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# WETLAND ASSESSMENT AND IMPACT REPORT

## Application for Approval under the *Water Act* for the proposed Town of Penhold Public Works Yard Development within NW 6-37-27 W4M

**Prepared for:**
Tagish Engineering
#104, 230 Lake Street
Red Deer County, AB T4E 1B9

**August 11, 2021**

**Project No.:** 5646

**Ghostpine Rev:** 0

EFFECTIVE PLANNING, REAL SOLUTIONS

# Executive Summary

The Town of Penhold (the Town) is applying to Alberta Environment and Parks for approval under the *Water Act* to infill one temporary marsh wetland, one seasonal marsh wetland, two ephemeral drainages, and one ephemeral waterbody during the construction of the proposed, approximately 7.8 hectare, Public Works Yard, and 0.42 hectare access road located on lands currently owned by the Town in NW 6-37-27 W4M.

Tagish Engineering, on behalf of the Town of Penhold, commissioned Ghostpine Environmental Services Ltd. to prepare an Application for Approval under the *Water Act* for impacts to wetlands and waterbodies traversed by the proposed development to allow for construction of a public works yard.

Classification, description, delineation, mapping, and assessment of wetland and waterbody impacts were completed in accordance with the *Alberta Wetland Policy* and its associated directives. Wetlands and waterbodies were identified, and boundaries were delineated in accordance with the *Alberta Wetland Identification and Delineation Directive*. Ten historic aerial photographs from 1950 to 2018 were examined to identify and delineate potential site wetlands and waterbodies. A field survey was then completed on May 20, 2021 to confirm wetland and waterbody presence, boundaries, and classifications, and Alberta Wetland Rapid Evaluation Tool – Actual (ABWRET-A) submissions.

A temporary marsh wetland, seasonal marsh wetland, two ephemeral waterbodies, and two ephemeral drainages were identified within and immediately adjacent to the subject property. These waterbodies will be impacted by the planned development. Wetland/waterbody avoidance, minimization, and replacement are discussed within this report. Wetland replacement, by means of paying an in-lieu replacement fee, was selected for addressing impacts to the on-site temporary marsh and seasonal wetlands. Based on the results of an ABWRET-A assessment, the wetland replacement fee was determined to be $10,769.54, which will be paid to the Government of Alberta once approval under the *Water Act* is received. Wetland replacement is not required for the ephemeral waterbodies or ephemeral drainages, as per the Alberta Wetland Policy.

# Limitation of Liability

Methods and results in this report are based on Ghostpine Environmental Services Ltd.'s (Ghostpine) adherence to municipal, provincial and federal regulations in place on the date issued. Inter- and intra-regulatory agency interpretation of rules and regulations have been accounted for as much as reasonably possible.

During the preparation of this report and associated services, Ghostpine relied upon the full disclosure and accuracy of all applicable information by the client on the past, present, and proposed conditions of this site, including historical information on the use of the site. This report is based upon the information provided by the client, information collected during desktop and/or field investigations, and information gathered from regulatory bodies and agencies. The information provided by parties other than Ghostpine is believed to be accurate but cannot be guaranteed. The work was conducted by Ghostpine in accordance with the scope of work prepared for this project, including verbal or written requests from Tagish Engineering (Tagish). No other warranty, expressed or implied, is made.

All spatial data presented in this report (text or figures) was collected by a hand-held GPS unit, which typically has a 5 to 7 m margin of error. This known margin of error may be subject to further variance or discrepancy under certain field conditions or the time of day. A verified survey is recommended where any distances are required for regulatory compliance or conformance.

Ghostpine has exercised reasonable care and due diligence in the preparation of this report and the services have been performed in a manner consistent with other professionals currently practicing under similar conditions in the jurisdiction in which the services were provided.

It must be noted that the environmental assessment, as per the established scope of work of any site, is based on observations made at a specific moment in time; therefore, the conclusions and recommendations set out in this report are time sensitive. The report is based solely on the conditions that existed at the time of the investigation. The conclusions and recommendations set out in this report are based on the specific observations and testing at the subject site. Conditions across the site may vary which would affect the conclusions and recommendations made in the report. No detailed assessment on a given property or site can wholly eliminate the uncertainty regarding the potential for unrecognized conditions in connection with that particular property or site.

This report and the assessments and recommendations described within are intended for the sole use of Tagish, the Town of Penhold (the Town), and their agents. Other representations or warranties regarding surface, subsurface, biotic, and abiotic documentation of said condition in the form of report or regulatory submission not referenced are not provided. Any unauthorized use of this report is at the sole risk of the user. The document may not be manipulated, edited, or amended without the expressed written consent and understanding of Ghostpine.

Tagish and the Town may rely on this completed report for specific application to this project based on the project area discussed and conditions present at the time of the field assessment.

# Signatures

If you have any questions in relation to this report, please contact the undersigned for additional information or with any questions or comments.

Yours truly,

GHOSTPINE ENVIRONMENTAL SERVICES LTD.

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Modifications of any kind to this document, without express written permission, will render all signatures and professional stamps null and void.

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# 1 INTRODUCTION

The Town of Penhold (the Town) is applying to Alberta Environment and Parks (AEP) for approval under the *Water Act* to infill one temporary marsh wetland, one seasonal marsh wetland, two ephemeral drainages, and one ephemeral waterbody during the construction of the proposed, approximately 7.8 hectare, Public Works Yard, and 0.42 hectare access road located on lands currently owned by the Town in NW 6-37-27 W4M.

Tagish Engineering (Tagish), on behalf of the Town, commissioned Ghostpine Environmental Services Ltd. (Ghostpine) to perform a field assessment for the proposed project, as well as to prepare an Application for Approval under the *Water Act* for waterbodies traversed by the proposed development (Government of Alberta, 2000). Ghostpine completed a field assessment on May 20, 2021. The wetlands' classification [according to the Alberta Wetland Classification System (Alberta Environment and Sustainable Resource Development, 2015)], size, location, substrate, vegetation, and associated wildlife species were included within the field assessment. The results of the survey are summarized in this letter. The wetlands were delineated in the field to estimate the area traversed (impacted) in hectares.

Construction of the proposed development is scheduled to commence as soon as all regulatory approvals are in place.

The regional setting of the development area is provided in Appendix A: Figure 1. Photographs taken during the field assessment are provided in Appendix B.

This Wetland Assessment and Impact Report (WAIR) was supervised and authenticated by the above-signed Authenticating Professional.

# 2 WETLAND/WATERBODY IDENTIFICATION AND DELINEATION

Alberta Environment and Parks defines wetlands as land saturated with water long enough to promote formation of water altered soils, growth of water tolerant vegetation, and various kinds of biological activity that are adapted to the wet environment (Government of Alberta, 2013). Common identifying features of wetlands are hydric soils and hydrophytic vegetation, although the vegetation may not always be present if biotic or anthropogenic factors have removed them or prevented their development (National Research Council, 1995).

In addition to wetlands, other waterbodies may be present within a defined area. These include lakes, ephemeral waterbodies, watercourses, drainages or draws, and anthropogenic waterbodies.

Lakes are deep water aquatic systems. These are defined in the Alberta Wetland Classification System as surface water areas with water that is greater than two metres deep at midsummer.

Ephemeral waterbodies are defined in the Alberta Wetland Classification System as terrain affected by the water table near, at, or above the ground surface for a short period of days, but not long enough to promote the formation of water altered soils within 30 cm of the ground surface, or a dominance of water-tolerant vegetation.

Watercourses, ephemeral drainages, and draws are defined based on water flow and flow periodicity, based on definitions provided in the Alberta Public Lands Glossary of Terms (Government of Alberta, 2020) and the Alberta Timber Harvest Planning Operating Ground Rules Framework (Government of Alberta, 2016). A watercourse is a water feature within a channel, with a bed and bank, which conveys water continuously or intermittently (Government of Alberta, 2017). Drainages and draws are features with little to no channel development where water can collect and flow, and which remains vegetated along the flow-path. Flowing water is usually present during or immediately after rainfall or snowmelt events. Drainages are distinguished from draws as follows:

- drainages are typically greater than 100 m long and connect into higher order water features; and
- draws are typically less than 100 m long and do not connect to higher order water features.

Drainages and draws may also contain wetlands in locations where wetland indicator plant species and water altered soils are present.

Anthropogenic waterbodies are human-made features such as dugouts, reservoirs, ditches, industrial/stormwater ponds, or adventitiously/inadvertently formed water features (e.g., areas with artificial water input or blockage of water flow). These features often have characteristics like natural wetlands, but examination of site history will often show that these features are not of natural origin.

Anthropogenically modified wetlands or waterbodies are natural waterbodies that have been altered by human intervention, such as the construction of a dugout within a wetland. An examination of site history will often show these features have been developed within natural water features.

## 2.1 Desktop Wetland Identification and Delineation

Wetlands and waterbodies were identified, and boundaries were delineated in accordance with the *Alberta Wetland Identification and Delineation Directive* (Government of Alberta, 2015). The Alberta Merged Wetland Inventory (Government of Alberta, 2017) and hydrological mapping (e.g., Fisheries and Wildlife Information System (FWMIS), base features mapping) were reviewed to identify possible onsite wetlands and waterbodies. Wetland boundaries were delineated using a Geographic Information System (GIS) prior to fieldwork utilizing imagery obtained from the AEP Informatics Branch, Air Photo Distribution, and from ESRI®.

Aerial photographs were selected within the growing season (April to October) or fall/winter (November and January) to represent a range of wet, average, and dry conditions to assess changes in wetland sizes, hydroperiod, and classification for as far back as records were available. The imagery was also examined to identify changes in local disturbances and land uses on, and adjacent to, the project site. In addition, any disturbances to waterbodies (e.g., cultivation, dugouts, impoundment, infilling, cleared patches, or built infrastructure) was recorded. Aerial photographs were selected for the following dates:

- September 30, 1950 – Fall (no precipitation information available)
- August 21, 1966 – Summer (drier than average conditions)
- July 2, 1969 – Summer (wetter than average conditions)
- November 17, 1975 – Fall (average conditions)
- April 26, 1977 – Spring (wetter than average conditions)
- July 18, 1983 – Summer (drier than average conditions)
- May 4, 1998 – Spring (drier than average conditions)
- August 17, 2002 – Summer (drier than average conditions)
- June 1, 2007 – Spring (wetter than average conditions)
- January 15, 2018 (ESRI®) – Winter (drier than average conditions)

Documentation of selected imagery, sources, and precipitation conditions are provided in Appendix C.

Each potential waterbody was delineated on every year of available aerial imagery by drawing a polygon boundary along the edge of wet areas as identified by change in texture, colour, or observed terrain, soil, water, or vegetation boundaries (Appendix A: Figure 2). Wetland delineations for each year were amalgamated, and the largest composite area, excluding outlier conditions, for each potential waterbody was used as the desktop delineated boundary (Appendix A: Figure 3). This method is intended to demonstrate the average size of the waterbodies over the period of photographic records.

The wetland delineation pathway selected for each of the potential waterbodies (excluding drainages) is outlined in Table 1. Based on a preliminary review of aerial photography, lakes, draws, and anthropogenically-modified waterbodies were not identified within the project area. Waskasoo Creek, which has historically been anthropogenically modified, lies outside of the project area to the north and east. Potential waterbodies (DW01, DW02, DW03, DW04, DW05 and DW06) and drainages (DD01, DD02) were identified, and a preliminary classification was completed. DW01 was preliminarily classified as a semi-permanent marsh wetland based on the presence of water in most years. DW02 was classified as a semi-permanent marsh based on the presence of water and apparent vegetation. DW03 was classified as a temporary marsh, DW04 a temporary marsh, DW05 a semi-permanent marsh, and DW06 was preliminarily classified as a temporary marsh. As drainages are known to change course frequently in agricultural settings, field observation alone was used for confirmation of occurrence.

**Table 1 Wetland Delineation Pathway Process – Desktop Review**

| Wetland | Boundaries: Straightforward, Complex, or Indistinct | Wetland Saturation: Year-Round or Periodic | Wetland Disturbance | Site Access Available | Imagery | Pathway Selected* |
|---|---|---|---|---|---|---|
| **DW01** | Straight-forward | Periodic | Yes. This feature has been cultivated at various times through the photographic record. | Yes, fully accessible on property | Available and high quality | 5: Comprehensive desktop delineation with field verification |
| **DW02** | Straight-forward | Periodic | Yes. This feature has been cultivated at various times through the photographic record. | Yes, fully accessible on property | Available and high quality | 5: Comprehensive desktop delineation with field verification |
| **DW03** | Straight-forward | Periodic | Yes. This feature has been cultivated at various times through the photographic record. | Yes, fully accessible | Available and high quality | 5: Comprehensive desktop delineation with field verification |
| **DW04** | Straight-forward | Periodic | Yes. This feature has been cultivated at various times through the photographic record. | Yes, fully accessible | Available and high quality | 5: Comprehensive desktop delineation with field verification |

| Wetland | Boundaries: Straightforward, Complex, or Indistinct | Wetland Saturation: Year-Round or Periodic | Wetland Disturbance | Site Access Available | Imagery | Pathway Selected* |
|---|---|---|---|---|---|---|
| **DW05** | Straight-forward | Periodic | Yes. This feature has been disturbed by the construction of buildings and the altering of topography/vegetation. | No, not within project boundary | Available and high quality | 5: Comprehensive desktop delineation with field verification |
| **DW06** | Straight-forward | Periodic | Yes. This feature has been affected by anthropogenic alterations to Waskasoo Creek. | No, not accessible | Available and high quality | 2: Comprehensive desktop delineation |

## 2.2 Wetland Field Delineation

A field assessment was conducted on May 20, 2021 between the hours of 09:00 to 13:30. As is required by the *Alberta Wetland Assessment and Impact Report Directive* (Government of Alberta, 2017), fieldwork was completed within the growing season (between approximately April and October).

The field survey included validation of the potential wetland boundaries identified during the desktop review, and documentation of wetland classification, size, substrate, vegetation, and wildlife species.

Documentation and evidence of wetland field indicators used to verify the desktop delineation wetland boundaries and/or to re-delineate the wetland boundaries are provided in Appendix D.

All potential waterbodies which were identified and delineated prior to fieldwork were assessed in the field (subject to land access). Two marsh wetlands, two ephemeral waterbodies, and two ephemeral drainages were confirmed to be located within, or immediately adjacent to, the development area based on the results of the field assessment.

All but one of the potential wetlands and waterbodies which were identified and delineated prior to fieldwork were assessed in the field. DW01 was confirmed to be a seasonal marsh (LC_20210520_028) which has historically been cultivated. This wetland did not extend south of the project boundary/fence line as anticipated based on the desktop review. DW02 was confirmed to be temporary marsh (LC_20210520_041) which has also been cultivated historically. As with DW01, this wetland did not extend south of the project boundary/fence line. DW03 was confirmed to be an ephemeral waterbody (LC_20210520_054) which was recently ploughed. DW04 was confirmed to be an ephemeral waterbody (LC_20210520_053) and was also recently ploughed. DW05 was field assessed as an ephemeral waterbody (LC_20210520_054). The feature was adjacent to the proposed access road but outside of the project property line and could not be fully accessed. DW06 is located outside of the project boundary as well as the property line and was not assessed in the field (Appendix A; Figure 4). Drainages DD01 and DD02 were determined to be ephemeral drainages which followed the contour of the land (LC_20210520_511, LC_20210520_521). They had been recently ploughed so topography and aerial photos were used to identify them as drainages. In addition, no other drainage features were observed in the proposed project area. To ensure that no additional water bodies were present, searches were also completed throughout the entire potential project area. No additional water features were identified.

The final wetland and waterbody boundaries were determined based on field indicators (Appendix A: Figure 4).

# 3 WETLAND CLASSIFICATION

Wetlands within the project area, evaluated through the desktop and field assessments, were classified based on the Alberta Wetland Classification System (Alberta Environment and Sustainable Resource Development, 2015). Documentation and evidence of wetland field conditions to classify the wetlands and waterbodies are provided in Table 2.

Desktop delineated wetland DW01 was confirmed to be a seasonal marsh wetland (Wetland ID: LC_20210520_028). The wetland had a low central area with standing water and was dominated by wetland indicator plant species. The soil was composed of a silty clay, up to 30 cm depth, with no gleying or mottles present; however, the soil was saturated, and water was present in the soil pit (Appendix B: Plate 1). DW02, a temporary marsh (Wetland ID: LC_20210520_041), had a silty clay soil from 0 to 11 cm, with mottles, and a clay soil also with mottling from 11 to 30 cm (Appendix B: Plate 2). This wetland had few vegetation indicator species but could be seen on aerial photos over multiple years (Figure 3: A-J). Desktop delineated waterbody DW03 was reclassified as an ephemeral waterbody in the field (LC_20210520_049). The waterbody had been recently ploughed and historically cultivated, so soil and vegetation indicators could not be relied on to confirm a wetland (Appendix B: Plate 3). DW04 is outside of the project area but was assessed and found to be an ephemeral waterbody which has been cultivated. DW05 is adjacent to the proposed road but is outside of the project property line. A small corner of it was assessed and classified as an ephemeral waterbody (Appendix B, Plate 4).

Both wetlands LC_20210520_041 and LC_20210520_028 have been historically altered by the construction of a ditch and culvert along the fence line which traverses the wetlands. The ditch appears to drain the wetlands into nearby Waskasoo Creek. The drainage ditch and culvert are discussed further in Section 7.2 of this report.

Documentation and evidence used to key out wetland classes, forms, and/or types, including classification codes and other information, is provided in Table 2. Photographs of wetlands, waterbodies, and onsite features are provided in Appendix B.

**Table 2 Information and Evidence used in Wetland Classification**

| Desktop ID | Wetland ID | Classification Codes | Soil Characteristics | Hydrologic Characteristics | Vegetation Zone (%) | Indicator Species/ Communities | Site Photo |
|---|---|---|---|---|---|---|---|
| **DW01** | LC_20210520_028 | Seasonal Marsh | 0 to 30 cm saturated silty clay (10YR3/1) with no mottles or gleying | Low area; collects overland flow from the north | Wet Meadow (100%) | Dominant Species (>10% cover)<br>• *Typha latifolila* (FAC-UPL)<br>• *Carex sp.* (N/A)<br>• *Juncus sp.* (FAC-WET)<br>• *Poa pratensis* (FAC-UPL)<br>• moss (N/A)<br>Additional Species (<10% cover)<br>• *Argentina anserina* (OBL) | Appendix B: Plate 1 |
| **DW02** | LC_20210520_041 | Temporary Marsh | 0 to 11 cm silty clay (10YR 2/1) slight with mottles<br><br>11 to 30 cm clay (10YR 4/1) with prominent mottles (10YR 5/6) | Low area; collects overland flow from the north | Low Prairie (100%) | Dominant Species (>10% cover)<br>• *Poa pratensis* (FAC-UP)<br>• *Plantago major* (FAC)<br>• moss (N/A)<br>• *Taraxacum officinale* (FAC-UP)<br>• *Trifolium sp.* (FAC-UP)<br>• *Pascopyrum smithii* (FAC-UP)<br>Additional Species (<10% cover)<br>• *Triglochin maritima* (OBL)<br>– *Rumex crispus* (FAC)<br>– *Cirsium arvense* (FAC-UP) | Appendix B: Plate 2 |
| **DW03** | LC_20210520_049 | Ephemeral Waterbody | 0 to 20 cm loamy (10YR2/1)<br><br>20 to 30 cm clay loam (10YR 5/3) | Low area | N/A | Recently ploughed and unvegetated | Appendix B: Plate 3 |
| **DW04** | LC_20210520_053 | Ephemeral Waterbody | 0 to 20 cm loamy (10YR2/1)<br><br>20 to 30 cm clay loam (10YR 5/3) | Low area | N/A | Recently ploughed and unvegetated | Appendix B: Plate 3 |

| Desktop ID | Wetland ID | Classification Codes | Soil Characteristics | Hydrologic Characteristics | Vegetation Zone (%) | Indicator Species/ Communities | Site Photo |
|---|---|---|---|---|---|---|---|
| **DW05** | LC_20210520_054 | Ephemeral Waterbody | Loamy and contained pocket gopher mounds | Slopes away from buildings in a southeast direction | Upland | Dominant Species (>10% cover)<br>• *Populus tremuloides* (FAC)<br>• *Taraxacum officinale* (UPL)<br>• *Poa pratensis* (FAC-UPL)<br>Additional Species (<10% cover)<br>• *Descurainia sophia* (UPL)<br>• *Melilotus sp.* (FAC-UP) | Appendix B: Plate 4 |

# 4 RELATIVE WETLAND VALUE ASSESSMENT

The Alberta Wetland Rapid Evaluation Tool – Actual (ABWRET-A) is completed during the on-site assessment of a wetland and considers various wetland functions and health criteria (Government of Alberta, 2015).

The ABWRET-A data is submitted to AEP for review and analysis, and a Relative Wetland Value (RWV) for each wetland is provided. A copy of the ABWRET-A form completed for the impacted wetlands is provided in Appendix E, and ABWRET-A values are summarized in Table 3.

As part of the ABWRET-A submission, a digital shapefile of wetland boundaries, as determined in accordance with the *Alberta Wetland Identification and Delineation Directive* (Government of Alberta, 2015) was submitted to AEP. A digital shapefile of the proposed project boundary and proposed areas of wetland losses will be submitted to AEP as part of this WAIR application.

**Table 3 ABWRET-A Scores**

| Wetland ID | Classification | RWV |
|---|---|---|
| LC_20210520_028 | Seasonal Marsh | D |
| LC_20210520_041 | Temporary Marsh | D |

# 5 WETLAND PERMANENCE

According to Section 3(1) of the *Public Lands Act* (Government of Alberta, 2000), the title to the bed and shores of all permanent and naturally occurring water is vested in the Crown in Right of Alberta. To be Crown claimable, a wetland must be a "body of water," must be naturally occurring, and must be permanent, or reasonably so (Alberta Environment and Parks, 2014). The wetland must have a boundary that can be clearly defined, with a distinct change in vegetation; usually the upland boundary of the emergent hydrophytic plant community (Alberta Environment and Parks, 2014). An historical aerial photograph review is required to determine potential permanency of impacted wetlands (Appendix C).

Under the Alberta Wetland Classification System, semi-permanent and permanent marsh and/or shallow open water wetlands may be Crown claimable (Alberta Environment and Sustainable Resource Development, 2015). Seasonal marsh wetlands may also be considered Crown claimable and must be reviewed on a case-by-case basis (Alberta Environment and Sustainable Resource Development, 2015). Generally, however, seasonal wetlands are not claimed (Alberta Environment and Sustainable Resource Development, 2015).

A Wetland Permanence Review was not conducted for the proposed development, as all wetlands within the proposed project area are seasonal or lower in classification, and as such, would not be claimed by AEP as Crown land under Section 3(1) of the *Public Lands Act*. LC_20210520_28 was determined to be a seasonal marsh wetland. On occasion, seasonal wetlands may be claimable if they maintain characteristics of permanence and if natural in occurrence. While a full wetland permanence review has not been completed for submission to AEP to confirm if this wetland is claimable or not, this wetland is frequently dry over the course of the photo record (8 of 10 years) and has frequently been cultivated, suggesting that it is not a reasonably permanent feature and would not likely be claimed by the Crown.

# 6 SPECIES SURVEYS

## 6.1 Landscape Analysis Tool Report Results

A Landscape Analysis Tool report was not generated for this project as it is located on privately-owned land; however, Ghostpine's in-house GIS team prepared a background review map of the development area which included the available AEP Wildlife Data Sets (Alberta Environment and Parks, 2016) (Appendix A: Figure 1).

The Government Wildlife Data Sets identified the following layers traversed by the proposed development (Alberta Environment and Parks, 2016):

- Sensitive Raptors: Bald Eagle and Prairie Falcon
- Sharp-tailed Grouse Survey Area
- Other Sensitive and Endangered Species: Parkland

The proposed project is in the Parkland (Central Parkland) Natural Region (Alberta Environment and Parks, 2016).

AEP recommends that a pre-construction wildlife survey be completed for all activities occurring within an identified Species at Risk range. Ghostpine conducted a wildlife survey as part of the on-site wetland assessment. Ghostpine did not observe any sharp-tailed grouse within the project area, or suitable habitat for sharp-tailed grouse. As the proposed development area is currently cultivated for agricultural use, it is not likely that sharp-tailed grouse will utilize this area. Based on the *Alberta Sensitive Species Inventory Guidelines* (Government of Alberta, 2013), bald eagles prefer nesting in large coniferous trees or poplars near water. Prairie falcons, as per *Status of the Prairie Falcon in Alberta* (Paton, 2002) are limited to cliff faces, escarpments, and steep banks. Therefore, suitable nesting habitat for bald eagle and prairie falcon is not present within the proposed development area. As the majority of the project area is cultivated, habitat for ground nesting and wetland adapted bird species and amphibian species of concern is limited on the project site.

## 6.2 FWMIS and ACIMS

Searches of the FWMIS and Alberta Conservation Information Management System (ACIMS) databases were conducted on December 8, 2020.

Previous observations of the following terrestrial species have been made within 1 km of the proposed development: bobolink, common yellowthroat, and sora (Alberta Environment and Parks, 2019). Suitable habitat may be present for bobolink and sora on and within the vicinity of the project site near the vegetated wetlands, but they were not observed during the site visit.

A previous observation of Marsh Gentian (*Gentiana fremontii*) was identified in the vicinity of the project area (observed May 27, 1989). An ACIMS search indicated no observations of rare plants in and surrounding the planned development site; however, vegetation identification was limited due to previous ground disturbances, and it was early in the growing season (Alberta Conservation Information Management System, 2019). There is limited potential for rare plant species within the project area as it has been previously cultivated or disturbed.

## 6.3 Wildlife Survey

A wildlife survey was performed as part of the wetland assessment on May 20, 2021 between the hours of 08:00 and 17:00. A Grassland Bird Point count was also conducted at the site prior to 10:00 AM as part of the survey. The purpose of the wildlife survey was to record wildlife species and to identify any breeding and/or niche sites and specific habitats in the vicinity of the proposed project. Listed species, or species which have an official federal and/or provincial designation, were of survey focus and include the following:

- Species legally listed (or approved for listing) as *Endangered* or *Threatened* under the Alberta *Wildlife Act* (Government of Alberta, 2000).
- Species designated in Alberta as *Endangered*, *Threatened,* or *Special Concern* by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) (2017).
- Species listed as *Endangered*, *Threatened*, or *Special Concern* under Schedules 1, 2, and 3 of the federal *Species at Risk Act* (Government of Canada, 2002).
- Species ranked as *Vulnerable*, *Imperiled,* or *Critically Imperiled* by the Canadian Endangered Species Conservation Council (CESCC) (2016).
- Species ranked *At Risk, May be At Risk,* or *Sensitive* by the *Alberta Wild Species General Status Listing – 2015* (Alberta Environment and Parks, 2017).

Although the survey focused on searching for listed species and their signs, all wildlife species heard and/or observed during the survey were recorded, including species protected under the federal *Migratory Birds Convention Act* (Government of Canada, 1994) and the Alberta *Wildlife Act* (Government of Alberta, 2000).

### 6.3.1 Wildlife Species Observed on Site

#### 6.3.1.1 Listed Species

A Baird's sparrow (*Ammodramus bairdii*) was heard in the area south of the project area in SW 6-37-27 W4M. This species listed under Schedule 1 as *Special Concern* under the *Species at Risk Act* (Government of Canada, 2002), *Special Concern* by COSEWIC (Committee on the Status of Endangered Wildlife in Canada, 2017), rated as *Vulnerable* by CESCC (Canadian Endangered Species Conservation Council, 2016) and rated as *Sensitive* in Alberta (Alberta Environment and Parks, 2017). Both species and their active nest sites have protection under the Alberta *Wildlife Act* (Government of Alberta, 2000) and the Baird's sparrow is also protected under the *Migratory Birds Convention Act* (Government of Canada, 1994).

### 6.3.1.2 Unlisted Species

A Swainson's hawk (*Buteo swainsoni*) was observed hunting above the proposed project during the site assessment but did not appear to be nesting in the area.

Stick nests occupied by American crows were observed along Waskasoo Creek and another unoccupied stick nest was observed along Range Road 280. All these nests are outside of the project boundary, with the closest nest being approximately 80 meters from the project boundary. The American crow is not listed as a protected species under government legislation [*Migratory Birds Convention Act* (Government of Canada, 1994), Alberta *Wildlife Act* (Government of Alberta, 2000)].

Unlisted species observed during the survey include:

Birds: American crow (*Corvus brachyrhynchos*), Swainson's hawk (*Buteo swainsoni*), blue-winged teal (*Anas discors*), mallard (*Anas platyrhynchos*), Canada goose (*Branta canadensis*), clay coloured sparrow (*Spizella pallida*), Bonaparte's gull (*Chroicocephalus philadelphia*).

Herptiles: None observed

Mammals: None observed

Most of these species, their young, and active nest sites have protection under government legislation [*Migratory Birds Convention Act* (Government of Canada, 1994), Alberta *Wildlife Act* (Government of Alberta, 2000)].

## 6.4 Wildlife Mitigations

To ensure due diligence that potential issues with wildlife protected under government legislation [*Migratory Birds Convention Act* (Government of Canada, 1994), Alberta *Wildlife Act* (Government of Alberta, 2000), *Species at Risk Act* (Government of Canada, 2002)] have been avoided, a supplemental pre-construction wildlife sweep will be undertaken, if construction will commence within the breeding season (mid-April to end of August). Appropriate mitigation, such as timing and/or setback recommendations, in consideration of AEP and Environment Canada guidelines will be provided if wildlife issues are found during the survey. Additional government consultation will be undertaken, if warranted.

If nest sites or specific habitats of listed species, migratory bird species protected under the federal *Migratory Birds Convention Act* (Government of Canada, 1994), species protected under the Alberta *Wildlife Act* (Government of Alberta, 2000), and/or the federal *Species at Risk Act* (Government of Canada, 2002) are found, suspected, or observed during clearing, construction, and/or clean up, work will be postponed. Ghostpine will be contacted to verify the issue. If an active nest site is confirmed, a species appropriate setback buffer, based upon AEP and Environment Canada guidelines as well as the professional judgement of Ghostpine's Biologists will be put in place until the young have fledged from the vicinity. Further consultation with AEP and Environment Canada will be undertaken, if warranted.

The following mitigation measures will also be implemented to minimize impact to wildlife:

- Speed limits during the construction program will be strictly enforced. Workers will be informed to respect speed limits and watch for wildlife and avoid wildlife on roads.
- Workers found harassing or feeding wildlife or littering will be removed from the project; and
- Vegetation pre-clearing/pre-mowing will occur outside of the main breeding season if construction commences within the breeding season (mid-April to end of August).

# 7 IMPACTS TO WETLANDS

## 7.1 Impacted Wetlands and Waterbodies

As part of the on-site assessment, one seasonal marsh covering 0.456 ha, one temporary marsh covering 0.081 ha, one ephemeral waterbody covering 0.162 ha, and two ephemeral drainages will be affected by the development of this project, based on the desktop and field assessments.

Table 4 summarizes the wetlands and waterbodies that will be impacted by the proposed project, including size, potential area of impact, and wetland classification according to Alberta Wetland Classification System (Alberta Environment and Sustainable Resource Development, 2015).

**Table 4 Wetlands and Waterbodies Impacted by the Proposed Development**

| Wetland Location | Approximate Total Size of Waterbody (ha) | Potential Area of Impact (ha) | Area of Waterbody Impacted (%) | Classification |
|---|---|---|---|---|
| **12-6-37-27 W4M (Appendix A: Figure 4 – LC_20210520_028)** | 0.456 | 0.456 | 100 | Seasonal Marsh |
| **12-6-37-27 W4M (Appendix A: Figure 4 – LC_20210520_041)** | 0.081 | 0.081 | 100 | Temporary Marsh |
| **12-6-37-27 W4M (Appendix A: Figure 4 – LC_20210520_049)** | 0.162 | 0.162 | 100 | Ephemeral Waterbody |
| **12-6-37-27 W4M (Appendix A: Figure 4 – LC_20210520_511)** | 112.31 meters | 112.31 meters | 100 | Ephemeral Drainage |
| **12-6-37-27 W4M (Appendix A: Figure 4 – LC_20210520_521)** | 142.41 meters | 142.41 meters | 100 | Ephemeral Drainage |

Seasonal marsh LC-20210520_028, temporary marsh LC_20210520_041, ephemeral waterbody LC_20210520_049, and two ephemeral drainages, LC-20210520_511 and LC-20210520_521, will be completely removed by the proposed development. The total wetland habitat that will be potentially impacted by the proposed development is 0.537 ha, with an additional 0.05 ha of ephemeral waterbody and 254.72 meters of ephemeral drainages. Currently the hydrologic, ecologic, and socio-economic function of these waterbodies are considered low. A *Water Act* application for the proposed impacts to these waterbodies will be submitted for Approval. Compensation for lost waterbody function will be required for seasonal marsh LC_20210520_028 and temporary marsh LC_20210520_041, based on the RWV provided by AEP, as per the Alberta Wetland Policy (Government of Alberta, 2013). Compensation for lost waterbody function will not be required for the ephemeral waterbody LC_20210520_049 or ephemeral drainages LC_20210520_511 and LC_20210520_521.

Adverse effects on the public, including First Nations, public health and safety, and human use due to wetland impacts are not anticipated.

As lost wetland area will require replacement under the *Alberta Wetland Policy*, cumulative effects are expected to be neutral.

## 7.2 Historical and Regional Context

The NW 6-37-27 W4M property has been used as pasture and/or was cultivated land since at least 1950. The proposed project is currently within the Town Boundary on land designated as Residential and Open Space/Park by the Town of Penhold (Map 3 – Future Land Use Concept) (Town of Penhold, 2019). Past *Water Act* and Environmental Protection and Enhancement Act approvals identified no previous developmental approvals within the proposed Public Works Yard area (Alberta Environment and Parks, 2021).

The parcel is located within the Waskasoo Creek flood fringe. Based on aerial imagery, the Waskasoo Creek water course was altered dramatically between 1950 and 1975, reducing the meanders of the creek. This visual realignment was human-impacted, possibly to improve utilization of adjacent agricultural land and/or to redirect flow for irrigation purposes. According to the aerial imagery, Range Road 280 west of the proposed project area was established between 1950 and 1966. To date, this range road remains unpaved. Rural residential driveways/access roads located around the project appear to have been established throughout the 1960s, with few additional approaches present between 2007 and 2018.

Rural residential lands occur west and north of the proposed project area. The Alberta Merged Wetland Inventory identified areas of potential ephemeral water bodies to the north of the proposed project area (Government of Alberta, 2017). These potential ephemeral water bodies are visible on aerial imagery. As per the ABWRET-A assessment (Appendix E), the project area is in Relative Wetland Value Assessment Unit (RWVAU) 1. This RWVAU has an abundance factor of 0, indicating that this area has not experienced greater wetland loss in comparison to other RWVAUs within the White Area of the province.

### 7.2.1 Non-Compliance Activity

The project area has been subject to agricultural practices since at least the 1950s, and the wetlands have been cultivated over several past years. Additionally, a storm drain and drainage ditch are present along the southern edge of the project boundary which is a utility right of way and affects the LC_20210520_028 seasonal marsh and potentially the LC_20210520_041 temporary marsh (Appendix B, Plate 5). This ditch was constructed circa 2012 by others, to allow for drainage from an existing subdivision on the west side of Range Road 280 to Waskasoo Creek. The drainage is located within a registered easement (Registration No.: 132008329) along the southern part of the property (Appendix G) and is excluded from the proposed development area as discussed in this WAIR. At the time of construction, environmental assessments and approvals were not completed for this storm drain and drainage ditch. At the time of preparation of this application, the developers of this infrastructure are in the process of self-reporting this non-compliant activity and will work with AEP to rectify the non-compliance *Water Act* (Chadwick Kunkel, pers. comm, 2021).

# 8 ALIGNMENT WITH WATERSHED PLANS AND MUNICIPAL POLICIES

## 8.1 Watershed Plans

The development of this proposed project was examined to ensure it aligns with recommendations of relevant watershed plans and municipal wetland policies. The proposed project occurs on lands within the South Saskatchewan River Basin, the corresponding Red Deer River Sub-basin, the Red Deer River Watershed, and the Waskasoo Creek Sub Watershed. However, legislative or regulatory management plans have not been created for the above-mentioned sub-basin or watersheds; therefore, the Town of Penhold's Municipal Development Plan will provide the general policies for future development of land in this area which includes wetlands. It should be noted that the project area is near the eastern side of the Red Deer River Reach 2 within the Red Deer River Corridor Integrated Management Plan; however, as this plan applies to Crown land only it will not be referred to in the recommended best management practices.

## 8.2 Town of Penhold Municipal Development Plan

The purpose of the Town of Penhold's Municipal Development Plan is to guide future growth and development to ensure it is sustainable for the citizens of Penhold (Town of Penhold, 2019). The proposed development is located within The Town of Penhold boundary and follows policies documented within the Town of Penhold Municipal Development Plan (Town of Penhold, 2019). The proposed Town of Penhold Public Works Yard aligns with the following plan recommendations, and mitigation measures listed in this plan comply with the *Municipal Government Act* (Government of Alberta, 2000).

Open Space and Environment

- Section 10.4: Environmental Reserve – Buffers Adjacent to Waskasoo Creek:
  - When lands adjacent to Waskasoo Creek are subdivided, a strip of land shall be dedicated as environmental reserve to provide a buffer between the natural feature and the developed area and provide public access to the creek. The width of the required dedication shall be determined in consultation with AEP and shall be no less than 6 m in width.

The proposed development is located greater than 6 m from Waskasoo Creek.

- Section 10.5: Waskasoo Creek Floodplain:
  - The Town shall not permit subdivision and development of land for residential uses within the 1:100 floodplain of Waskasoo creek, as identified in the most current AEP flood hazard mapping for Waskasoo Creek.

Subdivision and development of land for residential use is not proposed as part of this application.

- Section 10.6: Proposed Subdivisions in Waskasoo Floodplain:
  - All subdivision, development, and changes in land use that are proposed within the 1:100 floodplain shall be circulated to AEP for their review and input. Subdivision and development in the floodplain may be considered subject to the following:
    - no development of buildings within the floodway and no construction of landscaping features or other improvements within the floodway that would obstruct the flow of water shall be allowed;

- development shall be restricted to areas within the flood fringe or on sites sufficiently elevated to be considered a flood fringe area without adversely impacting the continuity of the floodway or other properties through the displacement of flood waters; and
- any subdivision and development that is allowed within the 1:100 floodplain shall be undertaken in accordance with AEP requirements for modifications to the floodplain and must use suitable flood proofing techniques.

The proposed application is being submitted to AEP for review. Development of buildings, landscaping features, or other improvements within the floodway that would obstruct the flow of water are not proposed in this application. The proposed development is not anticipated to adversely impact the continuity of the floodway or other properties through the displacement of flood waters. Refer to the attached Stormwater Management Plan for additional details (Appendix F).

- Section 10.17: Conservation Tools:
  - In addition to environmental reserve dedication and possible conservation reserve designation, the Town shall investigate the possible use of such tools as land purchases, land swaps, tax incentives, leasing and conservation agreements or easements, and other similar mechanisms as a means of conserving natural features both within and in the areas surrounding Penhold.

# 9 GEOLOGY AND SOILS

The project is located within the upper Paskapoo Formation (Hamilton, Price, & Langenberg, 1999). The Paskapoo Formation is a stratigraphic unit of Middle to Late Paleocene age in the Western Canada Sedimentary Basin. The Paskapoo Formation is of fluvial origin and consists primarily of sandstones, siltstones, and mudstones (Hamilton, Price, & Langenberg, 1999).

The proposed development is located within Soil Correlation Area 9 (Pedocan Land Evaluation Ltd., 1993). Soils in this area are predominantly Chernozemic with areas of Solonetzic soils. Agricultural Regions of Alberta Soil Inventory Database (AGRASID) mapping identifies one soil polygon in the project area, polygon 13338 (EAPE 10/U1h) (Alberta Agriculture and Forestry, 2021). This unit is an area of undulating, high relief land composed of soils dominated by Orthic Black Chernozems on medium textured sediment deposits or Eluviated Black Chernozems on fine textured water-laid sediment (Alberta Agriculture and Forestry, 2021).

# 10 CATCHMENTS AND DRAINAGE BASINS

Wetland drainage basins were determined and mapped for the project area (Appendix A; Figure 5), based on contour mapping for the project area and known location of developments surrounding the project area (i.e., raised berms). These represent the portions of the project area in which rainfall, snowmelt, and other runoff is captured for each of the waterbody features. The drainage basin related to temporary marsh LC_20210520_041 and seasonal marsh LC_20210520_028 covers approximately 46.48 ha.

# 11 HISTORICAL RESOURCES

The proposed development is not located in an area with Historical Resources Value (Alberta Ministry of Culture, Multiculturalism and Status of Women, 2021). *Historical Resources Act* approval is not required, although Section 31 of the *Historical Resources Act* applies. Section 31 requires that anyone who discovers an historic resource, such as an archaeological, paleontological, historic structure, or Aboriginal Traditional Use site during development activities must cease work and notify the Ministry of Culture, Multiculturalism and Status of Women immediately for further direction on the most appropriate action.

# 12 WETLAND MITIGATION

## 12.1 Avoidance

Relocation of the proposed development to avoid impacts to wetlands was limited due to land ownership and the design of the proposed parcel.

Surrounding environmental limitations to movement of the proposed development include:

- Existing rural residential developments and occupied dwellings to the north and west within The Town of Penhold boundary;
- Existing Waskasoo Creek and creek flood fringe area to the east; and
- Existing utility right-of-ways to the south.

If wetland LC_20210520_028 and LC_20210520_041 were avoided by the proposed development, they would likely become diminished from long-term drying as overland surface flow is drained away from them by construction of the public works yard. Retaining on-site grades to allow overland surface flow to enter these wetlands would likely result in the introduction of sediment and other contaminants from the developed area into these wetlands. Retaining wetlands LC_20210520_028 and LC_20210520_041 is not desired by the developer, as these wetlands provide minimal to no aesthetic value to the property as they have been periodically cultivated and only contain standing water temporarily throughout the year.

## 12.2 Minimization

To minimize the impacts of the proposed development on the environment, the development has been designed to require the least amount of grading possible. To this end, the development has been designed so that surface water will flow towards a stormwater pond built on the east side of the property, which will allow for sediment settling. The pond will outlet to the existing ditch along the south edge of the property, before discharging to Waskasoo Creek to the east. The stormwater pond is in approximately the same location as wetland LC_20210520_028, which occurs within a low spot on the property.

In addition to the minimization of grading, Low Impact Design strategies have been proposed for use in this development. The project area will be dressed in topsoil following construction (Kunkel, Pers. Comm.). This will help to increase water absorption and penetration into the soil and to reduce run off and erosion of soils within the proposed development.

Sediment and erosion control measures will be installed to ensure that any runoff from the access road is mitigated from draining into the adjacent ephemeral waterbody LC_20200520_054, though this waterbody slopes towards the proposed access road.

## 12.3 Stormwater Management

Municipal permits and approvals may be required for stormwater management on the parcel. Approval and/or registration under the *Environmental Protection and Enhancement Act* may also be required.

A stormwater pond for retention of all post-construction surface flow within the development is proposed. Additional stormwater collected by this parcel may be directed towards the stormwater pond (Appendix F).

Notification and/or application for approval under the *Environmental Protection and Enhancement Act* (Government of Alberta, 2000) has been submitted to AEP by Tagish under a separate cover through the Digital Regulatory Assurance System (DRAS; Application No.: DAPP 0001075; Appendix F).

To minimize overall environmental impacts of the project, the stormwater management plan has been designed such that the stormwater pond will be constructed within the lowest elevation portion of the project area. This roughly coincides with the seasonal marsh wetland LC_20210520_028.

If feasible, wetland soils from LC_20210520_028 and LC_20210520_041 will be salvaged during stripping and grading operations and be re-used during the construction of the stormwater pond to preserve the seed bank of wetland species. This will assist in recruitment/establishment of wetland vegetation along the periphery of the stormwater pond and provide a more naturalized aesthetic to the stormwater pond.

## 12.4 Replacement Plan

The proposed development will impact two wetlands, spanning an area 0.537 ha in size, based on the desktop and field assessments. The Town proposes to compensate for the entirety of the wetland areas impacted. In addition to the two wetlands, an additional 0.162 ha of ephemeral waterbody and 254.72 meters of ephemeral drainages will be impacted by the proposed development. As per the Alberta Wetland Policy, compensation is not required for these features (Government of Alberta, 2013).

The Town understands that AEP will require compensation for any lost wetland function. The proposed development will be constructed for long-term use; therefore, the wetlands located within the development will likely experience long-term or permanent loss of function. AEP determines the amount of compensation that is required using the ABWRET-A (Government of Alberta, 2015).

The ABWRET value is used as a multiplier to determine the overall compensation value required. The proposed compensation rates paid by the Town for impacts to wetlands are provided in Table 5. The Town proposes to pay compensation for impacts to wetlands, according to the Alberta Wetland Policy (Government of Alberta, 2013).

**Table 5 Proposed Compensation**

| Wetland Location | Area of Impact (ha) | Percentage of Wetland Impacted (%) | RWV | Replacement Ratio | Total Area of Wetland to Replace (ha) | RWV Assessment Unit | In-lieu Rate ($/ha) | Total Replacement Value |
|---|---|---|---|---|---|---|---|---|
| 12-6-37-27 W4M (Appendix A: Figure 4: LC_20210520_028) | 0.456 | 100 | D | 1:1 | 0.456 | 1 | $19,100 | $8,709.60 |
| 12-6-37-27 W4M (Appendix A: Figure 4: LC_20210520_041) | 0.081 | 100 | D | 1:1 | 0.081 | 1 | $19,100 | $1,547.10 |
| | | | | | | | **Subtotal:** | **$10,256.70** |
| | | | | | | | **5% GST:** | **$512.84** |
| | | | | | | | **Total Compensation Value:** | **$10,769.54** |

The total compensation required for this *Water Act* application is $10,769.54, including 5% GST. Compensation will be paid by the Town to AEP once *Water Act* approval is obtained.

## 12.5 Mitigation

The Town of Penhold proposes the following mitigations during construction of the proposed development to minimize disturbance:

- Topsoil, subsoil, and wetland soils will be stored separately a minimum distance of 1 m apart. Topsoil will be stored intact on a dry area, subsoil piles will be stored on a dry area stripped of topsoil, or on top of a suitable barrier material, whereas wetland soils will be stored on topsoil or on top of a suitable barrier material;
- Once development has been constructed, the project area will be dressed with topsoil;
- Erosion and sediment control (ESC) measures will be installed along the south and east property lines and any other places deemed necessary to prevent the introduction of sediment into Waskasoo Creek and adjacent waterbodies;
- The proposed development will be constructed in dry and/or frozen conditions (where possible) to minimize disturbance to the surrounding lands and species that may inhabit it;
- Efforts will be taken to minimize compaction, rutting, and damage to surrounding vegetation;
- Road grades shall be maintained for proper drainage;
- A Spill Contingency Plan will be in place and proper spill containment equipment will be on-site during construction; and
- No vehicle fueling or maintenance shall take place within the vicinity of the ephemeral waterbody located adjacent to the access road.

## 12.6 Monitoring

As all wetlands within the project boundary will be permanently impacted by the proposed Public Works Yard development, monitoring of water quality/quantity is not proposed. The public works yard will be maintained regularly once constructed and weed control will be completed as required under the Alberta *Weed Control Act* and Weed Control Regulations (Government of Alberta, 2008) (Government of Alberta, 2010).

# 13 LANDOWNERSHIP

The proposed development is located on privately-owned land in the White Area of the province. Copies of the landowner title for the subject property as well as for the easement right of way along the south end of the project area are provided in Appendix G. There is currently no First Nation access, nor has there been since the property was deeded. There is no Crown land in the proposed project area.

Wetlands and waterbodies do not extend across boundary lines into other landowners' properties. Therefore, consent letters from adjacent property owners are not provided.

# 14 OTHER SURVEYS

No additional surveys, other than the recommended pre-construction wildlife sweep, are anticipated. Refer to Section 6.4 of this report for additional details.

# 15 REFERENCES

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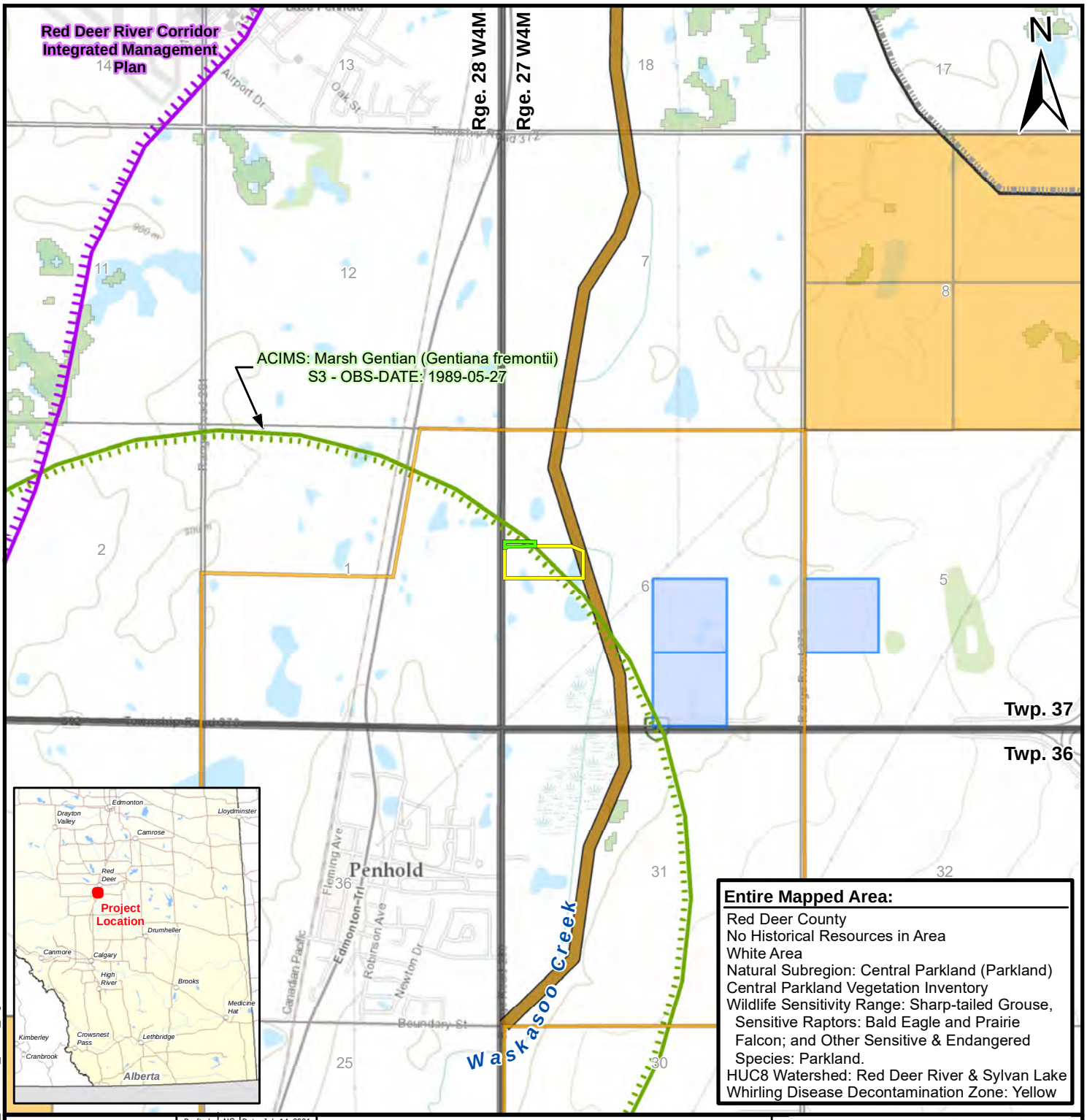
## 15.2 Personal Communication

Kunkel, Chadwick. Senior Project Manager, Tagish Engineering. Email to Amy Krawczyk, Senior Environmental Planner, Ghostpine Environmental Services Ltd. 2021.

# APPENDIX A

# FIGURES




**Entire Mapped Area:**

Red Deer County
No Historical Resources in Area
White Area
Natural Subregion: Central Parkland (Parkland)
Central Parkland Vegetation Inventory
Wildlife Sensitivity Range: Sharp-tailed Grouse, Sensitive Raptors: Bald Eagle and Prairie Falcon; and Other Sensitive & Endangered Species: Parkland.
HUC8 Watershed: Red Deer River & Sylvan Lake
Whirling Disease Decontamination Zone: Yellow

**SCALE:** 1:30,000

250 0 250 500 m

| | | |
|---|---|---|
| Drafted: | NG | Date: July 14, 2021 |
| Approved: | XXX | Revision: 1 |
| Route Source: | | Date: Dec 21, 2020 |
| Survey | | Revision: 0 |

Data Sources:
ESRI World Topographic Map
ATS Grid: AltaLIS 2007.

*AbaData 2.0
**Alberta Merged Wetland Inventory

Please contact Ghostpine Environmental Services Ltd. for all other sources.

*Although we have no reason to doubt the accuracy and completeness of the data used to generate this product, users should be aware that errors in the data may be present.*

Ghostpine Environmental Services Ltd.

## Legend

- Public Works Yard
- Access Road
- Sand & Gravel Deposit Boundary
- Town of Penhold Boundary
- Subregional Integrated Resource Management Plan Boundary
- Class C, RAP: April 16 to June 30
- ACIMS
- HBC Lands
- Spill*
- Marsh**

TAGISH ENGINEERING

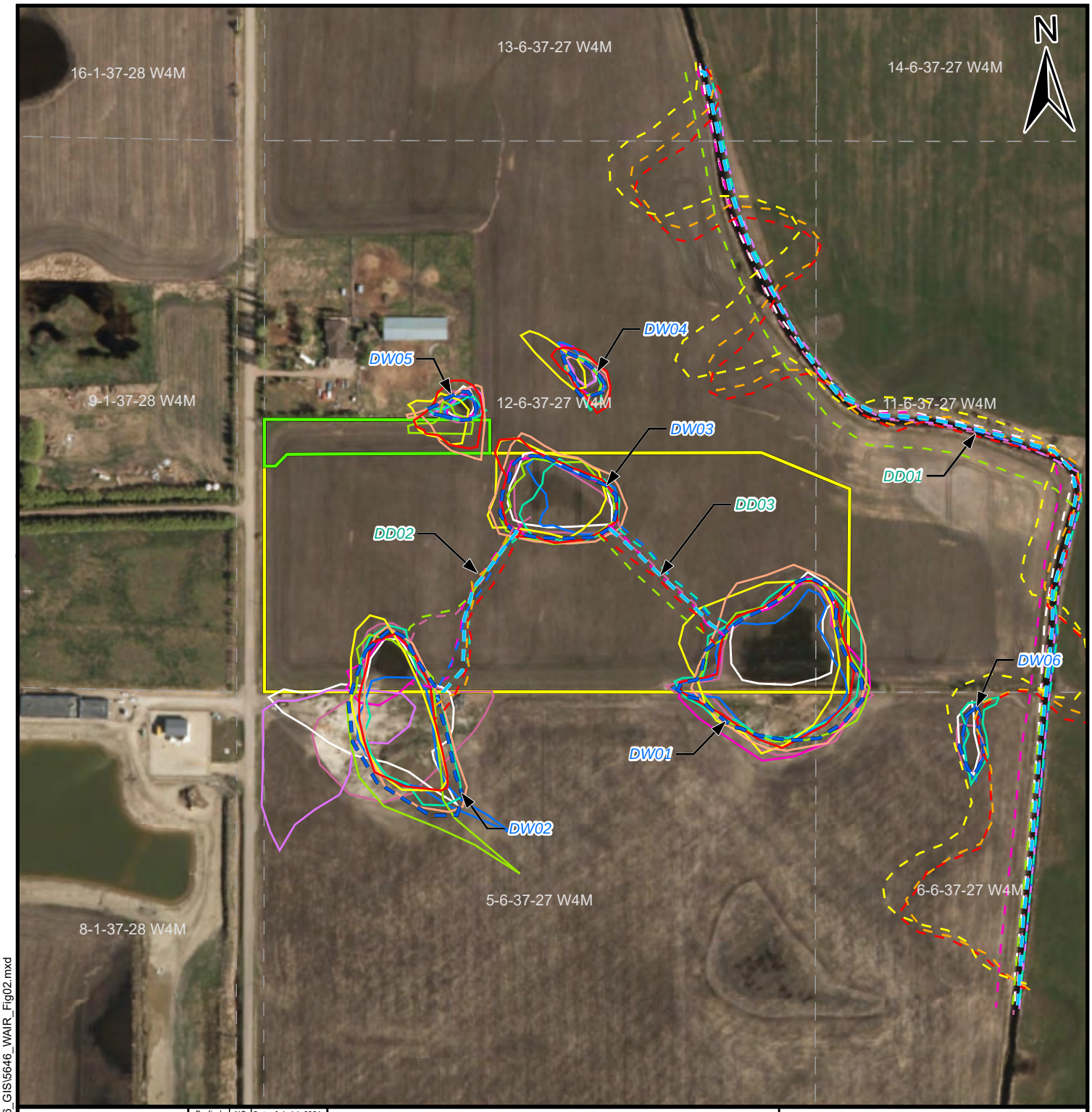
# Regional Location of the Proposed Town of Penhold Public Works Yard in NW 6-37-27 W4M

July 2021

REF.: 5646-200-3
(WAIR)

**Figure 1**

Map Location: \\Sv-gpdata3\gis\01_GISProject\00_5600_Proj\5646_GIS\5646_WAIR_Fig01.mxd




**SCALE:** 1:4,000

25 0 25 50 m

| | | | |
|---|---|---|---|
| Drafted: | NG | Date: July 14, 2021 | |
| Approved: | XXX | Revision: | 3 |
| Route Source: | | Date: Dec 21, 2020 | |
| Survey | | Revision: | 0 |

Data Sources:
Imagery Source: ESRI. Date: 2018/01/15
ATS Grid: AltaLIS 2007.

*Approximate location based on historial aerial imagery review.

Please contact Ghostpine Environmental Services Ltd. for all other sources.

*Although we have no reason to doubt the accuracy and completeness of the data used to generate this product, users should be aware that errors in the data may be present.*

Ghostpine Environmental Services Ltd.

## Legend

**Routing:**

- Public Works Yard
- Access Road

**Desktop Delineations*:**

- 1950
- 1966
- 1969
- 1975
- 1977
- 1983
- 1998
- 2002
- 2007
- 2018
- Best-Fit

TAGISH ENGINEERING

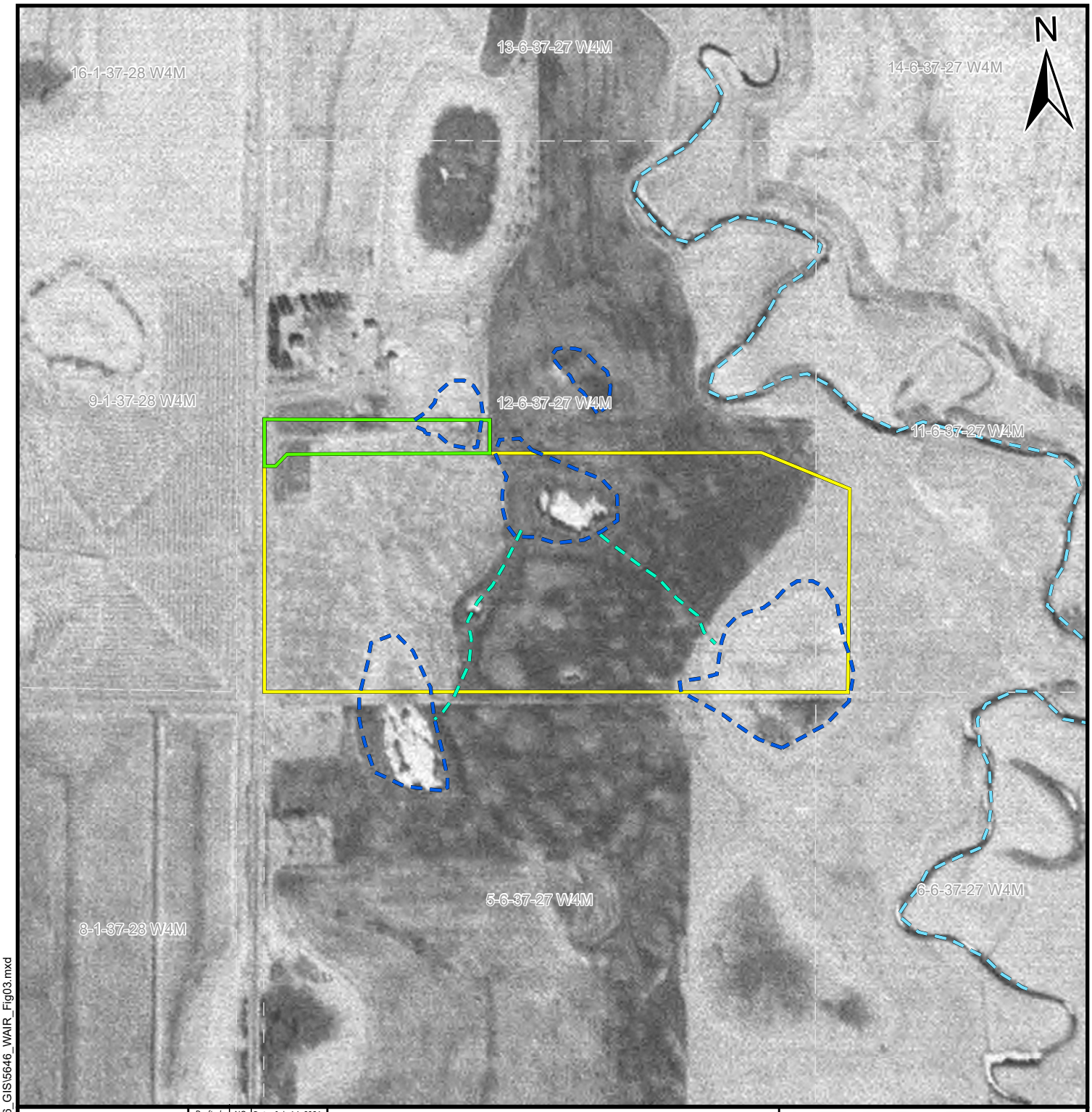
# Amalgamated Desktop Delineated Wetlands for the Proposed Town of Penhold Public Works Yard in NW 6-37-27 W4M

July 2021

REF.: 5646-200-3 (WAIR)

**Figure 2**

Map Location: \\Sv-gpdata3\gis\01_GISProject\00_5600_Proj\5646_GIS\5646_WAIR_Fig02.mxd




**SCALE:** 1:4,000

25 0 25 50 m

| | | | |
|---|---|---|---|
| Drafted: | NG | Date: July 14, 2021 | |
| Approved: | XXX | Revision: | 1 |
| Route Source: | 2 | | |
| Survey | | Revision: | 0 |

Data Sources:
Imagery Source: ESRI. Dte: 2018/01/15
Aerial Photography from the Air Photo Distribution Office, Alberta Environment and Parks (under Crown copyright).
Date of Imagery: 1950. 1966. 1969. 1975. 1977. 1983. 1998. 2002. & 2007.
ATS Grid: AltaLIS 2007.

*Approximate location based on historial aerial imagery review.

Please contact Ghostpine Environmental Services Ltd. for all other sources.

*Although we have no reason to doubt the accuracy and completeness of the data used to generate this product, users should be aware that errors in the data may be present.*

Ghostpine Environmental Services Ltd.

## Legend

**Routing:**

- Public Works Yard
- Access Road

**Desktop Delineations*:**

- Canal
- Ephemeral Drainage
- Small Permanent Watercourse
- Wetland Boundary

TAGISH ENGINEERING

# Historical Imagery Review for the Proposed Town of Penhold Public Works Yard in NW 6-37-27 W4M

**September 30, 1950**

July 2021

REF.: 5646-200-3 (WAIR)

**Figure 3-A**

Map Location: \\Sv-gpdata3\gis\01_GISProject\00_5600_Proj\5646_GIS\5646_WAIR_Fig03.mxd


**SCALE:** 1:4,000

25 0 25 50 m

| | | | |
|---|---|---|---|
| Drafted: | NG | Date: July 14, 2021 | |
| Approved: | XXX | Revision: | 1 |
| Route Source: | 2 | | |
| Survey | | Revision: | 0 |

Data Sources:
Imagery Source: ESRI. Dte: 2018/01/15
Aerial Photography from the Air Photo Distribution Office, Alberta Environment and Parks (under Crown copyright).
Date of Imagery: 1950. 1966. 1969. 1975. 1977. 1983. 1998. 2002. & 2007.
ATS Grid: AltaLIS 2007.

*Approximate location based on historial aerial imagery review.

Please contact Ghostpine Environmental Services Ltd. for all other sources.

*Although we have no reason to doubt the accuracy and completeness of the data used to generate this product, users should be aware that errors in the data may be present.*

Ghostpine Environmental Services Ltd.

## Legend

**Routing:**

- Public Works Yard
- Access Road

**Desktop Delineations*:**

- Canal
- Ephemeral Drainage
- Small Permanent Watercourse
- Wetland Boundary

TAGISH ENGINEERING

# Historical Imagery Review for the Proposed Town of Penhold Public Works Yard in NW 6-37-27 W4M

**August 21, 1966**

July 2021

REF.: 5646-200-3 (WAIR)

**Figure 3-B**

Map Location: \\Sv-gpdata3\gis\01_GISProject\00_5600_Proj\5646_GIS\5646_WAIR_Fig03.mxd


SCALE: 1:4,000

m
25 0 25 50

| | | | |
|---|---|---|---|
| Drafted: | NG | Date: July 14, 2021 | |
| Approved: | XXX | Revision: | 1 |
| Route Source: | 2 | | |
| Survey | | Revision: | 0 |

Data Sources:
Imagery Source: ESRI. Dte: 2018/01/15
Aerial Photography from the Air Photo Distribution Office, Alberta Environment and Parks (under Crown copyright).
Date of Imagery: 1950. 1966. 1969. 1975. 1977. 1983. 1998. 2002. & 2007.
ATS Grid: AltaLIS 2007.

*Approximate location based on historial aerial imagery review.

Please contact Ghostpine Environmental Services Ltd. for all other sources.

*Although we have no reason to doubt the accuracy and completeness of the data used to generate this product, users should be aware that errors in the data may be present.*

Ghostpine Environmental Services Ltd.

## Legend

**Routing:**

- Public Works Yard
- Access Road

**Desktop Delineations*:**

- Canal
- Ephemeral Drainage
- Small Permanent Watercourse
- Wetland Boundary

TAGISH ENGINEERING

# Historical Imagery Review for the Proposed Town of Penhold Public Works Yard in NW 6-37-27 W4M

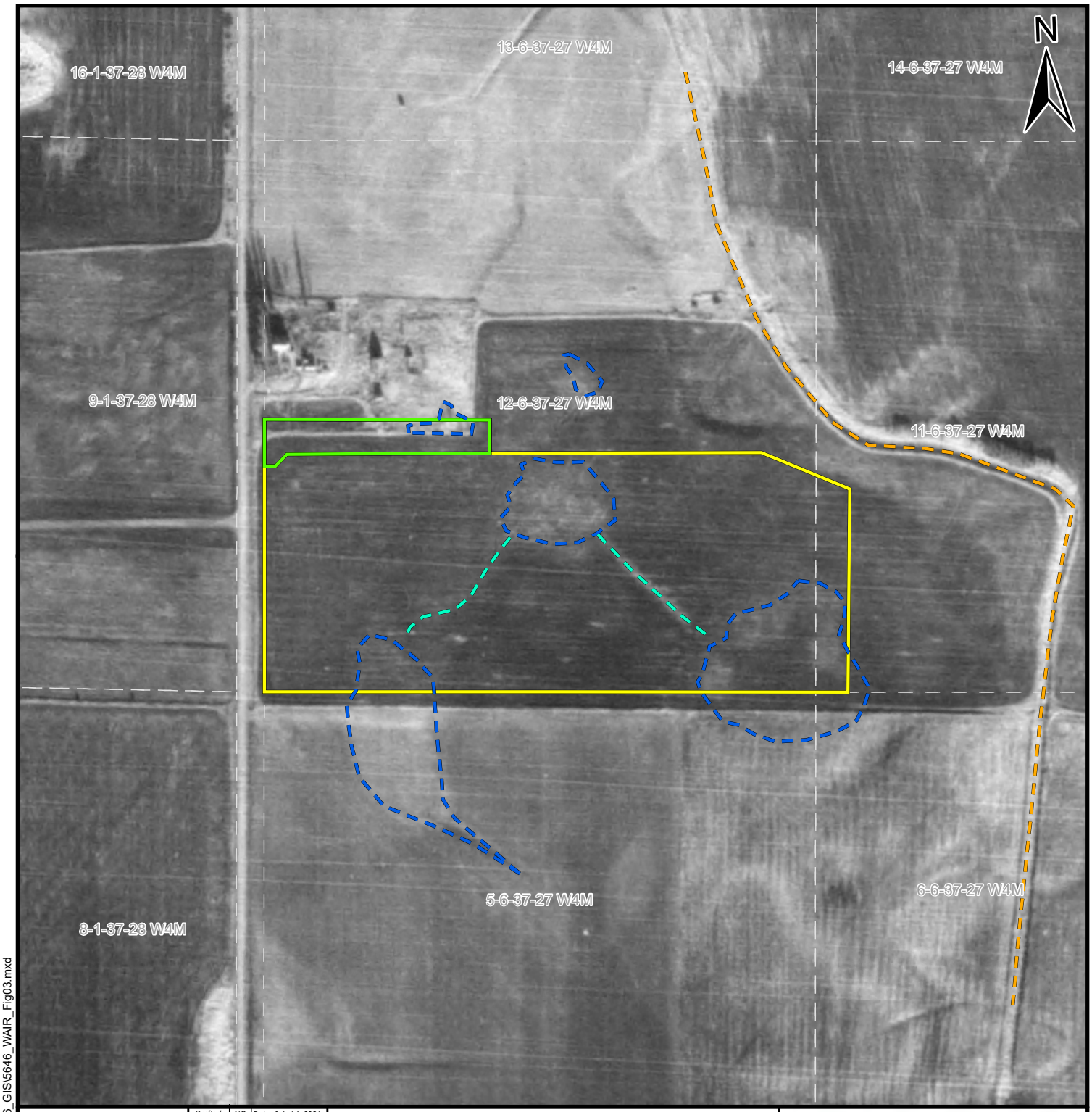
**July 2, 1969**

July 2021

REF.: 5646-200-3
(WAIR)

**Figure 3-C**

Map Location: \\Sv-gpdata3\gis\01_GISProject\00_5600_Proj\5646_GIS\5646_WAIR_Fig03.mxd




**SCALE:** 1:4,000

m
25 0 25 50

| | | | |
|---|---|---|---|
| Drafted: | NG | Date: July 14, 2021 | |
| Approved: | XXX | Revision: | 1 |
| Route Source: | 2 | | |
| Survey | | Revision: | 0 |

Data Sources:
Imagery Source: ESRI. Dte: 2018/01/15
Aerial Photography from the Air Photo Distribution Office, Alberta Environment and Parks (under Crown copyright).
Date of Imagery: 1950. 1966. 1969. 1975. 1977. 1983. 1998. 2002. & 2007.
ATS Grid: AltaLIS 2007.

*Approximate location based on historial aerial imagery review.

Please contact Ghostpine Environmental Services Ltd. for all other sources.

*Although we have no reason to doubt the accuracy and completeness of the data used to generate this product, users should be aware that errors in the data may be present.*

Ghostpine Environmental Services Ltd.

## Legend

**Routing:**

- Public Works Yard
- Access Road

**Desktop Delineations*:**

- Canal
- Ephemeral Drainage
- Small Permanent Watercourse
- Wetland Boundary

TAGISH ENGINEERING

# Historical Imagery Review for the Proposed Town of Penhold Public Works Yard in NW 6-37-27 W4M

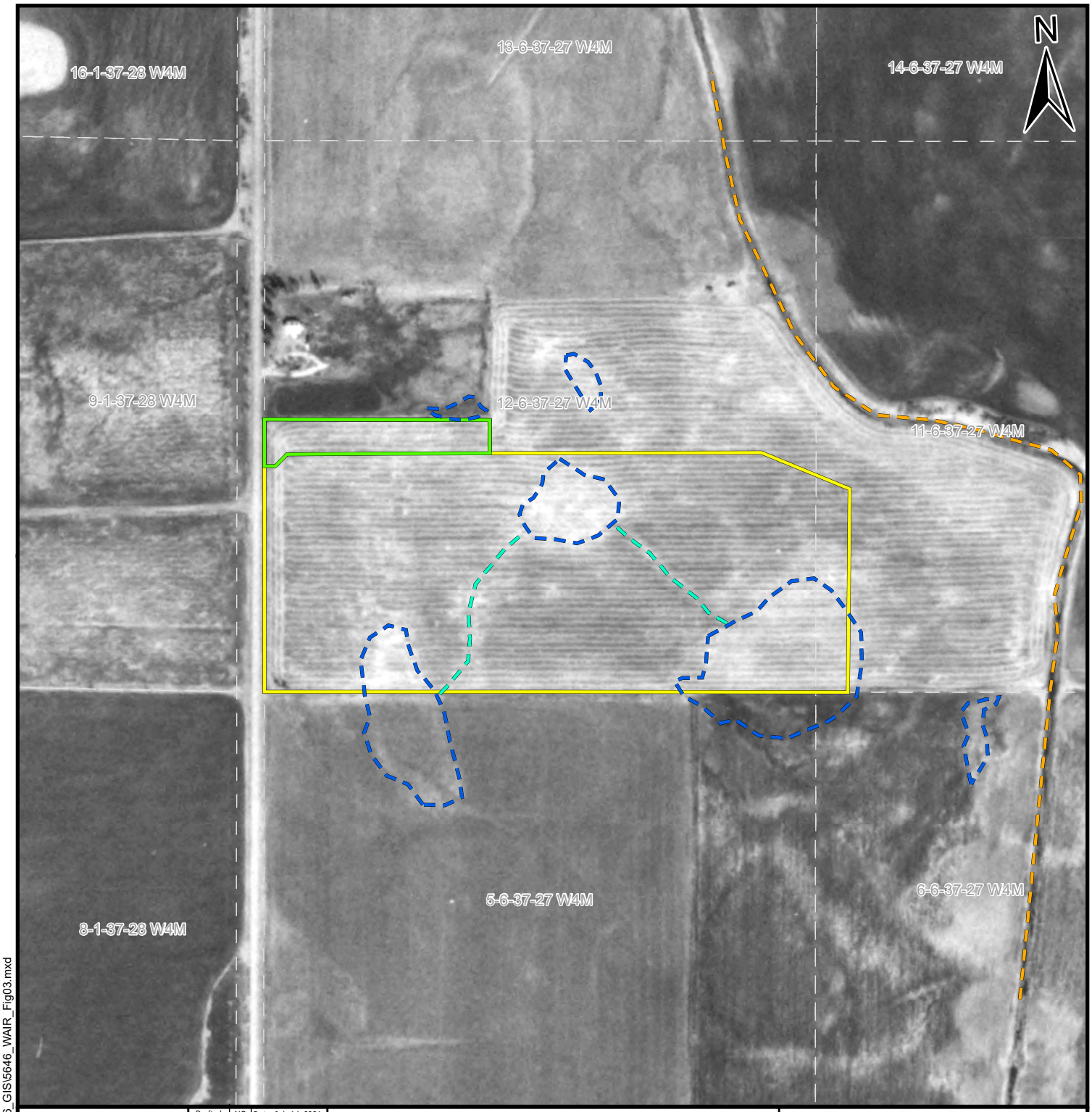
**November 17, 1975**

July 2021

REF.: 5646-200-3
(WAIR)

**Figure 3-D**

Map Location: \\Sv-gpdata3\gis\01_GISProject\00_5600_Proj\5646_GIS\5646_WAIR_Fig03.mxd




**SCALE:** 1:4,000

m
25 0 25 50

| | | | |
|---|---|---|---|
| Drafted: | NG | Date: July 14, 2021 | |
| Approved: | XXX | Revision: | 1 |
| Route Source: | 2 | | |
| Survey | | Revision: | 0 |

Data Sources:
Imagery Source: ESRI. Dte: 2018/01/15
Aerial Photography from the Air Photo Distribution Office, Alberta Environment and Parks (under Crown copyright).
Date of Imagery: 1950. 1966. 1969. 1975. 1977. 1983. 1998. 2002. & 2007.
ATS Grid: AltaLIS 2007.

*Approximate location based on historial aerial imagery review.

Please contact Ghostpine Environmental Services Ltd. for all other sources.

*Although we have no reason to doubt the accuracy and completeness of the data used to generate this product, users should be aware that errors in the data may be present.*

Ghostpine Environmental Services Ltd.

## Legend

**Routing:**

- Public Works Yard
- Access Road

**Desktop Delineations*:**

- Canal
- Ephemeral Drainage
- Small Permanent Watercourse
- Wetland Boundary

TAGISH ENGINEERING

# Historical Imagery Review for the Proposed Town of Penhold Public Works Yard in NW 6-37-27 W4M

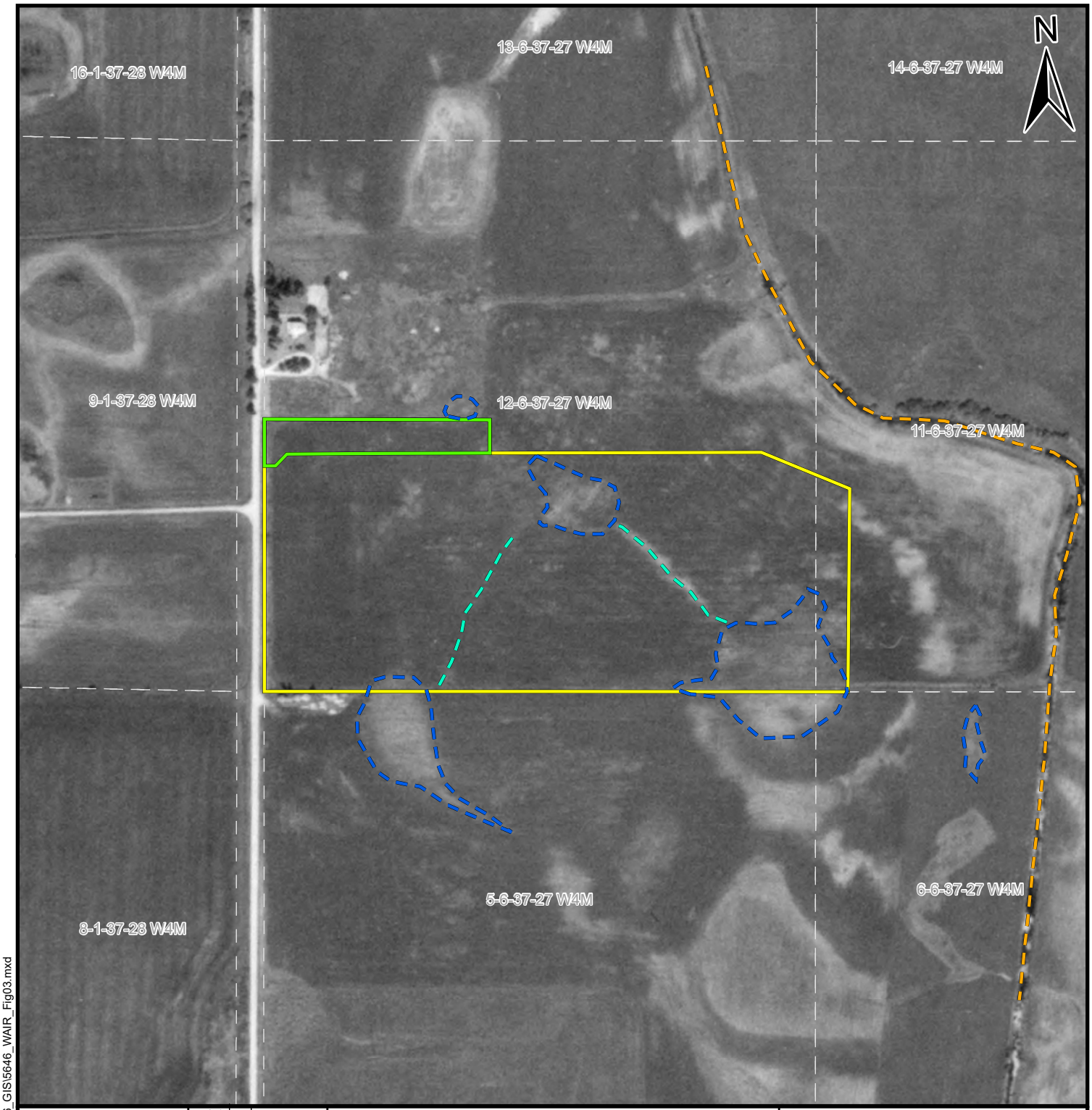
**April 26, 1977**

July 2021

REF.: 5646-200-3
(WAIR)

**Figure 3-E**

Map Location: \\Sv-gpdata3\gis\01_GISProject\00_5600_Proj\5646_GIS\5646_WAIR_Fig03.mxd




**SCALE:** 1:4,000

m
25 0 25 50

| | | | |
|---|---|---|---|
| Drafted: | NG | Date: July 14, 2021 | |
| Approved: | XXX | Revision: | 1 |
| Route Source: | 2 | | |
| Survey | | Revision: | 0 |

Data Sources:
Imagery Source: ESRI. Dte: 2018/01/15
Aerial Photography from the Air Photo Distribution Office, Alberta Environment and Parks (under Crown copyright).
Date of Imagery: 1950. 1966. 1969. 1975. 1977. 1983. 1998. 2002. & 2007.
ATS Grid: AltaLIS 2007.

*Approximate location based on historial aerial imagery review.

Please contact Ghostpine Environmental Services Ltd. for all other sources.

*Although we have no reason to doubt the accuracy and completeness of the data used to generate this product, users should be aware that errors in the data may be present.*

Ghostpine Environmental Services Ltd.

## Legend

**Routing:**

- Public Works Yard
- Access Road

**Desktop Delineations*:**

- Canal
- Ephemeral Drainage
- Small Permanent Watercourse
- Wetland Boundary

TAGISH ENGINEERING

# Historical Imagery Review for the Proposed Town of Penhold Public Works Yard in NW 6-37-27 W4M

**July 18, 1983**

July 2021

REF.: 5646-200-3
(WAIR)

**Figure 3-F**

Map Location: \\Sv-gpdata3\gis\01_GISProject\00_5600_Proj\5646_GIS\5646_WAIR_Fig03.mxd


SCALE: 1:4,000

m
25 0 25 50

| | | | |
|---|---|---|---|
| Drafted: | NG | Date: July 14, 2021 | |
| Approved: | XXX | Revision: | 1 |
| Route Source: | 2 | | |
| Survey | | Revision: | 0 |

Data Sources:
Imagery Source: ESRI. Dte: 2018/01/15
Aerial Photography from the Air Photo Distribution Office, Alberta Environment and Parks (under Crown copyright).
Date of Imagery: 1950. 1966. 1969. 1975. 1977. 1983. 1998. 2002. & 2007.
ATS Grid: AltaLIS 2007.

*Approximate location based on historial aerial imagery review.

Please contact Ghostpine Environmental Services Ltd. for all other sources.

*Although we have no reason to doubt the accuracy and completeness of the data used to generate this product, users should be aware that errors in the data may be present.*

Ghostpine Environmental Services Ltd.

## Legend

**Routing:**

- Public Works Yard
- Access Road

**Desktop Delineations*:**

- Canal
- Ephemeral Drainage
- Small Permanent Watercourse
- Wetland Boundary

TAGISH ENGINEERING

# Historical Imagery Review for the Proposed Town of Penhold Public Works Yard in NW 6-37-27 W4M

**May 4, 1998**

July 2021

REF.: 5646-200-3
(WAIR)

**Figure 3-G**

Map Location: \\Sv-gpdata3\gis\01_GISProject\00_5600_Proj\5646_GIS\5646_WAIR_Fig03.mxd


**SCALE:** 1:4,000

m
25 0 25 50

| | | | |
|---|---|---|---|
| Drafted: | NG | Date: July 14, 2021 | |
| Approved: | XXX | Revision: | 1 |
| Route Source: | 2 | | |
| Survey | | Revision: | 0 |

Data Sources:
Imagery Source: ESRI. Dte: 2018/01/15
Aerial Photography from the Air Photo Distribution Office, Alberta Environment and Parks (under Crown copyright).
Date of Imagery: 1950. 1966. 1969. 1975. 1977. 1983. 1998. 2002. & 2007.
ATS Grid: AltaLIS 2007.

*Approximate location based on historial aerial imagery review.

Please contact Ghostpine Environmental Services Ltd. for all other sources.

*Although we have no reason to doubt the accuracy and completeness of the data used to generate this product, users should be aware that errors in the data may be present.*

Ghostpine Environmental Services Ltd.

## Legend

**Routing:**

- Public Works Yard
- Access Road

**Desktop Delineations*:**

- Canal
- Ephemeral Drainage
- Small Permanent Watercourse
- Wetland Boundary

TAGISH ENGINEERING

# Historical Imagery Review for the Proposed Town of Penhold Public Works Yard in NW 6-37-27 W4M

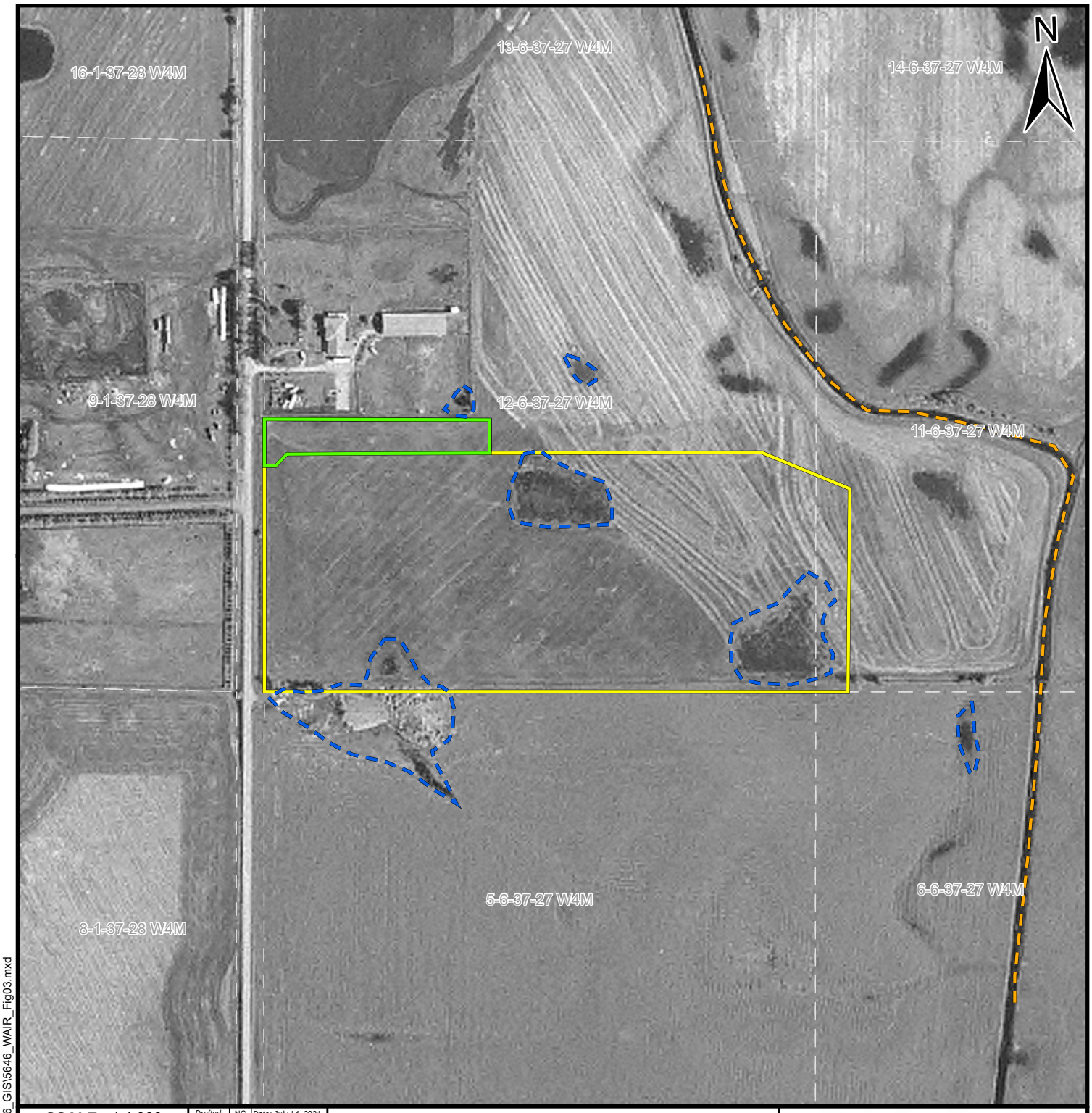
**August 17, 2002**

July 2021

REF.: 5646-200-3
(WAIR)

**Figure 3-H**

Map Location: \\Sv-gpdata3\gis\01_GISProject\00_5600_Proj\5646_GIS\5646_WAIR_Fig03.mxd




SCALE: 1:4,000

25 0 25 50 m

| | | | |
|---|---|---|---|
| Drafted: | NG | Date: July 14, 2021 | |
| Approved: | XXX | Revision: | 1 |
| Route Source: | 2 | | |
| Survey | | Revision: | 0 |

Data Sources:
Imagery Source: ESRI. Dte: 2018/01/15
Aerial Photography from the Air Photo Distribution Office, Alberta Environment and Parks (under Crown copyright).
Date of Imagery: 1950. 1966. 1969. 1975. 1977. 1983. 1998. 2002. & 2007.
ATS Grid: AltaLIS 2007.

*Approximate location based on historial aerial imagery review.

Please contact Ghostpine Environmental Services Ltd. for all other sources.

*Although we have no reason to doubt the accuracy and completeness of the data used to generate this product, users should be aware that errors in the data may be present.*

Ghostpine Environmental Services Ltd.

## Legend

**Routing:**

- Public Works Yard
- Access Road

**Desktop Delineations*:**

- Canal
- Ephemeral Drainage
- Small Permanent Watercourse
- Wetland Boundary

TAGISH ENGINEERING

# Historical Imagery Review for the Proposed Town of Penhold Public Works Yard in NW 6-37-27 W4M

**June 1, 2007**

July 2021

REF.: 5646-200-3 (WAIR)

**Figure 3-I**

Map Location: \\Sv-gpdata3\gis\01_GISProject\00_5600_Proj\5646_GIS\5646_WAIR_Fig03.mxd


**SCALE:** 1:4,000

25 0 25 50 m

| | | | |
|---|---|---|---|
| Drafted: | NG | Date: July 14, 2021 | |
| Approved: | XXX | Revision: | 1 |
| Route Source: | 2 | | |
| Survey | | Revision: | 0 |

Data Sources:
Imagery Source: ESRI. Dte: 2018/01/15
Aerial Photography from the Air Photo Distribution Office, Alberta Environment and Parks (under Crown copyright).
Date of Imagery: 1950. 1966. 1969. 1975. 1977. 1983. 1998. 2002. & 2007.
ATS Grid: AltaLIS 2007.

*Approximate location based on historial aerial imagery review.

Please contact Ghostpine Environmental Services Ltd. for all other sources.

*Although we have no reason to doubt the accuracy and completeness of the data used to generate this product, users should be aware that errors in the data may be present.*

Ghostpine Environmental Services Ltd.

## Legend

**Routing:**

- Public Works Yard
- Access Road

**Desktop Delineations*:**

- Canal
- Ephemeral Drainage
- Small Permanent Watercourse
- Wetland Boundary

TAGISH ENGINEERING

# Historical Imagery Review for the Proposed Town of Penhold Public Works Yard in NW 6-37-27 W4M

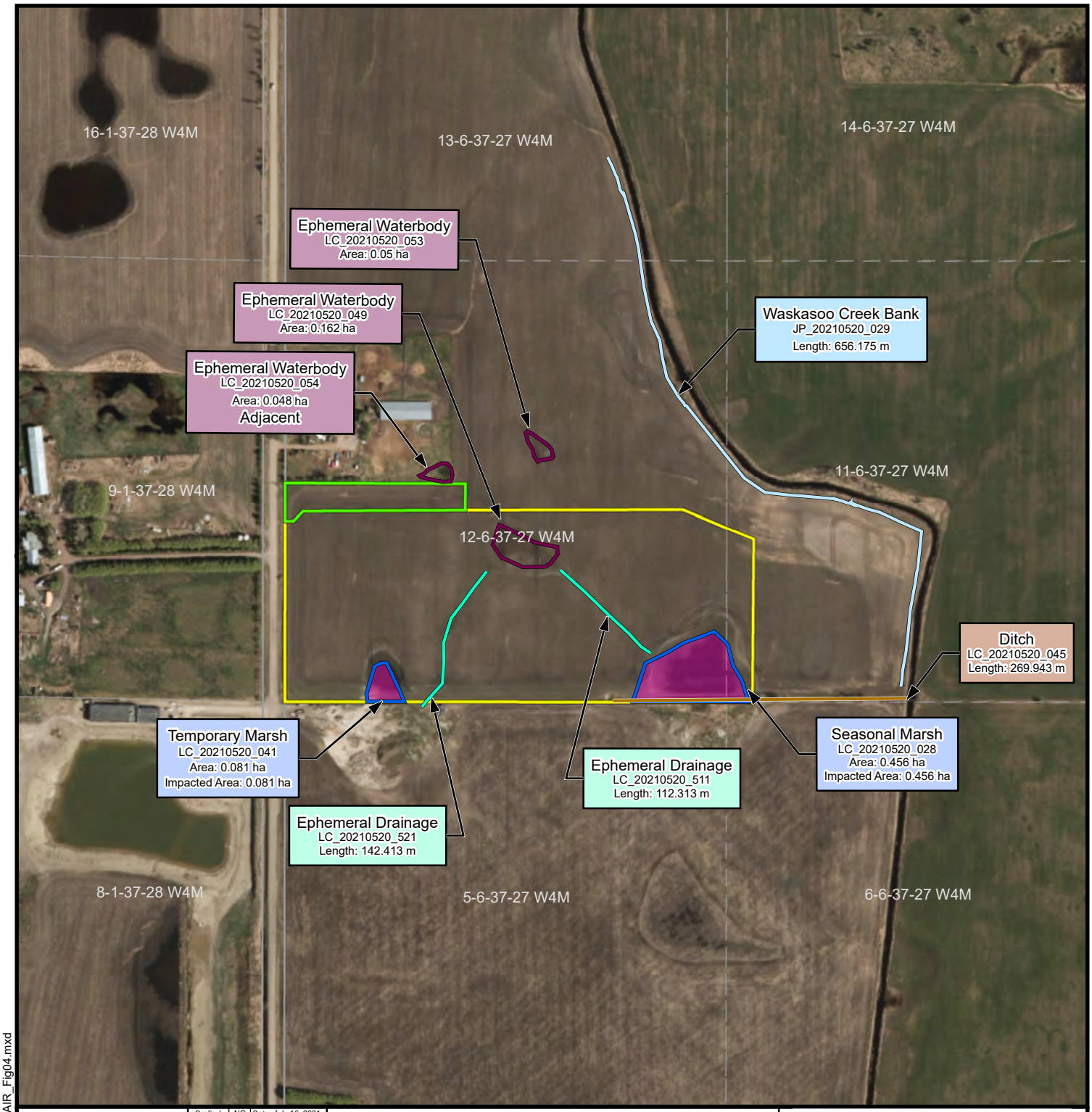
**January 15, 2018**

July 2021

REF.: 5646-200-3
(WAIR)

**Figure 3-J**

Map Location: \\Sv-gpdata3\gis\01_GISProject\00_5600_Proj\5646_GIS\5646_WAIR_Fig03.mxd




Map Location: Y:\01_GISProject\00_5600_Proj\5646_GIS\5646_WAIR_Fig04.mxd

**SCALE:** 1:5,000

m
40 0 40 80

| | | | |
|---|---|---|---|
| Drafted: | NG | Date: July 16, 2021 | |
| Approved: | XXX | Revision: | 3 |
| Route Source: | | Date: Dec 21, 2020 | |
| Survey | | Revision: | 0 |

Data Sources:
Imagery Source: ESRI. Dte: 2018/01/15
ATS Grid: AltaLIS 2007.

*Approximate location based on field survey.

Please contact Ghostpine Environmental Services Ltd. for all other sources.

*Although we have no reason to doubt the accuracy and completeness of the data used to generate this product, users should be aware that errors in the data may be present.*

Ghostpine Environmental Services Ltd.

## Legend

**Routing:**

- Public Works Yard
- Access Road

**Biophysical Issues*:**

- Ephemeral Drainage
- Ditch
- Waskasoo Creek Bank
- Ephemeral Waterbody
- Wetland Boundary
- Impacted Wetland

TAGISH ENGINEERING

# Field Verified Waterbodies and Drainages for the Proposed Town of Penhold Public Works Yard in NW 6-37-27 W4M

July 2021

REF.: 5646-200-3
(WAIR)

**Figure 4**


**SCALE:** 1:10,000

80 0 80 160 m

| | | | |
|---|---|---|---|
| Drafted: | NG | Date: July 14, 2021 | |
| Approved: | XXX | Revision: | 2 |
| Route Source: | | Date: Dec 21, 2020 | |
| Survey | | Revision: | 0 |

Data Sources:
Imagery Source: ESRI. Dte: 2018/01/15
ATS Grid: AltaLIS 2007.

*Approximate location based on spatial analysis & field survey.

Please contact Ghostpine Environmental Services Ltd. for all other sources.

*Although we have no reason to doubt the accuracy and completeness of the data used to generate this product, users should be aware that errors in the data may be present.*

Ghostpine Environmental Services Ltd.

## Legend

**Routing:**

- Public Works Yard
- Access Road

**Water Resources*:**

- Wetland Drainage Basin

**Base Layers:**

- 5 m Contours
- 1 m Contours

TAGISH ENGINEERING

# Wetland Drainages Basin for the Proposed Town of Penhold Public Works Yard in NW 6-37-27 W4M

July 2021

REF.: 5646-200-3
(WAIR)

**Figure 5**

Map Location: \\Sv-gpdata3\gis\01_GISProject\00_5600_Proj\5646_GIS\5646_WAIR_Fig05.mxd

# APPENDIX B

# WETLAND PHOTO PLATES

| Plate 1 |
| --- |
| **Date**: May 20, 2021 |
| **Location of Photo**: NW 6-37-27 W4M, 12 U 304568 5781624 |
| **Photo Direction**: East-southeast |
| **Description**: Wetland LC_20210520_028, a seasonal marsh containing standing water (Appendix A: Figure 4: LC_20210520_028). |


| Plate 2 |
| --- |
| **Date**: May 20, 2021 |
| **Location of Photo**: NW 6-37-27 W4M, 12 U 304318 5781633 |
| **Photo Direction**: Southeast |
| **Description**: Wetland LC_20210520_041 (temporary marsh) showing a slight upward slope to the right. Rows of taller grass demonstrates this wetland has been cultivated in the past (Appendix A: Figure 4: LC_20210520_041) |

| Plate 3 |
| --- |
| **Date**: May 20, 2021 |
| **Location of Photo**: NW 6-37-27 W4M 12 U 304497 5781743 |
| **Photo Direction**: Southeast |
| **Description**: Example of ephemeral water bodies which have been ploughed (Appendix A: Figure 4: LC_20210520_049, LC_20210520_053) |

| Plate 4 |
| --- |
| **Date**: May 20, 2021 |
| **Location of Photo**: NW 6-37-27 W4M 12U 304365 5781807 |
| **Photo Direction**: Northwest |
| **Description**: Ephemeral waterbody showing the ground sloping away from the building. (Appendix A: Figure 4: LC_20210520_054) |

**Plate 5**

**Date**: May 20, 2021

**Location of Photo**: NW 6-37-27 W4M, 12U 304546 5781617

**Photo Direction**: Southwest

**Description**: The culvert and ditch which have been constructed along the south fence/property line which transects the seasonal and temporary marshes (Appendix A: Figure 4:LC_20210520_045).

# APPENDIX C

# DOCUMENTATION OF IMAGERY SOURCES USED TO IDENTIFY AND DELINEATE WETLAND BOUNDARIES

**Table C-1 Historical Precipitation Data and Photo Review**

| Wetland/ Waterbody ID | Legal Land Location | | | | | Alberta Wetland Class | Photo Date & ID Aerial imagery from the AEP Air Photo Distribution Office unless otherwise noted | Season[a] | Precipitation Departure from yearly Average[b] | Waterbody Basin, Water, and Vegetation[c] | Aerial Photograph Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Sec | Twp | Rg | M | Qtr | | | | | | |
| LC_20210520_028 | 6 | 37 | 27 | 4 | NW | Seasonal Graminoid Marsh (M-G-III) | Date: Sep. 30, 1950<br>Project #: 49-83A<br>Roll: AS 0155<br>Line: 5203<br>Photo: 94<br>Source: AEP | F | No precipitation data is available for this year. | Basin: E-75, L-25,<br>Water: Wet<br>Veg: DV<br>Type: G | Waterbody appears to have more water south of the property line and has been cultivated north of the line. |
| | | | | | | | Date: Aug. 21, 1966<br>Project #: 66-83A<br>Roll: AS0948<br>Line: 5204<br>Photo: 38<br>Source: AEP | Sum | • 427.84 mm<br>• D | Basin: E-30, L-70<br>Water: Wet<br>Veg: DV<br>Type: G | Appears to have graminoid vegetation with no standing water.<br>A dugout has been constructed in Waskasoo creek with an inlet and outlet. |
| | | | | | | | Date: Jul. 2, 1969<br>Project #: 69-167 83A<br>Roll: AS-1017<br>Line: 5203<br>Photo: 32<br>Source: AEP | Sum | • 503.94 mm<br>• W | Basin: E-15, L-85<br>Water: Dry<br>Veg: DV<br>Type: G | Wetter than previous photo with no other changes. |
| | | | | | | | Date: Nov. 17, 1975<br>Project #: 75-168<br>Roll: AS 1439<br>Line: 7<br>Photo: 15<br>Source: AEP | F | • 443.76 mm<br>• D to N | Basin: E-30, L-70<br>Water: W<br>Veg: DV<br>Type: C | Wetland has been cultivated on both sides of the property line.<br>Waskasoo creek has been trenched, altering its meander. |

| Wetland/ Waterbody ID | Legal Land Location | | | | | Alberta Wetland Class | Photo Date & ID Aerial imagery from the AEP Air Photo Distribution Office unless otherwise noted | Season[a] | Precipitation Departure from yearly Average[b] | Waterbody Basin, Water, and Vegetation[c] | Aerial Photograph Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Sec | Twp | Rg | M | Qtr | | | | | | |
| | | | | | | | Date: Apr. 26, 1977<br>Project #: S77-181<br>Roll: AS2959<br>Line: 1<br>Photo: 229<br>Source: AEP | Sp | • 519.17 mm<br>• W | Basin: E-80, L-20<br>Water: Dry<br>Veg: DV<br>Type: C | Appears more heavily cultivated north of the property line. |
| | | | | | | | Date: Jul. 18, 1983<br>Project #: 8-081 83A<br>Roll: AS-2737<br>Line: 7<br>Photo: 250<br>Source: AEP | Sum | • 369.22 mm<br>• D | Basin: E-100<br>Water: Dry<br>Veg: DV<br>Type: C | Less distinct than previous years; still appears cultivated. |
| | | | | | | | Date: May 4, 1998<br>Project #: 98-097A 83A<br>Roll: AS4967<br>Line: 17A<br>Photo: 22<br>Source: AEP | Sp | • 486.09 mm<br>• N | Basin: E-100<br>Water: Dry<br>Veg: DVI<br>Type: C | Wetland is very faint and was not desktop delineated in this year. |
| | | | | | | | Date: Aug. 17, 2002<br>Project #: 02-076<br>Roll: AS5235<br>Line: 7<br>Photo: 250<br>Source: AEP | Sum | • 394.79 mm<br>• L | Basin: E-95, L-5<br>Water: Wet<br>Veg: DV<br>Type: C | Wetland appears to have a different characteristic south of the property line from the north end. Standing water in the center of the wetland adjacent to the property boundary. Remains cultivated. |

| Wetland/ Waterbody ID | Legal Land Location | | | | | Alberta Wetland Class | Photo Date & ID Aerial imagery from the AEP Air Photo Distribution Office unless otherwise noted | Season[a] | Precipitation Departure from yearly Average[b] | Waterbody Basin, Water, and Vegetation[c] | Aerial Photograph Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Sec | Twp | Rg | M | Qtr | | | | | | |
| | | | | | | | Date: Jun. 2, 2007<br>Project #:<br>07-021 83A SW<br>Roll: AS5407<br>Line: n/a<br>Photo: 217<br>Source: AEP | Sp | • 591.73 mm<br>• W | Basin: E-5, L-95<br>Water: Wet<br>Veg: DV<br>Type: C | Appears wetter than surrounding crop land |
| | | | | | | | Date: Jan. 15, 2018<br>Project #: n/a<br>Roll: n/a<br>Line: n/a<br>Photo: n/a<br>Source: ESRI® | Sp | • 362.9 mm<br>• D | Basin: E-30 L-70<br>Water: Wet<br>Veg: DV<br>Type: C | Standing water appears to be present with a possible ditch running east to Waskasoo Creek. Wetland is dry south of the property line |

| Wetland/ Waterbody ID | Legal Land Location | | | | | Alberta Wetland Class | Photo Date & ID Aerial imagery from the AEP Air Photo Distribution Office unless otherwise noted | Season[a] | Precipitation Departure from yearly Average[b] | Waterbody Basin, Water, and Vegetation[c] | Aerial Photograph Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Sec | Twp | Rg | M | Qtr | | | | | | |
| LC_20210520_041 | 6 | 37 | 27 | 4 | NW | Temporary Graminoid Marsh (M-G-II) | Date: Sep. 30, 1950<br>Project #: 49-83A<br>Roll: AS 0155<br>Line: 5203<br>Photo: 94<br>Source: AEP | F | No precipitation data is present for this year. | Basin: E-50, L-50<br>Water: Pooled<br>Veg: DV<br>Type: G | Wetland appears cultivated to the north of the property line and possibly untouched to the south and appears saline in nature. |
| | | | | | | | Date: Aug. 21, 1966<br>Project #: 66-83A<br>Roll: AS0948<br>Line: 5204<br>Photo: 38<br>Source: AEP | Sum | • 427.84 mm<br>• D | Basin: E-30, L-70<br>Water: D<br>Veg: DV<br>Type: G | There is cultivation around the wetland but not within it. There is a stand of shrubs/trees to the west. |
| | | | | | | | Date: Jul. 2, 1969<br>Project #: 69-167 83A<br>Roll: AS-1017<br>Line: 5203<br>Photo: 32<br>Source: AEP | Sum | • 503.94 mm<br>• W | Basin: E-5, L_95<br>Water: Wet<br>Veg: DVI<br>Type: G | Wetland is cultivated north of the property line. |
| | | | | | | | Date: Nov. 17, 1975<br>Project #: 75-168<br>Roll: AS 1439<br>Line: 7<br>Photo: 15<br>Source: AEP | F | • 443.76 mm<br>• D to N | Basin: E-100<br>Water: Dry<br>Veg: DVI<br>Type: C | Wetland now appears completely cultivated and fairy indistinguishable from the surrounding land. Treed area to the west has been removed. |

| Wetland/ Waterbody ID | Legal Land Location | | | | | Alberta Wetland Class | Photo Date & ID Aerial imagery from the AEP Air Photo Distribution Office unless otherwise noted | Season[a] | Precipitation Departure from yearly Average[b] | Waterbody Basin, Water, and Vegetation[c] | Aerial Photograph Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Sec | Twp | Rg | M | Qtr | | | | | | |
| | | | | | | | Date: Apr. 26, 1977<br>Project #: S77-181<br>Roll: AS2959<br>Line: 1<br>Photo: 229<br>Source: AEP | Sp | • 519.17 mm<br>• W | Basin: E-95, L-5<br>Water: Wet<br>Veg: DV<br>Type: C | Wetland remains cultivated and appears dry and saline on the north end. |
| | | | | | | | Date: Jul. 18, 1983<br>Project #: 8-081 83A<br>Roll: AS-2737<br>Line: 7<br>Photo: 250<br>Source: AEP | Sum | • 369.22 mm<br>• D | Basin: E-5, L-95<br>Water: Dry<br>Veg: DV<br>Type: C | Wetland's north end has shrunk from previous years. No standing water is visible |
| | | | | | | | Date: May 4, 1998<br>Project #:<br>98-097A 83A<br>Roll: AS4967<br>Line: 17A<br>Photo: 22<br>Source: AEP | Sp | • 486.09 mm<br>• N | Basin: E-100<br>Water: Dry<br>Veg: DV<br>Type: C | Wetland does not appear north of the property line and has shifted west to lie adjacent to the road. |
| | | | | | | | Date: Aug. 17, 2002<br>Project #: 02-076<br>Roll: AS5235<br>Line: 7<br>Photo: 250<br>Source: AEP | Sum | • 394.79 mm<br>• L | Basin: E-95, L-5<br>Water: Dry<br>Veg: DV<br>Type: C | Wetland is more north of the property line with nothing seen to the south. |

| Wetland/ Waterbody ID | Legal Land Location | | | | | Alberta Wetland Class | Photo Date & ID Aerial imagery from the AEP Air Photo Distribution Office unless otherwise noted | Season[a] | Precipitation Departure from yearly Average[b] | Waterbody Basin, Water, and Vegetation[c] | Aerial Photograph Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Sec | Twp | Rg | M | Qtr | | | | | | |
| | | | | | | | Date: Jun. 2, 2007<br>Project #:<br>07-021 83A SW<br>Roll: AS5407<br>Line: n/a<br>Photo: 217<br>Source: AEP | Sp | • 591.73 mm<br>• W | Basin: E-60, L-40<br>Water: Wet<br>Veg: DVI<br>Type: G | There may be a debris pile within the wetland on the south side of the property line. Wetland is very diminished. |
| | | | | | | | Date: Jan. 15, 2018<br>Project #: n/a<br>Roll: n/a<br>Line: n/a<br>Photo: n/a<br>Source: ESRI® | Sp | • 362.9 mm<br>• D | Basin: E-50, L-50<br>Water: Pooled<br>Veg: DV<br>Type: G | Debris pile persists and wetland is only on the north side of the property line containing standing water. |

(a) Sp = Spring (March, April, May); Sum = Mid to Late Summer (June, July, August); F = Fall (September, October, November): Seasonality based on aerial photo capture date.

(b) Interpolated daily precipitation data for 27-29-W4M (Alberta Agriculture and Forestry, 2020)
D = Dryer; N = Normal; W = Wetter.

- Annual precipitation:
  - Dryer = One Standard Deviation (66.3 mm) or more less than 1955 to 2019 Yearly Average (431.4 mm)
  - Wetter = One Standard Deviation or more than Average
- Monthly precipitation:
  - Dryer = One Standard Deviation (20.3 mm) or more less than 1955 to 2019 Monthly Average (36.0 mm)
  - Wetter = One Standard Deviation or more than Average

(c) Basin/Zone (%): E = Ephemeral, L = Low/Wet Meadow, Sh = Shallow, D = Deep, O = Open Water
Water: Wet, Pooled, Dry (in deepest zone covering greater than 25% of feature)
Vegetation: DV = vegetated (consistent with wetland class); DVI = Dry, vegetated (indistinguishable from surrounding uplands)
Type: Wc = Wooded-coniferous, Wd = Wooded-deciduous, Wm = Wooded-mixedwood, Sh = Shrubby, G = Graminoid, C = Crop, A = Aquatic Vegetation

# APPENDIX D

# FIELD INFORMATION AND INDICATORS USED TO IDENTIFY, CLASSIFY, AND DELINEATE WETLANDS

**Table D-1 Field Information and Indicators Used to Identify and Delineate Wetlands and Waterbodies**

| Wetland Number | Wetland Class | Stratum (Ground, Shrub, Tree)/Soil | Plot Representing | Location (NAD 83 UTM) | Common Name of Species/Soil Strata Depth | Latin Name of Species/Soil Texture | Indicator Status/Soil Colour | Cover (%)/Soil Indicators |
|---|---|---|---|---|---|---|---|---|
| LC_20210520_028 | Seasonal Marsh (M-G-III) | Ground (1m x 1 m plot) | Wetland | 12 U 304599 5781627 | Moss | n/a | n/a | 40 |
| | | | | | Sedges | *Carex sp.** | n/a | 10 |
| | | | | | Kentucky Blue Grass | *Poa pratensis* | FAC-UP | 10 |
| | | | | | Cattails | *Typha latifolia* | OBL | 5 |
| | | | | | Seaside Arrow Grass | *Triglochin maritima* | OBL | 5 |
| | | | | | Rush | *Juncus sp.* | OBL | 3 |
| | | | | | Silverweed | *Argentina anserina* | OBL | 2 |
| | | | Upland | 12 U 292097 5688127 | Kentucky Blue Grass | *Poa pratensis* | FAC-UPL | 30 |
| | | | | | Common Plantain | *Plantago major* | FAC-W | 5 |
| | | | | | Moss | n/a | n/a | 5 |
| | | | | | Dandelion | *Taraxacum officinale* | Not listed | 3 |
| | | | | | Clover | *Trifolium sp.* | FAC-UP | 2 |
| | | Soil (30 cm pit) | Wetland | 12 U 304589 5781633 | 0 to 30 cm | Silty clay | 10YR 3/1 | none |
| | | | Upland | 12 U 292097 5688127 | 0 to 20 cm | Loam | 10YR 2/1 | none |
| | | | | | 20 to 30 cm | Clay loam | 10YR 5/3 | none |

| Wetland Number | Wetland Class | Stratum (Ground, Shrub, Tree)/Soil | Plot Representing | Location (NAD 83 UTM) | Common Name of Species/Soil Strata Depth | Latin Name of Species/Soil Texture | Indicator Status/Soil Colour | Cover (%)/Soil Indicators |
|---|---|---|---|---|---|---|---|---|
| LC_20210520_041 | Temporary Marsh (M-G-II) | Ground (1m x 1 m plot) | Wetland | | Wheat Grass | *Pascopyrum smithii* | FAC-UP | 15 |
| | | | | | Dandelion | *Traxacum officinale* | FAC-UP | 3 |
| | | | | | Common Plantain | *Plantago major* | FAC | 2 |
| | | | | | Dock* | *Rumex sp.** | OBL to FAC-WET | 2 |
| | | | Upland | 12 U 304595 5781630 | Bare Ground | n/a | n/a | 60 |
| | | | | | Crop Stubble | n/a | n/a | 40 |
| | | Soil (30 cm pit) | Wetland | 12 U 304589 5781633 | 0 to 30 cm | Silty clay | 10YR 3/1 mottles present | none |
| | | | Upland | 12 U 292097 5688127 | 0 to 20 cm | Loam | 10YR 2/1 | none |
| | | | | | 20 to 30 cm | Clay loam | 10YR 5/3 | none |

* Could not identify to species as early in growing season

# APPENDIX E

# ABWRET-A RESULTS

| Function (ABWRET-A Raw Score) | _20210529_ | 20210520_028 |
|---|---|---|
| Surface Water Storage (WS) | 5.02 | 2.55 |
| Stream Flow Support (SFS) | 0.00 | 3.02 |
| Streamwater Cooling (WC) | 0.00 | 3.40 |
| Sediment & Toxicant Retention & Stabilization (SR) | 10.00 | 4.00 |
| Phosphorus Retention (PR) | 10.00 | 3.87 |
| Nitrate Removal & Retention (NR) | 10.00 | 4.20 |
| Organic Nutrient Export (OE) | 0.00 | 3.84 |
| Fish Habitat (FH) | 0.00 | 0.00 |
| Aquatic Invertebrate Habitat (INV) | 4.64 | 4.61 |
| Amphibian Habitat (AM) | 2.16 | 2.17 |
| Waterbird Habitat (WB) | 3.51 | 3.54 |
| Songbird, Raptor, & Mammal Habitat (SBM) | 2.03 | 1.81 |
| Pollinator & Native Plant Habitat (PH) | 4.34 | 2.35 |
| Human Use & Recognition (HU) | 1.80 | 1.63 |
| | | |
| **Function (ABWRET-A Normalized Score)** | _20210529_ | 20210520_028 |
| Surface Water Storage (WS) | 0.65 | 0.22 |
| Stream Flow Support (SFS) | 0.00 | 0.49 |
| Streamwater Cooling (WC) | 0.00 | 0.49 |
| Sediment & Toxicant Retention & Stabilization (SR) | 1.00 | 0.23 |
| Phosphorus Retention (PR) | 1.00 | 0.26 |
| Nitrate Removal & Retention (NR) | 1.00 | 0.10 |
| Organic Nutrient Export (OE) | 0.00 | 0.59 |
| Fish Habitat (FH) | 0.00 | 0.00 |
| Aquatic Invertebrate Habitat (INV) | 0.45 | 0.45 |
| Amphibian Habitat (AM) | 0.26 | 0.26 |
| Waterbird Habitat (WB) | 0.20 | 0.20 |
| Songbird, Raptor, & Mammal Habitat (SBM) | 0.08 | 0.04 |
| Pollinator & Native Plant Habitat (PH) | 0.46 | 0.11 |
| Human Use & Recognition (HU) | 0.15 | 0.12 |
| | | |
| **Normalized Score (ABWRET_A) Based on Wetlands in RWVAU** | _20210529_ | 20210520_028 |
| Normalized Hydrological Health (HH) | 0.65 | 0.49 |
| Normalized Water Quality (WQ) | 1.00 | 0.59 |
| Normalized Ecological Health (EH) | 0.46 | 0.45 |
| Normalized Human Use (HU) | 0.15 | 0.12 |
| RWVAU # | 1 | 1 |
| Normalized Value Score (ABWRET_a) | 0.65 | 0.47 |
| Value Category (a, b, c, d) | d | d |
| Abundance Factor | 0 | 0 |
| Final Score(A, B, C, D) | D | D |

# APPENDIX F

# STORMWATER MANAGEMENT

# Storm Water Management Plan
## Public Works Lot

July 2021
**Issued for Approval**
TPN48

TAGISH ENGINEERING

***Revisions:***

| *Date* | *Description* |
|---|---|
| July 2021 | Issued for Approval. |
| | |
| | |

***Corporate Authorization:***


*Prepared by Chad Carmichael, P.Tech.(Eng.)*


*Reviewed by Greg Smith, P.Eng.*

PERMIT TO PRACTICE
TAGISH ENGINEERING LTD.
Signature
Date July 23, 2021
PERMIT NUMBER: P 3686
The Association of Professional Engineers, Geologists and Geophysicists of Alberta

***Corporate Copyright:***

## Table of Contents



## List of Tables



## List of Appendices

# 1 INTRODUCTION

## 1.1 Purpose

The Town of Penhold is developing a lot for its new Public Works Building and Fire Hall. This stormwater management plan addresses all stormwater that runs off or through this lot in the pre-development and post-development states. This report will identify the pre and post-development flows and recommend a pond and outlet size to mitigate flows to a rate less than the pre-development state.

## 1.2 Site Description

The proposed lot area is approximately 8.55 ha and is within the NW6 37-27 W4. Waskasoo Avenue binds the West edge of the lot, and Waskasoo Creek binds the east. The south edge runs along the quarter section line, and the north property line is approximately 175 m north of the south property line.

## 1.3 Background

The Town of Penhold purchased the lot that was previously zoned for and used as farmland. The property is currently zoned industrial.

## 1.4 Previous Studies

2018 - Master Servicing Study recommended a 2 l/s/ha release rate for the entire town.
Oxford Landing Stormwater Management Plan
AEP Flood Inundation Maps

# 2 DRAINAGE PATTERNS

## 2.1 General Overview

The existing site is primarily farmland that naturally drains from northwest to southeast towards Waskasoo Creek. North of the site is a rural residential lot that drains south onto the site and requires routing through the proposed pond. The stormwater outlet from Oxford Landing Subdivision parallels the developments south property line running from west to east, stopping 275 m short of Waskasoo Creek, then flowing through a channel south of the fence line.

## 2.2 Existing Site

Figure 2 identifies the sub-basins that represent the land that drains off or through the area. Sub-basin B1 contains approximately 75% of the proposed development and drains southeast into Waskasoo Creek. Sub Basin B2 contains the remaining 25% of the development and drains northeast to Waskasoo Creek. The east end of the site is within the Flood Fringe of Waskasoo creek as defined by the Waskasoo Creek Modeling supplied by Alberta Environment and Parks.

### 2.2.1 Wetland Assessment

Ghostpine Environmental Services Ltd. has completed an Environmental desktop and Field Assessment and will submit it independently from this report.

## 2.3 Proposed site

Figure 3 shows the proposed site design and the resulting sub-basins differentiating between on-site and off-site. Sub Basin C1 represents the 8.55 ha of on-site flows and is used to determine the minimum pond storage and primary outlet size. Sub-Basins C2 flows onto the site, then through the proposed pond and outlets through the weir in the outlet structure. Sub Basins C3, C4, C5, and C6 flow directly to the creek and do not cross into the proposed development. As mentioned in the Section 2.2 Existing Site, the property is in the flood fringe of Waskasso Creek. To ensure the pond is not subject to backwater flooding a tideflex valve or equivalent is being recommended for the outlet.

# 3 STORMWATER ANALYSIS

The completed analysis utilized the following data:

- The Environment Canada IDF curve for the City of Red Deer determines the 1:100-year (106 mm) - 24-hour storm.
- Chicago Distribution Method was used to derive a curve using the following values (as per City of Red Deer Guidelines): a=187 b= -1.6 c=-0.51 r=0.3
- The Time of Concentration was calculated using the TR55 Method

## 3.1 Pre-Development Analysis

In the Predevelopment condition, the proposed development was partially within two sub-basins labeled B1 and B2 in the pre-development model, both with a CN=70. In their pre-development state during the 1:100 year 24-hour storm, the model calculates a flow of approximately 151.9 l/s or 9 l/s/ha. The recommended outlet rate of 2 l/s/ha has been set by the Town of Penhold to match the Alberta Government's streamflow analysis and will be used for this project; therefore, the development's proposed maximum outlet rate will be 8.55 ha x 2 l/s/ha = 17.1 l/s.

## 3.2 Post Development

In the post-development model, the Sub-basin C uses a CN=80, typical of an industrial lot. Sub-Basin C2 is a sub-basin from the adjacent property to the north developed into a rural residential acreage with a CN=63. Routing sub-basin C2 through the proposed storm pond for treatment will not affect the pond storage. The runoff for C1 will be reduced to less than 2 l/s/ha and released through a 100 mm orifice (invert elevation = 892.5) at 17.1 l/s for the 8.55 ha lot. The off-site flow will be released over a weir in the outlet structure with an elevation of 893.05m during the 100-year 24 hour storm event. During more frequent events, the release rate will be less than 17.1 l/s. Table 1 on the following page summarizes the post-development condition.

The outlet structure allows the pond storage to remain equal to that calculated for the minimum pond volume while also addressing the off-site flow shown on Table 1 on the following page. The outlet rate is slightly increased through the orifice to 17.6 l/s (2.1 l/s/ha) and 6.9 l/s over the outlet weir. This totals 17.1 l/s for the development and 7.4 l/s for the offsite flows. Therefore the onsite post development flows were reduced form 531.2 l/s to 17.1 l/s and the existing offsite flows are reduced from 15.3 l/s to 7.4 l/s by allowing it to be routed through the pond. This is a totals 24.5 l/s for both onsite and offsite flows (9.83 ha) or 2.49 l/s/ha at the outlet.

**Table 1 Post Development minimum pond size**

| Location | Area | Regional Analysis Pre-development | | Calculated Post-development | | Calculated Post-development using storage (Full Build Out) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | (ha) | Target Peak Flow (l/s) | Flow Rate (l/s/ha) | Peak Flow (l/s) | Flow Rate (l/s/ha) | Storage ($m^3$) | Peak Flow (l/s) | Flow Rate (l/s/ha) | Orifice (mm) | Orifice Invert Elevation (m) |
| **Routed to Primary Outlet** | | | | | | | | | | |
| Basin C1 | 8.55 | 17.1 | 2 | 531.2 | 62 | 3,829 | 17 | 2.0 | 108 | 892.5 |

**Table 2 Post Development w/ Offsite Flows**

| Location | Area | Regional Analysis Pre-development | | Calculated Post-development | | Calculated Post-development using storage (Full Build Out) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | (ha) | Target Peak Flow (l/s) | Flow Rate (l/s/ha) | Peak Flow (l/s) | Flow Rate (l/s/ha) | Storage ($m^3$) | Peak Flow (l/s) | Flow Rate (l/s/ha) | Orifice diameter (mm) | Orifice Invert Elevation (m) |
| **Routed to Primary Outlet** | | | | | | | | | | |
| Basin C1 | 8.55 | 17.1 | 2 | 531.2 | 62 | 3,829 | 17.6 | 2.1 | 108 | 892.5 |
| **Routed to Secondary Outlet** | | | | | | | | | | |
| Basin C2* | 1.28 | N/A | N/A | 15.3 | 12 | | 6.9 | 5 | Weir | 893.05 |
| Totals & **Averages** | **9.83** | | | | | | **24.5** | **2.49** | | |
| *Sub Basin C2 from off site - Flow Through pond - future development to restrict flow. | | | | | | | | | | |

# 4 WATER QUALITY

The proposed wet pond design holds the 1:100-year storm event while releasing at a rate of 2 l/s/ha. The minimum pond volume required for the site is 3,829 $m^3$ and is achieved by utilizing a 108 mm orifice. An outlet weir accommodates the off-site flow through the pond.

Once the flow leaves the outlet structure through a tideflex valve, it will flow into an existing channel that flows to Waskassoo Creek.

The proposed retention pond contains more than 3,829 $m^3$ of stormwater which equals more than the 1:100-year storm event volume. The proposed development is 8.55 ha, and the calculated minimum release rate is 17.1 l/s or 2 l/s/ha.

The proposed wet pond should have the following flow characteristics:

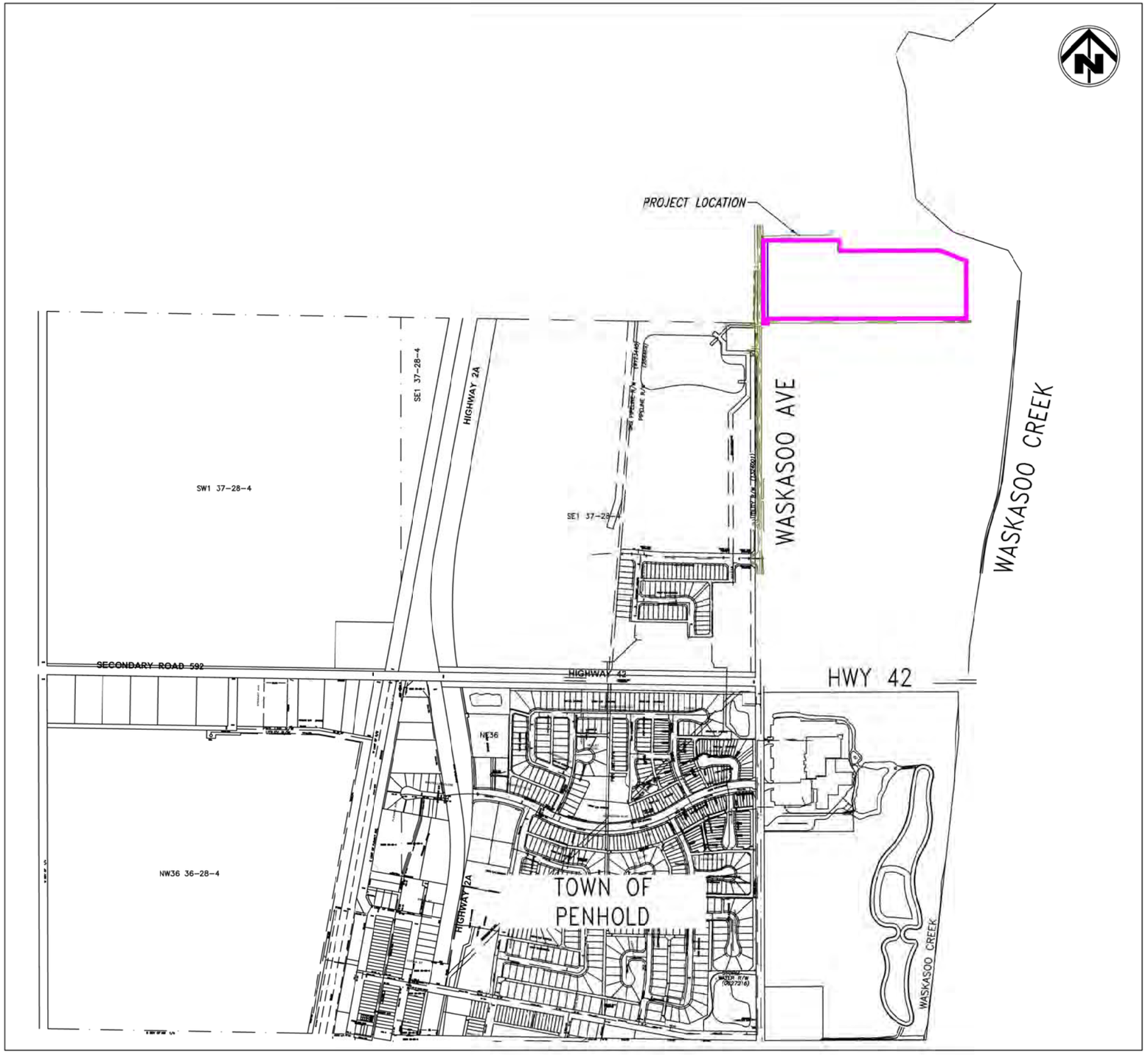
- The minimum storage capacity for the 8.55 ha development is 3,829 $m^3$
- HWL 893.10 m
- Surface Area at HWL = 0.7 ha
- Top of Berm Elevation = 892.7
- Detention time of more than 24 hours
- Maximum storage depth = 0.6 m
- Interior side slopes Maximum of 5:1
- Exterior side slopes of Maximum 3.5:1
- Permanent storage depth of 2.0 m
- Primary outlet (108 mm Orifice) Q = 17.1l/s (2.0 l/s/ha)
- Outlet Structure Weir elevation = 893.05 m
- Flood Fringe Elevation of Waskassoo Creek = 893.4 m
- Emergency Outlet Elevation= 893.4 m
- Tideflex Valve (or equivilant) on outlet pipe

# 5 CONCLUSION

This Stormwater Management Plan lowers the Post-development flow to that of the recommended flow in the Town of Penhold's 2018 – Master Servicing Study. Adding Riprap to the outlet will ensure no erosion issues where the new outlet will enter the existing channel.

- The proposed storage volume for the pond is more than 3,829 $m^3$
- The primary outlet is a 108-mm orifice.
- There is an overflow weir in the outlet structure at 893.05 m
- The proposed development's release rate is 2.0 l/s/ha, which matches the recommendation in the Town of Penhold's 2018 Master Servicing Study.
- The pond will not empty within 24 hours (1 day) of the storm as per Alberta Environment guidelines during the 1:100-year event. However, it will drain approximately 90% of the volume 48 hours after the storm.
- The Wet Pond does not meet the guidelines recommended minimum surface area of 2 ha. According to the boreholes completed with this project, the permanent pool will be within the groundwater zone year-round. Should the permanent pool ever dry up, water is available on site to refill the permanent pool.
- Tagish Engineering believes that the design complies with Alberta Environment standards and guidelines. Please contact the office of Tagish Engineering if you have any questions or require any further information.

# Appendix A
## Figures

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Penhold

PROJECT NAME

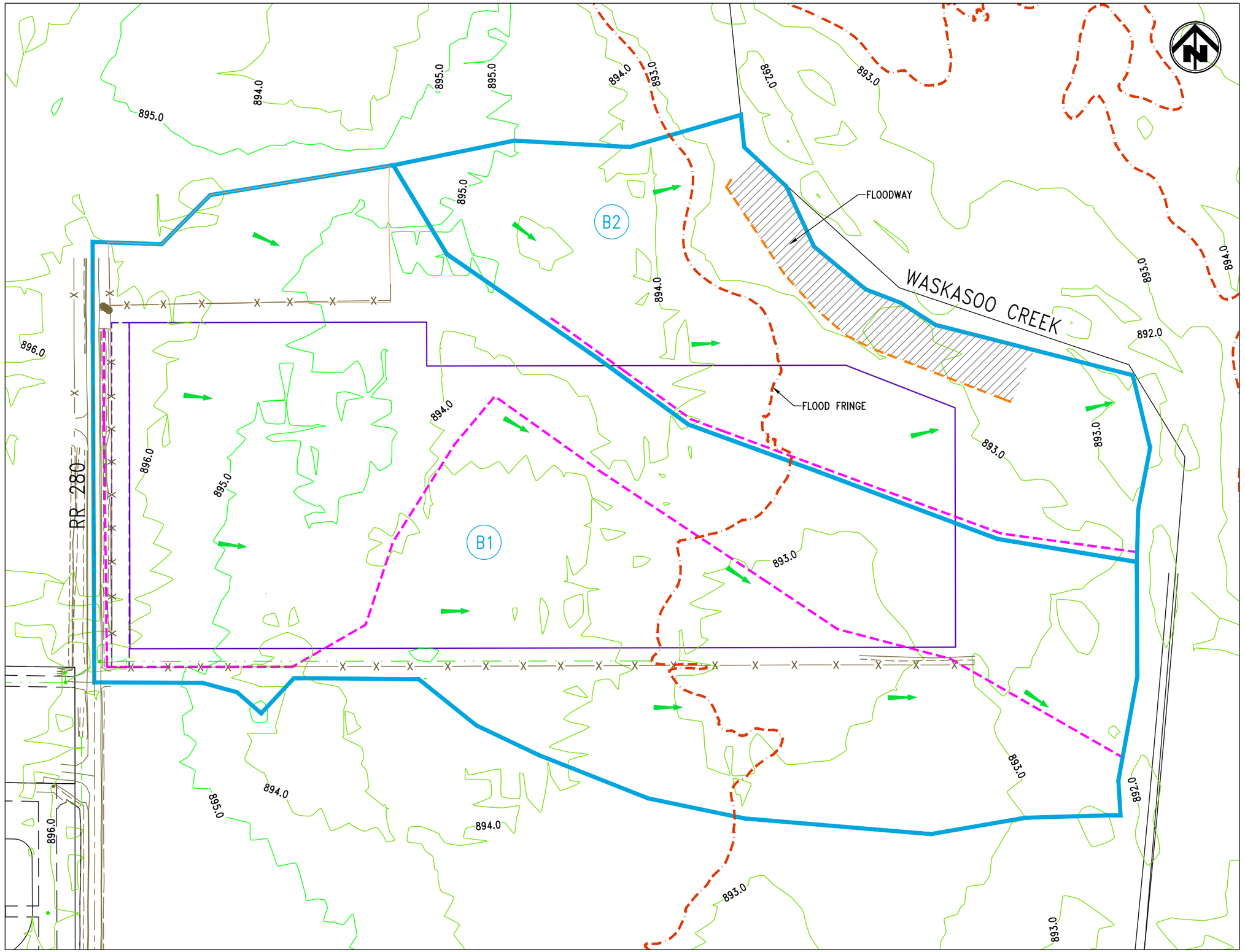
**PUBLIC WORKS LOT STORMWATER MANAGEMENT PALN**

TAGISH ENGINEERING
#104, 239 LAKE STREET | RED DEER COUNTY AB T4E 1S8 | 403.346.7715
www.tagish-engineering.com

TITLE

LOCATION PLAN

| DATE | SCALE |
|---|---|
| FEB 03, 2021 | 1:10,000 |
| PROJECT NO. | FIGURE NO. |
| TPN48 | FIG. 1 |

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Penhold

PROJECT NAME

**PUBLIC WORKS LOT STORMWATER MANAGEMENT PALN**

TAGISH ENGINEERING
#104, 230 LAKE STREET | RED DEER COUNTY AB T4E 1B9 | 403.346.7710
www.tagish-engineering.com

LEGEND:

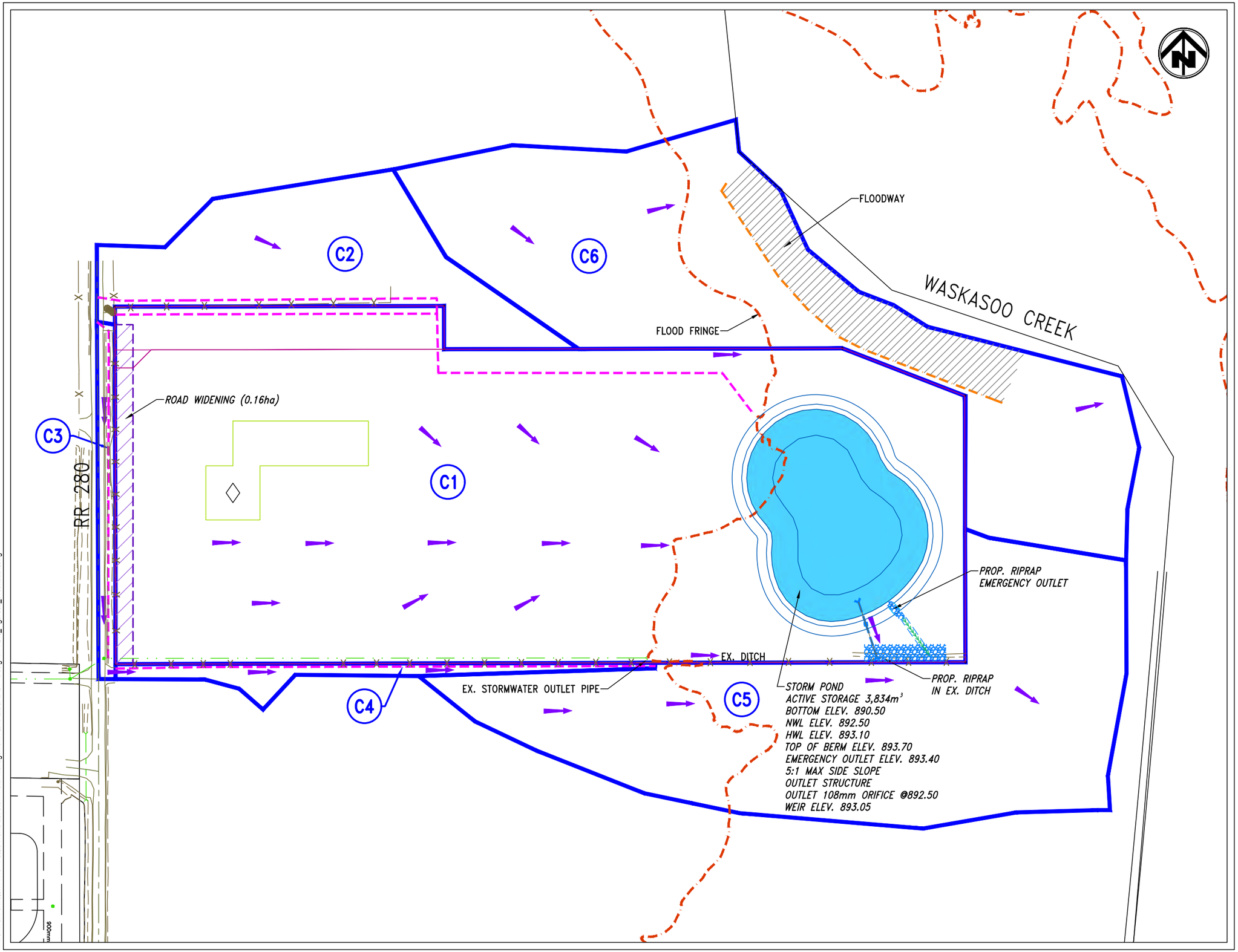
- PRE-DEVELOPMENT BASIN BOUNDARY
- EXISTING OVERLAND FLOW
- 900.0 MAJOR ELEVATION CONTOURS
- 900.0 MINOR ELEVATION CONTOURS
- Tc PATHWAY
- FLOOD FRINGE AREA
- FLOODWAY AREA

| BASIN | AREA (ha) | Tc (m) |
|---|---|---|
| B1 | 12.38 | 880.0 |
| B2 | 4.48 | 355.0 |

TITLE

PRE-DEVELOPMENT BASINS

| DATE | FEB 03, 2021 | SCALE | 1:2,000 |
|---|---|---|---|
| PROJECT NO. | TPN48 | FIGURE NO. | FIG. 2 |

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Penhold

PROJECT NAME

**PUBLIC WORKS LOT STORMWATER MANAGEMENT PALN**


TAGISH ENGINEERING

#104, 230 LAKE STREET | RED DEER COUNTY AB T4E 1B9 | 403.346.7710
www.tagish-engineering.com


LEGEND:

- POST-DEVELOPMENT BASIN BOUNDARY
- PROPOSED CULVERT
- PROPOSED OVERLAND FLOW
- PROPOSED STORM POND
- 900.0 MAJOR ELEVATION CONTOURS
- 900.0 MINOR ELEVATION CONTOURS
- Tc PATHWAY
- FLOOD FRINGE AREA
- FLOODWAY AREA

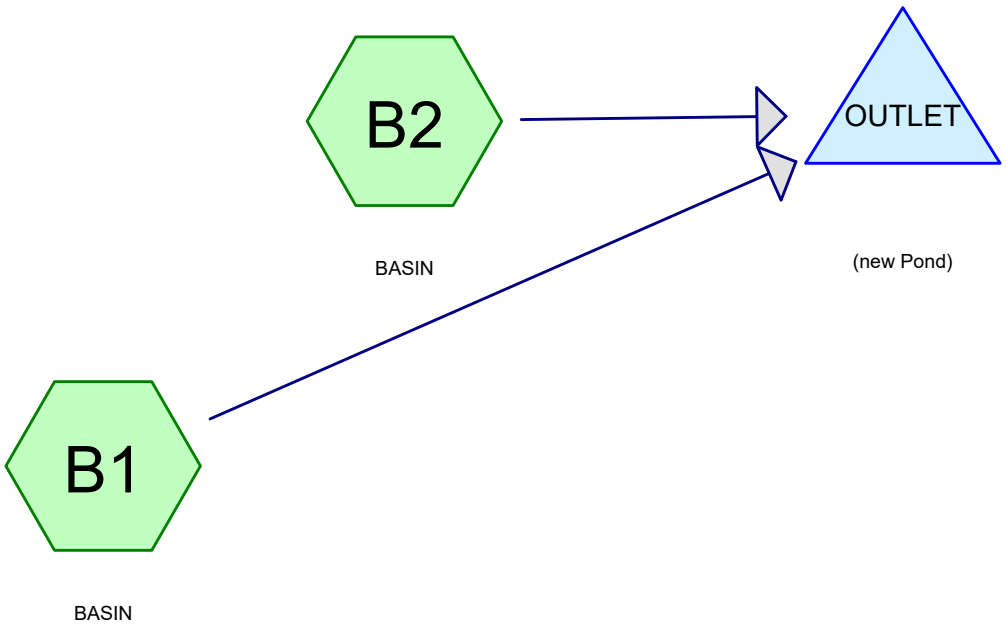
| BASIN | AREA (ha) | Tc (m) |
|---|---|---|
| C1 | 8.55 | 400.0 |
| C2 | 1.28 | 420.0 |
| C3 | 0.20 | 190.0 |
| C4 | 0.23 | 295.0 |
| C5 | 3.28 | |
| C6 | 3.35 | |

TITLE

POST-DEVELOPMENT BASINS

| DATE | FEB 03, 2021 | SCALE | 1:2,000 |
|---|---|---|---|
| PROJECT NO. | TPN48 | FIGURE NO. | FIG. 3 |

# Appendix B
## Pre - Development




Subcat Reach Pond Link

**Routing Diagram for TPN48_PRE**
Prepared by {enter your company name here}, Printed 7/12/2021

## Area Listing (all nodes)

| Area (hectares) | CN | Description (subcatchment-numbers) |
|---|---|---|
| 16.8600 | 70 | Row crops, C&T + CR, Good, HSG B (B1, B2) |
| **16.8600** | **70** | **TOTAL AREA** |

## Soil Listing (all nodes)

| Area (hectares) | Soil Group | Subcatchment Numbers |
|---|---|---|
| 0.0000 | HSG A | |
| 16.8600 | HSG B | B1, B2 |
| 0.0000 | HSG C | |
| 0.0000 | HSG D | |
| 0.0000 | Other | |
| **16.8600** | | **TOTAL AREA** |

## Ground Covers (all nodes)

| HSG-A (hectares) | HSG-B (hectares) | HSG-C (hectares) | HSG-D (hectares) | Other (hectares) | Total (hectares) | Ground Cover | Subcatchme Numbers |
|---|---|---|---|---|---|---|---|
| 0.0000 | 16.8600 | 0.0000 | 0.0000 | 0.0000 | 16.8600 | Row crops, C&T + CR, Good | |
| **0.0000** | **16.8600** | **0.0000** | **0.0000** | **0.0000** | **16.8600** | **TOTAL AREA** | |

Time span=1.00-125.00 hrs, dt=0.01 hrs, 12401 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

**Subcatchment B1: BASIN** Runoff Area=12.3800 ha 0.00% Impervious Runoff Depth=37 mm
Flow Length=880.0 m Tc=200.3 min CN=70 Runoff=0.1198 m³/s 4.549 Ml

**Subcatchment B2: BASIN** Runoff Area=4.4800 ha 0.00% Impervious Runoff Depth=37 mm
Flow Length=355.0 m Tc=59.2 min CN=70 Runoff=0.0791 m³/s 1.646 Ml

**Pond OUTLET: (new Pond)** Inflow=0.1519 m³/s 6.195 Ml
Primary=0.1519 m³/s 6.195 Ml

**Total Runoff Area = 16.8600 ha Runoff Volume = 6.195 Ml Average Runoff Depth = 37 mm**
**100.00% Pervious = 16.8600 ha 0.00% Impervious = 0.0000 ha**

## Summary for Subcatchment B1: BASIN

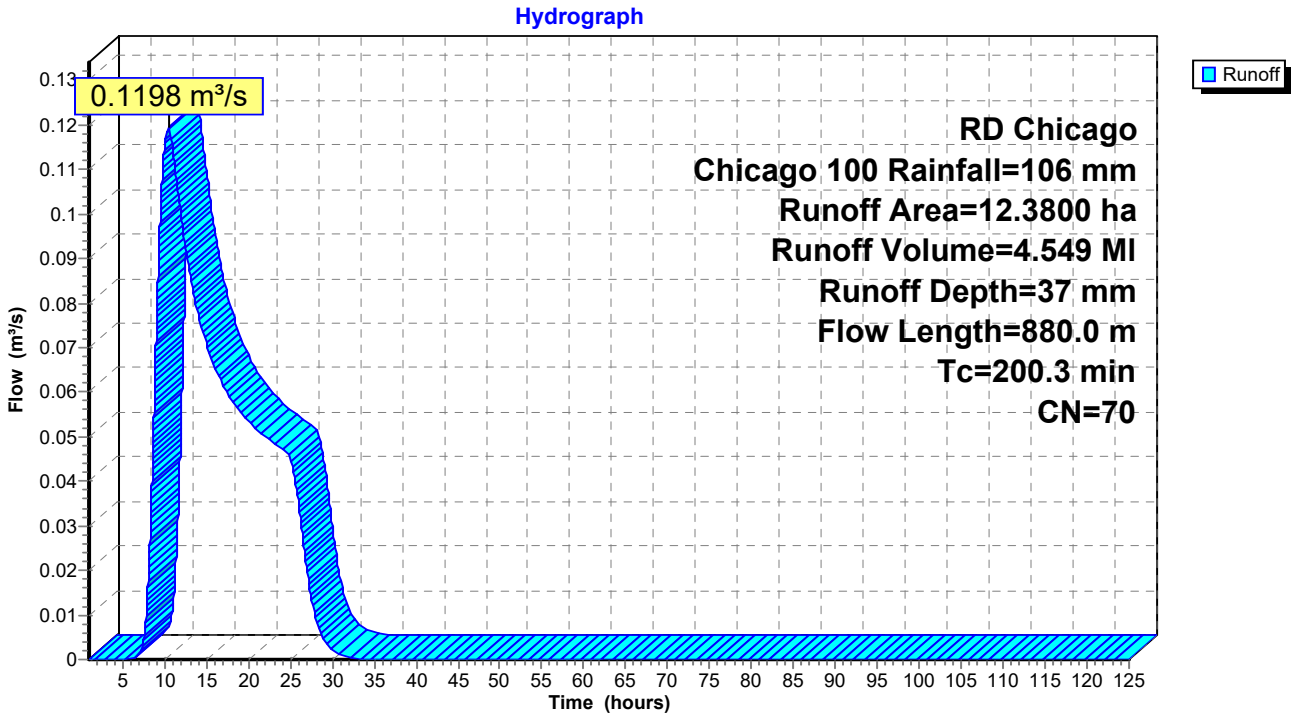
Runoff = 0.1198 m³/s @ 10.46 hrs, Volume= 4.549 Ml, Depth= 37 mm

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-125.00 hrs, dt= 0.01 hrs
RD Chicago Chicago 100 Rainfall=106 mm

| Area (ha) | CN | Description |
|---|---|---|
| 12.3800 | 70 | Row crops, C&T + CR, Good, HSG B |
| 12.3800 | | 100.00% Pervious Area |

| Tc (min) | Length (meters) | Slope (m/m) | Velocity (m/sec) | Capacity (m³/s) | Description |
|---|---|---|---|---|---|
| 36.7 | 50.0 | 0.0036 | 0.02 | | **Sheet Flow,** Range n= 0.130 P2= 40 mm |
| 17.9 | 135.0 | 0.0035 | 0.13 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 2.13 m/s |
| 6.6 | 105.0 | 0.0157 | 0.27 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 2.13 m/s |
| 73.3 | 265.0 | 0.0008 | 0.06 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 2.13 m/s |
| 8.4 | 105.0 | 0.0095 | 0.21 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 2.13 m/s |
| 57.4 | 220.0 | 0.0009 | 0.06 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 2.13 m/s |
| 200.3 | 880.0 | Total | | | |

## Subcatchment B1: BASIN



## Summary for Subcatchment B2: BASIN

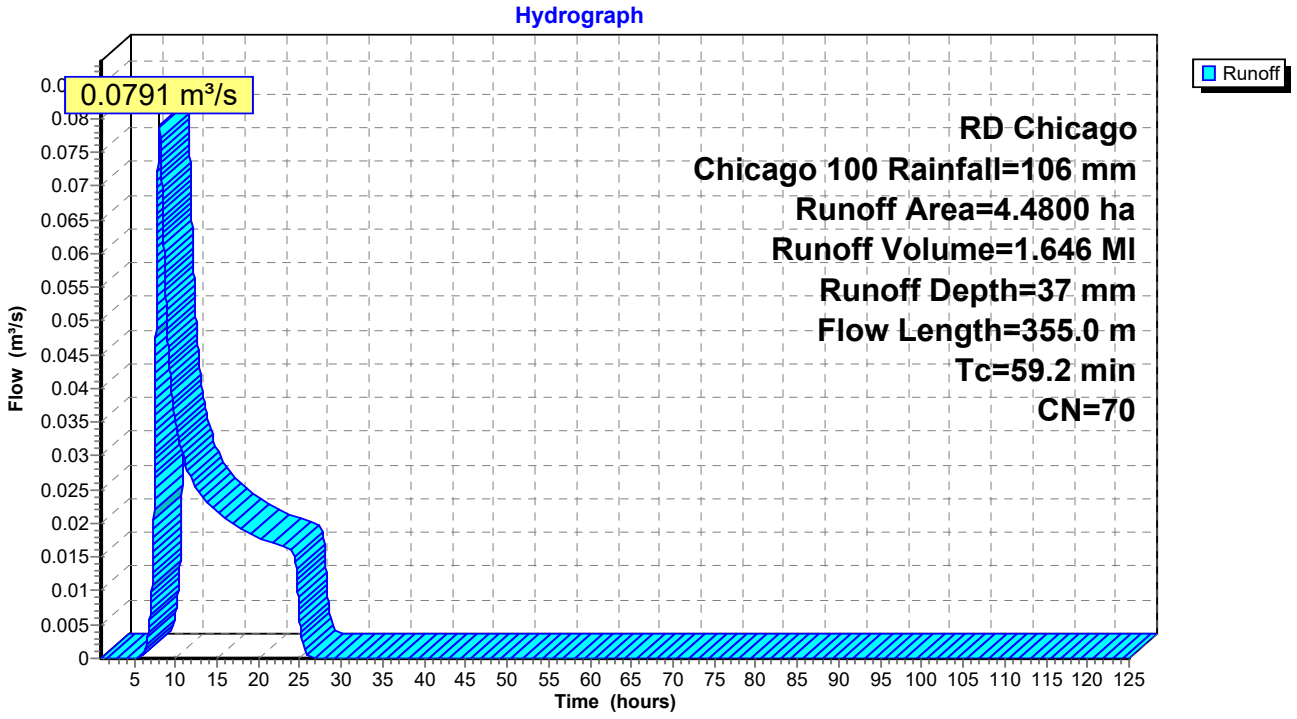
Runoff = 0.0791 m³/s @ 8.09 hrs, Volume= 1.646 Ml, Depth= 37 mm

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-125.00 hrs, dt= 0.01 hrs
RD Chicago Chicago 100 Rainfall=106 mm

| Area (ha) | CN | Description |
|---|---|---|
| 4.4800 | 70 | Row crops, C&T + CR, Good, HSG B |
| 4.4800 | | 100.00% Pervious Area |

| Tc (min) | Length (meters) | Slope (m/m) | Velocity (m/sec) | Capacity (m³/s) | Description |
|---|---|---|---|---|---|
| 25.7 | 50.0 | 0.0088 | 0.03 | | **Sheet Flow,** Range n= 0.130 P2= 40 mm |
| 4.5 | 65.0 | 0.0129 | 0.24 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 2.13 m/s |
| 29.0 | 240.0 | 0.0042 | 0.14 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 2.13 m/s |
| 59.2 | 355.0 | Total | | | |

## Subcatchment B2: BASIN



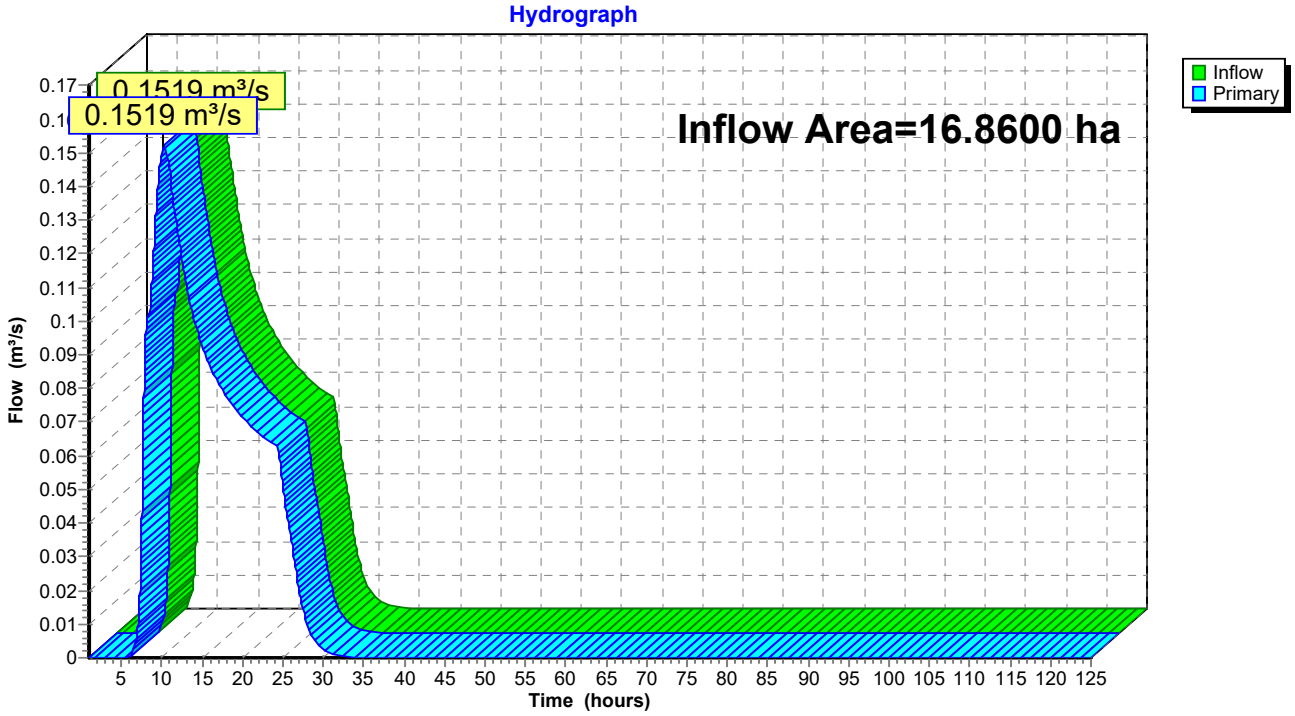
## Summary for Pond OUTLET: (new Pond)

[40] Hint: Not Described (Outflow=Inflow)

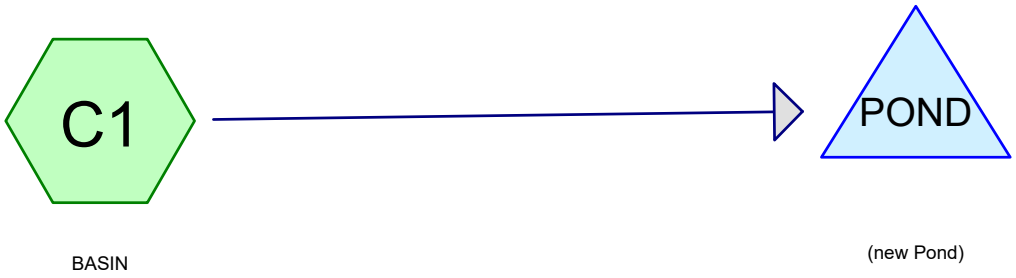
Inflow Area = 16.8600 ha, 0.00% Impervious, Inflow Depth = 37 mm for Chicago 100 event
Inflow = 0.1519 m³/s @ 10.24 hrs, Volume= 6.195 Ml
Primary = 0.1519 m³/s @ 10.24 hrs, Volume= 6.195 Ml, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 1.00-125.00 hrs, dt= 0.01 hrs / 3

### Pond OUTLET: (new Pond)



# Appendix C
# Post – Development
# On-site Flow




Subcat Reach Pond Link

**Routing Diagram for TPN48_POST Minimum Pond Size**
Prepared by {enter your company name here}, Printed 7/12/2021

## Area Listing (all nodes)

| Area (hectares) | CN | Description (subcatchment-numbers) |
|---|---|---|
| 8.5500 | 80 | Industrial Development (C1) |
| **8.5500** | **80** | **TOTAL AREA** |

## Soil Listing (all nodes)

| Area (hectares) | Soil Group | Subcatchment Numbers |
|---|---|---|
| 0.0000 | HSG A | |
| 0.0000 | HSG B | |
| 0.0000 | HSG C | |
| 0.0000 | HSG D | |
| 8.5500 | Other | C1 |
| **8.5500** | | **TOTAL AREA** |

## Ground Covers (all nodes)

| HSG-A (hectares) | HSG-B (hectares) | HSG-C (hectares) | HSG-D (hectares) | Other (hectares) | Total (hectares) | Ground Cover | Subcatchment Numbers |
|---|---|---|---|---|---|---|---|
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 8.5500 | 8.5500 | Industrial Development | C1 |
| **0.0000** | **0.0000** | **0.0000** | **0.0000** | **8.5500** | **8.5500** | **TOTAL AREA** | |

Time span=1.00-125.00 hrs, dt=0.01 hrs, 12401 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

**Subcatchment C1: BASIN** Runoff Area=8.5500 ha 0.00% Impervious Runoff Depth=56 mm
Flow Length=355.0 m Slope=0.0075 m/m Tc=15.8 min CN=80 Runoff=0.5312 m³/s 4.747 Ml

**Pond POND: (new Pond)** Peak Elev=893.044 m Storage=3.829 Ml Inflow=0.5312 m³/s 4.747 Ml
Outflow=0.0170 m³/s 4.471 Ml

**Total Runoff Area = 8.5500 ha Runoff Volume = 4.747 Ml Average Runoff Depth = 56 mm**
**100.00% Pervious = 8.5500 ha 0.00% Impervious = 0.0000 ha**

## Summary for Subcatchment C1: BASIN

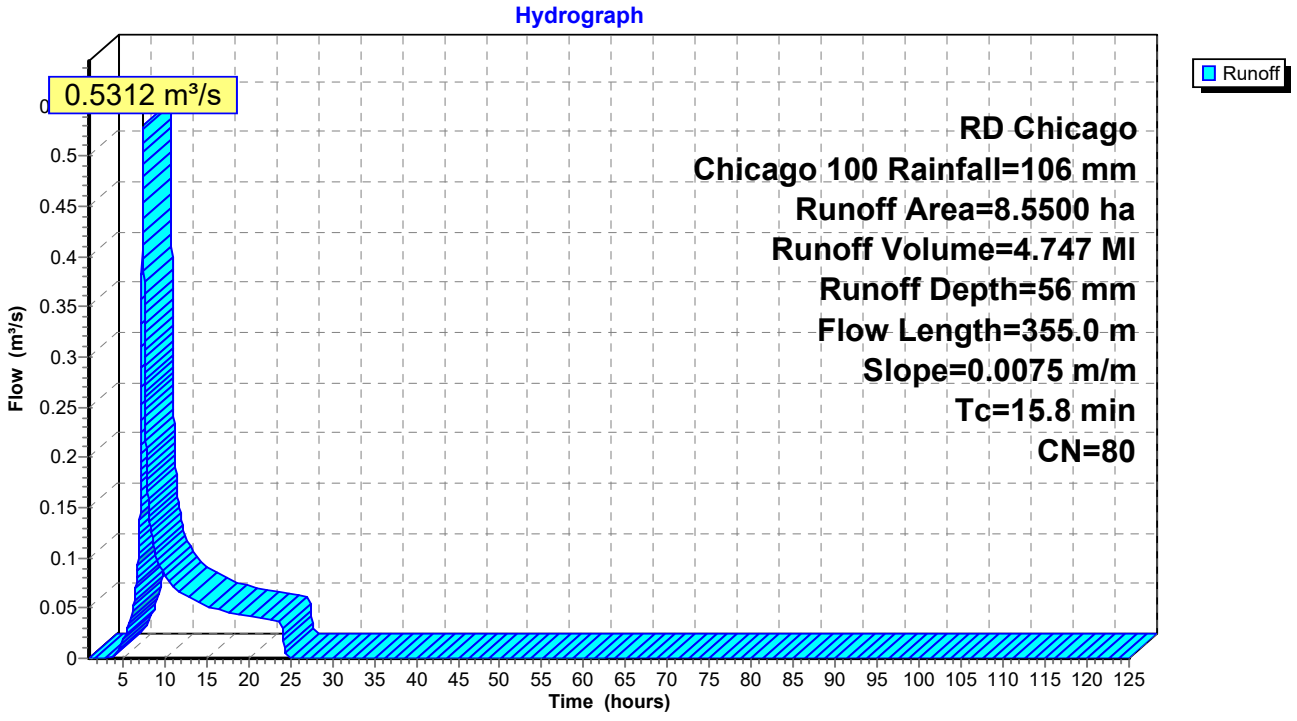
Runoff = 0.5312 m³/s @ 7.41 hrs, Volume= 4.747 Ml, Depth= 56 mm

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-125.00 hrs, dt= 0.01 hrs
RD Chicago Chicago 100 Rainfall=106 mm

| | Area (ha) | CN | Description |
|---|---|---|---|
| * | 8.5500 | 80 | Industrial Development |
| | 8.5500 | | 100.00% Pervious Area |

| Tc (min) | Length (meters) | Slope (m/m) | Velocity (m/sec) | Capacity (m³/s) | Description |
|---|---|---|---|---|---|
| 3.8 | 50.0 | 0.0075 | 0.22 | | **Sheet Flow,** Smooth surfaces n= 0.011 P2= 40 mm |
| 12.0 | 305.0 | 0.0075 | 0.43 | | **Shallow Concentrated Flow,** Unpaved Kv= 4.91 m/s |
| 15.8 | 355.0 | Total | | | |

## Subcatchment C1: BASIN



## Summary for Pond POND: (new Pond)

Inflow Area = 8.5500 ha, 0.00% Impervious, Inflow Depth = 56 mm for Chicago 100 event
Inflow = 0.5312 m³/s @ 7.41 hrs, Volume= 4.747 Ml
Outflow = 0.0170 m³/s @ 24.23 hrs, Volume= 4.471 Ml, Atten= 97%, Lag= 1,009.2 min
Primary = 0.0170 m³/s @ 24.23 hrs, Volume= 4.471 Ml

Routing by Dyn-Stor-Ind method, Time Span= 1.00-125.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 893.044 m @ 24.23 hrs Surf.Area= 0.9080 ha Storage= 3.829 Ml

Plug-Flow detention time= 2,416.0 min calculated for 4.471 Ml (94% of inflow)
Center-of-Mass det. time= 2,375.9 min ( 3,118.2 - 742.4 )

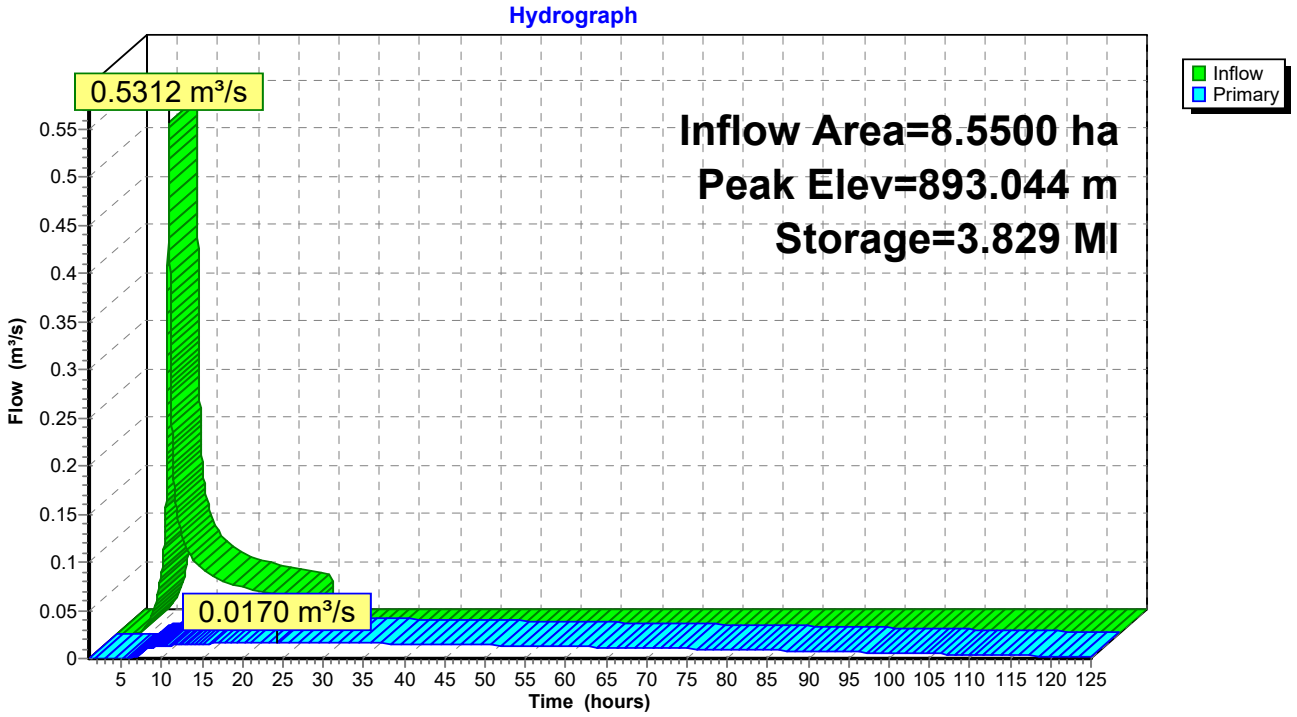
| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 892.500 m | 4.350 Ml | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

| Elevation (meters) | Surf.Area (hectares) | Inc.Store (Mega-liters) | Cum.Store (Mega-liters) |
|---|---|---|---|
| 892.500 | 0.5000 | 0.000 | 0.000 |
| 893.100 | 0.9500 | 4.350 | 4.350 |

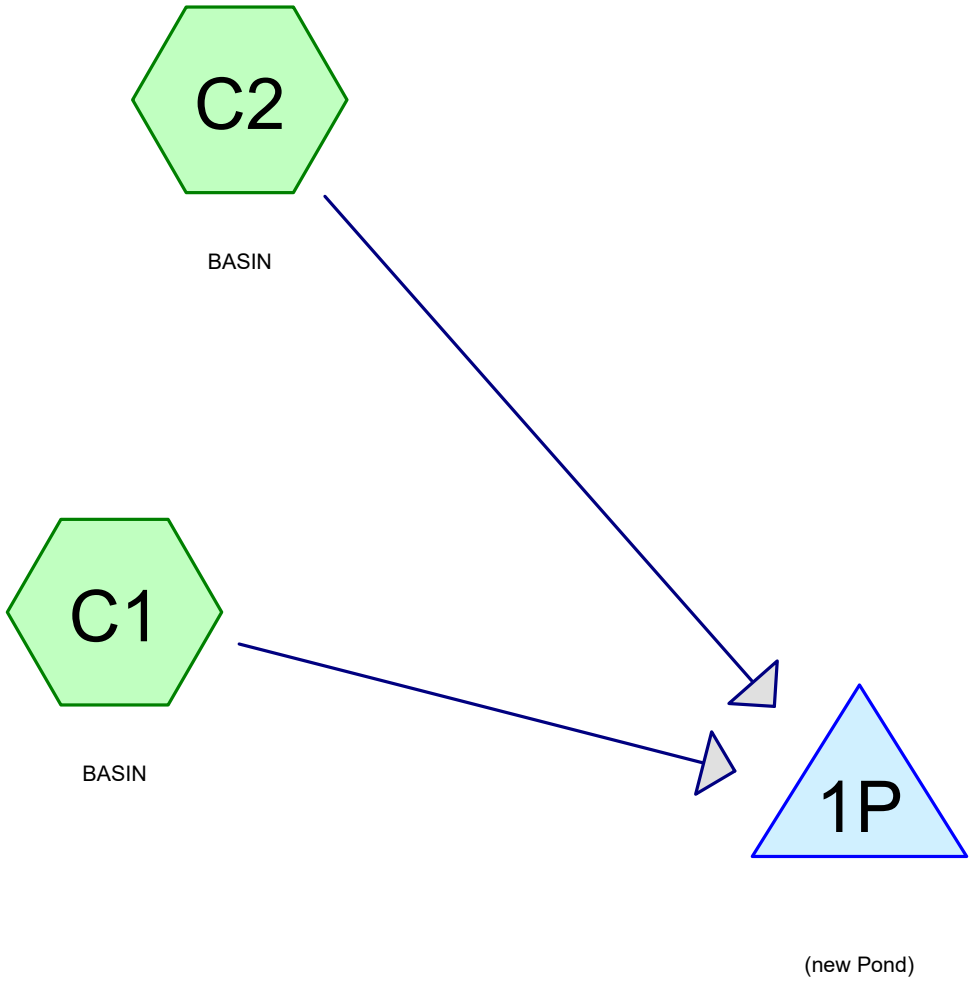
| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 892.500 m | **108 mm Vert. Orifice/Grate** C= 0.600<br>Limited to weir flow at low heads |

**Primary OutFlow** Max=0.0170 m³/s @ 24.23 hrs HW=893.044 m (Free Discharge)
↑—**1=Orifice/Grate** (Orifice Controls 0.0170 m³/s @ 1.86 m/s)

## Pond POND: (new Pond)



# Appendix D
# Post – Development
# On-site and Off-site Flow




Subcat Reach Pond Link

**Routing Diagram for TPN48_POST_Outlet Structure_Offsite_Rev**
Prepared by {enter your company name here}, Printed 7/12/2021

## Area Listing (all nodes)

| Area (hectares) | CN | Description (subcatchment-numbers) |
|---|---|---|
| 0.8700 | 65 | 2 acre lots, 12% imp, HSG B (C2) |
| 0.3940 | 61 | >75% Grass cover, Good, HSG B (C2) |
| 0.0160 | 85 | Gravel roads, HSG B (C2) |
| 8.5500 | 80 | Industrial Development (C1) |
| **9.8300** | **78** | **TOTAL AREA** |

## Soil Listing (all nodes)

| Area (hectares) | Soil Group | Subcatchment Numbers |
|---|---|---|
| 0.0000 | HSG A | |
| 1.2800 | HSG B | C2 |
| 0.0000 | HSG C | |
| 0.0000 | HSG D | |
| 8.5500 | Other | C1 |
| **9.8300** | | **TOTAL AREA** |

## Ground Covers (all nodes)

| HSG-A (hectares) | HSG-B (hectares) | HSG-C (hectares) | HSG-D (hectares) | Other (hectares) | Total (hectares) | Ground Cover | Subcatchment Numbers |
|---|---|---|---|---|---|---|---|
| 0.0000 | 0.8700 | 0.0000 | 0.0000 | 0.0000 | 0.8700 | 2 acre lots, 12% imp | C2 |
| 0.0000 | 0.3940 | 0.0000 | 0.0000 | 0.0000 | 0.3940 | >75% Grass cover, Good | C2 |
| 0.0000 | 0.0160 | 0.0000 | 0.0000 | 0.0000 | 0.0160 | Gravel roads | C2 |
| 0.0000 | 0.0000 | 0.0000 | 0.0000 | 8.5500 | 8.5500 | Industrial Development | C1 |
| **0.0000** | **1.2800** | **0.0000** | **0.0000** | **8.5500** | **9.8300** | **TOTAL AREA** | |

Time span=1.00-48.00 hrs, dt=0.01 hrs, 4701 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

**Subcatchment C1: BASIN** Runoff Area=8.5500 ha 0.00% Impervious Runoff Depth=56 mm
Flow Length=400.0 m Slope=0.0075 m/m Tc=17.5 min CN=80 Runoff=0.5072 m³/s 4.747 Ml

**Subcatchment C2: BASIN** Runoff Area=1.2800 ha 8.16% Impervious Runoff Depth=27 mm
Flow Length=420.0 m Tc=43.3 min CN=64 Runoff=0.0153 m³/s 0.348 Ml

**Pond 1P: (new Pond)** Peak Elev=893.075 m Storage=4.112 Ml Inflow=0.5125 m³/s 5.095 Ml
Primary=0.0176 m³/s 2.313 Ml Secondary=0.0069 m³/s 0.066 Ml Outflow=0.0245 m³/s 2.380 Ml

**Total Runoff Area = 9.8300 ha Runoff Volume = 5.095 Ml Average Runoff Depth = 52 mm**
**98.94% Pervious = 9.7256 ha 1.06% Impervious = 0.1044 ha**

## Summary for Subcatchment C1: BASIN

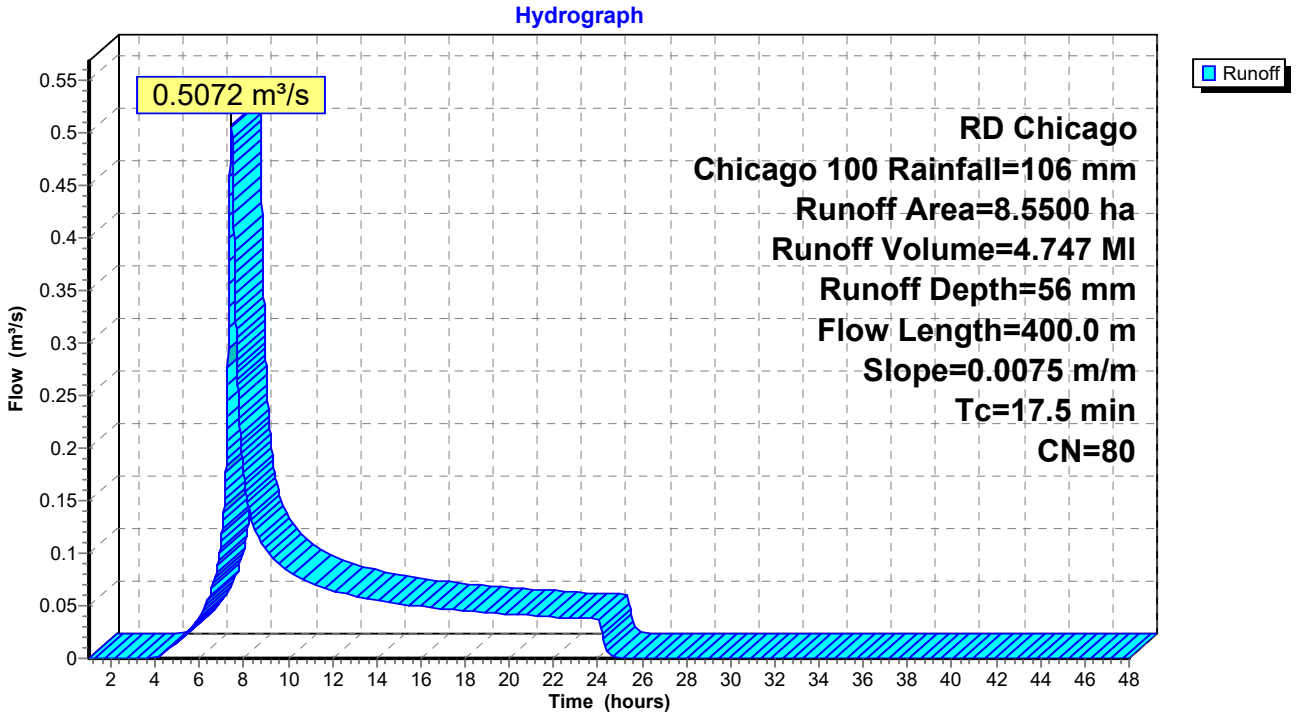
Runoff = 0.5072 m³/s @ 7.44 hrs, Volume= 4.747 Ml, Depth= 56 mm

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
RD Chicago Chicago 100 Rainfall=106 mm

| | Area (ha) | CN | Description |
|---|---|---|---|
| * | 8.5500 | 80 | Industrial Development |
| | 8.5500 | | 100.00% Pervious Area |

| Tc (min) | Length (meters) | Slope (m/m) | Velocity (m/sec) | Capacity (m³/s) | Description |
|---|---|---|---|---|---|
| 3.8 | 50.0 | 0.0075 | 0.22 | | **Sheet Flow,** Smooth surfaces n= 0.011 P2= 40 mm |
| 13.7 | 350.0 | 0.0075 | 0.43 | | **Shallow Concentrated Flow,** Unpaved Kv= 4.91 m/s |
| 17.5 | 400.0 | Total | | | |

## Subcatchment C1: BASIN



## Summary for Subcatchment C2: BASIN

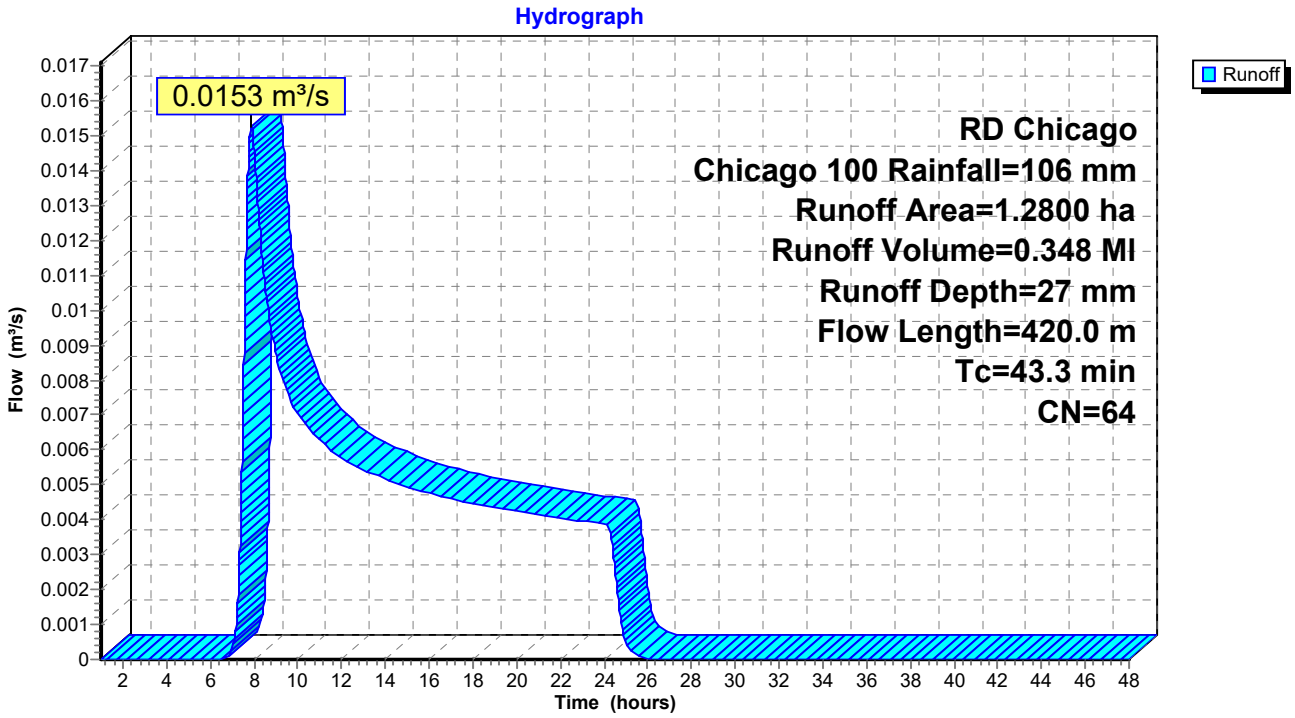
Runoff = 0.0153 m³/s @ 7.89 hrs, Volume= 0.348 Ml, Depth= 27 mm

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
RD Chicago Chicago 100 Rainfall=106 mm

| Area (ha) | CN | Description |
|---|---|---|
| 0.8700 | 65 | 2 acre lots, 12% imp, HSG B |
| 0.0160 | 85 | Gravel roads, HSG B |
| 0.3940 | 61 | >75% Grass cover, Good, HSG B |
| 1.2800 | 64 | Weighted Average |
| 1.1756 | | 91.84% Pervious Area |
| 0.1044 | | 8.16% Impervious Area |

| Tc (min) | Length (meters) | Slope (m/m) | Velocity (m/sec) | Capacity (m³/s) | Description |
|---|---|---|---|---|---|
| 23.5 | 50.0 | 0.0110 | 0.04 | | **Sheet Flow,** Range n= 0.130 P2= 40 mm |
| 11.2 | 150.0 | 0.0110 | 0.22 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 2.13 m/s |
| 8.6 | 220.0 | 0.0075 | 0.43 | | **Shallow Concentrated Flow,** Unpaved Kv= 4.91 m/s |
| 43.3 | 420.0 | Total | | | |

## Subcatchment C2: BASIN



## Summary for Pond 1P: (new Pond)

Inflow Area = 9.8300 ha, 1.06% Impervious, Inflow Depth = 52 mm for Chicago 100 event
Inflow = 0.5125 m³/s @ 7.44 hrs, Volume= 5.095 Ml
Outflow = 0.0245 m³/s @ 24.23 hrs, Volume= 2.380 Ml, Atten= 95%, Lag= 1,007.5 min
Primary = 0.0176 m³/s @ 24.23 hrs, Volume= 2.313 Ml
Secondary = 0.0069 m³/s @ 24.23 hrs, Volume= 0.066 Ml

Routing by Dyn-Stor-Ind method, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 893.075 m @ 24.23 hrs Surf.Area= 0.9310 ha Storage= 4.112 Ml

Plug-Flow detention time= 1,191.3 min calculated for 2.379 Ml (47% of inflow)
Center-of-Mass det. time= 916.0 min ( 1,668.3 - 752.3 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 892.500 m | 4.350 Ml | **Custom Stage Data (Prismatic)**Listed below (Recalc) |

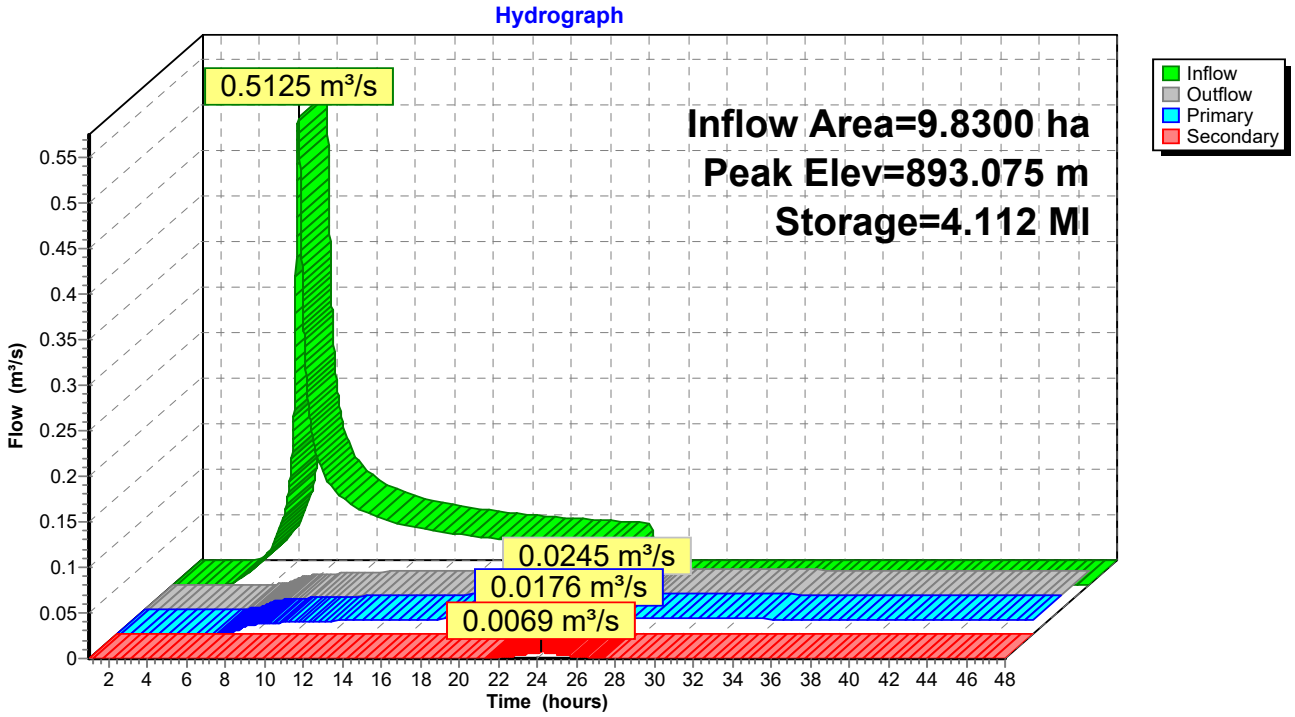
| Elevation (meters) | Surf.Area (hectares) | Inc.Store (Mega-liters) | Cum.Store (Mega-liters) |
|---|---|---|---|
| 892.500 | 0.5000 | 0.000 | 0.000 |
| 893.100 | 0.9500 | 4.350 | 4.350 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 892.500 m | **108 mm Vert. Orifice/Grate** C= 0.600<br>Limited to weir flow at low heads |
| #2 | Secondary | 893.050 m | **45.0 deg x 1.00 m long Sharp-Crested Vee/Trap Weir**<br>Cv= 1.41 (C= 1.76) |

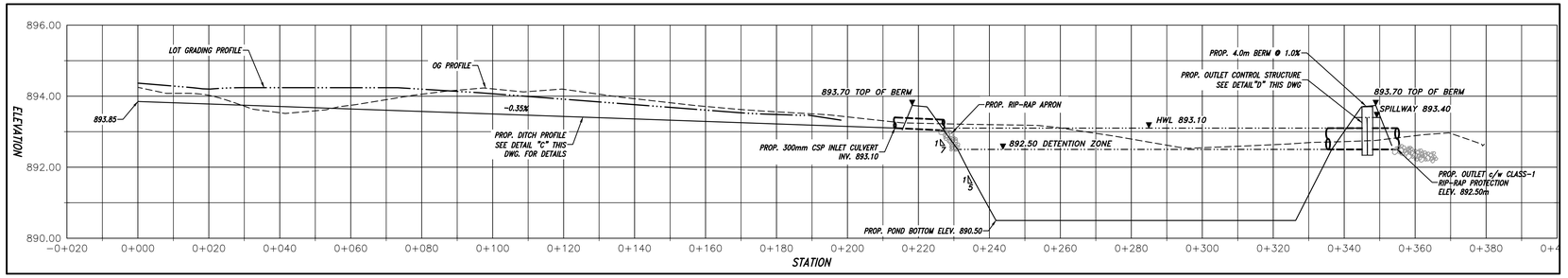
**Primary OutFlow** Max=0.0176 m³/s @ 24.23 hrs HW=893.075 m (Free Discharge)
└**1=Orifice/Grate** (Orifice Controls 0.0176 m³/s @ 1.92 m/s)

**Secondary OutFlow** Max=0.0069 m³/s @ 24.23 hrs HW=893.075 m (Free Discharge)
└**2=Sharp-Crested Vee/Trap Weir** (Weir Controls 0.0069 m³/s @ 0.28 m/s)

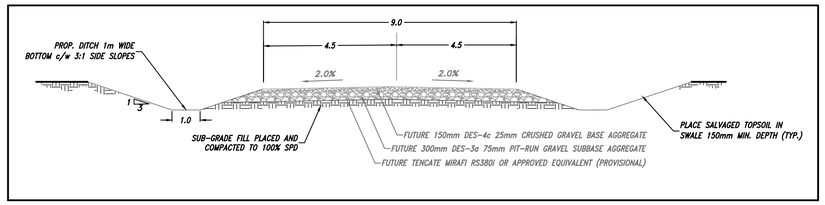
## Pond 1P: (new Pond)



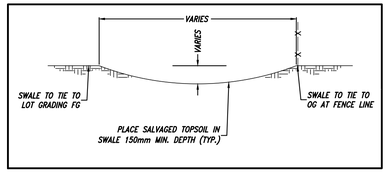
# Appendix E
# Proposed Wet Pond And Outlet Control Structure Preliminay Drawing



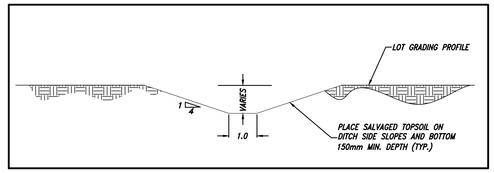

DRAINAGE DITCH - PROFILE VIEW
SCALE 1: 750 H 1:75 V



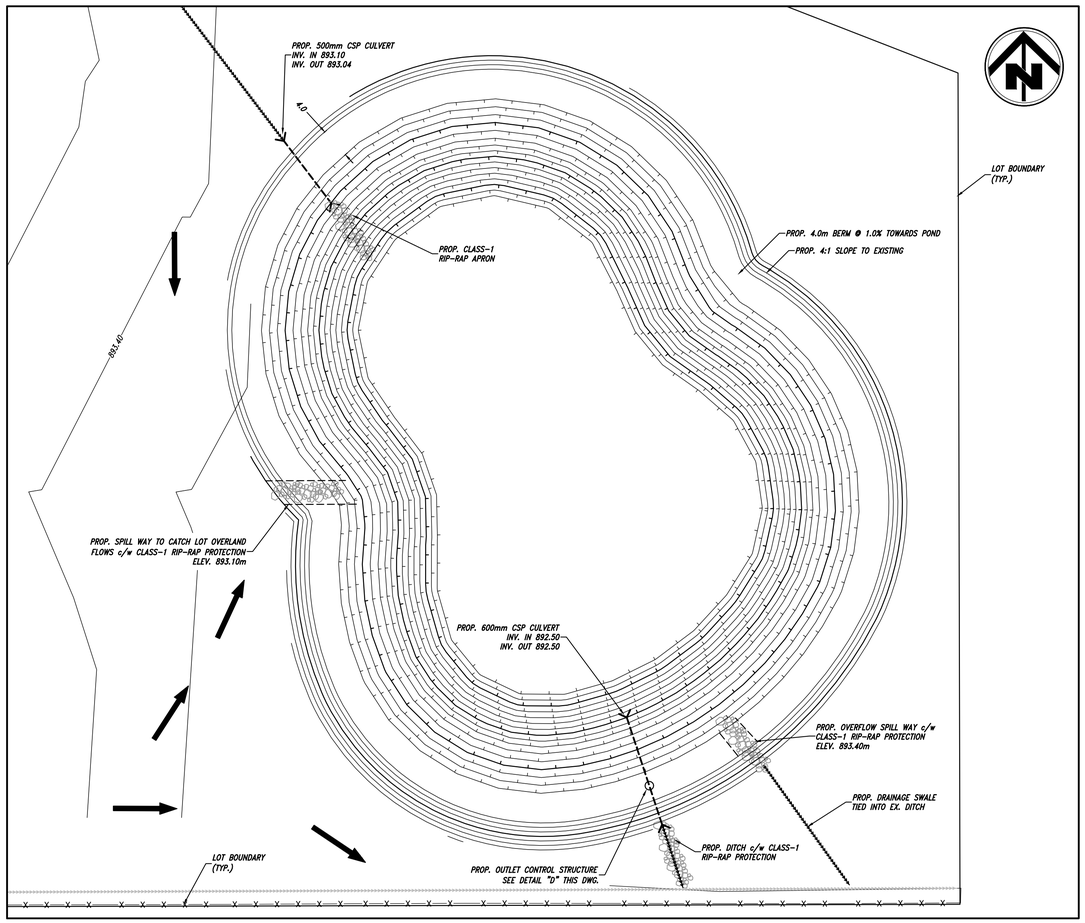

DETAIL "A" - ACCESS ROAD
SCALE: 1:100



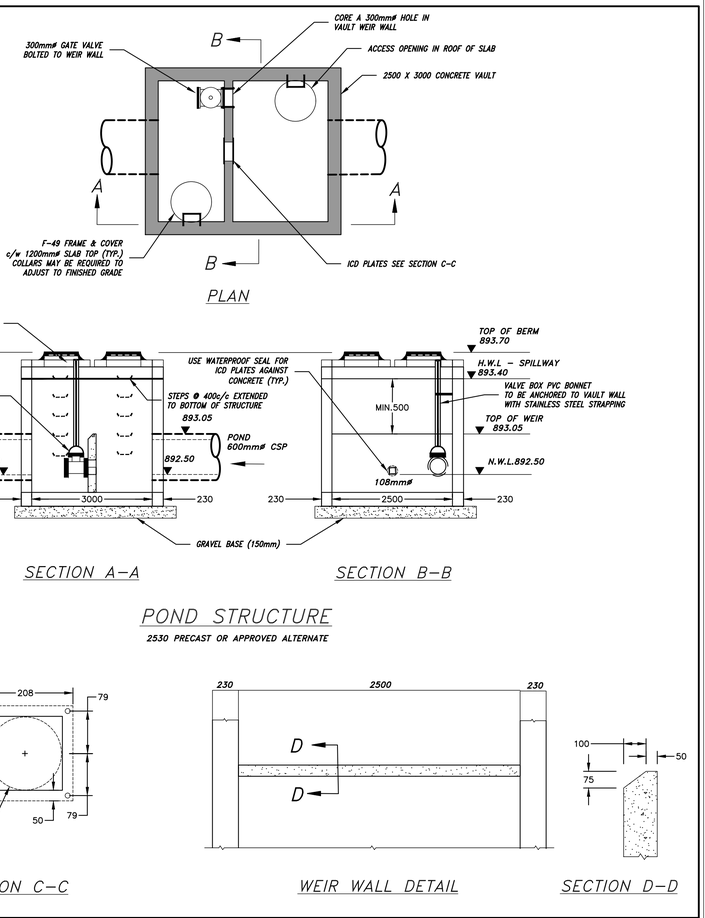

DETAIL "B" - DRAINAGE SWALE
SCALE: NTS



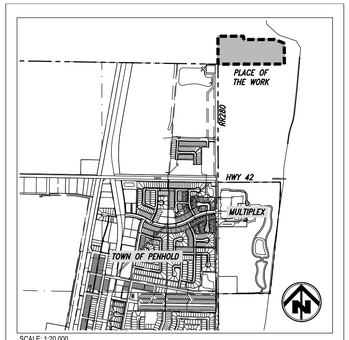

DETAIL "C" - DRAINAGE DITCH
SCALE: 1:100




STORM WET POND DETAIL
SCALE 1: 500




DETAIL "D" - OUTLET CONTROL STRUCTURE
SCALE: NTS




SCALE: 1:20,000

TAGISH ENGINEERING
#104, 230 LAKE STREET | RED DEER COUNTY AB T4E 1B9 | 403.346.7710
www.tagish-engineering.com

LEGEND

| DESCRIPTION | EXISTING | PROPOSED |
|---|---|---|
| BLOCK PROPERTY LINE /W PI | | |
| LOT PROPERTY LINE /W PI | | |
| RIGHT OF WAY | | |
| MAJOR ELEVATION CONTOURS | 900.000 | 900.000 |
| MINOR ELEVATION CONTOURS | 900.000 | 900.000 |
| MONOWALK /W PARARAMP | (LOG) (BOW) (LOG) (BOC) | |
| CURB & GUTTER W/ DROP | | |
| EDGE OF ASPHALT SURFACE | EOA | EOA |
| EDGE OF GRAVEL SURFACE | EOG | EOG |
| CENTERLINE W/ FLOW & PI | | |
| LIGHT STANDARD | | |
| POWERPOLE W/ ANCHOR | | |
| FENCELINE | | |
| STD 1200 DIA. MANHOLE (TYPE 5A) | | |
| CATCH BASIN MANHOLE (STD) | | |
| CATCH BASIN MANHOLE (ROLLED FACE) | | |
| CATCH BASIN MANHOLE (TRASH GRATE) | | |
| CATCH BASIN (STRAIGHT FACE) | | |
| CATCH BASIN (ROLLED FACE) | | |
| CATCH BASIN (TRASH GRATE) | | |
| INLET OR OUTFALL STRUCTURE | | |
| STORM WATER CULVERT | | |
| STORM MAIN W/ FLOW & MH | | |
| SANITARY MAIN W/ FLOW & MH | | |
| SANITARY VERT. DEFL. & PLUG | | |
| WATER SERVICE CURB COCK | | |
| WATER HYDRANT | | |
| WATER VALVE | | |
| WATER MAIN /W REDUCER & TEE | | |
| CABLE SURFACE PEDESTAL | C | C |
| CABLE MAIN LINE | | |
| PHONE SURFACE PEDESTAL | P | P |
| TELUS MAIN LINE | FIBRE FIBRE FIBRE | FIBRE FIBRE FIBRE |
| POWER SURFACE TRANSFORMER | T | T |
| POWER MAIN LINE | ELEC ELEC ELEC | ELEC ELEC ELEC |
| GAS MAIN LINE | GAS GAS GAS | GAS GAS GAS |
| TESTHOLE LOCATION & ELEVATION | BH 3 900.000 | BH 3 900.000 |

| REV | DESCRIPTION | DATE | DRAWN | DESIGN | APPRVD |
|---|---|---|---|---|---|
| E | | | | | |
| D | | | | | |
| C | ISSUED FOR TENDER REVIEW | 14JUNE2021 | CK | CK | JP |
| B | ISSUED FOR CLIENT REVIEW | 31MAR2021 | CK | CK | JP |
| A | ISSUED FOR INTERNAL REVIEW | 23MAR2021 | CK | CK | JP |

SEAL - PERMIT

FOR INFORMATION ONLY

CLIENT

Penhold

PROJECT

**PUBLIC WORKS LOT DEVELOPMENT**

TITLE

DRAINAGE DITCH PROFILE & MISC. DETAILS

| DATE | SCALE |
|---|---|
| JUNE 14, 2021 | AS NOTED |
| PROJECT NO. | SHEET |
| TPN.46 | P2 |

M:\Town of Penhold\TPN46 - Public Works Lot Development\AutoCAD\02 - Design\TPN46_SD\Dwg\3_LOT GRADING PLANS_CK_01_19_2021.dwg

# APPENDIX G

# LAND TITLE

# LAND TITLE CERTIFICATE

S

| LINC | SHORT LEGAL | TITLE NUMBER |
|---|---|---|
| 0038 901 104 | 4;27;37;6;NW | 212 152 125 +1 |

LEGAL DESCRIPTION

MERIDIAN 4 RANGE 27 TOWNSHIP 37
SECTION 6
QUARTER NORTH WEST
CONTAINING 64.7 HECTARES (160 ACRES) MORE OR LESS
EXCEPTING THEREOUT: HECTARES (ACRES) MORE OR LESS
A) ALL THAT PORTION DESCRIBED AS FOLLOWS: COMMENCING AT A POINT ON THE WEST BOUNDARY OF THE SAID QUARTER SECTION 650 FEET NORTH OF THE SOUTH WEST CORNER THEREOF; THENCE EASTERLY AND PARALLEL TO THE SAID SOUTH BOUNDARY 500 FEET; THENCE NORTHERLY AND PARALLEL TO THE WEST BOUNDARY THEREOF 435.60 FEET; THENCE WESTERLY AND PARALLEL TO THE SAID SOUTH BOUNDARY THEREOF TO A POINT ON THE SAID WEST BOUNDARY; THENCE SOUTHERLY ALONG THE SAID WEST BOUNDARY TO THE POINT OF COMMENCEMENT, CONTAINING 2.02 5.00
ALSO EXCEPTING THEREOUT:

| PLAN | NUMBER | HECTARES | (ACRES) | MORE OR LESS |
|---|---|---|---|---|
| SUBDIVISION | 2121668 | 8.547 | 21.12 | |

EXCEPTING THEREOUT ALL MINES AND MINERALS

ESTATE: FEE SIMPLE

MUNICIPALITY: TOWN OF PENHOLD

REFERENCE NUMBER: 212 117 017

---

REGISTERED OWNER(S)

| REGISTRATION | DATE(DMY) | DOCUMENT TYPE | VALUE | CONSIDERATION |
|---|---|---|---|---|
| 212 152 125 | 13/07/2021 | SUBDIVISION PLAN | | |

OWNERS

BRIAN DOUGLAS RITCHIE
OF 13903-47 AVENUE
EDMONTON
ALBERTA T6H 0B5
AS TO AN UNDIVIDED 3/8 INTEREST

LOIS KYLE
OF 3050 28 ST NE
SALMON ARM

( CONTINUED )

BRITISH COLUMBIA V1E 3L3
AS TO AN UNDIVIDED 1/8 INTEREST

WARREN BLAIR
OF BOX 20 SITE 9 R.R. 4
RED DEER
ALBERTA T4N 5E4
AS TO AN UNDIVIDED 1/2 INTEREST

---

ENCUMBRANCES, LIENS & INTERESTS

| REGISTRATION NUMBER | DATE (D/M/Y) | PARTICULARS |
|---|---|---|
| 902 255 989 | 28/08/1990 | UTILITY RIGHT OF WAY<br>GRANTEE - CANADIAN WESTERN NATURAL GAS COMPANY LIMITED. |
| 912 127 093 | 28/05/1991 | UTILITY RIGHT OF WAY<br>GRANTEE - TAQA NORTH LTD.<br>PO BOX 2350, STN M<br>CALGARY<br>ALBERTA T2P2M6<br>(DATA UPDATED BY: TRANSFER OF UTILITY RIGHT OF WAY 982388136)<br>(DATA UPDATED BY: CHANGE OF NAME 072611218)<br>(DATA UPDATED BY: CHANGE OF NAME 092152439) |
| 982 377 911 | 07/12/1998 | CAVEAT<br>RE : RIGHT OF WAY AGREEMENT<br>CAVEATOR - TAQA NORTH LTD.<br>PO BOX 2350, STN M<br>CALGARY<br>ALBERTA T2P2M6<br>AGENT - BRET KAY<br>(DATA UPDATED BY: CHANGE OF ADDRESS 062260431)<br>(DATA UPDATED BY: CHANGE OF NAME 072602287)<br>(DATA UPDATED BY: CHANGE OF NAME 092133723) |
| 132 008 329 | 08/01/2013 | CAVEAT<br>RE : UTILITY RIGHT OF WAY<br>CAVEATOR - THE TOWN OF PENHOLD.<br>1 WASKASOO AVE, BOX 10<br>PENHOLD<br>ALBERTA T0M1R0<br>AGENT - RICHARD BINNENDYK |

TOTAL INSTRUMENTS: 004

( CONTINUED )

THE REGISTRAR OF TITLES CERTIFIES THIS TO BE AN ACCURATE REPRODUCTION OF THE CERTIFICATE OF TITLE REPRESENTED HEREIN THIS 20 DAY OF JULY, 2021 AT 09:44 A.M.

ORDER NUMBER: 42192272

CUSTOMER FILE NUMBER:

*END OF CERTIFICATE*

---

# ALBERTA GOVERNMENT SERVICES
## LAND TITLES OFFICE

**IMAGE OF DOCUMENT REGISTERED AS:**

# 132008329

## ORDER NUMBER: 39980982

**ADVISORY**

**This electronic image is a reproduction of the original document registered at the Land Titles Office. Please compare the registration number on this coversheet with that on the attached document to ensure that you have received the correct document. Note that Land Titles Staff are not permitted to interpret the contents of this document.**

**Please contact the Land Titles Office at (780) 422-7874 if the image of the document is not legible.**

**CAVEAT FORBIDDING REGISTRATION**
**FORM 26**
**Land Titles Act**
**Sections 130**

Take notice that we, **the Town of Penhold,** claim an interest in the land on Title Number 072 412 735 pursuant to a Utility Easement attached hereto in the land described as follows:

MERIDIAN 4 RANGE 27 TOWNSHIP 37
SECTION 6
QUARTER NORTH WEST
CONTAINING 64.7 HECTARES (160 ACRES) MORE OR LESS
EXCEPTING THEREOUT HECTARES (ACRES) MORE OR LESS

A) ALL THAT PORTION DESCRIBED AS FOLLOWS: COMMENCING AT A POINT ON THE WEST BOUNDARY OF THE SAID QUARTER SECTION 650 FEET NORTH OF THE SOUTH WEST CORNER THEREOF; THENCE EASTERLY AND PARALLEL TO THE SAID SOUTH BOUNDARY 500 FEET; THENCE NORTHERLY AND PARALLEL TO THE WEST BOUNDARY THEREOF 435.60 FEET; THENCE WESTERLY AND PARALLEL TO THE SAID SOUTH BOUNDARY THEREOF TO A POINT ON THE SAID WEST BOUNDARY; THENCE SOUTHERLY ALONG THE SAID WEST BOUNDARY TO THE POINT OF COMMENCEMENT, CONTAINING:
2.02 HA 5 ACRES

EXCEPTING THEREOUT ALL MINES AND MINERALS

Standing in the register as **LINC 0018 248 872** and is registered in the names of **MARIDEL RITCHIE, LOIS KYLE AND WARREN BLAIR,** and we forbid the registration of any person as transferee or owner of, or of any instrument affecting that estate or interest, unless the certificate of title is expressed to be subject to my claim.

I designate the following address as the place at which notices and proceedings relating hereto may be served:

Town of Penhold
#1 Waskasoo Avenue, Box 10
Penhold, AB T0M 1R0

In witness whereof, I have hereunto subscribed my name this 2nd of January, 2013.

Signature of Caveator or Agent

**AFFIDAVIT IN SUPPORT OF CAVEAT**
**FORM 27**
**Land Titles Act**
**Sections 131**

I, Richard Binnendyk, Chief Administrative Officer for the Town of Penhold, make oath and say:

1. I am the within named caveator (or agent for the caveator).
2. I believe that I have a good and valid claim on the land, and I say that this caveat is not being filed for the purpose of delaying or embarrassing any person interested in or proposing to deal with it.

SWORN before me at the Town of Penhold
In the Province of Alberta this ____ day of January, 2013

A Commissioner for Oaths
Tricia Willis
Expiry date October 28, 2015

Richard Binnendyk, CAO
Town of Penhold

**EXHIBIT "A"**

**THE LAND TITLES ACT**

**UTILITY EASEMENT ("URW")**

BETWEEN:

MARIDEL RITCHIE,LOIS KYLE and WARREN BLAIR
(collectively hereinafter called the "Grantor")

OF THE FIRST PART

- and -

TOWN OF PENHOLD
(hereinafter called the "the Grantee")

OF THE SECOND PART

RECITALS:

A. The Grantor is the owner of the following lands:

MERIDIAN 4 RANGE 27 TOWNSHIP 37
SECTION 6
QUARTER NORTH WEST
CONTAINING 64.7 HECTARES (160 ACRES) MORE OR LESS
EXCEPTING THEREOUT HECTARES (ACRES) MORE OR LESS
A) ALL THAT PORTION DESCRIBED AS FOLLOWS: COMMENCING AT A POINT ON THE WEST BOUNDARY OF THE SAID QUARTER SECTION 650 FEET NORTH OF THE SOUTH WEST CORNER THEREOF; THENCE EASTERLY AND PARALLEL TO THE SAID SOUTH BOUNDARY 500 FEET; THENCE NORTHERLY AND PARALLEL TO THE WEST BOUNDARY THEREOF 435.60 FEET; THENCE WESTERLY AND PARALLEL TO THE SAID SOUTH BOUNDARY THEREOF TO A POINT ON THE SAID WEST BOUNDARY; THENCE SOUTHERLY ALONG THE SAID WEST BOUNDARY TO THE POINT OF COMMENCEMENT, CONTAINING 2.02 5.00
EXCEPTING THEREOUT ALL MINES AND MINERALS
ALL MINES AND MINERALS

(the "Lands")

B. The Grantor has agreed to grant to the Grantee a URW across a portion of the Lands in accordance with the terms contained in this Agreement.

IN CONSIDERATION OF the granting of the URW by the Grantor to the Grantee and the payment of the Fee as described in Clause 2, by the Grantee to the Grantor, the Grantor and the Grantee agree as follows:

1. **GRANT**

1.1. The Grantor gives, grants, transfers and makes over unto the Grantee the exclusive right, privilege and easement of a right-of-way, in, through and over that portion of the Lands described as follows:

> the Utility Right-of-Way as shown on Plan of Survey attached hereto as Schedule "A"

(hereinafter referred to as the "Right-Of-Way") for the digging, putting down taking up, relaying, connecting, disconnecting, constructing, repairing, replacing, maintaining, inspecting and operating of storm water line, together with the usual and ordinary appurtenances thereto, (all or any one or more of which are hereinafter referred to as the "utility line") to be laid, in, and under the Right-of-Way, and, in cases of emergency, to access and use such other portion of the Lands as is reasonably necessary to address the emergency, the said right, privilege and easement being subject to the following terms and conditions which are hereby agreed to by and between the Grantee and the Grantor, namely:

a. The term "Grantor", wherever used in these presents shall include and shall be interpreted to mean Maridel Ritchie, Lois Kyle and Warren Blair and the assignees, nominees, employees, agents or appointees of the Grantor.

b. The easement or a right-of-way hereby granted shall be for such length of time as the utility line is required by the Grantee or its assignees, nominees or appointees.

c. The Grantee, its tenants, contractors, subcontractors, officers, servants, agents and workmen shall have the full and free right and liberty to have ingress, egress and to pass the repass on the right-of-way either on foot or by means of vehicles or necessary machines whatsoever, and to remain the right- of-way for all purposes of digging, putting down, taking up, relaying, connecting, disconnecting, constructing, repairing, replacing, maintaining, inspecting and operating the utility line. The Grantee, its tenants, contractor, subcontractors, officers, servants, agents and workmen shall have full right and liberty of ingress and egress over the lands as necessary in an emergency to access the right-of-way.

d. The Grantee, in carrying out any of the aforesaid operations, will do so in good and workmanlike manner and will cause or do as little damage and inconvenience to the owner or occupier of the said lands, as is possible, and any excavations or working made or done in connection therewith shall, so far as is reasonably practicable, be restored to its former condition.

e. The Grantor covenants that it will not build, erect or maintain nor permit or suffer to be built, erected or maintained on the right-of-way any building or structure, nor will it plant or maintain, nor allow or suffer to be planted or maintained thereon any trees, shrubs or landscaping which would or could prevent or hinder the exercise by the Grantee, its tenants, contractors, officers, servants, agents, and workmen of any of the rights hereinbefore granted, save and except the Grantee may plant crops on the Right-of-Way on an annual basis.

MG

f. This Right-of-Way and covenants herein granted are and shall be covenants running with the land.

g. The rights, privileges and obligations hereunder shall extend to and shall be binding upon the Grantor, the Grantee, and their respective successors and assigns.

2. **FEE**

2.1. Upon the execution of this Agreement by the Grantor, the Grantee shall pay to the Grantor the sum of $10.00 (the "Fee"), the receipt of which is acknowledged by the Grantor. The payment of the Fee by the Grantee is the total compensation payable by the Grantee to the Grantor for the right to use the Right-of-Way as stated in this Agreement and in particular in Section 1.1.

2.2. The Grantee shall bear all costs, in preparing and registering the Utility Right-of-Way.

3. **UTILITIES**

3.1. Notwithstanding any rule of law to the contrary, the utility line shall remain a chattel and the property of the Grantee or its assigns and shall not become part of the Lands.

3.2. The Grantee shall install, construct, operate and maintain the utility line in a responsible manner so as to minimize damage to the Right-of-Way and shall after any such work, restore the Right-of-Way to substantially its original level and condition.

3.3. Construction of a storm water line in the Right-of-Way may include the installation of manholes. The Grantee shall, so long as the Lands remain farmland, construct and maintain any manholes at least one-half metre below the ground level to permit normal crop farming operations on the Right-of-Way. The Grantor shall not be liable for any damage to a manhole caused by its exercise of normal crop farming operations on the Right-of-Way.

3.4. Should the Grantee decide that it has no further need of the Right-of-Way, the Grantee shall abandon the utility line and the Grantee shall remove all visible above ground parts of the utility line and the ground surface area shall be restored to the condition that existed prior to the abandonment. Upon abandonment, each party shall have no further obligation or liability to the other pursuant to this Agreement, except that the Grantee's obligations and covenants contained in Section 5 shall endure so long as any part of the utility line shall remain in the Lands.

4. **GRANTOR'S USE OF RIGHT-OF-WAY**

4.1. The Grantor shall not, without the prior written consent of the Grantee stockpile, excavate, drill, install, erect, construct or place above, on or under the Right-of-Way, any pavement, building, fence, pit, sidewalk, or other improvement. The Grantor shall not permit any of these activities to occur by others. This provision does not restrict the Grantee's right to plant crops on the Right-of-Way.

4.2. The Grantor shall not alter the surface grade level of the Right-of-Way in any manner which would affect the rights granted to the Grantee pursuant to this Agreement.

5. **ENVIRONMENTAL OBLIGATIONS**

5.1. The Grantee and the Grantor shall comply with all legislation dealing with environmental issues related to the right of way, provided that the cost of dealing with any such issues arising from the Right of Way, the Grantee's activities thereon and on the Lands, and the utility line contained therein shall be borne by the Grantee. The Grantee covenants and agrees to indemnify the Grantor from any and all damages, cost, claims and liability (including but not limited to all legal, engineering, environmental or other professional fees incurred) that the Grantor may suffer or be subject to arising from the Right of Way, the Grantee's activities on the Lands and the Right of Way, and the utility line contained therein.

5.2. The responsibility of the Grantee and the Grantor with respect to environmental obligations, as required by the Agreement, shall continue to be enforceable during and after the termination of the term of this Agreement.

6. **INDEMNITY AND COMPENSATION**

6.1. The Grantee shall at all times indemnify the Grantor from and against all actions, claims and demands that may be lawfully brought or made against the Grantor by reason of anything done by the Grantee, its agents, employees or contractors, in the exercise of the rights granted in this Agreement.

6.2. The Grantee shall reasonably compensate the Grantor for damage to crops, buildings or other improvements belonging to the Grantor arising out of the exercise by the Grantee of its rights in this Agreement, including any crops planted by the Grantor on the Right-of-Way planted before or after the date of this Agreement but excluding any buildings or improvements placed within the Right-of-Way subsequent to the execution of this Agreement.

7. **QUIET ENJOYMENT**

7.1. The Grantee, by performing and observing the terms and conditions of this Agreement, shall peaceably hold and enjoy all the rights granted in this Agreement, without hindrance or interruption from the Grantor or any person claiming through, under or for the Grantor.

8. **ADDRESS FOR CONSENT**

8.1. Any prior written consent required to be obtained from the Grantee pursuant to this Agreement shall be obtained by delivering the request to the Grantee by registered mail, postage prepaid, addressed to Town of Penhold, P.O. Box 10, Penhold, AB T0M 1R0.

9. **DISPUTE RESOLUTION**

9.1. In the event of a determination by either party in regard to a matter in dispute between the Grantee and the Grantor as to the interpretation or effect of any of the terms or conditions of this Agreement, the determination shall be conclusively deemed to have been accepted by the parties, unless, within Ten (10) days of the determination, a party shall give written notice to the other party (the "Arbitration Notice") of their desire to have the matter in dispute resolved by arbitration.

9.2. Within seven (7) days of receipt of the Arbitration Notice, the parties shall mutually appoint an arbitrator (the "Arbitrator"). In the event that the parties shall fail to agree on the appointment of the Arbitrator, then either party may, on written notice to the other apply to the President of the Alberta Arbitration and Mediation Society to name the Arbitrator.

9.3. The decision of the Arbitrator is final and binding on the parties and there shall be no appeal of the decision to the courts.

9.4. Except as modified by this Agreement the provisions of the Arbitration Act RSA 2000 c. A-43 as amended shall apply.

10. **GENERAL**

10.1. There are no conditions, either subsequent or precedent, except as stated in this Agreement. This Agreement is the entire Agreement between the Grantee and the Grantor and no representations or warranties have been made by the Grantee, except as stated in this Agreement.

10.2. If any term or condition of this Agreement shall be invalid or unenforceable, the remainder of this Agreement shall not be affected and each remaining term and condition shall be valid and be enforced to the fullest extent permitted by law.

10.3. In this Agreement

a. the word "shall" is to be read and interpreted as mandatory;

b. the word "may" is to be read and interpreted as permissive; and

c. the word "Grantor" shall be read and interpreted as meaning an individual, a partnership, a corporation, a trust, an unincorporated organization, a government, or any department or agency thereof, and the heirs executors, administrators or other legal representatives of any individual.

IN WITNESS WHEREOF the Grantee has hereunto executed this Agreement and the Grantor has hereunto caused its corporate seal to be affixed, attested by the hands of its proper officers in its behalf, at the City of Edmonton, in the Province of Alberta, this 10 day of July, 2012.

Witness

MARIDEL RITCHIE

Witness

LOIS KYLE

Witness

WARREN BLAIR

TOWN OF PENHOLD

Per:

Per:

## AFFIDAVIT OF EXECUTION

**CANADA**
**PROVINCE OF ALBERTA**
**TO WIT:**

I, Scott Hiller,
of Edmonton,
in the Province of Alberta
**MAKE OATH AND SAY:**

9. THAT I was personally present and did see MARIDEL RITCHIE, named in the within instrument, on the basis of the identification provided to me, duly sign and execute the same for the purpose named therein;

10. THAT the instrument was executed at Edmonton, Alberta and that I am the subscribing witness thereto;

11. THAT I believe MARIDEL RITCHIE, whose signature I witnessed is at least eighteen years of age.

SWORN before me at Edmonton,
in the Province of Alberta
this 16th day of July, 2012

A Commissioner for Oaths in and for the
Province of Alberta

Leroy N. Miller
BARRISTER & SOLICITOR
1720 Sun Life Place, 10123 - 99 Street
Edmonton, Alberta, Canada T5J 3H1

Scott Hiller

005

## AFFIDAVIT OF EXECUTION

**CANADA**
**PROVINCE OF ALBERTA**
**TO WIT:**

I, Scott Hiller,
of Edmonton,
in the Province of Alberta
**MAKE OATH AND SAY:**

1. THAT I was personally present and did see LOIS KYLE, named in the within instrument, on the basis of the identification provided to me, duly sign and execute the same for the purpose named therein;

2. THAT the instrument was executed at Edmonton Alberta and that I am the subscribing witness thereto;

3. THAT I believe LOIS KYLE, whose signature I witnessed is at least eighteen years of age.

SWORN before me at Edmonton
in the Province of Alberta
this 10th day of July, 2012

A Commissioner for Oaths in and for the
Province of Alberta

Scott Hiller

**Leroy N. Hiller**
BARRISTER & SOLICITOR
1720 Sun Life Place, 10123 - 99 Street
Edmonton, Alberta Canada T5J 3H1

## AFFIDAVIT OF EXECUTION

**CANADA**
**PROVINCE OF ALBERTA**
**TO WIT:**

I, Jennifer Anderson,
of Innisfail,
in the Province of Alberta
**MAKE OATH AND SAY:**

1. THAT I was personally present and did see WARREN BLAIR, named in the within instrument, on the basis of the identification provided to me, duly sign and execute the same for the purpose named therein;

2. THAT the instrument was executed at Innisfail, Alberta and that I am the subscribing witness thereto;

3. THAT I believe WARREN BLAIR, whose signature I witnessed is at least eighteen years of age.

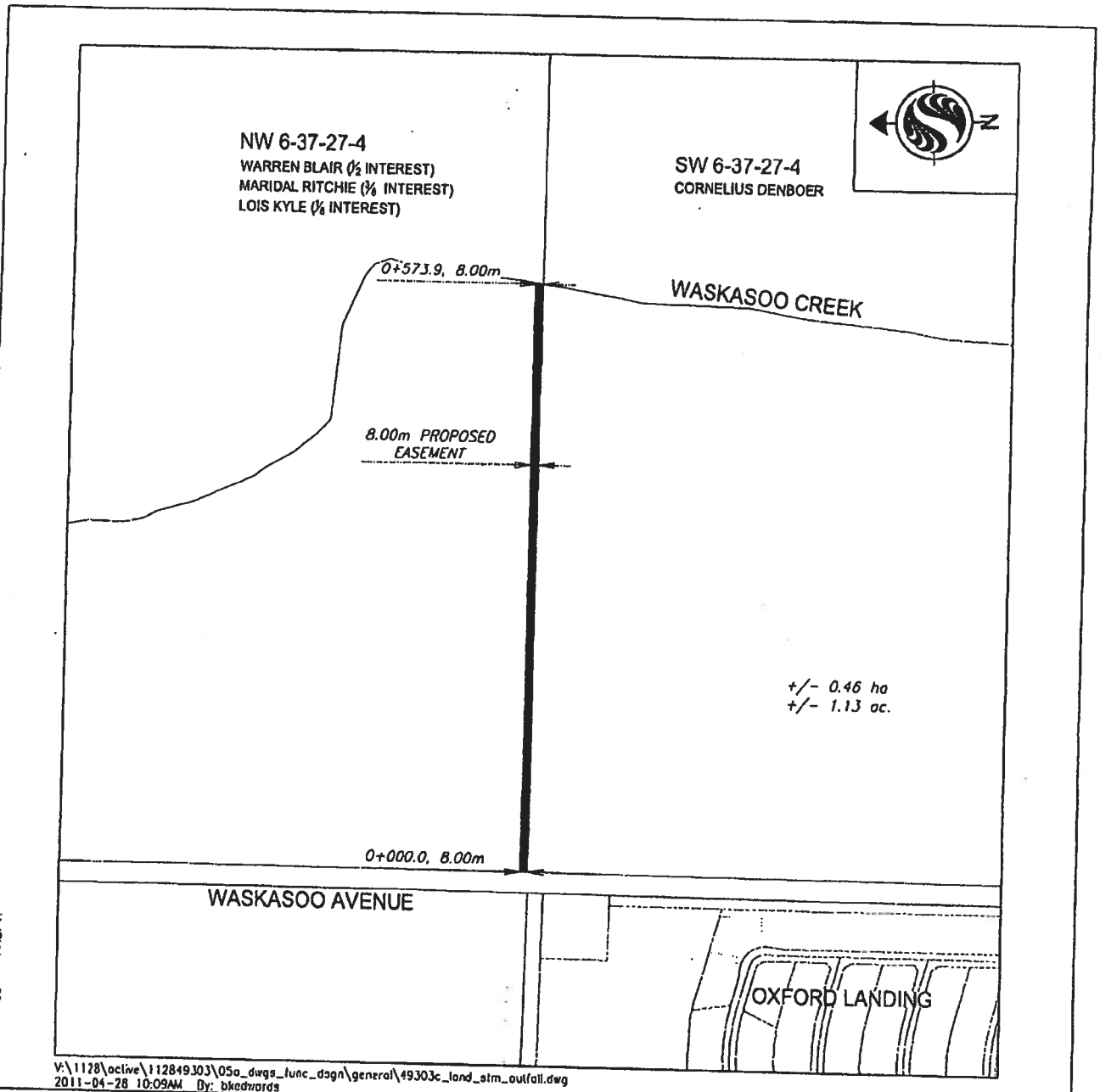
SWORN before me at Innisfail,
in the Province of Alberta
this 20 day of August, 2012

A Commissioner for Oaths in and for the
Province of Alberta

**Devon Reid Kirkness**
A Commissioner for Oaths in and
For the Province of Alberta
My Commission Expires May 31, 2015

914536;July 5, 2012

# Schedule "A"




ORIGINAL SHEET - ANSI A

V:\1128\active\112849303\05o_dwgs_func_dsgn\general\49303c_land_stm_outfall.dwg
2011-04-28 10:09AM By: bkedwards

## NW 6-37-27-4

| OWNER | R/W Requirements | |
|---|---|---|
| BRIAN FRASER | Acres | Hectares |
| PURCHASE | +/- 1.13 | +/- 0.46 |
| | | |
| | | |
| | | |

**MELCOR DEVELOPMENTS**
**OXFORD LANDING**
**STORM OUTFALL**
**EASEMENT PLAN**

1:5000 0 50 150 250m

Stantec Consulting Ltd.
600-4808 Ross Street
Red Deer AB Canada
T4N 1X5
Tel. 403.341.3320
Fax. 403.342.0969
www.stantec.com

Approved and Accepted This _____ Day of _____ 2012

Owner _____ Witness _____

## CONSENT TO EASEMENT BY OCCUPANT

I, Bob Blair of Penhold, in the Province of Alberta, being the occupant of the with lands by virtue of Agreement(s) dated the 22 day of Aug, 2012, DO HEREBY AGREE that all our rights, interest and estate which are, or may be, affected by the above Easement shall be fully bound by all the terms and conditions thereof both now and henceforth.

DATED at the City of ~~Edmonton~~ Red Deer, in the Province of Alberta, this 22 day of August, 2012.

Witness — Yvonne Blair P/A Bob Blair
Occupant

Witness — Occupant

## CONSENT TO EASEMENT

We, _____ of _____, in the Province of Alberta, having an interest in the within lands by virtue of Caveat _____ dated _____.

DO HEREBY AGREE that all our rights, interest and estate which are, or may be affected by the above Easement shall be fully bound by all the terms and conditions thereof both now and henceforth.

DATED at the City of _____, in the Province of Alberta, this _____ day of _____, 2012.

Witness — Occupant

Witness — Occupant

132008329 REGISTERED 2013 01 08
CAVE - CAVEAT
DOC 1 OF 1 DRR#: F07756E ADR/BMCGUNIG
LINC/S: 0018248872