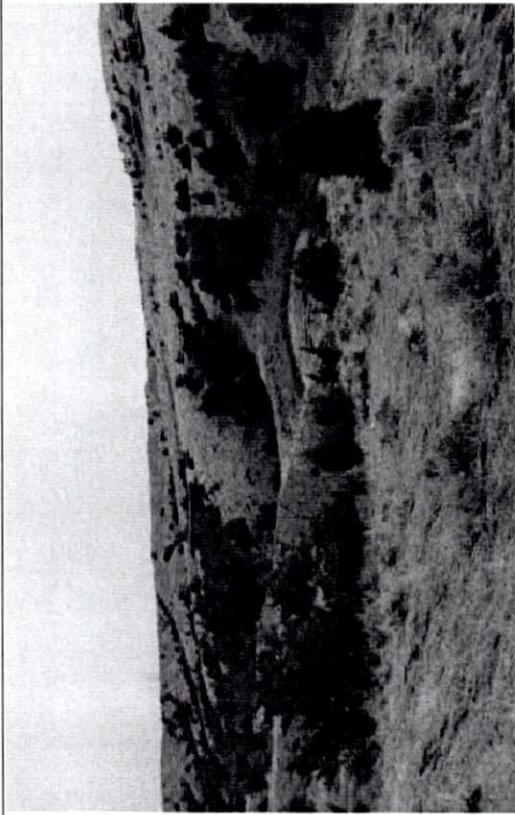


Photo 1. Overview of south-central portion of project site, looking northeast. Wetland 1 is visible in the background (October 8, 2012).

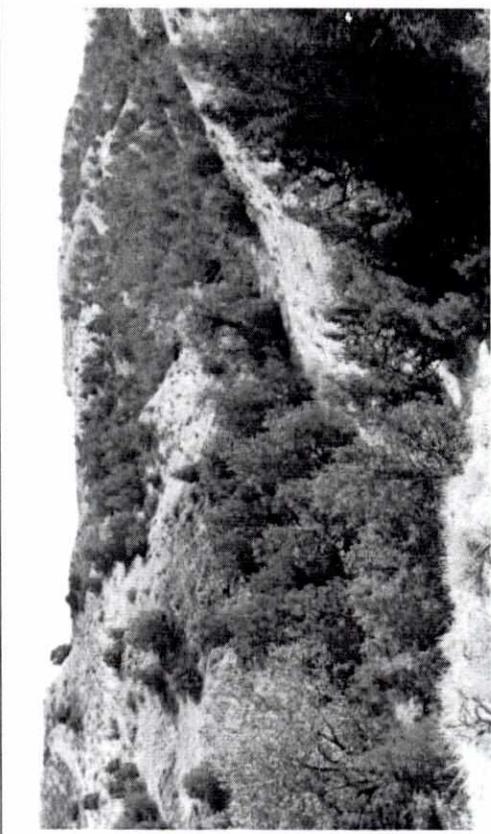


Photo 2. Overview of north portion of the project site, looking south (October 8, 2012)



Photo 3. Wetland 1, unvegetated depression ringed by twoscale saltbush and rough cocklebur, in north portion of the site (October 8, 2012)



Photo 4. Wetland 1, southwest portion of wetland with *Schoenoplectus* spp. and common spikerush (October 8, 2012)

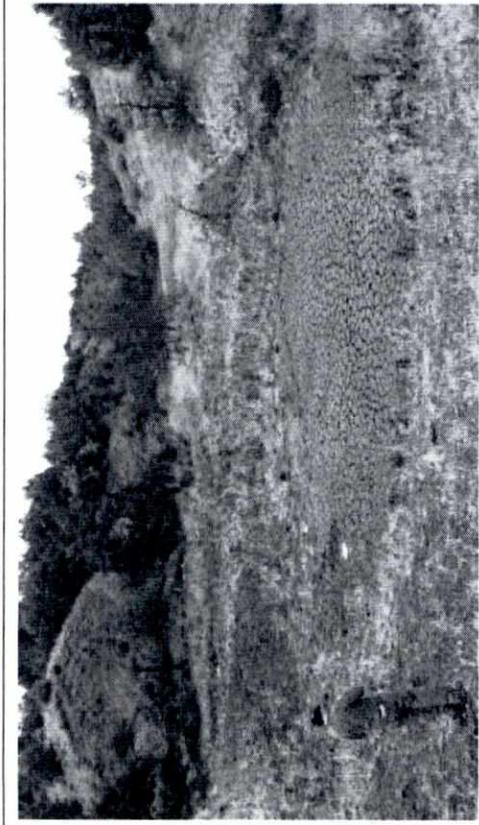


Photo 5. Wetland 2, looking south from north berm (October 8, 2012).

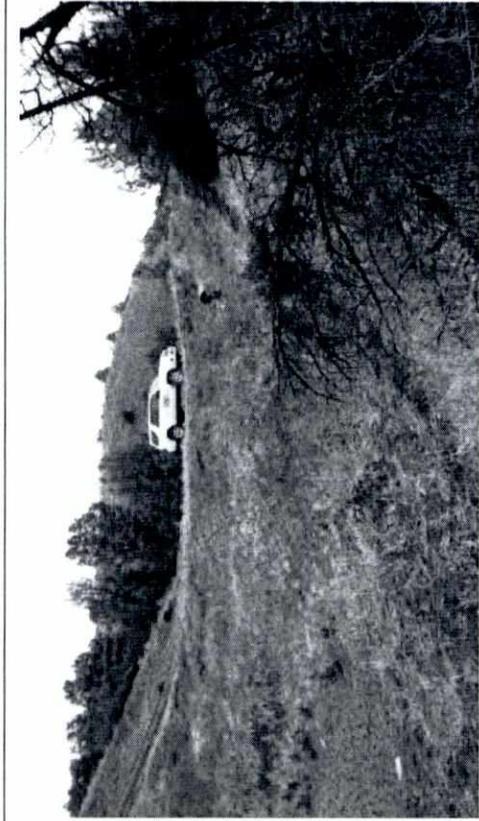


Photo 6. Wetland 2, road berm on north side of wetland and high-flow culvert (October 8, 2012)

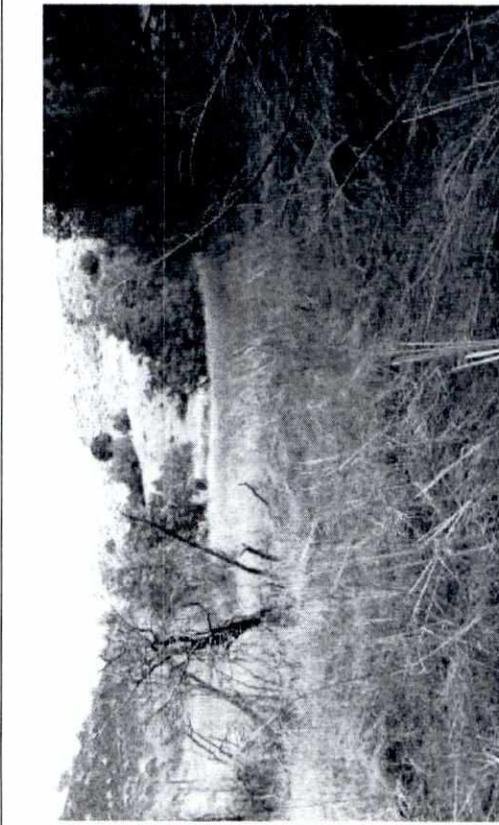


Photo 7. Wetland 3, looking north from south portion of wetland (October 9, 2012)



Photo 8. Wetland 2b, dominated by narrowleaf cattail and common spikerush (October 8, 2012). Numerous other minor wetlands along Stream 1 had similar vegetation communities.



Photo 9. Wetland 5, looking east. Wetland is dominated by narrowleaf cattail (October 9, 2012).



Photo 11. Stream 1, typical bed and bank conditions in the south portion of the project site (October 8, 2012).



Photo 10. Wetland 6, looking east. Wetland is dominated by saltmarsh club-rush. (October 8, 2012)



Photo 12. Stream 1, culvert outlet at Blue Creek Road, where Stream 1 discharges to Blue Creek (October 9, 2012).



Photo 13. Drainage 7 East, looking downstream. Stream channel conditions were typical of other seasonal drainages inventoried in the project area (October 9, 2012).



Photo 14. Drainage 2 West looking downstream (October 9, 2012).