

**Water Course Setback Determination**

**Business Park Development - NE section of 24-29-01 WM5**

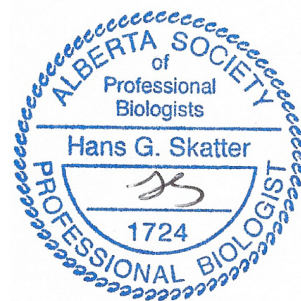
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**Hans  
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Project #: 2208-07

October 2022

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## Authenticating Professional Details

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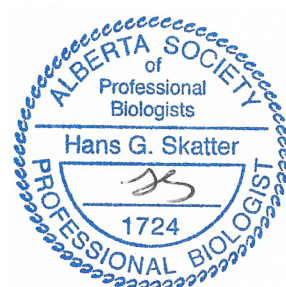
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**Professional Affiliation:** Alberta Society of Professional Biologists  
**Professional Designation:** Professional Biologist  
**Professional Registration Date:** August 29, 2009  
**Education Level:** Cand. scient.<sup>1</sup>

**Company name:** Omnia Ecological Services

**On behalf of applicant:** Appin Developments Inc.

**Hans Skatter** Digitally signed by Hans Skatter  
Date: 2026.03.03 16:21:51 -05'00'

Hans Skatter, *P.Biol, Cand. Scient.*



By signing this document, I confirm self-declaration as an authenticating professional meeting educational, professional registration, and experience requirements as outlined in Section 4 of the *Professional Responsibilities in Completion and Assurance of Wetland Science, Design and Engineering Work in Alberta* (Government of Alberta 2017).

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<sup>1</sup> Candidatus scientiarum, equivalent of M.Sc. from the University of Oslo, Norway (2003).

## Background/Introduction

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Omnia Ecological Services (Omnia) was commissioned by Appin Developments Inc. (Appin), to complete a drainage course and corresponding riparian setback assessment as part of the sub development of a property into industrial properties Southeast of the Town of Carstairs, AB ([Figure 1](#)). The development activities on a portion of the property are anticipated to begin in the summer of 2023.

Specific tasks of this assessment were as follows:

- Gather sufficient evidence for the Crown to determine potential claim of the drainage course.
- *If* the drainage course is claimed by the crown:
  - Determine the watercourse banks with assistance from a certified Alberta Land Surveyor (ALS)
  - Determine appropriate setbacks from the watercourse.



## 1 Permanency Assessment and Crown Ownership

### 1.1 Historical Precipitation Analysis and Aerial Photography Acquisition

Aerial photographs for this assessment were obtained from the Government of Alberta's Aerial Photographic Records System (APRS) as well as recent Google Earth Imagery as a substitute for recent years where availability from APRS was limited.

Yearly precipitation tables for Mountain View, AB were exported from beginning of record (1950) to 2019 using the Alberta Agriculture and Rural Development's AgroClimatic Information Service (ACIS) ([Table 1](#)). Aerial images were selected to represent the range of seasons and variations in yearly precipitation over as long a period of time as possible. In addition, the amount of precipitation in days and months prior to photograph date were taken into consideration. Photographs from 11 different years were used for the assessment ([Table 2](#)).

**Table 1** Historical precipitation records for Mountain View, AB for Sec. 24 - 29 - 01 W5, exported from Alberta Agriculture and Rural Development's AgroClimatic Information Service (ACIS).

| Township  | Year | Precip. (mm) | Township  | Year       | Precip. (mm) |
|-----------|------|--------------|-----------|------------|--------------|
| T029R01W5 | 1955 | 450.3        | T029R01W5 | 1987       | 368.9        |
| T029R01W5 | 1956 | 434.9        | T029R01W5 | 1988       | 432.7        |
| T029R01W5 | 1957 | 413.0        | T029R01W5 | 1989       | 487.0        |
| T029R01W5 | 1958 | 383.4        | T029R01W5 | 1990       | 548.2        |
| T029R01W5 | 1959 | 449.3        | T029R01W5 | 1991       | 478.2        |
| T029R01W5 | 1960 | 369.7        | T029R01W5 | 1992       | 512.8        |
| T029R01W5 | 1961 | 432.6        | T029R01W5 | 1993       | 451.2        |
| T029R01W5 | 1962 | 468.7        | T029R01W5 | 1994       | 460.6        |
| T029R01W5 | 1963 | 498.2        | T029R01W5 | 1995       | 536.2        |
| T029R01W5 | 1964 | 496.0        | T029R01W5 | 1996       | 490.1        |
| T029R01W5 | 1965 | 697.1        | T029R01W5 | 1997       | 427.1        |
| T029R01W5 | 1966 | 513.7        | T029R01W5 | 1998       | 526.4        |
| T029R01W5 | 1967 | 395.1        | T029R01W5 | 1999       | 465.7        |
| T029R01W5 | 1968 | 479.9        | T029R01W5 | 2000       | 458.1        |
| T029R01W5 | 1969 | 501.5        | T029R01W5 | 2001       | 318.7        |
| T029R01W5 | 1970 | 496.5        | T029R01W5 | 2002       | 399.1        |
| T029R01W5 | 1971 | 443.7        | T029R01W5 | 2003       | 424.7        |
| T029R01W5 | 1972 | 542.9        | T029R01W5 | 2004       | 441.2        |
| T029R01W5 | 1973 | 512.4        | T029R01W5 | 2005       | 595.1        |
| T029R01W5 | 1974 | 410.3        | T029R01W5 | 2006       | 430.8        |
| T029R01W5 | 1975 | 405.1        | T029R01W5 | 2007       | 501.4        |
| T029R01W5 | 1976 | 489.6        | T029R01W5 | 2008       | 485.0        |
| T029R01W5 | 1977 | 482.9        | T029R01W5 | 2009       | 288.3        |
| T029R01W5 | 1978 | 650.5        | T029R01W5 | 2010       | 376.3        |
| T029R01W5 | 1979 | 347.5        | T029R01W5 | 2011       | 427.9        |
| T029R01W5 | 1980 | 563.5        | T029R01W5 | 2012       | 401.5        |
| T029R01W5 | 1981 | 563.1        | T029R01W5 | 2013       | 514.9        |
| T029R01W5 | 1982 | 473.7        | T029R01W5 | 2014       | 438.4        |
| T029R01W5 | 1983 | 347.1        | T029R01W5 | 2015       | 413.0        |
| T029R01W5 | 1984 | 491.6        | T029R01W5 | 2016       | 429.6        |
| T029R01W5 | 1985 | 430.9        | T029R01W5 | 2017       | 320.0        |
| T029R01W5 | 1986 | 554.4        | T029R01W5 | 2018       | 328.5        |
|           |      |              | T029R01W5 | 2019       | 476.9        |
|           |      |              |           | <b>AVG</b> | 459.1        |
|           |      |              |           | <b>MAX</b> | 697.1        |
|           |      |              |           | <b>MIN</b> | 288.3        |

**Table 2** Details of the historical aerial photographs selected for this assessment from the Government of Alberta's Aerial Photographic Records System (APRS) and Google Earth Imagery (for 2019).

| Photo # | Year | Season | Precipitation |
|---------|------|--------|---------------|
| 1       | 1950 | Summer | N/A           |
| 2       | 1962 | Fall   | Normal        |
| 3       | 1966 | Summer | Wet           |
| 4       | 1971 | Fall   | Normal        |
| 5       | 1983 | Spring | Dry           |
| 6       | 1992 | Summer | Wet           |
| 7       | 2000 | Summer | Normal        |
| 8       | 2005 | Fall   | Wet           |
| 9       | 2007 | Spring | Wet           |
| 10      | 2010 | Summer | Dry           |
| 11      | 2019 | Spring | Normal        |

## 1.2 Historical Aerial Photograph Analysis

The historical photographs for all 11 years of analysis were overlaid and geo-corrected for the property and are presented in [Appendix 1](#). The photographic record was used for analysis of disturbance across the property, and the drainage course in particular, over time (1950 to Present), as well as the permanency assessment of the drainage course.

### 1.2.1 Human activity in/adjacent to project area: 1950 to Present.

Analysis of the photographic records revealed extensive change in use and increased disturbance levels of the project area over time since earliest record (1950). A detailed description of alterations from 1950 to 2019 is provided in [Table 3](#). The *key* alterations affecting the drainage course on the property include:

- 1962: New road along the Northern border of the property potentially altering the drainage pattern.
- 1992: Dugout excavated within the drainage course potentially altering timing of water input and drainage.
- 2010: A road crossing the property from West to East has dammed up the water course, causing wetter conditions and the area surrounding the dugout to be flooded.

**Table 3** Overview of human activity in/adjacent to project area drainage course and corresponding landscape changes: 1950 to Present.

| Year | Photo ID                    | Status of Property                                                                                                                                                                                                                                                                                                         | Potential effect of human disturbance on Drainage Course                                                                                                                                                                                                                                                                                               |
|------|-----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1950 | <a href="#">Appendix 1a</a> | Relatively low disturbance in the area. A road crosses the drainage course in the NW corner of the property, and a narrow road crosses drainage course in the south. Most of the upland areas appear to be used for agricultural purposes (hay/cultivation). Neither of the three currently existing wetlands are visible. | Apart from the two roads crossing, minimal disturbance to the drainage course currently.                                                                                                                                                                                                                                                               |
| 1962 | <a href="#">Appendix 1b</a> | New road created along the Northern border of property. Old road appears still intact with culvert. New road along the Eastern border.                                                                                                                                                                                     | No visible change to drainage course drainage or shape. New road has created a wetland along the Eastern border by disrupting the natural grade of the area.                                                                                                                                                                                           |
| 1966 | <a href="#">Appendix 1c</a> | Old County road in the NW and road in the south no longer intact, culverts removed. New road created along Western border.                                                                                                                                                                                                 | No visible change to drainage or shape.                                                                                                                                                                                                                                                                                                                |
| 1971 | <a href="#">Appendix 1d</a> | Gravel extraction operation in the SE, accessed from the road along the Western border. Trailers parked in the NW. Majority of upland area continues to be cultivated.                                                                                                                                                     | No visible change to drainage or shape.                                                                                                                                                                                                                                                                                                                |
| 1983 | <a href="#">Appendix 1e</a> | Gravel pit in the SE appears reclaimed, but access road to pit is still present, trailers in the NW are removed.                                                                                                                                                                                                           | No visible change to drainage or shape.                                                                                                                                                                                                                                                                                                                |
| 1992 | <a href="#">Appendix 1f</a> | A residential/farmstead developed along the Northern border (outside of the property). A dugout with open water is excavated in the drainage course. Two dugouts visible in reclaimed gravel pit.                                                                                                                          | The dugout has created an open pond, which may have altered timing of water input and drainage.                                                                                                                                                                                                                                                        |
| 2000 | <a href="#">Appendix 1g</a> | The property appears similar to the 1992 conditions.                                                                                                                                                                                                                                                                       | No visible change to drainage or shape.                                                                                                                                                                                                                                                                                                                |
| 2005 | <a href="#">Appendix 1h</a> | A residential/farmstead was built in the Eastern portion of the property. The rest of the property appears similar to the conditions present in the year 2000.                                                                                                                                                             | No visible change to drainage or shape.                                                                                                                                                                                                                                                                                                                |
| 2007 | <a href="#">Appendix 1i</a> | The property appears similar to 2005.                                                                                                                                                                                                                                                                                      | No visible change to drainage or shape.                                                                                                                                                                                                                                                                                                                |
| 2010 | <a href="#">Appendix 1j</a> | A gravel extraction pit occurs in the Northern portion of the property, as well as a smaller gravel pit in the Southern portion of the property. An access road to the gravel pit was created intersecting the property from west to east connecting to the residential property on the Eastern portion of the property.   | The damming of the water course has altered the water levels and timing of water drainage and has caused the area surrounding the dugout (first observed in 1992) to be flooded. The access road has dammed the water course and also created two smaller wetlands in the Western portion of the property by disrupting the natural grade of the area. |
| 2019 | <a href="#">Appendix 1k</a> | The property appears similar to prevalent condition in the year 2010.                                                                                                                                                                                                                                                      | No visible change to drainage or shape.                                                                                                                                                                                                                                                                                                                |

### *1.2.2 Identification and Permanency Assessment of the Drainage Course*

Three man-made wetlands and a riparian area/drainage course were identified and delineated by the historical review and several site visits. The boundary for all wetlands on the site were identified and digitized using Photographs from all 11 years.

The drainage course drains from South to North through the center of the property. The banks of this drainage course have steep slopes for most stretches but some wider areas (predominantly in the Northern portion) have wetland vegetation and soil profiles consistent with Seasonal wetlands. Based on the review of the historical photographs, this drainage course does not appear to have water in it during all years, e.g. 1992 and 2000 ([Appendix 1f](#) and [Appendix 1g](#)), or at least not in all seasons across all years, suggesting intermittent seasonal flow.

Under Section 3 of the Public Lands Act, the title to the bed and shore of all permanent and naturally occurring bodies of water and all naturally occurring rivers, streams, watercourses and lakes is vested in the Crown in right of Alberta. In cases of streams and watercourses, water does not have to be continuously present in the channel to support the permanence of the watercourse, it is the natural occurrence of that watercourse is the most important factor to consider (Sid Parseyan, Water Boundaries Unit, pers. comm.). Water within a watercourse is dynamic and flows; as long as the regular flow of water creates a distinguishable bed within the channel of that watercourse, it proves the permanence of that watercourse.

### **1.3 Crown Ownership**

The assessment, including historical aerial photographs, was submitted to the Water Boundaries Unit at Alberta Environment and Parks (AEP) on July 8th, 2022 to determine the potential for a Crown claim. The decision from AEP was received on the same day.

AEP did confirm an ownership claim to the bed and shore of the drainage course within the gully (not the entire gully) running through the property since it meets the criteria for Crown ownership. As a result, the Crown in right of Alberta, asserted ownership of the bed and shore of the drainage course. They stated further that any flooded areas beyond its normal bed and shore which has occurred due to man-made activities are not considered to be part of the Crown-owned bed and shore.

## 2 Identification of Drainage Course Banks

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To identify the extent of the Crown-owned banks, as a natural ownership boundary, an authorized Alberta Land Surveyor (ALS) was required. The drainage course was surveyed by Pat Maloney (Alberta Land Surveyor) using a desk top review and two site visits on November 15, 2018 and September 9, 2022. The mapped bank of the drainage course was provided as a shape file, and has been used to establish the required setbacks ([Figure 2](#)).

### 3 Establishment of Riparian Setback

Property subdivision authorities have the authority to establish building development setbacks, or dedicate environmental strips, for the purpose of maintaining riparian areas in a healthy state (Government of Alberta 2012). The *Stepping Back from the Water* guidelines (Government of Alberta 2012) outline the approach for establishing riparian setbacks based on variables such as the type of waterbody, soil substrate, topography and slope.

#### 3.1 Methods

Per the riparian setback requirements, a 6m buffer was generated around the stream bank. In addition, along the length of the stream, at 10 m intervals, lines running perpendicular to the stream were generated. Using the stream course (i.e., the center of the buffer) and these perpendicular lines, the 6m stream buffer was segmented ([Figure 3](#)). Within each of these segments, the average slope was calculated. These averages were derived using 1x1m resolution slope raster data<sup>2</sup>, and measured in percentage units. For each of these segments, a buffer (originating from the stream) was generated based on the following criteria (Government of Alberta 2012):

- 1) Where the average slope in a segment was less than 5%: Add a 6m buffer (i.e., vegetated filter strip).
- 2) Where the average slope in a segment was 6-25%: Add a slope factor (additional buffer) to the vegetated filter strip based on the equation:

$$6 + 1.5 (\text{Average Slope} - 5)$$

Buffers in this scenario are not allowed to extend further than 6m from the crest of the gully.

- 3) Slopes >25% are not credited toward the filter strip (Government of Alberta 2012), therefore, where the average slope in a segment was greater than 25%: Add a buffer that extends to 6m beyond the crest of the gully.

This buffering was done separately for the true left and true right side of the stream, and the final result was clipped so that the buffers did not cross the stream. The gully crest was manually digitized using 0.5m resolution contour polyline data, and 1x1m resolution slope raster data. A 6m buffer was generated around this gully boundary, and clipped to the property boundary.

#### 3.2 Results

A riparian buffer ranging from 6 to 79m from the drainage course bank was established based on the criteria outlined in Section 3.1. The resulting setbacks are displayed in [Figure 4](#).

<sup>2</sup> slope\_dtm\_1m\_utm11\_e\_20\_170 from the High Resolution Digital Elevation Model (HRDEM) dataset from the Government of Canada.

## Literature Cited

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Government of Alberta. 2012. Stepping back from the Water: A beneficial Management Practices Guide for New Development Near Water Bodies in Alberta's Settled Region. Regional Science and Planning. Alberta Environment and Parks. Edmonton, AB.

## Figures

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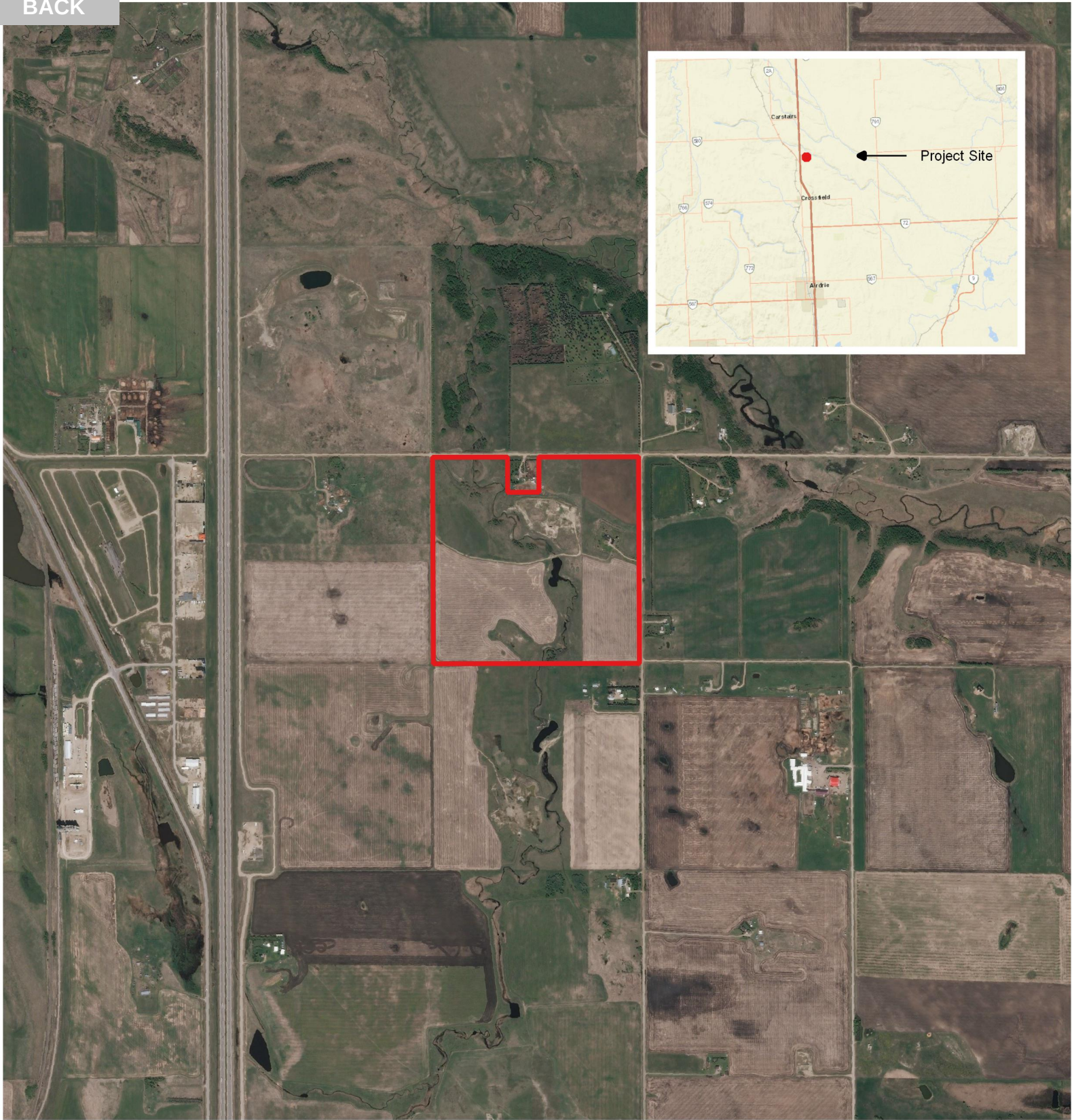
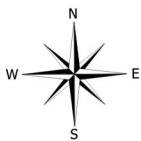


Figure 1. Appin Construction Project Area  
Site Location



Legend

 Project Boundary



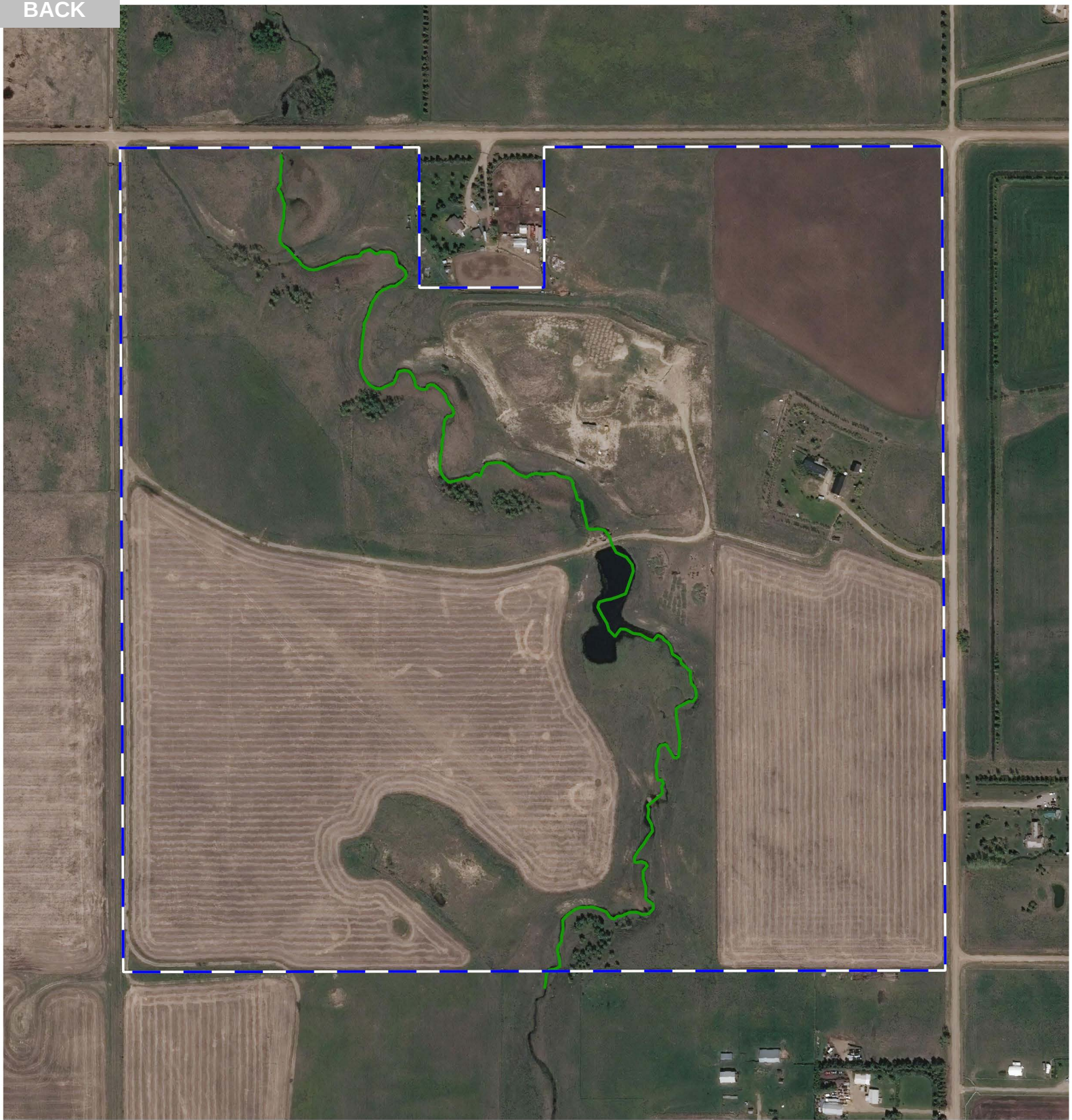
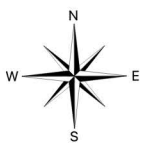
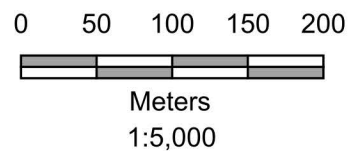


Figure 2. Appin ALS Surveyed Drainage Course.



Legend

-  Property Boundary
-  ALS Surveyed Drainage Course







**Figure 3** Segmentation of the 6m stream buffer for calculation of average slope percentages.



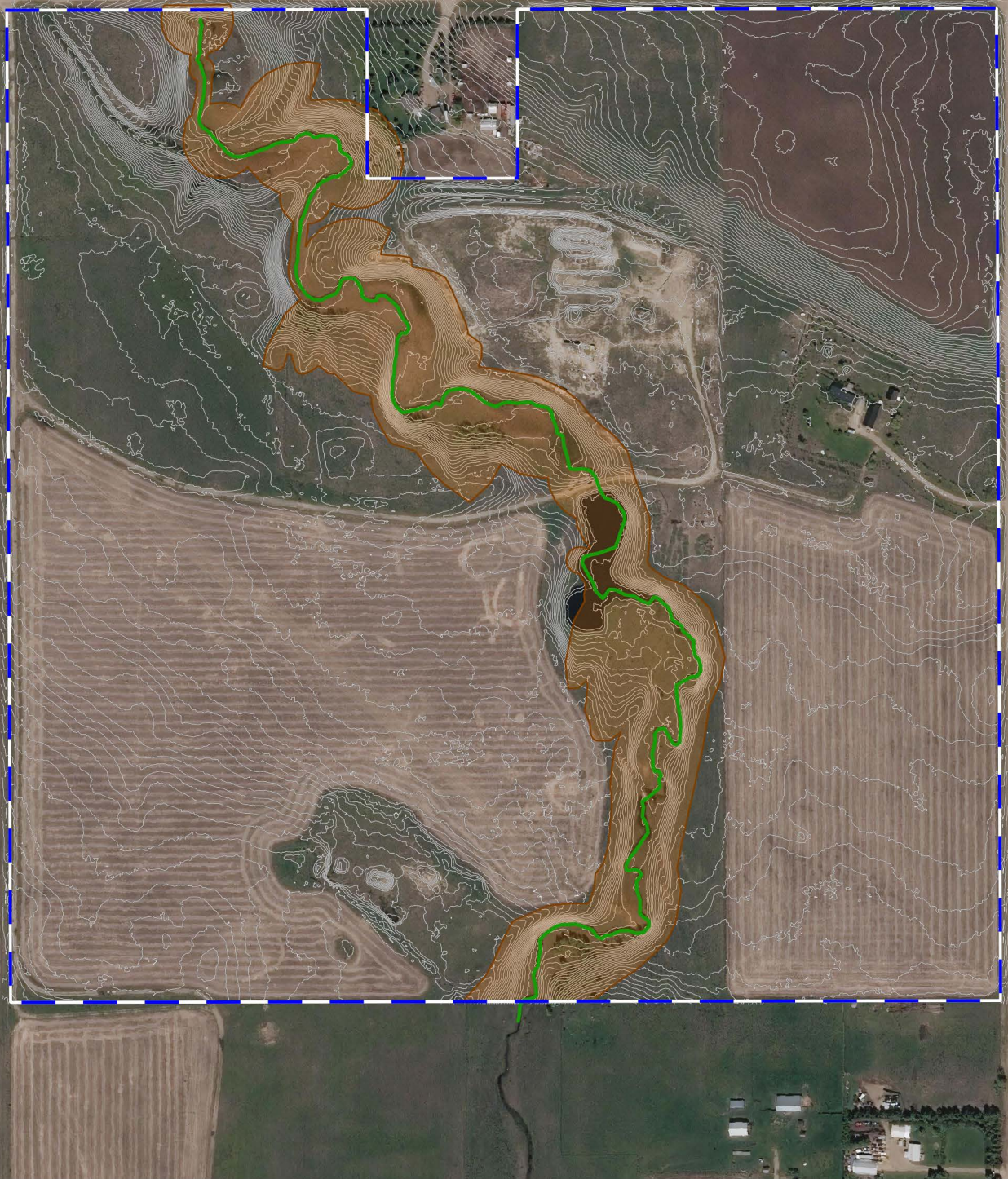
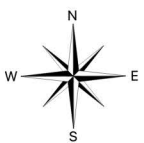
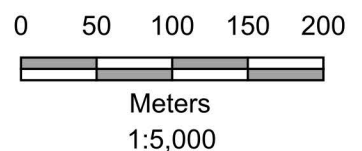


Figure 4. Appin ALS Surveyed Drainage Course and Setback.



Legend

-  Property Boundary
-  Contour line (0.5 m interval)
-  ALS Surveyed Drainage Course
-  Riparian Setback

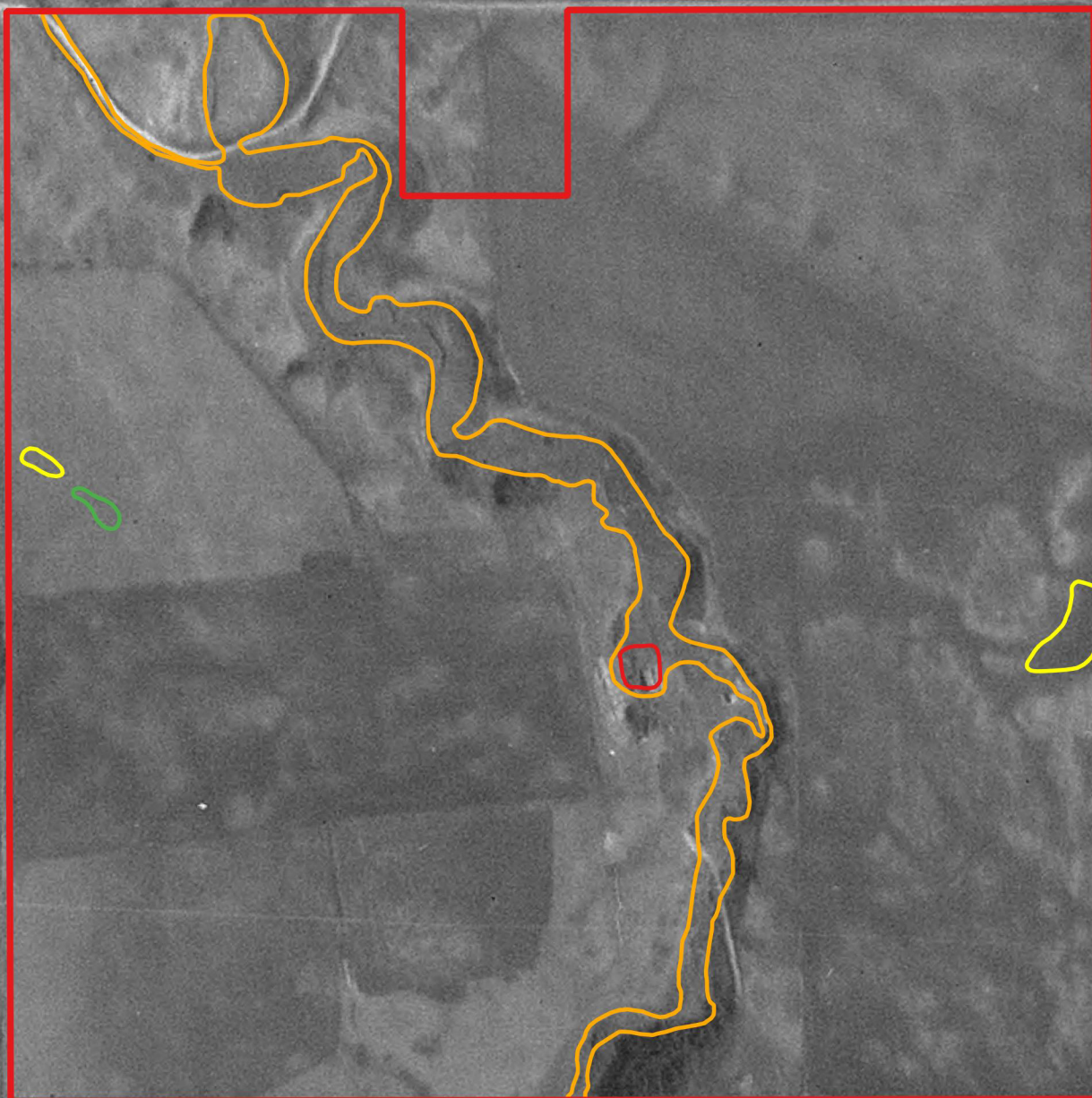




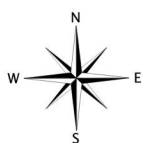
## Appendices

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## **Appendix 1 Historical Aerial Photographs**

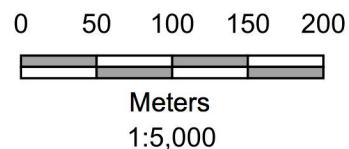


Appendix 1a. Appin Construction Project Area -  
Historical Wetland Assessment  
Imagery from June 5 1950

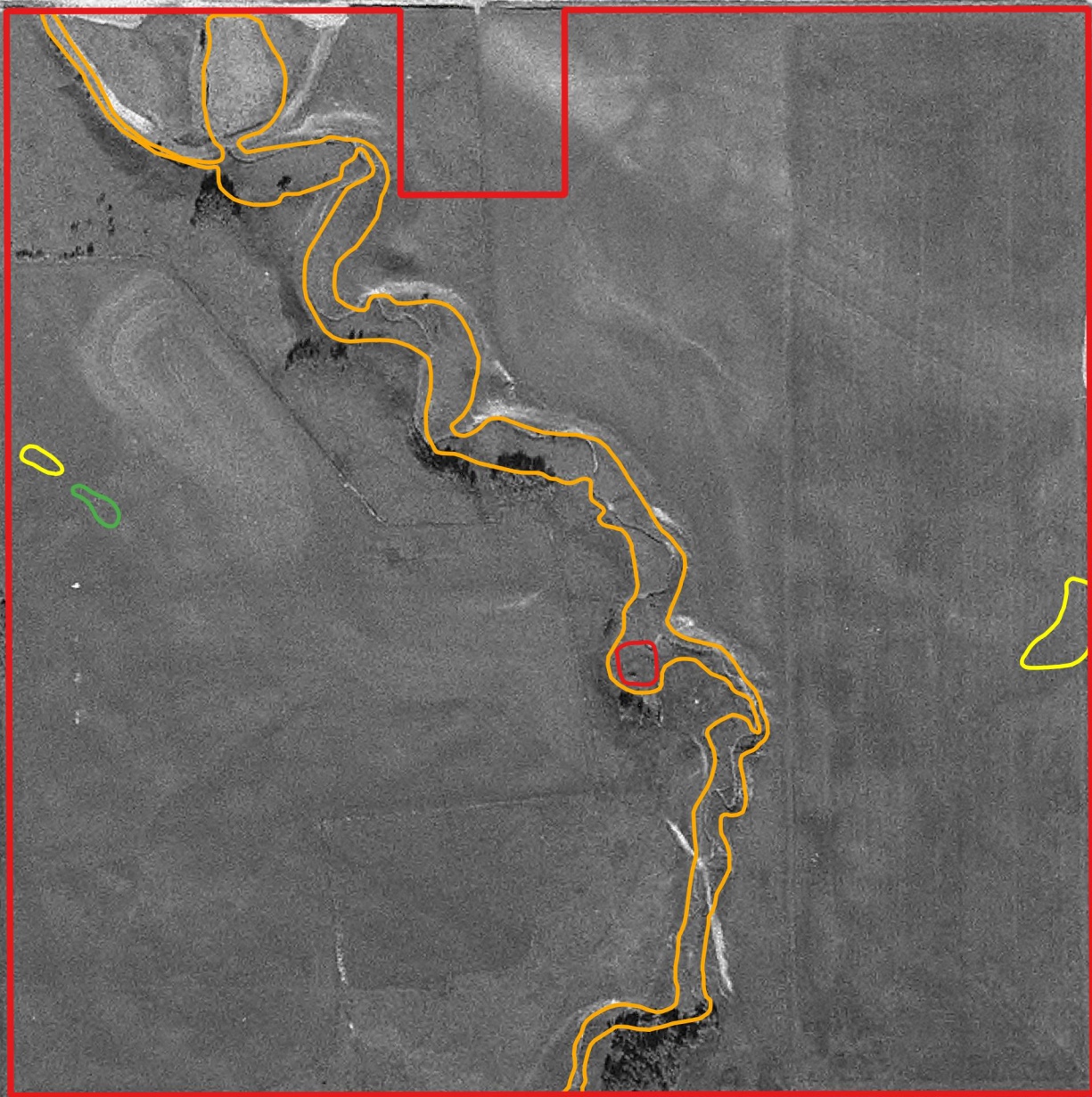


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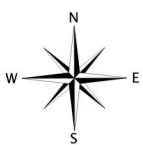
- Project Boundary
- Ephemeral Wetland
- Temporary Wetland
- Riparian
- Dugout





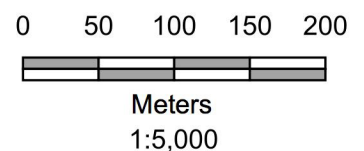


Appendix 1b. Appin Construction Project Area -  
Historical Wetland Assessment  
Imagery from September 17 1962

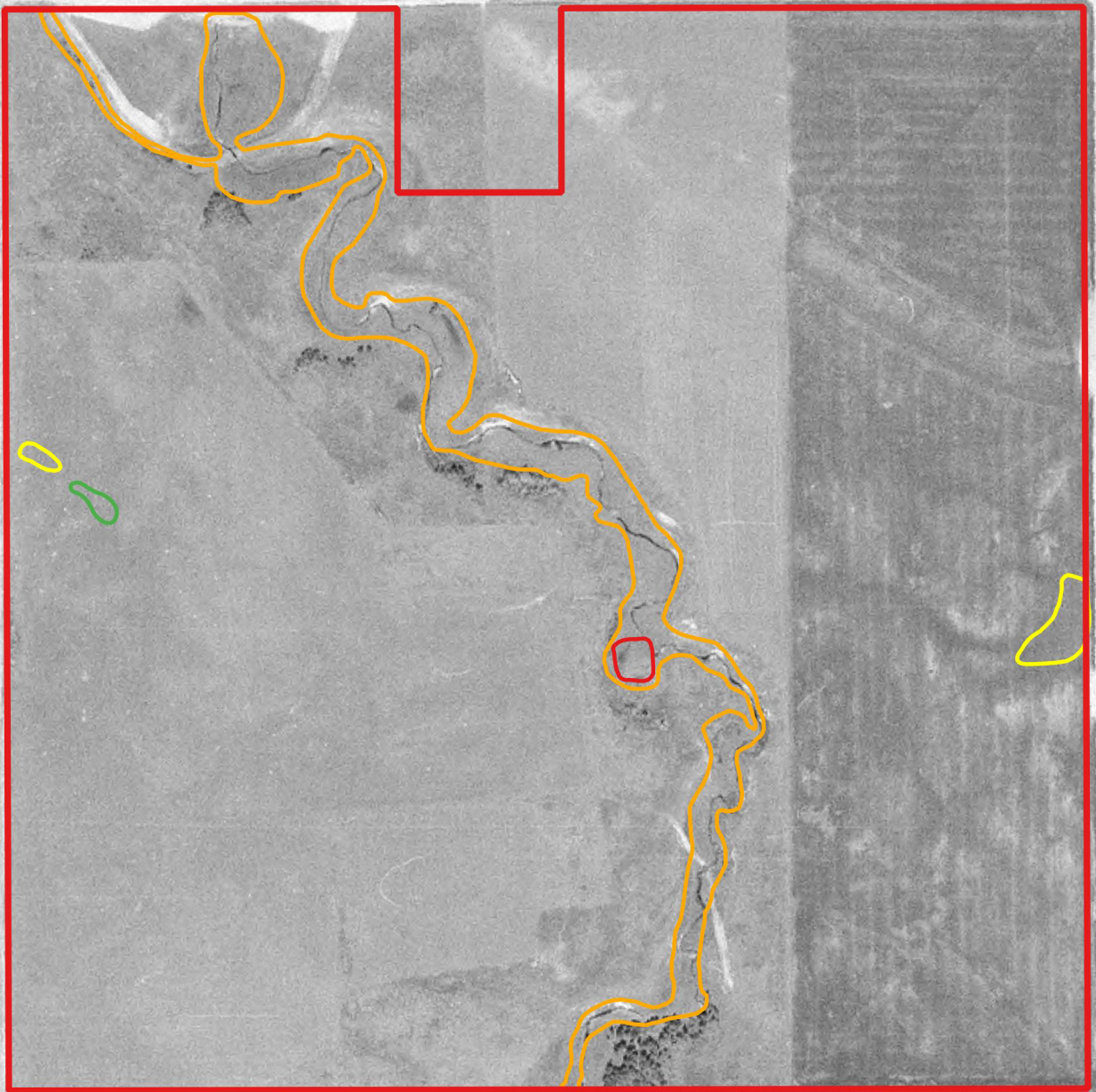


Legend

- Project Boundary
- Ephemeral Wetland
- Temporary Wetland
- Riparian
- Dugout





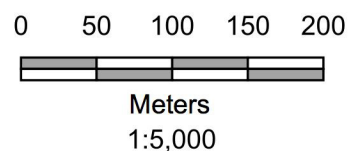


Appendix 1c. Appin Construction Project Area -  
Historical Wetland Assessment  
Imagery from August 1 1966



Legend

-  Project Boundary
-  Ephemeral Wetland
-  Temporary Wetland
-  Riparian
-  Dugout





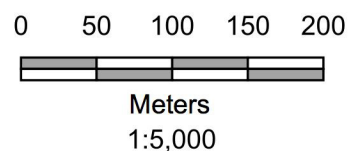


Appendix 1d. Appin Construction Project Area -  
Historical Wetland Assessment  
Imagery from October 1 1971



Legend

-  Project Boundary
-  Ephemeral Wetland
-  Temporary Wetland
-  Riparian
-  Dugout





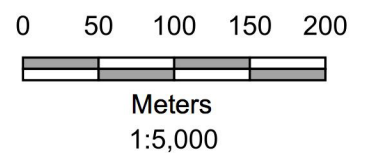


Appendix 1e. Appin Construction Project Area -  
Historical Wetland Assessment  
Imagery from April 22 1983



Legend

- Project Boundary
- Ephemeral Wetland
- Temporary Wetland
- Riparian
- Dugout





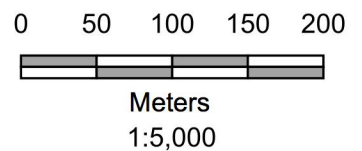


Appendix 1f. Appin Construction Project Area -  
Historical Wetland Assessment  
Imagery from June 26 1992



Legend

- Project Boundary
- Ephemeral Wetland
- Temporary Wetland
- Riparian
- Dugout



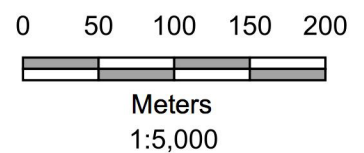


Appendix 1g. Appin Construction Project Area -  
Historical Wetland Assessment  
Imagery from July 26 2000



Legend

-  Project Boundary
-  Ephemeral Wetland
-  Temporary Wetland
-  Riparian
-  Dugout





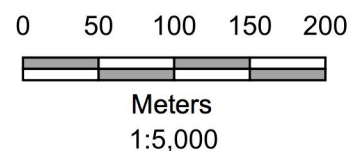


Appendix 1h. Appin Construction Project Area -  
Historical Wetland Assessment  
Imagery from October 9 2005



Legend

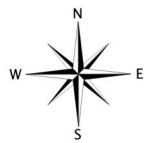
-  Project Boundary
-  Ephemeral Wetland
-  Temporary Wetland
-  Riparian
-  Dugout



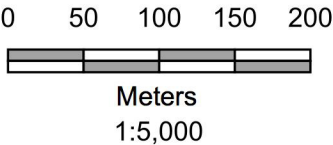




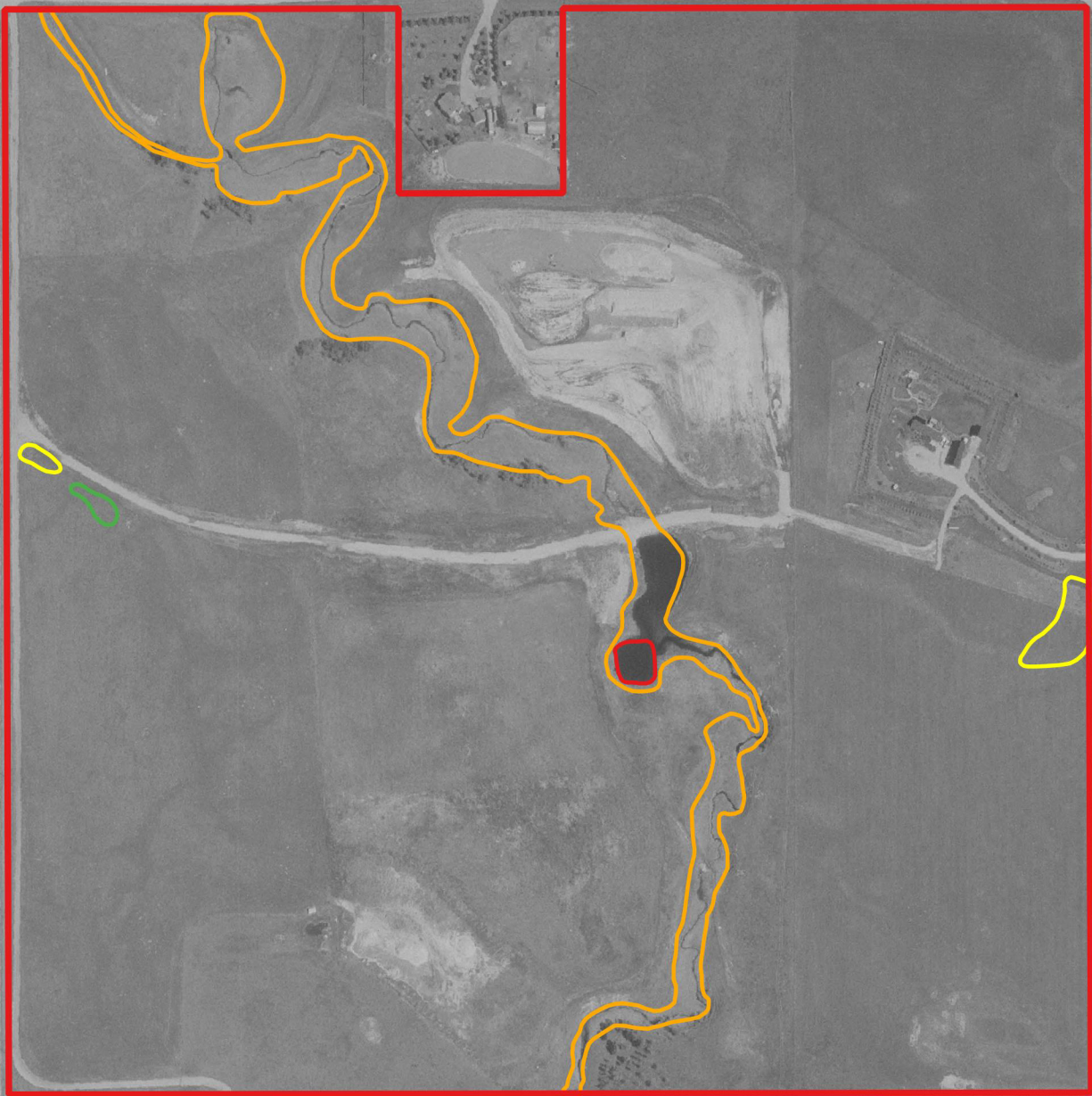
Appendix 1i. Appin Construction Project Area -  
Historical Wetland Assessment  
Imagery from April 26 2007



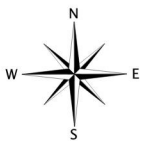
- Legend
-  Project Boundary
  -  Ephemeral Wetland
  -  Temporary Wetland
  -  Riparian
  -  Dugout





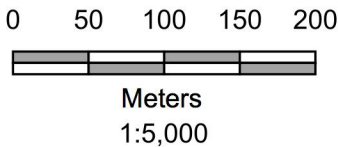


Appendix 1j. Appin Construction Project Area -  
Historical Wetland Assessment  
Imagery from June 2 2010

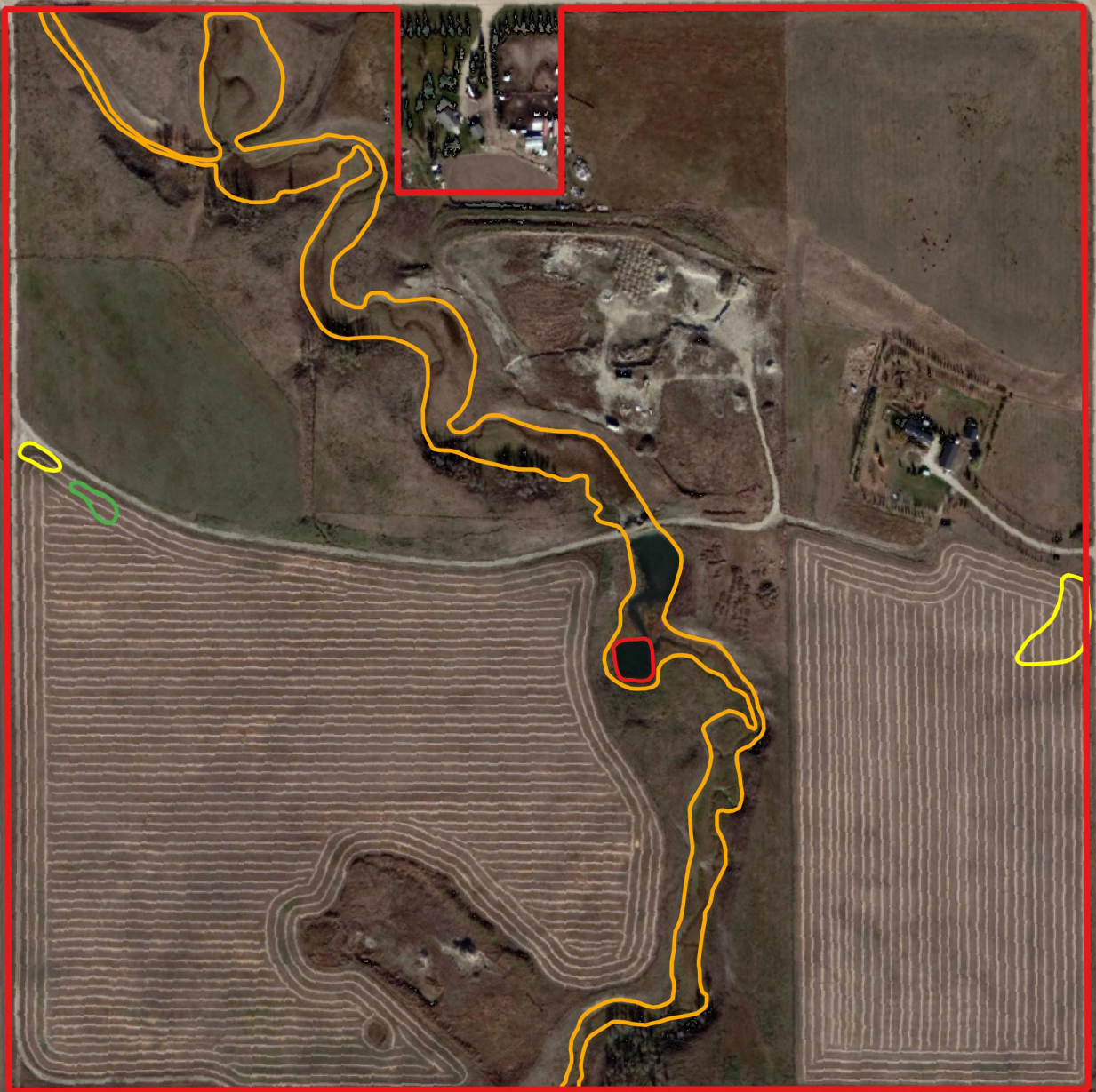


Legend

-  Project Boundary
-  Ephemeral Wetland
-  Temporary Wetland
-  Riparian
-  Dugout







Appendix 1k. Appin Construction Project Area -  
Historical Wetland Assessment  
Imagery from April 3 2019



Legend

- Project Boundary
- Ephemeral Wetland
- Temporary Wetland
- Riparian
- Dugout

