

October 21, 2024

Village of Linden  
Box 213, 109 Central Avenue East  
Linden (Alberta) T0M 1J0

Attention: Lynda VanderWoerd, Chief Administrative Officer

**Subject: Environmental Overview for North Area Structure Plan, West Side in SW-29-30-25 W4**

**CIMA File: CA000928**

Ms. VanderWoerd,

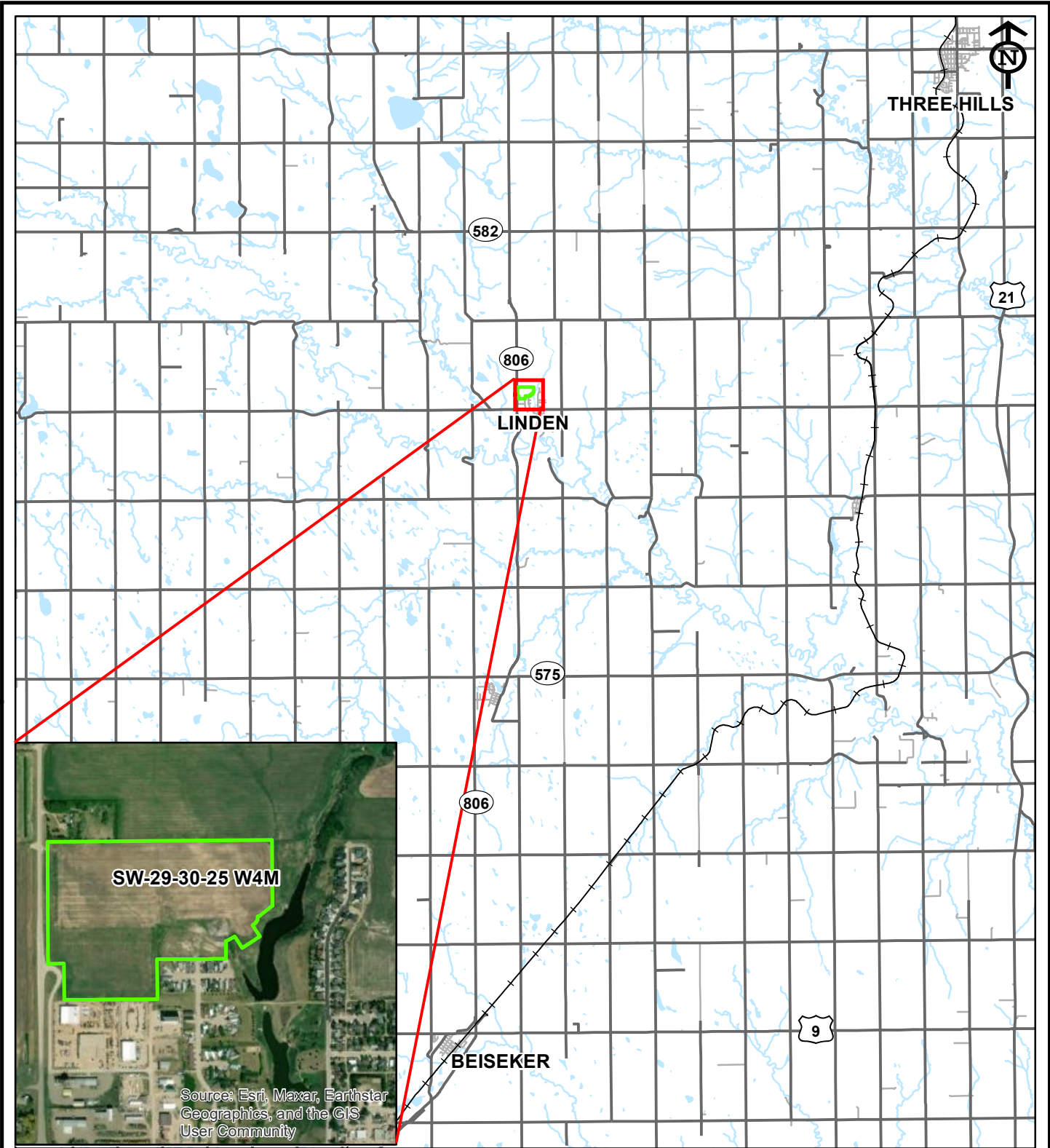
CIMA+ was retained to complete an Environmental Overview of the existing conditions within SW-29-30-25 W4M in Linden, Alberta. The Project Site is located north of existing development in the Village of Linden, bounded on the west by Highway 806, on the north by agricultural land, and on the east by a coulee with a reservoir and associated natural area (Figure 1).

## 1. Methods

### 1.0 Desktop Review

A review of existing literature and data sets was conducted, including:

- + Natural Regions of Alberta (Natural Regions Committee, 2006),
- + Alberta Environment and Protected Areas (AEPA) Wildlife Land Use Guidelines and Wildlife Sensitivity Mapping,
- + Fish and Wildlife Management Information System (FWMIS) Fish and Wildlife Internet Mapping Tool (FWIMT) (Alberta Government, Fish and Wildlife Internet Mapping Tool - Public, 2024),
- + Alberta Conservation Information Management System (ACIMS) (Alberta Parks, 2023),
- + Environmentally Significant Areas (ESA) (Fiera Biological Consulting Ltd., 2014),
- + Alberta Merged Wetland Inventory (AMWI),
- + Alberta Biodiversity Monitoring Institute (ABMI),
- + Alberta Soil Information Viewer (Alberta Agriculture and Rural Development, 2019),
- + Grassland Vegetation Inventory (GVI) (Alberta Sustainable Resource Development, 2009),
- + Historical Resources Listing (Alberta Arts, Culture, and Status of Women, 2024),
- + and Historical Aerial Photographs from Alberta Environment and Protected Areas (AEPA) and Google Earth™.



### LEGEND

- Major Road
- Minor Road
- + Railway
- Water Body

Imagery Source: ESRI Basemap

Client:

VILLAGE OF LINDEN

Project:

SW-29-30-25 W4M  
WEST ASP

Title:

PROJECT LOCATION

Date:

10-21-2024

Project No.:

CA000928

Drawn:

JLP

Scale:

1:200,000

**FIGURE 1**

We refer to the Alberta Wetland Identification and Delineation Directive, 2015, No.4 (Alberta Environment and Parks, 2015), to provide methods for the historical review for potential wetlands. Photographs were accessed through Alberta Environment and Protected Areas (AEPA) and Google Earth™. A sub-set of photographs was chosen based on the following criteria:

- + photographs taken from multiple years over several decades;
- + photographs taken in multiple seasons; and
- + photographs representing the best available scale and clarity of image.

A preliminary wetland evaluation was completed based on the historical aerial photograph review. The Alberta Merged Wetland Inventory (AMWI) and Alberta Biodiversity Monitoring Institute (ABMI) wetland data were also assessed for potential wetlands and waterbodies.

## 1.1 Field Assessment

Potential wetlands were identified in a preliminary desktop review of the Site; therefore, field surveys were completed to confirm existing conditions. We referred to the Alberta Wetland Identification and Delineation Directive 2015 for guidelines on wetland identification and delineation in the field (Alberta Environment and Parks, 2015).

- + A wetland is defined as land saturated with water long enough to promote the formation of water altered soils, growth of water tolerant vegetation and various kinds of biological activity that are adapted to the wet environment (Alberta Environment and Parks 2013).
- + An ephemeral water body is an area where the terrain is by the water table near, at or above the ground surface for a short period of days (Alberta Environment and Parks 2015). However, water is not present long enough to promote the formation of water altered soils within 30 cm of the ground surface or a dominance of water tolerant vegetation.

The preliminary map of potential wetlands was used as reference when conducting field surveys. Waterbody locations and boundaries were confirmed in the field based on wetland verses upland indicators (terrain, vegetation, and soils). The boundaries were surveyed using a hand-held Garmin GPS unit.

### 1.1.1 Wetland Classification

For any wetlands identified, we applied the information gained through the historical aerial photograph review, combined with field surveys (soils and vegetation information), to classify observed wetlands with reference to the Alberta Wetland Classification System (AWCS). The class is determined by the type of vegetation zone occurring in the central or deepest part of the wetland. This deepest vegetation zone must be 25% or more of the total wetland area.

### 1.1.2 Drainage Classification

We applied the Alberta Environment and Sustainable Resource Development's Timber Harvest Planning and Operating Ground Rules (Alberta Environment and Sustainable Resource Development, 2012) system for drainage classification:

- + **Large Permanent:** major streams and rivers with well-developed floodplains and carry flows year-round. The non-vegetated channel width is greater than 5 m.
- + **Small Permanent:** permanent streams, often with small valley bottoms and bench floodplain development. The stream carries flow year-round but may freeze completely in winter or dry up during periods of drought. The banks and non-vegetated channel are well defined, with channel width greater than 0.7 m to 5 m.
- + **Transitional:** small streams, often with small valley bottoms and bench floodplain development. The stream carries flow year-round but may freeze completely in winter or dry up during periods of drought. The banks and non-vegetated channel are well defined, with channel width greater than 0.4 m to 0.7 m.
- + **Intermittent:** small stream channels with usually no terrestrial vegetation in the channel. The stream usually has some bank development and carries flows during spring runoff and heavy rainfall. Small springs can also supply flows to intermittent streams. Channel width is less than 0.4 m.
- + **Ephemeral:** a vegetated draw that may be connected to a higher-class drainage. The draw carries flow only during or immediately after rainfall or snowmelt. There is little to no channel development.

## 2. Results

### 2.0 Terrain and Soils

The Project Site is located within the Foothills Fescue Natural Subregion of the Grassland Natural Region. Characteristic native plant communities include mountain rough fescue and Parry oat grass grasslands (Natural Regions Committee, 2006). Shrub communities comprised of buckbrush and silverberry and balsam forests and willow stands are common along rivers and depressions (Natural Regions Committee, 2006). The native vegetation typical of the Subregion is no longer represented within the Project Site due to consistent historical disturbance.

Dominant soils are well-drained Orthic Black Chernozems on medium textured till of the Rockyview soil series or moderately fine textured sediments deposited by water of the Lyalta soil series (Alberta Agriculture and Rural Development, 2019). The Site is characterized by an undulating, high relief landform with slopes to 4% (Alberta Agriculture and Rural Development, 2019).

## 2.1 Vegetation

No areas of native grassland were identified at the Project Site based on the Grassland Vegetation Inventory (GVI) data (Alberta Sustainable Resource Development, 2009). The Site is described as Anthropogenic/cropped. This was confirmed with field observations of the Site.

A review of historical and current aerial photographs from AEPA and Google Earth™ images confirms the Site has been subject to disturbance from agricultural practices (cultivation). The southeast portion of the Site has been subject to soil stripping and grading activities. Aerial photographs are shown in Appendix A.

Upland plant species documented during field surveys are summarized in Table 1, including the Alberta Weed Control Act status, where relevant.

Table 1. Upland Plant Species

Community	Species		Alberta Weed Control Act Status
	Common Name	Scientific Name	
Tame Pasture/ Non-Native	Cultivated wheat	<i>Triticum aestivum</i>	Not Regulated
	Yellow sweet-clover	<i>Melilotus officinalis</i>	Not Regulated
	Creeping thistle	<i>Cirsium arvense</i>	Noxious
	Perennial sow-thistle	<i>Sonchus arvensis</i>	Noxious
	Common dandelion	<i>Taraxacum officinale</i>	Not Regulated
	Smooth brome	<i>Bromus inermis</i>	Not Regulated
Native	Wild licorice	<i>Glycyrrhiza lepidota</i>	Not Regulated
	Pasture sagewort	<i>Artemisia frigida</i>	Not Regulated
	Foxtail barley	<i>Hordeum jubatum</i>	Not Regulated
	Smooth brome	<i>Bromus inermis</i>	Not Regulated

## 2.2 Wetlands and Waterbodies

We identify two (2) wetlands within the Project Site. The wetlands are classified as temporary marsh. The total wetland area is 0.314 ha. There is an ephemeral drainage that extends across the Project Site between the two wetlands, which is 0.689 ha. Field data for the wetlands is in Appendix B.

Table 2 summarizes wetland area and class. Observed surface water characteristics are based on the historical photograph review. Figure 2 shows the locations of the wetlands and waterbodies.



#### LEGEND

- Project Site
- Ephemeral Drainage
- Temporary Wetland
- 0.5 m Contours
- LSD

Imagery Source: ESRI Basemap

Client: **VILLAGE OF LINDEN**

Project: **WEST AREA STRUCTURE PLAN**

Title: **WETLANDS AND WATERBODIES**

Note: Wetlands and drainage based on desktop assessment and field verification.

Date: **10-18-2024**

Project No.: **CA000928**

Drawn: **JLP**

Scale: **1:3,500**

**FIGURE 2**

Table 2. Wetland Area and Classification

ID	Area (ha)	Alberta Wetland Classification	Species			Representative Plant Species
			Total Years Visible <sup>1</sup>	Years Surface Water Visible <sup>1</sup>	Surface Water Visible in Dry Years <sup>2</sup>	
1	0.689	Ephemeral drainage	10	0	0	quackgrass ( <i>Elymus repens</i> ), smooth brome ( <i>Bromus inermis</i> ), silverweed ( <i>Potentilla anserina</i> )
2	0.058	Temporary wetland	18	0	0	cattails ( <i>Typha latifolia</i> ), wire rush ( <i>Juncus balticus</i> )
3	0.256	Temporary wetland	8	0	0	cultivated wheat ( <i>Triticum aestivum</i> ), no wetland species

<sup>1</sup>Total number of photographs out of 18 that the water body is visible

<sup>2</sup>Total number of photographs out of 18 that the water body is visible in a dry year (9 dry years)

\*Includes area outside of the Project Site

## 2.3 Environmentally Significant Areas

The Environmentally Significant Areas (ESAs) in Alberta: 2014 Update report identifies ESAs on a provincial scale (Fiera Biological Consulting Ltd. 2014). We overlaid the provincial ESA map on the Project Site and determined that no portion of the Site has been previously identified as a provincial ESA.

## 2.4 Species of Special Management Concern

Wildlife observations recorded on August 30, 2024 are provided in Table 3.

Table 3. Observed Wildlife

Species		Alberta General Status
Common Name	Scientific Name	
Grey partridge	<i>Perdix perdix</i>	Exotic
House sparrow	<i>Passer domesticus</i>	Exotic
Pine siskin	<i>Spinus pinus</i>	Secure

A search of the Alberta Conservation Information Management System (ACIMS) returned no records for rare, threatened or plant species at risk (Alberta Parks, 2023). A search of the Fish and Wildlife Management Information System (FWMIS) returned a record of burrowing owl within 3 km of the Site (Alberta Government, 2024). Burrowing owls (*Athene cunicularia*) are found in open, treeless areas with low, sparse vegetation such as

grasslands and deserts and have been found on golf courses, pastures, agricultural fields and road embankments (Cornell University 2019). Typically, they occur in the Mixedgrass and Dry Mixedgrass Subregions of the Grassland Natural Region (Alberta Sustainable Resource Development and Alberta Conservation Association 2005). They are at the edge of their range in the Linden area.

Burrowing owls are listed as “At Risk” under the General Status of Alberta Wild Species (Alberta Environment and Parks 2020) and “Threatened” under the Alberta Wildlife Act. They are listed as Endangered under the federal *Species at Risk Act*. There is the potential for burrowing owls within the Project Site given known habitat preferences and species distributions.

FWMIS identifies three (3) fish species within 3 km of the Project Site (Table 4). Rainbow Trout are stocked in the Boese Reservoir approximately 1.14 km north of the Site.

Table 4. Fish Species with 3 km of Project Site

Common Name <sup>1</sup>	Scientific Name <sup>2</sup>	AEPA Status <sup>3</sup>	SARA Status <sup>4</sup>
Pearl dace	<i>Margariscus margarita</i>	Undetermined	Not Listed
Quillback	<i>Cariodes Cyprinus</i>	Undetermined	Not Listed
White sucker	<i>Catostomus commersoni</i>	Secure	Not Listed

1. List compiled from AEPA FWMIS database website, 2024.

[https://geospatial.alberta.ca/FWIMT\\_Pub/Viewer/?TermsOfUseRequired=true&Viewer=FWIMT\\_Pub](https://geospatial.alberta.ca/FWIMT_Pub/Viewer/?TermsOfUseRequired=true&Viewer=FWIMT_Pub)

2. According to AEPA

3. Alberta Environment and Protected Areas, 2024. Status of Alberta Wild Species 2020 <https://www.alberta.ca/lookup/wild-species-status-search.aspx>

At Risk -Any Species known to be “At Risk” after formal detailed status assessment and designation as “Endangered” or “Threatened” in Alberta.

May Be At Risk -Any species that “May Be At Risk” of extinction or extirpation, and is therefore a candidate for detailed risk assessment.

Sensitive -Any species that is not at risk of extinction or extirpation but may require special attention or protection to prevent from becoming at risk.

Secure -A species that is not “At Risk,” “May Be At Risk” or “Sensitive.”

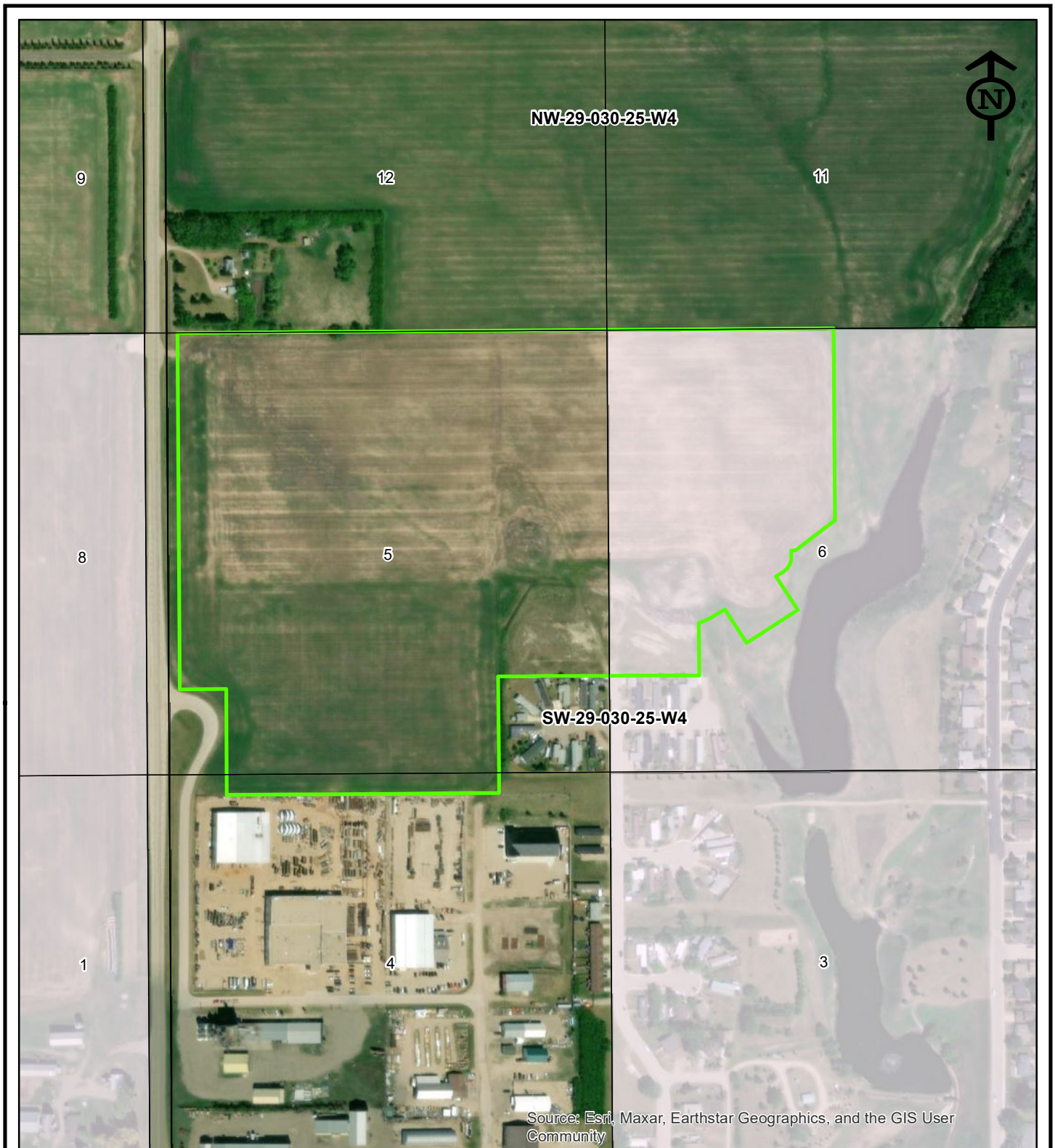
Undetermined/Data Deficient- Any species for which insufficient information, knowledge, or data is available to reliably evaluate its general status.








Exotic/alien -Any species that has been introduced as a result of human activities

4 Species at Risk Act 2021 Species at Risk Public Registry <https://species-registry.canada.ca/index-en.html#/species?sortBy=commonNameSort&sortDirection=asc&pageSize=10>

## 2.5 Historical Resources

The eastern portion of the Site, LSD 6, has an Historical Resource Value of 5a, indicating that the Site has potential to have historic resources (Alberta Arts, Culture, and Status of Women, 2024). Any proposed development will require a Historical Resource Clearance application. Figure 3 shows the HRV listing for the Project Site.



	<div><b>LEGEND</b></div> <div> Project Site</div> <div> LSD</div> <div><b>Listing of Historical Values</b></div> <div> 1</div> <div> 3</div> <div> 4</div> <div> 5</div> <div>Imagery Source: ESRI Basemap</div>	Client:	VILLAGE OF LINDEN	Date:	03-07-2024
		Project:	WEST AREA STRUCTURE PLAN	Project No.:	CA000928
		Title:	PROVINCIAL LISTING OF HISTORICAL RESOURCE VALUES (HRV) BY QUARTER SECTION	Drawn:	JLP
		Provincial HRV data from: Alberta Arts, Culture and Status of Women. (2023). Listing of Historical Resources. Fall 2023. Edmonton, AB.		Scale:	1:5,000
				FIGURE 3	

## 2.0 Potential Impacts

We identify the predicted environmental impacts related to Project Site development. A summary of the potential impacts and recommended mitigation measures are presented in Table 5.

*Table 5. Summary of Potential Impacts*

Environmental Component	Potential Impact	Mitigation Measures
Soils/terrain/hydrology	<ul style="list-style-type: none"> <li>loss of soil from removal, erosion and/or admixing during construction</li> <li>soil compaction from heavy equipment used during construction.</li> <li>sediment runoff to surrounding areas, possibly the east drainage.</li> <li>accidental spills of fuels, chemicals, and other potentially hazardous materials</li> </ul>	<ul style="list-style-type: none"> <li>Erosion and Sediment Control (ESC) Plan</li> <li>Environmental Construction Operation (ECO) Plan</li> <li>Topsoil shall be salvaged and stored for re-use in accordance with current standards.</li> <li>Stormwater management strategies</li> </ul>
Wetlands	<ul style="list-style-type: none"> <li>Loss of identified wetland areas and the ephemeral drainage</li> </ul>	<ul style="list-style-type: none"> <li>Compensation for wetland loss through the Alberta Wetland Policy and associated regulations</li> <li>Stormwater management strategies to support post development drainage conditions</li> </ul>
Vegetation	<ul style="list-style-type: none"> <li>Loss of vegetation – majority non-native (pasture or cultivated)</li> <li>accidental spills of fuels, chemicals, and other hazardous materials during construction and site occupation.</li> <li>introduction and spread of weeds or other invasive plants during construction and site occupation.</li> </ul>	<ul style="list-style-type: none"> <li>Erosion and Sediment Control (ESC) Plan</li> <li>Environmental Construction Operation (ECO) Plan</li> <li>Weed Management Best Practices</li> <li>All construction equipment to be cleaned and inspected prior to arrival to the Project Site</li> </ul>
Wildlife	<ul style="list-style-type: none"> <li>damage, disturbance, and/or loss of individual wildlife, active nests, and burrows.</li> <li>sensory disturbance, barriers to movement and habitat avoidance by wildlife</li> <li>accidental spills of fuels, chemicals, and other hazardous materials resulting in loss or alteration of habitat</li> </ul>	<ul style="list-style-type: none"> <li>Time construction to avoid critical breeding periods for wildlife and/or conducting pre-construction wildlife sweeps.</li> </ul>

## 3.0 Mitigation Measures

Mitigation measures are measures applied to eliminate, reduce, or control the predicted negative impacts of a particular project (Government of Canada 2012). We present mitigation measures that could eliminate, reduce, or control the predicted negative impacts of the Project.

### 3.1 Erosion and Sediment Control

Erosion and Sediment Control Planning (ESC Plan) should be developed as per current guidelines. The design and implementation of site-specific erosion and sediment control measures should be carried out prior to, during, and following the completion of each phase of the planned development. The purpose of the ESC Plan is to provide measures to limit or control the potential for deleterious substances, like sediments in runoff, from leaving the Site or entering regional waterbodies.

### 3.2 Environmental Construction Operation Plan

Environmental Construction Operation (ECO) Plan strategies should be prepared to current standards. ECO Plan Best Management Practices should include vegetation protection, dust control measures, management of mud-tracking off-site, designated stockpile storage, designated re-fueling areas, waste management and recycling. ECO Planning strategies will be implemented prior to construction by the prime contractor completing the work.

The ECO planning procedures for the Site should include the following specific mitigation strategies:

- + Topsoil shall be salvaged and stored in accordance with available Best Management Practices.
- + Vehicle and equipment traffic should be restricted to designated access routes/areas to minimize impact on surrounding area.
- + All construction equipment should be cleaned and inspected prior to arrival the Project Site.
- + Construction and revegetation materials should be certified weed-free.

### 3.3 Weed Management Best Practices

Weed management activities should be implemented as per the Weed Control Act Regulations (Government of Alberta 2010). Any problem species (Prohibited Noxious or Noxious) should be managed to current provincial standards using recommended prescriptions of mechanical, chemical, or biological controls. Chemical control of invasive plants will follow the Environmental Code of Practices for Pesticides (Government of Alberta 2010).

### 3.4 Stormwater Management Strategies

Stormwater management strategies should be implemented as provided by a qualified stormwater engineer.

### 3.5 Timing of Construction

It is recommended that stripping and grading be completed outside the critical time period for many wildlife species: approximately April 1 to August 31 (Environment Canada 2014). This is the primary breeding period for many species that may be encountered within the work site (Stebbins 2003, Smith 1993, McGillivray and Semenchuk 1998). Bird nesting can be influenced by micro-climatic conditions in specific areas as well as inter-annual variation due to factors such as an early spring or cold, wet summer (Environment Canada 2014). Therefore, this nesting period may vary by Project location.

If stripping and grading is to take place within the April 1 to August 31 period, a pre-construction wildlife survey will be completed. The wildlife survey will support the avoidance of sensitive wildlife features including active burrows or nests, as described in the Alberta Wildlife Sweep Guidelines (Government of Alberta, 2020). The following steps should be followed:

1. A qualified biologist will complete the survey up to 7 days prior to any clearing or construction commencing.
2. If active breeding is observed, no construction activities can occur until mitigation measures are applied. These mitigation measures may include a construction setback designated around the breeding site. Canadian Wildlife Service and/or Alberta Fish and Wildlife should be consulted to determine the required width of the setback.
3. The construction setback will be in effect as long as the breeding activity occurs.
4. Once breeding activity is no longer present, the setback can be removed, and construction activities can begin.
5. If construction stops for 7 consecutive days, the area should be surveyed again for active breeding activity before commencing works.
6. A qualified biologist will re-survey the area to determine if breeding activity is still present.

This surveying will facilitate compliance with the *Migratory Birds Convention Act* (Government of Canada 1994), the *Species at Risk Act* (Government of Canada 2002), and the *Alberta Wildlife Act* (Government of Alberta 1997).

## 4.0 Summary and Recommendations

The planned project site was reviewed for any potential environmental sensitivities requiring further site evaluation.

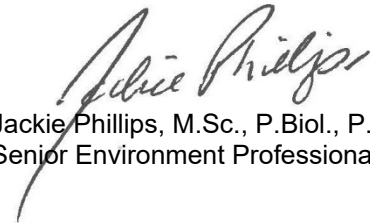
1. There is the potential for burrowing owls within the project site. Field sampling is recommended to support confirmation of whether burrowing owls currently inhabit the area. The Alberta Sensitive Species Inventory Guidelines should be applied with two ground searches and call playback surveys to be conducted between May 15 and July 31.
2. There are confirmed wetlands or waterbodies within the Site. If activities are planned for the site that will impact wetlands or waterbodies, a *Water Act* application to Alberta Environment and Protected Areas (AEPA) is required.
3. *Water Act* applications are pursued by the owner of the land at or before subdivision and in tandem with detailed stormwater management planning and related Provincial approvals under EPEA (*Environmental Protection and Enhancement Act*)
4. If watercourse crossings are planned, a Code of Practice for Water Crossings application to AEPA is required at the time the planned activity is to be constructed.

Please contact the undersigned for any further details regarding the desktop Environmental Overview.

Sincerely,



Karen Oldershaw B.Sc., M.E.Des., P. Biol.  
Senior Project Manager Urban Planning and Environment  
M 587-894-3395  
E Karen.Oldershaw@cima.ca



Jackie Phillips, M.Sc., P.Biol., P.Ag  
Senior Environment Professional

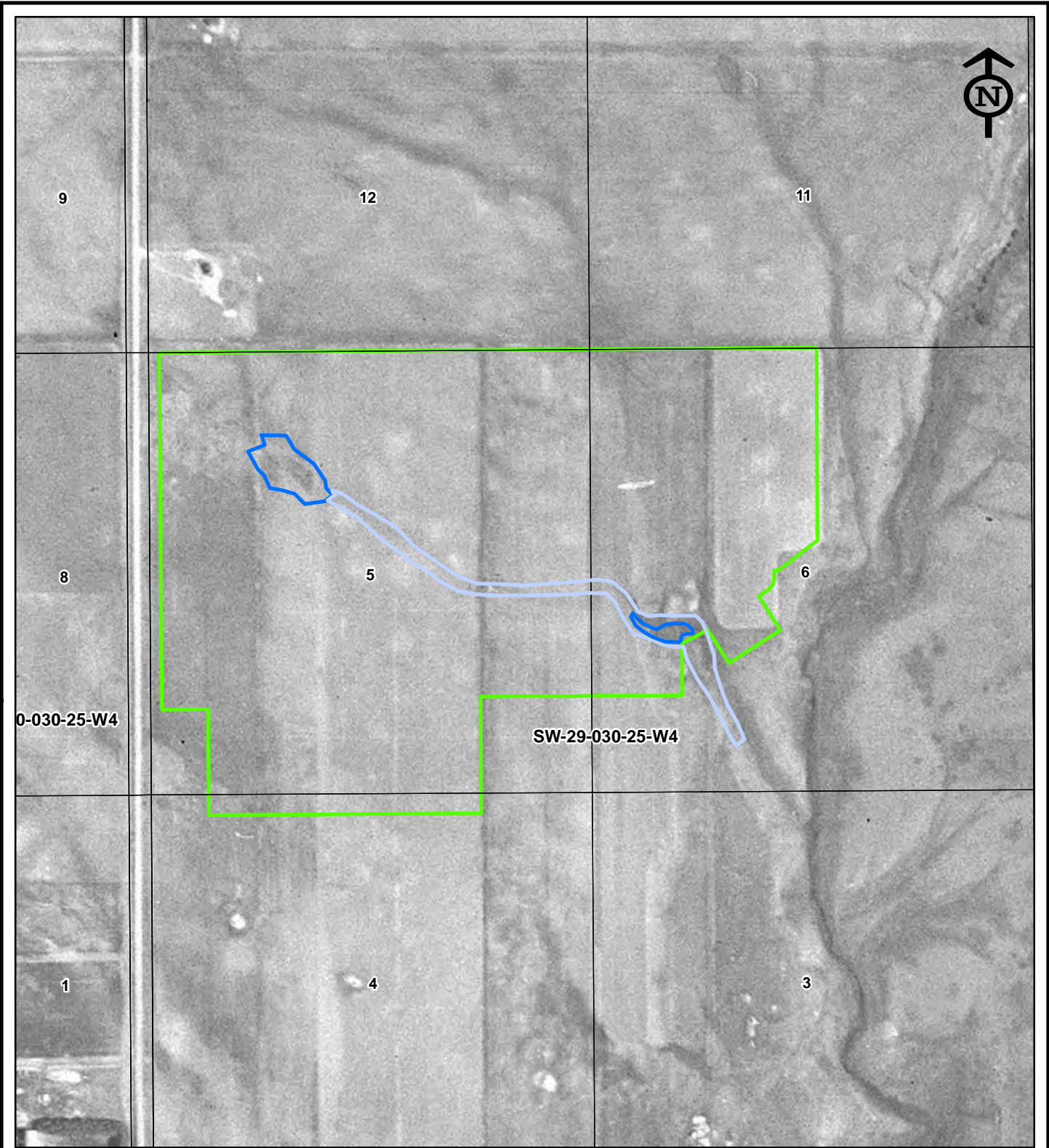
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# A

## Appendix A: Historical Aerial Photographs



**LEGEND**

- ▬ Project Site
- ▬ Ephemeral Drainage
- ▬ Temporary Wetland
- LSD

Imagery Source: AEPA

Client:

VILLAGE OF LINDEN

Project:

WEST AREA STRUCTURE PLAN

Title:

HISTORICAL AERIAL PHOTOGRAPH  
JULY 3, 1950

Note: Aerial photographs have been georeferenced and are not 100% spatially accurate

Date:

10-21-2024

Project No.:

CA000928

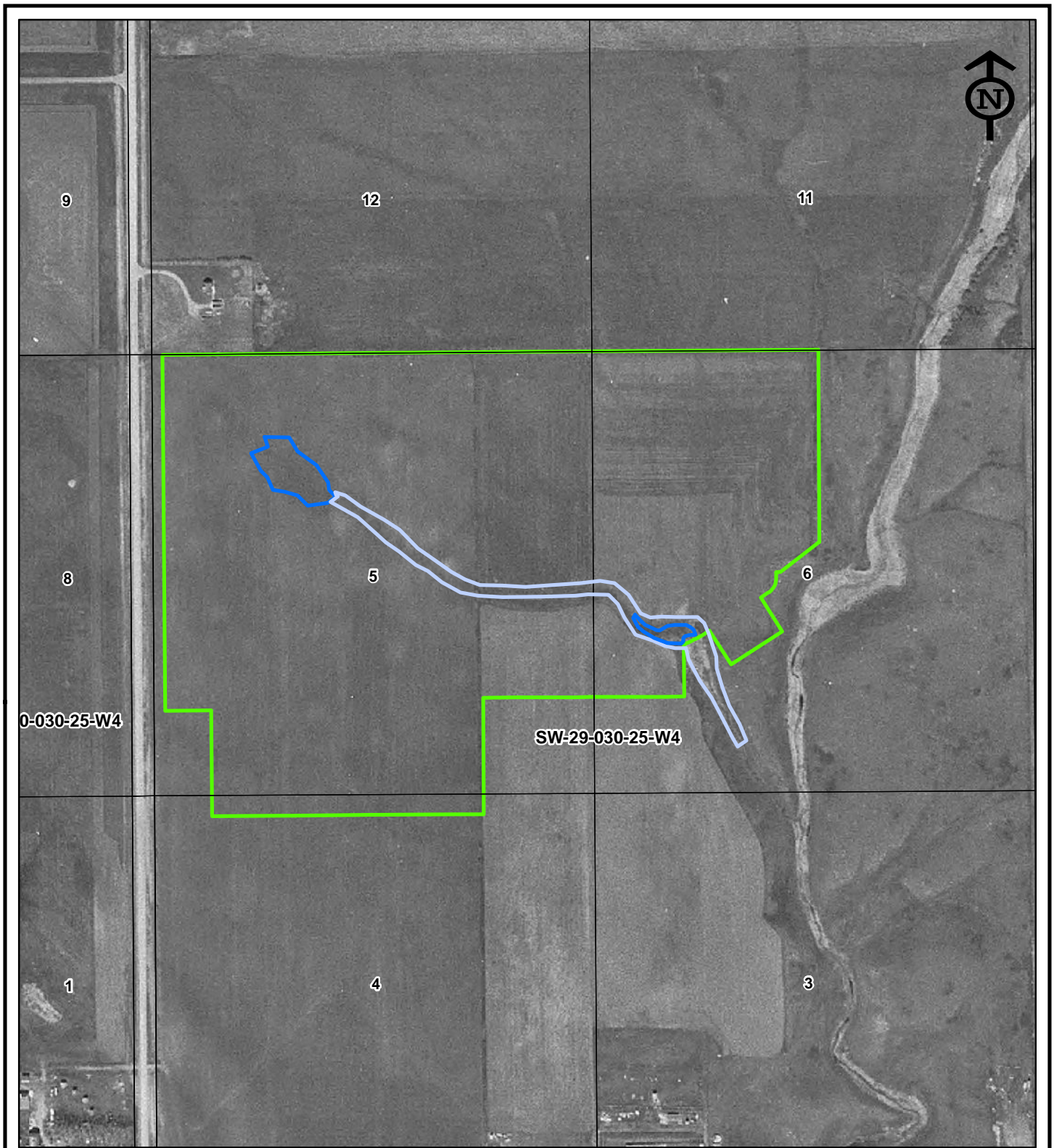
Drawn:

JLP

Scale:

1:5,000

**APPENDIX A**



#### LEGEND

- Project Site
- Ephemeral Drainage
- Temporary Wetland
- LSD

Imagery Source: AEPA

Client:

VILLAGE OF LINDEN

Project:

WEST AREA STRUCTURE PLAN

Title:

HISTORICAL AERIAL PHOTOGRAPH  
MAY 19, 1963

Note: Aerial photographs have been georeferenced and are not 100% spatially accurate

Date:

10-21-2024

Project No.:

CA000928

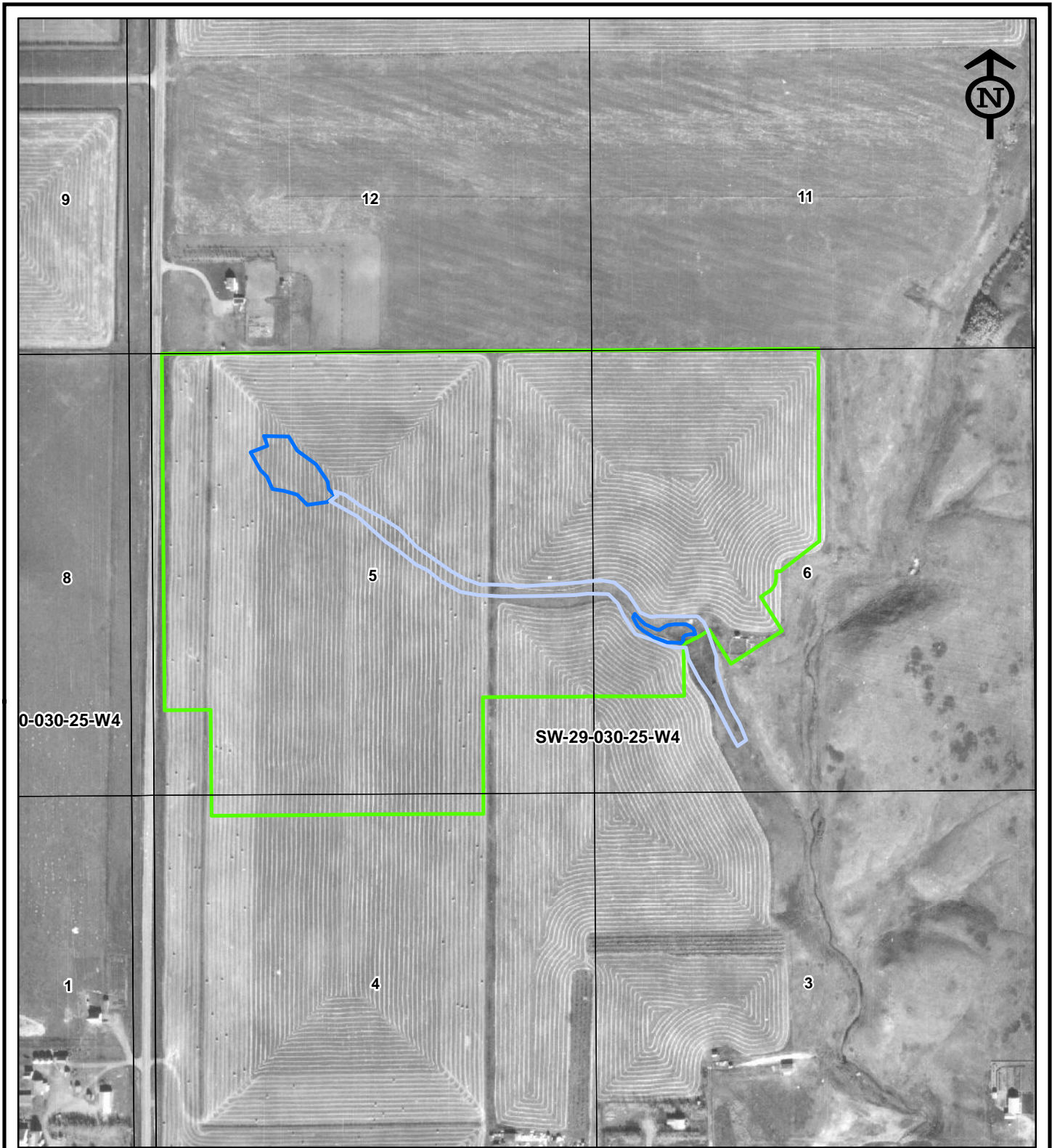
Drawn:

JLP

Scale:

1:5,000

**APPENDIX A**



**LEGEND**

- █ Project Site
- █ Ephemeral Drainage
- █ Temporary Wetland
- LSD

Imagery Source: AEPA

Client:

VILLAGE OF LINDEN

Project:

WEST AREA STRUCTURE PLAN

Title:

HISTORICAL AERIAL PHOTOGRAPH  
OCTOBER 6, 1969

Note: Aerial photographs have been georeferenced and are not 100% spatially accurate

Date:

10-21-2024

Project No.:

CA000928

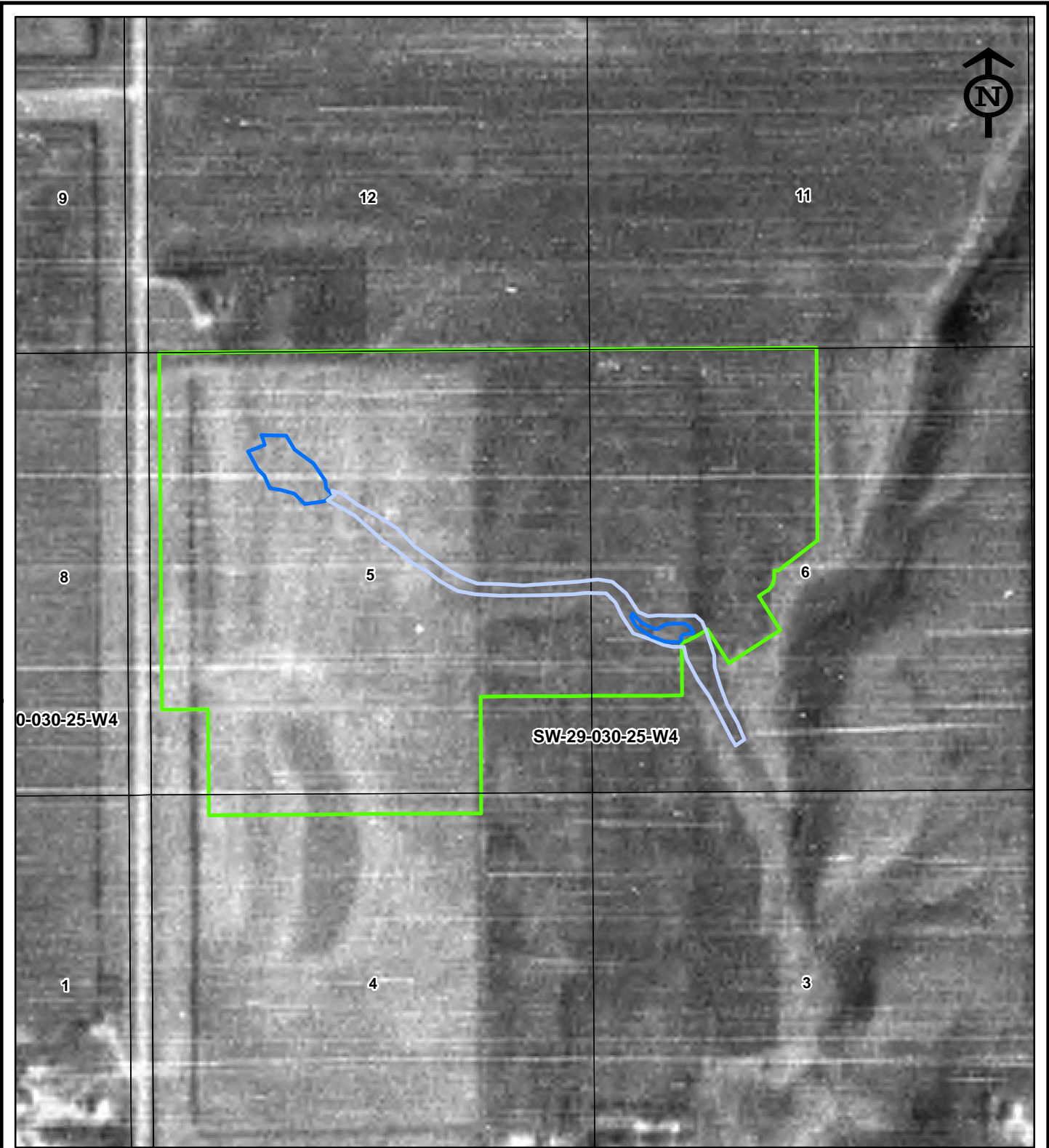
Drawn:

JLP

Scale:

1:5,000

**APPENDIX A**



**LEGEND**

- █ Project Site
- █ Ephemeral Drainage
- █ Temporary Wetland
- █ LSD

Imagery Source: AEPA

Client:

VILLAGE OF LINDEN

Project:

WEST AREA STRUCTURE PLAN

Title:

HISTORICAL AERIAL PHOTOGRAPH  
JULY 23, 1970

Note: Aerial photographs have been georeferenced and are not 100% spatially accurate

Date:

10-21-2024

Project No.:

CA000928

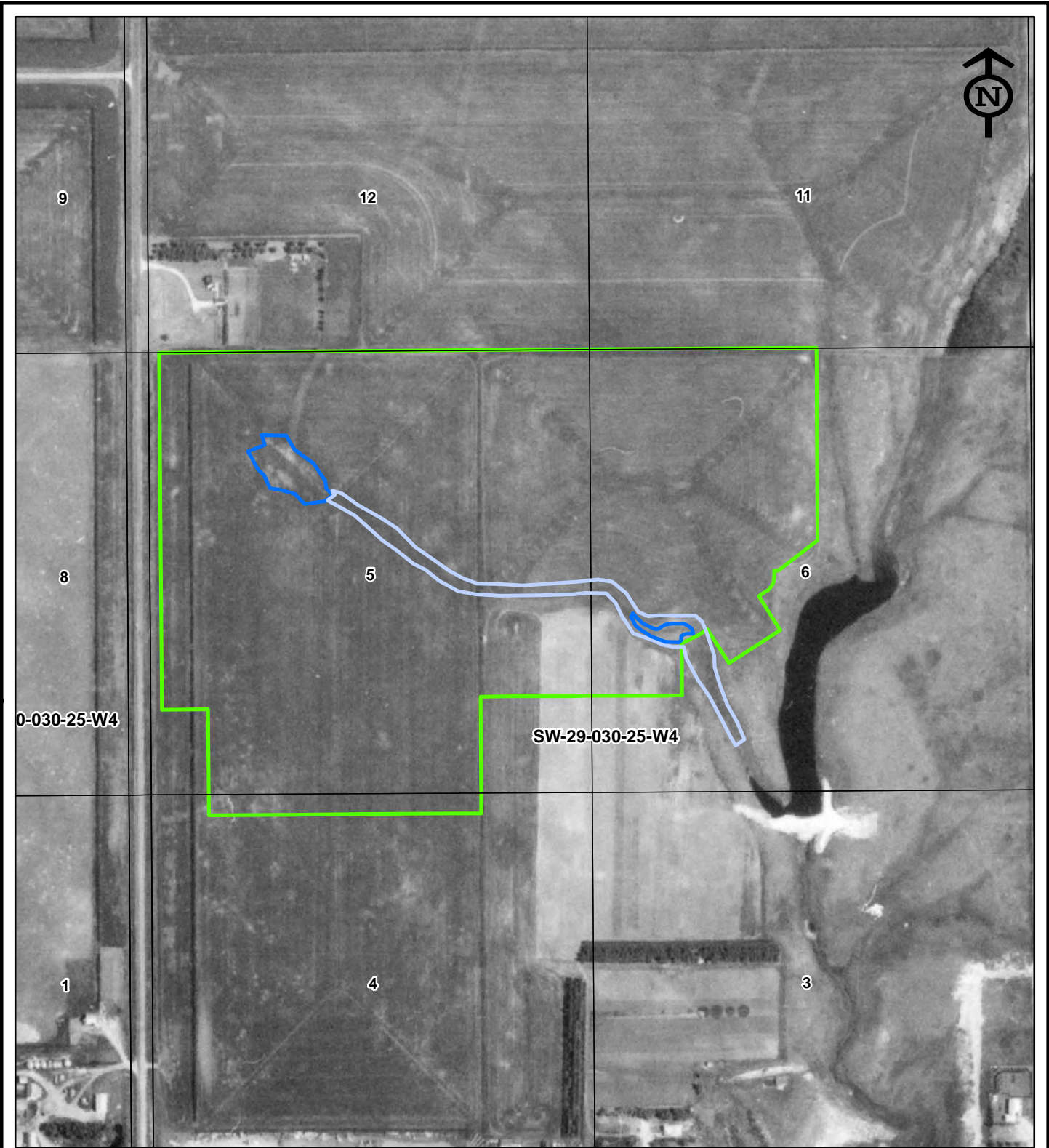
Drawn:

JLP

Scale:

1:5,000

**APPENDIX A**



**LEGEND**

- Project Site
- Ephemeral Drainage
- Temporary Wetland
- LSD

Imagery Source: AEPA

Client:

VILLAGE OF LINDEN

Project:

WEST AREA STRUCTURE PLAN

Title:

HISTORICAL AERIAL PHOTOGRAPH  
JUNE 20, 1976

Note: Aerial photographs have been georeferenced and are not 100% spatially accurate

Date:

10-21-2024

Project No.:

CA000928

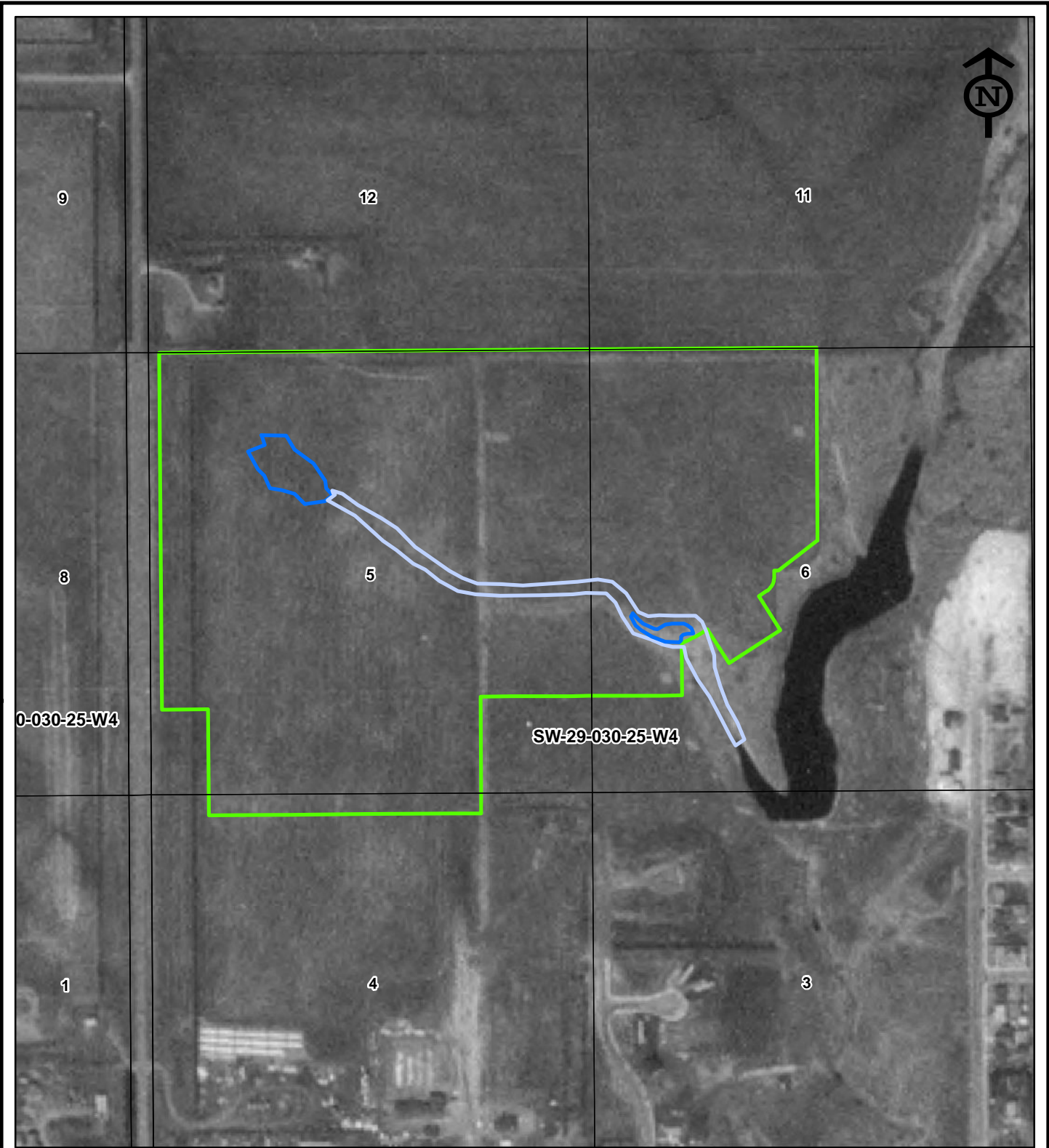
Drawn:


JLP

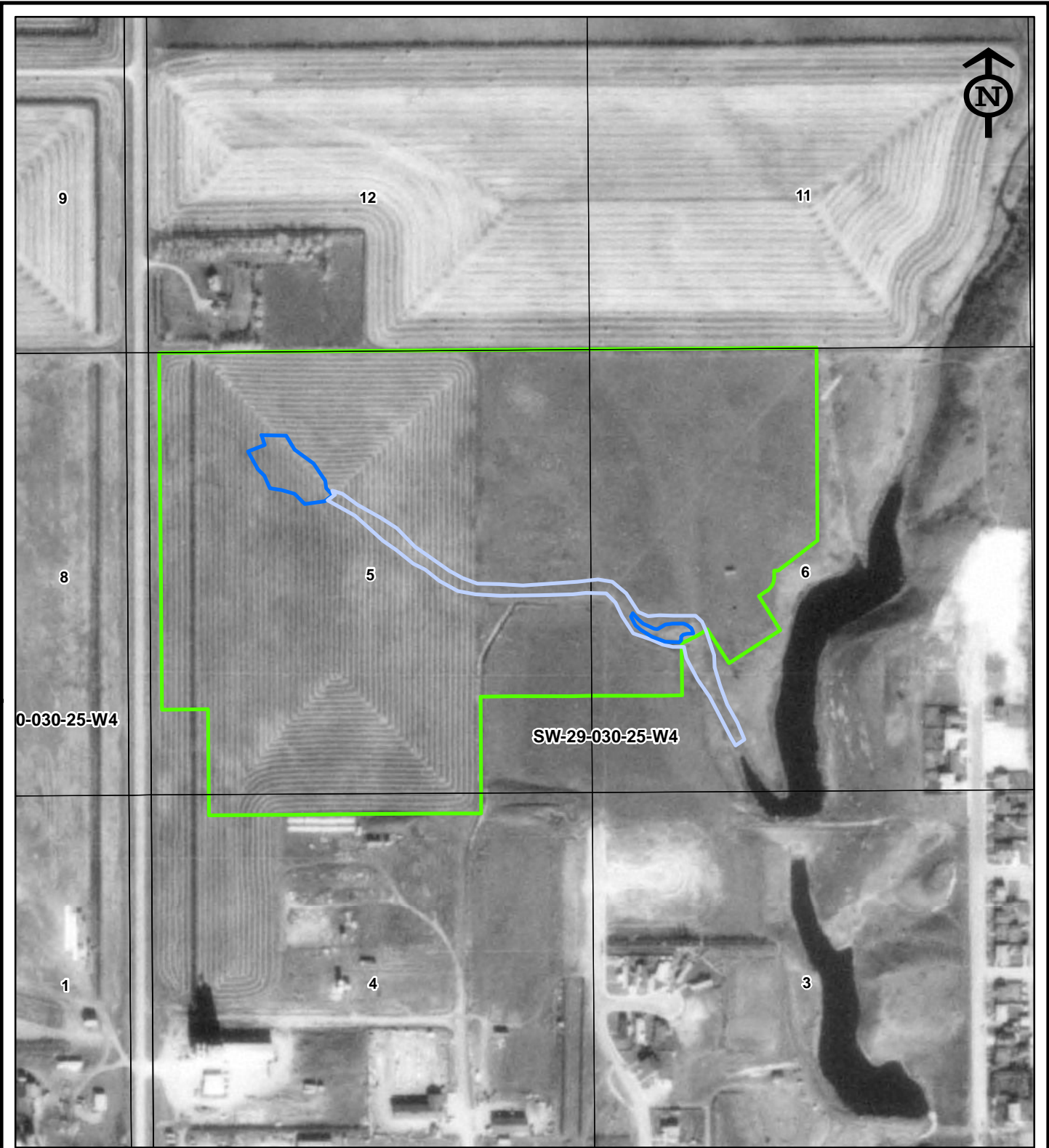
Scale:

1:5,000

**APPENDIX A**



	<b>LEGEND</b> <div><div></div> Project Site</div> <div><div></div> Ephemeral Drainage</div> <div><div></div> Temporary Wetland</div> <div><div></div> LSD</div>	Client:	VILLAGE OF LINDEN	Date:	10-21-2024
		Project:	WEST AREA STRUCTURE PLAN	Project No.:	CA000928
		Title:	HISTORICAL AERIAL PHOTOGRAPH MAY 11, 1982	Drawn:	JLP
				Scale:	1:5,000
				<b>APPENDIX A</b>	
Imagery Source: AEPA		Note: Aerial photographs have been georeferenced and are not 100% spatially accurate			



#### LEGEND

- Project Site
- Ephemeral Drainage
- Temporary Wetland
- LSD

Imagery Source: AEPA

Client:

VILLAGE OF LINDEN

Project:

WEST AREA STRUCTURE PLAN

Title:

HISTORICAL AERIAL PHOTOGRAPH  
OCTOBER 16, 1986

Note: Aerial photographs have been georeferenced and are not 100% spatially accurate

Date:

10-21-2024

Project No.:

CA000928

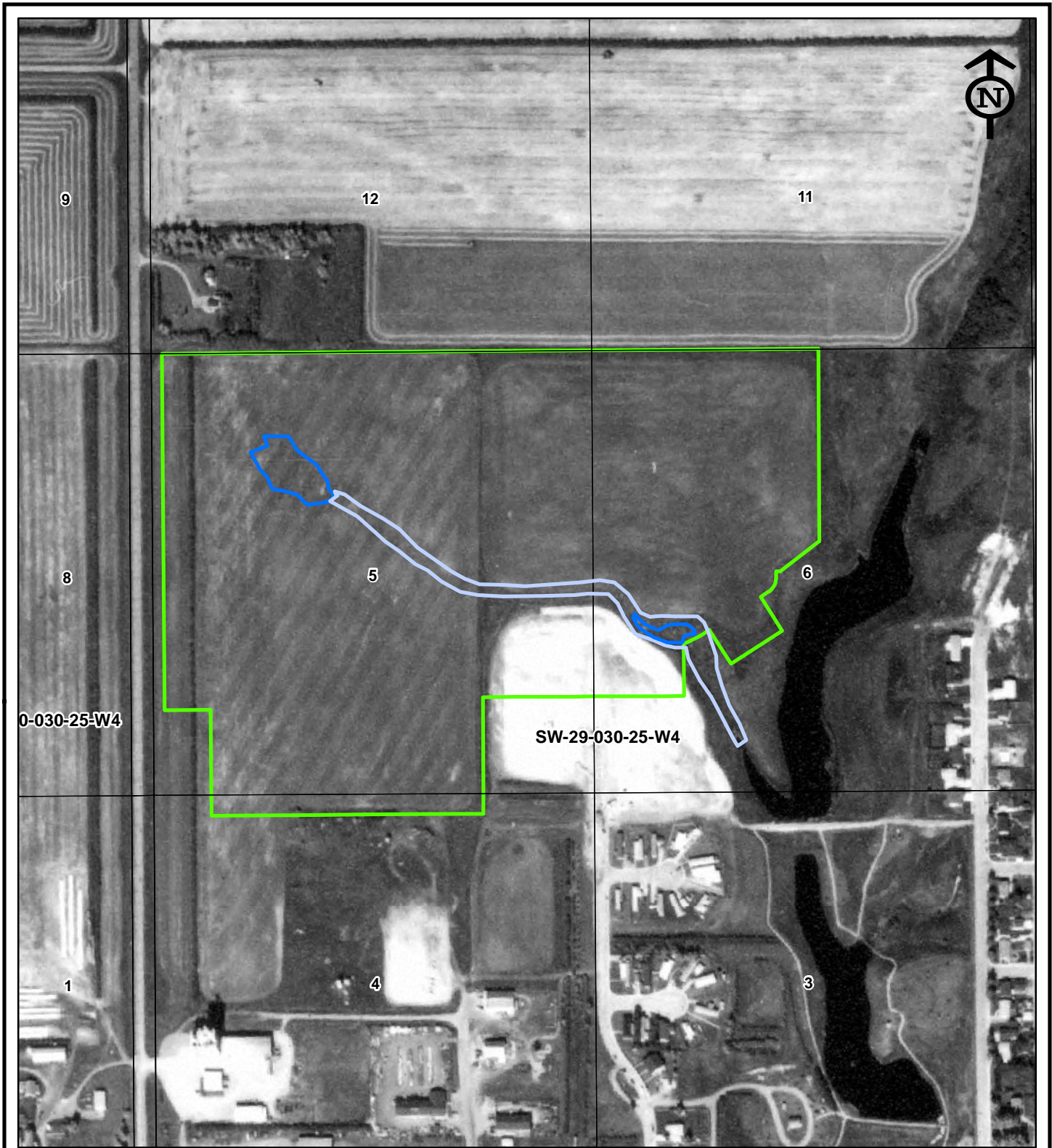
Drawn:

JLP

Scale:

1:5,000

**APPENDIX A**



**CIM+**

**LEGEND**

- █ Project Site
- █ Ephemeral Drainage
- █ Temporary Wetland
- █ LSD

Imagery Source: AEPA

Client:

VILLAGE OF LINDEN

Project:

WEST AREA STRUCTURE PLAN

Title:

HISTORICAL AERIAL PHOTOGRAPH  
SEPTEMBER 17, 1993

Note: Aerial photographs have been georeferenced and are not 100% spatially accurate

Date:

10-21-2024

Project No.:

CA000928

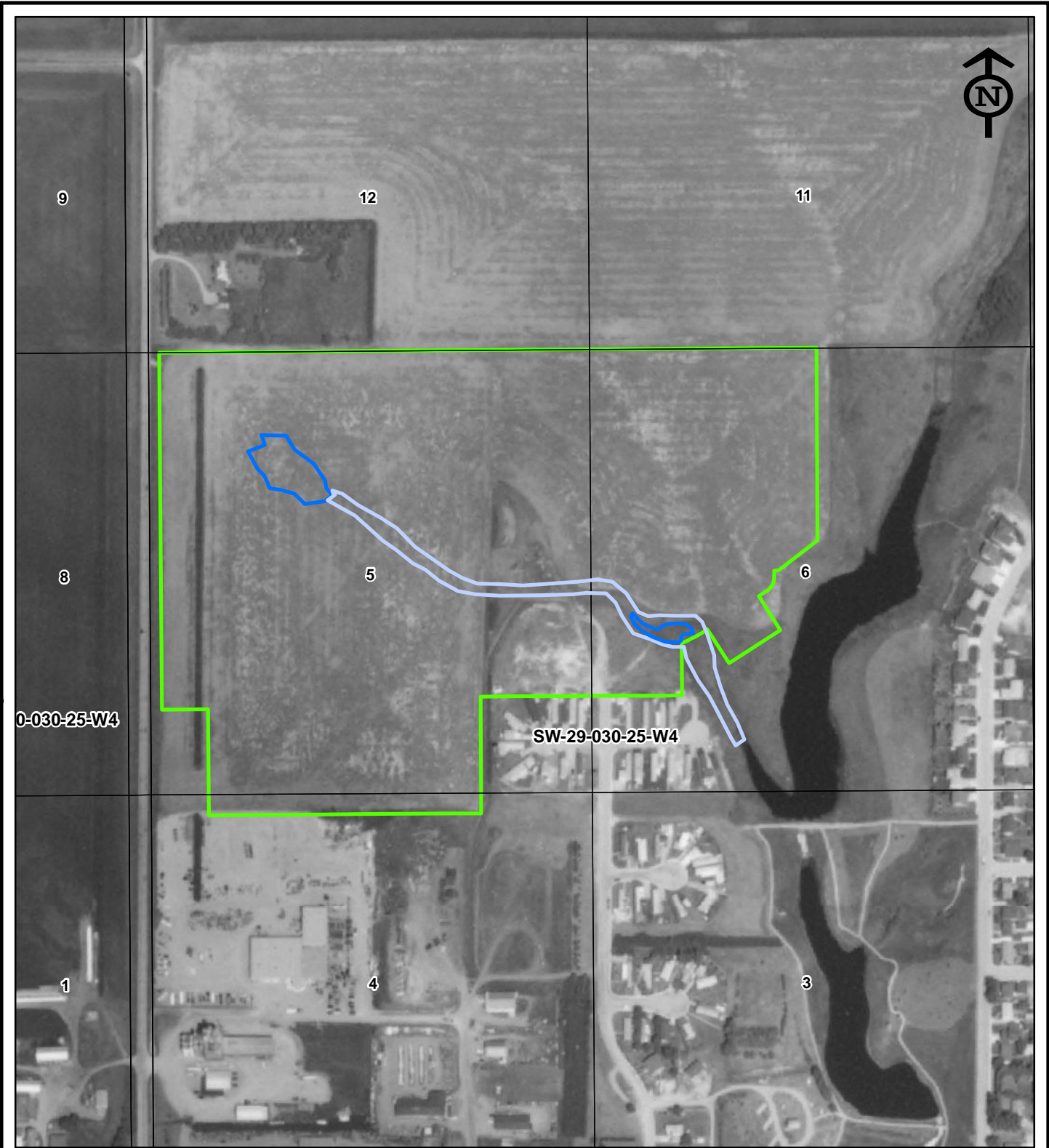
Drawn:

JLP

Scale:

1:5,000

**APPENDIX A**



**LEGEND**

- █ Project Site
- █ Ephemeral Drainage
- █ Temporary Wetland
- █ LSD

Imagery Source: AEPA

Client:

VILLAGE OF LINDEN

Project:

WEST AREA STRUCTURE PLAN

Title:

HISTORICAL AERIAL PHOTOGRAPH  
JULY 13, 2000

Note: Aerial photographs have been georeferenced and are not 100% spatially accurate

Date:

10-21-2024

Project No.:

CA000928

Drawn:

JLP

Scale:

1:5,000

**APPENDIX A**



#### LEGEND

- Project Site
- Ephemeral Drainage
- Temporary Wetland
- LSD

Imagery Source: Google Earth™

Client:

VILLAGE OF LINDEN

Project:

WEST AREA STRUCTURE PLAN

Title:

HISTORICAL AERIAL PHOTOGRAPH  
JULY 3, 2004

Note: Aerial photographs have been georeferenced and are not 100% spatially accurate

Date:

10-21-2024

Project No.:

CA000928

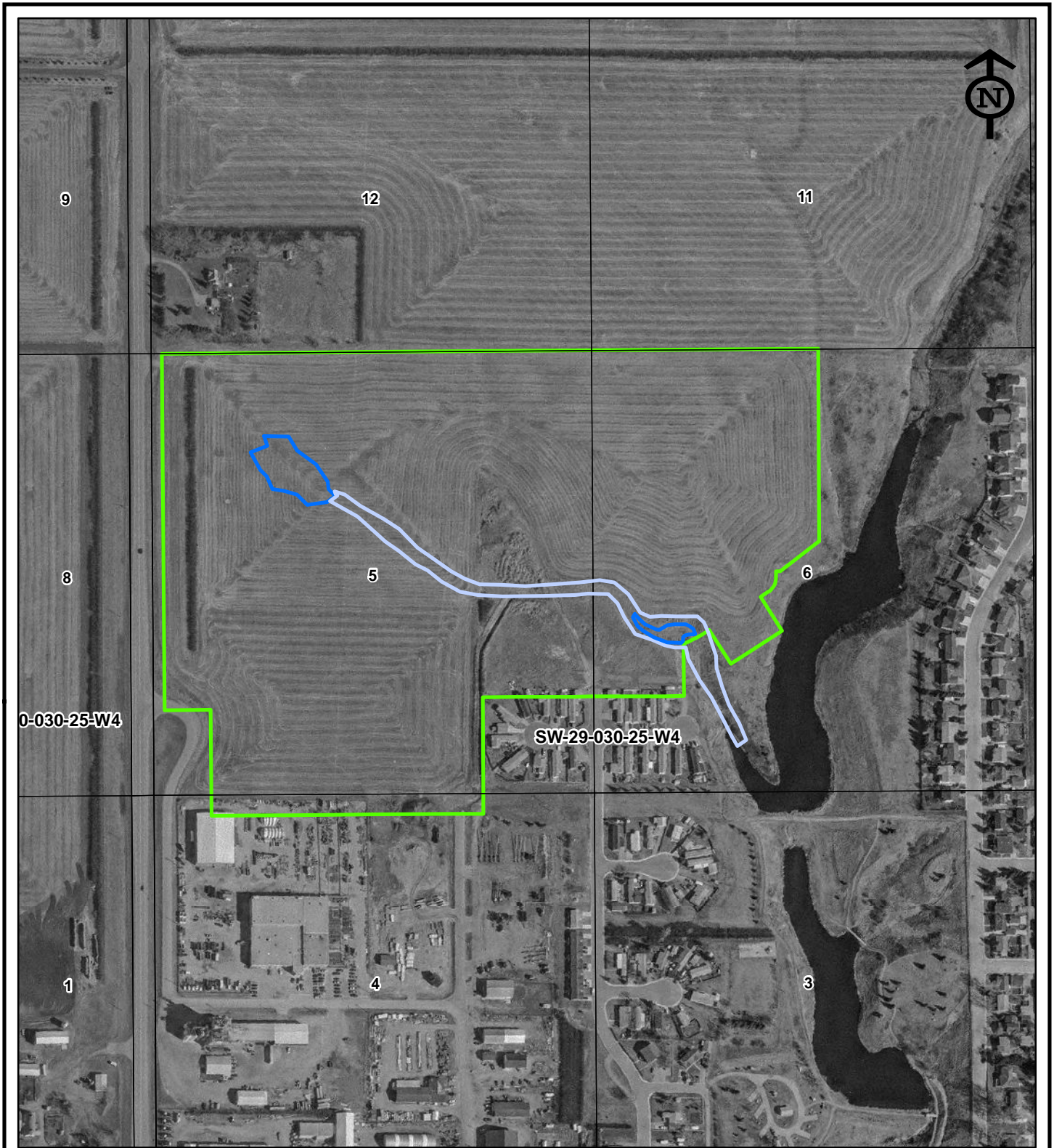
Drawn:

JLP

Scale:

1:5,000

**APPENDIX A**



#### LEGEND

- Project Site
- Ephemeral Drainage
- Temporary Wetland
- LSD

Imagery Source: AEPA

Client:

VILLAGE OF LINDEN

Project:

WEST AREA STRUCTURE PLAN

Title:

HISTORICAL AERIAL PHOTOGRAPH  
APRIL 21, 2010

Note: Aerial photographs have been georeferenced and are not 100% spatially accurate

Date:

10-21-2024

Project No.:

CA000928

Drawn:

JLP

Scale:

1:5,000

**APPENDIX A**



#### LEGEND

- Project Site
- Ephemeral Drainage
- Temporary Wetland
- LSD

Imagery Source: Google Earth™

Client:

VILLAGE OF LINDEN

Project:

WEST AREA STRUCTURE PLAN

Title:

HISTORICAL AERIAL PHOTOGRAPH  
SEPTEMBER 15, 2014

Note: Aerial photographs have been georeferenced and are not 100% spatially accurate

Date:

10-21-2024

Project No.:

CA000928

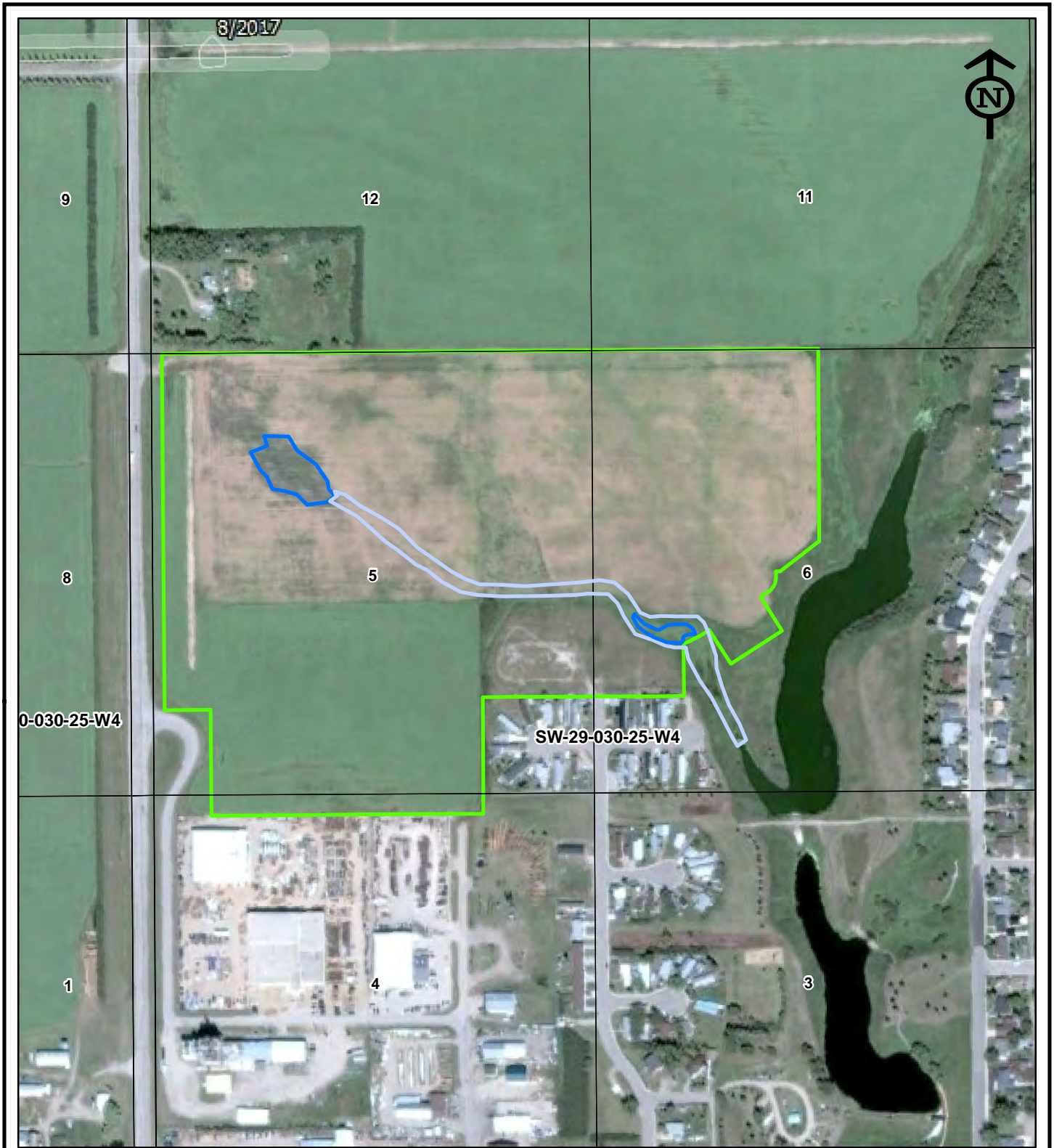
Drawn:

JLP

Scale:

1:5,000

**APPENDIX A**



#### LEGEND

- Project Site
- Ephemeral Drainage
- Temporary Wetland
- LSD

Imagery Source: Google Earth™

Client:

VILLAGE OF LINDEN

Project:

WEST AREA STRUCTURE PLAN

Title:

HISTORICAL AERIAL PHOTOGRAPH  
AUGUST 2, 2017

Note: Aerial photographs have been georeferenced and are not 100% spatially accurate

Date:

10-21-2024

Project No.:

CA000928

Drawn:

JLP

Scale:

1:5,000

**APPENDIX A**



#### LEGEND

- Project Site
- Ephemeral Drainage
- Temporary Wetland
- LSD

Imagery Source: Google Earth™

Client:

VILLAGE OF LINDEN

Project:

WEST AREA STRUCTURE PLAN

Title:

HISTORICAL AERIAL PHOTOGRAPH  
AUGUST 26, 2017

Note: Aerial photographs have been georeferenced and are not 100% spatially accurate

Date:

10-21-2024

Project No.:

CA000928

Drawn:

JLP

Scale:

1:5,000

**APPENDIX A**



#### LEGEND

- Project Site
- Ephemeral Drainage
- Temporary Wetland
- LSD

Imagery Source: Google Earth™

Client:

VILLAGE OF LINDEN

Project:

WEST AREA STRUCTURE PLAN

Title:

HISTORICAL AERIAL PHOTOGRAPH  
JUNE 12, 2019

Note: Aerial photographs have been georeferenced and are not 100% spatially accurate

Date:

10-21-2024

Project No.:

CA000928

Drawn:

JLP

Scale:

1:5,000

**APPENDIX A**



#### LEGEND

- Project Site
- Ephemeral Drainage
- Temporary Wetland
- LSD

Imagery Source: Google Earth™

Client:

VILLAGE OF LINDEN

Project:

WEST AREA STRUCTURE PLAN

Title:

HISTORICAL AERIAL PHOTOGRAPH  
AUGUST 18, 2020

Note: Aerial photographs have been georeferenced and are not 100% spatially accurate

Date:

10-21-2024

Project No.:

CA000928

Drawn:

JLP

Scale:

1:5,000

**APPENDIX A**



#### LEGEND

- Project Site
- Ephemeral Drainage
- Temporary Wetland
- LSD

Imagery Source: Google Earth™

Client:

VILLAGE OF LINDEN

Project:

WEST AREA STRUCTURE PLAN

Title:

HISTORICAL AERIAL PHOTOGRAPH  
AUGUST 13, 2022

Note: Aerial photographs have been georeferenced and are not 100% spatially accurate

Date:

10-21-2024

Project No.:

CA000928

Drawn:

JLP

Scale:

1:5,000

**APPENDIX A**



#### LEGEND

- █ Project Site
- █ Ephemeral Drainage
- █ Temporary Wetland
- LSD

Imagery Source: Google Earth™

Client:

VILLAGE OF LINDEN

Project:

WEST AREA STRUCTURE PLAN

Title:

HISTORICAL AERIAL PHOTOGRAPH  
OCTOBER 7, 2023

Note: Aerial photographs have been georeferenced and are not 100% spatially accurate

Date:

10-21-2024

Project No.:

CA000928

Drawn:

JLP

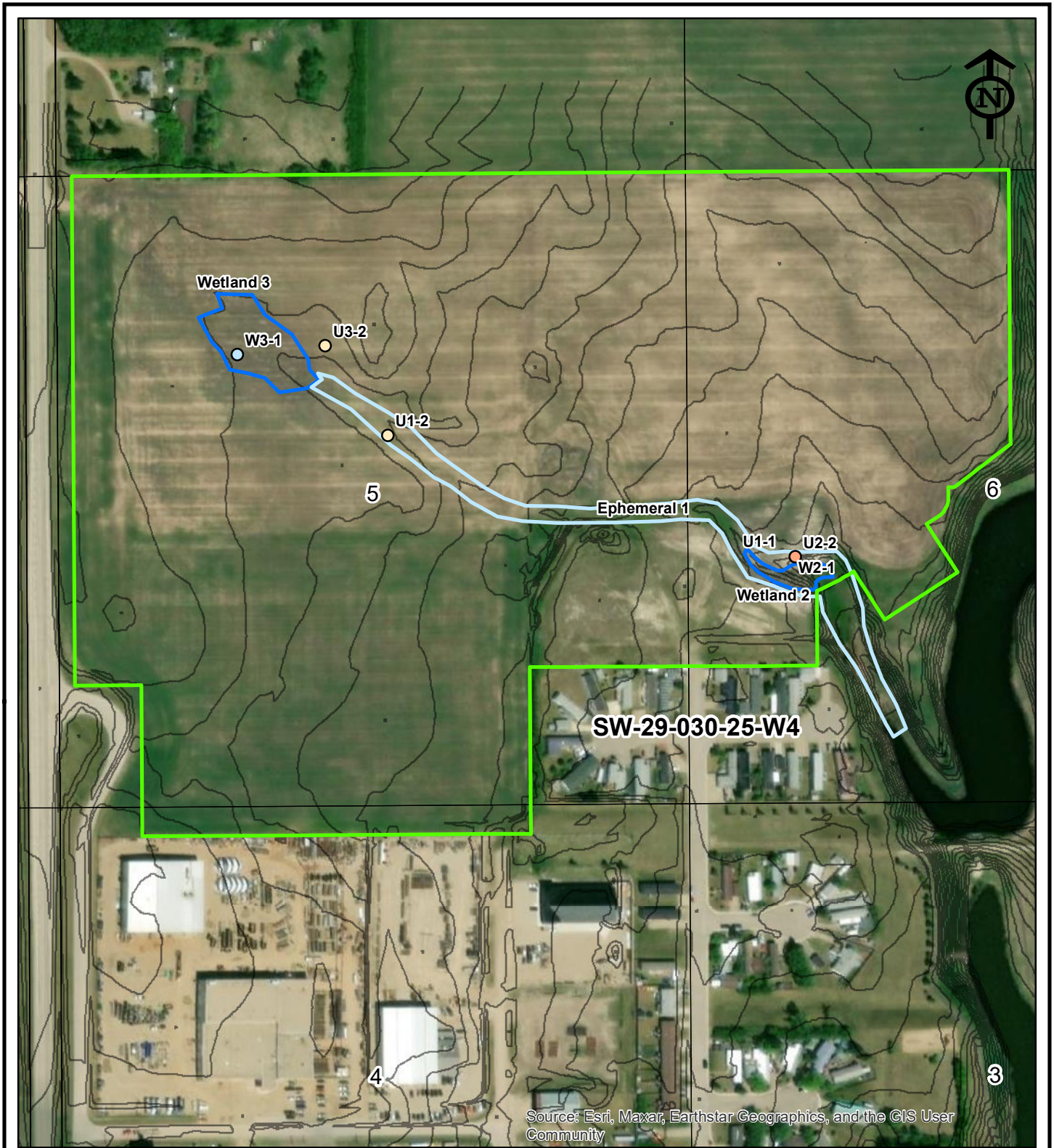
Scale:

1:5,000

**APPENDIX A**

# B

## Appendix B: Wetland Data



#### LEGEND

- Project Site
- Ephemeral Drainage
- Temporary Wetland
- Upland Plot
- Wetland Plot
- Ephemeral Plot
- 0.5 m Contours
- LSD

Imagery Source: ESRI Basemap

Client: VILLAGE OF LINDEN

Project: WEST AREA STRUCTURE PLAN

Title: FIELD SAMPLE PLOTS

Date: 10-18-2024

Project No.: CA000928

Drawn: JLP

Scale: 1:3,500

**APPENDIX B**

## Appendix 7

SP U1-1 - drainage

**Instructions: Complete this form for the plant community at the boundary between wetland and non-wetland.**

QWSP Investigator	Company Name	Date	Project Name	Wetland #
K. Oldershaw & M. Mann	CIMA+	August 30, 2024	CA000928	1

Plot #	Stratum	Plot technique	Plot location (Lat)	Plot location (Long)
1	Ground	1 x 1	51.59582127714426	-113.49114309122038

**Primary Indicator Observed (Circle and describe below)**

V1. Hydrophytic species cover more than 50 percent of the abundant plant species in the community or plot (An abundant species is a plant species with 20 percent or more areal cover in the community or plot). List all abundant species in the plots	<u>no</u>
V2. Surface encrustations of algae are present?	<u>no</u>
V3. The presence of a dominant groundcover of peat mosses ( <i>Sphagnum</i> spp.)	<u>no</u>
V4. Diminished vigor and productivity of upland species in disturbed areas	<u>no</u>
V5. Evidence of morphological adaptations of plants to saturated conditions (e.g. floating leaves, inflated stems, adventitious roots)	<u>no</u>
Other Comments –	

Wetland Species			
Common name of species	Scientific name of species	Facultative Wetland or Obligate Wetland spp	% Relative cover of abundant species

Upland Species			
Common name of species	Scientific name of species	Facultative Wetland or Obligate Wetland spp	% Relative cover of abundant species
quackgrass	<i>Elymus repens</i>		49
smooth brome	<i>Bromus inermis</i>		50
silverweed	<i>Potentilla anserina</i>		1

## Appendix 7

SP U1-1 - drainage

<b>Soils</b>	
<b>Soil Pit Depth (cm)</b>	30
<b>Aspect</b>	E
<b>Slope Position</b>	upper slope
<b>S1. Organic soils (except Folists)</b>	<u>no</u>
<b>S2. Presence of peat accumulation determined by Von Post test</b>	<u>no</u>
<b>S3. Of, Om or Oh horizons (organic surface layer 20-40 cm thick) present</b>	<u>no</u>
<b>S4. Sulfidic material (odor of "rotten eggs") present</b>	<u>no</u>
<b>S5. Gleying (chroma of 2 or less formed by excessive soil wetness) or mottling (blotches or spots of different colour) present immediately below the surface layer (A- or Ae- horizon) and within 30 cm</b>	<u>no</u>
<b>S6. Native prairie soils with a low chroma matrix (chroma of 2 or less) within 30 cm of the soil surface and one of the following present:</b>	<u>no</u>
<i>a. Thin surface layer (at least 0.5 cm) of peat or muck; or</i>	<u>no</u>
<i>b. Presence of iron (high chroma mottles, oxidized rhizospheres) within 30 cm of surface; or</i>	<u>no</u>
<i>c. Iron and manganese concretions within the surface layer (A-horizon); or</i>	<u>no</u>
<i>d. Low chroma (gray-coloured) matrix or mottles present immediately below the surface layer (A-horizon) and the crushed color is chroma 2 or less</i>	<u>no</u>
<b>S7. Nonsandy soils (e.g. clay, loam, silt) with a low chroma matrix (chroma of 2 or less) within 40 cm of the soil surface and one of the following present within 30 cm of the surface:</b>	<u>no</u>
<i>a. Iron and manganese concretions or nodules; or</i>	<u>no</u>
<i>b. Distinct or prominent oxidized rhizospheres along several living roots; or</i>	<u>no</u>
<i>c. Low chroma mottles</i>	<u>no</u>
<b>S8. Sandy soils with one of the following present</b>	
<i>a. Thin surface layer (at least 2.5 cm) of peat or muck where leaf litter is present; or</i>	<u>no</u>
<i>b. Surface layer of peat or muck of any thickness where a leaf litter is absent; or</i>	<u>no</u>
<i>c. A surface layer (A-horizon) having a low chroma matrix (chroma 1 or less and value of 3 or less) greater than 10 cm thick; or</i>	<u>no</u>
<i>d. Vertical organic streaking or blotchiness with 30 cm of the surface; or</i>	<u>no</u>
<i>e. Easily recognized high chroma mottles occupy at least 2 percent of the low chroma subsoil matrix within 30 cm of the surface; or</i>	<u>no</u>
<i>f. Organic concretions with 30 cm of the surface; or</i>	<u>no</u>
<i>g. Oxidized rhizospheres along living roots within 30 cm of the surface; or h. A cemented layer (ortstein) within 30 cm of the soil surface</i>	<u>yes</u>
<b>S9. Remains of aquatic invertebrates are present within 30 cm of the soil surface in pothole-like depressions</b>	<u>no</u>
<b>S10. Other regionally applicable, field-verifiable soil properties associated with prolonged seasonal high water tables</b>	
<i>Surface water present</i>	<u>no</u>
<i>Free water in soil pit</i>	<u>no</u>
<i>Saturated soil</i>	<u>no</u>
<i>Oxidized rhizospheres</i>	<u>yes</u>
<i>Water-stained leaves</i>	<u>no</u>
<i>Sediment deposits</i>	<u>no</u>
<i>Water marks</i>	<u>no</u>
<i>Drift lines</i>	<u>no</u>
<i>Scoured/bare areas</i>	<u>no</u>
<i>Drained patterns</i>	<u>no</u>
<i>Beaver lodges or muskrat mounds</i>	<u>no</u>

Horizon A	Depth (cm)	Munsell Soil Color	Soil Value	Soil Chroma
A	0-30	10YR 2/1	2	1
Comments				
Sandy loam. No mottles.				
Horizon B	Depth (cm)	Munsell Soil Color	Soil Value	Soil Chroma
Comments				



View of soil pit U1-1



View looking south at upland conditions from U1-1

## Appendix 7

SP U1-2 - drainage

**Instructions: Complete this form for the plant community at the boundary between wetland and non-wetland.**

QWSP Investigator	Company Name	Date	Project Name	Wetland #
K. Oldershaw & M. Mann	CIMA+	August 30, 2024	CA000928	1

**Plots**

Plot #	Stratum	Plot technique	Plot location (Lat)	Plot location (Long)
2	Ground	1 x 1	51.59651856318342	-113.4943795999999

**Primary Indicator Observed (Circle and describe below)**

V1. Hydrophytic species cover more than 50 percent of the abundant plant species in the community or plot (An abundant species is a plant species with 20 percent or more areal cover in the community or plot). List all abundant species in the plots	<u>no</u>
V2. Surface encrustations of algae are present?	<u>no</u>
V3. The presence of a dominant groundcover of peat mosses ( <i>Sphagnum</i> spp.)	<u>no</u>
V4. Diminished vigor and productivity of upland species in disturbed areas	<u>no</u>
V5. Evidence of morphological adaptations of plants to saturated conditions (e.g. floating leaves, inflated stems, adventitious roots)	<u>no</u>
Other Comments –	

**Wetland Species**

Common name of species	Scientific name of species	Facultative Wetland or Obligate Wetland spp	% Relative cover of abundant species

**Upland Species**

Common name of species	Scientific name of species	Facultative Wetland or Obligate Wetland spp	% Relative cover of abundant species
cultivated wheat	<i>Triticum aestivum</i>		100

## Appendix 7

SP U1-2 - drainage

<b>Soils</b>	
<b>Soil Pit Depth (cm)</b>	30
<b>Aspect</b>	N
<b>Slope Position</b>	depression
<b>S1. Organic soils (except Folists)</b>	<u>no</u>
<b>S2. Presence of peat accumulation determined by Von Post test</b>	<u>no</u>
<b>S3. Of, Om or Oh horizons (organic surface layer 20-40 cm thick) present</b>	<u>no</u>
<b>S4. Sulfidic material (odor of "rotten eggs") present</b>	<u>no</u>
<b>S5. Gleying (chroma of 2 or less formed by excessive soil wetness) or mottling (blotches or spots of different colour) present immediately below the surface layer (A- or Ae- horizon) and within 30 cm</b>	<u>no</u>
<b>S6. Native prairie soils with a low chroma matrix (chroma of 2 or less) within 30 cm of the soil surface and one of the following present:</b>	<u>no</u>
<i>a. Thin surface layer (at least 0.5 cm) of peat or muck; or</i>	<u>no</u>
<i>b. Presence of iron (high chroma mottles, oxidized rhizospheres) within 30 cm of surface; or</i>	<u>no</u>
<i>c. Iron and manganese concretions within the surface layer (A-horizon); or</i>	<u>no</u>
<i>d. Low chroma (gray-coloured) matrix or mottles present immediately below the surface layer (A-horizon) and the crushed color is chroma 2 or less</i>	<u>no</u>
<b>S7. Nonsandy soils (e.g. clay, loam, silt) with a low chroma matrix (chroma of 2 or less) within 40 cm of the soil surface and one of the following present within 30 cm of the surface:</b>	<u>no</u>
<i>a. Iron and manganese concretions or nodules; or</i>	<u>no</u>
<i>b. Distinct or prominent oxidized rhizospheres along several living roots; or</i>	<u>no</u>
<i>c. Low chroma mottles</i>	<u>no</u>
<b>S8. Sandy soils with one of the following present</b>	
<i>a. Thin surface layer (at least 2.5 cm) of peat or muck where leaf litter is present; or</i>	<u>no</u>
<i>b. Surface layer of peat or muck of any thickness where a leaf litter is absent; or</i>	<u>no</u>
<i>c. A surface layer (A-horizon) having a low chroma matrix (chroma 1 or less and value of 3 or less) greater than 10 cm thick; or</i>	<u>no</u>
<i>d. Vertical organic streaking or blotchiness with 30 cm of the surface; or</i>	<u>no</u>
<i>e. Easily recognized high chroma mottles occupy at least 2 percent of the low chroma subsoil matrix within 30 cm of the surface; or</i>	<u>no</u>
<i>f. Organic concretions with 30 cm of the surface; or</i>	<u>no</u>
<i>g. Oxidized rhizospheres along living roots within 30 cm of the surface; or h. A cemented layer (ortstein) within 30 cm of the soil surface</i>	<u>no</u>
<b>S9. Remains of aquatic invertebrates are present within 30 cm of the soil surface in pothole-like depressions</b>	<u>no</u>
<b>S10. Other regionally applicable, field-verifiable soil properties associated with prolonged seasonal high water tables</b>	
<i>Surface water present</i>	<u>no</u>
<i>Free water in soil pit</i>	<u>no</u>
<i>Saturated soil</i>	<u>no</u>
<i>Oxidized rhizospheres</i>	<u>no</u>
<i>Water-stained leaves</i>	<u>no</u>
<i>Sediment deposits</i>	<u>no</u>
<i>Water marks</i>	<u>no</u>
<i>Drift lines</i>	<u>no</u>
<i>Scoured/bare areas</i>	<u>no</u>
<i>Drained patterns</i>	<u>no</u>
<i>Beaver lodges or muskrat mounds</i>	<u>no</u>

Horizon A	Depth (cm)	Munsell Soil Color	Soil Value	Soil Chroma
A	0-30	10YR 2/1	2	1
Comments				
Sandy Silty				
Horizon B	Depth (cm)	Munsell Soil Color	Soil Value	Soil Chroma
Comments				



View of soil pit U1-2



View north from soil pit U1-2 showing upland conditions

## Appendix 7

SP W2-1 wetland

**Instructions: Complete this form for the plant community at the boundary between wetland and non-wetland.**

QWSP Investigator	Company Name	Date	Project Name	Wetland #
K. Oldershaw & M. Mann	CIMA+	August 30, 2024	CA000928	2

**Plots**

Plot #	Stratum	Plot technique	Plot location (Lat)	Plot location (Long)
1	Ground	1 x 1	51.59569807290315	-113.49064071826562

**Primary Indicator Observed (Circle and describe below)**

V1. Hydrophytic species cover more than 50 percent of the abundant plant species in the community or plot (An abundant species is a plant species with 20 percent or more areal cover in the community or plot). List all abundant species in the plots	<u>yes</u>
V2. Surface encrustations of algae are present?	<u>no</u>
V3. The presence of a dominant groundcover of peat mosses ( <i>Sphagnum</i> spp.)	<u>no</u>
V4. Diminished vigor and productivity of upland species in disturbed areas	<u>no</u>
V5. Evidence of morphological adaptations of plants to saturated conditions (e.g. floating leaves, inflated stems, adventitious roots)	<u>no</u>
Other Comments –	

**Wetland Species**

Common name of species	Scientific name of species	Facultative Wetland or Obligate Wetland spp	% Relative cover of abundant species
wire rush	<i>Juncus balticus</i>		40
common cattail	<i>Typha latifolia</i>		20

**Upland Species**

Common name of species	Scientific name of species	Facultative Wetland or Obligate Wetland spp	% Relative cover of abundant species
creeping thistle	<i>Cirsium arvense</i>		5
perennial sow-thistle	<i>Sonchus arvensis</i>		10
yellow sweet-clover	<i>Melilotus officinalis</i>		20

## Appendix 7

SP W2-1

<b>Soils</b>	
<b>Soil Pit Depth (cm)</b>	30
<b>Aspect</b>	N
<b>Slope Position</b>	depression
<b>S1. Organic soils (except Folists)</b>	<u>no</u>
<b>S2. Presence of peat accumulation determined by Von Post test</b>	<u>no</u>
<b>S3. Of, Om or Oh horizons (organic surface layer 20-40 cm thick) present</b>	<u>no</u>
<b>S4. Sulfidic material (odor of "rotten eggs") present</b>	<u>no</u>
<b>S5. Gleying (chroma of 2 or less formed by excessive soil wetness) or mottling (blotches or spots of different colour) present immediately below the surface layer (A- or Ae- horizon) and within 30 cm</b>	<u>no</u>
<b>S6. Native prairie soils with a low chroma matrix (chroma of 2 or less) within 30 cm of the soil surface and one of the following present:</b>	<u>no</u>
<i>a. Thin surface layer (at least 0.5 cm) of peat or muck; or</i>	<u>no</u>
<i>b. Presence of iron (high chroma mottles, oxidized rhizospheres) within 30 cm of surface; or</i>	<u>no</u>
<i>c. Iron and manganese concretions within the surface layer (A-horizon); or</i>	<u>no</u>
<i>d. Low chroma (gray-coloured) matrix or mottles present immediately below the surface layer (A-horizon) and the crushed color is chroma 2 or less</i>	<u>no</u>
<b>S7. Nonsandy soils (e.g. clay, loam, silt) with a low chroma matrix (chroma of 2 or less) within 40 cm of the soil surface and one of the following present within 30 cm of the surface:</b>	<u>no</u>
<i>a. Iron and manganese concretions or nodules; or</i>	<u>no</u>
<i>b. Distinct or prominent oxidized rhizospheres along several living roots; or</i>	<u>no</u>
<i>c. Low chroma mottles</i>	<u>no</u>
<b>S8. Sandy soils with one of the following present</b>	<u>no</u>
<i>a. Thin surface layer (at least 2.5 cm) of peat or muck where leaf litter is present; or</i>	<u>no</u>
<i>b. Surface layer of peat or muck of any thickness where a leaf litter is absent; or</i>	<u>no</u>
<i>c. A surface layer (A-horizon) having a low chroma matrix (chroma 1 or less and value of 3 or less) greater than 10 cm thick; or</i>	<u>no</u>
<i>d. Vertical organic streaking or blotchiness with 30 cm of the surface; or</i>	<u>no</u>
<i>e. Easily recognized high chroma mottles occupy at least 2 percent of the low chroma subsoil matrix within 30 cm of the surface; or</i>	<u>no</u>
<i>f. Organic concretions with 30 cm of the surface; or</i>	<u>no</u>
<i>g. Oxidized rhizospheres along living roots within 30 cm of the surface; or h. A cemented layer (ortstein) within 30 cm of the soil surface</i>	<u>yes</u>
<b>S9. Remains of aquatic invertebrates are present within 30 cm of the soil surface in pothole-like depressions</b>	<u>no</u>
<b>S10. Other regionally applicable, field-verifiable soil properties associated with prolonged seasonal high water tables</b>	
<i>Surface water present</i>	<u>no</u>
<i>Free water in soil pit</i>	<u>no</u>
<i>Saturated soil</i>	<u>no</u>
<i>Oxidized rhizospheres</i>	<u>yes</u>
<i>Water-stained leaves</i>	<u>no</u>
<i>Sediment deposits</i>	<u>no</u>
<i>Water marks</i>	<u>no</u>
<i>Drift lines</i>	<u>no</u>
<i>Scoured/bare areas</i>	<u>no</u>
<i>Drained patterns</i>	<u>no</u>
<i>Beaver lodges or muskrat mounds</i>	<u>no</u>

Horizon A	Depth (cm)	Munsell Soil Color	Soil Value	Soil Chroma
A	0-30	10YR 2/1	2	1
Comments				
Sandy loam				
Horizon B	Depth (cm)	Munsell Soil Color	Soil Value	Soil Chroma
Comments				



View of soil pit W2-1



View looking east up the drainage from soil pit W2-1

## Appendix 7

SP U2-2 -

**Instructions: Complete this form for the plant community at the boundary between wetland and non-wetland.**

QWSP Investigator	Company Name	Date	Project Name	Wetland #
K. Oldershaw & M. Mann	CIMA+	August 30, 2024	CA000928	2

Plot #	Stratum	Plot technique	Plot location (Lat)	Plot location (Long)
2	Ground	1 x 1	51.59580501409673	-113.49062714719999

**Primary Indicator Observed (Circle and describe below)**

V1. Hydrophytic species cover more than 50 percent of the abundant plant species in the community or plot (An abundant species is a plant species with 20 percent or more areal cover in the community or plot). List all abundant species in the plots	<u>no</u>
V2. Surface encrustations of algae are present?	<u>no</u>
V3. The presence of a dominant groundcover of peat mosses ( <i>Sphagnum</i> spp.)	<u>no</u>
V4. Diminished vigor and productivity of upland species in disturbed areas	<u>no</u>
V5. Evidence of morphological adaptations of plants to saturated conditions (e.g. floating leaves, inflated stems, adventitious roots)	<u>no</u>
Other Comments – Bare ground present	

Common name of species	Scientific name of species	Facultative Wetland or Obligate Wetland spp	% Relative cover of abundant species

Common name of species	Scientific name of species	Facultative Wetland or Obligate Wetland spp	% Relative cover of abundant species
creeping thistle	<i>Cirsium arvense</i>		10
yellow sweet-clover	<i>Melilotus officinalis</i>		5
wild licorice	<i>Glycyrrhiza lepidota</i>		10
common dandelion	<i>Taraxacum officinale</i>		5
pasture sagewort	<i>Artemisia frigida</i>		1
foxtail barley	<i>Hordeum jubatum</i>		5
smooth brome	<i>Bromus inermis</i>		10
perennial sow-thistle	<i>Sonchus arvensis</i>		5

## Appendix 7

SP U2-2 -

<b>Soils</b>	
<b>Soil Pit Depth (cm)</b>	30
<b>Aspect</b>	N
<b>Slope Position</b>	level
<b>S1. Organic soils (except Folists)</b>	<u>no</u>
<b>S2. Presence of peat accumulation determined by Von Post test</b>	<u>no</u>
<b>S3. Of, Om or Oh horizons (organic surface layer 20-40 cm thick) present</b>	<u>no</u>
<b>S4. Sulfidic material (odor of "rotten eggs") present</b>	<u>no</u>
<b>S5. Gleying (chroma of 2 or less formed by excessive soil wetness) or mottling (blotches or spots of different colour) present immediately below the surface layer (A- or Ae- horizon) and within 30 cm</b>	<u>no</u>
<b>S6. Native prairie soils with a low chroma matrix (chroma of 2 or less) within 30 cm of the soil surface and one of the following present:</b>	<u>no</u>
<i>a. Thin surface layer (at least 0.5 cm) of peat or muck; or</i>	<u>no</u>
<i>b. Presence of iron (high chroma mottles, oxidized rhizospheres) within 30 cm of surface; or</i>	<u>no</u>
<i>c. Iron and manganese concretions within the surface layer (A-horizon); or</i>	<u>no</u>
<i>d. Low chroma (gray-coloured) matrix or mottles present immediately below the surface layer (A-horizon) and the crushed color is chroma 2 or less</i>	<u>no</u>
<b>S7. Nonsandy soils (e.g. clay, loam, silt) with a low chroma matrix (chroma of 2 or less) within 40 cm of the soil surface and one of the following present within 30 cm of the surface:</b>	<u>no</u>
<i>a. Iron and manganese concretions or nodules; or</i>	<u>no</u>
<i>b. Distinct or prominent oxidized rhizospheres along several living roots; or</i>	<u>no</u>
<i>c. Low chroma mottles</i>	<u>no</u>
<b>S8. Sandy soils with one of the following present</b>	
<i>a. Thin surface layer (at least 2.5 cm) of peat or muck where leaf litter is present; or</i>	<u>no</u>
<i>b. Surface layer of peat or muck of any thickness where a leaf litter is absent; or</i>	<u>no</u>
<i>c. A surface layer (A-horizon) having a low chroma matrix (chroma 1 or less and value of 3 or less) greater than 10 cm thick; or</i>	<u>no</u>
<i>d. Vertical organic streaking or blotchiness with 30 cm of the surface; or</i>	<u>no</u>
<i>e. Easily recognized high chroma mottles occupy at least 2 percent of the low chroma subsoil matrix within 30 cm of the surface; or</i>	<u>no</u>
<i>f. Organic concretions with 30 cm of the surface; or</i>	<u>no</u>
<i>g. Oxidized rhizospheres along living roots within 30 cm of the surface; or h. A cemented layer (ortstein) within 30 cm of the soil surface</i>	<u>no</u>
<b>S9. Remains of aquatic invertebrates are present within 30 cm of the soil surface in pothole-like depressions</b>	<u>no</u>
<b>S10. Other regionally applicable, field-verifiable soil properties associated with prolonged seasonal high water tables</b>	
<i>Surface water present</i>	<u>no</u>
<i>Free water in soil pit</i>	<u>no</u>
<i>Saturated soil</i>	<u>no</u>
<i>Oxidized rhizospheres</i>	<u>no</u>
<i>Water-stained leaves</i>	<u>no</u>
<i>Sediment deposits</i>	<u>no</u>
<i>Water marks</i>	<u>no</u>
<i>Drift lines</i>	<u>no</u>
<i>Scoured/bare areas</i>	<u>no</u>
<i>Drained patterns</i>	<u>no</u>
<i>Beaver lodges or muskrat mounds</i>	<u>no</u>

Horizon A	Depth (cm)	Munsell Soil Color	Soil Value	Soil Chroma
A	0-30	10YR 5/3	5	3
Comments				
Sandy loam. No mottles. No colour change				
Horizon B	Depth (cm)	Munsell Soil Color	Soil Value	Soil Chroma
Comments				



View of soil pit U2-2



View east of upland conditions from soil pit U2-2

## Appendix 7

SP W3-1 - wetland

**Instructions: Complete this form for the plant community at the boundary between wetland and non-wetland.**

QWSP Investigator	Company Name	Date	Project Name	Wetland #
K. Oldershaw & M. Mann	CIMA+	August 30, 2024	CA000928	3

**Plots**

Plot #	Stratum	Plot technique	Plot location (Lat)	Plot location (Long)
1	Ground	1 x 1	51.596933931987905	-113.49575644871078

**Primary Indicator Observed (Circle and describe below)**

V1. Hydrophytic species cover more than 50 percent of the abundant plant species in the community or plot (An abundant species is a plant species with 20 percent or more areal cover in the community or plot). List all abundant species in the plots	<u>no</u>
V2. Surface encrustations of algae are present?	<u>no</u>
V3. The presence of a dominant groundcover of peat mosses ( <i>Sphagnum</i> spp.)	<u>no</u>
V4. Diminished vigor and productivity of upland species in disturbed areas	<u>yes</u>
V5. Evidence of morphological adaptations of plants to saturated conditions (e.g. floating leaves, inflated stems, adventitious roots)	<u>no</u>
Other Comments – 30% bare ground	

**Wetland Species**

Common name of species	Scientific name of species	Facultative Wetland or Obligate Wetland spp	% Relative cover of abundant species

**Upland Species**

Common name of species	Scientific name of species	Facultative Wetland or Obligate Wetland spp	% Relative cover of abundant species
common wheat	<i>Triticum aestivum</i>		70

## Appendix 7

SP W3-1 - wetland

<b>Soils</b>	
<b>Soil Pit Depth (cm)</b>	30
<b>Aspect</b>	N
<b>Slope Position</b>	depression
<b>S1. Organic soils (except Folists)</b>	<u>no</u>
<b>S2. Presence of peat accumulation determined by Von Post test</b>	<u>no</u>
<b>S3. Of, Om or Oh horizons (organic surface layer 20-40 cm thick) present</b>	<u>no</u>
<b>S4. Sulfidic material (odor of "rotten eggs") present</b>	<u>no</u>
<b>S5. Gleying (chroma of 2 or less formed by excessive soil wetness) or mottling (blotches or spots of different colour) present immediately below the surface layer (A- or Ae- horizon) and within 30 cm</b>	<u>yes</u>
<b>S6. Native prairie soils with a low chroma matrix (chroma of 2 or less) within 30 cm of the soil surface and one of the following present:</b>	<u>no</u>
<i>a. Thin surface layer (at least 0.5 cm) of peat or muck; or</i>	<u>no</u>
<i>b. Presence of iron (high chroma mottles, oxidized rhizospheres) within 30 cm of surface; or</i>	<u>no</u>
<i>c. Iron and manganese concretions within the surface layer (A-horizon); or</i>	<u>no</u>
<i>d. Low chroma (gray-coloured) matrix or mottles present immediately below the surface layer (A-horizon) and the crushed color is chroma 2 or less</i>	<u>no</u>
<b>S7. Nonsandy soils (e.g. clay, loam, silt) with a low chroma matrix (chroma of 2 or less) within 40 cm of the soil surface and one of the following present within 30 cm of the surface:</b>	<u>no</u>
<i>a. Iron and manganese concretions or nodules; or</i>	<u>no</u>
<i>b. Distinct or prominent oxidized rhizospheres along several living roots; or</i>	<u>no</u>
<i>c. Low chroma mottles</i>	<u>no</u>
<b>S8. Sandy soils with one of the following present</b>	
<i>a. Thin surface layer (at least 2.5 cm) of peat or muck where leaf litter is present; or</i>	<u>no</u>
<i>b. Surface layer of peat or muck of any thickness where a leaf litter is absent; or</i>	<u>no</u>
<i>c. A surface layer (A-horizon) having a low chroma matrix (chroma 1 or less and value of 3 or less) greater than 10 cm thick; or</i>	<u>yes</u>
<i>d. Vertical organic streaking or blotchiness with 30 cm of the surface; or</i>	<u>no</u>
<i>e. Easily recognized high chroma mottles occupy at least 2 percent of the low chroma subsoil matrix within 30 cm of the surface; or</i>	<u>yes</u>
<i>f. Organic concretions with 30 cm of the surface; or</i>	<u>no</u>
<i>g. Oxidized rhizospheres along living roots within 30 cm of the surface; or h. A cemented layer (ortstein) within 30 cm of the soil surface</i>	<u>no</u>
<b>S9. Remains of aquatic invertebrates are present within 30 cm of the soil surface in pothole-like depressions</b>	<u>no</u>
<b>S10. Other regionally applicable, field-verifiable soil properties associated with prolonged seasonal high water tables</b>	
<i>Surface water present</i>	<u>no</u>
<i>Free water in soil pit</i>	<u>no</u>
<i>Saturated soil</i>	<u>no</u>
<i>Oxidized rhizospheres</i>	<u>no</u>
<i>Water-stained leaves</i>	<u>no</u>
<i>Sediment deposits</i>	<u>no</u>
<i>Water marks</i>	<u>no</u>
<i>Drift lines</i>	<u>no</u>
<i>Scoured/bare areas</i>	<u>yes</u>
<i>Drained patterns</i>	<u>no</u>
<i>Beaver lodges or muskrat mounds</i>	<u>no</u>

Horizon A	Depth (cm)	Munsell Soil Color	Soil Value	Soil Chroma
A	0-14	10YR 2/1	2	1
Comments				
Sandy Silty, grittier than other ephemerals				
Horizon B	Depth (cm)	Munsell Soil Color	Soil Value	Soil Chroma
B	14-30	10YR 5/2	5	2
Comments				
sandy clay, Mottles 10YR 5/8				



View of soil pit W3-1



View west from soil pit W3-1

## Appendix 7

SP U3-2 - upland

**Instructions: Complete this form for the plant community at the boundary between wetland and non-wetland.**

QWSP Investigator	Company Name	Date	Project Name	Wetland #
K. Oldershaw & M. Mann	CIMA+	August 30, 2024	CA000928	3

**Plots**

Plot #	Stratum	Plot technique	Plot location (Lat)	Plot location (Long)
2	Ground	1 x 1	51.59704323592266	-113.49494161481938

**Primary Indicator Observed (Circle and describe below)**

V1. Hydrophytic species cover more than 50 percent of the abundant plant species in the community or plot (An abundant species is a plant species with 20 percent or more areal cover in the community or plot). List all abundant species in the plots	<u>no</u>
V2. Surface encrustations of algae are present?	<u>no</u>
V3. The presence of a dominant groundcover of peat mosses ( <i>Sphagnum</i> spp.)	<u>no</u>
V4. Diminished vigor and productivity of upland species in disturbed areas	<u>no</u>
V5. Evidence of morphological adaptations of plants to saturated conditions (e.g. floating leaves, inflated stems, adventitious roots)	<u>no</u>
Other Comments –	Wheat

**Wetland Species**

Common name of species	Scientific name of species	Facultative Wetland or Obligate Wetland spp	% Relative cover of abundant species

**Upland Species**

Common name of species	Scientific name of species	Facultative Wetland or Obligate Wetland spp	% Relative cover of abundant species
cultivated wheat	<i>Triticum aestivum</i>		100

## Appendix 7

SP U3-2 - upland

<b>Soils</b>	
<b>Soil Pit Depth (cm)</b>	30
<b>Aspect</b>	S
<b>Slope Position</b>	level
<b>S1. Organic soils (except Folists)</b>	<u>no</u>
<b>S2. Presence of peat accumulation determined by Von Post test</b>	<u>no</u>
<b>S3. Of, Om or Oh horizons (organic surface layer 20-40 cm thick) present</b>	<u>no</u>
<b>S4. Sulfidic material (odor of "rotten eggs") present</b>	<u>no</u>
<b>S5. Gleying (chroma of 2 or less formed by excessive soil wetness) or mottling (blotches or spots of different colour) present immediately below the surface layer (A- or Ae- horizon) and within 30 cm</b>	<u>no</u>
<b>S6. Native prairie soils with a low chroma matrix (chroma of 2 or less) within 30 cm of the soil surface and one of the following present:</b>	<u>no</u>
<i>a. Thin surface layer (at least 0.5 cm) of peat or muck; or</i>	<u>no</u>
<i>b. Presence of iron (high chroma mottles, oxidized rhizospheres) within 30 cm of surface; or</i>	<u>no</u>
<i>c. Iron and manganese concretions within the surface layer (A-horizon); or</i>	<u>no</u>
<i>d. Low chroma (gray-coloured) matrix or mottles present immediately below the surface layer (A-horizon) and the crushed color is chroma 2 or less</i>	<u>no</u>
<b>S7. Nonsandy soils (e.g. clay, loam, silt) with a low chroma matrix (chroma of 2 or less) within 40 cm of the soil surface and one of the following present within 30 cm of the surface:</b>	<u>no</u>
<i>a. Iron and manganese concretions or nodules; or</i>	<u>no</u>
<i>b. Distinct or prominent oxidized rhizospheres along several living roots; or</i>	<u>no</u>
<i>c. Low chroma mottles</i>	<u>no</u>
<b>S8. Sandy soils with one of the following present</b>	
<i>a. Thin surface layer (at least 2.5 cm) of peat or muck where leaf litter is present; or</i>	<u>no</u>
<i>b. Surface layer of peat or muck of any thickness where a leaf litter is absent; or</i>	<u>no</u>
<i>c. A surface layer (A-horizon) having a low chroma matrix (chroma 1 or less and value of 3 or less) greater than 10 cm thick; or</i>	<u>no</u>
<i>d. Vertical organic streaking or blotchiness with 30 cm of the surface; or</i>	<u>no</u>
<i>e. Easily recognized high chroma mottles occupy at least 2 percent of the low chroma subsoil matrix within 30 cm of the surface; or</i>	<u>no</u>
<i>f. Organic concretions with 30 cm of the surface; or</i>	<u>no</u>
<i>g. Oxidized rhizospheres along living roots within 30 cm of the surface; or h. A cemented layer (ortstein) within 30 cm of the soil surface</i>	<u>no</u>
<b>S9. Remains of aquatic invertebrates are present within 30 cm of the soil surface in pothole-like depressions</b>	<u>no</u>
<b>S10. Other regionally applicable, field-verifiable soil properties associated with prolonged seasonal high water tables</b>	
<i>Surface water present</i>	<u>no</u>
<i>Free water in soil pit</i>	<u>no</u>
<i>Saturated soil</i>	<u>no</u>
<i>Oxidized rhizospheres</i>	<u>no</u>
<i>Water-stained leaves</i>	<u>no</u>
<i>Sediment deposits</i>	<u>no</u>
<i>Water marks</i>	<u>no</u>
<i>Drift lines</i>	<u>no</u>
<i>Scoured/bare areas</i>	<u>no</u>
<i>Drained patterns</i>	<u>no</u>
<i>Beaver lodges or muskrat mounds</i>	<u>no</u>

Horizon A	Depth (cm)	Munsell Soil Color	Soil Value	Soil Chroma
A	0-14	10YR 2/1	2	1
Comments				
Sandy Silty				
Horizon B	Depth (cm)	Munsell Soil Color	Soil Value	Soil Chroma
B	14-30	10YR 4/3	4	3
Comments				
Silty				



View of soil pit U3-2



View looking north from soil pit U3-2 showing cultivated upland conditions