WETLAND ASSESSMENT + IMPACT REPORT

SUBREGIONAL WATER PIPELINE STORAGE SITE – FINAL

August 29, 2024

URBAN SYSTEMS

Suite 101, 134 - 11 Avenue SE, Calgary, AB T2G 0X5 | T: 403.291.1193

CONTACT: Terri Duret,.P.Bio., Q.W.S.P.
E: tduret@urbansystems.ca

PREPARED FOR:

Foothills County
309 Macleod Trail Box 5605
High River, AB T1V 1M7

Town of Okotoks
5 Elizabeth St.
Okotoks, AB T1S 1K1

Suite 101, 134 - 11 Avenue SE, Calgary, AB T2G 0X5 | T: 403.291.1193

File: 1306.0120.01

CONTENTS

APPENDICES

TABLES

FIGURES

EXECUTIVE SUMMARY

The Town of Okotoks (Okotoks) and Foothills County (County) has retained Urban Systems Ltd. (USL) to prepare a Wetland Assessment and Impact Report (WAIR) for the Sub-Regional Water Pipeline Storage Site (Project Site). The Project Site is owned by Okotoks and is in Foothills County within ATS NW section 21-21-28-W4M along the south boundary of Highway 552.

The proposed Sub-Regional Water Pipeline Storage Site is situated on approximately 16.4 hectares of land, currently managed under agricultural practices. The proposed storage facility ultimately includes a reservoir cell and a pump station. South of the proposed reservoir, earthworks will occur in order to obtain borrow material for construction of the dam. Following excavation of the area, the surface will be re-graded similar to that of the pre-disturbance grading. The preserved topsoil will be placed back and the area will be re-vegetated.

The Sub-Regional Water Pipeline project is a collaboration between the Town of Okotoks and Foothills County to draw raw water from the confluence of the Bow and Highwood Rivers. The intake will draw water and will be piped to the reservoir storage facility and will be drawn down and piped to the Town of Okotoks when needed to supply the wastewater treatment plant.

The purpose of this report is to provide the results of a wetland functional assessment and provide all the required information to meet the Alberta Wetland Assessment and Impact Report Directive 2017 under the 2013 Alberta Wetland Policy. This WAIR and the Water Act application that will be submitted is part of a larger set of approvals that are required for the Sub-regional Water intake, pipeline, and reservoir storage facility.

Current Project Site Conditions

A response was received on May 5, 2021, by Alberta Culture, Multiculturalism and Status of Women, with the results on the application. A conditional approval indicated specific areas for further assessment, which does not include the Project Site.

From 1950 to present day the land use surrounding the Project Site appears to have been dominantly agricultural. Most wetlands identified within this report are visible in the earliest available images.

The Project Site is located within the Grassland Natural Region in the Foothill Fescue Subregion of the province. This Subregion is characterized by mountain rough fescue, parry oat grass and bluebunch fescue. Moist, moderately well drained sites often support silverberry, buckbrush, prickly rose, and saskatoon shrub communities. Along watercourses and waterbodies, balsam poplar, aspen, and plains cottonwood stands may occur. The major soil groups represented in the Foothills Fescue Subregion are Black and Dark Brown Chernozems in the uplands, and Humic Gleysols associated with wetlands.

Hydrology, Wetlands and Waterbodies

The catchment areas for each wetland have been identified as contributing to areas within the Project Site. The major flow path within the Project Site is to the southeast.

WETLAND ID	TOTAL CATCHMENT AREA (HA)	AREA IMPACTED (HA)	% OF CATCHMENT IMPACTED
WL01	**49.04**	**4.46**	**9.1%**
WL01a	**33.56**	**3.41**	**10.2%**
WL02	**0.23**	**0.09**	**39.1%**
WL03	**2.76**	**1.09**	**39.5%**

WL05	0.27	0.26	96.3%
WL06	173.83	0.82	0.47%
WL07	0.80	0.80	100%
WL09	**17.78**	**12.98**	**73.0%**
WL10a	**112.73**	**0.8**	**0.71%**
WL10b	**0.47**	**0.01**	**2.13%**
WL11	**12.29**	**2.25**	**18.31%**

A ground water assessment of the Project Site was conducted by Waterline Resources Inc in 2021 to summarized groundwater conditions. The assessment identified groundwater flow direction generally to the northeast across the Project Site. The wetlands have been identified as groundwater recharge and the hydraulic conductivity of the clay is very low (Waterline Resources Inc., 2021).

Within the current Project Site boundary there are three (3) wetlands with a total area of 0.61 ha. Wetland classes include two (2) temporary marsh graminoid wetlands and one (1) seasonal marsh graminoid wetland. In addition to the wetlands there are three (3) ephemeral waterbodies. All identified wetlands have been determined to have a functional value of C.

WETLAND ID	AREA (HA)	ALBERTA WETLAND CLASSIFICATION SYSTEM	ABWRET-A SCORE
WL05	0.06	Marsh-graminoid-temporary	**C**
WL06	0.38	Marsh-graminoid-seasonal	**C**
WL07	0.17	Marsh-graminoid-temporary	**C**

EPHEMERAL REFERENCE	AREA (HA)
E02	0.43
E03	0.05
E04	0.08

The remaining wetlands will be avoided and protected with a minimum of a 30 m ecological buffer. While the remaining wetlands are to be retained, the Project footprint will result in a catchment area reduction and therefore a Monitoring and Mitigation Plan has been prepared as per the Alberta Wetland Restoration Directive. The three (3) ephemeral waterbodies EO2, EO3 and EO4 will also be removed by the development footprint.

The result of the Public Lands review of for permanency on semi-permanent and permanent wetlands within the Project Site was received on April 7, 2021. The Crown has laid claim to Wetland 01. Mitigation measures will be applied to protect the wetland during construction.

Wildlife

The ACMIS search did not result in any sensitive element occurrences of rare or listed species. FWMIS results indicated several sensitive species have been historically recorded within 3 km of the Project Site: Ferruginous hawk, great blue heron, and the northern leopard frog. A search of the eBird (Cornell Lab of Ornithology, 2021) database indicated one hotspot (Highway 552/Township Rd 274 Slough)

located at the Project Site, with numerous bird species having been historically identified in the area. During the site surveys, incidental wildlife observations were recorded within and adjacent to the wetlands. Lands adjacent to the wetlands were primarily vegetated with agricultural crops and narrow strips of weed species. A total of 16 species with provincial and/or a federal listing were identified during surveys or on the ebird list.

Amphibian survey results identified boreal chorus frogs within wetland 06. However, they did not result in any detection of the northern leopard frog or wood frogs.

Mitigation Measures

RESOURCE-SPECIFIC COMPONENT	PROJECT PHASE	POTENTIAL IMPACT	MITIGATION MEASURES
Terrain and Soils			
Terrain and Soils	*Construction; Operation*	Soil compaction from heavy equipment. Removal of natural topsoil. Soil contamination from heavy equipment fuelling and maintenance and historical deposition of debris.	• Prepare and implement an Erosion and Sediment Control Plan. • Place appropriate erosion and sediment control fencing along ecological setbacks from the retained wetlands and restrict operation of machinery to designated areas to minimize impact on surrounding areas. • Establish a dedicated refueling and equipment maintenance area at least 100m from any waterbodies. • Ensure equipment is clean and leak-free prior to construction. • Have a spill response plan and ensure adequate spill kits in place prior to project initiation and during operation. • Debris and construction waste will be screened out from the disturbed fill area and properly disposed. • Stockpile soil horizons separately, label/mark, protect and replace in proper order. • Stabilize stockpiles in place longer than 30 days. • Avoid or phase removal of existing vegetation when possible. • Implement Best Management Practices for equipment maintenance, storage, refueling, and concrete washout stations. • Use existing access, roads, and trails.
Vegetation			
Weeds	*Construction; Operation*	Increase in weeds in disturbed areas	• Implement controls to prevent spread of noxious or prohibited noxious weeds during growing season (e.g., mowing, spraying).

RESOURCE-SPECIFIC COMPONENT	PROJECT PHASE	POTENTIAL IMPACT	MITIGATION MEASURES
			• Where appropriate, re-seed disturbed areas with native species (certified weed-free) to deter noxious weed invasion and capture overland flow during rain events or snowmelt. • Use mechanical (pulling and mowing) and chemical methods to control weed species identified in vegetation surveys. A multi-year management approach will be used since weed species generally have high seed production and vegetative reproduction, contributing to their success and difficulty of eradication. • Ensure all equipment and vehicles are clean and free of soil prior to arrival on the Project Site. • Minimize the spread of weeds by establishing designated access and pathways.
Wetlands	Construction; Operation	Decrease in wetland function due to wetland disturbance. Loss of wetlands. Change in local hydrology due to grading and on-site stormwater storage.	• Avoid disturbance to retained wetlands by establishing and implementing appropriate development buffers. • Obtain approval under the Alberta Water Act for alteration and/or removal of wetland area. • Execute a Wetland Restoration Plan for retained wetlands where temporary impacts are anticipated. • Ensure all equipment is well maintained, clean and leak-free prior to project initiation. Implement Best Management Practices for equipment maintenance, storage, refueling, and concrete washout stations. • Prepare an ESC plan to protect adjacent wetlands and downstream
Wildlife			
Wildlife (excluding migratory birds – see below)	*Construction; Operation*	Decrease in ecological function due to wetland disturbance.	• Avoid disturbance to retained wetlands by establishing and implementing appropriate development buffers. • Obtain approval under the Alberta *Water Act* for alteration and/or impacts to wetlands. • Conduct a wildlife sweep prior to construction for non-migratory birds (i.e: owls, raptors) and other potential species such as fox, coyote and badger dens.

RESOURCE-SPECIFIC COMPONENT	PROJECT PHASE	POTENTIAL IMPACT	MITIGATION MEASURES
			• Do not feed or approach wildlife. Predetermine wildlife deterrent garbage receptacles and locations prior to construction • If a nest/den is found during construction, immediately stop all works in the area and consult a qualified biologist. If required, notify the appropriate authorities, and implement all required mitigation measures before resuming work in the area.
Migratory Birds	*Construction; Operation*	Decrease in breeding habitat potential due to wetland disturbance. Disturbance during breeding period (April 15 to August 31).	• Avoid disturbance to retained wetlands by establishing and implementing appropriate development buffers. • Conduct clearing of vegetation between September 1 and April 14 to avoid incidental take of migratory birds, nests, or eggs and to maintain compliance with the *Migratory Birds Convention Act, the Species-at-Risk Act,* and the Alberta *Wildlife Act.* • If clearing is required within general nesting periods, migratory bird breeding surveys will be completed by a qualified avian specialist; if breeding activity is observed appropriate disturbance buffers will be implemented until young have fledged and left the nesting area.
Hydrology			
Hydrology	*Construction; Operation*	Change in local hydrology due to change in grading and stormwater storage on site	• Maintain existing drainage pathways and pre-development runoff volumes. • Avoid disturbance to retained wetlands by establishing and implementing appropriate development buffers. • Obtain approval under the Alberta Water Act for alteration of wetland area.
Historical Resources			
Historical Resources	*Construction; Operation*	No historical resources have been identified and impacts are not anticipated	• A Historical Resources Impact Assessment was completed in 2021 by Bison Historical Services and no historical resources were recorded. • If historical resources are discovered during excavation/construction stop work and notify the Alberta Historical Resources Management Branch subject to Section 31 of the Historical Resources Act.

Regulatory Framework

Impacts to wetlands trigger an approval under the Alberta Water Act. The proposed reservoir site will have a direct and permanent impact on wetlands and ephemeral waterbodies identified within the Project Site except for WL01.

Wetlands 5, 6 and 7 will be permanently removed to accommodate the reservoir and will be compensated through the in-lieu fee payment option under the Alberta Wetland Policy.

WETLAND ID	WETLAND CLASS (AWCS)	ABWRET VALUE	AREA (HA)	COMPENSATION RATIO	COMPENSATION AREA (HA)	RWVAU	REPLACEMENT COST
WL05	Marsh-graminoid-temporary	C	0.06	2	0.12	$17,700.00	$2,124.00
WL06	Marsh-graminoid-seasonal	C	0.38	2	0.76	$17,700.00	$13,452.00
WL07	Marsh-graminoid-temporary	C	0.17	2	0.34	$17,700.00	$6,018.00
TOTAL			**0.61**		**1.22**		**$21,594.00** (excluding GST)

An EPEA amendment has been prepared and submitted to EPA for review and approval that addresses the water volumes that will be taken from the Bow/Highwood River intake location. A discussion with EPA on July 6, 2021, indicated this amendment would satisfy the requirement of an EPEA registration for the Water Act application.

A Pre-Consultation Adequacy Assessment was submitted to ACO for the Storage Site on November 30, 2021 (FNC202108527-002). The results of the assessment indicated that no consultation is required.

1.0 INTRODUCTION

The Town of Okotoks (Okotoks) and Foothills County (County) has retained Urban Systems Ltd. (USL) to prepare a Wetland Assessment and Impact Report (WAIR) for the Sub-Regional Water Pipeline Storage Site (Project Site). The Project Site is owned by Okotoks and is in Foothills County within ATS NW section 21-21-28-W4M along the south boundary of Highway 552 (**Figure 1**).

The data collection, assessments and report were supervised, reviewed, and approved by Theresa (Terri) Duret, a professional biologist and qualified wetland science practitioner, registered with the Alberta Society of Professional Biologists.

1.1 PROJECT DESCRIPTION AND BACKGROUND

The proposed Sub-Regional Water Pipeline Storage Site is situated on approximately 16.4 hectares of land, currently managed under agricultural practices. The Sub-Regional Water Pipeline project is a collaboration between the Town of Okotoks and Foothills County to draw raw water from the confluence of the Bow and Highwood Rivers. The intake will draw water and will be piped to the reservoir storage facility and will be drawn down and piped to the Town of Okotoks when needed to supply the wastewater treatment plant.

The proposed storage facility ultimately includes two reservoir cells and a pump station (**Figure 2**).

The proposed works will include one reservoir and a pump station. To the south of the reservoir, earthworks will occur in order to obtain borrow material for construction of the dam. Following excavation of the area, the surface will be re-graded similar to the pre-disturbance grading. The preserved topsoil will be replaced and the area will be re-vegetated.

1.2 PURPOSE

The purpose of this report is to provide the results of a wetland functional assessment and provide all the required information to meet the Alberta Wetland Assessment and Impact Report Directive 2017 under the 2013 Alberta Wetland Policy (Government of Alberta, 2013). This report will be submitted to Environment and Protected Areas (EPA) for approval under the Water Act to impact specific wetlands to support the development of the proposed reservoir and pump station.

This WAIR and the Water Act application that will be submitted is part of a larger set of approvals that are required for the Sub-regional Water intake, pipeline, and reservoir storage facility. **Table 1:1** provides a list of the related reports, applications, and approvals in conjunction with this WAIR.

Table 1:1: Regulatory Status

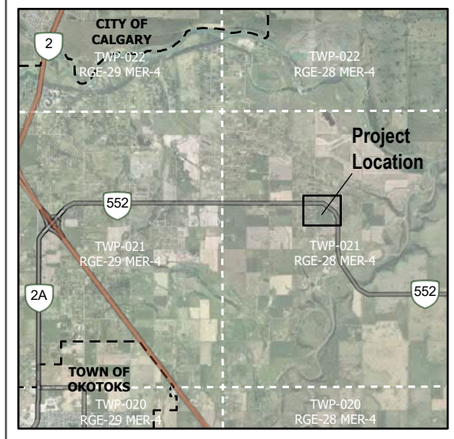
PROJECT	REGULATORY BODY/ACT	REGULATORY REQUIREMENT	STATUS
Intake	EPEA	Amendment To Existing Water Licence	**In Review with EPA**
	Water Act	Application To Extract Water From Bow River/Highwood Confluence	**Submission Pending**
	Historical Resources Act	Further assessments outstanding to be completed in 2023	**Pending field investigation**

PROJECT	REGULATORY BODY/ACT	REGULATORY REQUIREMENT	STATUS
Pipeline	EPEA	Conservation and Reclamation Plan	**Approved**
	Fisheries and Oceans Canada (FOC)	Fish Habitat Assessment	**Submission Pending**
	Historical Resources Act	Further assessments outstanding	**Pending field investigation**
Storage Site (Reservoir)	Water Act	Wetland Assessment and Impact Report	**In Review**
	EPEA	Amendment to Water Licence	**In Review with EPA**
	Historical Resources Act	No further assessment required in this LSD.	**Not Required**
	Dam Safety Department	Reservoir design reviewed by the Dam Safety Department.	**In Progress**

Wetland Assessment and Impact Report
Subregional Water Pipeline Storage Site
Project Location

Legend

Project Boundary



0 50 100 150
Meters

N

Coordinate System:
NAD 1983 3TM 114

Scale: 1:4,000
(When plotted at 11"x17")

Project #:	1306.0120.01
Author:	SDF
Checked:	TD
Status:	**Final**
Revision:	A
Date:	2024 / 6 / 20

URBAN systems

FIGURE 1

LEGEND

PROPOSED FEATURES

- SITE BOUNDARY
- 1025.0 MAJOR CONTOUR LINE
- 1026.0 MINOR CONTOUR LINE
- 12.85 SPOT ELEVATION
- 5.0:1 9.08% CULVERT
- SLOPE / GRADE
- TOP OF SLOPE
- TOE OF SLOPE
- BREAK LINE
- EDGE OF GRAVEL
- SHOULDER
- CHAIN-LINK SECURITY FENCE
- ENVIRONMENTAL ENHANCEMENT AREA
- DAM

EXISTING FEATURES

- 1025.0 MAJOR CONTOUR LINE
- 1026.0 MINOR CONTOUR LINE
- 15.74 SPOT ELEVATION
- 5.0:1 9.08% SLOPE / GRADE
- WETLAND BOUNDARY
- BED AND SHORE
- EPHEMERAL WATERBODY
- WETLAND BOUNDARY (OFFSITE)
- G EXISTING GAS LINE
- E EXISTING ELECTRICAL LINE
- EXISTING CULVERT

FORWP – RESERVOIR R1 STORAGE VOLUME CHARACTERISTICS

STAGE	ELEVATION (m)	VOLUME (m3)	AREA (m2)
FULL SUPPLY LEVEL (FSL)	1022.00	296,619	80,643
FSL +1m	1023.00	379,150	84,428
MINIMUM SUPPLY LEVEL (MSL)*	1020.50	182,609	71,429
EMPTY SUPPLY LEVEL (ESL)	1017.00	0	0

* MSL BASED ON MINIMUM 3m WATER DEPTH REQUIREMENT AS PER RECOMMENDATION FROM PACE

ATTENTION
This drawing is prepared for the sole use of THE TOWN OF OKOTOKS
No representations of any kind are made by Urban Systems Ltd. or its employees to any party with whom Urban Systems Ltd. does not have a contract.

WARNING
Utilities or structures shown on this drawing were compiled from information supplied by various parties and may not be complete or accurate. Expose and conclusively confirm the location in the field all underground utilities and structures indicated on this drawing, all underground utilities in the area of the proposed work and any utilities or structures reasonably apparent from an inspection of the proposed work. Urban Systems Ltd. assumes no responsibility for loss or damage caused by third party negligence or failure to comply with the above.

SURVEY INFORMATION
Prepared by: URBAN SYSTEMS SURVEY INC.
Coordinate System: 3TM-NAD83-114
Compilation Date: APRIL 2024

ISSUED FOR APPROVAL
JULY 3, 2024
urbansystems.ca

Professional Seals

#	Date	Issue / Revision	App
1	2024-07-03	ISSUED FOR APPROVAL	DN

URBAN systems

Scale 1:2000 (20m 0 20 40 60)

Quality Control by DN
Designed by DN/TL
Drawn by TL

FOOTHILLS OKOTOKS REGIONAL WATER PROJECT
PHASE 1 RESERVOIR
SITE LAYOUT AND GRADING PLAN

Sheet Number 1 of 1
Project Number 1306.0120.06
Drawing Number 002-01
Revision 1

ISSUED FOR APPROVAL

U:\Projects_CALI\1306\0120\06\D-Design\CAD\20_PROD\Phase1\FORWP-03-C-SGP-002-01.dwg, 002-01-GRADING (34x22-VERT PLAN) (2), 2024-07-03 10:35 am tlam

2.0 METHODS

2.1 HISTORICAL RESOURCES

Protection and management of historical and archeological resources in Alberta are governed under the *Alberta Historical Resources Act* (HRA) and associated regulations.

The *Listing of Historical Resources* (Alberta Government Historic Resources Managment Branch, 2019) was reviewed to determine if the Project Site has been assigned an Historical Resource Value (HRV). If the Project Site is located within an area that has been assigned an HRV an Historical Resources Impact Assessment (HRIA) is required, and an HRA approval must be issued prior to development. The absence of an HRV ranking means the Project Site does not require further assessment. However, in the event any archeological, paleontological and/or other historical resources are found on the site during development activities, it is to be immediately reported to Alberta Culture and Tourism for further investigation.

2.2 HISTORICAL AERIAL PHOTOGRAPHS AND PRECIPITATION DATA

Historical aerial photographs were ordered from the Environment and Protected Areas (EPA) Aerial Photographic Records System (APRS) to review changes in land use and to aid in the classification of wetlands. Additional images from Google Earth were also reviewed.

As part of the historical review process described in the Wetland Identification and Delineation Directive (the Directive), (Government of Alberta, 2015), precipitation data is required to correlate with the available historical photographs reviewed and aid in determining wetland class. Precipitation data was downloaded from the Alberta Agriculture and Forestry Interpolated Weather website (Alberta Agriculture and Forestry, 2021). Precipitation data was compiled from Alberta Agriculture and Forestry to document the total amount of precipitation relative to each day, month, and year that historical aerial photographs were available. To determine whether each year of historical photographs was either a dry, average, or wet year, the upper and lower 25% quartile was calculated.

2.3 ALBERTA CONSERVATION INFORMATION MANAGEMENT SYSTEMS AND FISH AND WILDLIFE INFORMATION MANAGEMENT SYSTEM

The Alberta Conservation Information Management Systems (ACIMS) is a resource that provides biodiversity information on Alberta species and ecological community sites. It provides the location, condition, and status of selected elements.

The Fish and Wildlife Information Management System (FWIMS) is a provincial database that provides information on fish and wildlife observations and can generate reports and maps of observed species within a specified area or polygon.

A database search was conducted for both management systems to reflect the most current recordings of vegetation and wildlife species of conservation concern. In addition, an eBird database search was conducted to look for any documented hotspots near the Project Site.

2.4 WETLAND DELINIATION AND ASSESSMENT

Potential wetlands within the Project Site were identified and delineated prior to field work through historical aerial imagery. The boundaries were confirmed in the field in May 2021 through a combination of soils, vegetation, topography, precipitation and historical data following the Wetland Identification and Delineation Directive 2015 (Government of Alberta, 2015). The Project Site was traversed fully during site visits to confirm the presence or absence of additional wetlands areas or features that may have been overlooked during the historical aerial image review. Wetland conditions were re-confirmed during a site visit on April 15, 2024.

Where possible, a change in obligate and facultative wetland vegetation to upland vegetation was used to confirm or adjust wetland boundaries. When vegetation provided a clear boundary of transition from wetland to upland species, an Appendix 7 field form using a 1 m x 1 m vegetation plot at the wetland/upland boundary was recorded. To confirm wetland boundaries where vegetation did not provide a clear transition, soil pit inspections were conducted by starting at the desktop delineated wetland boundary and moving progressively up gradient in 5m intervals until evidence of hydric soils was absent and upland soils were observed. An Appendix 7 Field Form was completed for each wetland boundary documenting vegetation and/or soil data as per the Wetland Identification and Delineation Directive 2015. Each wetland was then classified under the Alberta Wetland Classification System 2015 (Alberta Environment and Sustainable Resources Development, 2015).

As part of the 2013 Alberta Wetland Policy, the province created the Alberta Wetland Rapid Evaluation Tool – Actual (ABWRET-A) to assess the natural functions for all wetland types. This tool generates a wetland functional score. Once a score is generated, the province assigns a value category to the wetland (A, B, C, or D). (Government of Alberta, 2015). An ABWRET-A form was completed for the Project Site wetlands based on recent and historical photographs, historical precipitation data, and site visits during the 2021 and 2024 growing season.

Ephemeral waterbody boundaries were determined through a combination of field investigation and desktop review. Historical images were reviewed for signs of ephemeral water bodies such as diminished vegetation growth, drainage channels and early season surface water. Identified potential ephemeral waterbody areas were then physically visited for field truthing. Soil pits were conducted in the centre of potential areas to search for evidence of hydric soils, and boundary indicators such as salt watermarks, flow patterns, and diminished vegetation growth were recorded. Final boundaries were confirmed and adjusted on desktop using photographs, field notes, and historical aerial imagery.

2.5 HYDROLOGY

The catchment areas for the wetlands were determined by using ArcGIS, Lidar and the ArcHydro data models. To delineate the watershed boundaries and major flow paths, existing surface data along with flow direction and flow accumulation grids were used. The data model is then used to define catchments for user specified areas or points.

A study on the groundwater conditions within the Project Site was conducted by Water Line Resources Inc.

2.6 PERMANENCY REVIEW

On February 25, 2021, a request for permanency review was submitted by Urban Systems to Public Lands for determination of Crown claimability of permanent wetlands and waterbodies within the Project Site, for the NW section of 21-21-28-W4M.

2.7 FIELD SURVEYS

Field surveys of the wetlands were conducted within the 2021 growing season between April and May 2021. Wetland conditions were confirmed during a field visit on April 15, 2024. A functional assessment using the ABWRET-A tool was used to assess each wetland. Field surveys included documentation of weed species, vegetation, incidental wildlife observations and photographs. Wetland boundaries were documented using the Appendix 7 field form as per the Directive.

Amphibian surveys were conducted on April 28, 2021 and April 29, 2021. Amphibian survey methods adapted the Sensitive species guidelines (Alberta Government, 2013). Leopard frog call surveys were conducted May 17 and May 29, 2024 to assess for the presence/absence of leopard frogs following the Survey Protocol for the Northern Leopard Frog (Kendell, 2002).

2.8 LANDSCAPE ANALYSIS TOOL

The Landscape Analysis Tool (LAT) is a web enabled geospatial tool that allows proponents to plan activities on public lands (Government of Alberta, 2018). The current Project Site is not within public land and does not meet any of the activities listed on the Activities Code Table for the LAT process. Therefore, a LAT search was not generated for the Project Site.

3.0 CURRENT CONDITIONS

3.1 HISTORICAL RESOURCES

A response was received on May 5, 2021, by Alberta Culture, Multiculturalism and Status of Women, with the results on the application. A conditional approval indicated specific areas for further assessment, which does not include the Project Site. A copy of the conditional approval is in **Appendix A**.

3.2 HISTORICAL AERIAL PHOTOGRAPHS

From 1950 to present day the land use surrounding the Project Site appears to have been dominantly agricultural. Most wetlands identified within this report are visible in the earliest available images. Below is a summary of the historical aerial photograph review. Historical aerial photographs are in **Appendix B.**

- The earliest available historical aerial image of the Project Site was taken on March 30, 1950. An unpaved road runs west to east along the north boundary of the Project Site. Two large wetlands with surface water are present in the northeast section of the quarter section. Many other wetlands throughout the Project site are evident and span across quarter section lines. Land use may be agricultural related but is showing lines in various directions throughout.
- September 20, 1962 – no surface water present at the end of the growing season.
- June 13, 1974 – 112 St E has been constructed running north to south along the west Project Site boundary and intersects a wetland. Unpaved road (Highway 552) has been diverted to run north to south at the northeast corner of the Project Site, intersecting the large wetland. Some agricultural land use on the Project Site is evident.
- July 5, 1983 –. 112 St E appears to have been paved with a few residential houses being developed on the west side of the street. No surface water is present in any of the wetlands in July.
- July 17, 1998 – Highway 552 is paved and there is a township road constructed branching off Highway 552 at the northeast corner of the Project Site. Residential development to the west of 112 St E is expanding. Agricultural land use on the Project Site is clear. Large wetland in the northeast has been impacted by road construction.
- July 7, 2007 – Rural residential development continues around the Project Site to the west, north and east. The Project Site continues to be used for agriculture practices.
- May 4, 2013 – No significant changes.
- August 21, 2017 – No significant changes.
- May 1, 2020 – No significant changes.

3.3 NATURAL REGION, LANDFORM AND SOILS

The Project Site is located within the Grassland Natural Region in the Foothill Fescue Subregion of the province. This Subregion is characterized by mountain rough fescue, parry oat grass and bluebunch fescue. Moist, moderately well drained sites often support silverberry, buckbrush, prickly rose, and saskatoon shrub communities. Along watercourses and waterbodies, balsam poplar, aspen, and plains cottonwood stands may occur (Natural Regions Comittee, 2006).

The major soil groups represented in the Foothills Fescue Subregion are Black and Dark Brown Chernozems in the uplands, and Humic Gleysols associated with wetlands (Natural Regions Comittee, 2006). A review of the Alberta Soil Information Viewer indicates the Project Site is within one soil polygon (Government of Alberta Agriculture and Forestry, 2021):

- 10989 - Undulating, high relief landform with a limiting slope. Rego Humic Gleysol on fine textured materials over medium textured till and Rego Black Chernozem on course textured materials over medium or fine textured till.

3.4 HYDROLOGY

The catchment areas for each wetland have been identified as contributing to areas within the Project Site (**Figure 3**). The major flow path within the Project Site is to the southeast.

Catchments for each wetland were generated and reviewed to determine if the project footprint removes or impacts wetland catchment areas. **Table 3:3** provides the catchment information and anticipated impact to each catchment area.

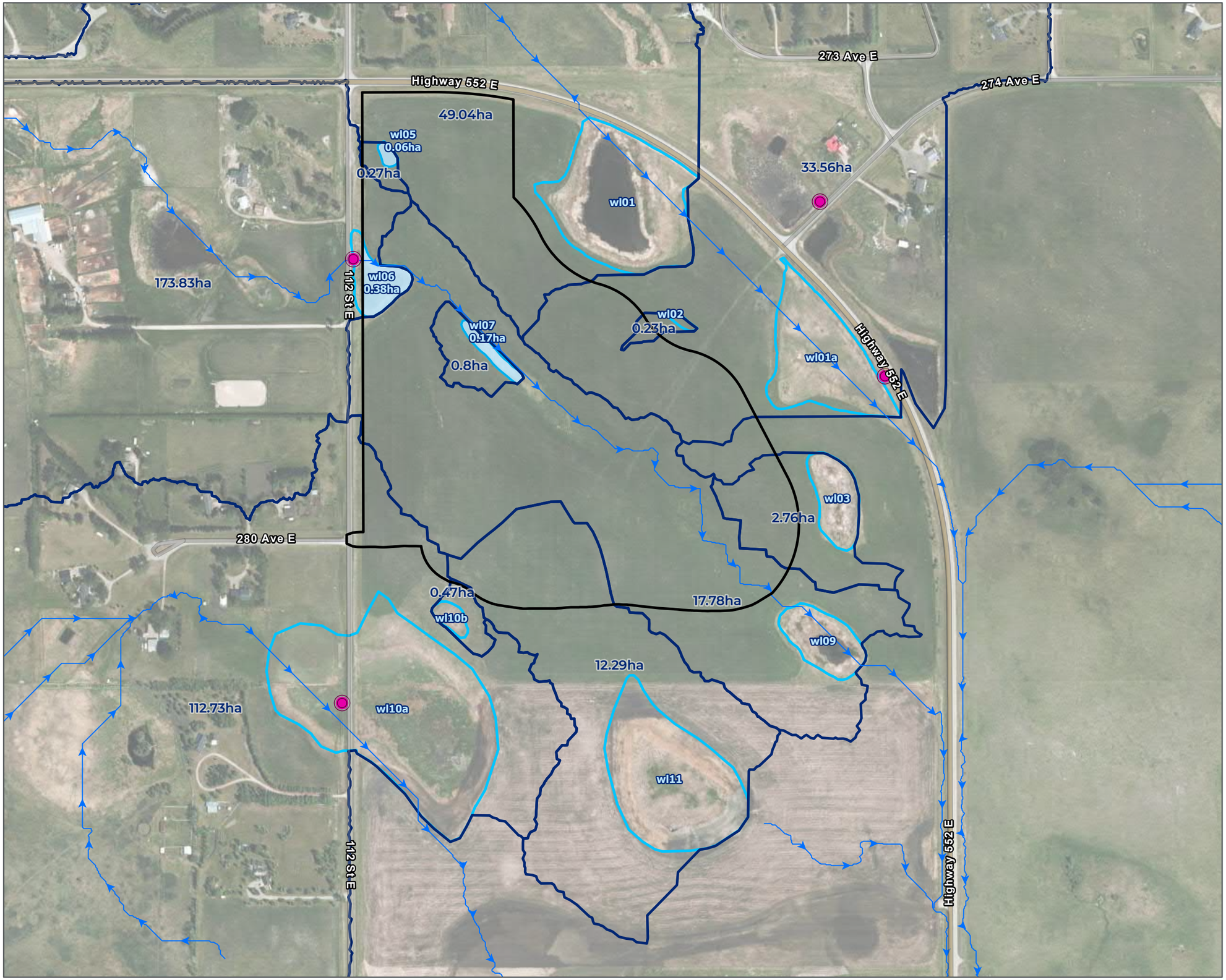
Table 3:3: Wetland Catchment Areas

WETLAND ID	TOTAL CATCHMENT AREA (HA)	AREA IMPACTED (HA)	% OF CATCHMENT IMPACTED
WL01	**49.04**	**4.46**	**9.1%**
WL01a	**33.56**	**3.41**	**10.2%**
WL02	**0.23**	**0.09**	**39.1%**
WL03	**2.76**	**1.09**	**39.5%**
WL05	0.27	0.26	96.3%
WL06	173.83	0.82	0.47%
WL07	0.80	0.80	100%
WL09	**17.78**	**12.98**	**73.0%**
WL10a	**112.73**	**0.8**	**0.71%**
WL10b	**0.47**	**0.01**	**2.13%**
WL11	**12.29**	**2.25**	**18.31%**

WL05, WL06, and WL07 will be removed by the Project footprint in their entirety (**Section 3.5**). While the remaining wetlands are to be retained, the Project footprint will result in a reduction and/or temporary impact to the catchment areas. Based on potential short-term and long-term impacts to the catchment areas a Monitoring and Mitigation Plan (**Appendix C**) has been prepared as per the Alberta Wetland Restoration Directive. The catchment areas of WL01, WL01a WL02, WL03, WL09, and WL10a will be directly impacted by proposed works. The catchment areas of WL03, WL09, WL11, WL10b, will be temporarily impacted by earthworks operations within south portion of the Project Area. Re-contouring and re-seeding of the earthworks area will be completed as soon as possible, and post development contouring is to be similar to pre-disturbance conditions.

For the wetland assessments average annual precipitation levels from 1955 to 2020 was calculated to be 442.37 mm. A dry year is precipitation levels below or at 385.12 mm and a wet year is levels at or above 480.03 mm.

A groundwater assessment of the Project Site was conducted by Waterline Resources Inc in 2021 to summarized groundwater conditions. The assessment identified groundwater flow direction generally to the northeast across the Project Site. The wetlands have been identified as groundwater recharge and the hydraulic conductivity of the clay is very low (Waterline Resources Inc., 2021).



Wetland Assessment and Impact Report
Subregional Water Pipeline Storage Site
Wetland Catchments

Legend

- Culverts
- Flow Path
- Wetlands Within Project Boundary
- Wetlands
- Catchments
- Project Boundary

0 50 100 150
Meters

Coordinate System:
NAD 1983 3TM 114

Scale: 1:5,000
(When plotted at 11"x17")

Project #:	1306.0120.01
Author:	SDF
Checked:	TD
Status:	**Final**
Revision:	A
Date:	2024 / 8 / 29

URBAN systems

FIGURE 3

3.5 WETLANDS AND WATERBODIES

Within the current Project Site boundary there are three (3) wetlands with a total area of 0.61 ha (**Figure 4**). Wetland classes include two (2) temporary marsh graminoid wetlands and one (1) seasonal marsh graminoid wetland. In addition to the wetlands there are three (3) ephemeral waterbodies. All identified wetlands have been determined to have a functional value of C. **Table 3:1** provides the class, functional value, and area in hectares of the identified wetlands.

Table 3:1: Wetland Classification and Areas

WETLAND ID	AREA (HA)	ALBERTA WETLAND CLASSIFICATION SYSTEM	ABWRET-A SCORE
WL05	0.06	Marsh-graminoid-temporary	**C**
WL06	0.38	Marsh-graminoid-seasonal	**C**
WL07	0.17	Marsh-graminoid-temporary	**C**

3.5.1 IDENTIFICATION, DELINEATION AND CLASSIFICATION

During the field surveys in May 2021, the previously defined wetland boundaries were verified or adjusted based on the delineation process described in **Section 2.4**. Using field data and desktop analysis of historical and precipitation data, the wetland classifications were confirmed or reclassified using the Alberta Wetland Classification System. Adjustments to wetland boundaries and classifications were based on historical photographs, historical precipitation data, changes in vegetation communities, topography, and/or hydric soil indictors as outlined in the Directive.

Appendix D provides tables of the historical precipitation information and the Appendix 7 Field Form data for each wetland as per the Directive. Results of the ABWRET-A functional assessment is also attached in **Appendix D**.

3.5.2 EPHEMERAL WATERBODIES

Three (3) ephemeral waterbodies have been identified within the Project Site with a total area of 0.56 ha. A listing of the ephemeral waterbodies is provided in Table 3:2.

Table 3:2: Ephemeral Water Body Areas

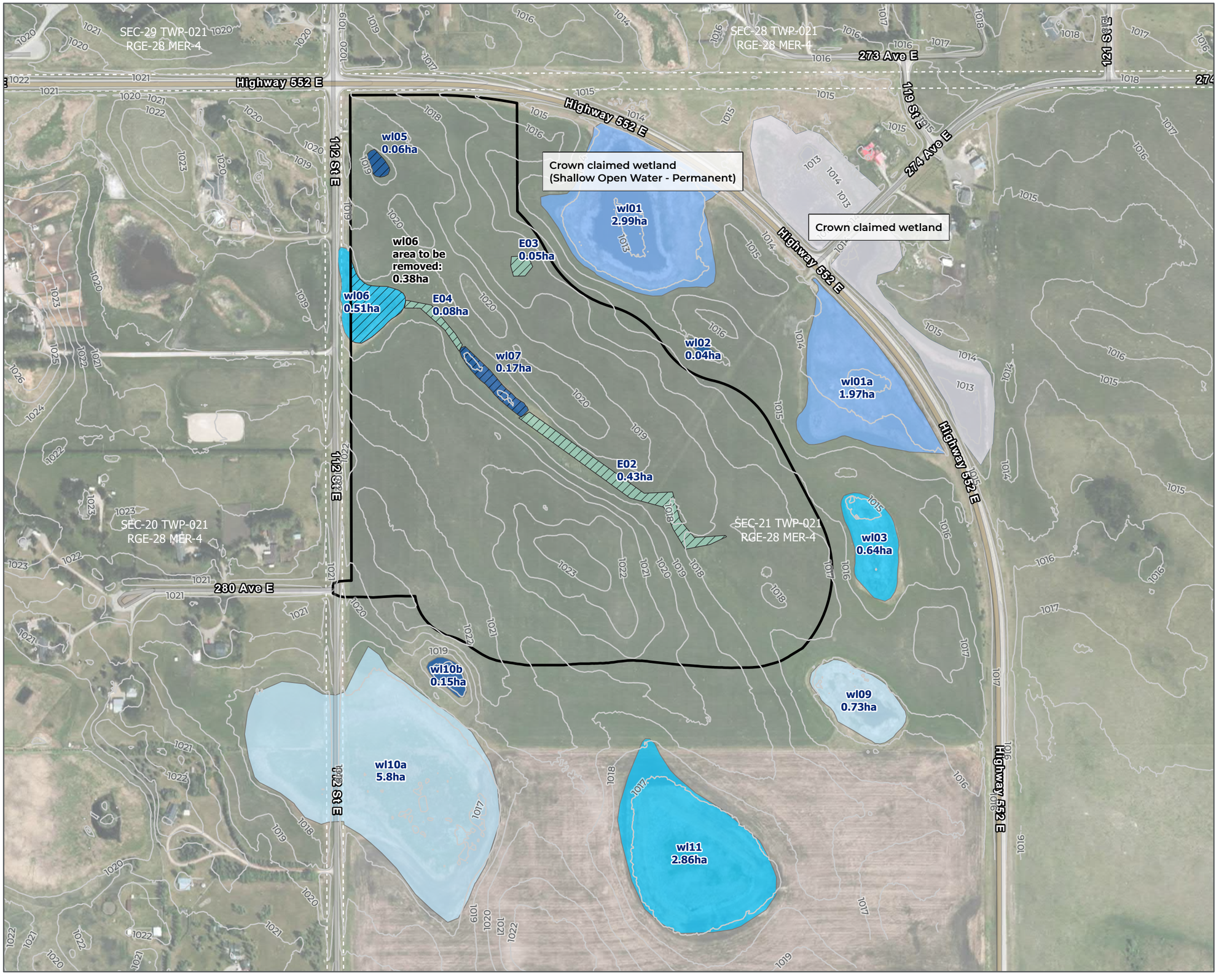
EPHEMERAL REFERENCE	AREA (HA)
E02	0.43
E03	0.05
E04	0.08

To aid in the classification of ephemeral waterbodies, soils were observed for signs of mottles/gleying, and recorded. No wetland vegetation was observed during field surveys and the vegetation footprint was consistent with pasture species such as Kentucky bluegrass, quackgrass, smooth brome, and common dandelion. No indication of hydric soils was observed. Ephemeral waterbodies presented as overland drainage paths through historical imagery and topography.

3.5.3 PUBLIC LANDS

The result of the Public Lands review of for permanency on semi-permanent and permanent wetlands within the Project Site was received on April 7, 2021. The Crown has laid claim to Wetland 01, which was originally identified as Wetland 2 in the Public Lands review memorandum. The Public Lands memorandum and response is attached in **Appendix E**.

Mitigation measures and best management practices will be applied during construction to protect the Crown wetland.



Wetland Assessment and Impact Report Subregional Water Pipeline Storage Site

Wetland and Ephemeral Waterbodies

Legend

- Contours (1m)
- Project Boundary

Wetlands

- Wetland/Waterbody Area To Be Removed
- Ephemeral Waterbody
- Marsh-Graminoid-Seasonal
- Marsh-Graminoid-Temporary
- Marsh-Graminoid-Permanent
- Marsh-Graminoid-Semi-Permanent

0 50 100 150
Meters

Coordinate System:
NAD 1983 3TM 114

Scale: 1:4,500
(When plotted at 11"x17")

Project #:	1306.0120.01
Author:	SDF
Checked:	TD
Status:	Final
Revision:	A
Date:	2024 / 7 / 3

URBAN systems

FIGURE 4

4.0 WILDLIFE AND WILDLIFE HABITAT

The ACMIS search did not result in any sensitive element occurrences of rare or listed species. FWMIS results indicated the following sensitive species historically recorded within 3 km of the Project Site: Ferruginous hawk, great blue heron, and the northern leopard frog. A search of the eBird (Cornell Lab of Ornithology, 2021) database indicated one hotspot (Highway 552/Township Rd 274 Slough) located at the Project Site, with numerous bird species having been historically identified in the area. ACIMS and FWIMIS database reports are provided in **Appendix F**. During the site surveys, incidental wildlife observations were recorded within and adjacent to the wetlands. Lands adjacent to the wetlands were primarily vegetated with agricultural crops and narrow strips of weed species.

Amphibian survey results identified boreal chorus frogs within wetland 06. However, they did not result in any detection of the northern leopard frog or wood frogs.

Observations of incidental wildlife and historically identified species from the FWIMIS and eBird results are provided in Table 4:1 along with their conservation status.

Table 4:1: Historically Observed Wildlife and Conservation Status

COMMON NAME	SCIENTIFIC NAME	ALBERTA WILDLIFE ACT STATUS	SPECIES AT RISK ACT SCHEDULE 1
American avocet	*Recurvirostra americana*	Secure	-
American coot	*Fulica americana*	-	-
American crow	*Corvus brachyrhynchos*	-	-
American goldfinch	*Carduelis tristis*	-	-
American robin	*Turdus migratorius*	-	-
American tree sparrow	*Spizella arborea*	-	-
American wigeon	*Anas americana*	-	-
Baird's sandpiper	*Calidris bairdii*	-	-
bald eagle	*Haliaeetus leucocephalus*	Sensitive	-
Baltimore oriole	*Icterus galbula*	Sensitive	-
bank swallow	*Riparia riparia*	Sensitive	Threatened
barn swallow	*Hirundo rustica*	-	Threatened
black tern	*Chlidonias niger*	Sensitive	-
black-billed magpie	*Pica hudsonia*	-	-
black-capped chickadee	*Poecile atricapillus*	-	-
black-necked stilt	*Himantopus mexicanus*	Sensitive	-
blue-winged teal	*Anas discors*	-	-
boreal chorus frog	*Pseudacris maculata*	-	-
brewer's blackbird	*Euphagus cyanocephalus*	-	-
brown thrasher	*Toxostoma rufum*	-	-
brown-headed cowbird	*Molothrus ater*	-	-

COMMON NAME	SCIENTIFIC NAME	ALBERTA WILDLIFE ACT STATUS	SPECIES AT RISK ACT SCHEDULE 1
bufflehead	*Bucephala albeola*	-	-
Canada goose	*Branta canadensis*	-	-
canvasback	*Aythya valisineria*	-	-
cedar waxwing	*Bombycilla cedrorum*	-	-
cinnamon teal	*Anas cyanoptera*	-	-
clay-colored sparrow	*Spizella pallida*	-	-
common goldeneye	*Bucephala clangula*	-	-
common grackle	*Quiscalus quiscula*	-	-
common raven	*Corvus corax*	-	-
cooper's hawk	*Accipiter cooperii*	-	-
eastern kingbird	*Tyrannus tyrannus*	Sensitive	-
European starling	*Sturnus vulgaris*	-	-
ferruginous hawk	*Buteo regalis*	At Risk	Threatened
Franklin's gull	*Leucophaeus pipixcan*	-	-
gadwall	*Anas strepera*	-	-
gray catbird	*Dumetella carolinensis*	-	-
gray partridge	*Perdix perdix*	-	-
great blue heron	*Ardea herodias*	Sensitive	-
great horned owl	*Bubo virginianus*	-	-
greater yellowlegs	*Tringa melanoleuca*	-	-
green-winged teal	*Anas crecca*		-
hairy woodpecker	*Picoides villosus*	-	-
house sparrow	*Passer domesticus*	-	-
house wren	*Troglodytes aedon*	-	-
killdeer	*Charadrius vociferus*	-	-
least flycatcher	*Empidonax minimus*	Sensitive	-
least sandpiper	*Calidris minutilla*	-	-
LeConte's sparrow	*Ammodramus leconteii*	-	-
lesser scaup	*Aythya affinis*	-	-
lesser yellowlegs	*Tringa flavipes*	-	-
Lincoln's sparrow	*Melospiza lincolnii*	-	-
long-billed dowitcher	*Limnodromus scolopaceus*	-	-
mallard	*Anas platyrhynchos*	-	-
marbled godwit	*Limosa fedoa*	-	-
merlin	*Falco columbarius*	-	-

COMMON NAME	SCIENTIFIC NAME	ALBERTA WILDLIFE ACT STATUS	SPECIES AT RISK ACT SCHEDULE 1
mountain bluebird	*Sialia currucoides*	-	-
mourning dove	*Zenaida macroura*	-	-
nelson's sparrow	*Ammodramus nelsoni*	-	-
northern flicker	*Colaptes auratus*	-	-
northern harrier	*Circus cyaneus*	-	-
northern leopard frog	*Lithobates pipiens*	At Risk	Special Concern
northern pintail	*Anas acuta*	-	-
northern shoveler	*Anas clypeata*	-	-
osprey	*Pandion haliaetus*	Sensitive	-
pied-billed grebe	*Podilymbus podiceps*	Sensitive	-
redhead	*Aythya americana*	-	-
red-necked phalarope	*Phalaropus lobatus*	-	-
red-tailed hawk	*Buteo jamaicensis*	-	-
red-winged blackbird	*Agelaius phoeniceus*	-	-
ring-billed gull	*Larus delawarensis*	-	-
ring-necked duck	*Aythya collaris*	-	-
ring-necked pheasant	*Phasianus colchicus*	-	-
rock pigeon	*Columba livia*	-	-
rough-legged hawk	*Buteo lagopus*	-	-
ruddy duck	*Oxyura jamaicensis*	-	-
savannah sparrow	*Passerculus sandwichensis*	-	-
semipalmated sandpiper	*Calidris pusilla*	-	-
sharp-shinned hawk	*Accipiter striatus*	-	-
solitary sandpiper	*Tringa solitaria*	-	-
song sparrow	*Melospiza melodia*	-	-
sora	*Porzana carolina*	Sensitive	-
spotted sandpiper	*Actitis macularius*	-	-
spotted towhee	*Pipilo maculatus*	-	-
Swainson's hawk	*Buteo swainsoni*	-	-
tree swallow	*Tachycineta bicolor*	-	-
trumpeter swan	*Cygnus buccinator*	Sensitive	-
vesper sparrow	*Pooecetes gramineus*	-	-
western kingbird	*Tyrannus verticalis*	-	-
western meadowlark	*Sturnella neglecta*	-	-
white-faced ibis	*Plegadis chihi*	Sensitive	-

COMMON NAME	SCIENTIFIC NAME	ALBERTA WILDLIFE ACT STATUS	SPECIES AT RISK ACT SCHEDULE 1
willet	*Catoptrophorus semipalmatus*	-	-
Wilson's phalarope	*Phalaropus tricolor*	-	-
Wilson's snipe	*Gallinago delicata*	-	-
wood frog	*Lithobates sylvaticus*	-	-
yellow warbler	*Dendroica petechia*	-	-
yellow-headed blackbird	*Xanthocephalus xanthocephalus*	-	-

A description of the species listed on FWMIS/eBird and observed by USL that are either listed under Schedule 1 of the federal Species at Risk Act (SARA), (Government of Canada, 2021) and/or are listed as sensitive in Alberta under the Alberta Wildlife Act (Alberta Environment and Parks, 2021) are provided below.

Bald eagle (*Haliaeetus leucocephalus)* is listed as Sensitive in Alberta. Preferring habitat with open water such as lakes, rivers, marshes and reservoirs (The Cornell Lab of Orthinology, 2021), the Project Site provides suitable habitat for bald eagles. However, they were not observed during field surveys.

Baltimore oriole (*Icterus galbula*) is listed as sensitive in Alberta. Found primarily in open woodlands with deciduous trees (The Cornell Lab of Orthinology, 2021), the Project Site does not provide suitable habitat and Baltimore orioles were not identified during field surveys.

Bank swallow (*Riparia riparia*) is listed as Sensitive in Alberta and Threatened under SARA Schedule 1. Bank swallows inhabit open, wet areas and stay away from forested habitat (The Cornell Lab of Orthinology, 2021). Nesting in burrows in banks and sandy cliffs (The Cornell Lab of Orthinology, 2021), the Project Site does not provide nesting habitat, but it does provide suitable foraging and general habitat. Bank swallows were not observed during field surveys.

Barn swallow (*Hirundo rustica*) is listed as Sensitive in Alberta and Threatened under SARA Schedule 1, and commonly nests on steep banks and man-made structures along beams and eaves (The Cornell Lab of Orthinology, 2021). Foraging habitat includes open grassland areas where they feed primarily on insects (The Cornell Lab of Orthinology, 2021). The Project Site provides habitat for barn swallows; however, they were not observed during field surveys.

Black tern is listed as Sensitive in Alberta. Nesting in freshwater marshes and spotted in almost any type of wetland while migrating (The Cornell Lab of Orthinology, 2021), the Project Site provides potential habitat for black terns. However, they were not observed during field surveys.

Black-necked stilt is listed as Sensitive in Alberta. Black-necked stilts are found primarily near swallow bodies of water where they wade for aquatic invertebrates (The Cornell Lab of Orthinology, 2021). Having no preference for salt or freshwater and often seen in human modified habitats (The Cornell Lab of Orthinology, 2021), the project site has the potential to provide habitat for black-necked stilts. However, they were not observed during field surveys.

Eastern kingbird (*Tyrannus tyrannus*) is listed as Sensitive in Alberta. The eastern kingbird inhabits a wide range of habitat which generally includes mixed habitat of trees, shrubs, and water bodies with scattered open spaces (The Cornell Lab of Orthinology, 2021). The Project Site does not provide abundant suitable habitat for eastern kingbirds and they were not observed during field surveys.

Ferruginous hawk (*Buteo regalis*) is listed as At Risk in Alberta and Threatened under SARA Schedule 1. Highly dependent on native prairie grasslands, ferruginous hawks use a wide variety of structures for nesting including cliffs, trees, and manmade structures (Government of Canada, 2021). Due to the disturbed nature of the Project Site from agricultural impacts, the Project Site does not provide ample habitat for ferruginous hawks, and they were not observed during field surveys.

Great blue heron (*Ardea herodias*) is listed as Sensitive in Alberta and species of Special Concern under SARA Schedule 1. Habitat of the great blue heron is generally near fresh or saltwater bodies. They have also been observed foraging in grassland and agricultural areas in the vicinity of their breeding colonies (The Cornell Lab of Orthinology, 2021). Great blue herons were not observed during field surveys although the Project Site does provide potential habitat.

Least Flycatcher (*Empidonax minimus)* is listed as Sensitive in Alberta. Congregating in deciduous forests and nesting in clusters (The Cornell Lab of Ornithology, 2021), the Project site does not provide suitable habitat and they were not identified during field surveys.

Northern leopard frog (*Lithobates pipiens*) is listed as At Risk in Alberta and Special Concern under SARA Schedule 1. Northern leopard frogs breed in permanent or semi-permanent wetlands and can be found considerable distances away from aquatic habitats in fields and meadows (Canadian Herpetological Society, 2021). The Project Site provides suitable habitat for northern leopard frogs; however, they were not observed during field surveys.

Osprey (*Pandion haliaetus*) is listed as sensitive in Alberta. Found near open water with abundant fish supply (The Cornell Lab of Orthinology, 2021), the Project Site does not provide suitable habitat and osprey were not observed during field surveys.

Pied-billed grebe (*Podilymbus podiceps)* is listed as Sensitive in Alberta. Found primarily on large ponds and small lakes with cattails and bullrushes (The Cornell Lab of Ornithology, 2021), the Project Site does not provide significant suitable habitat for pied-billed grebe, and they were not observed during field surveys.

Sora (*Porzana carolina*) is listed as Sensitive in Alberta. Nesting in densely vegetated freshwater and brackish wetlands with cattails, sedges, and rushes (The Cornell Lab of Orthinology, 2021), current wetland conditions within the Project Site provide moderate sora habitat. A sora was identified by call at wetland 01 during field surveys.

Trumpeter swan (*Cygnus buccinator*) is listed as Sensitive in Alberta. Found in areas with shallow water in the summer months, trumpeter swans have also been observed feeding in agricultural fields during winter migrations (The Cornell Lab of Orthinology, 2021). Breeding in remote areas of Canada (The Cornell Lab of Orthinology, 2021), the Project Site does not provide suitable habitat and they were not observed during field surveys.

White-faced ibis (*Plegadis chihi*) is listed as Sensitive in Alberta. White-faced ibis inhabit various wetland environments, especially those with shallow water and exposed mud (The Cornell Lab of Orthinology, 2021). They have also been observed feeding in farmers fields and open areas where soils are moist (The Cornell Lab of Orthinology, 2021). The Project Site provides suitable habitat and white-faced ibis have been identified during field surveys.

5.0 IDENTIFICATION OF IMPACTS AND MITIGATION MEASURES

Based on the proposed development of the Project Site, impacts on the ecological characteristics have been identified. To help reduce or eliminate residual and cumulative impacts, mitigation measures have been determined for each identified impact.

Table 5:1 identifies potential impacts and associated mitigation measures that will be implemented prior to and during construction of the development.

Table 5:1: Mitigation Strategies

RESOURCE-SPECIFIC COMPONENT	PROJECT PHASE	POTENTIAL IMPACT	MITIGATION MEASURES
Terrain and Soils			
Terrain and Soils	*Construction; Operation*	Soil compaction from heavy equipment. Removal of natural topsoil. Soil contamination from heavy equipment fuelling and maintenance and historical deposition of debris.	• Prepare and implement an Erosion and Sediment Control Plan. • Place appropriate erosion and sediment control fencing along ecological setbacks from the retained wetlands and restrict operation of machinery to designated areas to minimize impact on surrounding areas. • Establish a dedicated refueling and equipment maintenance area at least 100m from any waterbodies. • Ensure equipment is clean and leak-free prior to construction. • Have a spill response plan and ensure adequate spill kits in place prior to project initiation and during operation. • Debris and construction waste will be screened out from the disturbed fill area and properly disposed. • Stockpile soil horizons separately, label/mark, protect and replace in proper order. • Stabilize stockpiles in place longer than 30 days. • Avoid or phase removal of existing vegetation when possible. • Implement Best Management Practices for equipment maintenance, storage, refueling, and concrete washout stations. • Use existing access, roads, and trails.
Vegetation			
Vegetation	*Construction; Operation*	Increase in weeds in disturbed areas	• Implement controls to prevent spread of noxious or prohibited noxious weeds

RESOURCE-SPECIFIC COMPONENT	PROJECT PHASE	POTENTIAL IMPACT	MITIGATION MEASURES
			during growing season (e.g., mowing, spraying). • Where appropriate, re-seed disturbed areas with native species (certified weed-free) to deter noxious weed invasion and capture overland flow during rain events or snowmelt. • Use mechanical (pulling and mowing) and chemical methods to control weed species identified in vegetation surveys. A multi-year management approach will be used since weed species generally have high seed production and vegetative reproduction, contributing to their success and difficulty of eradication. • Ensure all equipment and vehicles are clean and free of soil prior to arrival on the Project Site. • Minimize the spread of weeds by establishing designated access and pathways.
Wetlands	Construction; Operation	Decrease in wetland function due to wetland disturbance. Loss of wetlands. Change in local hydrology due to grading and on-site stormwater storage.	• Avoid disturbance to retained wetlands by establishing and implementing appropriate development buffers. • Obtain approval under the Alberta Water Act for alteration and/or removal of wetland area or indirect impacts. • Execute a Wetland Restoration Plan for retained wetlands where temporary impacts are anticipated. • Ensure all equipment is well maintained, clean and leak-free prior to project initiation. Implement Best Management Practices for equipment maintenance, storage, refueling, and concrete washout stations. • Prepare an ESC plan to protect adjacent wetlands and downstream • Follow the Wetland Monitoring and Mitigation plan for removal/impact to wetland catchment areas.
Wildlife			
Wildlife (excluding migratory birds – see below)	*Construction; Operation*	Decrease in ecological function due to wetland disturbance.	• Avoid disturbance to retained wetlands by establishing and implementing appropriate development buffers.

RESOURCE-SPECIFIC COMPONENT	PROJECT PHASE	POTENTIAL IMPACT	MITIGATION MEASURES
			• Obtain approval under the Alberta *Water Act* for alteration and/or impacts to wetlands. • Conduct a wildlife sweep prior to construction for non-migratory birds (i.e: owls, raptors) and other potential species such as fox, coyote and badger dens. • Do not feed or approach wildlife. Predetermine wildlife deterrent garbage receptacles and locations prior to construction • If a nest/den is found during construction, immediately stop all works in the area and consult a qualified biologist. If required, notify the appropriate authorities, and implement all required mitigation measures before resuming work in the area.
Migratory Birds	*Construction; Operation*	Decrease in breeding habitat potential due to wetland disturbance. Disturbance during breeding period (April 15 to August 31).	• Avoid disturbance to retained wetlands by establishing and implementing appropriate development buffers. • Conduct clearing of vegetation between September 1 and April 14 to avoid incidental take of migratory birds, nests, or eggs and to maintain compliance with the *Migratory Birds Convention Act, the Species-at-Risk Act,* and the Alberta *Wildlife Act.* • If clearing is required within general nesting periods, migratory bird breeding surveys will be completed by a qualified avian specialist; if breeding activity is observed appropriate disturbance buffers will be implemented until young have fledged and left the nesting area.
Hydrology			
Hydrology	*Construction; Operation*	Change in local hydrology due to change in grading and stormwater storage on site	• Maintain existing drainage pathways and pre-development runoff volumes. • Avoid disturbance to retained wetlands by establishing and implementing appropriate development buffers. • Obtain approval under the Alberta Water Act for alteration of wetland area.
Historical Resources			
Historical Resources	*Construction; Operation*	No historical resources have been identified and	• A Historical Resources Impact Assessment was completed in 2021 by Bison Historical

RESOURCE-SPECIFIC COMPONENT	PROJECT PHASE	POTENTIAL IMPACT	MITIGATION MEASURES
		impacts are not anticipated	Services and no historical resources were recorded. • If historical resources are discovered during excavation/construction stop work and notify the Alberta Historical Resources Management Branch subject to Section 31 of the Historical Resources Act.

6.0 REGULATORY FRAMEWORK

An EPEA amendment has been prepared and submitted to EPA for review and approval that addresses the water volumes that will be taken from the Bow/Highwood River intake location that will supply the proposed reservoir. A discussion with EPA on July 6, 2021, indicated this amendment would satisfy the requirement of an EPEA registration for this Water Act application. EPEA submission is provided in **Appendix G**.

There are various other environmental Acts and regulations that may be triggered throughout the development process. A list of the anticipated regulations but not limited to, is provided in **Table 6.1** below.

Table 6:1: Environmental Regulatory Considerations

LEGISLATION	DESCRIPTION	TRIGGER
Alberta Wildlife Act	Provides for the protection and conservation of wild animals in Alberta.	Disturbance or destruction of an animal, or its active residence.
Species at Risk Act (SARA)	Provides for the protection and conservation of wild animals in Canada.	Disturbance or destruction of an animal, its active residence, or its critical habitat.
Migratory Birds Convention Act	Provides for the protection of migratory birds, their nests or their habitats.	Development within areas of suitable nesting habitat during the Restricted Activity Period.
Alberta Water Act	The diversion and use of water in Alberta are controlled under provisions of the *Water Act* with approvals required for disturbance of water and the bed and shore of waterbodies/water courses. Unless exempt, any disturbance of rivers requires prior approval by Alberta Environment and Parks.	Any disturbance or activity within a waterbody/water course. This includes the diversion from or discharge of water and or sediment into a waterbody.
Alberta Public Lands Act	Prohibits the unauthorized use of Alberta's public lands, including the beds and shores of all-natural water courses and permanent and naturally occurring bodies of water.	An approval process may be triggered when development of public lands is proposed. Section 3 of the Public Lands Act indicates that all permanent and naturally occurring bodies of water are claimable by the Crown (Province of Alberta, 2020).
Alberta Soil Conservation Act	Discourages practices that cause soil degradation.	Must actively prevent soil loss or deterioration throughout the life of the project.
Alberta Culture and Tourism (Historical Resources Act)	Outlines the responsibilities of protection for archaeological,	Where historic resources are identified by the Listing of Historic Resources.

LEGISLATION	DESCRIPTION	TRIGGER
	palaeontological, traditional aboriginal or historic sites.	
Environmental Protection and Enhancement Act (EPEA)	Promotes the protection, enhancement, and wise use of the environment.	The diversion, discharge, or retention of surface waters will require EPEA approval. Any contamination release into/onto the environment will trigger EPEA.
Municipal Government Act	Provides municipal governments with the authority to declare Environmental Reserves and Conservation Easements to manage waterbodies.	Development in proximity to waterbodies will require a minimum of a 6m setback from the bed and shore of the body.

6.1 WATER ACT APPLICATION

Impacts to wetlands trigger an approval under the Alberta Water Act. The proposed reservoir site will have a direct and permanent impact on wetlands and ephemeral waterbodies identified within the Project Site.

Wetlands 05, 06 and 07 will be permanently removed to accommodate the reservoir and will be compensated through the in-lieu fee payment option under the Alberta Wetland Policy. The three (3) ephemeral waterbodies EO2, EO3 and EO4 will also be removed by the development footprint. The Project footprint was designed to avoid wetlands where possible, including complete avoidance of higher value wetlands east of the Project Site (WL01 and WL02). Wetlands which could not be avoided due to the reservoir construction are of lower ecological function, value and size.

The wetlands located outside of the Project footprint will be maintained and monitored to ensure no impacts occur due to a reduction in their catchment areas. While the catchment areas will be reduced by the Project, setbacks and mitigation measures will be implemented throughout construction and the wetlands are expected to continue functioning at their current functional values. A Monitoring and Mitigation Plan has been developed in accordance with the Wetland Restoration Directive and the wetlands will be re-assessed on an annual basis to ensure the functional value of wetlands does not decline.

The Project Site falls within the RWVAU #13, and compensation values have been calculated in **Table 6:2**.

Table 6:2: Calculated Wetland Replacement Costs

WETLAND ID	WETLAND CLASS (AWCS)	ABWRET VALUE	AREA (HA)	COMPENSATION RATIO	COMPENSATION AREA (HA)	RWVAU	REPLACEMENT COST
WL05	Marsh-graminoid-temporary	C	0.06	2	0.12	$17,700.00	$2,124.00

WETLAND ID	WETLAND CLASS (AWCS)	ABWRET VALUE	AREA (HA)	COMPENSATION RATIO	COMPENSATION AREA (HA)	RWVAU	REPLACEMENT COST
WL06	Marsh-graminoid-seasonal	C	0.38	2	0.76	$17,700.00	$13,452.00
WL07	Marsh-graminoid-temporary	C	0.17	2	0.34	$17,700.00	$6,018.00
TOTAL			**0.61**		**1.22**		**$21,594.00** (excluding GST)

A Pre-Consultation Adequacy Assessment was submitted to ACO for the Storage Site on November 30, 2021 (FNC202108527-002). The results of the assessment indicated that no consultation is required. The ACO decision is attached in **Appendix H**.

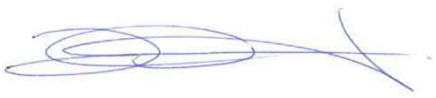
7.0 CORPORATE AUTHORIZATION

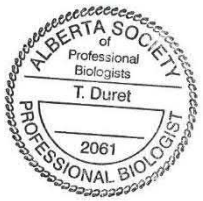
This document, entitled Wetland Assessment and Impact Report for the Sub-Regional Water Pipeline Storage Site is prepared by Urban Systems Ltd. for the Town of Okotoks and Foothills County. The material in this report reflects the best judgment of Urban Systems based on the information available at the time of preparation. Any use, which a third party makes of this report, or reliance on or decisions made based on it, is the responsibilities of the third party. Urban Systems Ltd. accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions taken based on this report.

Prepared By:

Sidney Kwok, AIT.
Environmental Consultant

Reviewed By:





Terri Duret, P.Biol, Authenticating Wetland Practitioner
Senior Environmental Consultant

8.0 REFERENCES

Alberta Agriculture and Forestry. (2021). *Alberta Climate Information Service*. Retrieved from Interpolated Weather Data Since 1961 for Alberta Townships: http://agriculture.alberta.ca/acis/township-data-viewer.jsp

Alberta Environment and Parks. (2021). Wild Species Status Search.

Alberta Environment and Sustainable Resources Development. (2015). *Alberta Wetland Classification System.* Edmonton, AB: Water Policy Branch, Policy and Planning Division.

Alberta Government. (2013). *Sensitive Species Inventory Guidelines.*

Alberta Government Historic Resources Managment Branch. (2019). Listing of Historical Resources. Edmonton, Alberta, Canada.

Canadian Herpetological Society. (2021, July 9). *Northern Leopard Frog*. Retrieved from Canadian Herpetological Society: http://canadianherpetology.ca/species/species_page.html?cname=Northern%20Leopard%20Frog

Cornell Lab of Ornithology. (2021). *Highway 552/Township Rd 274 Slough*. Retrieved from eBird: https://ebird.org/hotspot/L4505590

Government of Alberta. (2013). *Alberta Wetland Policy.* Edmonton: Environment and Sustainable Resource Development.

Government of Alberta. (2015). *Alberta Wetland Identification and Delineation Directive.* Edmonton: Alberta Environment and Parks.

Government of Alberta. (2018). *Landscape Analysis Tool User Guide.* Edmonton: Alberta Environment and Parks.

Government of Alberta Agriculture and Forestry. (2021). *Alberta Soil Information Viewer*. Retrieved from https://soil.agric.gov.ab.ca/agrasidviewer/

Government of Canada. (2021, July 9). *Species at risk public registry*. Retrieved from Species profile Ferruginous hawk: https://wildlife-species.canada.ca/species-risk-registry/species/speciesDetails_e.cfm?sid=47

Government of Canada. (2021). Species at Risk Public Registry.

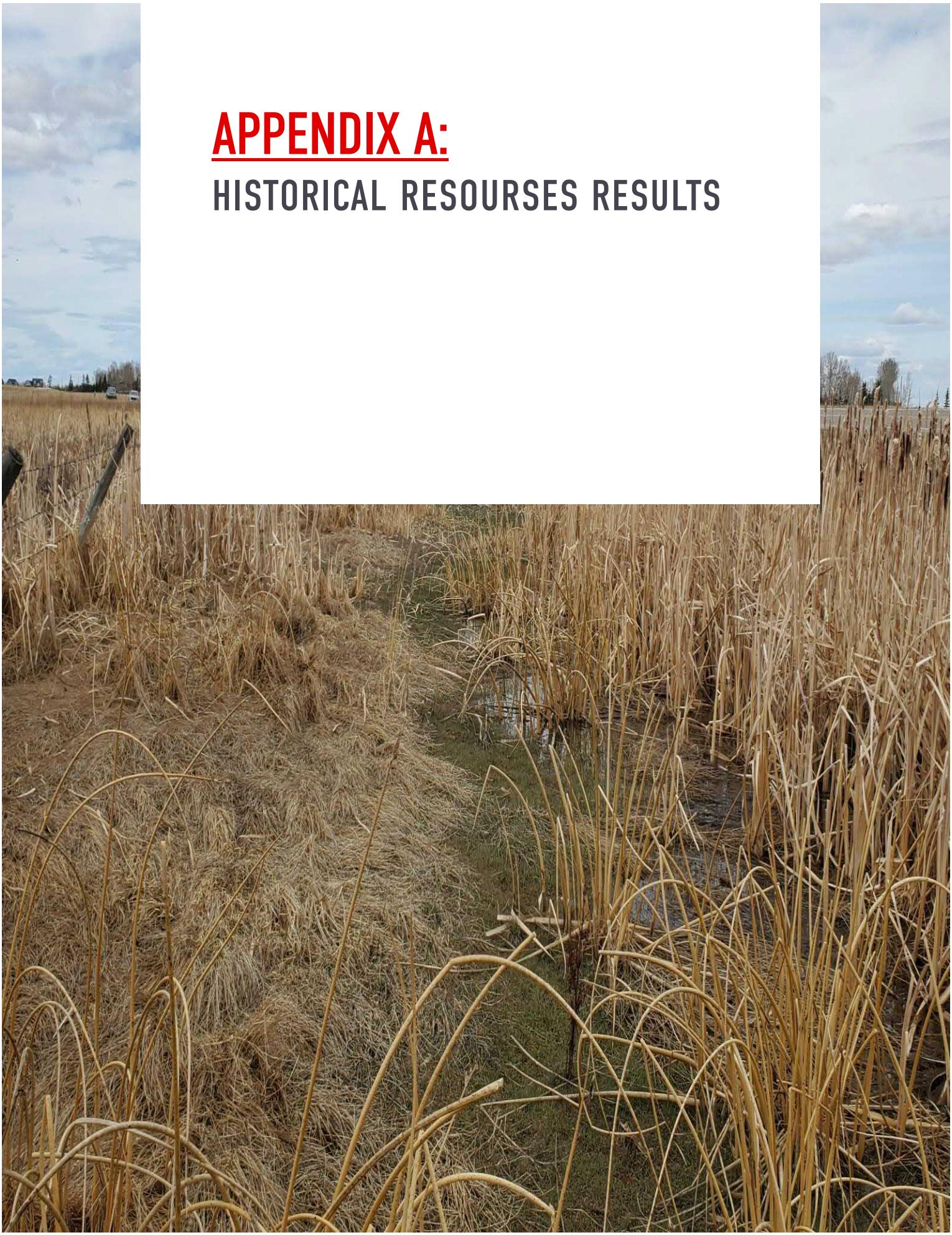
Natural Regions Comittee. (2006). *Natural Regions and Subregions of Alberta.* Government of Alberta.

The Cornell Lab of Orthinology. (2021, July 9). *All About Birds.* Retrieved from https://www.allaboutbirds.org/news/

Waterline Resources Inc. (2021). *Preliminary Hydrogeological Investigation Proposed Reservoir Site NW-21- 021-28 W4M, Near Okotoks, Alberta.* Calgary: Waterline Resources Inc.

APPENDIX A:

HISTORICAL RESOURSES RESULTS



HRA Number: 4970-21-0007-001
May 05, 2021

Historical Resources Act Approval with Conditions

Proponent:	Town of Okotoks
	P.O. Box 20, 5 Elizabeth Street, Okotoks, AB T1S 1K1
Contact:	Jeremy Huet
Proponent:	Foothills County
	Box 5605, 309 Macleod Trail, High River, AB T1V 1M7
Contact:	Jeff Edgington
Agent:	Bison Historical Services Ltd.
Contact:	Sean Goldsmith
Project Name:	**Town of Okotoks Sub-Regional Water Pipeline: Proposed Waterline Alignment**
Project Components:	Water Supply Line
	Water Intake
	Other - Storage Sites
Application Purpose:	Requesting HRA Approval / Requirements

Historical Resources Act approval is granted for the activities described in this application and its attached plan(s)/sketch(es) subject to the following conditions.

David Link
Assistant Deputy Minister
Heritage Division
Alberta Culture, Multiculturalism
and Status of Women

SCHEDULE OF CONDITIONS

ARCHAEOLOGICAL RESOURCES

Conditional *Historical Resources Act* approval is granted relative to archaeological resources on the understanding that a targeted Historic Resources Impact Assessment for archaeological resources will be conducted, as outlined below.

1. The Historic Resources Impact Assessment must target LSD 2, Section 20, Twp 21-28-W4M and LSDs 6, 11 & 14, Section 26, Twp 21-28-W4M.

SCHEDULE OF CONDITIONS (continued)

2. During the Historic Resources Impact Assessment, the proponent's consulting archaeologist must evaluate the relationship between sites EePl-7 and EePk-20 and the proposed development footprint.

   A map and shapefiles of the site locations are attached to this correspondence to facilitate project planning. These files contain sensitive information about historic resources that are protected under provisions of the *Historical Resources Act*. This information is provided to your organization for the purposes of project planning only. It must not be shared for any other purpose without permission from the Historic Resources Management Branch, Alberta Culture, Multiculturalism and Status of Women.

3. The Historic Resources Impact Assessment must be carried out prior to the initiation of any land surface disturbance activities under snow-free, unfrozen ground conditions. Should the project require field studies under winter conditions, directions in the Archaeological Survey Information Bulletin: Winter Conditions must be followed.

4. The Historic Resources Impact Assessment for archaeological resources must be conducted on behalf of the proponent by an archaeologist qualified to hold an archaeological research permit within the Province of Alberta. A permit must be issued by Alberta Culture, Multiculturalism and Status of Women prior to the initiation of any archaeological field investigations. Please allow ten working days for the permit application to be processed.

5. Results of the Historic Resources Impact Assessment must be reported to Alberta Culture, Multiculturalism and Status of Women and subsequent *Historical Resources Act* approval must be granted before development proceeds through the areas of sites EePl-7 and/or EePk-20.

6. Site-specific conditions are as follows:

SITE	HRV	SITE DESCRIPTION	CONDITIONS/APPROVAL
EePk-20	4	campsite	The proponent's consulting archaeologist must evaluate the relationship between this site and the project's development footprint.
EePl-7	4	historic feature	The proponent's consulting archaeologist must evaluate the relationship between this site and the project's development footprint.

PALAEONTOLOGICAL RESOURCES

Conditional *Historical Resources Act* approval is granted on the understanding that a Historic Resources Impact Assessment for palaeontological resources in the form of a monitoring program will be conducted, as outlined below.

1. The monitoring program is required for areas where open-cut excavations, trenching or bell pit excavation will impact intact fluvial deposits in S26 T21 R28 W4M, S21, 22, 27, 28 & 29 T10 R29 W4M and S19 T20 R18 W4M. Refer to attached map.

2. No excavation activities are to take place on the project, in the areas described above, until a professional consulting palaeontologist is on site to monitor construction activities. Should significant palaeontological resources be encountered during the conduct of the monitoring program, the Royal Tyrrell Museum of Palaeontology must be contacted. It may then be necessary for Alberta Culture, Multiculturalism and Status of Women to issue further instructions regarding these resources.

SCHEDULE OF CONDITIONS (continued)

3. The Historic Resources Impact Assessment for palaeontological resources is to be conducted on behalf of the proponent by a palaeontologist qualified to hold a palaeontological research permit within the Province of Alberta. A permit must be issued by Alberta Culture, Multiculturalism and Status of Women prior to the initiation of any palaeontological field investigations. Please allow ten working days for the permit application to be processed.

ABORIGINAL TRADITIONAL USE SITES

There are no *Historical Resources Act* requirements associated with Aboriginal traditional use sites of a historic resource nature; however, the proponent must comply with Standard Requirements under the *Historical Resources Act*: Reporting the Discovery of Historic Resources, which are applicable to all land surface disturbance activities in the Province.

HISTORIC STRUCTURES

There are no *Historical Resources Act* requirements associated with historic structures; however, the proponent must comply with Standard Requirements under the *Historical Resources Act*: Reporting the Discovery of Historic Resources, which are applicable to all land surface disturbance activities in the Province.

PROVINCIALLY DESIGNATED HISTORIC RESOURCES

There are no *Historical Resources Act* requirements associated with Provincially Designated Historic Resources; however, the proponent must comply with Standard Requirements under the *Historical Resources Act*: Reporting the Discovery of Historic Resources, which are applicable to all land surface disturbance activities in the Province.

SPECIAL CONDITIONS

1. *Historical Resources Act* approval is granted conditionally on the understanding that final development plans will be submitted for review by Alberta Culture, Multiculturalism and Status of Women before unconditional approval is granted. The final plans must be submitted in a new Historic Resources Application prior to the onset of development activities. The application must be accompanied by GIS shapefiles.

ADDITIONAL COMMENTS

1. To obtain contact information for consultants qualified to undertake the assessment work specified above, please consult the list of Alberta Historic Resource Consultants.

2. In addition to any specific conditions detailed above, the proponent must abide by all Standard Conditions under the *Historical Resources Act*.

Lands Affected: All New Lands

Proposed Development Area:

MER	RGE	TWP	SEC	LSD List
4	28	21	21	4-6,11-16

SCHEDULE OF CONDITIONS (continued)

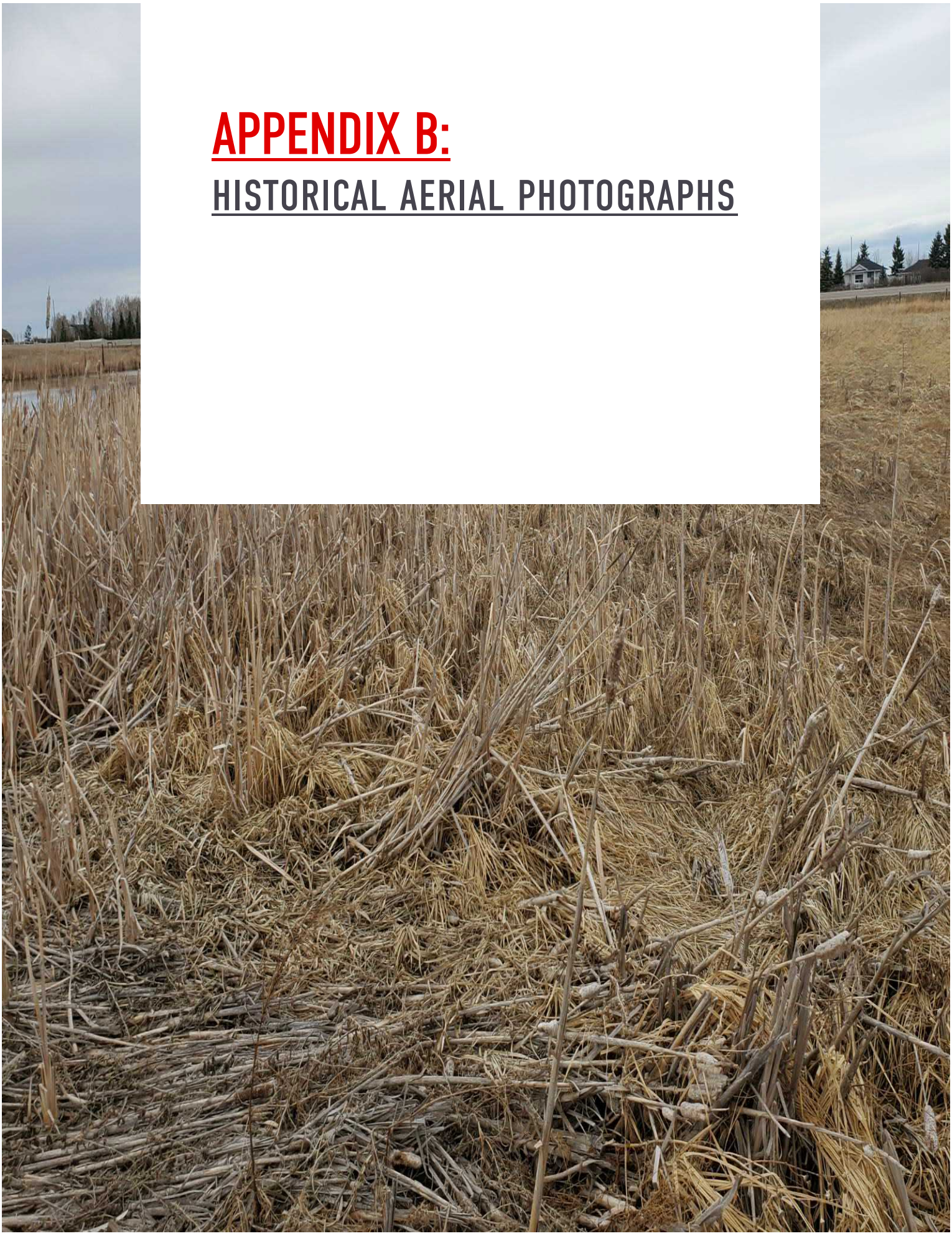
4	28	21	6,20	1-4,8-9,16
4	29	20	21	14-16
4	28	20	31	4-5,12-16
4	28	21	16	13
4	28	21	5,8	4-5,12-13
4	28	21	7,18	1,8-9,16
4	29	20	36	1,8-9,16
4	28	20	19,30	4-5,12-13
4	29	20	25	1-4,9,16
4	28	21	17	4-5,12-16
4	28	21	26	3-6,11,14
4	29	20	22-24	13-16
4	29	20	26-27	1-4
4	28	21	22	13-15
4	29	20	28	1-5
4	29	20	29	1,8
4	28	20	18	5,12-13
4	28	21	27	1-4,8
4	28	21	28	1-4
4	28	20	32	13
4	28	21	19,29	1
4	29	21	1	1

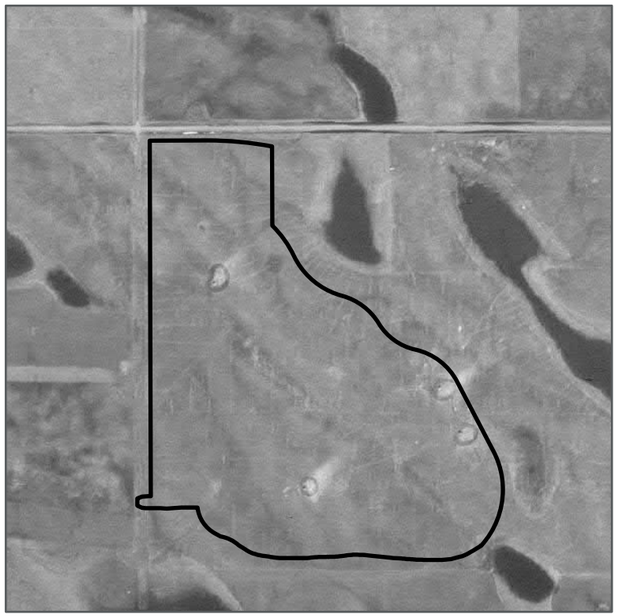
Documents Attached:

Document Name	Document Type
MAP_relationship of development footprint and site EePk-20	Review
MAP_relationship of development footprint to EePl-7	Review
Project Plans	Illustrative Material
SHP_Shapefiles of sites EePl7 and EePk-20	Miscellaneous
Surficial Geology Without Fossil Sites	Review

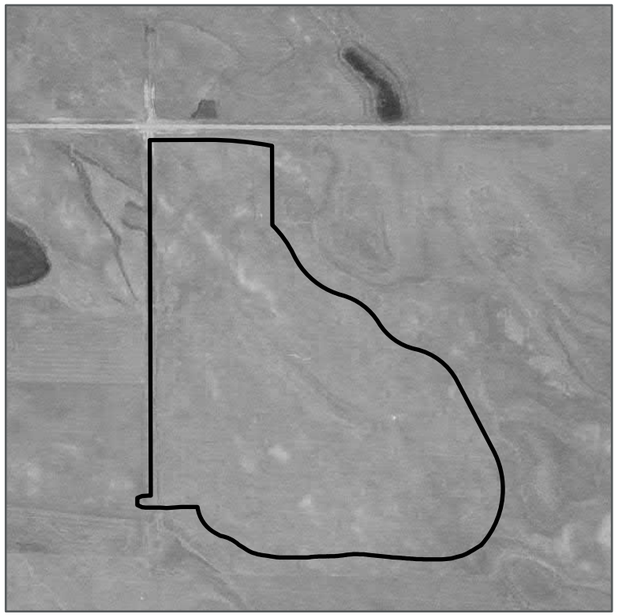
APPENDIX B:

HISTORICAL AERIAL PHOTOGRAPHS

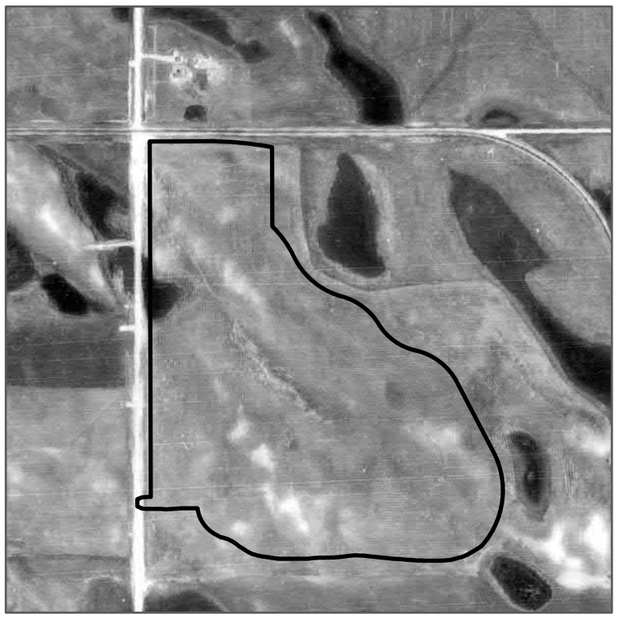




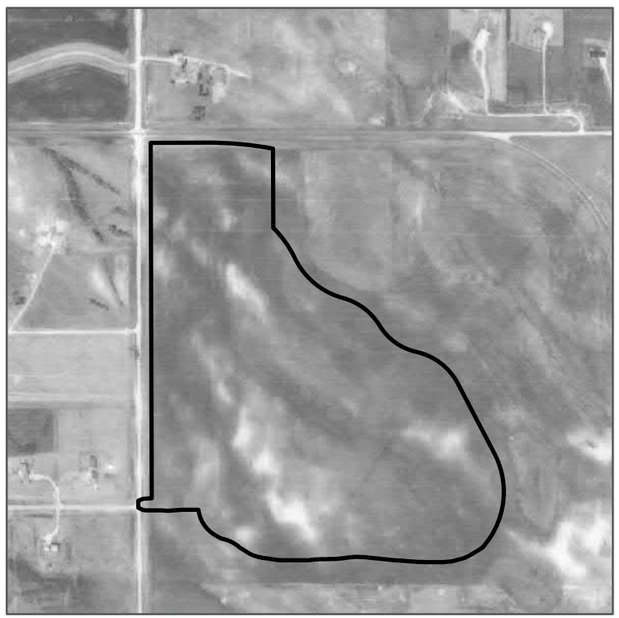
March 30, 1950



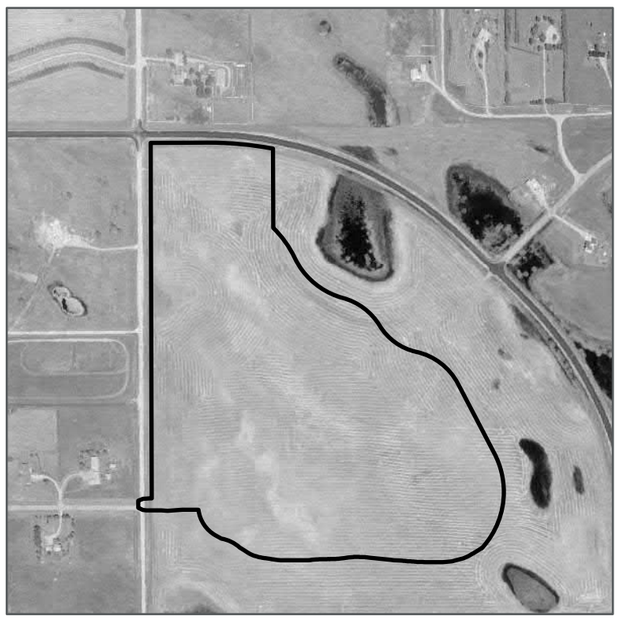
September 20, 1962



June 13, 1974



July 5, 1983



July 17, 1998

Wetland Assessment and Impact Report
Subregional Water Pipeline Storage Site

Historical Imagery

NW Sec-21 Twp-21 Rge-28 Mer-4

Project Boundary

The accuracy & completeness of information shown on this drawing is not guaranteed. It will be the responsibility of the user of the information shown on this drawing to locate & establish the precise location of all existing information whether shown or not.

0 50 100 150

Meters

Coordinate System:
NAD 1983 3TM 114

Scale: 1:10,000
(When plotted at 11"x17")

Data Sources:

- Historical Imagery provided by Alberta Environment and Parks

Project #:	1306.0120.01
Author:	SDF
Checked:	TD
Status:	**Final**
Revision:	A
Date:	2024 / 6 / 20

URBAN systems

APPENDIX B1

July 7, 2007

May 1, 2020

May 4, 2013

August 27, 2017

Wetland Assessment and Impact Report
Subregional Water Pipeline Storage Site

Historical Imagery

NW Sec-21 Twp-21 Rge-28 Mer-4

Project Boundary

The accuracy & completeness of information shown on this drawing is not guaranteed. It will be the responsibility of the user of the information shown on this drawing to locate & establish the precise location of all existing information whether shown or not.

0 50 100 150

Meters

Coordinate System:
NAD 1983 3TM 114

Scale: 1:10,000
(When plotted at 11"x17")

Data Sources:

- Historical Imagery provided by Alberta Environment and Parks

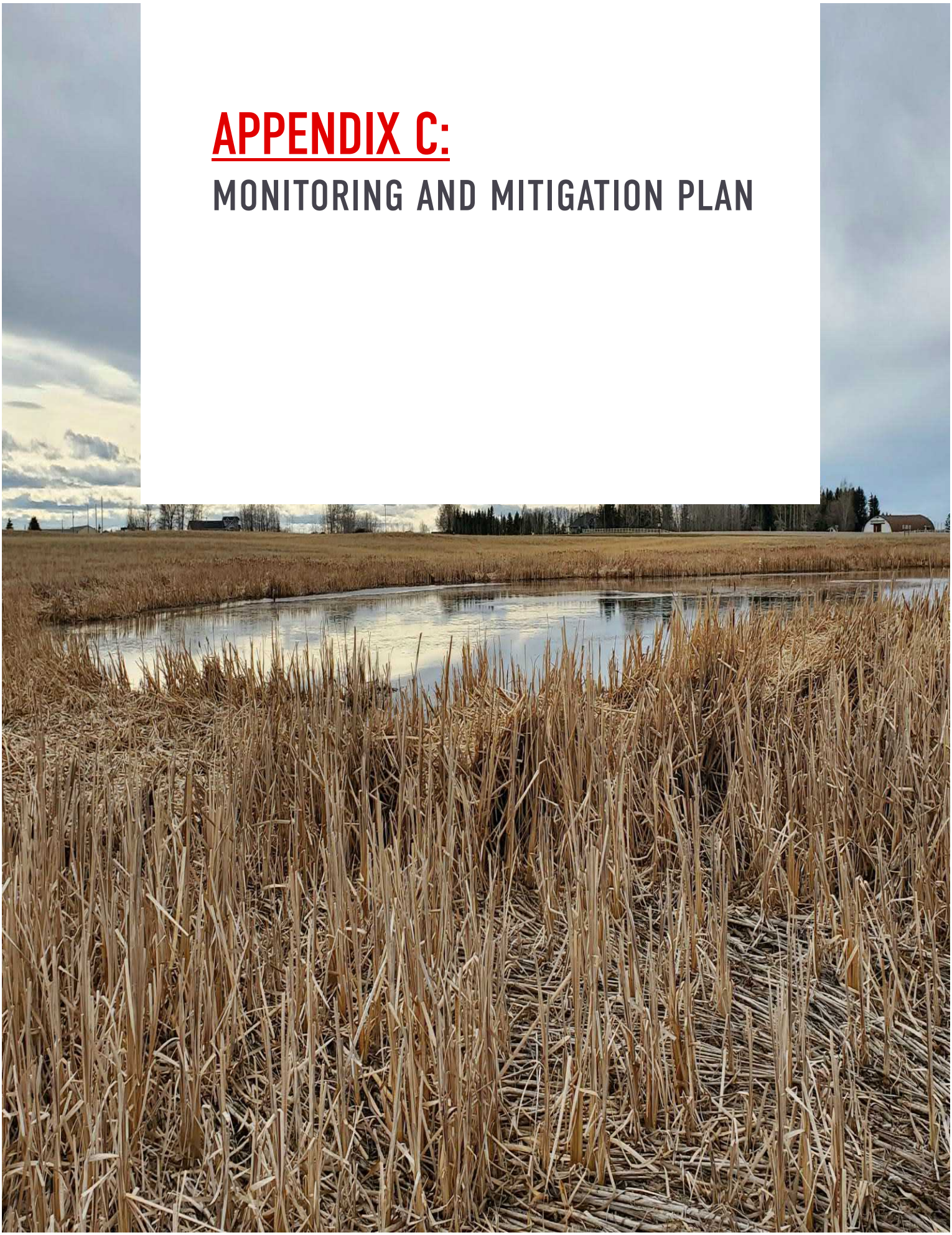
Project #:	1306.0120.01
Author:	SDF
Checked:	TD
Status:	Final
Revision:	A
Date:	2024 / 6 / 20

URBAN systems

APPENDIX B2

APPENDIX C:

MONITORING AND MITIGATION PLAN



WETLAND MONITORING AND MITIGATION PLAN

FOWR STORAGE SITE

July 4, 2024

URBAN SYSTEMS

Suite 101, 134 - 11 Avenue SE, Calgary, AB T2G 0X5 | T: 403.291.1193

CONTACT: Terri Duret
E: tduret@urbansystems.ca

PREPARED FOR:

Foothills County
309 Macleod Trail Box 5605
High River, AB T1V 1M7

Town of Okotoks
5 Elizabeth St.
Okotoks, AB T1S 1K1

Suite 101, 134 - 11 Avenue SE, Calgary, AB T2G 0X5 | T: 403.291.1193

File: 1306.0120.06

CONTENTS

TABLES

1.0 INTRODUCTION

This Monitoring and Mitigation Plan (MMP) has been completed for the Foothills Okotoks Water Regional Project (FOWR) (Project Site). This wetland MMP has been created based on guidelines and recommendations from the Alberta Wetland Restoration Directive (Government of Alberta, 2016).The MMP is required for all wetlands outside of the current Project footprint whose catchment areas will be reduced/impacted by the development. The MMP addresses the monitoring and mitigation measures to be implemented in order to ensure no negative impacts occur to the wetlands resulting from partial catchment removal or temporary disturbance. Total catchment area and the catchment area impacted by the Project footprint for all retained wetlands are in **Table 1-1**.

Table 1-1: Wetland Catchment Areas and Project Impact

WETLAND ID	TOTAL CATCHMENT AREA (HA)	AREA IMPACTED (HA)	% OF CATCHMENT IMPACTED
WL01	**49.04**	**4.46**	**9.1%**
WL01a	**33.56**	**3.41**	**10.2%**
WL02	**0.23**	**0.09**	**39.1%**
WL03	**2.76**	**1.09**	**39.5%**
WL05	0.27	0.26	96.3%
WL06	173.83	0.82	0.47%
WL07	0.80	0.80	100%
WL09	**17.78**	**12.98**	**73.0%**
WL10a	**112.73**	**0.8**	**0.71%**
WL10b	**0.47**	**0.01**	**2.13%**
WL11	**12.29**	**2.25**	**18.31%**

The catchment areas of WL01, WL01a WL02, WL09, and WL10a will be directly impacted by proposed works. The catchment areas of WL03, WL09, WL11, WL10b, will be temporarily impacted by earthworks operations within south portion of the Project Area. Re-contouring and re-seeding of the earthworks area will be completed as soon as possible, and post development contouring is to be similar to pre-disturbance conditions.

Wetland delineation and classification was previously determined through desktop searches and field assessments. Wetland functional values as determined through the Alberta Wetland Rapid Evaluation Tool – Actual (ABWRET-A), classification, and area are listed in **Table 1-2** .

Table 1-2: Monitoring Plan Wetland Values

WETLAND ID	AREA (HA)	ALBERTA WETLAND CLASSIFICATION SYSTEM	ABWRET-A SCORE
WL01	2.99	Marsh-graminoid-permanent	**C**
WL01a	1.97	Marsh-graminoid-permanent	**D**
WL02	0.04	Marsh-graminoid-temporary	**D**
WL03	0.64	Marsh-graminoid-seasonal	**C**
WL09	0.73	Marsh-graminoid-semi-permanent	**D**
WL10a	0.58	Marsh-graminoid-semi-permanent	**C**
WL10b	0.15	Marsh-graminoid-temporary	**C**

WL11	2.86	Marsh-graminoid-seasonal	**D**

A site visit will be conducted prior to disturbance to establish baseline conditions and confirm previously assessed conditions and to document any changes that may have occurred.

WL01a is hydraulically connected to a Crown-claimed wetland through a culvert under Highway 552. The level of monitoring effort of this wetland will be determined pending landowner consent.

An annual review of the results of the monitoring program will determine whether wetland restoration or adaptive management actions are required to maintain current wetland function.

2.0 MONITORING PLAN

In order to track wetland conditions overtime, monitoring and maintenance inspections will be conducted over four years, beginning the first year of construction. Monitoring is to be conducted during construction as well as post-construction to ensure wetlands are continuing to function as expected following Project completion.

Key performance indicators for this monitoring program are surface water presence based on wetland classification (temporary, seasonal, semi-permanent and permanent) and vegetation abundance and diversity and wetland size.

2.1 HYDROLOGY

Water level gauges will be installed within wetlands 01a, 02, 03, and 09 (Figure 3 in Wetland Assessment and Impact Report) and recordings of water levels will occur monthly from May to September throughout the 4-year monitoring plan.

Pending landowner consent, water level gauges will be installed within the Crown claimed wetland on the east side of wetland 02, as it is hydraulically connected through a culvert.

At the end of each growing season, precipitation data will be gathered to compare to the observations of surface water recorded during each monitoring event.

Wetland size will be completed on a yearly basis. Baseline sizes have been recorded in **Table 2-1**.

Table 2-1: Wetland Areas

Wetland	Area
Wetland 01	2.99 ha
Wetland 01a	1.97 ha
Wetland 02	0.04 ha
Wetland 03	0.64 ha
Wetland 09	0.73 ha
Wetland 10a	5.8 ha
Wetland 10b	0.15 ha
Wetland 11	2.86 ha

2.2 WATER QUALITY

Basic in-situ water quality parameters will be taken prior to construction to establish baseline conditions. Surface water parameters will be collected at each wetland monthly from May to September, using a handheld Oakton PCTS 5 water quality pen. The following parameters will be measured:

- Temperature;
- pH;
- Conductivity (uS/cm);
- Turbidity; and
- Salinity

One (1) surface water sampling location will be selected, and documented using a GPS unit, and water quality will be measured from the same location throughout the monitoring plan.

2.3 VEGETATION AND SOIL INDICATORS

Vegetation monitoring is to be conducted annually between June 30 and August 31 and will utilize two 1 m x 1 m quadrats placed at three transect locations as per the Alberta Wetland Restoration Directive.

2.3.1 WETLAND VEGETATION

Wetland vegetation health indicators to be measured at each wetland are as follows:

- Species list and relative percent cover in each transect plot;
- Zone widths associated with the wet meadow and emergent vegetation zones;
- Percent cover of vegetated vs. non-vegetated areas (target is > 75%);
- Average percent cover of native wetland plants within the vegetated zone (target is > 60%);
- Average percent cover of invasive species within the vegetated zone (target is < 10%).

Targets outlined in the Directive may not be met based on the baseline conditions. Baseline conditions will define percent cover targets for the MMP.

2.3.2 UPLAND VEGETATION

Upland vegetation monitoring will occur in tandem with wetland vegetation surveys between June – August. Monitoring metrics for upland vegetation will include species list, percent cover, and invasive species coverage using 1m x 1m plots. One upland vegetation plot will be recorded for each wetland.

2.3.3 SOIL INDICATORS

Soil observations will be noted during monitoring events and will document evidence such as erosion, salt/alkaline indicators and oxidation. Any concerns with soil conditions with be evaluated and adaptive management strategies may be implemented.

2.4 WILDLIFE

Incidental wildlife observations will be documented during each site visit. Observations of wildlife (estimate number and species), and signs of habitat use (muskrat mounds, burrows, nesting, scant, etc.) will be recorded.

Fencing will be installed around each wetland at a 30 m setback from the wetland boundary at each wetland to delineate a no entry zone from construction and agricultural activities.

During each site inspection, wetland photographs will be taken from the same vantage point, documented using a GPS device.

3.0 MONITORING SCHEDULE

Table 3-1 provides the expected monitoring schedule for a 4-year monitoring period. Based upon regulatory approval and construction scheduling, monitoring is expected to commence in 2024.

Table 3-1: Monitoring Schedule

MONITORING YEAR	PARAMETER	TIMELINE
1	Water Levels	*All Wetlands: May/June/July/August
	Water Quality	All Wetlands: May/June/July/August
	Vegetation	All Wetlands: Between June 30 – August 31
	Wildlife	During all monitoring events
2	Water Level	All Wetlands: May/June/July/August
	Water Quality	All Wetlands: May/June/July/August
	Vegetation	All Wetlands: Between June 30 – August 31
	Wildlife	During all monitoring events
3	Water Level	All Wetlands: May/June/July/August
	Water Quality	All Wetlands: May/June/July/August
	Vegetation	All Wetlands: Between June 30 – August 31
	Wildlife	During all monitoring events
4	Water Level	All Wetlands: May/June/July/August
	Water Quality	All Wetlands: May/June/July/August
	Vegetation	All Wetlands: Between June 30 – August 31
	Wildlife	During all monitoring events

*When surface water is present

4.0 MONITORING REPORT

At the end of each year, a memorandum will be prepared with the results of the annual monitoring events, with adaptive management recommendations or actions that may have been employed and submitted to EPA by December 31.

The validation report will include the following as per the Alberta Wetland Restoration Directive:

- Title of Project;
- Addressee;
- Water Act approval number;
- Date of monitoring site assessments;
- Legal land location and GIS coordinates of the wetlands;

- Statement as to whether the wetland actions were untaken in compliance with the approved wetland monitoring plan;
- Any monitoring/mitigation deviations which occurred and the anticipated effect on the likelihood of wetland retention success;
- Authenticating validator's contact information, signature, professional designation and date.

The final wetland monitoring report will include:

- Wetland size, and class;
- Confirmation of accuracy, quality and completeness of the data collected;
- Submission of all monitoring results (past annual monitoring reports);
- Evaluation of monitoring results;
- Completion of an ABWRET-A for relative wetland value.

4.1.1 TEAM ROLES

The mitigation measures, monitoring plan and adaptive management considerations/actions will confirm whether or not the wetlands function has been maintained given the partial removal and/or temporary impacts of the wetland catchment area. Monitoring and data analysis will be managed and overseen by the following qualified team members:

Terri Duret, P.Biol, Authenticating Wetland Practitioner – Senior Environmental Consultant
tduret@urbansystems.ca
403-291-1193

Liliana Bozic, M.Sc., P.Eng. – Water Resources Senior Engineer
lbozic@urbansystems.ca
403-219-7401

5.0 VERIFICATION

Verification is to be conducted by a 3rd party and will be carried out after year 4 of monitoring (in year 5). As per the directive, a desktop review, and a minimum of 1 site visit will be completed. The verification report will include the following:

- Verification of team member roles (name, contact information, designation)
- Monitoring results and synthesis
- Verification assessment
- Verification conclusion

6.0 MITIGATION MEASURES

Based on the proposed development of the Project Site, impacts anticipated from construction activities and associated mitigation measures to minimize impacts have been identified. To help retain the current function of all retained wetlands, the following mitigation measures will be implemented:

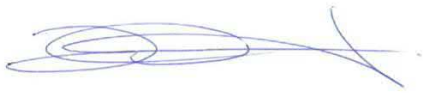
- Prepare and implement an Erosion and Sediment Control plan, emphasize will be placed on the earthworks disturbance of the southern portion of the Project Area;
- Have a spill response plan and spill kits in place prior to project initiation and during operation and construction;

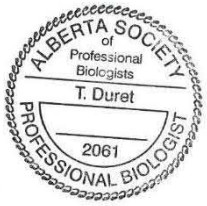
- Establish staging area a minimum of 50 m away from wetland for fueling and maintenance of equipment and ensure equipment is clean and leak-free prior to project initiation;
- Minimize the degradation of vegetation and spread of weeds by establishing designated pathways for access;
- Ensure all equipment and vehicles are clean and free of soil prior to arrival on the Project Site;
- Wildlife sweeps shall be conducted no earlier than seven days prior to construction and must be repeated if work stops for more than 4 consecutive days between April 15 – August 15;
- Complete a reseeding and contour plan, re-seeding of the earthworks area will be completed as soon as possible, contouring plan is to be similar to that of post-disturbance conditions;
- Implement this MMP;
- Adaptive management techniques applied to target areas showing signs of distress from impacts.

6.1 ADAPTIVE MONITORING STRATEGIES

Adaptive monitoring or management strategies will be reviewed on an as needed basis each year throughout the monitoring program. Strategies may range from new fencing to avoid trampling from wildlife/public, supplying wetlands with supplemental surface water to retain natural hydrology, or to an integrated pest management approach in the event the wetland is inundated with noxious or prohibitive noxious species. If adaptive management identifies the need for supplemental surface water during or following the monitoring program, all appropriate regulatory approvals will be obtained.

CLOSURE,

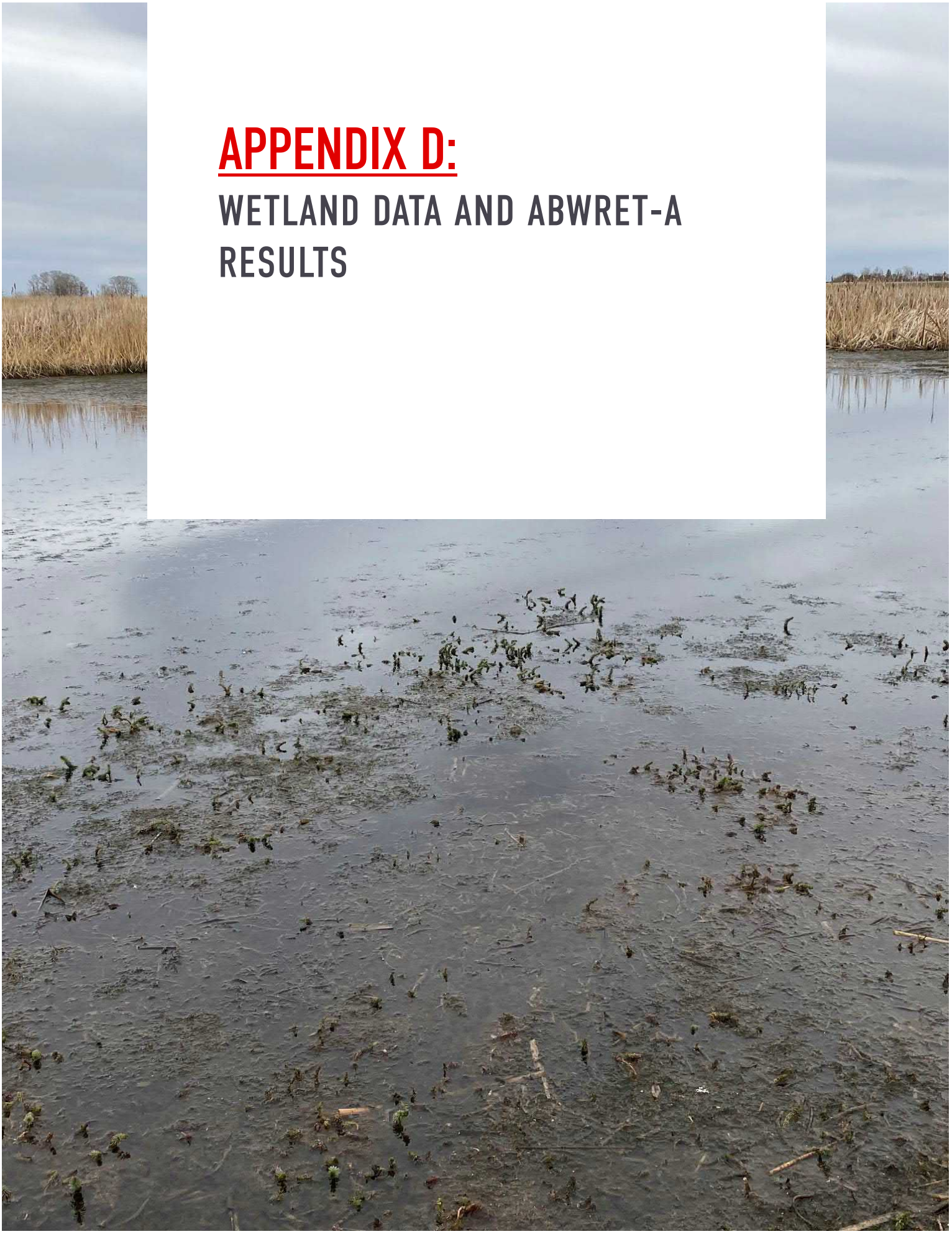




Terri Duret, P.Biol, Authenticating Wetland Practitioner
Senior Environmental Consultant

APPENDIX D:

WETLAND DATA AND ABWRET-A RESULTS



Function (ABWRET-A Raw Score)	wl01	wl01a	wl03
Surface Water Storage (WS)	5.92	2.94	5.61
Stream Flow Support (SFS)	0.00	3.65	0.00
Streamwater Cooling (WC)	0.00	3.43	0.00
Sediment & Toxicant Retention & Stabilization (SR)	10.00	2.47	10.00
Phosphorus Retention (PR)	10.00	2.08	10.00
Nitrate Removal & Retention (NR)	10.00	4.75	10.00
Organic Nutrient Export (OE)	0.00	3.56	0.00
Fish Habitat (FH)	0.00	0.00	0.00
Aquatic Invertebrate Habitat (INV)	3.69	4.94	5.09
Amphibian Habitat (AM)	2.35	2.55	2.52
Waterbird Habitat (WB)	3.90	4.39	4.66
Songbird, Raptor, & Mammal Habitat (SBM)	3.41	3.04	3.31
Pollinator & Native Plant Habitat (PH)	3.10	3.06	3.24
Human Use & Recognition (HU)	1.90	1.21	0.99
Function (ABWRET-A Normalized Score)	wl01	wl01a	wl03
Surface Water Storage (WS)	0.81	0.28	0.75
Stream Flow Support (SFS)	0.00	0.59	0.00
Streamwater Cooling (WC)	0.00	0.50	0.00
Sediment & Toxicant Retention & Stabilization (SR)	1.00	0.03	1.00
Phosphorus Retention (PR)	1.00	0.04	1.00
Nitrate Removal & Retention (NR)	1.00	0.19	1.00
Organic Nutrient Export (OE)	0.00	0.55	0.00
Fish Habitat (FH)	0.00	0.00	0.00
Aquatic Invertebrate Habitat (INV)	0.32	0.49	0.51
Amphibian Habitat (AM)	0.29	0.32	0.31
Waterbird Habitat (WB)	0.25	0.31	0.34
Songbird, Raptor, & Mammal Habitat (SBM)	0.34	0.27	0.32
Pollinator & Native Plant Habitat (PH)	0.24	0.23	0.27
Human Use & Recognition (HU)	0.17	0.03	0.00
Normalized Score (ABWRET_A) Based on Wetlands in RWVAU	wl01	wl01a	wl03
Normalized Hydrological Health (HH)	0.81	0.59	0.75
Normalized Water Quality (WQ)	1.00	0.55	1.00
Normalized Ecological Health (EH)	0.34	0.49	0.51
Normalized Human Use (HU)	0.17	0.03	0.00
RWVAU #	13	13	13
Normalized Value Score (ABWRET_a)	0.66	0.49	0.68
Value Category (a, b, c, d)	d	d	d
Abundance Factor	1	1	1
Final Score(A, B, C, D)	C	D	C

HUC 4	wl01	wl01a	wl03
HUC4Name	BOW RIVER	BOW RIVER	BOW RIVER
HUC4Code	0402	0402	0402

wl02	wl05	wl06	wl07	wl09	wl10a	wl10b	wl11
1.30	5.44	5.61	5.61	3.40	5.67	5.84	1.30
0.00	0.00	0.00	0.00	3.09	0.00	0.00	0.00
0.00	0.00	0.00	0.00	1.81	0.00	0.00	0.00
10.00	10.00	10.00	10.00	4.25	10.00	10.00	10.00
10.00	10.00	10.00	10.00	2.97	10.00	10.00	10.00
10.00	10.00	10.00	10.00	5.09	10.00	10.00	10.00
0.00	0.00	0.00	0.00	3.45	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4.33	4.72	4.82	4.69	5.04	3.82	4.69	3.92
2.46	2.57	2.58	2.60	2.52	1.87	2.57	2.27
4.57	4.77	4.64	4.77	4.69	4.26	4.83	4.40
3.21	3.12	3.25	3.20	3.25	3.55	3.39	3.27
1.95	2.51	3.19	2.36	3.26	3.92	2.71	2.06
1.18	1.69	1.08	1.79	0.98	2.42	1.44	2.75

wl02	wl05	wl06	wl07	wl09	wl10a	wl10b	wl11
0.00	0.72	0.75	0.75	0.37	0.76	0.79	0.00
0.00	0.00	0.00	0.00	0.50	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.26	0.00	0.00	0.00
1.00	1.00	1.00	1.00	0.26	1.00	1.00	1.00
1.00	1.00	1.00	1.00	0.15	1.00	1.00	1.00
1.00	1.00	1.00	1.00	0.24	1.00	1.00	1.00
0.00	0.00	0.00	0.00	0.53	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.41	0.46	0.47	0.46	0.50	0.34	0.46	0.35
0.31	0.32	0.33	0.33	0.32	0.21	0.32	0.27
0.33	0.35	0.34	0.35	0.34	0.29	0.36	0.31
0.30	0.29	0.31	0.30	0.31	0.37	0.34	0.31
0.04	0.14	0.26	0.11	0.27	0.38	0.17	0.06
0.03	0.13	0.01	0.15	0.00	0.27	0.08	0.34

wl02	wl05	wl06	wl07	wl09	wl10a	wl10b	wl11
0.00	0.72	0.75	0.75	0.50	0.76	0.79	0.00
1.00	1.00	1.00	1.00	0.53	1.00	1.00	1.00
0.41	0.46	0.47	0.46	0.50	0.38	0.46	0.35
0.03	0.13	0.01	0.15	0.00	0.27	0.08	0.34
13	13	13	13	13	13	13	13
0.43	0.67	0.67	0.68	0.46	0.67	0.68	0.44
d	d	d	d	d	d	d	d
1	1	1	1	1	1	1	1
D	C	C	C	D	C	C	D

wl02	wl05	wl06	wl07	wl09	wl10a	wl10b	wl11
BOW RIVER	BOW RIVER	BOW RIVER	BOW RIVER	BOW RIVER	BOW RIVER	BOW RIVER	BOW RIVER
0402	0402	0402	0402	0402	0402	0402	0402

Wetland 05

Wetland 05: Historical and Precipitation Data

Photo Date (MM/DD/ YYYY)	Photo ID (roll, AS#, Photo#)	Resolution	* Season	AWCS Wetland Class	** Annual Precipitation Data	Precipitation 30 Days Prior to Image (mm)	Daily Precipitation and 10 Days Previous (mm)	*** Open Water Visible (OW), Consistent Wetland Vegetation (WV)
03/30/1950	AS0170, 103, 49-821	1:40,000	S	Marsh-graminoid-Temporary	N/A	N/A	N/A	DVI
09/20/1962	AS0834, 165, 62821	1:31,680	F	Marsh-graminoid-Temporary	D	48.42	0 (1.25 in previous 10 days)	DVI
06/13/1974	AS1315, 280, 74-035	1:31,680	SUM	Marsh-graminoid-Temporary	N	64.33	0 (19.11 in previous 10 days)	DVI
07/05/1983	AS2747, 20, 83-082	1:30 000	SUM	Marsh-graminoid-Temporary	D	62.79	0 (44.12 in previous 10 days)	DVI
07/17/1998	AS4990, 265, 98-100	1:20,000	SUM	Marsh-graminoid-Temporary	W	146.00	0 (4.12 in previous 10 days)	DVI
07/28/2007	Google Earth	-	SUM	Marsh-graminoid-Temporary	W	30.68	0 (2.88 in previous 10 days)	DVI
05/04/2013	Google Earth	-	S	Marsh-graminoid-Temporary	N	19.80	0 (7.46 in previous 10 days)	DV
08/27/2017	Google Earth	-	SUM	Marsh-graminoid-Temporary	D	17.38	0 (0.16 in previous 10 days)	D

Photo Date (MM/DD/ YYYY)	Photo ID (roll, AS#, Photo#)	Resolution	* Season	AWCS Wetland Class	** Annual Precipitation Data	Precipitation 30 Days Prior to Image (mm)	Daily Precipitation and 10 Days Previous (mm)	*** Open Water Visible (OW), Consistent Wetland Vegetation (WV)
05/01/2020	Google Earth	-	SUM	Marsh-graminoid-Temporary	D	16.85	0 (0 in previous 10 days)	DV

*	S= Spring (April to June); Sum=Mid to Late Summer (June to September); F=Fall (Sept-Nov)
**	D=Dryer; N-Normal; W=Wetter; N/A= Not Available
***	W=Water Present/inundated; D=Dry; DV=Dry, vegetated (consistent with wetland class); DVI=Dry, vegetated (indistinguishable from surrounding uplands)

Wetland 05: Appendix 7 Soil Data (Coordinates 50°48'15.03"N 113°50'8.81"W)

Question	Soil Indicators of Wetlands	Y/N
S1	Organic Soils (except folists) present	N
S2	Presence of peat accumulation determined by Von Post test	N
S3	Of, Om, Oh horizons (organic surface layer 20-40 cm thick) present	N
S4	Sulfidic material present	N
S5	Gleying or mottling present immediately below the surface layer and within 30 cm	Y
S6	Native prairie soils with a low chroma matrix within 30 cm of the soil surface and the following present:	N
S7	Nonsandy soils with a low chroma matrix within 40 cm of the soil surface and one of the following present within 30 cm of the surface	N
S8	Sandy soils with one of the following present:	N
S9	Remains of aquatic invertebrates are present within 30 cm of the soil surface in pothole-like depressions	N
S10	Other regionally applicable, field-verifiable soil properties associated with prolonged seasonal high water?	N

Munsel Soil Color				
Soil Horizon	**Depth (cm)**	**Hue**	**Value**	**Chroma**
A	0-20	10YR	2	1
B (mixed horizon)	20+	10YR	3 and 6	2 and 4

Incidental Plant Species Within Wetland			
quack grass (*Elymus repens*)	Kentucky bluegrass (*Poa pratensis*)	common plantain (*Plantago major*)	horsetail species (*Equisetum spp.*)

Wetland 05, Looking Northeast in 2021 (Coordinates 50°48'14.89"N 113°50'9.76"W)

Wetland 05, Looking East in 2024 (Coordinates 50°48'14.79"N 113°50'9.65"W)

Wetland 06

Wetland 06: Historical and Precipitation Data

Photo Date (MM/DD/ YYYY)	Photo ID (roll, AS#, Photo#)	Resolution	* Season	AWCS Wetland Class	** Annual Precipitation Data	Precipitation 30 Days Prior to Image (mm)	Daily Precipitation and 10 Days Previous (mm)	*** Open Water Visible (OW), Consistent Wetland Vegetation (WV)
03/30/1950	AS0170, 103, 49-821	1:40,000	S	Marsh-graminoid-Seasonal	N/A	N/A	N/A	DVI
09/20/1962	AS0834, 165, 62821	1:31,680	F	Marsh-graminoid-Seasonal	D	48.42	0 (1.25 in previous 10 days)	DVI
06/13/1974	AS1315, 280, 74-035	1:31,680	SUM	Marsh-graminoid-Seasonal	N	64.33	0 (19.11 in previous 10 days)	W
07/05/1983	AS2747, 20, 83-082	1:30 000	SUM	Marsh-graminoid-Seasonal	D	62.79	0 (44.12 in previous 10 days)	DVI
07/17/1998	AS4990, 265, 98-100	1:20,000	SUM	Marsh-graminoid-Seasonal	W	146.00	0 (4.12 in previous 10 days)	DVI
07/28/2007	Google Earth	-	SUM	Marsh-graminoid-Seasonal	W	30.68	0 (2.88 in previous 10 days)	DV
05/04/2013	Google Earth	-	S	Marsh-graminoid-Seasonal	N	19.80	0 (7.46 in previous 10 days)	W
08/27/2017	Google Earth	-	SUM	Marsh-graminoid-Seasonal	D	17.38	0 (0.16 in previous 10 days)	DV

Photo Date (MM/DD/ YYYY)	Photo ID (roll, AS#, Photo#)	Resolution	* Season	AWCS Wetland Class	** Annual Precipitation Data	Precipitation 30 Days Prior to Image (mm)	Daily Precipitation and 10 Days Previous (mm)	*** Open Water Visible (OW), Consistent Wetland Vegetation (WV)
05/01/2020	Google Earth	-	SUM	Marsh-graminoid-Seasonal	D	16.85	0 (0 in previous 10 days)	W

*	S= Spring (April to June); Sum=Mid to Late Summer (June to September); F=Fall (Sept-Nov)
**	D=Dryer; N-Normal; W=Wetter; N/A= Not Available
***	W=Water Present/inundated; D=Dry; DV=Dry, vegetated (consistent with wetland class); DVI=Dry, vegetated (indistinguishable from surrounding uplands)

Wetland 06: Appendix 7 Soil Data (Coordinates 50°48'10.16"N 113°50'9.92"W)

Question	Soil Indicators of Wetlands	Y/N
S1	Organic Soils (except folists) present	N
S2	Presence of peat accumulation determined by Von Post test	N
S3	Of, Om, Oh horizons (organic surface layer 20-40 cm thick) present	N
S4	Sulfidic material present	N
S5	Gleying or mottling present immediately below the surface layer and within 30 cm	N
S6	Native prairie soils with a low chroma matrix within 30 cm of the soil surface and the following present:	N
S7	Nonsandy soils with a low chroma matrix within 40 cm of the soil surface and one of the following present within 30 cm of the surface	N
S8	Sandy soils with one of the following present:	N
S9	Remains of aquatic invertebrates are present within 30 cm of the soil surface in pothole-like depressions	N
S10	Other regionally applicable, field-verifiable soil properties associated with prolonged seasonal high water?	N

Munsel Soil Color				
Soil Horizon	**Depth (cm)**	**Hue**	**Value**	**Chroma**
A	0-25	10YR	2	1
B	25+	10YR	4	1

Incidental Plant Species Within Wetland			
bullrush (*Scirpoides holoschoenus sp.*)	creeping spike rush (*Eleocharis palustris*)	common cattail (*Typha latifolia*)	foxtail barley (*Hordeum jubatum*)
slough grass (*Beckmannia syzigachne*)	quack grass (*Elymus repens*)		

Wetland 06, Looking South in 2021 (Coordinates 50°48'10.16"N 113°50'9.92"W)

Wetland 06, Looking South in 2024 (Coordinates 50°48'9.38"N 113°50'9.92"W)

Wetland 07

Wetland 07: Historical and Precipitation Data

Photo Date (MM/DD/ YYYY)	Photo ID (roll, AS#, Photo#)	Resolution	* Season	AWCS Wetland Class	** Annual Precipitation Data	Precipitation 30 Days Prior to Image (mm)	Daily Precipitation and 10 Days Previous (mm)	*** Open Water Visible (OW), Consistent Wetland Vegetation (WV)
03/30/1950	AS0170, 103, 49-821	1:40,000	S	Marsh-graminoid-Seasonal	N/A	N/A	N/A	DV
09/20/1962	AS0834, 165, 62821	1:31,680	F	Marsh-graminoid-Seasonal	D	48.42	0 (1.25 in previous 10 days)	DVI
06/13/1974	AS1315, 280, 74-035	1:31,680	SUM	Marsh-graminoid-Seasonal	N	64.33	0 (19.11 in previous 10 days)	DVI
07/05/1983	AS2747, 20, 83-082	1:30 000	SUM	Marsh-graminoid-Seasonal	D	62.79	0 (44.12 in previous 10 days)	DVI
07/17/1998	AS4990, 265, 98-100	1:20,000	SUM	Marsh-graminoid-Seasonal	W	146.00	0 (4.12 in previous 10 days)	DVI
07/28/2007	Google Earth	-	SUM	Marsh-graminoid-Seasonal	W	30.68	0 (2.88 in previous 10 days)	DV
05/04/2013	Google Earth	-	S	Marsh-graminoid-Seasonal	N	19.80	0 (7.46 in previous 10 days)	DV

Photo Date (MM/DD/ YYYY)	Photo ID (roll, AS#, Photo#)	Resolution	* Season	AWCS Wetland Class	** Annual Precipitation Data	Precipitation 30 Days Prior to Image (mm)	Daily Precipitation and 10 Days Previous (mm)	*** Open Water Visible (OW), Consistent Wetland Vegetation (WV)
08/27/2017	Google Earth	-	SUM	Marsh-graminoid-Seasonal	D	17.38	0 (0.16 in previous 10 days)	DV
05/01/2020	Google Earth	-	SUM	Marsh-graminoid-Seasonal	D	16.85	0 (0 in previous 10 days)	DV

***** S= Spring (April to June); Sum=Mid to Late Summer (June to September); F=Fall (Sept-Nov)

****** D=Dryer; N-Normal; W=Wetter; N/A= Not Available

******* W=Water Present/inundated; D=Dry; DV=Dry, vegetated (consistent with wetland class); DVI=Dry, vegetated (indistinguishable from surrounding uplands)

Wetland 07: Appendix 7 Soil Data (Coordinates 50°48'7.49"N 113°50'3.12"W)

Question	Soil Indicators of Wetlands	Y/N
S1	Organic Soils (except folists) present	N
S2	Presence of peat accumulation determined by Von Post test	N
S3	Of, Om, Oh horizons (organic surface layer 20-40 cm thick) present	N
S4	Sulfidic material present	N
S5	Gleying or mottling present immediately below the surface layer and within 30 cm	Y
S6	Native prairie soils with a low chroma matrix within 30 cm of the soil surface and the following present:	N
S7	Nonsandy soils with a low chroma matrix within 40 cm of the soil surface and one of the following present within 30 cm of the surface	N
S8	Sandy soils with one of the following present:	N
S9	Remains of aquatic invertebrates are present within 30 cm of the soil surface in pothole-like depressions	N
S10	Other regionally applicable, field-verifiable soil properties associated with prolonged seasonal high water?	N

Munsel Soil Color				
Soil Horizon	**Depth (cm)**	**Hue**	**Value**	**Chroma**
A	0-20	10YR	2	1
B	20+	10YR	2	2

Incidental Plant Species Within Wetland			
foxtail barley (*hordeum jubatum*)	wheatgrass species (*Triticeae spp.*)	common cattails (*Typha latifolia*)	creeping thistle (*Cirsium arvense*)
perennial sow thistle (*Sonchus arvensis*)	common dandelion (*Taraxacum official)*		

Wetland 07, Looking Southwest in 2021 (Coordinates 50°48'7.56"N 113°50'2.94")

Wetland 07, Looking West in 2024 (Coordinates 50°48'7.64"N 113°50'1.38")

Ephemeral 02 Soil Data

Question	Soil Indicators of Wetlands	Y/N
S1	Organic Soils (except folists) present	N
S2	Presence of peat accumulation determined by Von Post test	N
S3	Of, Om, Oh horizons (organic surface layer 20-40 cm thick) present	N
S4	Sulfidic material present	N
S5	Gleying or mottling present immediately below the surface layer and within 30 cm	N
S6	Native prairie soils with a low chroma matrix within 30 cm of the soil surface and the following present:	N
S7	Nonsandy soils with a low chroma matrix within 40 cm of the soil surface and one of the following present within 30 cm of the surface	N
S8	Sandy soils with one of the following present:	N
S9	Remains of aquatic invertebrates are present within 30 cm of the soil surface in pothole-like depressions	N
S10	Other regionally applicable, field-verifiable soil properties associated with prolonged seasonal high water?	N

Munsel Soil Color				
Soil Horizon	**Depth (cm)**	**Hue**	**Value**	**Chroma**
A	0-30	10YR	2	1

Ephemeral 02 looking SE in 2024.

Ephemeral 03 Soil Data

Question	Soil Indicators of Wetlands	Y/N
S1	Organic Soils (except folists) present	N
S2	Presence of peat accumulation determined by Von Post test	N
S3	Of, Om, Oh horizons (organic surface layer 20-40 cm thick) present	N
S4	Sulfidic material present	N
S5	Gleying or mottling present immediately below the surface layer and within 30 cm	N
S6	Native prairie soils with a low chroma matrix within 30 cm of the soil surface and the following present:	N
S7	Nonsandy soils with a low chroma matrix within 40 cm of the soil surface and one of the following present within 30 cm of the surface	N
S8	Sandy soils with one of the following present:	N
S9	Remains of aquatic invertebrates are present within 30 cm of the soil surface in pothole-like depressions	N
S10	Other regionally applicable, field-verifiable soil properties associated with prolonged seasonal high water?	N

Munsel Soil Color				
Soil Horizon	**Depth (cm)**	**Hue**	**Value**	**Chroma**
A	0-25	10YR	2	1
B	25+	10YR	4	2

Ephemeral 03 looking NW in 2024.

Ephemeral 04 Soil Data

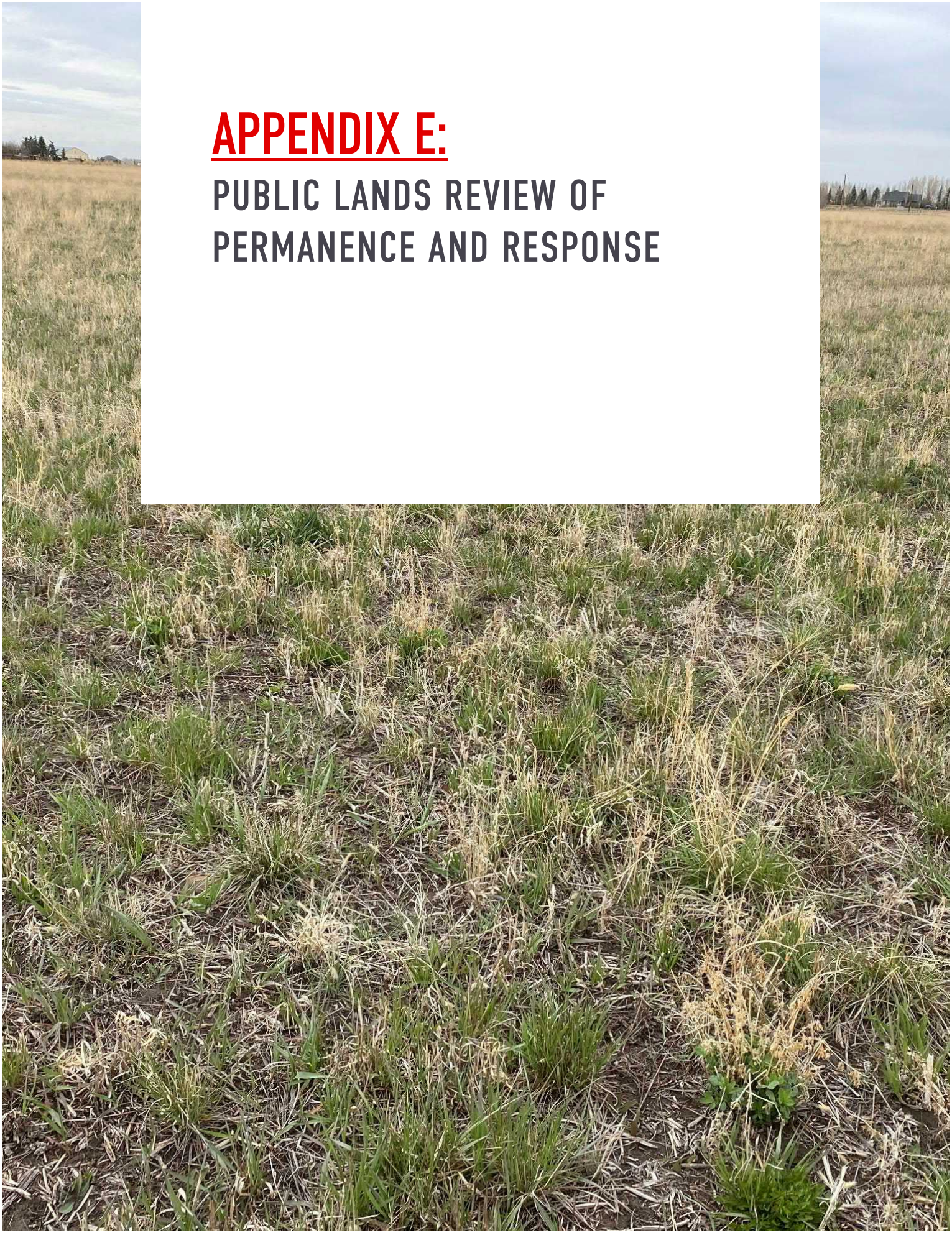
Question	Soil Indicators of Wetlands	Y/N
S1	Organic Soils (except folists) present	N
S2	Presence of peat accumulation determined by Von Post test	N
S3	Of, Om, Oh horizons (organic surface layer 20-40 cm thick) present	N
S4	Sulfidic material present	N
S5	Gleying or mottling present immediately below the surface layer and within 30 cm	N
S6	Native prairie soils with a low chroma matrix within 30 cm of the soil surface and the following present:	N
S7	Nonsandy soils with a low chroma matrix within 40 cm of the soil surface and one of the following present within 30 cm of the surface	N
S8	Sandy soils with one of the following present:	N
S9	Remains of aquatic invertebrates are present within 30 cm of the soil surface in pothole-like depressions	N
S10	Other regionally applicable, field-verifiable soil properties associated with prolonged seasonal high water?	N

Munsel Soil Color				
Soil Horizon	**Depth (cm)**	**Hue**	**Value**	**Chroma**
Ap	0-20	10YR	2	1
B	20+	10YR	4	2

Ephemeral 04 looking SE in 2024.

APPENDIX E:

PUBLIC LANDS REVIEW OF PERMANENCE AND RESPONSE



Terri Duret

From: AEP Water-Boundaries <Water.Boundaries@gov.ab.ca>
Sent: April 7, 2021 12:39 PM
To: Jason Frederickson
Cc: Terri Duret; Glenn Harasym
Subject: RE: Request for Review of Wetland Permanency
Attachments: September 14-2016_Google Earth.jpg

Good morning Jason,

Thank you for your enquiry and your patience. As you will notice from the attached Google Earth imagery, seven wetlands, labelled 1 to 7, within the W ½ Section 21-21-28-4 were reviewed at the Water Boundaries Unit. A review of historical aerial photos of the area supports the permanence of all those wetlands. Having said that, the bodies of water (i.e. surface water) within Wetlands 1 and 4 are more seasonal, within Wetlands 5, 6 and 7 are semi-permanent and within Wetlands 2 and 3 are reasonably permanent. As only the bed and shore of permanent and naturally occurring bodies of water (i.e., surface water) are eligible for a Crown ownership claim under Section 3 of the *Public Lands Act*, the bed and shore of bodies of water within Wetlands 1, 4, 5, 6 and 7 do not meet the criteria for such an ownership claim. As such, under Section 3 of the *Public Lands Act,* the Crown in right of Alberta asserts an ownership claim to the bed and shore of bodies of water within Wetlands 2 and 3 which are located on private lands and outside the boundaries of existing public roads. It should be mentioned that under Section 16(1) of the *Municipal Government Act*, the title to all roads in a municipality, other than a city, is vested in the Crown in right of Alberta. Therefore, any portion of the bed and shore within the boundaries of the roads in that area is already known to be owned by the Crown.

However, the assessments made by the Water Boundaries Unit do not provide any permission to alter any water feature. As the Crown in right of Alberta owns all waters on Alberta lands, regardless of the surface ownership, an activity which may affect any portion of the existing wetlands in that area will be subject to the regulatory requirements under the *Water Act*. For more information, the local Water Act Approvals authority need to be contacted.

Please let me know if any additional clarification is required and/or you have any questions or comments regarding this assessment.

Regards,

Sid

Sid Parseyan, M.Sc.
Senior Water Boundary Research Analyst
Water Boundaries Unit
Grants and Program Delivery Section
Lands Policy and Programs Branch
Lands Division
2nd Floor, South Petroleum Plaza
9915 – 108 Street, Edmonton, AB T5K 2G8
Phone: (780) 422-0187 | Fax: (780) 422-3120
Email: sid.parseyan@gov.ab.ca

Alberta Environment and Parks

Classification: Protected A

From: Jason Frederickson <jfrederickson@urbansystems.ca>
Sent: February-25-21 9:25 AM
To: AEP Water-Boundaries <Water.Boundaries@gov.ab.ca>
Cc: Terri Duret <TDuret@urbansystems.ca>; Glenn Harasym <gharasym@urbansystems.ca>
Subject: Request for Review of Wetland Permanency

Good day,

Please find attached behalf of our client The Town of Okotoks, a request a review under the Public Lands Act for permanency of wetlands identified in the attached document. Please let me know if any further information is required.

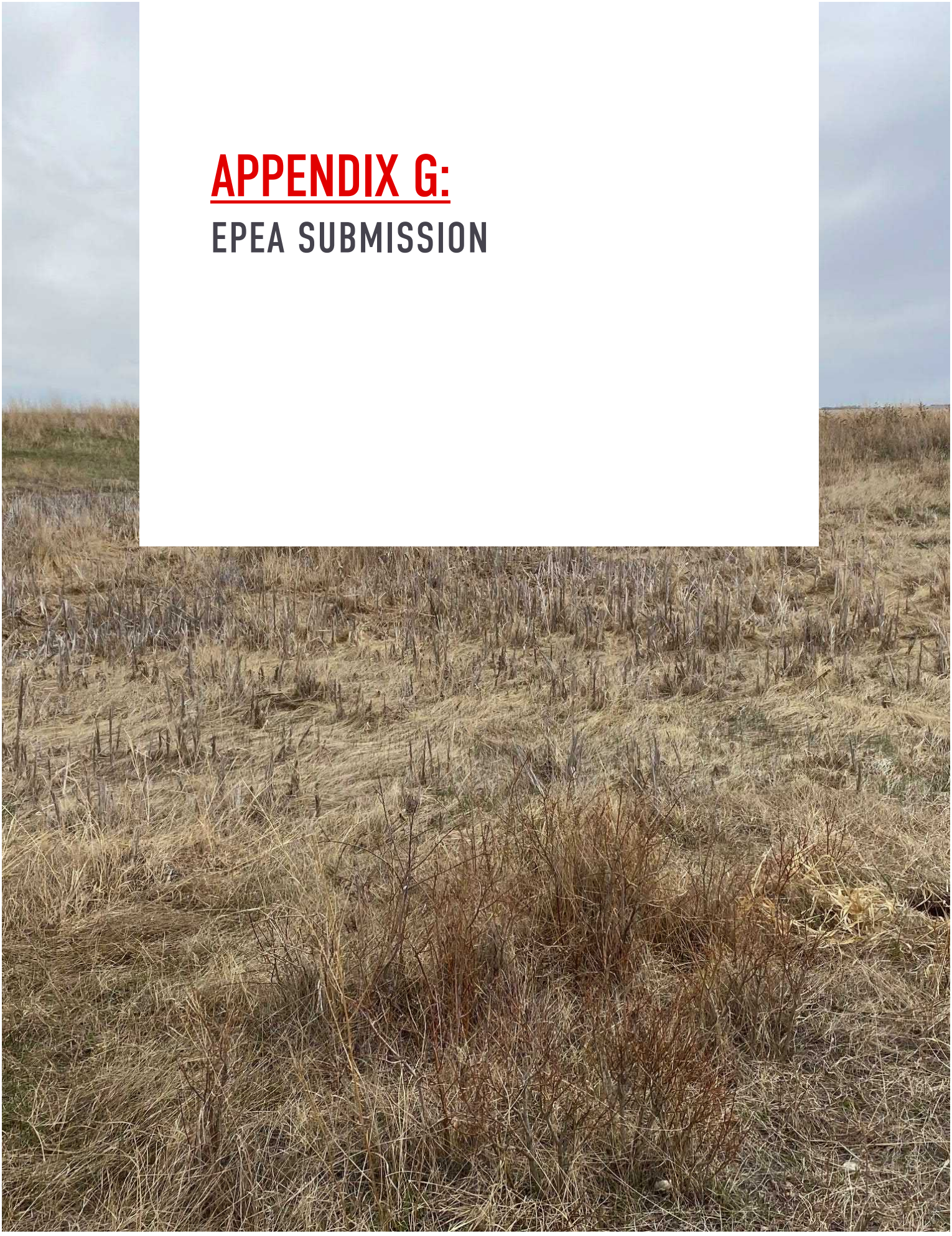
Kind Regards,

Jason Frederickson, B.Sc., A.I.T.
Environmental Consultant | urbansystems.ca
t 403.291.1193 x 4352 | **c** 403.992.8312


Assessed Bodies of Water
Write a description for your map.
Legend
1
2
3
3
4
5
6
7
NW 1/4 21-21-28-4
Google Earth
100 m
N

APPENDIX G:

EPEA SUBMISSION



Foothills Okotoks Regional Water Project - Reservoir - EPEA Amendment Application

Nathan Kristensen
To rac.environment@gov.ab.ca
Cc Sidney Kwok; Daniel Nyentap; Terri Duret; Frank Lotz

Reply | Reply All | Forward | ...

Fri 2024-08-09 6:13 PM

OKOTOKS New Raw Water Res EPEA 028-1029-03-05 APPROVAL AND REG PROCEDURE REGULATION - APPLICATION INFORMATION REQUIRED 4 8 24.pdf
.pdf File

OKOTOKS New Raw Water Res EPEA 028-1029-03-05 P.ENG Sign Off 4 8 24.pdf
.pdf File

OKOTOKS New Raw Water Res EPEA 028-1029-02-05 NOTICE OF APPLICATION 4 9 24.pdf
.pdf File

493244-00-00 - Cover Letter & Approval- FORW EPEA C&R Plan Approval.pdf
.pdf File

2024-07-19-FORWP-Phase 1 Reservoir Design Drawings-IFA - Stamped.pdf

2024-7-30 PACE to Urban Systems Water Quality Model Results and Recommen....pdf

Hello,

This email is to apply for an EPEA Amendment to include the Raw Water Reservoir site for the Foothills-Okotoks Regional Water Project (proposed 1029-03-05). We are providing the following forms for review/approval:

- Notice of Application Form
- Approvals and Registrations Procedure Regulation Information Form
    - This document is supplemented with the following attachments:
        - EPEA C&R Plan Approval (cover letter and approval)
        - EPEA Amending Approval (1029-03-04, current)
        - Original EPEA Approval (1029-03-00)
        - Issued for Approval Drawings
        - Water Quality Technical Memorandum
- Professional Engineer Sign-Off Form

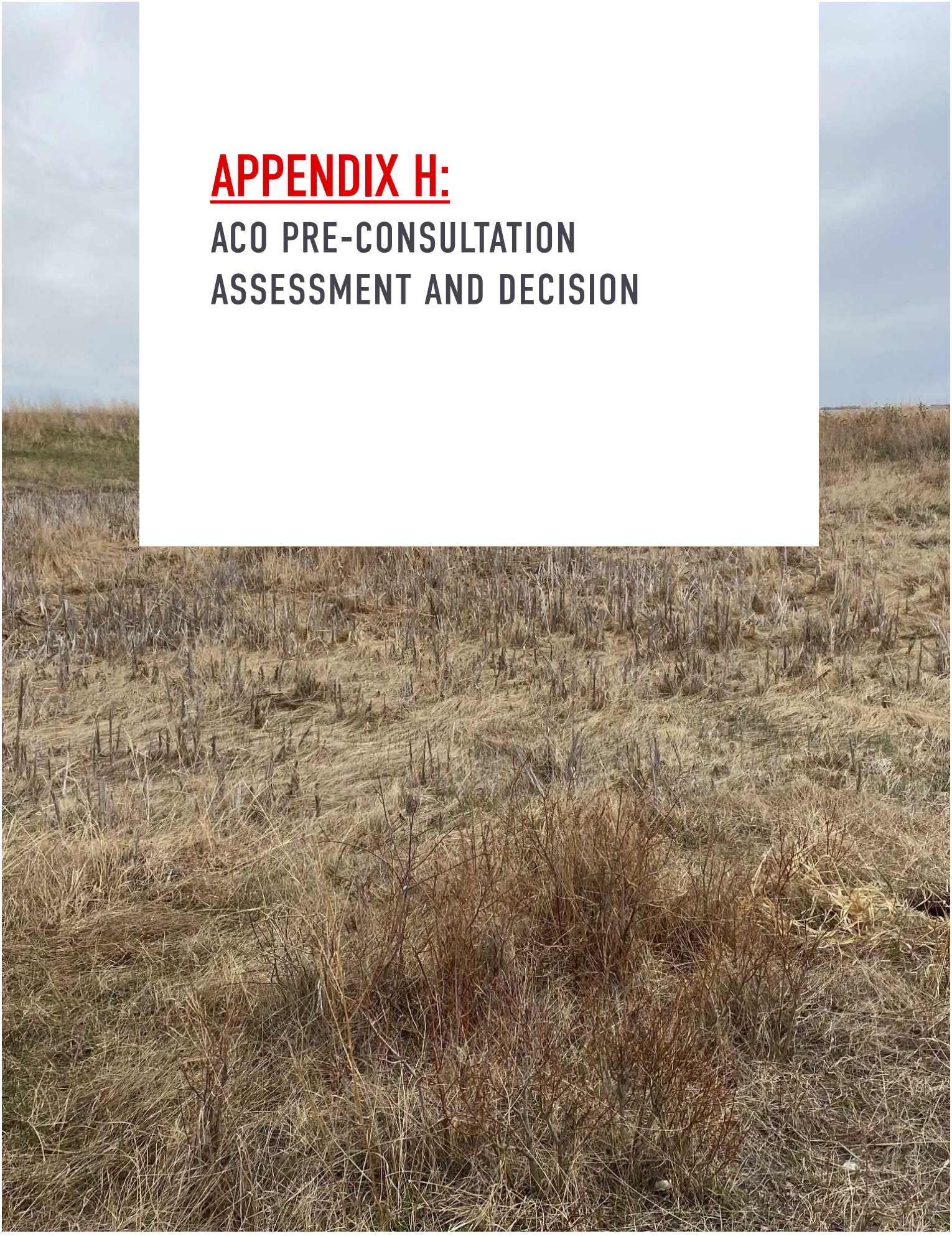
Should there be any questions or concerns with the application, please don't hesitate to contact us. If it's easier, we'd be happy to set up a meeting and review the application together.

Thank you,

NATHAN KRISTENSEN, E.I.T
URBAN SYSTEMS
101-134 11 Ave SE | Calgary, AB T2G 0X5
t 403-451-3649| c 587-921-5109
w urbansystems.ca

APPENDIX H:

ACO PRE-CONSULTATION ASSESSMENT AND DECISION



Adequacy Assessment

File Number for Consultation: FNC202108527 Date of Submission: 2021/11/30

Client Project Name: Foothills Okotoks Sub-Regional Water Project

The Aboriginal Consultation Office has reviewed the consultation records regarding the proposed projects provided by

URBAN SYSTEMS LTD.

In accordance with Alberta's First Nations and Metis Settlements policies and guidelines (http://indigenous.alberta.ca/1.cfm), the Aboriginal Consultation Office has determined adequacy for each activity number. The proponent may proceed with their regulatory applications for those activities deemed Adequate.

Be advised that this notice does not grant the client any authority to make application for any use of land not identified within this notification.

Reviewed by: Perchaluk, Kathleen Date of Review: 2022/02/18

Should you have any questions, please contact the reviewer at:

Phone Number: (403)355-4022 Email Address: kathleen.Perchaluk@gov.ab.ca

Supporting Comments/Direction:

Personal information is collected in accordance with Section 33(c) of the Freedom of Information and Protection of Privacy Act. The personal information collected within this form will be used to administer the First Nations/Metis Settlements consultation process. If you have any questions about the collection or use of this information, you can contact the Director, FOIP Services, Indigenous Relations and International and Intergovernmental Relations (780)427-9658.

Adequacy Assessment

Activity Number	Disp Type	Program Type	Source Line Spacing	Regulator	Purpose Type	Activity Area/Distance	Land Use Area
FNC202108527-001	WAC			AEP	Water Act	1.56 HA	South Saskatchewan Region

ATS Legal - From	ATS Legal - To
NW 26 21 28 4	NW 26 21 28 4

Action Required	No Consul. Recommended
Adequacy	No Consul. Recommended

First Nation(s) / Metis Settlement(s)

Activity Number	Disp Type	Program Type	Source Line Spacing	Regulator	Purpose Type	Activity Area/Distance	Land Use Area
FNC202108527-002	WAC			AEP	Water Act	16.49 HA	South Saskatchewan Region

ATS Legal - From	ATS Legal - To
NW 21 21 28 4	NW 21 21 28 4

Action Required	No Consul. Recommended
Adequacy	No Consul. Recommended

First Nation(s) / Metis Settlement(s)

Activity Number	Disp Type	Program Type	Source Line Spacing	Regulator	Purpose Type	Activity Area/Distance	Land Use Area

ATS Legal - From	ATS Legal - To

Action Required	
Adequacy	

First Nation(s) / Metis Settlement(s)