

# **TES INDUSTRIAL DEVELOPMENT Wetland Assessment**

Total Energy Services Inc.

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**Stantec**

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## **1 EXECUTIVE SUMMARY**

This Wetland Assessment was conducted on behalf of the Total Energy Services Inc. for the proposed TES Industrial Development. The subject lands are located west of the Town of Blackfalds, Alberta, within the Highway 2 West Area Structure Plan (ASP).

The Highway 2 West ASP was initiated in response to the continuing and increasing development pressures for commercial and light industrial development on the lands lying west of Highway 2. This was reinforced by the identification of these lands for commercial and industrial development in the County of Lacombe's Municipal Development Plan (MDP), the Economic Development Corridor Study and the Joint Economic Agreement Areas with the Town of Blackfalds and the City of Lacombe.

The area was identified for development due to its highway exposure and ease of access via the Highway 597/Aspelund Road and Highway 12 interchanges with Highway 2. Some development in the area has already proceeded under the guidance of the Highway 2 Corridor Economic Development Study which identified nodes of development at the aforementioned interchanges along Highway 2.

The study area includes a total of 160 acres of predominantly agricultural lands, of which 147 acres are proposed for development. Six wetlands, ranging from a Class II Temporary Pond to a Class VII Fen, were identified and assessed within the site.

The purpose of this Wetland Assessment is to provide an accurate inventory and evaluation of wetlands and wetland communities within the proposed development lands. Soils, surface hydrology, vegetation, wildlife usage, and habitat present were included in the assessment.

## 2 BACKGROUND

### 2.1 Site Description and History

The subject lands are located within Lacombe County, west of the Town of Blackfalds. The subject site falls within the Highway 2 West Area Structure Plan which designates the site for future commercial and light industrial development. The lands are currently, and have historically been under cultivation for the production of cereal crops. The total study area consists of approximately 160 ha located on the following lands;

- SW ¼ Sec 28-39-27-W4

The location and site boundaries are illustrated on **Figure 1.0**.

### 2.2 Investigative Methods

An on-site assessment of all wetlands within the subject lands was conducted by Stantec Consulting Ltd. on October 21, 2011. Information within this report is based on review of current and historical land use, soil surveys, historical aerial photos, and field reconnaissance visits to the subject area.

Data was collected from soil and vegetation plots within each wetland to determine vegetation species and populations and to document existing wetland communities. Incidental wildlife observations were also noted during the assessment. Site photos are located within **Appendix A**. Plot data was recorded onto Assessment Plot Data Sheets located in **Appendix B**. Historical air photos for the years 1962, 1975, and 1988 are located in **Appendix C**. Assessment plot locations are illustrated on **Figure 2.0**.



Scale N.T.S

LEGEND:

--- SITE BOUNDARY



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Figure No.

1.0

Title

**SITE LOCATION  
AND BOUNDARY**

### 3 STUDY AREA OVERVIEW AND INVENTORY

#### 3.1 Natural Environment

The subject lands are located within the Central Parkland Natural Subregion, which is the most extensive Subregion of the Parkland Natural Region. It includes all or parts of Alberta's three largest cities, and arches north from Calgary through Edmonton and east to the Alberta-Saskatchewan border. Typical landscapes within this Subregion include undulating till plains and hummocky uplands. Temperature, precipitation and growing season characteristics within the Central Parkland Natural Subregion are intermediate between the dry, warm grasslands to the south and the cooler, moister boreal forests to the west and north.

Current information suggests that only about 5 percent of the Central Parkland Natural Subregion remains in native vegetation. The area has been intensively cultivated for over a century, and the few remaining contiguous areas of parkland vegetation occur on sites that are unsuitable for agriculture because of topography or soil constraints. Plains rough fescue prairie is the dominant vegetation, with clumps of aspen present but restricted to moist areas. In the northern and western portions, aspen forest is dominant and grasslands are restricted to drier areas. Black Chernozems usually occur under grasslands, and Dark Gray Chernozems and Luvisols usually occur under aspen forests.

Wetlands cover about 10 percent of the Central Parkland Natural Subregion and are more common than in the Northern Fescue Natural Subregion because of the somewhat cooler and moister climate (Natural Regions Committee, 2006).

#### 3.2 Soils and Terrain

Orthic Black Chernozems are typically associated with grasslands and open woodlands in the Central Parkland Natural Subregion and Orthic Dark Gray Chernozemic and Dark Gray Luvisolic soils with the forested areas. Humic and Orthic Gleysols are the most common soil types associated with wetlands (Natural Regions Committee, 2006).

Topography of the subject lands consist of undulating high relief till plains and hummocky low relief uplands. Upland areas within the subject site have been utilized for the production of cereal crops. Wetlands occupy low-lying locations within the site. Soils within the proposed development site are Orthic Black Chernozem sediments deposited by wind and water. The area also has poorly drained and Solonchic soils.

**Table 1.0: Soil Characteristics Identified on the Site**

Location	Substrate	Horizon	Color	Texture	Depth (cm)	Comments
Wetland 1	Topsoil	A	10YR2/1	Clay loam to silty loam	0-29+	Moist to saturated and anaerobic. No redox observed
	Subsoil	No B horizon observed				
Wetland 2	Topsoil	A	10YR2/1	Silty loam	0-20	Saturated, anaerobic, standing water
	Subsoil	No distinct b horizon observed				
Wetland 3	Topsoil	No soil samples were obtained. Vegetation is growing on a dense organic moss layer overlying water.				
	Subsoil					
Wetland 4	Topsoil	A	10YR2/1	Clay loam	0-29+	Saturated
	Subsoil	No B horizon observed				
Wetland 5	Topsoil	A	10YR2/1	Silty loam	0-29+	Saturated, anaerobic
	Subsoil	No distinct b horizon observed				
Wetland 6	Topsoil	A	10YR2/1	Sandy loam	0-26	Low OM
	Subsoil	B	10YR6/2 with 10YR6/6 redox	Clay	26+	Non-cultivated

### 3.3 Geology and Geomorphology

The Central Parkland Region lies mainly within the Eastern Alberta Plains. Non-marine Upper Cretaceous sandstone and mudstone formations underlie the eastern portion of the Subregion while Tertiary sandstones and mudstones underlie the western portion. The dominant landform is undulating glacial till plains, with about thirty percent hummocky, rolling and undulating uplands (Natural Regions Committee, 2006).

Surficial material consists primarily of moderately fine textured, moderately calcareous glacial till. These till deposits can be quite thin in areas with steep slopes, and occasionally will have bedrock exposed. Glaciolacustrine and glaciofluvial sediments occur as inclusions within the till plain covering approximately fifteen percent of the Subregion (Natural Regions Committee, 2006).

The subject lands are mapped over the Buried Red Deer River Valley which is present in the central part of the County, and extends northeast from the County border through the towns of Blackfalds and Lacombe to the northern County border. The Valley is approximately nine kilometers wide, with local bedrock relief being less than 80 meters deep. Sand and gravel deposits can be expected in association with this bedrock low, but the thickness of the sand and gravel deposits is expected to be mainly less than 15 meters (Hydrogeological Consultants, 2001).

### 3.4 Hydrology

Wetlands cover approximately ten percent of the Central Parkland Subregion. Marshes, willow shrublands and seasonal ponds are typical wetland types in southern areas, while treed fens are more common in the northern areas of the Subregion. Major watercourses include the Red Deer, Battle and North Saskatchewan Rivers (Natural Regions Committee, 2006).

The hydrogeologic environment can be a prominent factor in soil formation and land use. For example, water ponded at the surface or rising from below can result in the formation of Gleysolic soils. Solonetzic soils may form where groundwater has brought high concentrations of soluble salts to the surface (MacMillan, 1987).

#### 3.4.1 Surface Water

Surface water within the subject lands generally drains toward wetlands located within low-lying basins both within and surrounding the site. No creeks, streams or overland drainages were observed within the site. Six wetlands were identified and assessed, ranging from a Class II Temporary Pond to a Class VII Fen. Wetlands are described in further detail under **Section 3.7, Wetland Complexes**.

#### 3.4.2 Groundwater

The subject lands are mapped within a groundwater recharge area. Recharge to the bedrock aquifers within Lacombe County takes place from the overlying surficial deposits and from flow in the aquifer from outside the County. For most of the County, there is a downward hydraulic gradient from the surficial deposits to the bedrock, i.e. recharge to the bedrock aquifers (Hydrogeological Consultants, 2001).

One Class VII Fen has been identified within the subject lands. This type of wetland is often associated with groundwater that is located at or near the surface. Class IV and above wetlands within the subject site are expected to contribute to groundwater recharge.

### 3.5 Natural Vegetation

The Central Parkland Subregion includes a southern grassland-dominated portion and a northern aspen-dominated portion, reflecting climate-related changes within the Subregion. The naturally occurring grasses and grass-like plants in the Central Parkland Natural Subregion are plains rough fescue (*Festuca hallii*), blue grama grass (*Bouteloua gracilis*), western porcupine grass (*Stipa curtisetia*) and June grass (*Koeleria*

*macrantha*). Naturally occurring shrubs include beaked hazelnut (*Corylus cornuta*), bunchberry (*Cornus canadensis*), and snowberry (*Symphoricarpos albus*). Trees that are naturally occurring include trembling aspen (*Populus tremuloides*), balsam poplar (*Populus balsamifera*) and white spruce (*Picea glauca*), (Natural Regions Committee, 2006).

### 3.6 Vegetation Communities

The project area will affect previously cultivated agricultural lands and wetlands. Vegetation species identified within wetland communities are listed in **Table 2.0**. Plot locations are illustrated on **Figure 2.0**.

**Table 2.0: Vegetation Identified on Site**

**Native Grasses and Grass-like Species**

western wheatgrass (*Agropyron smithii*)  
slough grass (*Beckmannia syzigachne*)  
sedge (*Carex spp.*)  
tufted hairgrass (*Deschampsia caespitosa*)  
fescue (*Festuca spp.*)  
northern manna grass (*Glyceria borealis*)  
foxtail barley (*Hordeum jubatum*)  
wire rush (*Juncus balticus*)  
reed canary grass (*Phalaris arundinacea*)  
prairie bulrush (*Scirpus paludosus*)  
common great bulrush (*Scirpus validus*)  
cattail (*Typha latifolia*)

**Non-native Grasses and Grass-like Species**

timothy (*Phleum pratense*)

**Native Forbs**

aster species (*Aster spp.*)  
yarrow (*Achillea millefolium*)  
larger duckweed (*Spirodela polyrhiza*)  
wild mint (*Mentha arvensis*)  
Canada goldenrod (*Solidago canadensis*)  
mudwort (*Limosella aquatica*)  
broad-leaved plantain (*Plantago major*)  
water smartweed (*Polygonum amphibium*)  
violet species (*Viola sp.*)

**Non-Native Forbs**

mustard species (*Brassica spp.*)

**Weed Species (as defined under the Alberta Weed Control Act)**

Canada thistle (*Cirsium arvense*)  
perennial sowthistle (*Sonchus arvensis*)  
annual sowthistle (*Sonchus asper*)

**Native Trees and Shrubs**

red osier dogwood (*Cornus sericea*)  
black spruce (*Picea mariana*)  
trembling aspen (*Populus tremuloides*)  
beaked willow (*Salix bebbiana*)  
willow species (*Salix spp.*)



Scale N.T.S

**LEGEND:**

- - - - - SITE BOUNDARY
- WETLAND OUTLINE
- PLOT LOCATION



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PLOT LOCATIONS

### 3.7 Wetland Complexes

There are seven major classes of wetlands found in natural basins of the Prairie Pothole Region. Classification of wetlands is based on ecological differentiation and distinguished by the vegetation zone occurring in the central or deepest part of the wetland and occupying five percent or more of the wetland area being classified. Various indicator species are associated with each wetland zone (Stewart and Kantrud, 1971).

Vegetation communities are subject to seasonal changes in precipitation as well as disturbances resulting from agricultural and other anthropogenic activities. The wetland conditions resulting from these circumstances are described as phases. Occasionally, the presence or lack of vegetation may be affected by the wetland phase. Wetland phases are affected by changes in precipitation throughout the season and by agricultural practices (Stewart and Kantrud, 1971).

Six wetlands within the subject site were assessed and inventoried by Stantec Consulting Ltd on October 21, 2011. Wetlands include one Class II Temporary Pond, one Class III Seasonal Pond, two Class IV Semi-permanent Ponds, one Class V Permanent Pond and one Class VII Fen. Historical air photos, hydrology, existing vegetation communities and densities, soil surveys, and existing soil characteristics were evaluated during the assessment and classification of the wetlands.

All wetlands within the proposed area of development have been previously influenced by surrounding agricultural activities. Wetland locations, areas and classifications are illustrated on **Figure 3.0**.

#### 3.7.1 Wetland 1: Class IV Semi-permanent Pond Area: 0.66 ha

Wetland 1 is a Class IV Semi-permanent Pond (see **Appendix A: Photos 1-5**). The wetland is characterized by a central deep marsh zone with peripheral shallow marsh zones. Standing water was present in the deepest portion of the wetland at the time of assessment.

Native vegetation documented around the perimeter of Wetland 1 includes sloughgrass (*Beckmannia syzigachne*), western wheatgrass (*Agropyron smithii*), foxtail barley (*Hordeum jubatum*) and northern manna grass (*Glyceria borealis*). Cattail (*Typha latifolia*), sedge spp. (*Carex spp.*), wire rush (*Juncus balticus*), and common great bulrush (*Scirpus validus*) were observed in areas of standing water within the wetland basin.

Wetland 1 has not been cultivated, however, cultivation and planting of crops has occurred around the entire perimeter of the wetland. Weed species noted include annual sowthistle (*Sonchus asper*) and (*Chenopodium sp.*). Soils consist of Black clay loam to silty loam with moderate organic matter. Soil samples were saturated and anaerobic but no redox features were observed.

No wildlife was observed in the area of Wetland 1 during the assessment.

#### 3.7.2 Wetland 2: Class V Permanent Pond Area: 2.37 ha

Wetland 2 is a Class V Permanent Pond (see **Appendix A: Photos 6-15**) that is located in a large naturally occurring forested basin and is surrounded by cultivated uplands. Wetland 2 is sheltered from the surrounding agricultural lands by the natural topography of the site and dense vegetation cover within the wetland. The wetland is characterized by a central open water zone surrounded by deep and shallow marsh zones. Aspen and willow forest populates the steep slopes that surround the wetland and extend into both the shallow and deep marsh areas of the wetland.

The perimeter slopes of Wetland 2 are populated by aspen (*Populus tremuloides*) forest with an understory of red osier dogwood (*Cornus sericea*) and beaked willow (*Salix bebbiana*). Sedge (*Carex spp.*) and northern manna grass (*Glyceria borealis*) cover the ground and extend into areas of standing water. Deadfall and leaf

litter contribute to a thick organic layer throughout. Larger duckweed (*Spirodela polyrhiza*) was observed throughout the wetland in areas of open and standing water.

Soils samples indicate a Black silty loam with a thick overlying organic layer. Samples were saturated and anaerobic at the time of sampling.

Numerous wildlife trails and signs of animals bedding down within the wetland indicate that the wetland provides water, food and cover for wildlife in the area. One hawk was observed circling over the wetland. No other wildlife was documented within Wetland 2.

### 3.7.3 Wetland 3: Class VII Fen Area: 1.37 ha (Partial)

Wetland 3 is a Class VII Fen (see **Appendix A: Photos 16-19**) that is partially located within the subject site (see **Figure 3.0**). The wetland extends expansively northward, beyond the site boundary and encompasses a large forested central fen or bog zone that is present within and beyond the study area. Fens are characterized by floating mats of surface vegetation that may be overlying soft muck, organic matter or water and are often brackish and fed by groundwater or springs. Fen zones may be present intermittently among other wetland zones, including shallow and deep marshes, and open water zones.

Wetland 3 is located within a large, densely forested basin that extends to the northeast, beyond the subject lands. Surrounding surface water feeds the wetland, which is also likely fed by groundwater. The upper forest canopy consists of trembling aspen (*Populus tremuloides*) and black spruce (*Picea mariana*), with a dense shrub layer of mixed willow (*Salix spp.*) and red osier dogwood (*Cornus sericea*) beneath. The interior of Wetland 3 was not safely accessible on foot due to floating layers of vegetation and unstable ground conditions, therefore, assessment plot locations were limited to perimeter areas of the wetland.

At the time of assessment, standing water was present throughout the wetland, including perimeter areas. Deadfall and organic matter are abundant. Fescue (*Festuca spp.*) dominates perimeter area, with a lesser amount of timothy (*Phleum pratense*) present. Sedge (*Carex spp.*) is the most prominent species in wetter areas. Wire rush (*Juncus balticus*) and northern manna grass (*Glyceria borealis*) are also present. A thick floating organic vegetation layer was observed within areas of standing water. Though this floating layer is supporting trees and forest vegetation, movement of the entire surface was evident up to 4 m away when this layer was disturbed. Due to the nature of this floating vegetation layer, soil sampling was not possible within the wetland.

Typical deposits found within fens consist of sedge peat that is derived primarily from sedges with inclusions of partially decayed shrub stems. Sedge peat is associated with a nutrient-rich environment. Fen deposits are usually moderately-well to well decomposed, dark Brown to Black in color, with medium to fine fibres. Decomposition often becomes greater at lower depths. These deposits are associated with open peat lands and a mineral-rich water table located at or near the surface. Fens are covered with a dominant component of sedges, but grasses and reeds may be present. Sphagnum is usually subordinate or absent and the more exacting mosses are common. There is often dense, low to medium shrub cover and sometimes a sparse layer of trees (Agriculture and Agri-food Canada, 2010).

One hawk's nest was observed within Wetland 3 (see **Appendix A: Photo 16**). No other wildlife was observed. However, due to the size of the wetland, the natural topography, and the dense cover provided by the forest vegetation, it is expected that the area would be extensively used by a variety of wildlife.

### 3.7.4 Wetland 4: Class III Seasonal Pond Area: 0.14 ha

Wetland 4 is a Class III Seasonal Pond (see **Appendix A: Photos 18 and 19**). Topography indicates that Wetland 4 was likely an overland drainage that, at one time, fed into Wetland 3. Wetland 4 is presently isolated by surrounding uplands that have been cultivated and cropped. A land bridge that provides vehicle access between wetlands, currently separates Wetland 4 from Wetland 3. Native vegetation documented

includes western wheatgrass (*Agropyron smithii*), tufted hairgrass (*Deschampsia caespitosa*), and sloughgrass (*Beckmannia syzigachne*). Moss, clover (*Trifolium sp.*), broad-leaved plantain (*Plantago major*), aster (*Aster sp.*), and cut-leaved anemone (*Anemone multifida*) were also documented within the site.

Soils within the wetland were Black Clay loam and were saturated at the time of assessment. No surface water was present within Wetland 4.

No wildlife was observed in the area of Wetland 4.

### **3.7.5 Wetland 5: Class IV Semi-permanent Pond Area: 0.40 ha (Partial)**

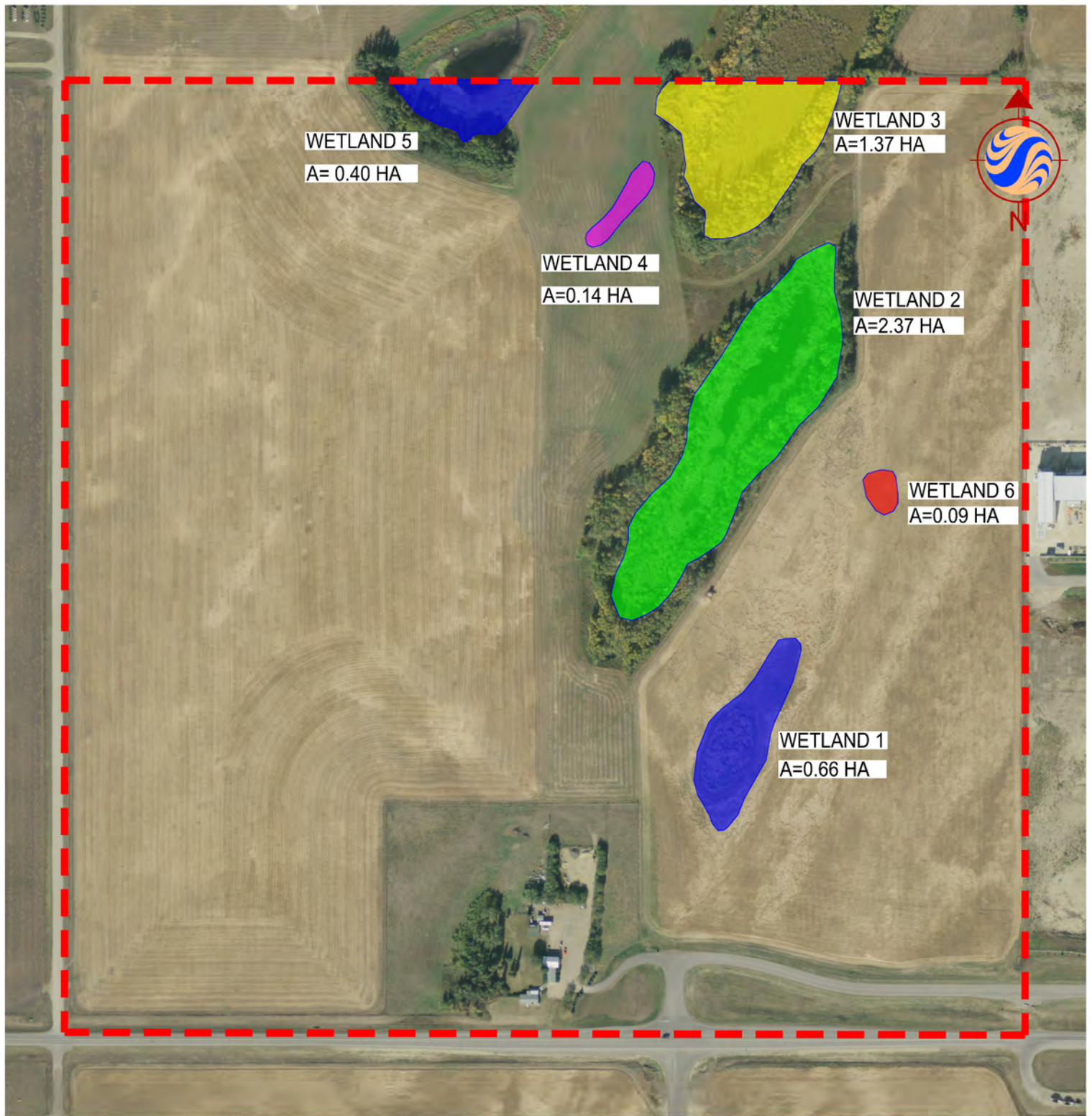
Wetland 5 is a Class IV Semi-permanent Pond that is only partially located within the subject site (see **Figure 3.0**). The wetland includes a central deep marsh dominated by cattail (*Typha latifolia*) and common great bulrush (*Scirpus validus*). Areas of open water are also present within the wetland (see **Appendix A: Photos 20-24**). Aspen forest surrounds the southern perimeter of the wetland and reed canary grass (*Phalaris arundinacea*), northern manna grass (*Glyceria borealis*), and sloughgrass (*Beckmannia syzigachne*) are present in the shallow marsh zone. Soils consist of Black silty loam and were saturated and anaerobic at the time of assessment.

Ducks and mud hens were observed on the water within Wetland 5.

### **3.7.6 Wetland 6: Class II Temporary Pond Area: 0.09 ha**

Wetland 6 is a Class II Temporary Pond that is comprised of a central wet meadow zone surrounded by cultivated lands (see **Appendix A: Photos 14**). Vegetation was sparse at the time of assessment with up to 95% unvegetated area. Vegetation observed within the wetland was limited to western wheatgrass (*Agropyron smithii*) and broad-leaved plantain (*Plantago major*).

Soils are Black sandy loam overlying clay and soil moisture levels were low at assessment. No wildlife was observed in the area



Scale N.T.S

LEGEND:

- SITE BOUNDARY
- WETLAND CLASS II - TEMPORARY POND
- WETLAND CLASS III - SEASONAL POND
- WETLAND CLASS IV - SEMI-PERMANENT POND
- WETLAND CLASS V - PERMANENT POND
- WETLAND CLASS VII - FEN

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WETLAND LOCATIONS  
AND CLASSIFICATION



### 3.8 Rare Plants and Rare Plant Communities

Rare plants are indigenous plants existing either in small quantities or in very specific habitats. Rare plant communities are defined as unusual, uncommon, of limited extent or encountered infrequently, or described by vegetation experts as in decline or threatened (Allen, 2006).

A rare plant community may or may not include individual plant species of conservation concern. It is the grouping, or community itself, which is the element of interest. Surveys help to identify the presence of rare plants and rare plant communities both locally and worldwide. The identification of these plants and their ecological communities aid in both planning and determining mitigation measures necessary for their protection (Allen, 2006).

A search of the Alberta Conservation Information Management System (ACIMS) indicated that one rare plant, marsh muhly (*Muhlenbergia racemosa*) was previously identified within or adjacent to the subject area. This occurrence was recorded in 1943. No evidence of this species was observed during the site assessment.

Marsh muhly (*Muhlenbergia racemosa*) can be found on dry sand hills, slopes and eroded banks, prairie meadows, stream banks, the edges of woodlands, rocky slopes, or waste ground. *M. racemosa* is readily found in the United States, Saskatchewan, Manitoba and northern Canada but is listed as rare in Alberta. It is easily confused with the more common bog muhly (*Muhlenbergia glomerata*) which is found in wet sites such as fens, but can also grow near ephemeral springs that become dry in summer (Kershaw, 2001).

### 3.9 Weeds

Weeds are aggressive and invasive plant species categorized by the Alberta Agriculture, Food and Rural Development into three distinct classes: Prohibited Noxious, Noxious, and Nuisance. Weeds are pioneer species to disturbed areas and are generally competitive and adaptive. They are difficult to manage and therefore cause economic damage affected lands. Legislation is in place to keep weed introduction and spread in Alberta to a minimum.

Prohibited Noxious weeds are not as commonly occurring in regions of Alberta. Often, low populations are present at a specific location. They are designated 'Prohibited Noxious' to prevent their establishment. Where found, destruction of Prohibited Noxious weeds is required. Noxious weeds are already established in many regions of the province. Control of Noxious weeds is required where they are identified as problematic.

Canada thistle (*Cirsium arvense*), perennial sow thistle (*Sonchus arvensis*), and annual sowthistle (*Sonchus asper*) were all identified in wetlands within the subject lands. Both Canada thistle (*Cirsium arvense*), and perennial sow thistle (*Sonchus arvensis*) are designated as Noxious weeds.

Nuisance weeds are common and well adapted to Alberta, making eradication improbable (Alberta Agriculture, Food and Rural Development, 2006). Annual sowthistle (*Sonchus asper*) is a nuisance weed.

No Prohibited Noxious weeds were found during the wetland assessment. Noxious and Nuisance weeds present on site are identified in **Table 3.0**.

**Table 3.0 –Weed Species Identified During Assessment**

**Noxious Weed Species**

Canada thistle (*Cirsium arvense*)

perennial sow thistle (*Sonchus arvensis*)

**Nuisance Weed Species**

annual sowthistle (*Sonchus asper*)

**3.10 Wildlife and Habitat**

One hawk and one hawk's nest was observed on site. The hawk was seen circling over Wetland 2 and the nest was observed within Wetland 3. Though no other wildlife was observed, the number of wildlife trails observed within the larger wetlands on site indicates that these sites are heavily used by wildlife in the area. The size of Wetland 3 and the cover that it offers would likely also provide a wildlife corridor for movement in the area.

A wildlife survey is recommended prior to any wetland disturbance.

## 4 LEGISLATION AND REGULATIONS

The following legislation may be applicable to development within the subject lands.

### 4.1 Canada Wildlife Act

The *Canada Wildlife Act*, as administered by the Federal Minister of the Environment, establishes statutes regarding wildlife within Canada, all Provinces, and the Territories located therein. The Act defines the powers, duties and functions of the Minister with respect to all wildlife that is wild by nature and the habitat of any such animal, plant, or organism, including any waters on or flowing through the lands.

The *Canada Wildlife Act* governs the management and protection of endangered wildlife and habitat. The Act stipulates that the Minister may take such measures as deemed necessary for the protection of any species of wildlife in danger of extinction, including the acquisition of lands for the purpose of research, conservation, and interpretation. Any wildlife or habitat categorized as endangered within the development area would be subject to the *Canada Wildlife Act*.

### 4.2 Species at Risk Act

The *Species at Risk Act*, as administered by the Federal Minister of the Environment, the Minister of Fisheries and Oceans, and the Minister of Canadian Heritage, prevents the extirpation or extinction of species that are of special concern, endangered, or threatened.

The Act legislates protection of these species and any existing critical habitats through agreements and permits, enforcement measures, and a public registry. Stewardship action plans and recovery strategies are also outlined within the Act.

Also detailed within the *Species at Risk Act* is a wildlife species listing process. Assessment and classification of wildlife species and habitats is conducted by the *Committee on the Status of Endangered Wildlife in Canada* (COSEWIC), in conjunction with the Canadian Endangered Species Conservation Council. The Act dictates measures to manage and protect listed wildlife species and critical habitats that may exist within the proposed development site.

### 4.3 Migratory Birds Convention Act

The *Migratory Birds Convention Act*, as administered by the Federal Minister of the Environment, designates that all migratory birds within Canada, including territorial waters of Canada, are protected by the authority of the Minister. Regulations pertaining to the capture, kill, commercial trade, and disturbance of nesting sites are also included within the Act. Endangered, threatened, or rare bird species are also addressed under the *Canada Wildlife Act* and the *Species at Risk Act*.

The *Migratory Birds Convention Act* dictates that disturbance of nesting sites will be avoided if at all possible, during the active nesting and rearing season (April through August). If this active nesting period cannot be avoided, Alberta Sustainable Resource Development must be consulted and a qualified Biologist must inspect the site for active nests immediately prior to the grading of the subject area. Appropriate avoidance measures may then be implemented.

### 4.4 Public Lands Act

The *Public Lands Act*, as administered by the Provincial Minister of the Environment, claims title to beds and shores of all permanent and naturally occurring bodies of water and all naturally occurring rivers, streams, watercourses and lakes. The province reserves the right to claim any waterbodies Class III and above. Under the Act, works affecting public land must be granted approval by the Minister.

#### 4.5 Water Act

The *Water Act*, as administered by Government of Alberta, identifies all water bodies within the Province of Alberta as Crown Property and defines regulations pertaining to rights, restrictions, and resource management in relation to all water resources within provincial boundaries. The Act also addresses the disposition, diversion, or alteration of any water body within Alberta, which may or may not impact water flows, wetlands, and the aquatic environment. Any activities or alterations to the land, either temporary or permanent, including stream diversions which influence or interfere with water quantity and quality within the Province of Alberta require statutory authorization.

Any impacts to wetlands that are shared with adjacent lands will require adjacent landowner consent.

The introduction of stormwater to any wetlands within the site will require *Water Act* approval.

## 5 POLICIES AND PLANS

### 5.1 Provincial Wetland Restoration / Compensation Guide

Alberta Environment's *Provincial Wetland Restoration / Compensation Guide* outlines applications under the *Water Act* will be reviewed when loss of wetland area will occur. The Guide also explains wetland compensation. Compensation for the loss of naturally occurring wetlands is required when an approval to impact a wetland is issued under the *Water Act*. Wetland compensation under the guidelines requires the restoration of drained or altered naturally occurring wetlands by a qualified wetland restoration agency.

Under the Guide, wetland loss is deferred as including infilling, altering, or physically draining any wetland, any impact to riparian area and buffer strips, and any type of interference with the hydrology to and from a wetland.

## **6 CONCLUSION**

This Wetland Assessment details wetlands within the TES Development Lands, as assessed on October 21, 2011. Any assessments that are required to any areas other than the area mentioned within this report will require a separate field assessment.

## 7 REFERENCES

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# APPENDIX A

Site Photos



Photo 1: Shallow marsh zone within Wetland 1



Photo 2: Shallow marsh zone within Wetland 1



**Photo 3: Sloughgrass community in Wetland 1**



**Photo 4: Standing water within the basin of Wetland 1**



Photo 5: Cattail community within Wetland 1



Photo 6: Aspen forest surrounding the perimeter of Wetland 2



Photo 7: Aspen and willow in standing water within Wetland 2



Photo 8: Sedge and aspen within the shallow marsh zone of Wetland 2



Photo 9: Dogwood and willow within Wetland 2



Photo 10: View of Wetland 2 from the SE perimeter



Photo 11: View of Wetland 2 from the south end of the wetland. Wetland 3 trees are visible in the distance



Photo 12: Deep marsh within Wetland 2



Photo 13: Deep marsh with sedge around the perimeter of Wetland 2



Photo 14: South view of Wetland 2



Photo 15: Deep marsh/open water within Wetland 2



Photo 16: Hawk's nest observed within Wetland 3



Photo 17: Standing water near the west perimeter of Wetland 3



Photo 18: East view of grasses within Wetland 4 with Wetland 3 aspen perimeter in the background



Photo 19: Wetland 4 in the foreground with trees and shrubs in Wetland 3 in the background



Photo 20: Northwest view of Wetland 5



Photo 21: Deep marsh and open water within Wetland 5



Photo 22: Cattail community within Wetland 5



Photo 23: Aspen community around the south perimeter of Wetland 5



Photo 24: Aspen at the south end of Wetland 5



**Photo 25: Wetland 6 with Wetland 2 aspen perimeter in the background**

# APPENDIX B

Plot Data

# Wetland Pre-Post-Disturbance Assessment: Plot Data Collection Form

**Client:** Total Energy Services Inc. **Project/Area:** Blackfalds: TES Industrial Development

**Assessment Area:** Wetland 1 **Assessor:** CK/RW **Date:** Oct.21, 2011 **Photo:**

**Plot Number:** 1 **UTM:**

<b>Plot Location:</b>	Wetland <input checked="" type="checkbox"/>	Riparian <input type="checkbox"/>	Drainage <input type="checkbox"/>	Other:
<b>Landscape Condition:</b>	Disturbed <input checked="" type="checkbox"/>	Undisturbed <input type="checkbox"/>	Comments:	
<b>Plot Drainage:</b>	Off <input type="checkbox"/>	Temporary Ponding <input checked="" type="checkbox"/>	Permanent Ponding <input type="checkbox"/>	
<b>Plot Topography:</b>	Aspect:		Position on Slope:	
<b>Plot Position:</b>	Concave <input type="checkbox"/>	Convex <input type="checkbox"/>	Level <input checked="" type="checkbox"/>	

Soils:	Horizon	Depth (cm)	Texture	Structure	Color	Redox
	A	0-29	Clay Loam	Granular	10YR2/1	No
	B					

**Organic Matter Content :** Low: ☐ Moderate: ☒ High: ☐ Cobble: ☐

**Soil Moisture:** Dry: ☐ Low: ☐ Moderate: ☐ High: ☒ Saturated: ☐

**Soil Conditions:** Gleyed: ☐ Anaerobic: ☐ Cultivated: ☐ Other:

**Comments:**

Vegetation:	% Litter Cover:	20	% Unvegetated Area:	10	Other:
<b>Grasses:</b>			<b>Grasses:</b>		
sloughgrass ( <i>Beckmannia syzigachne</i> )					
western wheatgrass ( <i>Agropyron smithii</i> )					
foxtail barley ( <i>Hordeum jubatum</i> )					
<b>Forbs:</b>			<b>Forbs:</b>		
Canada thistle ( <i>Cirsium arvense</i> )			<i>Brassica spp.</i>		1
water mudwort ( <i>limosella aquatica</i> )					
common groundsel ( <i>Senecio vulgaris</i> )					
stinkweed ( <i>Thlaspi arvense</i> )					
<b>Trees/Shrubs:</b>			<b>Trees/Shrubs:</b>		

**Wetlands:**

**Dominant Wetland Zone: (> 5% of wetland basin)** Low Prairie ☐ Wet Meadow ☐ Shallow Marsh ☐ Deep Marsh ☒  
Open Water ☐ Alkali Pond ☐ Other:

**Wetland Hydrology:** Open Water ☐ Standing Water ☒ No Surface Water ☐

**Preliminary Wetland Classification:** Class I ephemeral pond ☐ Class II temporary pond ☐ Class III seasonal pond ☐  
Class IV semipermanent pond ☒ Class V permanent pond ☐ Other:

**Wildlife Observations:**

**General Observations:** Plot in shallow marsh zone, annual sow thistle, willow spp., chenopodium spp., smartweed and duckweed in the area.

# Wetland Pre-Post-Disturbance Assessment: Plot Data Collection Form

**Client:** Total Energy Services Inc. **Project/Area:** Blackfalds: TES Industrial Development

**Assessment Area:** Wetland 1 **Assessor:** CK/RW **Date:** Oct.21, 2011 **Photo:**

**Plot Number:** 2 **UTM:**

<b>Plot Location:</b>	Wetland <input checked="" type="checkbox"/>	Riparian <input type="checkbox"/>	Drainage <input type="checkbox"/>	Other:
<b>Landscape Condition:</b>	Disturbed <input checked="" type="checkbox"/>	Undisturbed <input type="checkbox"/>	Comments: Basin	
<b>Plot Drainage:</b>	Off <input type="checkbox"/>	Temporary Ponding <input checked="" type="checkbox"/>	Permanent Ponding <input type="checkbox"/>	
<b>Plot Topography:</b>	Aspect:		Position on Slope:	
<b>Plot Position:</b>	Concave <input type="checkbox"/>	Convex <input type="checkbox"/>	Level <input checked="" type="checkbox"/>	

Soils:	Horizon	Depth (cm)	Texture	Structure	Color	Redox
	A	0-29	Silty Loam	Fine Granular	10YR2/1	No
	B					

**Organic Matter Content :** Low: ☐ Moderate: ☒ High: ☐ Cobble: ☐

**Soil Moisture:** Dry: ☐ Low: ☐ Moderate: ☐ High: ☐ Saturated: ☒

**Soil Conditions:** Gleyed: ☐ Anaerobic: ☒ Cultivated: ☐ Other:

**Comments:**

Vegetation:	% Litter Cover:	80	% Unvegetated Area:	0	Other: 60% Water
<b>Grasses:</b>			<b>Grasses:</b>		
sloughgrass ( <i>Beckmannia syzigachne</i> )	40		common great bulrush ( <i>Scirpus validus</i> )	10	
cattail ( <i>Typha latifolia</i> )	20		northern manna grass ( <i>Glyceria borealis</i> )	30	
wire rush ( <i>Juncus balticus</i> )	15		sedge ( <i>Carex spp.</i> )	40	
<b>Forbs:</b>			<b>Forbs:</b>		
aster spp.	10				
<b>Trees/Shrubs:</b>			<b>Trees/Shrubs:</b>		

**Wetlands:**

**Dominant Wetland Zone: (> 5% of wetland basin)** Low Prairie ☐ Wet Meadow ☐ Shallow Marsh ☐ Deep Marsh ☒  
Open Water ☐ Alkali Pond ☐ Other:

**Wetland Hydrology:** Open Water ☐ Standing Water ☒ No Surface Water ☐

**Preliminary Wetland Classification:** Class I ephemeral pond ☐ Class II temporary pond ☐ Class III seasonal pond ☐  
Class IV semipermanent pond ☒ Class V permanent pond ☐ Other:

**Wildlife Observations:**

**General Observations:** Tons of cattail, viola spp. nearby.

# Wetland Pre-Post-Disturbance Assessment: Plot Data Collection Form

**Client:** Total Energy Services Inc. **Project/Area:** Blackfalds: TES Industrial Development

**Assessment Area:** Wetland 2 **Assessor:** CK/RW **Date:** Oct.21, 2011 **Photo:**

**Plot Number:** 3 **UTM:**

<b>Plot Location:</b>	Wetland <input checked="" type="checkbox"/>	Riparian <input type="checkbox"/>	Drainage <input type="checkbox"/>	Other:
<b>Landscape Condition:</b>	Disturbed <input type="checkbox"/>	Undisturbed <input checked="" type="checkbox"/>	Comments:	
<b>Plot Drainage:</b>	Off <input type="checkbox"/>	Temporary Ponding <input checked="" type="checkbox"/>	Permanent Ponding <input type="checkbox"/>	
<b>Plot Topography:</b>	Aspect:		Position on Slope:	
<b>Plot Position:</b>	Concave <input type="checkbox"/>	Convex <input type="checkbox"/>	Level <input checked="" type="checkbox"/>	

Soils:	Horizon	Depth (cm)	Texture	Structure	Color	Redox
OM	A	0-20	Silty Loam	Granular	10YR2/1	No
	B					
<b>Organic Matter Content :</b> Low: <input type="checkbox"/> Moderate: <input type="checkbox"/> High: <input checked="" type="checkbox"/> Cobble: <input type="checkbox"/>						
<b>Soil Moisture:</b> Dry: <input type="checkbox"/> Low: <input type="checkbox"/> Moderate: <input type="checkbox"/> High: <input type="checkbox"/> Saturated: <input checked="" type="checkbox"/>						
<b>Soil Conditions:</b> Gleyed: <input type="checkbox"/> Anaerobic: <input checked="" type="checkbox"/> Cultivated: <input type="checkbox"/> Other:						
<b>Comments:</b> Organic matter very very high						

Vegetation:	% Litter Cover:	100	% Unvegetated Area:	0	Other: 100% Water
<b>Grasses:</b>			<b>Grasses:</b>		
sedge (Carex spp.)		50			
northern manna grass ( <i>Glyceria borealis</i> )		15			
<b>Forbs:</b>			<b>Forbs:</b>		
larger duckweed ( <i>Spirodela polyrhiza</i> )		25			
<b>Trees/Shrubs:</b>			<b>Trees/Shrubs:</b>		
trembling aspen ( <i>Populus tremuloides</i> )		75			
red osier dogwood ( <i>Cornus stolonifera</i> )		8			

<b>Wetlands:</b>			
<b>Dominant Wetland Zone: (&gt; 5% of wetland basin)</b>	Low Prairie <input type="checkbox"/>	Wet Meadow <input type="checkbox"/>	Shallow Marsh <input type="checkbox"/>
	Open Water <input checked="" type="checkbox"/>	Alkali Pond <input type="checkbox"/>	Other:
<b>Wetland Hydrology:</b>	Open Water <input checked="" type="checkbox"/>	Standing Water <input checked="" type="checkbox"/>	No Surface Water <input type="checkbox"/>
<b>Preliminary Wetland Classification:</b>	Class I ephemeral pond <input type="checkbox"/>	Class II temporary pond <input type="checkbox"/>	Class III seasonal pond <input type="checkbox"/>
	Class IV semipermanent pond <input type="checkbox"/>	Class V permanent pond <input checked="" type="checkbox"/>	Other:

**Wildlife Observations:** Hawk overhead, ducks

**General Observations:** Beaked willow in the area

# Wetland Pre-Post-Disturbance Assessment: Plot Data Collection Form

**Client:** Total Energy Services Inc. **Project/Area:** Blackfalds: TES Industrial Development

**Assessment Area:** Wetland 2 **Assessor:** CK/RW **Date:** Oct.21, 2011 **Photo:**

**Plot Number:** 4 **UTM:**

<b>Plot Location:</b>	Wetland <input checked="" type="checkbox"/>	Riparian <input type="checkbox"/>	Drainage <input type="checkbox"/>	Other: Aspen Woodland
<b>Landscape Condition:</b>	Disturbed <input type="checkbox"/>	Undisturbed <input checked="" type="checkbox"/>	Comments:	
<b>Plot Drainage:</b>	Off <input type="checkbox"/>	Temporary Ponding <input checked="" type="checkbox"/>	Permanent Ponding <input type="checkbox"/>	
<b>Plot Topography:</b>	Aspect:		Position on Slope:	
<b>Plot Position:</b>	Concave <input type="checkbox"/>	Convex <input type="checkbox"/>	Level <input checked="" type="checkbox"/>	

Soils:	Horizon	Depth (cm)	Texture	Structure	Color	Redox
	A	0-29	Silty Loam	Fine Granular	10YR2/1	No
	B					

**Organic Matter Content :** Low: ☐ Moderate: ☐ High: ☒ Cobble: ☐

**Soil Moisture:** Dry: ☐ Low: ☐ Moderate: ☐ High: ☐ Saturated: ☒

**Soil Conditions:** Gleyed: ☐ Anaerobic: ☒ Cultivated: ☐ Other:

**Comments:** Organic matter very very high, branches and roots

<b>Vegetation:</b>	<b>% Litter Cover:</b> 100	<b>% Unvegetated Area:</b> 0	<b>Other:</b> 90% Water
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Grasses:	Canopy Cover%:	Grasses:	Canopy Cover%:
sedge (Carex spp.)	50		

Forbs:	Canopy Cover%:	Forbs:	Canopy Cover%:

Trees/Shrubs:	Canopy Cover%:	Trees/Shrubs:	Canopy Cover%:
trembling aspen ( <i>Populus tremuloides</i> )	80		
red osier dogwood ( <i>Cornus stolonifera</i> )	5		
beaked willow ( <i>Salix bebbiana</i> )	12		

**Wetlands:**

**Dominant Wetland Zone: (> 5% of wetland basin)** Low Prairie ☐ Wet Meadow ☐ Shallow Marsh ☐ Deep Marsh ☐  
Open Water ☒ Alkali Pond ☐ Other:

**Wetland Hydrology:** Open Water ☒ Standing Water ☒ No Surface Water ☐

**Preliminary Wetland Classification:** Class I ephemeral pond ☐ Class II temporary pond ☐ Class III seasonal pond ☐  
Class IV semipermanent pond ☐ Class V permanent pond ☒ Other:

**Wildlife Observations:** Wildlife trails throughout

**General Observations:** Cattail and willow spp. nearby

# Wetland Pre-Post-Disturbance Assessment: Plot Data Collection Form

**Client:** Total Energy Services Inc. **Project/Area:** Blackfalds: TES Industrial Development

**Assessment Area:** Wetland 3 **Assessor:** CK/RW **Date:** Oct.21, 2011 **Photo:**

**Plot Number:** 5 **UTM:**

<b>Plot Location:</b>	Wetland <input checked="" type="checkbox"/>	Riparian <input type="checkbox"/>	Drainage <input type="checkbox"/>	Other:
<b>Landscape Condition:</b>	Disturbed <input type="checkbox"/>	Undisturbed <input checked="" type="checkbox"/>	Comments:	
<b>Plot Drainage:</b>	Off <input type="checkbox"/>	Temporary Ponding <input checked="" type="checkbox"/>	Permanent Ponding <input type="checkbox"/>	
<b>Plot Topography:</b>	Aspect:		Position on Slope:	
<b>Plot Position:</b>	Concave <input type="checkbox"/>	Convex <input type="checkbox"/>	Level <input checked="" type="checkbox"/>	

Soils:	Horizon	Depth (cm)	Texture	Structure	Color	Redox
	A	0-29	Organic Floating Layer	No Soil Found		
	B					

**Organic Matter Content : Only** Low: ☐ Moderate: ☐ High: ☐ Cobble: ☐

**Soil Moisture:** Dry: ☐ Low: ☐ Moderate: ☐ High: ☐ Saturated: ☐

**Soil Conditions:** Gleyed: ☐ Anaerobic: ☐ Cultivated: ☐ Other:

**Comments:** Organic floating layer on standing water, no soil found

<b>Vegetation:</b>	<b>% Litter Cover:</b> 100	<b>% Unvegetated Area:</b> 0	<b>Other:</b> 50% Water
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Grasses:	Canopy Cover%:	Grasses:	Canopy Cover%:
sedge ( <i>Carex</i> spp.)	80		
northern manna grass ( <i>Glyceria borealis</i> )	65		

Forbs:	Canopy Cover%:	Forbs:	Canopy Cover%:
moss spp.	80		

Trees/Shrubs:	Canopy Cover%:	Trees/Shrubs:	Canopy Cover%:
trembling aspen ( <i>Populus tremuloides</i> )	45	willow spp.	30
red osier dogwood ( <i>Cornus stolonifera</i> )	5		
black spruce ( <i>Picea mariana</i> )	50		

**Wetlands:**

**Dominant Wetland Zone: (> 5% of wetland basin)** Low Prairie ☐ Wet Meadow ☐ Shallow Marsh ☐ Deep Marsh ☐  
Open Water ☐ Alkali Pond ☐ Other: Class VII- Fen

**Wetland Hydrology:** Open Water ☐ Standing Water ☒ No Surface Water ☐

**Preliminary Wetland Classification:** Class I ephemeral pond ☐ Class II temporary pond ☐ Class III seasonal pond ☐  
Class IV semipermanent pond ☐ Class V permanent pond ☐ Other: **Fen**

**Wildlife Observations:**

**General Observations:** Moss, wire rush, fescue, timothy, thistle and goldenrod nearby. 40% deadwood.

# Wetland Pre-Post-Disturbance Assessment: Plot Data Collection Form

Client: Total Energy Services Inc. Project/Area: Blackfalds: TES Industrial Development

Assessment Area: Wetland 4 Assessor: CK/RW Date: Oct.21, 2011 Photo:

Plot Number: 6 UTM:

Plot Location:	Wetland <input checked="" type="checkbox"/>	Riparian <input type="checkbox"/>	Drainage <input type="checkbox"/>	Other:
Landscape Condition:	Disturbed <input checked="" type="checkbox"/>	Undisturbed <input type="checkbox"/>	Comments:	
Plot Drainage:	Off <input type="checkbox"/>	Temporary Ponding <input checked="" type="checkbox"/>	Permanent Ponding <input type="checkbox"/>	
Plot Topography:	Aspect:		Position on Slope: Toe	
Plot Position:	Concave <input type="checkbox"/>	Convex <input type="checkbox"/>	Level <input checked="" type="checkbox"/>	

Soils:	Horizon	Depth (cm)	Texture	Structure	Color	Redox
	A	0-29	Clay Loam	Granular	10YR2/1	No
	B					

Organic Matter Content : Low: ☐ Moderate: ☒ High: ☐ Cobble: ☐

Soil Moisture: Dry: ☐ Low: ☐ Moderate: ☐ High: ☐ Saturated: ☒

Soil Conditions: Gleyed: ☐ Anaerobic: ☐ Cultivated: ☐ Other:

Comments:

Vegetation:	% Litter Cover:	50	% Unvegetated Area:	10	Other:
Grasses:	Canopy Cover%:		Grasses:	Canopy Cover%:	
tufted hairgrass ( <i>Deschampsia caespitosa</i> )	70		prairie bulrush ( <i>Scirpus paludosus</i> )	3	
sloughgrass ( <i>Beckmannia syzigachne</i> )	60				
wheatgrass spp. ( <i>Agropyron spp.</i> )	15				
Forbs:	Canopy Cover%:		Forbs:	Canopy Cover%:	
moss spp.	40		aster spp.	5	
white clover ( <i>Trifolium repens</i> )	25				
plantain ( <i>Plantago major</i> )	5				
cutleaf anemone ( <i>Anemone multifida</i> )	1				
Trees/Shrubs:	Canopy Cover%:		Trees/Shrubs:	Canopy Cover%:	

**Wetlands:**

Dominant Wetland Zone: (> 5% of wetland basin)

Low Prairie ☐ Wet Meadow ☐ Shallow Marsh ☒ Deep Marsh ☐

Open Water ☐ Alkali Pond ☐ Other: Class

Wetland Hydrology:

Open Water ☐ Standing Water ☐ No Surface Water ☒

Preliminary Wetland Classification:

Class I ephemeral pond ☐ Class II temporary pond ☐ Class III seasonal pond ☒

Class IV semipermanent pond ☐ Class V permanent pond ☐ Other:

Wildlife Observations:

General Observations: Common great bulrush and cattail in the area.

# Wetland Pre-Post-Disturbance Assessment: Plot Data Collection Form

**Client:** Total Energy Services Inc. **Project/Area:** Blackfalds: TES Industrial Development

**Assessment Area:** Wetland 5 **Assessor:** CK/RW **Date:** Oct.21, 2011 **Photo:**

**Plot Number:** 7 **UTM:**

<b>Plot Location:</b>	Wetland <input checked="" type="checkbox"/>	Riparian <input type="checkbox"/>	Drainage <input type="checkbox"/>	Other:
<b>Landscape Condition:</b>	Disturbed <input checked="" type="checkbox"/>	Undisturbed <input type="checkbox"/>	Comments:	
<b>Plot Drainage:</b>	Off <input type="checkbox"/>	Temporary Ponding <input checked="" type="checkbox"/>	Permanent Ponding <input type="checkbox"/>	
<b>Plot Topography:</b>	Aspect:		Position on Slope:	
<b>Plot Position:</b>	Concave <input type="checkbox"/>	Convex <input type="checkbox"/>	Level <input checked="" type="checkbox"/>	

Soils:	Horizon	Depth (cm)	Texture	Structure	Color	Redox
	A	0-29	Silty Loam	Fine Granular	10YR2/1	No
	B					

**Organic Matter Content :** Low: ☐ Moderate: ☐ High: ☒ Cobble: ☒

**Soil Moisture:** Dry: ☐ Low: ☐ Moderate: ☐ High: ☐ Saturated: ☒

**Soil Conditions:** Gleyed: ☐ Anaerobic: ☒ Cultivated: ☐ Other:

**Comments:**

Vegetation:	% Litter Cover:	5	% Unvegetated Area:	20	Other: 20% standing water
<b>Grasses:</b>			<b>Grasses:</b>		
northern manna grass ( <i>Glyceria borealis</i> )		70	common great bulrush ( <i>Scirpus validus</i> )		5
sloughgrass ( <i>Beckmannia syzigachne</i> )		75			
reed canarygrass ( <i>Phalaris arundinacea</i> )		5			
<b>Forbs:</b>			<b>Forbs:</b>		
aster spp.		5			
chenopodium spp.		3			
<b>Trees/Shrubs:</b>			<b>Trees/Shrubs:</b>		

**Wetlands:**

**Dominant Wetland Zone: (> 5% of wetland basin)** Low Prairie ☐ Wet Meadow ☐ Shallow Marsh ☐ Deep Marsh ☒  
Open Water ☒ Alkali Pond ☐ Other: Class

**Wetland Hydrology:** Open Water ☐ Standing Water ☒ No Surface Water ☐

**Preliminary Wetland Classification:** Class I ephemeral pond ☐ Class II temporary pond ☐ Class III seasonal pond ☒  
Class IV semipermanent pond ☒ Class V permanent pond ☐ Other:

**Wildlife Observations:** Mudhens, ducks

**General Observations:** Lots of Cattail around basin perimeter, aspen, willow and reed canarygrass also in the area.

# Wetland Pre-Post-Disturbance Assessment: Plot Data Collection Form

**Client:** Total Energy Services Inc. **Project/Area:** Blackfalds: TES Industrial Development

**Assessment Area:** Wetland 6 **Assessor:** CK/RW **Date:** Oct.21, 2011 **Photo:**

**Plot Number:** 8 **UTM:**

<b>Plot Location:</b>	Wetland <input checked="" type="checkbox"/>	Riparian <input type="checkbox"/>	Drainage <input type="checkbox"/>	Other:
<b>Landscape Condition:</b>	Disturbed <input checked="" type="checkbox"/>	Undisturbed <input type="checkbox"/>	Comments:	
<b>Plot Drainage:</b>	Off <input type="checkbox"/>	Temporary Ponding <input checked="" type="checkbox"/>	Permanent Ponding <input type="checkbox"/>	
<b>Plot Topography:</b>	Aspect:		Position on Slope:	
<b>Plot Position:</b>	Concave <input type="checkbox"/>	Convex <input type="checkbox"/>	Level <input checked="" type="checkbox"/>	

Soils:	Horizon	Depth (cm)	Texture	Structure	Color	Redox
	A	0-26	Sandy Loam	Granular	10YR2/1	
	B	26+	Clay	Granular	10YR6/2	10YR6/6
<b>Organic Matter Content :</b> Low: <input type="checkbox"/> Moderate: <input checked="" type="checkbox"/> High: <input type="checkbox"/> Cobble: <input type="checkbox"/>						
<b>Soil Moisture:</b> Dry: <input type="checkbox"/> Low: <input checked="" type="checkbox"/> Moderate: <input type="checkbox"/> High: <input type="checkbox"/> Saturated: <input type="checkbox"/>						
<b>Soil Conditions:</b> Gleyed: <input type="checkbox"/> Anaerobic: <input type="checkbox"/> Cultivated: <input type="checkbox"/> Other:						
<b>Comments:</b>						

<b>Vegetation:</b>	<b>% Litter Cover:</b> 0	<b>% Unvegetated Area:</b> 95	<b>Other:</b>
<b>Grasses:</b>	<b>Canopy Cover%:</b>	<b>Grasses:</b>	<b>Canopy Cover%:</b>
western wheatgrass ( <i>Agropyron smithii</i> )	5		
<b>Forbs:</b>	<b>Canopy Cover%:</b>	<b>Forbs:</b>	<b>Canopy Cover%:</b>
<b>Trees/Shrubs:</b>	<b>Canopy Cover%:</b>	<b>Trees/Shrubs:</b>	<b>Canopy Cover%:</b>

<b>Wetlands:</b>			
<b>Dominant Wetland Zone: (&gt; 5% of wetland basin)</b>	Low Prairie <input type="checkbox"/>	Wet Meadow <input checked="" type="checkbox"/>	Shallow Marsh <input type="checkbox"/> Deep Marsh <input checked="" type="checkbox"/>
	Open Water <input type="checkbox"/>	Alkali Pond <input type="checkbox"/>	Other: Class
<b>Wetland Hydrology:</b>	Open Water <input type="checkbox"/>	Standing Water <input type="checkbox"/>	No Surface Water <input checked="" type="checkbox"/>
<b>Preliminary Wetland Classification:</b>	Class I ephemeral pond <input type="checkbox"/>	Class II temporary pond <input checked="" type="checkbox"/>	Class III seasonal pond <input checked="" type="checkbox"/>
	Class IV semipermanent pond <input checked="" type="checkbox"/>	Class V permanent pond <input type="checkbox"/>	Other:

**Wildlife Observations:**

**General Observations:** Plantain in the area

## APPENDIX C

Historical Air Photos: 1962, 1975, and 1988



Photo 1: 1962



Photo 2: 1975



Photo 3: 1988