Appendix D

Natural Resource Report

Natural Resources and Wetland Determination Report for the Garden Creek NGL Pipeline, McKenzie County, North Dakota

Prepared for

Bear Paw Energy, LLC

Prepared by

SWCA Environmental Consultants

June 20, 2011

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1.0 INTRODUCTION

1.1 BACKGROUND

SWCA Environmental Consultants (SWCA) conducted natural resources field surveys in order to identify exclusion and avoidance areas as specified in North Dakota Administrative Code (NDAC) 69-06-08-02 on the behalf of E3 Environmental, LLC (E3), for the proposed Bear Paw Energy, LLC (Bear Paw), Garden Creek Natural Gas Liquids Pipeline (Garden Creek) project. Bear Paw proposes to construct a 10-inch-diameter natural gas liquids (NGL) pipeline connecting the Garden Creek Gas Processing Plant, located northeast of Watford City, North Dakota, to the Riverview Terminal, located just southwest of Sidney, Montana. From the Riverview Terminal, the NGL would be shipped by rail.

The Garden Creek project is approximately 63.2 miles long, spanning private lands in North Dakota, U.S. Forest Service (USFS) lands in North Dakota, and private lands in Montana (see maps in Appendix A). Approximately 40.5 miles (non-contiguous) of pipe would cross private lands in McKenzie County, North Dakota; 13.7 miles (non-contiguous) would cross USFS lands (Dakota Prairie Grasslands, Little Missouri National Grasslands) in McKenzie County, North Dakota; and nine miles would cross private lands in Richland County, Montana. The portion of the pipeline crossing private lands in North Dakota falls under the jurisdiction of the North Dakota Public Service Commission (NDPSC). E3 is assisting Bear Paw with their application to the NDPSC for a certificate of corridor compatibility and route permit for the project.

The proposed 10-inch pipeline would be constructed within a 95-foot-wide temporary construction right-of-way (ROW). The ROW would be slightly offset on the centerline, with 45 feet of construction ROW on one side of the centerline and 50 feet of construction ROW on the other. Portions of the pipeline follow an existing pipeline ROW (Lewis and Clark Pipeline), while the remainder follows a greenfield corridor. Where the pipeline is co-located (on USFS lands and the private parcels interspersed between the USFS parcels), the pipeline centerline would be offset 10 feet from the existing Lewis and Clark Pipeline, and therefore the 95-foot-wide ROW would largely overlap with the existing pipeline disturbance. As proposed, additional disturbance would only occur on the northern and western side of the pipeline centerline, as the southern and eastern portion of the construction ROW is contained within the 50-foot-wide permanent ROW for the Lewis and Clark Pipeline. The Project ROW access uses existing access roads.

The inventoried area discussed herein is situated on the U.S. Geological Survey (USGS) Schafer (1979), Watford City (1980), Arnegard (1979), Stock Butte (1960), Bear Butte (1976), Moline School (1975), Sather Lake (1976), Phillip Spring (1975), Sheep Creek (1975), and Sidney SE (1975), North Dakota, quadrangles, as shown Appendix A. The inventoried area includes parcels in Sections 31, 32, 33, 34, and 35, Township (T) 151 North (N), Range (R) 98 West (W); in Section 6, T150N, R98W; Sections 1, 2, 11, 14, 15, 16, 21, 28, and 33, T150N, R99W; in Sections 4, 5, and 6, T149N, R99W; in Sections 1, 8, 9, 10, 11, 12, 16, 17, 18, and 19, T149N, R100W; in Sections 23, 24, 26, 27, 28, 32, and 33, T149N, R101W; in Sections 1, 2, 3, 4, 5, 6, 7, 8, and 9, T148N, R102W; in Sections 1, 12, 13, and 14,

T148N, R103W; in Sections 8, 9, 10, 11, and 12, T147N, R104W; and Section 12, T147N, R105W (see Appendix A).

The NDPSC has claimed jurisdiction over the survey area and is requiring a certificate of corridor compatibility and route permit be obtained prior to the commencement of construction activities.

SWCA conducted a field survey of a 250-foot-wide corridor between April 20 and 28, and May 17, 18, and 27, 2011, to determine the potential presence and extent of jurisdictional waters of the U.S., commonly referred to as a wetland determination, within the proposed survey area. Concurrently with the wetland determination, SWCA also conducted a cursory threatened and endangered species survey and habitat assessment; a tree, sapling, and shrub enumeration survey; and a noxious weed survey. An intensive search for all species of concern and an evaluation of habitat components necessary to support species of concern were conducted on USFS lands (SWCA 2011). On June 20, 2011, a block survey covering 0.89 acre was conducted in an area adjacent to the previously surveyed corridor for a possible pipeline re-route should it be deemed necessary in the future. Site Layout Maps of the survey area and natural resource features identified during the field surveys are provided in Appendix A.

This report outlines the methodology used by SWCA's ecologists to complete each of the aforementioned surveys. Additionally, this report presents the results of the completed field surveys and regulatory recommendations to ensure compliance with the NDPSC and the U.S. Army Corps of Engineers (USACE) Nationwide Permit 12.

1.2 REGULATORY BACKGROUND

1.2.1 Clean Water Act, Section 404

Section 404 of the Clean Water Act prohibits the discharge of fill material into waters of the U.S., also known as jurisdictional waters, without a permit from the USACE.

1.2.2 USACE Nationwide Permit 12

The USACE Nationwide Permit 12 authorizes the construction of utility lines and associated facilities in waters of the U.S., provided the activity does not result in the permanent loss of greater than 0.5 acre of waters of the U.S., including wetlands.

Nationwide Permit 12 also authorizes the construction of access roads for utility lines, provided that the access road:

- does not result in the permanent loss of greater than 0.5 acre of waters of the U.S.;
- is constructed to the minimum width necessary;
- is constructed so that the length of the road minimizes any adverse effects to waters of the U.S.;
- is as near as possible to pre-construction contours and elevations; and

- is properly bridged or culverted when constructed above pre-construction contours.

If the access roads are used exclusively for construction purposes, they must be temporary and removed upon project completion.

Nationwide Permit 12 requires that the permittee submit a pre-construction notification prior to commencing construction if any of the following criteria are met.

- The activity involves mechanized land clearing in a forested wetland.
- A Section 10 permit is required to cross a navigable waterbody (Rivers and Harbors Act).
- The utility line exceeds 500 feet in length through any single crossing of a water of the U.S.
- The utility line is placed within a jurisdictional area (i.e., water of the U.S.) and it runs parallel to a stream bed that is within that jurisdictional area.
- Discharges result in the permanent loss of greater than 0.1 acre of waters of the U.S.
- Permanent access roads are constructed abovegrade in waters of the U.S. for a distance of more than 500 feet.
- Permanent access roads are constructed in waters of the U.S. with impervious materials.

1.2.3 USACE Regional Conditions

The USACE has published several regional conditions for projects operating under Nationwide Permits in North Dakota. The regional conditions apply to wetlands classified as "fens," waters adjacent to natural springs, the Missouri River, historic properties, and fish spawning areas.

2.0 METHODS

2.1 PRE-FIELD REVIEW

Prior to conducting field surveys, SWCA reviewed the 2011 USFS sensitive and watch list species (USFS DPG 2011; USFS 2011a, 2011b, 2011c) and determined appropriate survey protocols, life history, and habitat requirements for these species on USFS lands. SWCA also compiled background data on: known species occupying the area from the USFS (personal communication, Ingalls 2011); vegetative cover (LANDFIRE 2006); soil types (U.S. Department of Agriculture, Natural Resources Conservation Service [NRCS] 2011); hydrology (USGS 2011); and climate (North Dakota State Climate Office 2010). Further, SWCA reviewed aerial imagery to assist in the wetland determinations, identification of waterbodies, and identification of woody vegetation prior to field surveys.

2.2 WETLANDS

SWCA ecologists conducted wetland determinations, within the survey area, based on the principles and guidelines provided in the 1987 Corps of Engineers Wetlands Delineation Manual (Manual) (Environmental Laboratory 1987) and the *Interim Regional Supplement to the Corps of Engineers Wetlands Determination Manual: Great Plains Region Version 2.0* (Supplement) (USACE 2010). According to the Manual, an area is a wetland if three mandatory wetland indicators are present in a given area, with special exceptions. These criteria include the presence of hydrophytic vegetation, wetland hydrology, and hydric soils. All wetlands and waterbodies geographically referenced within the survey area during field survey are depicted on the Site Layout Maps in Appendix A.

2.2.1 Hydrophytic Vegetation

SWCA biologists taxonomically identified all plant species within each recorded wetland area. All species were recorded according to their respective vegetative stratum. A tree is defined by the Supplement to be a woody-stemmed plant with a trunk diameter at breast height (DBH) of equal to or greater than 3 inches, regardless of height. The sapling and shrub stratum is defined by the Supplement to be composed of woody-stemmed plants with a trunk DBH of less than 3 inches, regardless of height. The herbaceous stratum includes all non-woody-stemmed plants regardless of height. Finally, the woody vine stratum includes all woody-stemmed vines, regardless of diameter.

SWCA ecologists noted each plant species' respective U.S. Fish and Wildlife Service (USFWS) indicator status (i.e., upland, facultative upland, facultative, facultative wetland, and obligate).

SWCA also noted all populations of North Dakota state- or county-listed noxious weeds identified within the survey area.

2.2.2 Wetland Hydrology

A wetland was determined to contain wetland hydrology if at least one primary indicator or at least two secondary indicators of wetland hydrology were present, as defined by the Manual. Common hydrologic indicators include the presence of surface water, high water table, soil saturation, water marks on trees or other objects, sediment deposits, water-stained leaves, and oxidized rhizospheres on living roots.

2.2.3 Hydric Soil

SWCA did not excavate any soil profiles during the wetland determination. Hydric soils were assumed to be present within each area that exhibited greater than 50% hydrophytic vegetation and a positive indication of wetland hydrology. Additionally, the assumption of the presence of hydric soil was predicated on the geomorphic position of each wetland area.

2.3 WATERBODIES

Waterbodies (i.e., ponds, creeks, streams, rivers) were identified by the presence of an ordinary high water mark (OHWM). Common identifiable indicators of an OHWM include open water or evidence of a clear, natural line visible on the bank; shelving; changes in soil characteristics; the destruction of terrestrial vegetation; the presence of litter and debris; and watermarks on structures that are inundated during normal high water conditions. The OHWM typically represents the potential limits of the USACE jurisdiction. Please note that the USACE has full discretion in determining the jurisdictional status of referenced wetlands and waterbodies.

SWCA classified streams as perennial, intermittent, or ephemeral based on field observations. During a typical year, a perennial stream contains flowing water year-round and the water table is located above the stream bed. Groundwater is the primary water source for stream flow while precipitation runoff is supplemental. Ecologists classified streams that showed significant flow during the field survey or were named or designated as solid blue lines on the USGS topographic maps as perennial.

An intermittent stream has flowing water for only portions of the year, when groundwater provides water for stream flow. During dry periods, intermittent streams may not have flowing water. Runoff from rainfall is a supplemental source of water for stream flow.

An ephemeral stream has flowing water only during, and for a short duration after, precipitation events in a typical year. Ephemeral stream beds are located above the water table year-round. Groundwater is not a source of water for the stream. Runoff from rainfall is the primary source of water for stream flow.

2.4 VEGETATION

Existing data on broad-scale vegetation communities was obtained from the LANDFIRE National Existing Vegetation Type to assist with field surveys and identification (LANDFIRE 2006). Field surveys for natural resources were conducted within a 250-foot-wide survey corridor centered on the proposed pipeline, within work areas, and within access road corridors (see Appendix A). SWCA identified areas with wetlands and any patches of woody vegetation within the ROW, such as trees, saplings, and shrubs, and the presence of noxious weeds. The position of these habitat types was geographically referenced using a handheld Trimble XT geographic positioning system (GPS) unit.

2.5 TREE, SAPLING, AND SHRUB COUNT

SWCA ecologists determined the total number of trees, saplings, and shrubs present within the surveyed 250-foot-wide ROW by employing several different techniques depending on the type of woody vegetation habitat (i.e., forested upland, shrubland, or shelterbelt) encountered and the overall extent of each habitat within the ROW. The boundary of all forested upland, shrubland, and shelterbelt habitat was geographically referenced using a Trimble GeoXT series handheld GPS unit. In forested upland and shrubland habitat, SWCA counted or estimated the number of all woody stemmed vegetation regardless of DBH. In

shelterbelt areas, all woody stemmed vegetation with a DBH of ≥ 1 inch was inventoried, regardless of height. Ecologists taxonomically identified all recorded individuals to the species level within each habitat type.

Linear Spacing Estimates: SWCA ecologists estimated the total number of individual trees or shrubs within each observed shelterbelt by calculating the total number of individuals, regardless of DBH, of each species within a set linear distance. This method assumes that spacing and species pattern between individuals is equal along the entire length of the shelterbelt. When a satisfactory number of replications was averaged (usually up to 50% of the total shelterbelt length), ecologists determined the total shelterbelt length and estimated the total number of individuals potentially present based on the average number of individuals per linear foot. Once the number of individuals per foot was estimated for each shelterbelt, SWCA used a shapefile depicting the width of the proposed disturbance area (i.e., 100 feet) to determine the linear length of each shelterbelt segment potentially impacted by construction activities. This linear length was then used to estimate the number of individual trees or shrubs potentially impacted through construction activities.

2.6 WILDLIFE INCLUDING THREATENED AND ENDANGERED SPECIES

Information regarding the presence of threatened or endangered species, which may occur within the survey area, was obtained from the USFWS list of threatened and endangered species by North Dakota county (USFWS 2011a). This document does not represent a comprehensive survey, but rather acknowledges the past and/or current presence of listed species. The lack of discovery of threatened or endangered species does not signify their non-existence within the area, but only that no primary or secondary indications of these species were recorded.

SWCA completed a cursory survey for all listed species potentially impacted by construction activities within a 250-foot-wide survey corridor centered on the proposed pipeline, including the proposed access road corridors which are located entirely within the construction ROW. A line-of-sight survey for wildlife was also conducted for a distance of approximately 0.5 mile with the aid of binoculars. Unique wildlife habitats were closely inspected on foot. Additionally, SWCA characterized suitable threatened and endangered species habitat encountered during the field survey.

SWCA ecologists noted all wildlife observed during the field survey. Wildlife sightings can involve primary observations (i.e., actual sighting of an animal) or secondary observations (i.e., observation of scat, tracks, or fur deposits).

2.7 MAPPING

The boundaries of each wetland, waterbody, and woody vegetation habitat were geographically recorded using a Trimble GeoXT GPS unit. The aforementioned GPS unit is capable of recording geographic data with sub-meter accuracy. SWCA used Universal Transverse Mercator Zone 13N as the projected coordinate system and North American Datum 1983 as the datum. ArcGIS v9.3 (ESRI Redlands, California) was used to analyze collected features, calculate areas, and generate the maps provided in Appendix A. Please

note that all data collected using the GPS unit, and displayed on the attached maps, are for review purposes only and do not represent a professional civil survey.

3.0 RESULTS

3.1 TOPOGRAPHY AND CLIMATE CONDITIONS

The project area is located in the glaciated Missouri Plateau and the River Breaks sections of the Great Plains physiographic province in western North Dakota (Fenneman 1931). The glaciated Missouri Plateau section is characterized by old plateaus and isolated mountains (Fenneman 1931). For the portion of the proposed project area located on the Missouri Plateau in the northwest Great Plains ecoregion, the general topography of the proposed project area is fairly consistent—semiarid rolling plains of shale, siltstone, and sandstone with the occasional butte (Bryce et al. 1998) (Figure 1). Largely unaffected by glaciation, this ecoregion retains its original soils and complex drainage system (Bryce et al. 1998). The general topography of the portion of the proposed project area located on the River Breaks, in the northwest Great Plains ecoregion, consists of highly dissected hills and uplands bordering major rivers and associated alluvial plains (Bryce et al. 1998) (Figure 2). The river breaks form broken terraces and uplands that descend to the Missouri River and its major tributaries. They have formed particularly in soft, easily erodible strata, such as Pierre shale (Bryce et al. 1998). The northern and eastern half of the proposed pipeline project area is located on gently rolling plains and active agricultural fields, while the western and southern half consists of increasingly dissected terrain interspersed with active agricultural fields (Figure 3). The elevation ranges from approximately 2,195 to 2,539 feet (669 to 774 meters [m]) above sea level, with the highest elevations in the northern portion of the project area, and the lowest elevations in the southern portion of the project area.

Figure 1. Project area overview depicting general topography towards eastern end of pipeline corridor, facing northeast.

Figure 2. Project area overview depicting general topography near the center section of the pipeline corridor, facing northeast.

Figure 3. General topography and adjacent agricultural disturbance along the western portion of pipeline corridor, facing west.

Overall, northwest North Dakota, like much of the northwestern Great Plains, is characterized by a moderate to cool climate, with cold, dry winters and mild to warm, dry to moderately wet summers.

3.2 WATER RESOURCES

3.2.1 Hydrology

Wetland communities observed during the determination effort displayed at least one primary or two secondary indicators of wetland hydrology, as defined by the Manual and Supplement. Upland communities either failed to display hydrologic indicators or failed to meet the hydrophytic vegetation requirement, as defined by the Manual and Supplement. Departure of observed rainfall from normal precipitation may skew the results of a visual identification of hydrologic indicators, such as Ordinary High Water Mark.

According to National Weather Service (NWS) preliminary climatological data for Williston, North Dakota, 4.69 inches of precipitation was recorded from 20 April through 20 June, 2011 (Table 1). This amount is 3.57 inches below normal for this time period. However, hydrologic conditions are still considered abnormal as a result of spring snow melt.

Table 1. Monthly Recorded Rainfall at NWS Williston, ND.

Month	2011 Recorded Precipitation (inches)	Normal Precipitation (inches)	Difference (inches)
April 20-30, 2011	1.08	1.08	0.0
May 2011	1.88	5.28	-3.40
June 1-20, 2011	1.73	1.90	-0.17
Total	**4.69**	**8.26**	**-3.57**

Source: National Oceanic and Atmospheric Administration 2011

3.2.2 Water Quality Protective Measures

During normal operation, no discharges of pollutants would occur from the proposed pipeline. However, the proposed pipeline Project would require hydrostatic (e.g., pressure-) testing to ensure the structural integrity of the system, prior to use. In total approximately 1,401,000 gallons of water would be used for the hydrostatic test. Water for the hydrostatic test would be obtained from surface waters crossed by the pipeline route or from municipal sources and trucked or piped to the pipeline for use in the tests. State regulatory permits for use of public water would be acquired prior to use.

After the test is complete, the pipeline section would be depressurized and the water would be discharged into an energy dissipation device located adjacent to the ROW. Representative discharge samples would be collected for analysis as required by state National Pollution Discharge System Elimination Permit conditions. The discharge water would be allowed to infiltrate into the soil or flow over the land.

Best management practices would be implemented for all ground-disturbing activities, as required by the Clean Water Act (CWA). With the implementation of all the provisions of the CWA National Pollution Discharge Elimination System, including federal requirements for implementation of adequate Spill Prevention, Control and Countermeasures during drilling and construction, no impacts to water resources are anticipated.

3.2.3 Wetlands

SWCA recorded 16 palustrine emergent (PEM) wetlands within the survey area, totaling 23.44 acres. However, only 14 PEM wetlands are anticipated to be temporarily impacted by the proposed 95-foot-wide construction ROW, resulting in approximately 4.16 acres of temporary wetland disturbance, as shown in Table 2. Although only the USACE has the final authority to determine if these PEM wetlands are jurisdictional, the field survey indicates that five of the 16 wetlands may not be jurisdictional, based on their lack of a significant nexus to waters of the U.S. See Appendix B for representative photographs of wetlands.

Table 2. PEM Wetland Acreage within the Survey Area

Wetland ID	Description	USACE Jurisdiction* (Yes/No)	Temporarily Impacted Area within 95-foot-wide ROW (acres)	Total PEM Size (acres)	Length of Required Crossing (feet)
BWET1	Hillside seep with *Typha angustifolia* (85%), and *Carex* sp., *Elaeagnus angustifolia*, *Sheparida argentea*, and *Phalaris arundinacea*	No	0	Unknown	0
BWET3	Depressional wetland with *Spartina pectinata*, with *Elymus canadensis* and *Carex* sp.	Yes	0.092	0.373	120
BWET4	Depressional wetland with *Rumex* sp., *Typha angustifolia*, and *Agropyron repens*	No	0.095	0.380	120
BWET5	*Typha* wetland, with *Spartina pectinata*, and *Rumex* sp.; adjacent to creek, road, and ditch	Yes	0.133	0.312	92
BWET6	*Depressional wetland with Rumex sp., Surrounded by P. deltoides*	No	0	0.17	0
BWET7	Hillside seep with *Junus* sp. (95%) and *Stipa* sp.	No	0.232	0.437	160
BWET8	*Phragmites australis* (95%), with *Typha angustifolia* and *Bromus* along margins	Yes	0.470	1.613	280
BWET9	Emergent wetland with *Phragmites australis* (60%) and *Phalaris arundinacea* and *Bromus* along margins	Yes	0.280	3.710	145
BWET10	*Spartina pectinata* (25%) and *Junus* sp. (25%), with *Agropyron repens* and *Rumex* sp.	Yes	0.432	2.875	250
BWET11	Emergent wetland with *Agropyron repens* (30%), and *Spartina pectinata*, and *Rumex* sp.; Hydrogen sulfide odor present	Yes	1.159	5.710	784
BWET12	Emergent wetland with *Phalaris arundinacea* (50%) and *Rumex* sp. (25%), and *Prunus virginiana*, *Bromus inermis*, and *Spartina pectinata.* A road and culvert cross the creek.	Yes	0.151	1.399	130
BWET13	*Phalaris arundinacea* wetland, with *Stipa viridula* and *Eleocharis palustris*	Yes	0.091	1.910	85
BWET15	Depressional wetland with *Typha angustifolia* (75%), with *Eleocharis palustris* and *Phalaris arundinacea*	Yes	0.110	0.553	57

Table 2. PEM Wetland Acreage within the Survey Area (Continued)

Wetland ID	Description	USACE Jurisdiction* (Yes/No)	Temporarily Impacted Area within 95-foot-wide ROW (acres)	Total PEM Size (acres)	Length of Required Crossing (feet)
WET1	Stock dam with *Carex* sp., *Rumex* sp., *Poa pratensis*, and *Agropyron smithii*	No	0.022	0.155	55
WET2	Emergent wetland adjacent to stream with *Bromus inermis*	Yes	0.052	0.2030	65
CWET1	Emergent wetland upstream of stock dam with *Carex* sp., *Rumex* sp.	Yes	0.844	3.530	432.5
TOTAL			**4.16**	**23.33**	

ˢ The USACE has the final authority on the jurisdictional status of a waterbody.

3.2.4 Waterbodies

SWCA identified a total of 25 waterbodies during the field survey including: three perennial streams, 13 intermittent/ephemeral streams, four perennial ponds, and five waterbodies with unknown classification (Table 3). Additionally, these drainages did not meet the criteria to be considered a wetland. For representative photos of these waterbodies, see Appendix B

Bear Paw is proposing to install perennial stream crossings by using horizontal open-cut dry crossing or horizontal directional drill crossing. This method would prevent removal of trees in the riparian zone. The open-cut crossing method would be used for installing the pipeline beneath intermittent and ephemeral streams. Open-cut stream crossings would be used across dry or non-flowing waters where the construction work area does not require isolation from stream flow.

Table 3. Waterbody ID, Name, Classification, Acreages, and Jurisdictional Status

Waterbody ID	Waterbody Name	Classification	Temporarily Impacted Area within 95-foot-wide ROW (acres)	Approximate Stream Width (feet)	USACE Jurisdictional Status*
BSTR10	West Branch Charbonneau	Intermitten t stream	0.027	6	Jurisdictional
BSTR11	Unnamed	Unknown	0	35	Jurisdictional
BSTR12	Charbonneau Creek	Unknown	0.024	10	Jurisdictional
BSTR13	Unnamed	Unknown	0.778	25	Jurisdictional

BSTR14	Unnamed	Ephemeral stream	0.196	15	Jurisdictional
BSTR15	Unnamed	Intermittent stream	0.34	15	Jurisdictional

Table 3. Waterbody ID, Name, Classification, Acreages, and Jurisdictional Status (Continued)

Waterbody ID	Waterbody Name	Classification	Temporarily Impacted Area within 95-foot-wide ROW (acres)	Approximate Stream Width (feet)	USACE Jurisdictional Status*
BSTR16	Unnamed	Intermittent stream	0.126	13	Jurisdictional
BSTR17	Unnamed	Intermittent stream	0.031	14	Jurisdictional
BSTR18	Unnamed	Ephemeral stream	0.087	10	Jurisdictional
BSTR19	Unnamed	Intermittent stream	0.004	1.5	Jurisdictional
BSTR20	Unnamed	Intermittent stream	0.154	65	Jurisdictional
BSTR21	Unnamed	Intermittent stream	0	65	Jurisdictional
BSTR22	Unnamed	Intermittent stream	0.019	8	Jurisdictional
BSTR24	Unnamed	Perennial stream	0.033	15	Jurisdictional
BSTR26	Unnamed	Intermittent stream	0.109	50	Jurisdictional
BSTR27	Bennie Peer Creek	Intermittent stream	0.015	10	Jurisdictional
BSTR28	McPeak Creek	Perennial stream	0.163	20	Jurisdictional
STR1	Bay Creek	Perennial stream	0.108	16	Jurisdictional
STRWV10	Bennie Peer Creek	Intermittent stream	0.045	20	Jurisdictional
CSTR1	Unnamed	Unknown	0.074	25	Jurisdictional
CSTR2	Unnamed	Unknown	0.147	65	Jurisdictional
BWB1	Unnamed	Perennial pond	0.094	0.715	Jurisdictional
BWB2	Unnamed	Perennial pond	0.095	0.859	Non-Jurisdictional
BWB3	Unnamed	Perennial pond	0	0.226	Non-Jurisdictional
BWB4	Unnamed	Perennial pond	0	1.562	Jurisdictional

* The USACE has the final authority on the jurisdictional status of a waterbody.

3.3 GEOLOGY

In general, the geology of the project area is characterized primarily by Oahe Formation-River Sediment. Oahe Formation-River Sediment consists of dark, obscurely bedded clay and silt (overbank sediment), generally overlying cross-bedded sand (channel sediment) on floodplains of modern streams up to 10 m (30 feet) thick (Clayton 1980). A minor portion of the project area is characterized by the Bullion Creek Formation. The Bullion Creek Formation consists of yellow-brown silt, sand, clay, sandstone, and lignite; river, lake, and swamp sediment, up to 200 m (600 feet) thick (Clayton 1980).

3.4 SOILS

Sixty-six soil types are present in the project construction corridor, based on NRCS mapping (NRCS 2011). The project area analyzed for soils covers the 95-foot-wide corridor. Table 4 lists all soil types units within the project area. The four most frequently occurring soil types were the Daglum-Belfield complex, which was present in 6.50% of the corridor, Rhoades-Daglum complex, present in 6.07% of the corridor, the Maschetah silt loam, present in 5.03% of the corridor, and the Dogtooth-Janesburg-Cabba complex, present in 4.95% of the corridor. The individual soil series descriptions for these more prevalent soil types are provided here.

BELFIELD

The Belfield series consists of deep and very deep, well to moderately well drained, very slowly permeable soils found on upland flats, terraces, and swales with slopes ranging from approximately 0 to 9%. The mean annual precipitation found throughout the spatial extent of this soil type is approximately 15 inches and mean annual air temperature is approximately 43°F. This soil type is largely used for rangeland foraging. Native vegetation species common to this soil type include western wheatgrass (*Agropyron smithii*), blue grama (*Bouteloua gracilis*), and green needlegrass (*Nasella viridula*) (NRCS 2011).

CABBA

The Cabba series consists of shallow, well drained, moderately permeable soils found on hills, escarpments, and sedimentary plains. The soil slopes broadly range between 2% and 70%. The mean annual precipitation found throughout the spatial extent of this soil type is approximately 16 inches and mean annual air temperature is approximately 43°F. The most common vegetation species found on this soil type are little bluestem, green needlegrass, and other various herbs, forbs, and shrub species (NRCS 2011).

DAGLUM

The Daglum series consists of deep and very deep, moderately well and well drained, slow to very slowly permeable soils found on swales on upland terraces and foot slopes. Slopes range from approximately 0 to 9%. The mean annual precipitation found throughout the spatial extent of this soil type is approximately 16 inches and mean annual air temperature is approximately 42°F. This soil type is used for rangeland foraging and cultivation of small

grains. Native vegetation species common to this soil type include western wheatgrass, blue grama, and green needlegrass (NRCS 2011).

DOGTOOTH

The Dogtooth series consists of moderately deep, well drained, very slowly permeable soils found in uplands where the predominant slope is between 0 and 25%. The mean annual precipitation found throughout the spatial extent of this soil type is approximately 15 inches and mean annual air temperature is approximately 42°F. The most common vegetation species found on this soil type are range and pasture grasses, including western wheatgrass and blue grama (NRCS 2011).

JANESBURG

The Janesburg series consists of moderately deep, well drained soils formed in residuum weathered from alkaline, soft shale, siltstone, and mudstone. These soils have slow or very slow permeability. They are on upland plains and have slopes of 0 to 25%. Mean annual air temperature is about 42°F, and mean annual precipitation is about 15 inches. This soil type is used for range, pasture, and the cultivation of small grains. Native vegetation is western wheatgrass, blue grama, green needlegrass, sedges, and forbs (NRCS 2011).

MASCHETAH

The Maschetah series consists of very deep, well drained soils found on sedimentary plains and hills. Slopes range from approximately 0 to 45%. The mean annual precipitation found throughout the spatial extent of this soil type is approximately 17 inches and mean annual air temperature is approximately 43°F. This soil type is used for rangeland foraging and cultivation of small grains. Native vegetation species common to this soil type include western wheatgrass, blue grama, green needlegrass, and prairie sagewort (*Artemisia frigida*) (NRCS 2011).

RHOADES

The Rhoades series consists of deep and very deep, well to moderately well drained, very slowly permeable soils found on swales and uplands with slopes ranging from approximately 0 to 25%. The mean annual precipitation found throughout the spatial extent of this soil type is approximately 16 inches and mean annual air temperature is approximately 42°F. This soil type is largely used for rangeland foraging. Native vegetation species common to this soil type include western wheatgrass and blue grama (NRCS 2011).

Table 4. NRCS Derived Soil Series Present within the ROW

Soil Types	Slopes (%)	Acres within 95-foot-wide ROW	Component Name and Percent within Map Unit
Daglum-Belfield complex	0 to 6	40.57	6.50%
Rhoades-Daglum complex	0 to 6	37.86	6.07%
Maschetah silt loam	0 to 2	31.39	5.03%
Dogtooth-Janesburg-Cabba complex	6 to 30	30.89	4.95%

Dogtooth-Janesburg silt loams	0 to 6	29.35	4.70%
Cabba-Chama-Sen silt loams	9 to 15	28.27	4.53%
Cabba-Sen-Chama silt loams	15 to 70	20.00	3.21%
Beisigl-Flasher loamy fine sands	6 to 15	19.35	3.10%
Belfield-Savage silty clay loams	2 to 6	18.63	2.99%
Cherry-Cabba silt loams	9 to 40	17.74	2.84%
Dooley-Zahl complex	6 to 9	17.01	2.73%
Savage silty clay loam	2 to 6	16.10	2.58%
Tally-Parshall fine sandy loams	0 to 6	16.10	2.58%
Brandenburg-Cabba-Dogtooth complex	15 to 70	16.04	2.57%
Maschetah silt loam	2 to 6	15.95	2.56%
Vebar-Flasher-Tally complex	9 to 15	14.18	2.27%
Cabba-Badland, outcrop complex	9 to 70	13.93	2.23%
Lawther silty clay	0 to 2	12.03	1.93%
Vebar-Flasher complex	6 to 9	10.29	1.65%
Zahl-Beisigl-Tally complex	9 to 15	10.04	1.61%
Manning-Schaller-Wabek complex	6 to 25	9.75	1.56%
Zahl-Williams loams	9 to 15	9.38	1.50%
Zahl-Williams loams, dissected	15 to 45	9.19	1.47%
Chama-Cabba-Sen silt loams	6 to 9	9.02	1.45%
Brandenburg-Searing-Dogtooth complex	6 to 15	8.69	1.39%
Reeder-Farnuf loams	3 to 6	8.41	1.35%
Zahl-Cabba-Williams complex	9 to 15	8.37	1.34%
Korchea loam, channeled, wooded	0 to 2	7.98	1.28%
Cherry silt loam	0 to 6	7.31	1.17%
Zahl-Williams loams	15 to 25	7.24	1.16%
Chama-Sen-Cabba silt loams	3 to 6	5.89	0.94%
Noonan-Niobell-Williams loams	0 to 6	5.73	0.92%
Williams-Zahl loams	3 to 6	5.55	0.89%
Savage silty clay loam	0 to 2	5.49	0.88%
Dooley-Zahl complex	3 to 6	5.39	0.86%
Farnuf loam	6 to 9	5.33	0.85%
Farnuf loam	2 to 6	5.14	0.82%
Farnuf loam	0 to 2	5.13	0.82%
Brandenburg-Cabba-Badland, outcrop complex	9 to 70	4.86	0.78%
Belfield-Grail silty clay loams	0 to 2	4.72	0.76%

Badland, outcrop-Cabba complex	9 to 70	4.04	0.65%
Williams-Zahl loams	6 to 9	3.81	0.61%
Maschetah silt loam	6 to 9	3.73	0.60%

Table 4. NRCS Derived Soil Series Present within the ROW (Continued)

Soil Types	Slopes (%)	Acres within 95-foot-wide ROW	Component Name and Percent within Map Unit
Harriet silt loam	0 to 2	3.72	0.60%
Dooley-Zahl complex	9 to 15	3.68	0.59%
Cabba-Chama-Havrelon silt loams	3 to 70	3.58	0.57%
Korchea loam, channeled	0 to 2	3.13	0.50%
Vebar-Flasher complex	3 to 6	3.05	0.49%
Manning fine sandy loam	0 to 6	2.81	0.45%
Beisigl-Flasher-Tally complex	9 to 50	2.81	0.45%
Niobell-Williams loams	0 to 6	2.77	0.44%
Cherry silt loam	6 to 9	2.66	0.43%
Savage silty clay loam	6 to 9	1.91	0.31%
Moreau-Wayden silty clays	6 to 9	1.84	0.29%
Regent-Janesburg complex	0 to 6	1.81	0.29%
Dooley fine sandy loam	0 to 6	1.69	0.27%
Zahl-Cabba-Maschetah complex	3 to 70	1.60	0.26%
Moreau silty clay	0 to 6	1.57	0.25%
Tally-Parshall fine sandy loams	6 to 9	1.45	0.23%
Amor-Cabba loams	6 to 9	1.35	0.22%
Regent-Janesburg complex	6 to 9	1.33	0.21%
Reeder-Cabba loams	6 to 9	1.21	0.19%
Janesburg-Dogtooth silt loams	0 to 6	1.13	0.18%
Regent-Savage silty clay loams	3 to 6	1.09	0.18%
Williams-Bowbells loams	3 to 6	0.04	0.01%

Source: NRCS (2011)

3.5 VEGETATION

Geographic information system (GIS) analysis and broad-scale vegetation spatial data analysis provided assessment of the area of developed, agricultural, and natural vegetation types (LANDFIRE 2006), as shown in

Table 5. Approximately 624.84 acres lies within the portion of the proposed project construction corridor located in North Dakota. Of this total, approximately 286.6 acres, or 46%, is dominated by natural vegetation types. Agricultural land cover types and other developed land covers account for the remaining 54%.

Table 5. Broad-scale Vegetation Types within Proposed Pipeline Construction Corridor

LANDFIRE Vegetation Type (North Dakota)	Acres	Percent of Total Acres in 95-foot-wide Corridor*
Natural Vegetation and Land Cover Types		
Northwestern Great Plains Mixedgrass Prairie	268.64	43.06%
Western Great Plains Depressional Wetland Systems	9.73	1.56%
Northwestern Great Plains Shrubland	2.31	0.37%
Herbaceous Semi-wet	2.17	0.35%
Western Great Plains Sand Prairie	1.09	0.17%
Western Great Plains Wooded Draw and Ravine	1.38	0.22%
Western Great Plains Sparsely Vegetated Systems	0.52	0.08%
Inter-Mountain Basins Big Sagebrush Shrubland	0.05	0.01%
Inter-Mountain Basins Big Sagebrush Steppe	0.42	0.07%
Inter-Mountain Basins Greasewood Flat	0.24	0.04%
Western Great Plains Floodplain Systems	0.05	0.01%
Total Natural Vegetation and Land Cover Types	**286.60**	**45.94%**
Agricultural Land Cover Types		
Agriculture-Cultivated Crops and Irrigated Agriculture	65.23	10.46%
Agriculture-Pasture and Hay	6.74	1.08%
NASS-Close Grown Crop	186.46	29.89%
NASS-Fallow/Idle Cropland	9.43	1.51%
NASS-Row Crop	12.94	2.07%
NASS-Row Crop-Close Grown Crop	14.64	2.35%
Introduced Upland Vegetation-Perennial Grassland and Forbland	24.13	3.87%
Total Land Area in Agriculture	**319.57**	**51.23%**
Developed Land Cover Types		
Barren	0.71	0.11%
Developed-Roads	9.75	1.56%
Developed-Upland Deciduous Forest	0.02	0.00%
Developed-Upland Herbaceous	4.54	0.73%
Developed-Upland Shrubland	2.66	0.43%
Total Land Area in Other Development	**17.68**	**2.83%**
Estimated Previous Disturbance	**336.53**	**54%**
Total Acres	**623.85**	

Source: LANDFIRE (2006)

During the field survey, SWCA ecologists identified four general types of vegetative communities within the survey area. These vegetative communities were classified as herbaceous upland, shrubland and upland woody vegetation, cropland, and PEM wetland. PEM wetlands are characterized by the presence of herbaceous hydrophytic or submergent aquatic macrophytes. Creeks, streams, and other waterbodies were also identified.

Vegetation communities met the hydrophytic vegetation criterion for wetlands if greater than 50% of dominant species had an indicator status of FAC, FACW, or OBL. The upland communities failed to meet at least one of the two assessed wetland criteria.

SWCA ecologists did not observe any occurrences of North Dakota state- or county-listed noxious weeds within the surveyed area.

3.5.1 Herbaceous Upland

Herbaceous upland communities occurring throughout the survey area consisted of non-wetland areas dominated by non-woody vegetation such as grasses and forbs. According to the LANDFIRE data, and confirmed during the field surveys, the largest natural vegetation community within the construction corridor is Northwestern Great Plains Mixedgrass Prairie, accounting for approximately 268.64 acres, or 43.06% of the entire North Dakota construction corridor. Other herbaceous upland vegetation types in the project area include Western Great Plains Sand Prairie and Western Great Plains Sparsely Vegetated Systems. In total, herbaceous upland vegetation accounts for approximately 43.31% of the vegetation found in the construction corridor.

Species common to the Northwestern Great Plains Mixedgrass Prairie and confirmed during field surveys included western wheatgrass, green needlegrass, needle and thread (*Hesperostipa comate*), prairie junegrass (*Koleria macrantha*), and various fescue (*Festuca* spp.) species. Other common species found within these herbaceous upland communities include big bluestem (*Andropogon gerardii*), green sagewort (*Artemisia campestris*), fringed sagewort (*Artemisia frigida*), cudweed sagewort (*Artemisia ludoviciana*), sideoats grama (*Bouteloua curtipendula*), blue grama, smooth bromegrass (*Bromus inermis*), purple coneflower (*Echinacea angustifolia*), squirreltail (*Elymus elymoides*), American licorice (*Glycyrrhiza lepidota*), curlycup gumweed (*Grindelia squarrosa*), needle and thread, gayfeather (*Liatris puncata*), yellow sweetclover (*Melilotus officinalis*), green needlegrass, western wheatgrass, Kentucky bluegrass (*Poa pratensis*), prairie coneflower (*Ratibida columnifera*), prairie rose (*Rosa arkansana*), and little bluestem. Shrub species found in low concentrations in this vegetation type include various snowberry (*Symphoricarpos* spp.) species, prairie sagewort, silver sagebrush (*Artemisia cana*), Wyoming big sagebrush (*A. tridentata* ssp. *wyomingensis*), soapweed yucca (*Yucca glauca*), and plains prickly pear cactus (*Opuntia polyacantha*) (Montana Field Guide 2011; Natureserve 2011).

3.5.2 Shrubland

Shrubland communities were indicated with LANDFIRE data and confirmed in the field. These included Northwestern Great Plains Shrubland, covering approximately 2.31 acres, with Intermountain Basins Greasewood Flats and Intermountain Big Sagebrush Shrubland and Steppe communities, which accounted for less than 1 acre of the construction ROW.

The field survey found shrubland communities occurring throughout the survey area consisted of upland areas dominated by woody-stemmed vegetation including downy hawthorn (*Crataegus mollis*), Russian olive (*Elaeagnus angustifolia*), silverberry (*Elaeagnus commutata*), chokecherry (*Prunus virginiana*), silver buffaloberry, and western snowberry (*Symphoricarpos occidentalis*).

Upland woody vegetation consisted of Western Great Plains Wooded Draw and Ravine vegetation type, which accounted for approximately 1.38% of the vegetative cover within the construction area. This vegetation type is dominated by green ash (F. pennsylvanica), American elm (*Ulmus americana*), boxelder (*Acer negundo*), chokecherry, western snowberry, Sprengel's sedge (*Carex sprengelii*), and western poison ivy (*Toxicodendron rydbergii*) (Montana Field Guide 2011; Natureserve 2011). For a photograph of the woody draws community type, see Appendix B.

3.5.3 Cropland

LANDFIRE data confirmed by the field survey indicates several types of agricultural occupation within the proposed ROW, making up approximately 319.56 acres, or 51.22% of the land cover within the construction corridor. Cropland vegetation accounted for most of the land cover, and included canola (*Brassica napus*) and hard red spring wheat (*Triticum aestivum*). Introduced upland grassland and forb pastures accounted for approximately 24.13 acres (3.87%) of the vegetation cover types.

3.5.4 PEM Wetland

The LANDFIRE data indicated that herbaceous semi-wet vegetation and Western Great Plains Depressional Wetlands occur in the North Dakota portion of the project ROW. The field study confirmed the presence of a total of 15 PEM wetlands in the survey area. The wetlands were found to mainly consist of herbaceous, non-woody vegetation such as sedges, spike-rushes, grasses, and forbs although some woody vegetation was present but not dominant. Common species found within these communities include quackgrass (*Agropyron repens*), big bluestem, smooth brome, *Carex* spp., redosier dogwood (*Cornus sericea*), creeping spikerush (*Eleocharis palustris*), Canada wildrye (*Elymus canadensis*), American licorice, foxtail barley (*Hordeum jubatum*), witchgrass (*Panicum capillaire*), reed canarygrass (*Phalaris arundinacea*), fowl bluegrass (*Poa palustris*), Kentucky bluegrass, smartweed (*Polygonum* sp.), *Rumex* sp., bulrush (*Scirpus* sp.), prairie cordgrass (*Spartina pectinata*), cattail (*Typha angustifolia*), and stinging nettle (*Urtica dioica*).

3.6 TREE, SAPLING, AND SHRUB COUNT

During SWCA's field survey, approximately 9 tree rows, 57 naturally occurring forested upland and shrubland areas, and 25 unknown distributions were geographically referenced within the survey area. Table 6 indicates the number of trees estimated to be impacted by the project as currently proposed. The NDPSC requires a 2:1 post- to pre-construction mitigation for all trees impacted during the construction of the proposed pipeline. Therefore, SWCA estimates approximately 3,957 two-year-old sapling individuals may need to be replanted in order to fulfill the 2:1 mitigation requirement depending on actual construction impacts.

Table 6. Tree, Sapling, and Shrub Count

Woody Vegetation (WV) ID	Species Scientific Name	Type	Number of Trees*		Estimated Mitigation Commitment
			250-foot-wide Survey Corridor	95-foot-wide Construction ROW	
BWV1	*Fraxinus pennsylvanica*	Natural	8	8	16
BWV2	*Prunus virginiana*	Natural	40	40	80
BWV3	*Prunus virginiana*	Natural	75	0	0
BWV4	*Prunus virginiana*	Natural	15	10	20
BWV5	F. pennsylvanica, *Populus deltoides*	Natural	16	2	4
BWV6	*Prunus virginiana, F. pennsylvanica*	Natural	86	0	0
BWV7	*F. pennsylvanica*	Natural	20	6	12
BWV8	*Shepherdia argentea*	Natural	75	40	80
BWV9a	*Populus deltoides*	Natural	10	0	0
BWV9b	*Populus deltoides*	Natural	10	0	0
BWV10	*Prunus virginiana*	Natural	120	68	136
BWV11	*Prunus virginiana*	Natural	61	0	0
BWV12	*Prunus virginiana*	Natural	184	0	0
BWV13	*Prunus virginiana*	Natural	203	0	0
BWV14	*Prunus virginiana*	Natural	77	0	0
BWV15	*Prunus virginiana*	Natural	45	45	90
BWV16	*Prunus virginiana*	Natural	32	32	64
BWV17	*Prunus virginiana*	Natural	45	45	90
BWV18	*Prunus virginiana*	Natural	37	37	74
BWV19	*Prunus virginiana*	Natural	47	47	94
BWV20	*Elaegnus angustifolia*	Natural	53	53	106
BWV21	*F. pennsylvanica*	Unknown	34	0	0
BWV22	*F. pennsylvanica*	Unknown	20	0	0
BWV23	*F. pennsylvanica*	Unknown	17	13	26
BWV24	*Elaegnus angustifolia*	Unknown	20	12	24
BWV25	*F. pennsylvanica*	Unknown	10	0	0
BWV26	*Juniperus virginiana, Elaegnus angustifolia, Prunus virginiana*	Unknown	68	0	0

Table 6. Tree, Sapling, and Shrub Count (Continued)

Woody Vegetation (WV) ID	Species Scientific Name	Type	Number of Trees*		Estimated Mitigation Commitment
			250-foot-wide Survey Corridor	95-foot-wide Construction ROW	
BWV27	*Juniperus virginiana, Elaegnus angustifolia, Prunus virginiana*	Unknown	23	22	45
BWV28	*Elaegnus angustifolia, Prunus virginiana*	Unknown	168	55	110
BWV29	*Elaegnus angustifolia*	Unknown	97	0	0
BWV30	*Elaegnus angustifolia*	Unknown	162	60	120
BWV31	*Prunus virginiana*	Unknown	37	37	74
BWV32	*Prunus virginiana*	Unknown	46	46	92
BWV33	*Prunus virginiana*	Unknown	16	16	32
BWV34	*Prunus virginiana*	Unknown	16	16	32
BWV36	*Elaegnus angustifolia, Prunus virginiana*	Natural	127	0	0
BWV37	*Elaegnus angustifolia, Prunus virginiana*	Unknown	6	0	0
BWV38	*Populus deltoides*	Natural	1	0	0
BWV39	*Populus deltoides*	Natural	1	0	0
BWV41	*Ulmus americana*	Tree Row	43	0	0
BWV42	*Prunus virginiana, Populus deltoides*	Natural	286	182	364
BWV43	*Ulmus americana*	Unknown	10	5	9
BWV44	*Prunus virginiana*	Unknown	109	51	101
BWV45	*Prunus virginiana*	Unknown	756	417	835
BWV46	*Ulmus americana*	Unknown	9	2	4
BWV47	*Elaegnus angustifolia*	Unknown	18	7	14
BWV48	*Ulmus americana*	Unknown	21	9	18
BWV49	*Ulmus americana*	Unknown	25	9	18
BWV50	*Elaegnus angustifolia*	Tree Row	1	0	0
BWV51	*Elaegnus angustifolia*	Tree Row	1	0	0
BWV52	*Elaegnus angustifolia*	Tree Row	7	0	0
BWV53	*Elaegnus angustifolia*	Tree Row	3	0	0

Table 6. Tree, Sapling, and Shrub Count (Continued)

Woody Vegetation (WV) ID	Species Scientific Name	Type	Number of Trees*		Estimated Mitigation Commitment
			250-foot-wide Survey Corridor	95-foot-wide Construction ROW	
BWV54	*Elaegnus angustifolia*	Tree Row	3	3	6
BWV55	*Elaegnus angustifolia*	Tree Row	3	0	0
BWV56	*Elaegnus angustifolia*	Tree Row	50	50	100
BWV57	*Prunus virginiana, Crataegus* spp.	Natural	18	0	0
BWV58	*Populus deltoides*	Natural	9	0	0
BWV59	*Populus deltoides*	Natural	4	0	0
BWV60	*Elaegnus angustifolia, Ulmus americana*	Natural	9	0	0
BWV61	*Ulmus americana*	Unknown	22	9	17
BWV62	*Ulmus americana*	Unknown	43	19	37
BWV63	*Elaegnus angustifolia*	Unknown	21	0	0
BWV64	*Elaegnus angustifolia*	Natural	27	0	0
BWV65	*Elaegnus angustifolia*	Natural	14	0	0
BWV68	*Populus deltoides, Prunus virginiana*	Natural	99	69	139
BWV69	*Populus deltoides, F. pennsylvanica*	Natural	171	78	156
WV1	*F. pennsylvanica, Prunus virginiana*	Natural	61	0	0
WV2	*F. pennsylvanica, Prunus virginiana*	Natural	78	0	1
WV3	*F. pennsylvanica, Prunus virginiana*	Natural	77	0	0
WV4	*F. pennsylvanica, Prunus virginiana*	Natural	42	0	0
WV6	*F. pennsylvanica, Prunus virginiana*	Natural	149	45	90
WV7	*F. pennsylvanica, Prunus virginiana*	Natural	88	14	27
WV8	*Syringa vulgaris, Picea pungens, Pinus ponderosa, Lonicera japonica*	Tree Row	176	67	134

Table 6. Tree, Sapling, and Shrub Count (Continued)

Woody Vegetation (WV) ID	Species Scientific Name	Type	Number of Trees*		Estimated Mitigation Commitment
			250-foot-wide Survey Corridor	95-foot-wide Construction ROW	
WV9	*F. pennsylvanica, Prunus virginiana*	Natural	147	64	128
WV10	*Elaegnus angustifolia, Populus deltoides, F. pennsylvanica, Prunus virginiana, Juniperus virginiana, Ulmus pumila*	Natural	2	0	0
WV11	*Ulmus pumila, Populus deltoides, F. pennsylvanica, Prunus virginiana*	Natural	29	11	22
WV12	*F. pennsylvanica, Elaegnus angustifolia, Lonicera japonica*	Natural	3	0	0
WV13	*Lonicera japonica*	Natural	8	0	0
WV14	*F. pennsylvanica, Elaegnus angustifolia, Lonicera japonica*	Natural	24	0	0
WV15	*F. pennsylvanica, Lonicera japonica*	Natural	32	7	14
WV16	*Lonicera japonica*	Natural	18	0	0
WV17	*F. pennsylvanica, Juniperus virginiana, Lonicera japonica*	Natural	26	0	0
WV18	*F. pennsylvanica, Lonicera japonica*	Natural	48	0	0
WV19	*F. pennsylvanica, Lonicera japonica*	Natural	180	86	172
WV20	*F. pennsylvanica, Lonicera japonica*	Natural	15	0	0
WV21	*F. pennsylvanica, Lonicera japonica*	Natural	36	0	0
WV22	*F. pennsylvanica, Lonicera japonica, Rhus glabra*	Natural	36	0	0

Table 6. Tree, Sapling, and Shrub Count (Continued)

Woody Vegetation (WV) ID	Species Scientific Name	Type	Number of Trees*		Estimated Mitigation Commitment
			250-foot-wide Survey Corridor	95-foot-wide Construction ROW	
WV23	*F. pennsylvanica, Rhus glabra*	Natural	58	22	44
WV24	*F. pennsylvanica, Rhus glabra*	Natural	33	9	18
WV25	*F. pennsylvanica, Lonicera japonica, Acer negundo*	Natural	134	34	68
WV27	*F. pennsylvanica*	Natural	1	0	0

* Estimated value based off of the observed density of trees.

3.7 WILDLIFE

SWCA conducted a cursory threatened and endangered species survey concurrently with the wetland determination. Ecologists did not observe any primary (i.e., actual sighting) or secondary (tracks, scat, fur) indication of the presence of threatened or endangered species. Sprague's pipit (*Anthus spragueii*), a candidate species, was observed during surveys. The survey area does contain suitable foraging and stopover habitat for the whooping crane (*Grus americana*) and suitable habitat for the Dakota skipper (*Hesperia dacotae*) and Sprague's pipit.

The proposed project would have no effect on black-footed ferret (*Mustela nigripes*), gray wolf (*Canis lupus*), greater sage-grouse (*Centrocercus urophasianus*), or designated critical habitat for piping plover (*Charadrius melodus*). Interior least tern (*Sterna antillarum*), whooping crane, and piping plover have the potential to occur within the project area as migrants. As a result these species may be, but are not likely to be, adversely affected by the proposed project. Dakota skipper and Sprague's pipit (both candidate species) have suitable habitat within the project area and may be, but are not likely to be, adversely affected by the proposed project.

3.7.1 Endangered Species Act

3.7.1.1 Black-footed Ferret (*Mustela nigripes*)

Federal Status: Endangered
Affects Determination: No Effect

Black-footed ferrets are nocturnal, solitary carnivores of the weasel family that have been largely extirpated from the wild primarily due to range-wide decimation of the prairie dog (*Cynomys* sp.) ecosystem (Kotliar et al. 1999). They have been listed by the USFWS as endangered since 1967, and have been the object of extensive re-introduction programs (USFWS 2010a). Ferrets inhabit extensive prairie dog complexes of the Great Plains,

typically composed of several smaller colonies in proximity to one another that provide a sustainable prey base. The *Black-footed Ferret Survey Guidelines for Compliance with the Endangered Species Act* (USFWS 1989) states that ferrets require black-tailed prairie dog (*Cynomys ludovicianus*) towns or complexes greater than 80 acres in size, and towns of this dimension may be important for ferret recovery efforts (USFWS 1988a). Prairie dog towns of this size were not observed during the field survey. In addition, this species has not been observed in the wild for more than 20 years. Therefore, the proposed project would have **no effect** on this species.

3.7.1.2 Gray Wolf (*Canis lupus*)

Federal Status: Endangered
Affects Determination: No Effect

The gray wolf, listed as endangered in the United States in 1978, was believed extirpated from North Dakota in the 1920s and 1930s, with only sporadic reports from the 1930s to present (Licht and Huffman 1996; USFWS 1978). The presence of wolves in most of North Dakota consists of occasional dispersing animals from Minnesota and Manitoba (Licht and Fritts 1994; Licht and Huffman 1996). Most documented gray wolf sightings within western North Dakota are believed to be young males seeking to establish territory (Hagen et al. 2005). The Turtle Mountain region of north-central North Dakota provides marginal habitat that may be able to support a very small population of wolves. The closest known pack of wolves is the Minnesota population located approximately 17 miles (28 kilometers [km]) from the northeast corner of North Dakota.

The gray wolf uses a variety of habitats that support a large prey base, including montane and low-elevation forests, grasslands, and desert scrub (USFWS 2010b). Due to a lack of forested habitat and distance from Minnesota and Manitoba populations, as well as the troubled relationship between humans and wolves and their vulnerability to being shot in open habitats (Licht and Huffman 1996), the re-establishment of gray wolf populations in North Dakota is unlikely. Additionally, habitat fragmentation may further act as a barrier against wolf recolonization in western North Dakota. Therefore, the proposed project would have **no effect** on the gray wolf.

3.7.1.3 Whooping Crane (*Grus americana*)

Federal Status: Endangered
Affect Determination: May Affect, Is Not Likely to Adversely Affect

The whooping crane was listed as endangered in 1970 in the United States by the USFWS and in 1978 in Canada. Historically, population declines were caused by shooting and destruction of nesting habitat in the prairies from agricultural development. Current threats to the species include habitat destruction, especially suitable wetland habitats that support breeding and nesting, as well as feeding and roosting during their fall and spring migration (Canadian Wildlife Service and U.S. Fish and Wildlife Service 2007).

The July 2010, total wild population was estimated at 383 (USFWS 2010c). There is only one self-sustaining wild population, the Aransas-Wood Buffalo National Park population, which nests in Wood Buffalo National Park and adjacent areas in Canada, where approximately 83% of the wild nesting sites occur (Canadian Wildlife Service and U.S. Fish and Wildlife Service

2007; USFWS 2010c). McKenzie County, including the project area, is within the primary migratory flyway of whooping cranes.

Whooping cranes probe the soil subsurface with their bills for foods on the soil or vegetation substrate (Canadian Wildlife Service and U.S. Fish and Wildlife Service 2007). Whooping cranes are omnivores and foods typically include agricultural grains, as well as insects, frogs, rodents, small birds, minnows, berries, and plant tubers. The largest amount of time during migration is spent feeding in harvested grain fields (Canadian Wildlife Service and U.S. Fish and Wildlife Service 2007). Studies indicate that whooping cranes use a variety of habitats during migration, in addition to cultivated croplands, and generally roost in small palustrine (marshy) wetlands within 0.6 mile (1 km) of suitable feeding areas (Howe 1987, 1989). Whooping cranes have been recorded in riverine habitats during their migration, with eight sightings along the Missouri River in North Dakota (Canadian Wildlife Service and U.S. Fish and Wildlife Service 2007:18). In these cases, they roost on submerged sandbars in wide, unobstructed channels that are isolated from human disturbance (Armbruster 1990).

Suitable whooping crane foraging habitat (i.e., cultivated cropland) was observed within the survey area. Additionally, project precautionary measures would be implemented if a whooping crane is sighted in or near the project area. Therefore, the proposed project **may affect, but is not likely to adversely affect** the endangered whooping crane.

3.7.1.4 Piping Plover (*Charadrius melodus*)

Federal Status: Threatened

Affect Determination: May Affect, Is Not Likely to Adversely Affect

The piping plover is a small shorebird which breeds only in three geographic regions of North America: the Atlantic Coast, the Northern Great Plains, and the Great Lakes. Piping plover populations were federally listed as threatened and endangered in 1985, with the Northern Great Plains and Atlantic Coast populations listed as threatened, and the Great Lakes population listed as endangered (USFWS 1985a).

Plovers in the Great Plains make their nests on open, sparsely vegetated sand or gravel beaches adjacent to alkali wetlands, and on beaches, sand bars, and dredged material islands of major river systems (USFWS 2002, 2010d). The shorelines of lakes of the Missouri River constitute significant nesting areas for the bird. Piping plovers nest on the ground, making shallow scrapes in the sand, which they line with small pebbles or rocks (USFWS 1988b). Anthropogenic alterations of the landscape along rivers and lakes where piping plover nest have increased the number and type of predators, subsequently decreasing nest success and chick survival (USFWS 2002, 2010d). The birds fly south by mid to late August to areas along the Texas coast and Mexico (USFWS 2002). The Northern Great Plains population has continued to decline despite federal listing, with population estimates of 1,500 breeding pairs in 1985 reduced to fewer than 1,100 in 1990. Low survival of adult birds has been identified as a factor (Root et al. 1992). Current conservation strategies include identification and preservation of known nesting sites, public education, and limiting or preventing shoreline disturbances near nests and hatched chicks (USFWS 1988b, 2010d).

A suitable shoreline habitat for breeding and nesting plovers does not occur within the project area and Lake Sakakawea is a minimum of 12.6 miles (20.3 km) away from the proposed

survey area. Suitable shoreline habitat may also occur along the Yellowstone River, which is located approximately 10 river miles away from the project area. It is unlikely that migrating plovers would visit the project area during their migration. Therefore, the proposed project **may affect, but is not likely to adversely affect** piping plovers.

3.7.1.5 Designated Critical Habitat of Piping Plover

Affect Determination: No Effect

The USFWS has designated critical habitat for the Great Lakes and Northern Great Plains populations of piping plover (USFWS 2002). Designated critical habitat for the piping plover includes 183,422 acres and 1,207.5 river miles of habitat along the shoreline of Lake Sakakawea in McKenzie County, North Dakota (USFWS 2002).

The proposed pipeline crosses, from east to west, the following named waterways and their smaller unnamed intermittent tributaries: Cherry Creek, Antelope Creek, Charbonneau Creek, Bay Creek, Cummings Draw, Bennie Peer Creek, McPeak Creek, Ronnigen Draw, Spring Creek, Badlands Draw, and One-O-One Creek. The Bennie Peer Creek drains into the Yellowstone River approximately 10.5 miles (17 km) northwest of the westernmost extent of the project area. Since the proposed project would not modify, alter, disturb, or affect the shoreline of Lake Sakakawea, **no effect** to designated critical habitat of the piping plover would occur.

3.7.1.6 Interior Least Tern (*Sterna antillarum*)

Federal Status: Endangered

Affect Determination: May Affect, Is Not Likely to Adversely Affect

The interior population of the least tern is listed as endangered by the USFWS (1985b). This bird is the smallest member of the gull and tern family, measuring approximately 9 inches in length. Terns remain near flowing water, where they feed by hovering over and diving into standing or flowing water to catch small fish (USFWS 2010e).

The interior population of least terns breeds in isolated areas along the Missouri, Mississippi, Ohio, Red, and Rio Grande river systems, where they nest in small colonies. From late April to August, terns nest in a shallow hole scraped in an open sandy area, gravel patch, or exposed flat and bare sandbars along rivers, sand and gravel pits, or lake and reservoir shorelines. The adults continue to care for chicks after they hatch. Least terns in North Dakota will often be found sharing sandbars with the piping plover, a threatened species (USFWS 2010e).

Census data indicate over 8,000 least terns in the interior population. In North Dakota, the least tern is found mainly on the Missouri River from Garrison Dam south to Lake Oahe, and on the Missouri and Yellowstone rivers upstream of Lake Sakakawea (USFWS 1990a, 2010f). Approximately 100 pairs breed in North Dakota (USFWS 2010e). Details of their migration are not known, but their winter range is reported to include the Gulf of Mexico and Caribbean Islands (USFWS 1990a, 2010e).

Loss of suitable breeding and nesting habitat for terns has resulted from dam construction and river channelization on major rivers throughout the Mississippi, Missouri, and Rio Grande River systems. River and reservoir changes have led to reduced sandbar formation and other

shoreline habitats for breeding, resulting in population declines. In addition, other human shoreline disturbances affect the species (USFWS 1990a). Critical habitat has not been designated for the species (USFWS 2010e). Current conservation strategies include identification and avoidance of known nesting areas, public education, and limiting or preventing shoreline disturbances near nests and hatched chicks (USFWS 2010e).

A suitable shoreline habitat for breeding and nesting terns does not occur in the project area, and Lake Sakakawea is a minimum of 12.6 miles (20.3 km) away from the survey area. It is unlikely that terns would visit the upland or wetland habitats present in the survey area. Therefore, the proposed project **may affect, but is not likely to adversely affect** endangered least terns.

3.7.1.7 Pallid Sturgeon (*Scaphirhynchus albus*)

Federal Status: Endangered
Affect Determination: May Affect, Is Not Likely to Adversely Affect

The pallid sturgeon was listed as endangered in 1990 in the United States by the USFWS (1990b). The primary factor leading to the decline of this species is the alteration of habitat through river channelization, creation of impoundments, and alteration of flow regimes (USFWS 1990b). These alterations within the Missouri River have blocked movements to spawning, feeding, and rearing areas; destroyed spawning habitat; altered flow conditions which can delay spawning cues; and reduced food sources by lowering productivity (USFWS 2007a). The fundamental elements of pallid sturgeon habitat are defined as the bottom of swift waters of large, turbid, free-flowing rivers with braided channels, dynamic flow patterns, flooding of terrestrial habitats, and extensive microhabitat diversity (USFWS 1990b).

The pallid sturgeon populations occur in the Missouri River below Fort Peck Dam to the headwaters of Lake Sakakawea and the lower Yellowstone River up the confluence of the Tongue River, Montana (USFWS 2007a). This population consists of approximately 136 wild adult pallid sturgeon (USFWS 2007a). Hatchery-reared sturgeon have also been stocked since 1998. The pallid sturgeon has been found to utilize the 15.5 miles (25 km) of riverine habitat that would be inundated by Lake Sakakawea at full pool (Bramblett 1996 per USFWS 2007a). Larval pallid sturgeons have also been found to drift into Lake Sakakawea. While the majority of pallid sturgeons are found in the headwaters of Lake Sakakawea, North Dakota Game and Fish have caught and released pallid sturgeon in nets set in 80 to 90 feet of water between the New Town and Van Hook area. Based on this information, pallid sturgeon could be found throughout Lake Sakakawea (personal communication, email from Steve Krentz, Pallid Sturgeon Project Lead, U.S. Fish and Wildlife Service, to Mike Cook, Aquatic Ecologist, SWCA Environmental Consultants, September 3, 2010).

Suitable habitat for pallid sturgeon is not present in the survey area in North Dakota, and Lake Sakakawea is a minimum of 12.6 miles (20.3 km) away from the project area. Pallid sturgeon are known to occur within the Yellowstone River, which is located approximately 10 river miles away from the North Dakota project area. However, tributaries to the Yellowstone River are found within the project area. Potential pollution occurring as a result of construction activities, hydrostatic testing, and pipeline operations are concerns for

downstream populations of endangered pallid sturgeon. Activities associated with the construction, hydrostatic testing (see section 3.3.1), reclamation, and operation of the proposed project are not anticipated to adversely affect water quality and subsequently the pallid sturgeon. Therefore, the proposed project **may effect, but is not likely to adversely affect** pallid sturgeon.

3.7.1.8 Dakota Skipper (*Hesperia dacotae*)

Federal Status: Candidate
Affect Determination: May Affect, Is Not Likely to Adversely Affect

The Dakota skipper is a small butterfly with a 1-inch wingspan and is found primarily in undisturbed native tall grass and upland dry mixed grass prairie areas with a high diversity of wildflowers and grasses (Committee on the Status of Endangered Wildlife in Canada 2003). The Dakota skipper appears to require a range of precipitation-evaporation ratios between 60 and 105 and a soil pH between 7.2 and 7.9 (McCabe 1981). Larvae feed on grasses, favoring little bluestem. Adults commonly feed on nectar of flowering native forbs such as harebell (*Campanula rotundifolia*), wood lily (*Lilium philadelphicum*), and purple coneflower. The species is threatened by conversion of native prairie to cultivated agriculture or shrublands, over-grazing, invasive species, gravel mining, and inbreeding (USFWS 2005). Dakota skippers are not known to occur within the survey area; however, suitable habitat does occur. The proposed project **may affect, but is not likely to adversely affect** this species. The use of best management practices and conservation guidelines (USFWS 2007b) during construction and operation and immediate reclamation of short-term disturbance should decrease direct, indirect, and cumulative impacts to this species.

3.7.1.9 Sprague's Pipit (*Anthus spragueii*)

Federal Status: Candidate
Affect Determination: May Affect, Is Not Likely to Adversely Affect

The Sprague's pipit is a small passerine, 10 to 15 centimeters in length, endemic to the Northern Great Plains (USFWS 2010f). The Sprague's pipit requires large tracts of native prairie habitat, unplowed, throughout their life cycle. Because native grasslands are disturbance-dependent, Sprague's pipit prefers grassland habitats that are regularly disturbed. The frequency of disturbance required for habitat maintenance depends on how quickly grasses grow to an intermediate height (4 to 12 inches) following a disturbance event.

In North Dakota, Sprague's pipit has been found in areas of moderate grazing. Sprague's pipits are sensitive to patch size and avoid edges between grasslands and other habitat features (USFWS 2010f). They may avoid non-grassland features including roads, trails, oil wells, croplands, woody vegetation, and wetlands. The Sprague's pipit is reported to stay up to 350 m away from anthropogenic features such as roads, oil wells, and wind turbines (USFWS 2010f). The USFWS has estimated that each new oil well and associated road in North Dakota results in potential impacts to approximately 51 acres of pipit habitat due to avoidance and habitat fragmentation (USFWS 2010f). Because of increasing habitat fragmentation, especially by energy development, throughout the Sprague's pipit range, and the loss of native prairie habitat, the Sprague's pipit was listed as a Candidate Species under the Endangered Species Act (ESA) in 2010 (USFWS 2010f).

In North Dakota, Sprague's pipit breeds throughout the state except for the easternmost counties. During the breeding season they prefer large patches of well drained, open native grassland with a minimum size of 358.3 acres (range = 170 to 776 acres). They have not been observed in areas smaller than 71.6 acres on their breeding grounds (USFWS 2010f).

A Sprague's pipit individual was observed within the project area in the NW ¼ of the SE ¼, Section 27, T148N, R103W, during SWCA's May 2011 survey. Additionally, a known Sprague's pipit nesting site is located approximately 1.3 miles (2.1 km) south of the proposed pipeline in the center of Section 16, T147N, R104W (Kadrmas, Lee, and Jackson 2010). Native prairie habitat with grasses of intermediate height does occur within the project area. However, the habitat within and surrounding the project area has been previously disturbed by agriculture, roads, and oil and gas development. The proposed project is unlikely to directly affect habitat due to lack of adequate patch sizes required by the Sprague's pipit for breeding grounds in the immediate project area, but may indirectly contribute to reduced use of any nearby suitable grassland habitat patches within 350 m of the proposed project. To minimize potential impacts, construction activities would occur outside of the breeding and nesting period, February 1 to July 15. Therefore, the proposed project **may affect, but is not likely to adversely affect** Sprague's pipit.

3.7.1.10 Greater Sage-grouse (*Centrocercus urophasianus*)

Federal Status: Candidate
Affect Determination: No effect

Greater sage-grouse populations are known to occur in North Dakota in Bowman, Golden Valley, and Slope counties (USFWS 2011b). Greater sage-grouse are not known to occur within McKenzie County, therefore the proposed project would have ***no effect*** on the greater sage-grouse.

3.7.2 Migratory Bird Treaty Act / Bald and Golden Eagle Protection Act

3.7.2.1 Bald Eagle (*Haliaeetus leucocephalus*)

Federal Status: Delisted in 2007; protected under the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act
Effects of Project: No adverse effects anticipated

The bald eagle (*Haliaeetus leucocephalus*) feeds on fish and carrion and typically roosts in large trees near a water source. Bald eagle nesting habitat is typically any mature stands of conifer or cottonwood trees in association with rivers, streams, reservoirs, lakes, or any significant body of water. Bald eagles are uncommon in North Dakota and are usually observed along the Missouri River (Gomes n.d.) and Yellowstone River. Bald eagles frequently migrate through the grassland habitats; however, no bald eagles or nests were observed during the field surveys. Suitable nesting and roosting habitat is not available within the project area in North Dakota. The proposed project would have ***no impact*** on this species at this time.

3.7.2.2 Golden Eagle (*Aquila chrysaetos*)

Federal Status: Unlisted; protected under the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act

Effects of Project: No adverse effects anticipated

Golden eagles (*Aquila chrysaetos*) nest on steep cliff faces and in large cottonwood trees along intermittent creeks. Golden eagles have been documented near the project area year-round; however, the majority of golden eagles migrate. The breeding season for golden eagles is from mid-March through late July. A golden eagle was observed during the field surveys, and nests have been documented within the project analysis area. Three nests are known to exist near the project area, in Sections 22, 23, and 24, T148N, R130W (personal communication, Ingalls 2011; Kadrmas, Lee, and Jackson 2010). These nests were not observed during surveys in May 2011 or during surveys conducted in June 2010 by Kadrmas, Lee, and Jackson (2010). However, suitable nesting habitat does exist within the analysis area. To minimize potential impacts, construction activities would occur outside of the breeding and nesting period, February 1 to August 15. Therefore, the proposed project ***may impact individuals or their habitat but will not likely contribute to a trend toward federal listing or cause a loss of viability to the population or species***.

3.7.3 Wildlife Observed

During the field survey, SWCA ecologists observed different species of wildlife which utilize wetlands and other habitat within the survey area (Table 7).

Table 7. Wildlife Observed during Field Surveys at the Proposed Pipeline Route

Common Name	Scientific Name	Observation Type	Comments
Northern harrier	*Circus cyaneus*	Primary	
Swainson's hawk	*Buteo swainsoni*	Secondary	Nest observed
Lazuli buntings	*Passerina amoena*	Primary	Two individuals observed
Yellow warblers	*Dendroica petechia*	Primary	Four individuals observed
Sprague's pipit	*Anthus spragueii*	Primary	
Prairie falcon	*Falco mexicanus*	Primary	Possible nest in area
Golden eagle	*Aquila chrysaetos*	Primary	
Mallard duck	*Anas platyrhynchus*	Primary	Nest observed
Ring-necked pheasant	*Phasianus colchicus*	Primary	
Sandpiper	*Actitis hypoleucos*	Primary	
Killdeer	*Charadrius vociferus*	Primary	
Red-winged blackbird	*Agelaius phoeniceus*	Primary	

Table 7. Wildlife Observed during Field Surveys at the Proposed Pipeline Route (Continued)

Common Name	Scientific Name	Observation Type	Comments
Black-tailed prairie dog	*Cynomys ludovicians*	Primary	Two towns observed; one with approximately 30 burrows, the second with approximately 70 burrows
Raccoon	*Procyon lotor*	Secondary	
Frogs	*Rana* sp.	Primary	
Deer	*Odocoileus* sp.	Secondary	
Pronghorn	*Antilocapra americana*	Primary	

4.0 CONCLUSIONS AND RECOMMENDATIONS

1. SWCA ecologists recorded approximately 23.33 acres of wetlands within the survey area.
2. In total, 4.16 acres of PEM wetland *may* be temporarily impacted by construction activities.
3. SWCA estimates 1,979 trees, saplings, and shrubs may be impacted. Therefore, approximately 3,957 two-year-old saplings may need to be replanted to fulfill the 2:1 mitigation requirement.
4. According to the recommendations of the North Dakota Forest Service (NDFS), tree species selection for replacement should be accomplished through collaboration with a reputable area nursery. This will allow for species to be selected based on various factors including species hardiness and area soil type (personal communication, telephone conversation between Tom Claeys, Forestry and Fire Management Team Leader, NDFS, and Michael Cook, Ecologist, SWCA, December 7, 2009).
5. According to the recommendations of the USFS North Dakota Office, non-native species are permitted and to an extent recommended for planting as they may be more resistant to known tree pathogens in the area (personal communication, telephone conversation between Tom Claeys, Forestry and Fire Management Team Leader, NDFS, and Michael Cook, Ecologist, SWCA, December 7, 2009).
6. No threatened or endangered species were observed during the field survey. One candidate species, Sprague's pipit, was observed during the surveys. The known species which occur in McKenzie County are not likely to be detrimentally impacted by construction activities.

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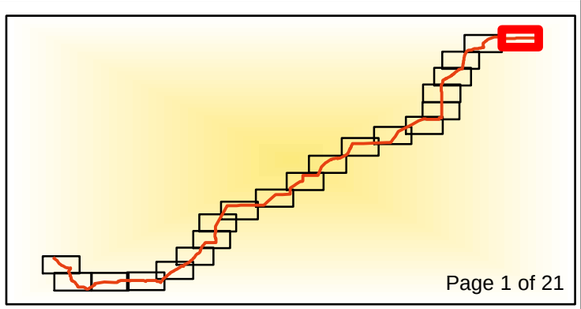
APPENDIX A

Vicinity Maps and Site Layout Maps

Legend

- Woody Vegetation
- Streams
- Woody Vegetation
- Water Bodies
- Streams
- Wetlands
- Woody Vegetation
- Sensitive Species (SWCA 2011)
- Access Roads
- Pipeline
- 95' Construction ROW
- SurveyArea



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Kilometers
0 0.45 0.9
Miles
0 0.2 0.4

Base Map: USGS 7.5' Topographic Map
Source: esri ArcGIS service
Quadrangle: Schafer

N

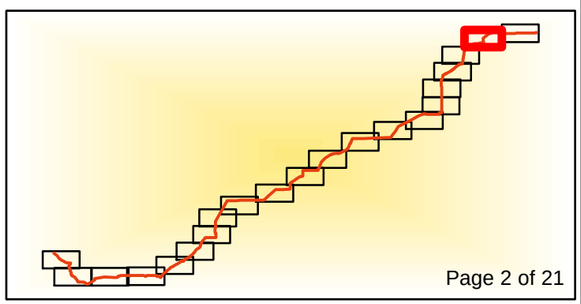
Township/Range: T151N R98W
County: McKenzie

NAD 1983 UTM Zone 13N

BWV43
BWV44
BWV45
BWV46
BWV47
BWV48
BWV49
BWV50
BWV51
BWV52
BWV53
BWV54
BWV55
BWV56

Legend

- Woody Vegetation
- Streams
- Woody Vegetation
- Water Bodies
- Streams
- Wetlands
- Woody Vegetation
- Sensitive Species (SWCA 2011)
- Access Roads
- Pipeline
- 95' Construction ROW
- SurveyArea



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Date Saved: 6/21/2011 08:32

Kilometers
0 0.45 0.9

Miles
0 0.2 0.4

Base Map: USGS 7.5' Topographic Map
Source: esri ArcGIS service
Quadrangle: Watford City

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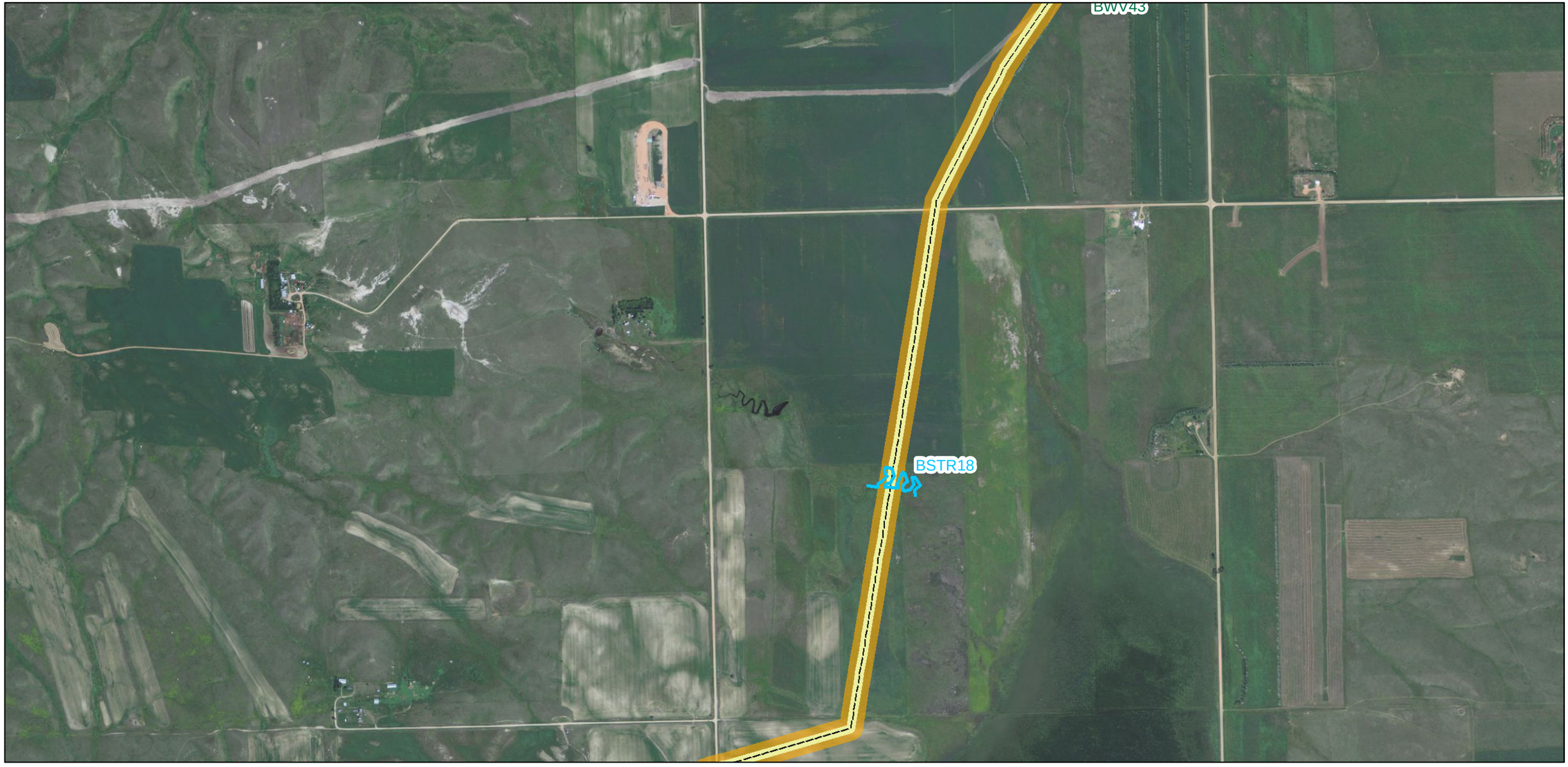
Township/Range: T151N R98W
County: McKenzie

NAD 1983 UTM Zone 13N



Legend

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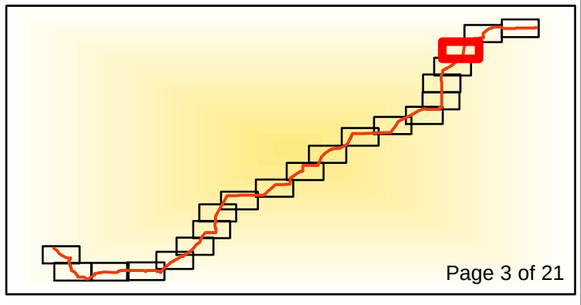

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Miles
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Base Map: USGS 7.5' Topographic Map
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Township/Range: T150N R99W
County: McKenzie

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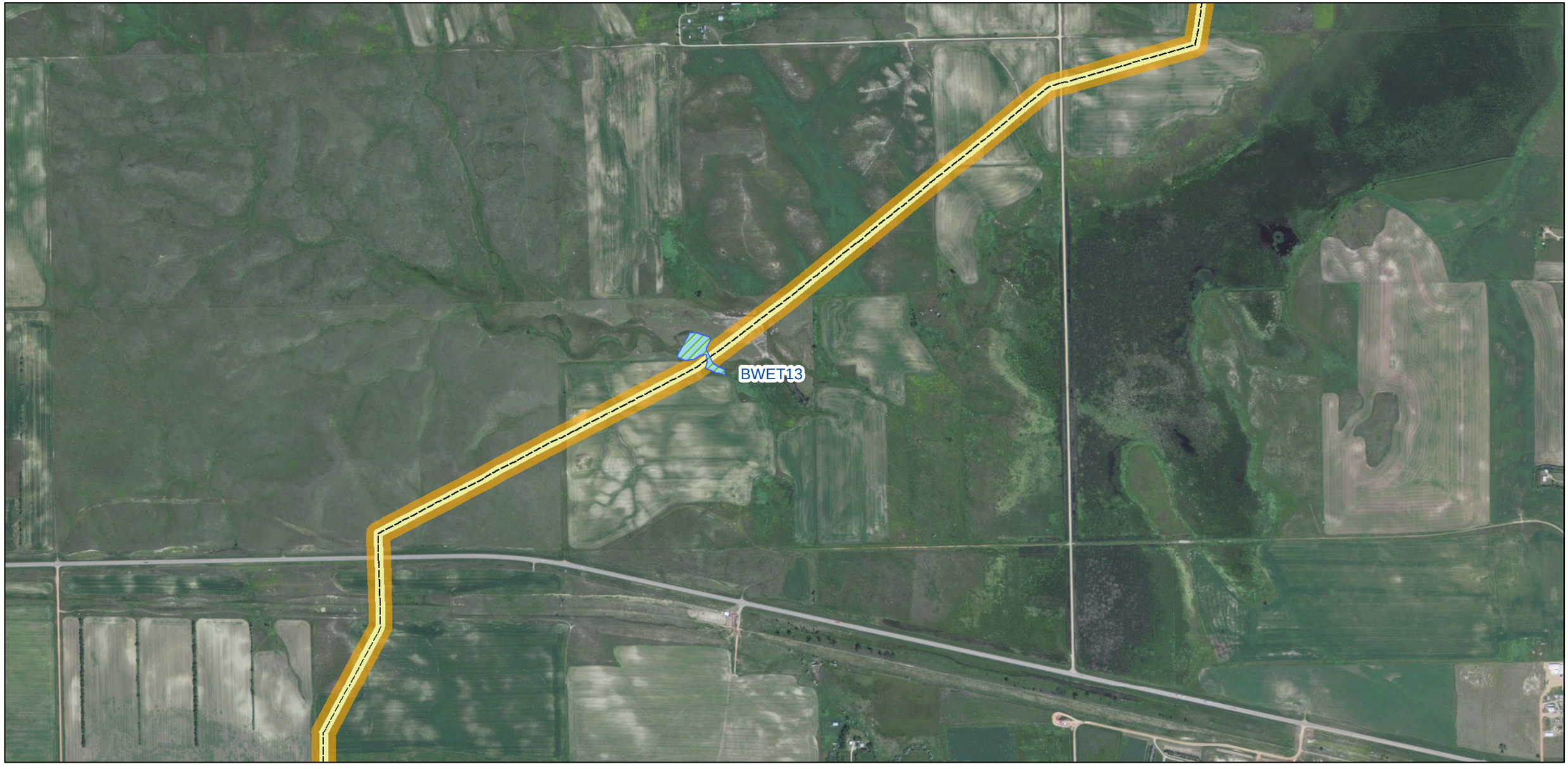

Legend

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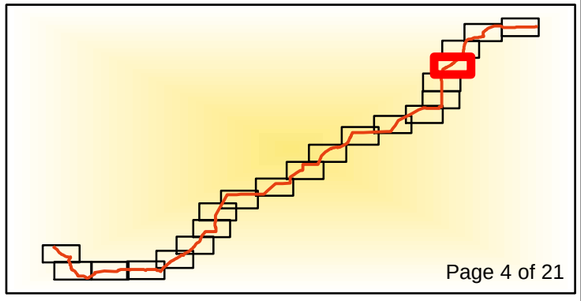

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Base Map: USGS 7.5' Topographic Map
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Quadrangle: Watford City

Township/Range: T150N R99W
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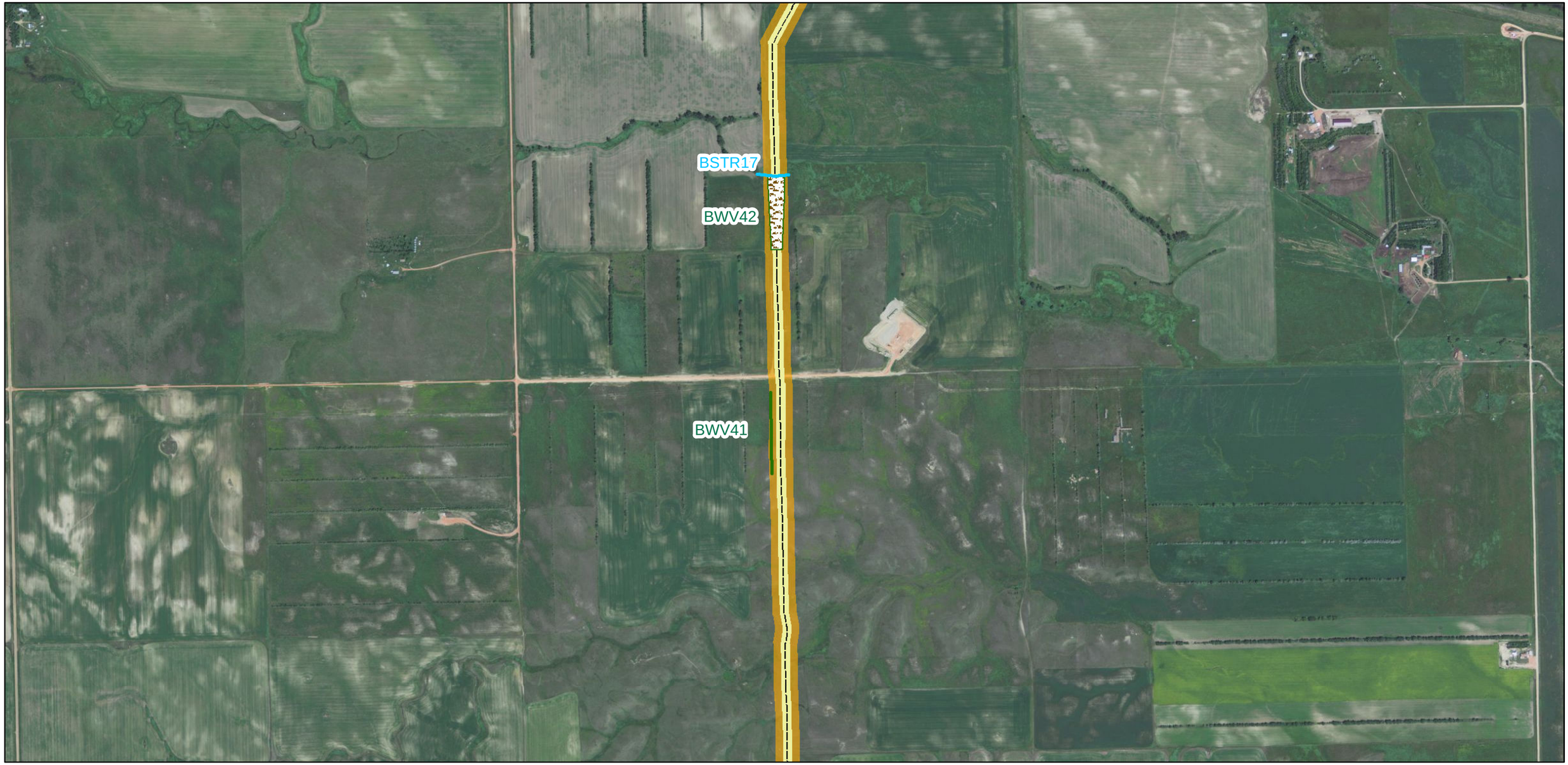

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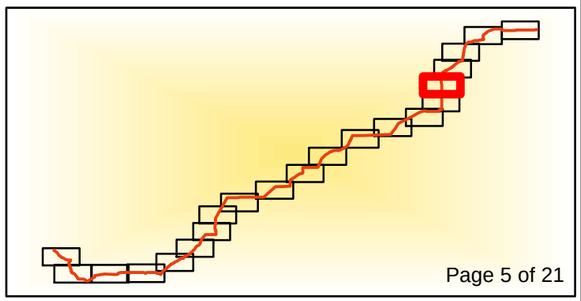

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Miles
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Base Map: USGS 7.5' Topographic Map
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Township/Range: T150N R99W
County: McKenzie

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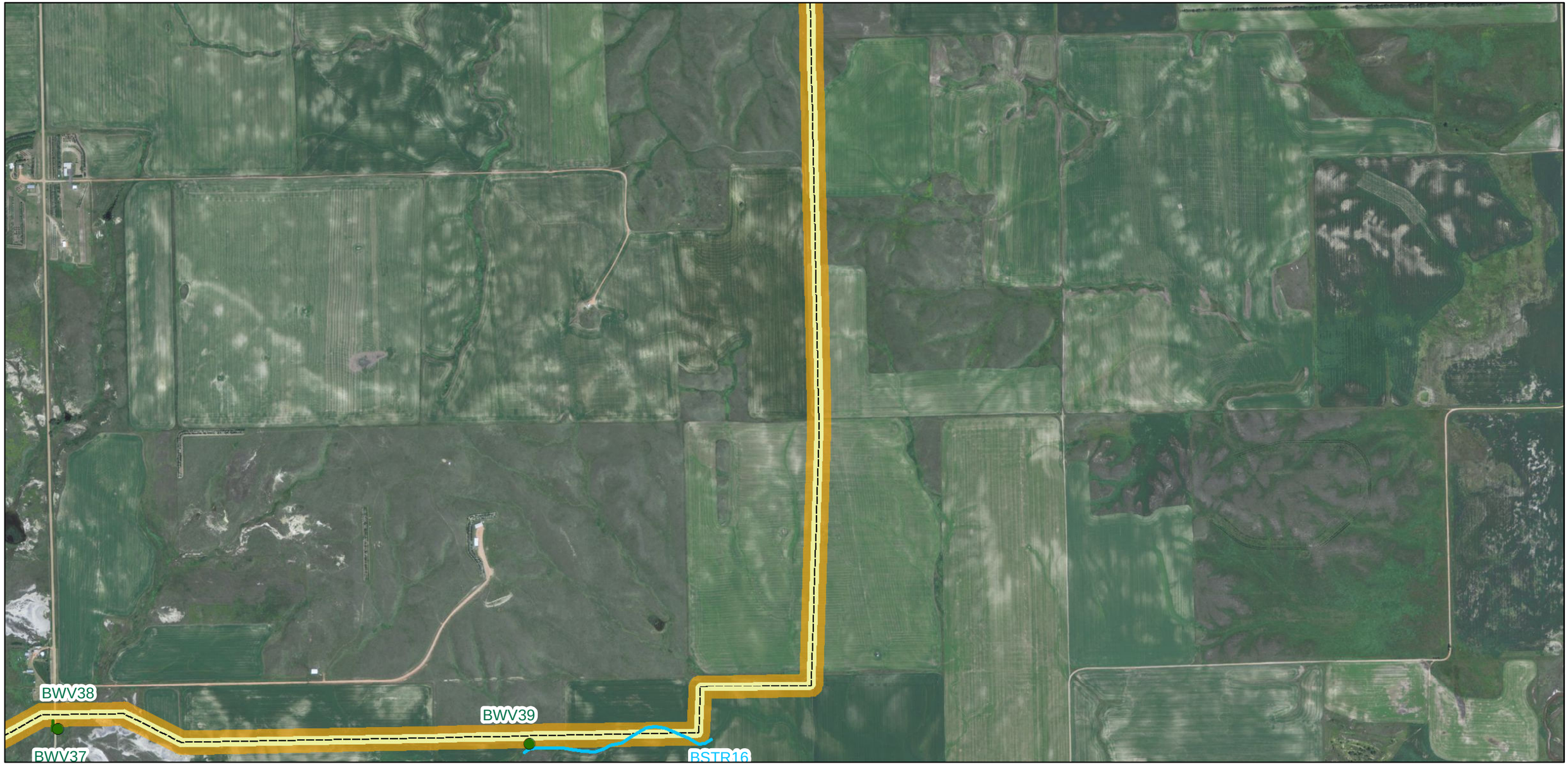

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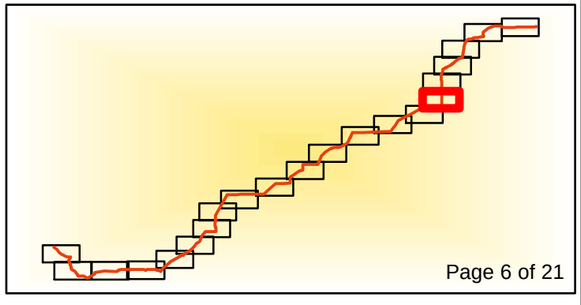

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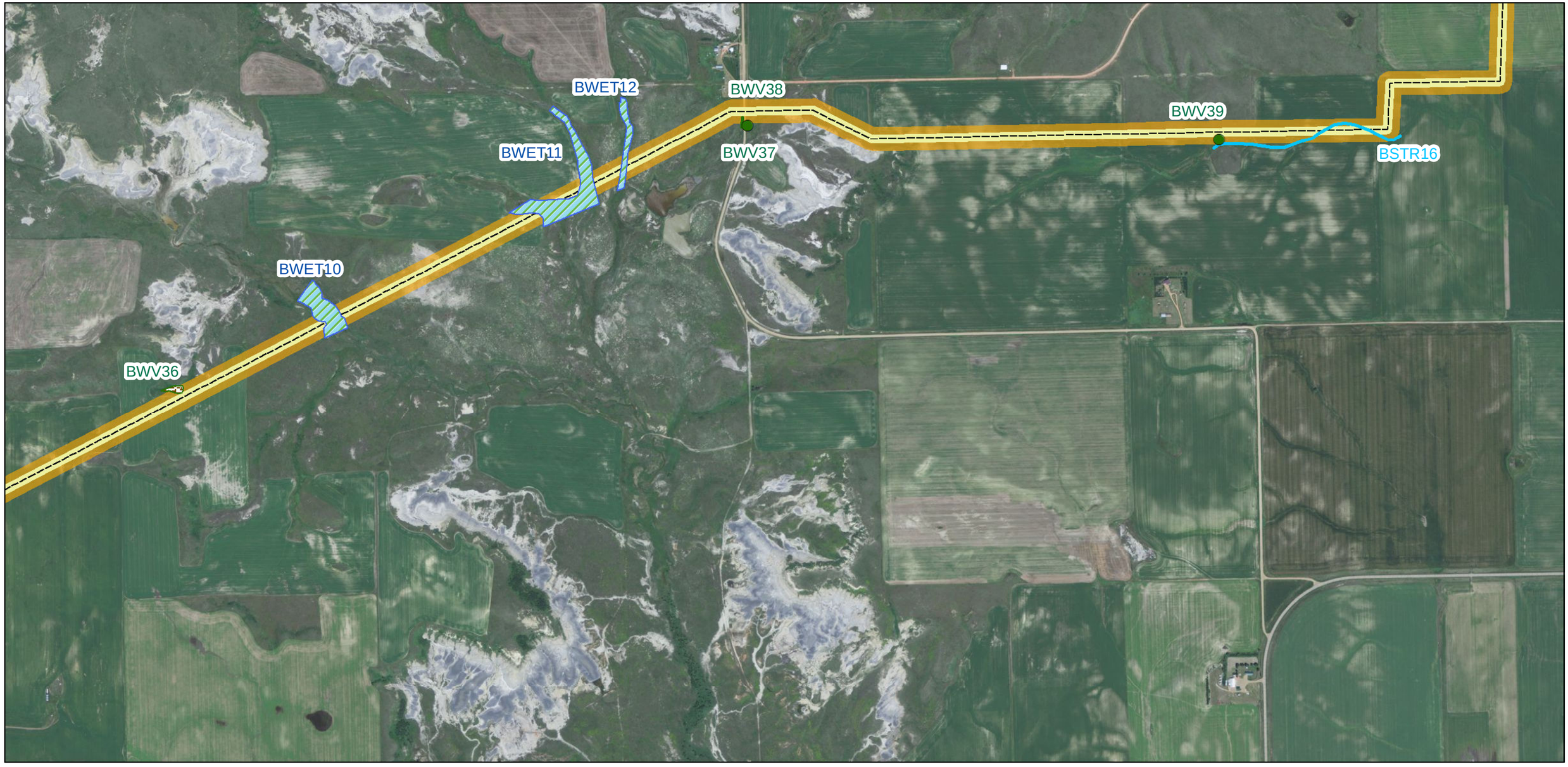

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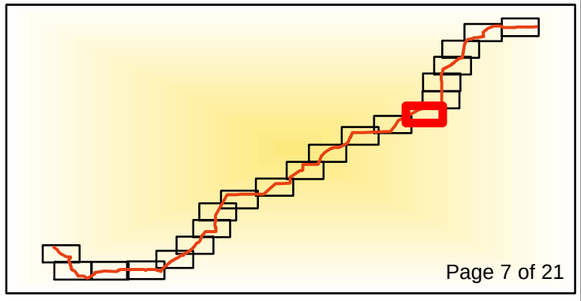

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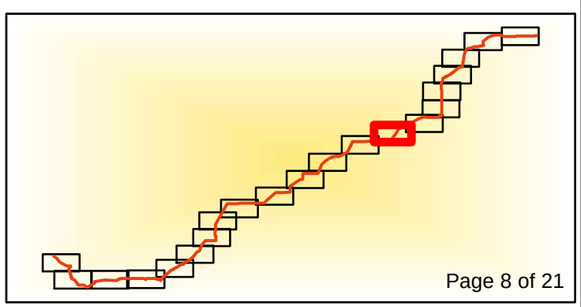

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Base Map: USGS 7.5' Topographic Map
Source: esri ArcGIS service
Quadrangle: Stocke Butte

N

Township/Range: T149N R100W
County: McKenzie

NAD 1983 UTM Zone 13N

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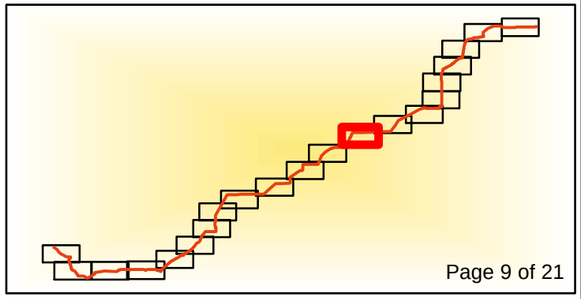

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Township/Range: T149N R100W
County: McKenzie

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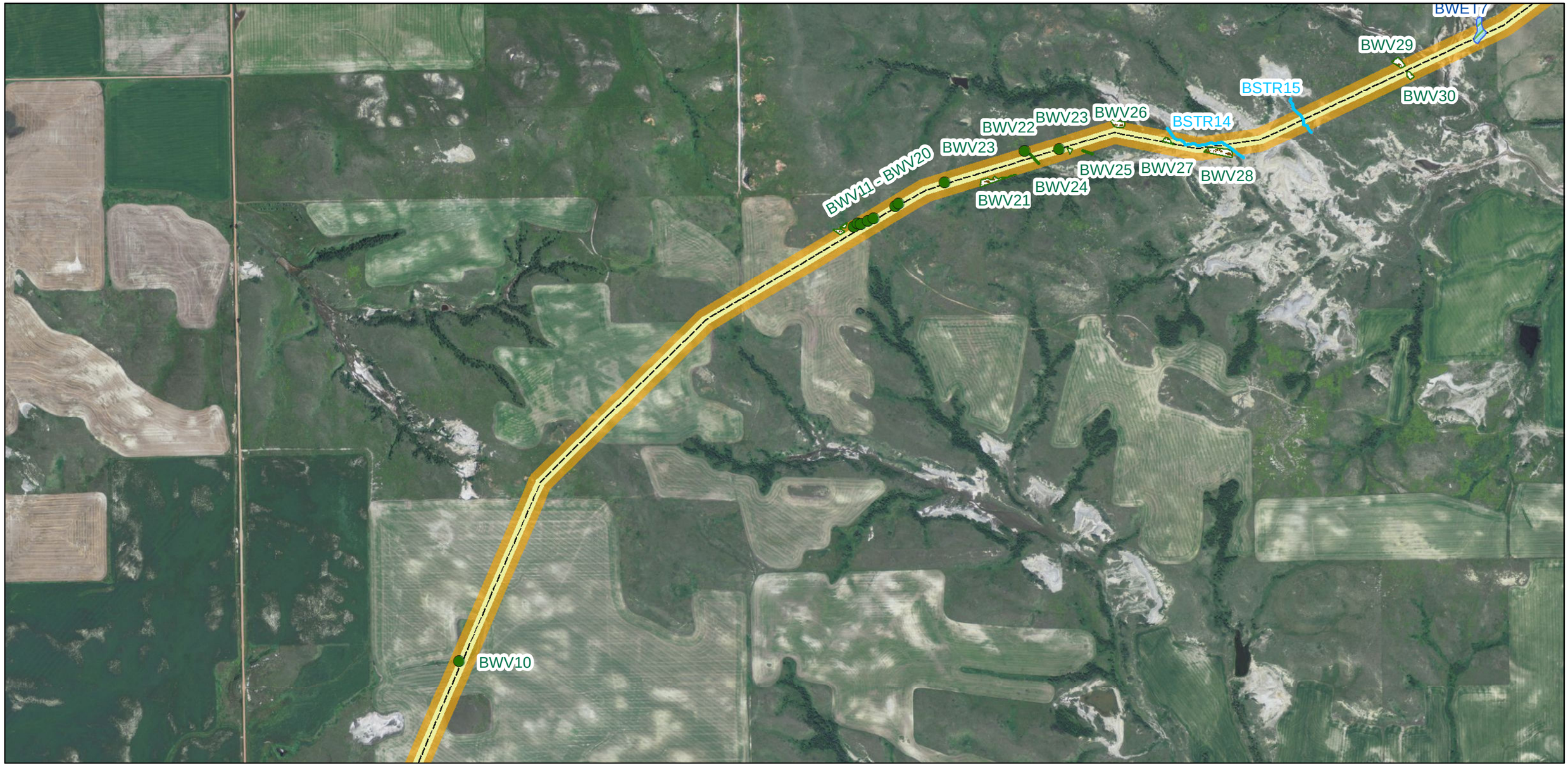

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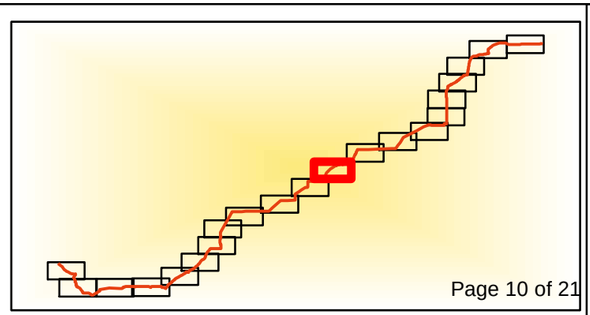

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Base Map: USGS 7.5' Topographic Map
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Township/Range: T149N R101W
County: McKenzie

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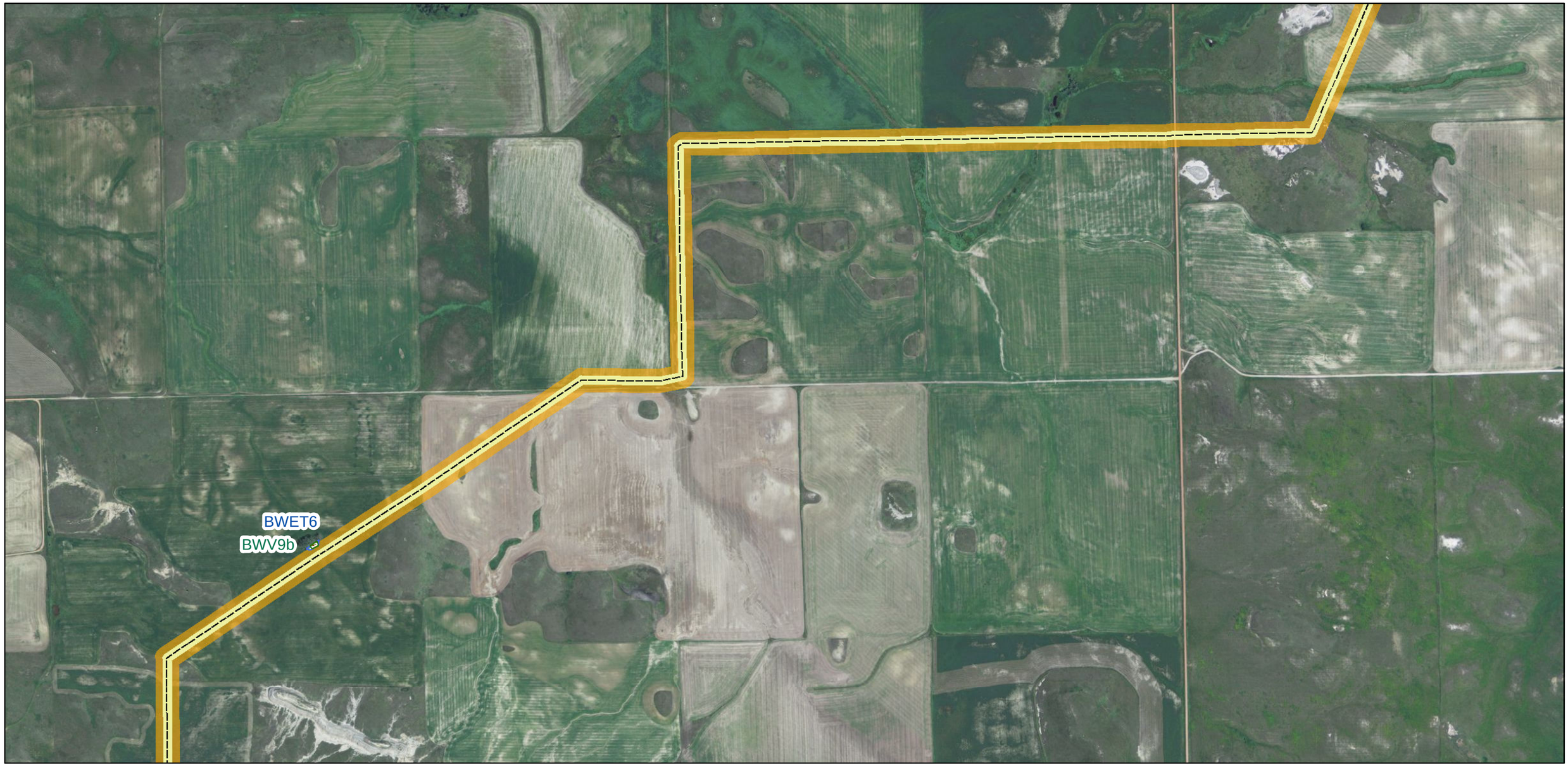

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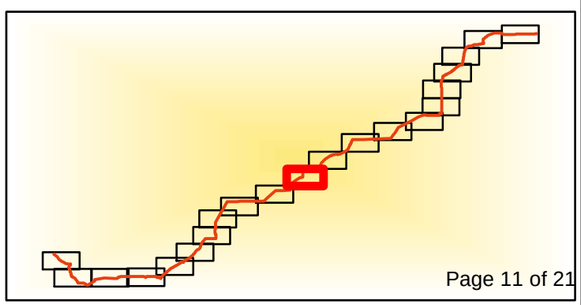

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Kilometers
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Miles
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Base Map: USGS 7.5' Topographic Map
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Township/Range: T149N R101W
County: McKenzie

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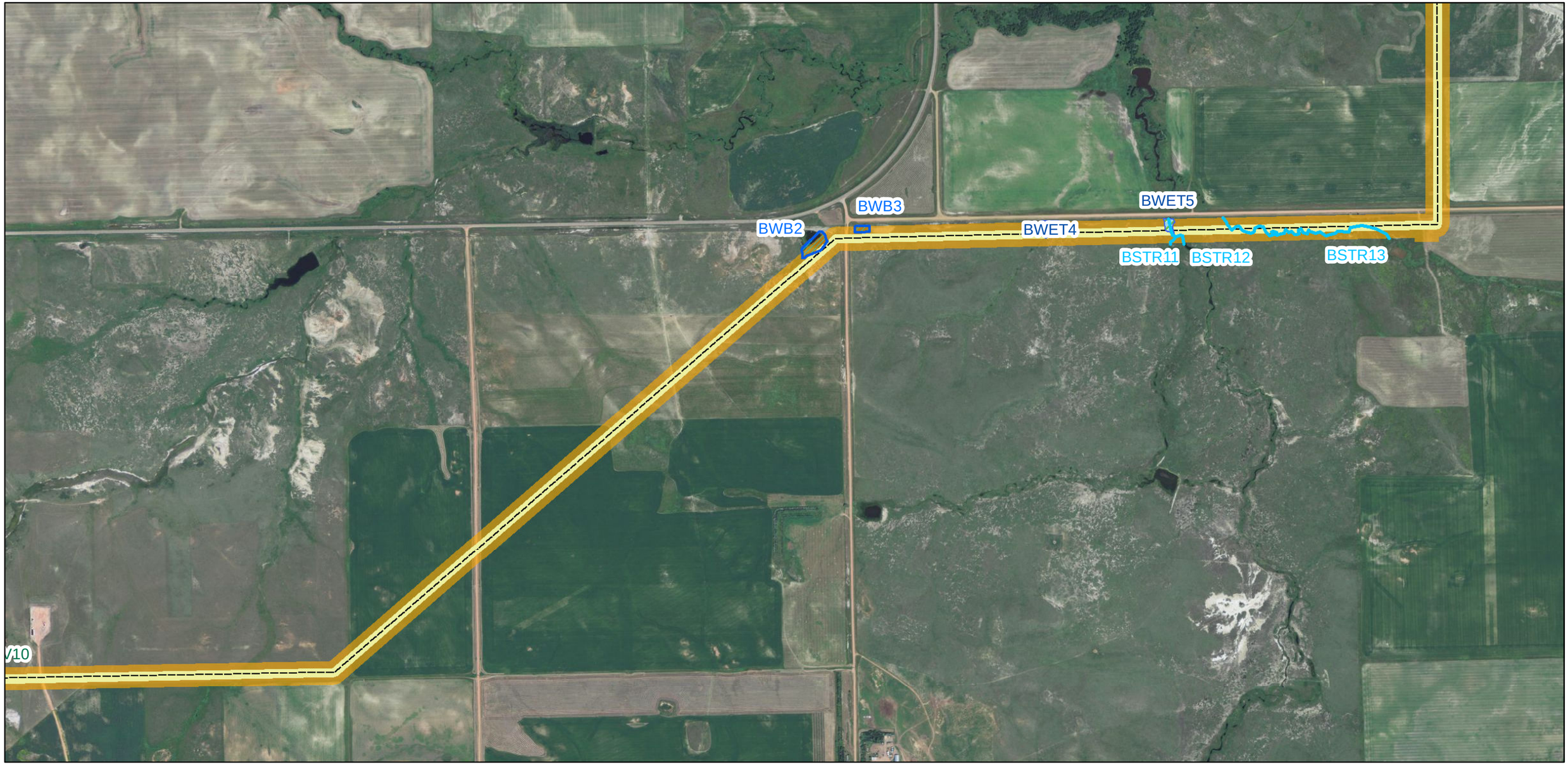
NAD 1983 UTM Zone 13N



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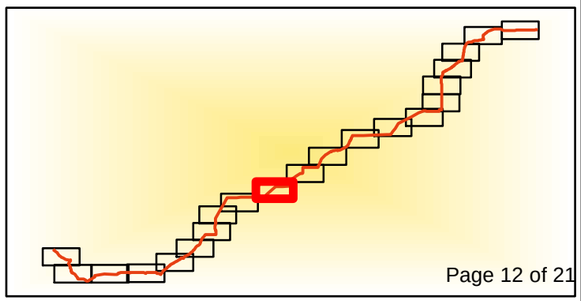

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Kilometers
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Base Map: USGS 7.5' Topographic Map
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County: McKenzie

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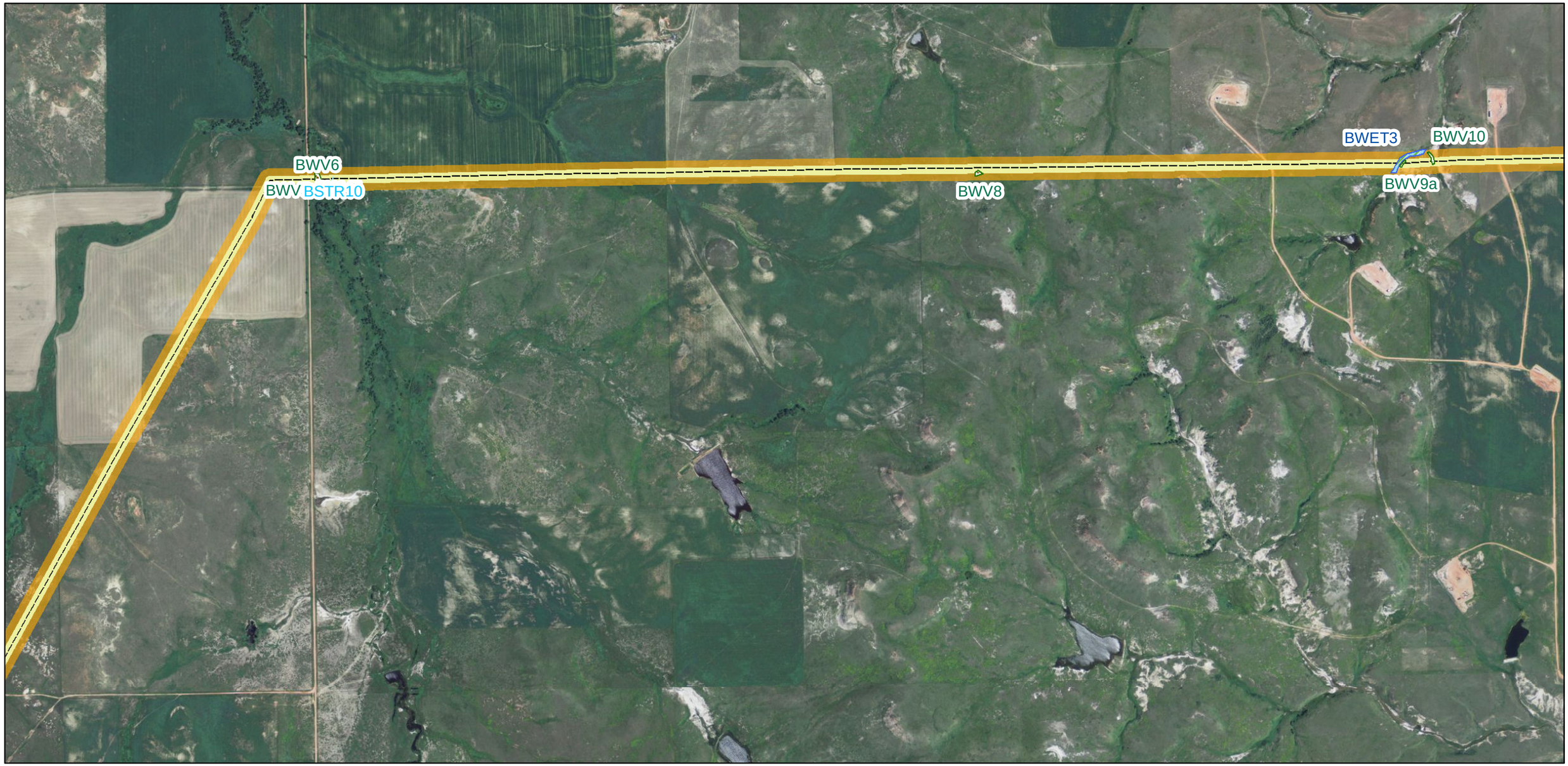

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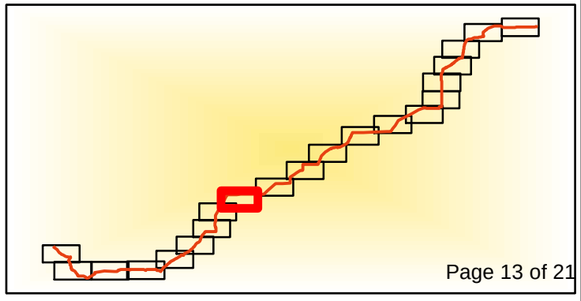

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Township/Range: T148N R102W
County: McKenzie

NAD 1983 UTM Zone 13N

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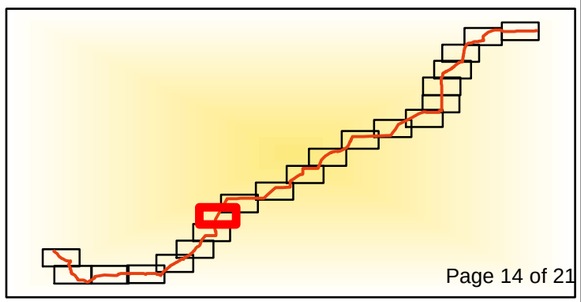

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Kilometers
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Miles
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Base Map: USGS 7.5' Topographic Map
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Township/Range: T148N R103W
County: McKenzie

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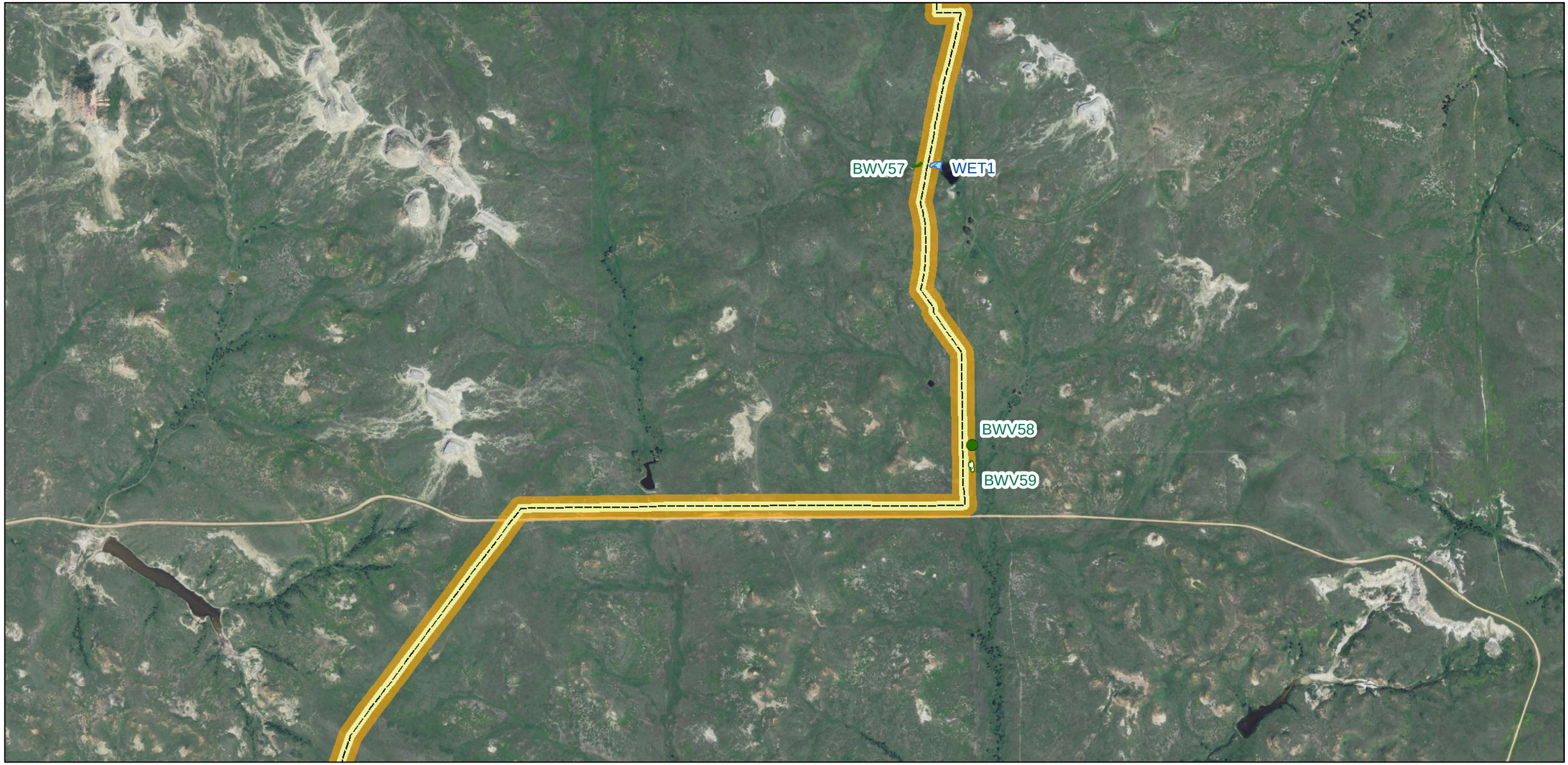
NAD 1983 UTM Zone 13N



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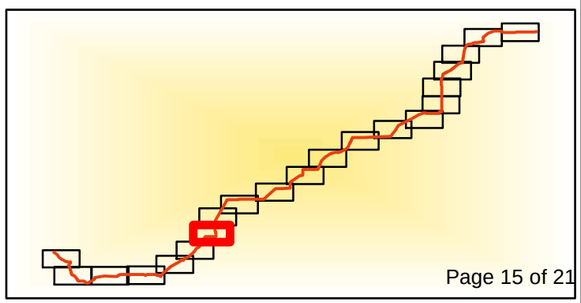

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Kilometers
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Miles
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Base Map: USGS 7.5' Topographic Map
Source: esri ArcGIS service
Quadrangle: Sather Lake & Sheep Creek
Township/Range: T148N R103W
County: McKenzie

N

NAD 1983 UTM Zone 13N

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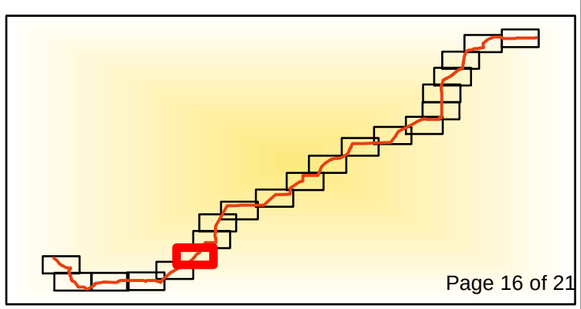

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Kilometers
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Miles
0 0.2 0.4

Base Map: USGS 7.5' Topographic Map
Source: esri ArcGIS service
Quadrangle: Sheep Creek

N

Township/Range: T148N R103W
County: McKenzie

NAD 1983 UTM Zone 13N

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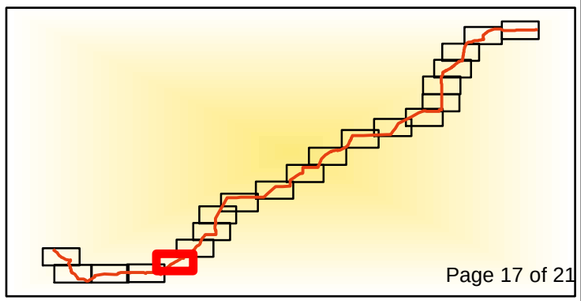

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Township/Range: T147N R103W
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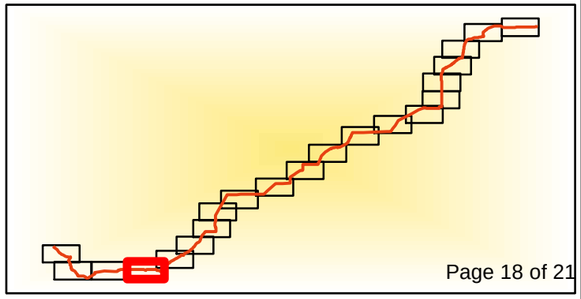

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Miles
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Base Map: USGS 7.5' Topographic Map
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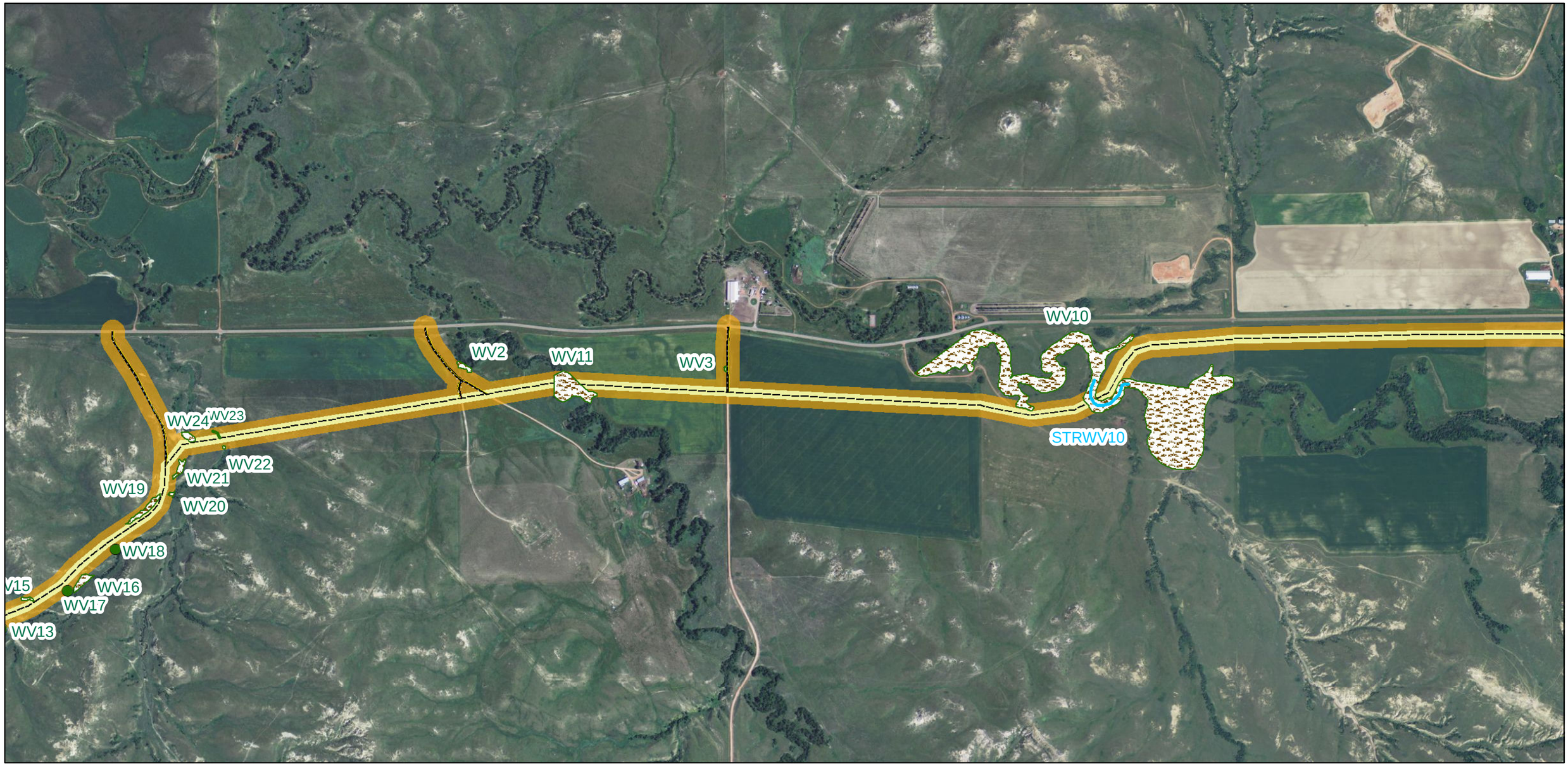
NAD 1983 UTM Zone 13N



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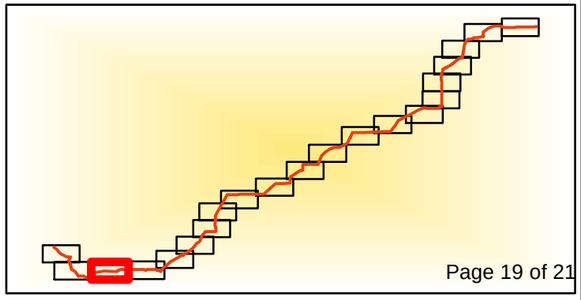
- 95' Construction ROW
- SurveyArea



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Date Saved: 6/21/2011 08:32

Kilometers
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Miles
0 0.2 0.4

Base Map: USGS 7.5' Topographic Map
Source: esri ArcGIS service
Quadrangle: Phillip Spring

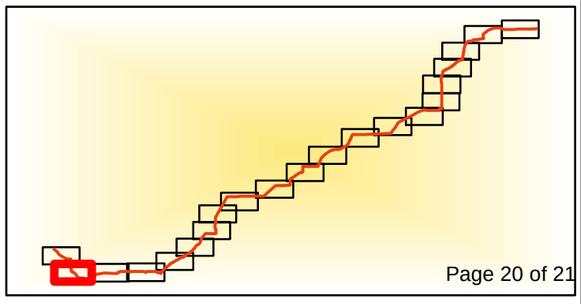
Township/Range: T147N R104W
County: McKenzie

N

NAD 1983 UTM Zone 13N

Legend

- Woody Vegetation
- Streams
- Woody Vegetation
- Water Bodies
- Streams
- Wetlands
- Woody Vegetation
- Sensitive Species (SWCA 2011)
- Access Roads
- Pipeline
- 95' Construction ROW
- SurveyArea



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Miles
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Base Map: USGS 7.5' Topographic Map
Source: esri ArcGIS service
Quadrangle: Phillip Spring &
Sidney SE
Township/Range: T147N R105W
County: McKenzie

N

NAD 1983 UTM Zone 13N

North Dakota/Montana State Line

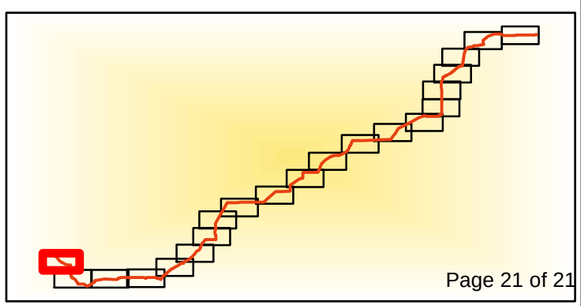
BWV1

Townsendia hookeri

WV1

Legend

- Woody Vegetation
- Streams
- Woody Vegetation
- Water Bodies
- Streams
- Wetlands
- Woody Vegetation
- Sensitive Species (SWCA 2011)
- Access Roads
- Pipeline
- 95' Construction ROW
- SurveyArea



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Kilometers
0 0.45 0.9

Miles
0 0.2 0.4

Base Map: USGS 7.5' Topographic Map
Source: esri ArcGIS service
Quadrangle: Sidney SE

N

Township/Range: T148N R105W
County: McKenzie

NAD 1983 UTM Zone 13N

APPENDIX B

Photographs of Project Area Corridor

Figure B.1. View of the project area. Note existing pipeline disturbance area within agricultural field.

Figure B.2. View of an agricultural field in project area.

Figure B.3. View of the BWET 3.

Figure B.4. View of WV10 facing northeast.

Figure B.5. View of the STRM1 crossing facing northeast.

Figure B.6. View of the BSTRM14 crossing facing northwest.

Figure B.7. View of the BSTRM23 crossing facing southeast.

Figure B.8. View of the BWB7 crossing facing north.

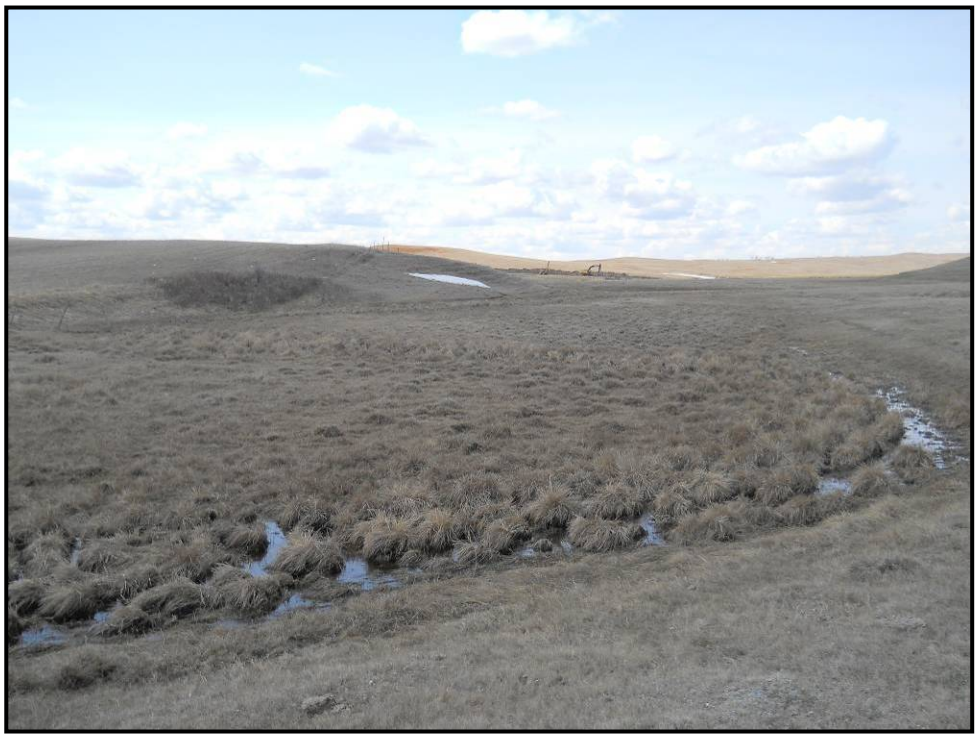

Figure B.9. View of the BWET13.

Figure B.10. View of the BWET15 facing southeast.

Figure B.11. View of the BWV42.

Figure B.12. View of the BWV50 to BWV56.

Figure B.13. View of the BWV67 facing northwest.