City of Billings

Solid Waste Alternatives Analysis

Job No. W.O. 12-29

ENVIRONMENTAL ASSESSMENT TECHNICAL MEMORANDUM

February 2014

Prepared for:

City of Billings

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Section 1.0 Description of Project

1.1 Introduction

The team of Great West Engineering and HDR Engineering has been hired by the City of Billings (City) to prepare a Solid Waste Alternatives Analysis. 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. The City will be required to comply with Montana Department of Environmental Quality (DEQ) Rules if a landfill expansion is proposed. The *Solid Waste Alternatives Analysis Report* (City of Billings 2013), the Master Plan Design Report (Great West 2013c) and other supporting documentation were used to develop this technical memorandum. The purpose of this technical memorandum is to provide environmental documentation that is anticipated to be used by the DEQ for preparation of an environmental assessment in accordance with the Montana Administrative Rule ARM 17.4.601 and the DEQ's Procedural Rules for implementing Montana Environmental Policy Act (MEPA).

1.2 Background

The existing DEQ solid waste permit was issued to the City in 1978 and included 421 acres of City property. The City has since acquired additional property and now owns approximately 842 acres. The additional property includes the 350-acre proposed landfill expansion study area. The limits of the current landfill licensed area and the proposed landfill expansion study area are shown on Figure 1.1.

Of the total existing landfill property, 226 acres are currently permitted for disposal of Class II waste and 28 acres for the disposal of Class IV waste. The existing landfill is accessed by South Billings Boulevard, Jellison Road and a paved on-site access road. The terrain slopes primarily to the north, with the Yellowstone River located approximately 2,000 feet north of the existing landfill. Figure 1.2 details the existing site plan for the Billings Landfill. The 842 acres is located in Sections 29 and 30 of Township 1 South, Range 26 East.

Current estimates calculate the remaining life of the 421-acre existing licensed landfill area to be between 39 to 62 years depending on waste volumes accepted for disposal (Great West 2013a). In anticipation of reaching the existing landfill's capacity, the City is initiating the steps necessary to license and expand the landfill to the adjacent 350 acres of City property.

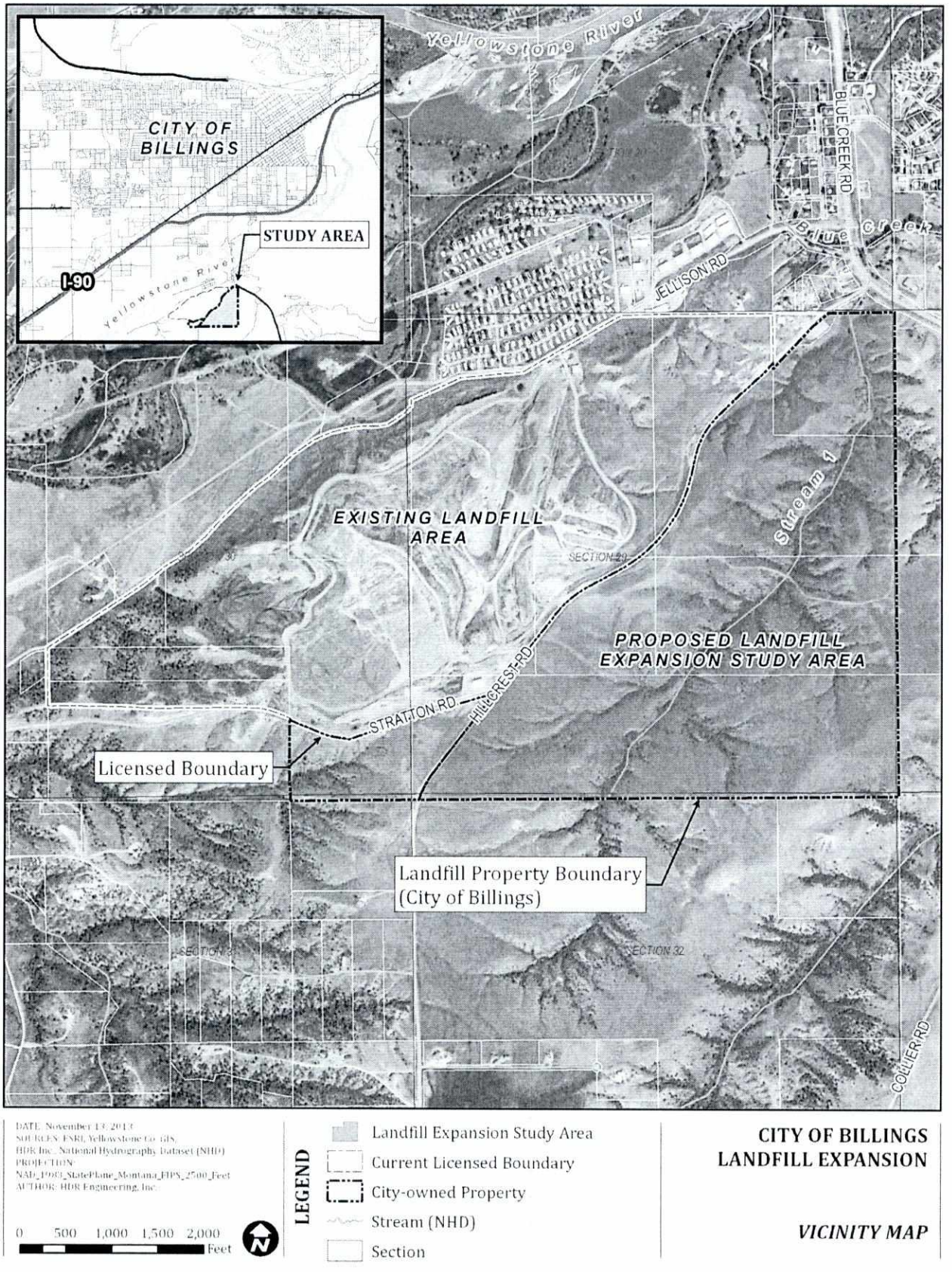

Figure 1.1. Vicinity and Location Map

Figure 1.2. Existing Site Plan

1.3 Project Site Location

The City of Billings, Montana, proposes to expand their landfill operations into the southeast half of Section 29 of Township 1 South, Range 26 East. The project is located in Yellowstone County, Montana, just south of the City of Billings. In particular, the study 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 study area is located on approximately 350 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 1.3 details ownership of other parcels near the study area including the 350 acres of unlicensed property owned by the City.

Figure 1.3. Site Plan and Land Ownership

1.4 Proposed Action

A technical evaluation of landfill expansion alternatives was conducted and results are found in the *Solid Waste Alternatives Analysis Final Report* (City of Billings 2013). Of the four alternatives presented in the analysis, Alternatives 1, 2, and 4 were carried forward for more detailed analysis. Alternative 3 was screened out and removed from further consideration, as described in Section 2.0. Initially, Alternative 1 was selected as the preferred alternative; however, following initial geotechnical investigations, it was later determined that construction of the large perimeter storm water ditches needed to control storm water run-on[1] under Alternatives 1 and 2 were economically infeasible. Alternative 4 was subsequently developed and chosen by the City as the preferred alternative. All alternatives are described in greater detail below.

Description of the Proposed Action (Alternative 4)

Alternative 4 develops the landfill into two separate units on either side of the primary drainage (Stream 1, Figure 1.1) which runs south to north through the property. By developing two separate units, the Proposed Action eliminates the need for a large perimeter run-on control ditch (as required under Alternatives 1 and 2, described below). The planned excavations for Alternative 4 cells will be significantly shallower than those originally anticipated for Alternatives 1 and 2. In order for this alternative to provide adequate cover soil, it will be essential for the City to dramatically reduce its daily cover soil usage. See Figure 1.4 for the Alternative 4 Site Plan.

Alternative 4 includes utilizing Hillcrest Road as access to the site, but includes improvements to widen the roadway and bring it up to County Road standards. Other roadway improvements under Alternative 4 include: reduction of steep grades on Hillcrest Road; improving sight distances at the Blue Creek Road/Hillcrest Road intersection to meet MDT requirements; and an addition of a dedicated right turn lane from Blue Creek Road to Hillcrest Road. Refer to the Transportation section for a more detailed description of roadway improvements under the Proposed Action.

[1] Storm water run-on is water that flows from adjacent properties onto the proposed landfill expansion study area.

Figure 1.4. Alternative 4 Site Plan

1.5 Benefits of the Proposed Action

The City ultimately selected Alternative 4 as the preferred alternative after detailed analysis of site conditions, capital costs, and capacity limits. Alternative 4 took the place of Alternative 1 as the preferred alternative following results of geotechnical investigations that showed an unanticipated presence of hard rock at relatively shallow depths. The primary differentiation between Alternative 4 and Alternatives 1 and 2 is constructability. Alternatives 1 and 2 were deemed economically infeasible due to the underlayment of the recently discovered hard rock that would dramatically increase excavation costs.

Alternative 4 has the highest unit capital costs at $6.65 per ton. This is due primarily to the reduced overall capacity of this alternative. This alternative has the highest capital cost per ton but the lowest overall capital cost (refer to the Master Plan Design Report [Great West 2013c]).

Alternative 4 retains the use of Hillcrest Road and plans for certain improvements to the road. The project team determined that removal of Hillcrest Road, as identified in Alternative 2, would be viewed negatively by the public. Removing Hillcrest Road under Alternative 2 would result in higher road costs with a potential need to acquire additional land for the other road alternatives. Therefore, it is likely that Alternative 4 would be viewed favorably by the surrounding property owners and general public due to the planned improvements to Hillcrest Road.

Alternative 4 has some minor regulatory advantages over Alternative 2. Alternative 4 could be licensed as either a brand new license or as a license expansion. Alternative 2 would need to be licensed as an expansion because of the eventual overlap of fill onto the existing licensed area. If Alternative 4 was licensed under a new license, the City would be able to start the 30-year post-closure care period on the existing landfill once the final closure work was complete. The primary financial advantage is that the City could stop the groundwater monitoring at the existing landfill once the post closure period is completed. However, there are some advantages to licensing the new area as an expansion of the license rather than a new landfill license. Licensing Alternative 4 as an expansion will likely be preferable from a public relations perspective and will also aid the process with DEQ because licensing as an expansion clearly indicates the connection to an existing landfill.

Section 2.0 Alternatives Considered

The alternatives analysis included 4 potential expansion alternatives, identified as Alternatives 1, 2, 3 and 4 (City of Billings 2013). The alternatives evaluation was based on the following considerations: soil balance, capacity, lifespan, and capital costs/costs per ton. Alternative 4 (the City-selected preferred alternative) is described above in Section 1.4. The other alternatives developed for evaluation are described in greater detail below.

2.1 Alternative 1

Alternative 1 is designed to stand alone from the existing landfill (Figure 2.1). The footprint is situated in a manner that maximizes space while allowing for setback from the property lines, and to direct the storm water run-on around the landfill to the northwest via a drainage ditch. This option would most likely utilize Hillcrest Road as access to the site, which would require improvements to reduce the steep grades to a more optimum grade for the haul trucks to maintain speed, and to meet the required sight distances for the speed limit of the road. This alternative may also use the option to reroute Hillcrest Road around the expansion area. Each alternative will be required to reroute a large overhead power transmission line. Due to the presence of large quantities of hard rock excavation, construction of the large perimeter storm water ditch was determined economically infeasible and impracticable.

2.2 Alternative 2

Alternative 2 is designed to overlap onto the existing landfill and remove Hillcrest Road (Figure 2.2). This alternative capitalizes on the airspace gained with overlap of the existing fill, which will allow more capacity in the early life of this alternative. The footprint is also situated in a manner that maximizes space while allowing for setback from the property lines, and to direct the storm water run-on around the landfill to the southeast via a large drainage ditch. This alternative would require the reroute of Hillcrest Road as access to the site around the expansion area either by utilizing and improving Collier Road or providing a new access off of Blue Creek Road. In addition, this alternative will also be required to reroute a large overhead power transmission main. Due to the presence of large quantities of hard rock excavation, construction of the large perimeter storm water ditch was determined economically infeasible and impracticable.

2.3 Alternative 3

Alternative 3 is a standalone facility, and, due to its configuration, would result in a reduced capacity and lifespan as compared to Alternatives 1 and 2, without providing any technical or financial advantages. Alternative 3 was therefore removed during the screening process.

2.4 No Action Alternative

Under the No Action Alternative, a final decision would not be required by DEQ because the City will have chosen to withdraw the application for licensure. Under a No Action Alternative, the City of Billings will continue utilizing the existing landfill facility and would not seek to license any additional property. The existing landfill facility was thoroughly evaluated during alternative analyses for capacity and life

expectancy. Based on this evaluation, the existing landfill has between approximately 39 to 62 years remaining, at which point the City would need to identify additional area for landfill activities.

Figure 2.1. Alternative 1 Site Plan

Figure 2.2. Alternative 2 Site Plan

2.5 Comparison of the Reasonable Alternatives

Based on the screening criteria, Alternatives 1, 2, and 4 were the reasonable alternatives carried forward. This section provides a brief comparison of the reasonable alternatives; for more information, see the *Solid Waste Alternative Analysis Report* (City of Billings 2013). Alternative 4 is further developed in the *Landfill Master Plan* and *Master Plan Design Report* (Great West 2013c).

The life of each expansion alternative is determined using waste volume and waste tonnage calculated with the soil balance and total airspace as described above. For purposes of comparing alternatives, four different life estimate calculation methods are shown in Table 2.1. Of the methods used, Alternative 2 provides the greatest life estimate benefits and Alternative 4 provides the least.

Table 2.1. Expansion Life Estimates Comparison

ALTERNATIVE	Calculation Method	Air Space Capacity (CY)	Solid Waste Capacity (Tons)	Solid Waste Capacity (CY)	Daily Cover (CY)	Approximate Life (Years)
ALTERNATIVE 1	250,000 Tons/Year	62,587,000	31,293,000	43,621,000	18,966,000	123
	416,686 Tons/Year with 1.07% Inflation, Begin Year 2060	62,587,000	31,293,000	43,621,000	18,966,000	54
	351,561 Tons/Year with 1.07% Inflation and Planned Diversion Begin Year 2062	62,587,000	31,293,000	43,621,000	18,966,000	62
	Expanded Service Area 486,911 Tons/Year with 1.07% Inflation Begin Year 2051	62,587,000	31,293,000	43,621,000	18,966,000	47
ALTERNATIVE 2	250,000 Tons/Year	72,430,900	36,215,000	50,482,100	21,948,800	142
	416,686 Tons/Year with 1.07% Inflation, Begin Year 2060	72,430,900	36,215,000	50,482,100	21,948,800	59
	351,561 Tons/Year with 1.07% Inflation and Planned Diversion Begin Year 2062	72,430,900	36,215,000	50,482,100	21,948,800	69
	Expanded Service Area 486,911 Tons/Year with 1.07% Inflation Begin Year 2051	72,430,900	36,215,000	50,482,100	21,948,800	53
ALTERNATIVE 4	250,000 Tons/Year	23,544,400	12,068,200	18,566,400	3,713,300	49
	416,686 Tons/Year with 1.07% Inflation, Begin Year 2060	23,544,400	12,068,200	18,566,400	3,713,300	26
	351,561 Tons/Year with	23,544,400	12,068,200	18,566,400	3,713,300	31

ALTERNATIVE	Calculation Method	Air Space Capacity (CY)	Solid Waste Capacity (Tons)	Solid Waste Capacity (CY)	Daily Cover (CY)	Approximate Life (Years)
	1.07% Inflation and Planned Diversion Begin Year 2062					
	Expanded Service Area 486,911 Tons/Year with 1.07% Inflation Begin Year 2051	23,544,400	12,068,200	18,566,400	3,713,300	22

Source: City of Billings Solid Waste Alternatives Analysis, July 2013

Planning level cost estimates comparing the construction of expansion and closure of each alternative are shown in Table 2.2. These capital cost estimates focus on capital infrastructure improvements at the landfill and do not include estimates for replacement of equipment such as drop boxes, trucks, earthmoving machines, etc. Estimates also do not include operations and maintenance costs for the landfill, which represent the most significant costs associated with most solid waste facilities. The construction estimates assume the City will excavate each of the landfill expansion areas as part of its excavations needed for daily cover. The estimates also assume that the City will continue constructing its own on-site roads rather than contracting them out. Cost tables include estimates for cell construction, liners and leachate collection systems, closure projects, infrastructure improvements and miscellaneous engineering tasks. Alternative 4 has the highest capital cost per ton.

Table 2.2. Alternative Cost Estimate Comparison (2013 Dollars)

ALTERNATIVE	Expansion Cost	Closure Cost	Total Capital Cost	Total Tonnage	Capital Cost Per Ton
ALTERNATIVE 1	$126,909,000	$10,557,000	$137,466,000	31,293,000	$4.40
ALTERNATIVE 2	$140,575,000	$9,544,000	$150,119,000	36,215,000	$4.15
ALTERNATIVE 4	$72,512,740	$7,981,570	$80,494,310	12,068,200	$6.65

Source: City of Billings Solid Waste Alternatives Analysis, July 2013

Section 3.0 Analysis of Potential Impacts

This section evaluates the potential environmental effects that may occur on the physical and human environment if the proposed facility is approved and constructed. Tables 3.1 and 3.7 identify the physical and human elements that may be impacted by licensure of the proposed facility. Each table is followed by a discussion of the potential impacts to the resources that might be affected by the Alternative 4 as the proposed action.

3.1 Potential Impacts on the Physical Environment

This section evaluates the potential environmental effects that may occur on the physical environment due to implementation of the proposed action, Alternative 4. The resources listed in Table 3.1 are described in greater detail in the following sections. Generally, only those resources potentially affected by the proposed action are discussed in greater detail. If there is no effect on a resource or the resource is not present within the study area, it is noted in the respective section and not analyzed any further.

Table 3.1. POTENTIAL IMPACTS ON THE PHYSICAL ENVIRONMENT

PHYSICAL ENVIRONMENT	Major	Moderate	Minor	No	Unknown
SITE GEOLOGY & SOIL QUALITY - STABILITY & MOISTURE: Are there unusual geologic features?				X	
Will the surface features be changed?	X				
Are fragile, compactible or unstable soils present?				X	
Are there special reclamation considerations?			X		
WATER QUALITY, QUANTITY & DISTRIBUTION: Are important surface or ground water resources present?				X	
Is there potential for violation of ambient water quality standards, drinking water maximum contaminant levels, or degradation of water quality?				X	
AIR QUALITY: Will pollutants or particulate be produced?			X		
Is the project influenced by air quality regulations or zones (Class I air-shed)?				X	
DEMANDS ON ENVIRONMENTAL RESOURCES OR LAND, WATER, AIR OR ENERGY: Will the project use resources that are limited in the area?				X	
Are there other activities nearby that will affect the project?				X	
TERRESTRIAL, AVIAN, AND AQUATIC LIFE AND HABITATS: Is there substantial use of the area by important wildlife, birds or fish?			X		
VEGETATION COVER, QUANTITY & QUALITY: Will vegetative communities be permanently altered?		X			
Are any rare plants or cover types present?				X	
UNIQUE, ENDANGERED, FRAGILE OR LIMITED ENVIRONMENTAL RESOURCES: Are any federally listed threatened or endangered species or identified habitat present?				X	
Any wetlands?			X		
Any species of special concern?				X	
HISTORICAL AND ARCHAEOLOGICAL SITES: Are any historical, archaeological or paleontological resources present?				X	
HAZARDOUS WASTE AND SITES: Are there any hazardous materials within or adjacent the study area?				X	
AESTHETICS: Is the project on a prominent topographical feature?				X	
Will it be visible from populated or scenic areas?			X		
Will there be excessive noise, light or odors?				X	

Site Geology and Soil Quality

General Geology and Soil Characteristics

The project site is located in the Missouri Plateau, Unglaciated 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 (map unit "Ln"), 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). Figure 3.1 shows the various soil types located within the landfill expansion area and soil properties are described in Table 3.2. Topographically, the study 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 study area and all drain to Stream 1 (see Figure 1.1). Surface elevation in the study area ranges from 3200 feet to 3500 feet above mean sea level.

Soil types within the study area do not represent any rare or unusual properties and similar soils types can be abundantly found surrounding the study area. Construction and operation of the proposed project would result in major earth moving activities and would affect the existing topography of the site. Following closure of the landfill, topsoil will be replaced and revegetated according to the reclamation plan. Due to the plastic nature of on-site soils and limited topsoil available, reclamation of disturbed areas will require augmentation of surface soils with compost or mulch.

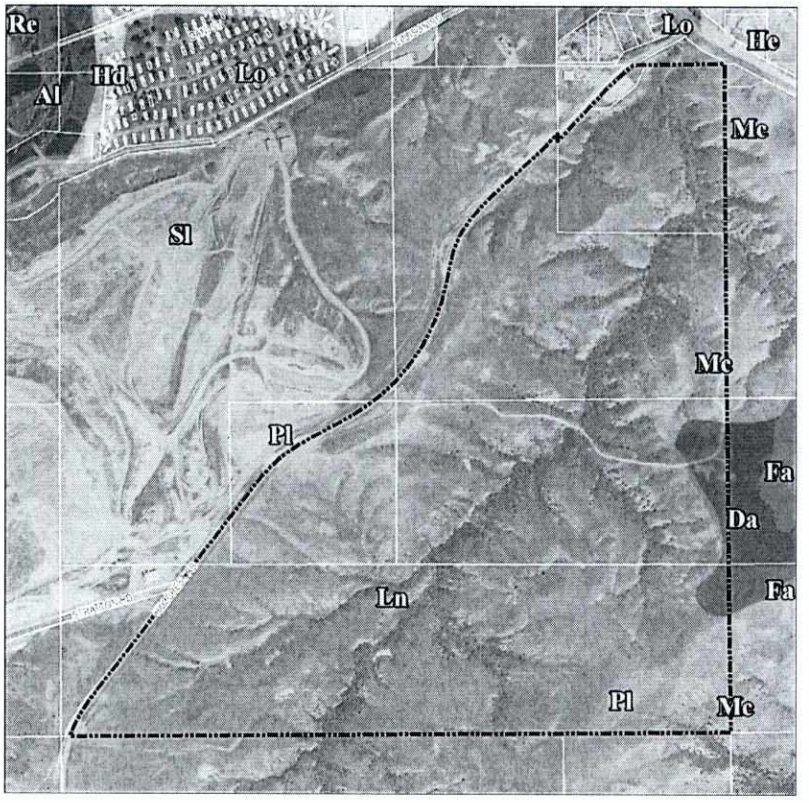

Figure 3.1. Soil Types within the Study Area

Table 3.2. Summary of Soil Properties within the Study Area

SOIL TYPE	MAP UNIT SYMBOL	ACRES IN STUDY AREA	DRAINAGE	PERMEA-BILITY	AVAILABLE WATER CAPACITY	DEPTH TO WATER TABLE
Lismas clay, 15 to 35 percent slopes	Ln	278	Well drained	Very low to moderately high	Very low	More than 80 in.
Pierre-Lismas clays, 7 to 15 percent slopes	Pl	57	Well drained	Very low to moderately low	Low	More than 80 in
Maginnis channery clay loam, 15 to 35 percent slopes	Mc	28	Well drained	Very low to moderately high	Very low	More than 80 in
Danvers silty clay loam, 2 to 4 percent slopes	Da	7	Well drained	Moderately low to moderately high	High	More than 80 in

Source: USDA NRCS 2013

Study Area Geology

Geologists conducted initial geotechnical investigations of the proposed expansion area to determine feasibility of expansion alternatives. A full description of geotechnical methodologies and results can be found in the *Report of Geotechnical Investigation* Technical Report (Tetra Tech 2013) and the *Billings*

Regional Landfill Facility Expansion Feasibility Study (Great West 2013b). Pertinent information is summarized below to provide a more detailed description of the expansion area.

Two geological units are exposed within the proposed landfill expansion property: The Belle Fourche unit and the Quaternary-aged (Pleistocene) deposit. The Belle Fourche shale underlies the entire site, either at the surface or near the surface. The unit is a fine-grained sedimentary rock of upper Cretaceous age. The unit is thinly-laminated, dark bluish-gray, and consists almost entirely of silt- and clay-sized particles. The Quaternary-aged (Pleistocene) deposit consists of silt, sand and gravel that underlie the center of the easternmost part of the property; it is expressed as a flat, non-eroded prairie and is obvious on the land east of the City property.

Geologists identified several faults within the landfill expansion property. One fault lies within a few hundred feet of the southeastern extreme of the property; about one-quarter mile further to the southeast is another normal fault. The far northern extreme of the proposed landfill site is transected by a northwest-trending normal fault. None of the faults in the area are active and the proposed facility does not lie within any seismic impact zones.

Field exploration and test borings were completed in March and April 2013. Eight test borings were completed ranging from 17 to 300 feet using a tracked drilling rig with auger and core capabilities. In addition, 17 shallower test excavations using a backhoe were completed. All four of the deeper holes reflected a change in the character of the rock at 35 to 45 feet. Above that level slightly degraded structure, iron stains, and secondary mineral fracture fillings provide evidence that water has penetrated the shale; below that level the rock is intact, resistant, and shows no evidence of water infiltration.

Water Quality, Quantity, and Distribution

All landfills are required to obtain coverage under the Montana Pollution Discharge Elimination System Permit (MPDES). The State of Montana gained delegation of the MPDES Permit Program from EPA by demonstrating that the state would maintain a permit program that is at least as stringent as the Federal requirements. The existing landfill has coverage under the MPDES General Permit for Industrial Activity No. MTR 000380. Since the new landfill area will have a separate discharge location, it will require its own Industrial Storm Water Permit.

The new landfill design incorporates perimeter ditches and berms to divert any run-on from entering any waste area. There is also a run-on ditch located in the existing drainage (Stream 1) between the two halves of the landfill development. These perimeter ditches provide effective run-on and run-off control for the active area. All run-off collected from the landfill area is directed to one of two water detention ponds. The detention ponds are designed to detain the total volume of water from the 25-year, 24-hour storm event in accordance with State and Federal requirements. The City staff will be responsible for maintenance of all on-site drainage structures and ditches. Maintenance will include the implementation of Best Management Practices (BMPs) to control erosion and sediment transport. The new landfill will operate and maintain the detention ponds and ditches in accordance with the Surface Water Pollution Prevention Plan (SWPPP) and General Industrial MPDES Permit.

Surface Water

Surface water and hydrographical features within the landfill expansion area are described in greater detail within the Wetlands and Water Bodies section.

Groundwater

Groundwater occurred in at least two of the four deeper borings and monitoring wells were established at these two sites. In general, the lower depths of the weathered Belle Fourche, perhaps as deep as 45 feet below ground surface, appear capable of transmitting small quantities of groundwater. Groundwater also migrates on top of thicker bentonite beds. Based on the lack of consistency in the occurrence of groundwater, the generally shallow depths at which it was conclusively detected and apparently low yields of the water-bearing formations, the hydrogeological regime consists of locally-recharged perched aquifers. Conditions documented during the geotechnical analyses lend support to the assertion that groundwater is not contiguous, is locally recharged, and occurs as isolated, perched water-bearing zones. Again, those conditions dominate the existing landfill, which is immediately adjacent to the proposed expansion area.

Nearby Groundwater Supply Wells

Based on a review of the Montana Bureau of Mines and Geology (MBMG) database of existing water supply wells, there are 13 monitoring wells located on the City property (MBMG 2013). Two wells are located on the landfill expansion area and 11 are located on adjacent City-owned land. Of the two wells located within the landfill expansion area, well depths range from 45 to 53 feet. The static water levels ranges between 42.3 to 45.85 feet. There are numerous other wells located nearby. Including the wells located on adjacent City property, there are a total of 73 wells located within a one-mile search radius from the landfill expansion area. According to the MBMG database, these wells are completed at depths from 0 to 110 feet below ground surface and have static water levels between 0 and 45.85 feet. The majority of those wells encountered groundwater in the alluvial deposits associated with the Yellowstone River. A full accounting of the groundwater conditions is presented in the *Billings Regional Landfill Expansion Feasibility Study*, which was conducted as part of the environmental evaluation of the proposed landfill site.

Air Quality

In general, landfills contribute to air quality degradation due to increased levels of dust from landfill traffic, site construction, and ongoing maintenance activities. Short-term temporary increases in airborne dust and particulate matter may be experienced as additional traffic along Hillcrest Road is required to construct the landfill. Air quality impacts due to general operations are anticipated to be no more significant than what is currently experienced with the existing landfill. During construction and periods of dry conditions, dust suppression methods such as watering the haul roads will effectively reduce air quality impacts. Because the construction of the proposed facility would be temporary and short-term, the overall effects to air quality are anticipated to be minor.

Per requirements of the Montana Solid Waste Management Act and the Montana Administrative Rule ARM 17.50.1107, the proposed facility would be required to comply with all applicable air quality criteria developed under a State Implementation Plan (SIP) promulgated by the EPA Regional Administrator pursuant to section 110 of the Clean Air Act, as amended, or any other applicable air quality requirements.

Billings Air Quality Monitoring Sites

According to the DEQ, the City of Billings has two air quality monitoring sites: one located along Coburn Road, called Billings-Coburn, and one downtown at the corner of 2nd Avenue North and North 32nd Street, called Billings-St Luke's (DEQ 2013a). The Billings-Coburn Road site is a neighborhood scale historical SO2 monitoring site located at higher elevations south of the Conoco and Exxon refineries, approximately 5.5 miles away from the landfill expansion study area. It has been operational for the last three decades and exists to monitor compliance with the federal and state SO2 ambient air standards. The Billings-St Luke's site monitors carbon monoxide (CO) on a microscale basis and is located approximately 4.0 miles away from the study area. The site was installed to demonstrate compliance with the CO NAAQS in the Billings non-attainment area. In 2008, the City began continuous PM2.5 monitoring to support daily informational website publication as well for public health protection plans during periods of poor air quality.

Billings Air Quality Background

The EPA requires each state to establish a network of monitors to measure concentrations of the air quality criteria pollutants[2] based upon population, regional air quality, and regulatory concerns (DEQ 2012a). The City of Billings is one of three Metropolitan Statistical Areas (MSAs) in Montana[3] for which certain monitoring requirements are mandated by the EPA. Of the six criteria pollutants regulated, Billings has only historically (pre-1990) exceeded air quality standards for CO.

The Montana Community Designation Status (refer to 40 CFR 81.327) was reviewed to determine the air quality nonattainment status for the City of Billings. According to the attainment status designation table, the study area falls within an attainment area as designated on April 22, 2002 (DEQ 2013b).

In 2002, the EPA approved a change in the legal designation of the Billings area from "not classified" nonattainment for CO to a limited maintenance plan attainment area, and approved the maintenance plan that was designed to keep the area in attainment for CO for the next 10 years (City of Billings 2009). In 2010, the City submitted a revised maintenance plan that provides for maintenance of the CO standards for an additional 10 years. Provided Billings does not exceed the 8-hour standard of 9.0 ppm more than once per calendar year during the next 20 years, it can then request full attainment status.

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[2] The six criteria pollutants are: carbon monoxide (CO), sulfur dioxide (SO2), lead (Pb), nitrogen dioxide (NO2), ozone (O3), and particulate matter (PM). PM includes two sizes of particles, those with an aerodynamic diameter of 10 microns and less (PM10), and particles with an aerodynamic diameter of 2.5 microns and less (PM2.5).

[3] A MSA must contain an urbanized area of 50,000 or more population. Missoula and Great Falls are the other two MSAs in Montana.

DEQ and the local City-County Health Department continue to monitor and analyze CO levels in Billings to help demonstrate ongoing compliance with the CO standards.

Demands on Environmental Resources or Land, Water, Air, or Energy

The primary energy demand required for the proposed landfill expansion would be the ongoing landfill operations of transporting waste to the facility. To a lesser extent, energy demands would be required for operations relating to excavation and construction of new cells, and the compaction, covering, and other routine landfill activities. During construction of the new facility, there would be a higher than normal energy demand; however, this would be a short-term temporary expenditure lasting no more than a couple construction seasons. The continuation of landfill operations on the expansion area would result in similar activities and energy demands to what currently occurs at the existing landfill. For this reason, it is anticipated that no additional impacts would occur.

Terrestrial, Avian, and Aquatic Life and Habitats

The landfill expansion study area consists of an upland plain dissected by a large secondary drainage (Stream 1) that discharges to Blue Creek, a tributary of the Yellowstone River. The study area is currently used for cattle grazing and horse pasture and is sparsely vegetated with grasses, cactus, and sage. In the vicinity of the study area, there are similar large tracts of open space adjacent the City property and sparse rural development. Due to the abundance of adjacent open space, there is adequate acreage of suitable habitat available for populations of grazing large game, terrestrial predators, avian species, and burrowing small animals that may be displaced by the proposed landfill expansion

Wetlands and Water Bodies

A wetland and stream delineation of the landfill expansion area was conducted in October 2012. The field investigation identified 14 wetlands with a cumulative area of 2.41 acres in the study area. Wetlands were distinguished from adjoining uplands by the presence of indicators for wetland hydrology, hydric soils, and hydrophytic vegetation. Figure 3.2 shows an overview of the wetlands and water bodies in the study area. For more information on the methodology and results, refer to the *Wetland and Stream Delineation Technical Report* (HDR 2013). With the exception of Wetlands 5 and 6, all wetlands identified in the study area adjoin Stream 1, the large second-order drainage that discharges to Blue Creek. Table 3.3 summarizes the size, hydrogeomorphic (HGM) and Cowardin classification of the wetlands found within the study area.

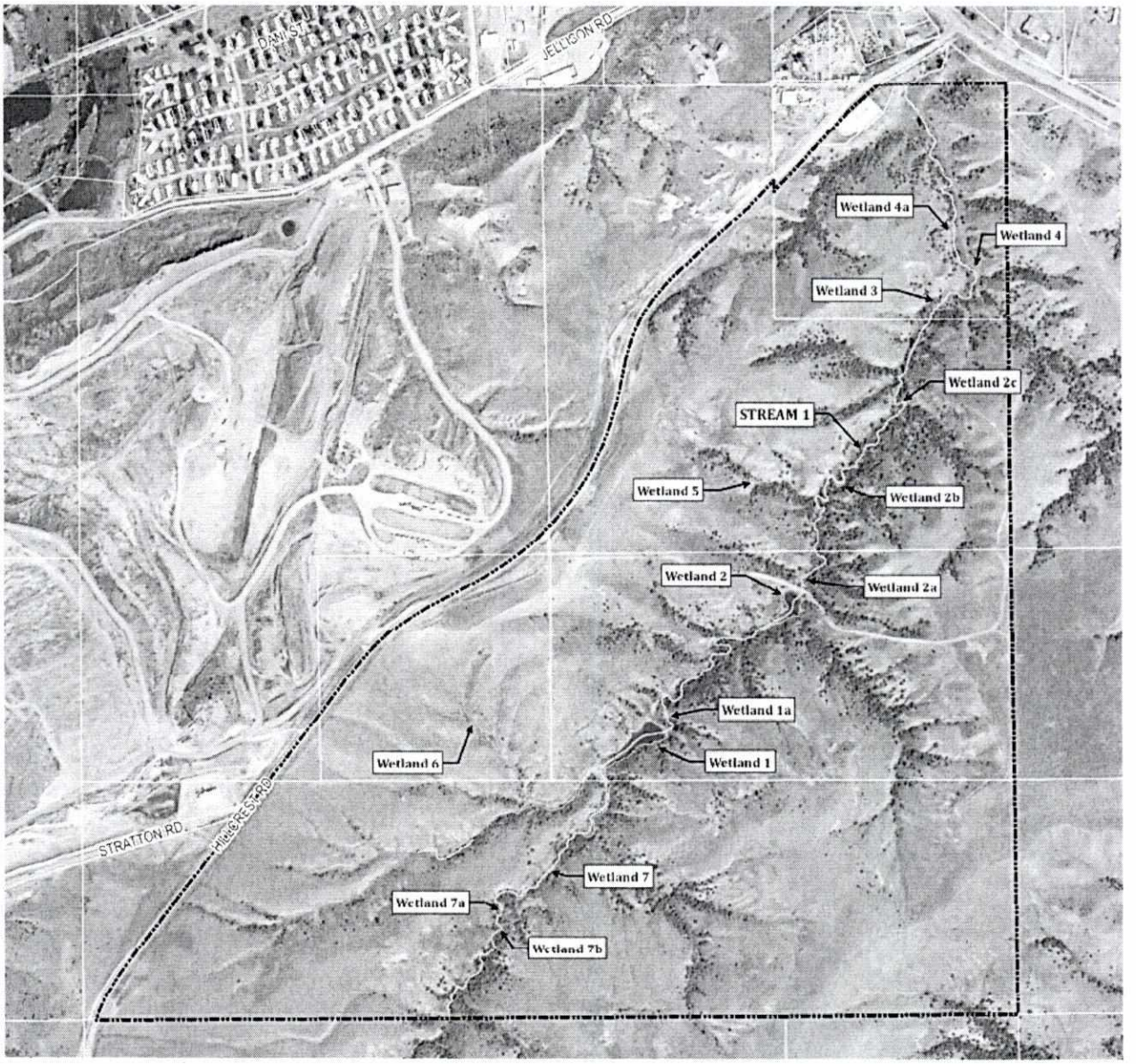

Figure 3.2. Wetlands Overview Map

Table 3.3. Summary of Wetlands in the Landfill Expansion Area

Wetland Name	Wetland area on Project Site	Hydrogeomorphic (HGM) Classification[a]	Cowardin Classification[b]
1	1.32 ac	Riverine	PEM1/PAB1
1a	0.02 ac	Riverine	PEM1
2	0.40 ac	Riverine	PEM1/PAB1
2a	0.03 ac	Riverine	PEM1
2b	0.02 ac	Riverine	PEM1
2c	0.02 ac	Riverine	PEM1
3	0.10 ac	Riverine	PEM1
4	0.05 ac	Riverine	PEM1
4a	0.03 ac	Riverine	PEM1
5	0.01 ac	Depressional	PEM1
6	0.30 ac	Slope	PEM1
7	0.09 ac	Riverine	PEM1
7a	0.01 ac	Riverine	PEM1
7b	0.01 ac	Riverine	PEM1
TOTAL AREA	2.41 ac		

The study area is located in the Blue Creek Watershed, located in the Upper Yellowstone-Lake Basin Watershed (USGS HUC 17010204) (USEPA 2012). Hydrographical features in the study area include a large second-order stream (Stream 1), which dissects the property, originating south of the study area boundary and flowing 1.5 miles north/northeast through the study area, finally discharging to Blue Creek through culverts under Blue Creek Road. The study area also contains 22 first-order seasonal drainages that discharge into Stream 1. None of the streams and drainages contained 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 primarily of low-gradient riffles, with large, deep pools at the two impoundments associated with Wetlands 1 and 2. None of the streams and drainages are considered to support fish species (MFWP 2012).

Implementation of Alternative 4 would result in unavoidable impacts to wetlands. The wetlands and water bodies associated with the landfill expansion area are all located adjacent to Blue Creek and have a direct surface water connection to the creek, which discharges into the Yellowstone River. The US Army Corps of Engineers (USACE) has designated the Yellowstone River as a Traditional Navigable Water, or TNW. Therefore, all wetlands and water bodies within the landfill expansion study area are likely subject to jurisdiction under Section 404 of the Clean Water Act. The USACE is ultimately responsible for all jurisdictional determinations.

In accordance with ARM 17.50.1005, a new landfill unit, or a lateral expansion of an existing landfill unit, may not be located in wetlands, unless the owner/applicant can clearly demonstrate to DEQ that a practicable alternative to the proposed action that does not involve wetlands is unavailable. If no practicable alternative exists to the proposed action, then pursuant to 33 USC 1344 (Section 404 of the Federal Clean Water Act, as amended) or applicable Montana wetlands laws, the owner/applicant must offset remaining unavoidable wetland impacts through compensatory mitigation.

In 2008, EPA 40 CFR 230 and USACE 33 CFR 332 published a final rule that addresses compensatory mitigation for unavoidable losses of aquatic resources. As a result, compensatory mitigation is expected to be required for most projects involving wetland impacts. Permitting conditions and final mitigation ratios, if applicable, would be negotiated with the USACE during the Section 404 permitting process.

Considerations for Permitting and Compensatory Mitigation

The proposed landfill expansion would impact 2.41 acres of wetland. The minimum wetland mitigation requirement would be a 1:1 ratio to achieve 2.41 acres of wetland, or 2.41 mitigation credits. However, mitigation could require at least a 2:1 ratio, depending on project timing and whether or not mitigation wetlands are likely to provide the same or better quality of habitat. Actual mitigation requirements will be determined prior to 404 permitting in a Wetland Mitigation Plan. The wetland delineation report identified other potentially jurisdictional waterbodies, including Stream 1, a seasonal tributary to Blue Creek, and several ephemeral tributaries to Stream 1. While similar projects in the past have not required stream mitigation, the possibility of stream mitigation requirements should be kept in mind due to new regulatory requirements. The construction for the expansion will be considered one project, so all impacted wetlands and jurisdictional water bodies would require mitigation even if construction is completed in phases and only disturbs a portion of the waterbodies at any given time. Additional mitigation credits will be required if mitigation is not completed before construction. Any additional investigations or data collection will be defined in the future during the permitting process.

A number of options currently exist for compensatory wetland and stream mitigation. While the options and agency preferences may change in the coming years, the following list encompasses the primary options available:

- Buy into existing wetland mitigation bank;
- Pay into in-lieu fee program prior to anticipated impacts;
- Pay into in-lieu fee program at time of permitting and anticipated impacts;
- Create mitigation bank for City of Billings prior to anticipated impacts on existing City property or purchased property to have mitigation wetlands in place before permitting and anticipated impacts to minimize required credits;
- Create mitigation bank for City of Billings at time of permitting and create additional wetland to fulfill additional required credits because mitigation follows impact;
- Contract off-site wetland creation and/or restoration before anticipated impact or additional acreage after impact;

- Create wetland on-site at downstream end of intermittent stream/run-on ditch in lower-lying areas for partial mitigation, combined with one of the above strategies to fulfill any remaining mitigation credit requirements; or
- Create wetland on-site at downstream end of intermittent stream/run-on ditch, excavating a greater volume of soil as needed to create wetland acreage sufficient to create all required mitigation credits; some stream mitigation off-site could still be required.

Vegetation Cover, Quantity, and Quality

According to the Montana Natural Heritage Program (MNHP) land cover atlas maps the upland plains in the study area are identified as Big Sagebrush Steppe and Great Plains Mixedgrass Prairie (MNHP 2013). 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*). 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 site types. Dominant 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 uphill extent of the drainages.

In accordance with ARM 17.50.530, the landfill closure requirements and design criteria, the final cover system for the proposed facility will include a water-balance cover similar to those approved at the existing facility. That design includes a thickness of naturally-occurring soils with a compost-soil surface layer. The system is designed to store a volume of water equivalent to the highest single precipitation total on record, allowing that moisture to be released to the atmosphere via evapotranspiration processes facilitated by the reestablishment of a native plant community atop the engineered cover. That cover would be subject to the alternative cover demonstration process delineated by the Montana Department of Environmental Quality. The closure plans would require the final cover to be revegetated with native species within one year of placement of the final cover. The DEQ may also approve alternative revegetation plans and sequencing. Post closure of the proposed landfill, revegetation and plant succession will make the area suitable once again for wildlife habitat and livestock grazing.

Unique, Endangered, Fragile or Limited Environmental Resources

The MNHP was accessed on March 6, 2013 to determine what threatened and endangered (T&E) species and species of concern for the State of Montana exist in Section 29, T1S, R26E, in Yellowstone County. According to the MNHP, three species of concern have been documented within Section 29. Table 3.4 provides a list of the species of concern that may occur in the vicinity of the landfill expansion study area.

Table 3.4 Montana Natural Heritage Program's Species of Concern Potentially Occurring within Section 29

COMMON NAME	SCIENTIFIC NAME
Milksnake	*Lampropeltis triangulum*
Western Hog-nosed Snake	*Heterodon nasicus*
Spotted Bat	*Euderma maculatum*

Source: MT Natural Heritage Program, 2013

According to data received from MNHP, no plant species of concern were documented within Section 29, T1S, R26E, in Yellowstone County.

The U.S. Fish and Wildlife Service (USFWS) Threatened and Endangered Species Program website was searched on April 18, 2013 to determine if any threatened and endangered species (T&E) and/or critical habitat are located within or near the study area. Table 3.5 lists the USFWS results for T&E species occurring within Yellowstone County, Montana. Of the species identified, the Whooping Crane and Black-footed ferret are considered "endangered," the Greater sage grouse and Sprague's pipit are considered "candidate" species, and the Gray wolf has the status of "recovery." Note that the USFWS T&E database search provides results at the county level; actual frequency of each species' presence within the study area is unknown.

Table 3.5. Threatened and Endangered Species Occurring in Yellowstone County, MT

GROUP	COMMON NAME	SCIENTIFIC NAME	STATUS
Bird	Whooping Crane	*Grus americana*	Endangered
	Greater sage grouse	*Centrocercus urophasianus*	Candidate
	Sprague's pipit	*Anthus spragueii*	Candidate
Mammal	Black-footed ferret	*Mustela nigripes*	Endangered
	Gray wolf	*Canis lupus*	Recovery

Source: USFWS, 2013

The landfill expansion area does not have any documented occurrences of critical habitat. The existing vegetation types are neither unique nor limited in quantity, especially considering the abundance of similar land cover adjacent the study area.

No effect on any threatened, endangered, proposed, candidate or sensitive species area is anticipated to occur due to the proposed project. Considering the abundance of available habitat within proximity to the study area, the impact resulting from construction of the project would have a negligible effect to wildlife.

Historical and Archaeological Sites

A Class III cultural resources inventory of the landfill expansion area was conducted by Ethnoscience, Inc. to investigate and document the presence of any significant cultural resources and provide preliminary National Register of Historic Places (NRHP) eligibility evaluations of sites located with the study area. A pedestrian survey (field investigation) was conducted of the entire study area on October 8, 2012. Additionally, the State Historic Preservation Office (SHPO) was contacted to obtain all relevant files, survey reports, and site records. From the records search, no existing historical or archaeological sites

were identified within the study area. Due to the proximity to the existing landfill, other miscellaneous pieces of cans, glass, and debris of undetermined age were visible but were not recorded.

The field investigation resulted in identification of one site and one isolate, which were documented on the appropriate state forms (Ethnoscience 2012). Site 24YL1868 is a historic cultural material scatter located on the spine and slope of a ridge that overlooks a secondary drainage, approximately in the center of the study area (see Figure 3.3). The site consists of glass shards of various colors, a ceramic bowl shard, two pull tabs, a bird cage, numerous asphalt and wood boards associated with a roof, and the engine hood of a circa 1940s Ford vehicle. It was determined that this site was likely a local secondary trash dump. All materials appear on the surface and it is unlikely that a significant buried component exists at the site. The isolate (see HDRIF-1 on Figure 3.3) consists of the remains of a 1940s era vehicle and a pull-tab beer can located at the bottom of a very steep drainage near the road to the current landfill. Neither the one site nor the one isolate find are recommended NRHP eligible as they lack sufficient qualities to be considered significant. The proposed project was determined as having no adverse effect upon significant cultural resources.

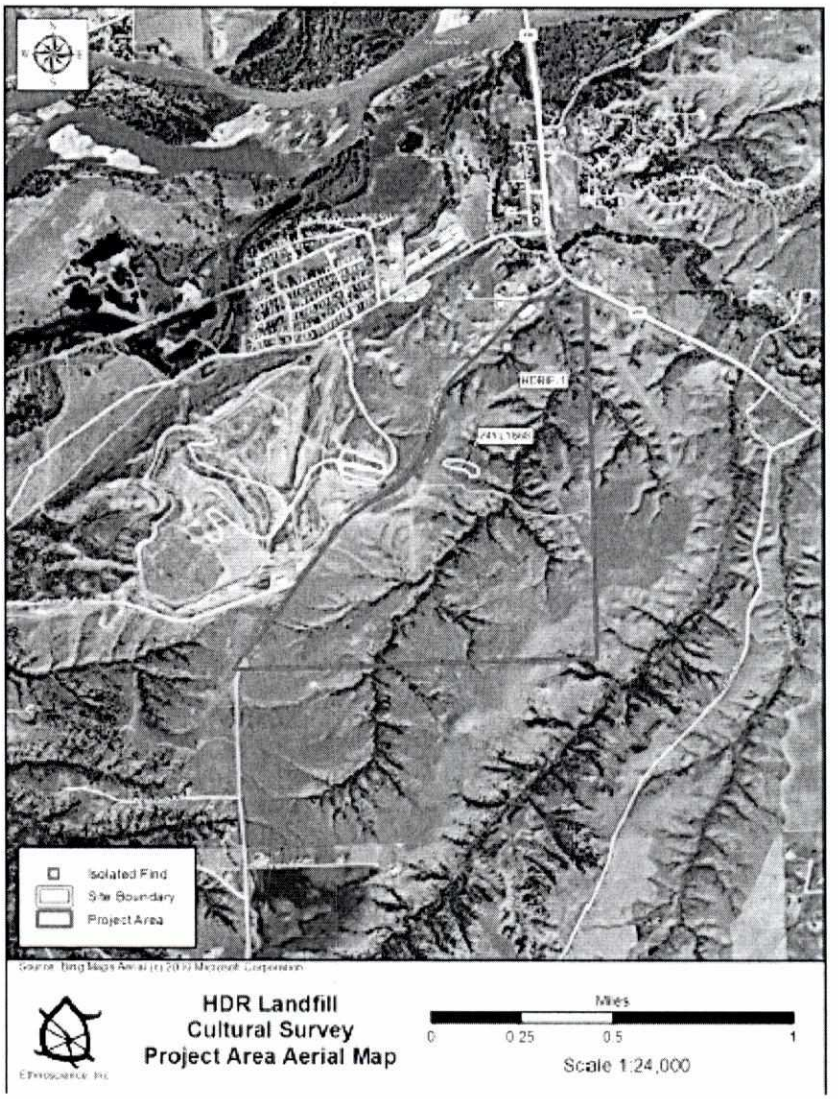

Figure 3.3. Cultural Resource Survey Results

Hazardous Waste and Sites

The DEQ Remediation Division, Permitting and Compliance Division (Waste and Underground Tank Management Bureau), Petroleum Tank Release Compensation Board (PTRCB) and the Montana State Library, Natural Resource Information System (NRIS) cooperatively provide database information regarding the following:

- Active and Inactive Regulated Underground Storage Tank sites;
- Abandoned/Inactive Mine sites;
- Active and Inactive Leaking Underground Storage Tank sites;
- State and Federal Superfund sites (including CERCLA, CECRA, WQA, ACGP, CALA, VCRA, and Brownfields), and;
- Petroleum Tank Release Compensation Board sites.

The online database was searched on April 18th, 2013 to investigate the presence of any hazardous materials within or near the study area. Database results were provided initially for the entire Yellowstone County. The sites were then narrowed down to include only sites within an approximate one-mile search radius from the landfill expansion study area. Results for sites located near the study area are listed in Table 3.6.

Table 3.6. Hazardous Waste Sites Located Near the Study Area

SITE NAME	ADDRESS	FACILITY ID	ACTIVE	PRIORITY RANKING	LOCATED IN T1S R26E SECTION 29?
BLUE BASKET FOOD MARKET 1 #946	2007 BLUE CREEK RD	5606595	YES	5.0 - Pending Closure	NO
CASEYS CORNER #7 #4924	2007 BLUE CREEK RD	5606595	YES	1.4 - High Priority Characterization	NO
CITY LANDFILL #3372	5240 JELLISON RD	5609744	YES	5.0 - Pending Closure	NO

Source: MT Department of Environmental Quality, 2013

A review of NRIS databases for LUSTs, Petroleum Tank Release Compensation Sites, and Remediation Response Sites found no record of hazardous materials or contamination within the study area (DEQ 2013c). The EPA CERCLIS Public Access Database site was also searched and found no listed sites within or near our study area.

Aesthetics

The proposed landfill expansion will likely have only minor impacts on aesthetics. The landfill expansion site is immediately adjacent the existing landfill which is an existing feature on the landscape. The proposed landfill expansion area is currently used for livestock grazing, which has impacted vegetation and eroded soils in the more heavily grazed areas. Portions of the proposed landfill expansion would be visible from Hillcrest Road and Stratton Road. The visual impacts would likely be limited to vehicular traffic or occasional cyclists traveling immediately next to the facility. The landfill expansion area would be less visible from the more heavily traveled Blue Creek Road because the expansion area is shielded by taller topography next to the road. The landscape affected by the proposed landfill expansion is not regionally or locally unique as large expanses of similar land cover exist in the immediate vicinity. In general, visual impacts resulting from the landfill expansion will not be permanent and will occur for only as long as the facility or each particular phase is in operation. As areas are capped, closed, and re-vegetated at the landfill, the aesthetics will gradually improve in those locations as operations are completed.

3.2 Potential Impacts on the Human Environment

This section analyzes the potential effects that may occur on the human environment due to implementation of the proposed action, Alternative 4. The resources listed in Table 3.7 are described in greater detail in the following sections. Generally, only those resources potentially affected by the proposed action are discussed in greater detail. If there is no effect on a resource or the resource is not present within the study area, it is noted in the respective section and not analyzed any further.

ACTS ON THE HUMAN ENVIRONMENT

UMAN ENVIRONMENT	Major	Moderate	Minor	No	Unknown
ES: Is some disruption of native or traditional lifestyles or				X	
VERSITY: Will the action cause a shift in some unique				X	
POPULATION & HOUSING: Will the project add to the housing?				X	
Vill this project add to health and safety risks in the area?				X	
COME: Will the facility generate or degrade income?				X	
F EMPLOYMENT: Will the project create, move or eliminate			X		
				NA*	
VENUES: Will the project create or eliminate tax revenue?			X		
SERVICES: Will substantial traffic be added to existing			X		
tion, police, schools, etc.) be needed?				X	
AGRICULTURAL ACTIVITIES & PRODUCTION: Will the ities?			X		
CREATIONAL & WILDERNESS ACTIVITIES: Are ocated nearby or accessed through this tract?				X	
within the tract?				X	
MENTAL PLANS & GOALS: Are there state, county, city, management plans in effect?				X	
oject affect local transportation networks and traffic flows?			X		

porary construction jobs during construction of the project

Social Structures and Mores

The proposed project will have no impact to native or traditional lifestyles or communities because these communities do not exist in the proposed landfill expansion study area.

Cultural Uniqueness and Diversity

The proposed project will have no impact to or affect any unique quality or culturally unique or diverse area within the vicinity of the project. Refer to the Historical and Archeological Sites section for more information on cultural resources within the study area.

Density and Distribution of Population and Housing

The proposed landfill expansion project would not result in an increase of population or require the need for additional housing.

Human Health and Safety

Impacts to human health and safety under the proposed alternative would not increase from existing conditions. Potential impacts resulting from the proposed project may include dust and debris transport from operations, the potential for disease transmission from animal and/or insect vectors, or potential for water contamination from storm water runoff. There are no close residents downwind or adjacent the proposed facility. The proposed landfill expansion would be designed and operated in accordance with the Montana Solid Waste Management Act and the Montana Administrative Rule ARM Title 17, Chapter 50 which provides the requirements for siting, construction, operation, and monitoring of solid waste facilities. There are no impacts to human health and safety anticipated by the proposed landfill expansion project.

Community and Personal Income

The proposed landfill expansion project would have no effect on community or personal income levels. Development of the landfill expansion site would have no impact on waste disposal costs.

Quantity and Distribution of Employment

The proposed project would have no long-term effect on the quantity and distribution of employment in the region. There would likely be a short-term increase on local employment during the construction phase of the project due to the need for contractors. The long-term requirement for operations and maintenance are expected to similar to existing conditions.

Local and State Tax Base Revenues

The short-term influx in local employment during the construction phase of the project would result in a minor beneficial impact to the local tax base. No long-term impacts, either positive or negative, are anticipated.

Demand for Government Services

The potential impact that the proposed landfill expansion facility licensure will have on the demand for government services will be minor. State personnel within the Montana Department of Environmental Quality (DEQ) will be required to review the proposal and licensing of the landfill, as well as periodic site visits during implementation. Ongoing city services and equipment operations and maintenance

required for the proposed facility will be no different than what is currently required for the existing landfill. During the construction phase, there would be a temporary increase in traffic on the roads leading to the facility; however, the impact is expected to be minor to roadway infrastructure or traffic enforcement. There will be a significant shift of traffic volume from Jellison Road to Hillcrest Road with the permitting of the new landfill. Improvements proposed to mitigate these impacts are discussed in more detail within the Transportation section below.

Industrial, Commercial, and Agricultural Activities and Production

Construction of the proposed facility will result in a minor increase in industrial activity due to the need for construction contractors, additional machinery, and associated materials. The area surrounding the proposed landfill expansion area is sparsely populated and the housing that is nearest the existing facility has long been accustomed to the noise associated with landfill operations. No noise sensitive receptors are located near the study area and therefore noise impacts from construction activities are expected to be minor.

Part of the study area is zoned Agricultural Open (see Land Use and Zoning below). Current agricultural activities within the study area are limited to cattle grazing, which produces nominal income for the City. The loss of the study area for this use is not expected to affect the City negatively. Additionally, ample open space exists near the study area for future cattle grazing opportunities.

Access to and Quality of Recreational and Wilderness Activities

The proposed landfill expansion will not affect access to or quality of any wilderness or recreational areas. The City of Billings has a diverse array of trails and recreational areas; however, these recreational resources are concentrated within city limits and north of the Yellowstone River, and are not in proximity to the study area.

Locally Adopted Environmental Plans and Goals

The proposed project has not been identified as conflicting or inconsistent with any locally adopted environmental plans or goals. No impacts are anticipated.

Land Use and Zoning

The proposed landfill expansion area is located on approximately 350 acres of land owned by the City of Billings. The existing landfill and expansion area is located outside of the Billings city limits. The majority of the expansion area is zoned Agricultural Open, or A1. A portion of the expansion area that is nearest Hillcrest Road, including the existing landfill, is zoned Public, or P (Yellowstone County 2013). The area is currently used for livestock grazing and horse pasture and is primarily vacant open space. Located in the very northern portion of the study area, near the Hillcrest Road/Blue Creek Road intersection, are a corral, watering tanks, and a stockpile of pipes. There is also a power substation located along Hillcrest Road. Within the landfill expansion area, the City has two separate parcels that allow grazing activities, each of which generates $300/year in revenue. The City would lose this revenue for several decades if the land use was converted to a landfill.

Transportation

Existing Transportation

Access to the existing landfill is provided by Jellison Road from South Billings Boulevard /Blue Creek Road. South Billings Boulevard, which turns into Blue Creek Road, has an interchange on Interstate 90 and provides good access to the landfill entrance. The existing primary route for vehicles arriving at the landfill is to travel south on Blue Creek Road then turn west onto Jellison Road. The right turn movement at this intersection utilizes a dedicated right turn lane. The landfill entrance is located approximately 0.7 miles along Jellison Road to the south. South Billings Boulevard has an interchange on Interstate 90 which provides good access to the landfill entrance. Hillcrest Road is located between the existing landfill and the expansion area.

Peak hour traffic analysis was conducted at the intersection of Blue Creek Road and Jellison Road from 7:30 am to 9:30 am. The analysis found that the eastbound movement operates at Level of Service (LOS) B, while the other intersection movements operate at a LOS A. Based on the LOS analysis, it was determined that directing traffic from Jellison Road to Hillcrest Road as required under Alternative 4 is not anticipated to significantly impact these intersections.

Roadway Improvements under Alternative 4

Field and topographical map reconnaissance surveys were conducted to determine potential alternate routes to accommodate expansion of the landfill south across Hillcrest Road while still providing acceptable levels of service. Hillcrest Road is a County collector road that serves residential and ranching properties to the south of Blue Creek Road. An electrical substation, overhead power, buried telephone lines, gas mains, and a commercial property are located along Hillcrest Road. Existing curve data and the roadway function were used to determine a design speed of 45 mph. This design speed is used for all roadway alternatives.

During development of the landfill expansion alternatives, three separate road improvement alternatives have been considered:

- Roadway Alternative 1: Reconstruction of Hillcrest Road
- Roadway Alternative 2: Reroute of Hillcrest Road to perimeter of expansion area
- Roadway Alternative 3: Reroute of Hillcrest Road to Collier Road

A detailed description of these 3 roadway alternatives can be found in Chapter 11 of the *Solid Waste Alternatives Analysis Final Report* (City of Billings 2013). Of the 3 scenarios developed, Roadway Alternative 1 was selected as part of Alternative 4. Roadway Alternative 1 is described below.

Roadway Scenario 1: Reconstruction of Hillcrest Road

This alternative will maintain the existing horizontal alignment, but will improve the typical section to include two foot shoulders as well as improving the cut/fill slopes to meet existing County Road standards. The intersection of Hillcrest Road and Blue Creek Road does not provide adequate grades or sight distances. This alternative includes the construction of an approach landing along Hillcrest Road to

meet MDT standards resulting in an approximate ten foot cut adjacent to the substation. This cut creates the need for a retaining wall separating the lowered Hillcrest Road from the substation to minimize impacts. Utility relocation will be required.

The alternative includes reconstruction of approximately 1100 feet of Blue Creek Road to improve the intersection sight distance to meet minimum MDT requirements.

The right turn lane found at the intersection of Blue Creek and Jellison does not appear to be warranted based on traffic count data alone, but is likely there due to accident data. During the field reconnaissance, a crash occurred that was caused by a north turning vehicle on Jellison unable to see north on Blue Creek due to the presence of a large commercial vehicle. An addition of a dedicated right turn lane from Blue Creek Road to Hillcrest Road is recommended due to type of vehicles utilizing the landfill.

Alternative 4 includes an on-grade crossing of landfill traffic at Hillcrest Road. A signalized intersection is recommended at this location. The estimated cost of this roadway alternative is $5.3 million in 2012 dollars. Property acquisition will be required on the eastern end of Hillcrest Road on the north side of the road.

Figures 3.4, 3.5, and 3.6 illustrate the three roadway alternatives and provide additional information for the reconstruction of Hillcrest Rd.

Utilities

There are existing utilities located in the landfill expansion area which will affect the overall cost of the landfill expansion project. There is an overhead power line and underground telephone line running along Hillcrest Road. Also located along Hillcrest Road is an unknown diameter underground gas line owned by Montana-Dakota Utilities Company. Portions of these utilities will be required to be relocated for Alternative 4. Additionally, a large overhead power transmission line runs through the expansion area owned by Northwestern Energy.

Figure 3.4

Figure 3.5

Figure 3.6

Section 4.0 References

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