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### 1 INTRODUCTION

## 1.1 Background

The exploration and pursuit of economic development and regional growth opportunities is a key priority for both the Town of Elk Point and County of St. Paul No. 19 (the "Town" and "County", respectively). The Town of Elk Point 2022-2025 Strategic Plan establishes the following mission for the municipality:

By collaborating with partners within and beyond, Elk Point is a safe and prosperous regional centre that attracts people to succeed where they live.

Under the pillar of *Quality Infrastructure that Contributes to a Sustainable Environment* and goal of *Continued Excellence in Capital Infrastructure*, the Town's 2022-2025 Strategic Plan establishes the tactic of:

[Leveraging] the Town's airport as a business and tourism driver that connects Elk Point to the wider world.

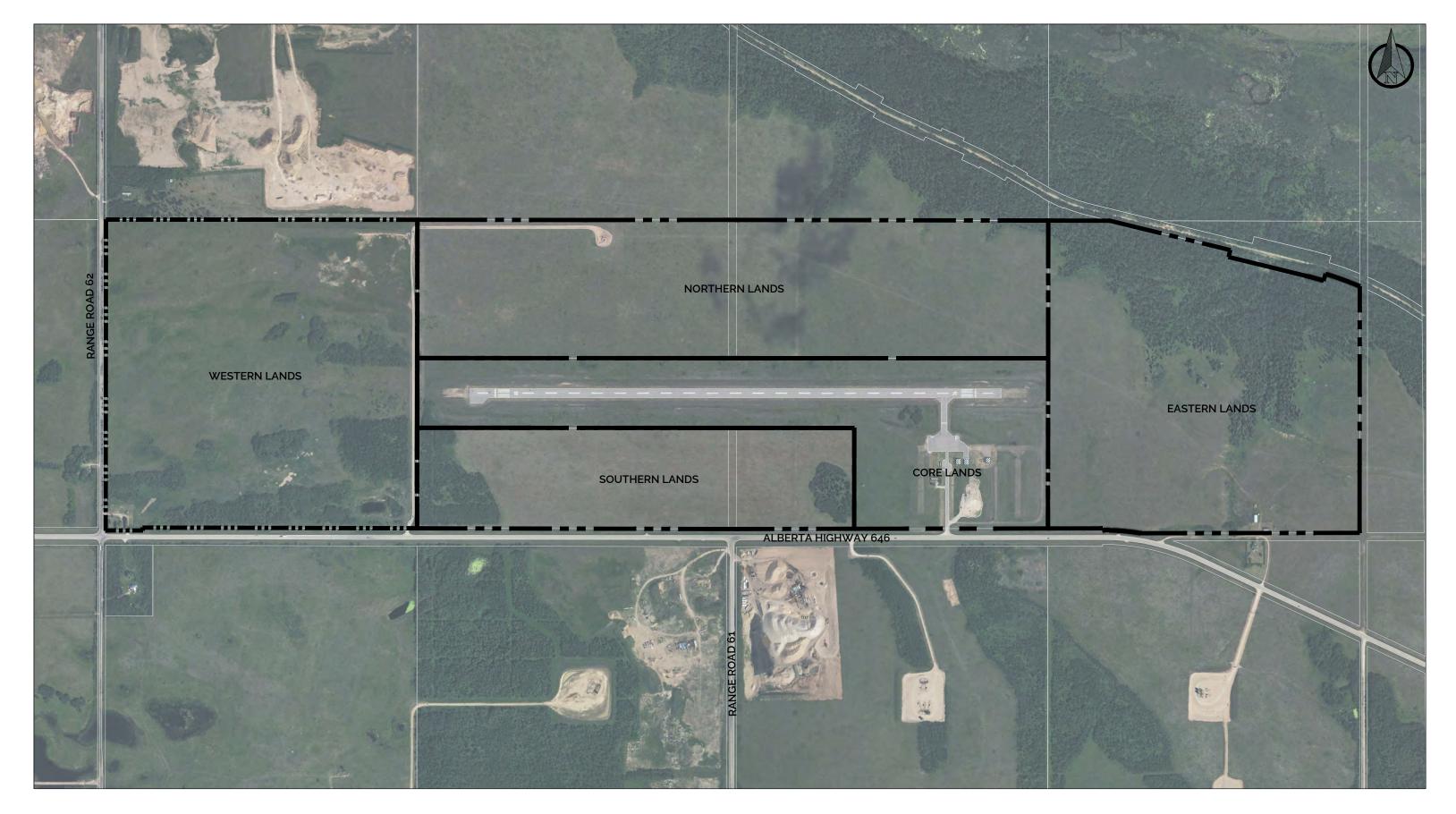
Similarly, the County's 2022 and 2023 Strategic Plans outline the opportunity to collaborate with the Town for the maintenance and improvements of this local airport, in addition to numerous directions with respect to economic development.

In October 2022, the Town, County, and St. Paul / Elk Point Economic Development Alliance (STEP) retained the services of HM Aero Aviation Consulting ("HM Aero") and its subconsultant, McIntosh Perry Consulting Engineers ("McIntosh Perry") to complete an Intermunicipal Area Structure Plan (IASP) for the Elk Point Airport (the "Airport"). The intent is that the IASP will guide future growth and development at the Airport with the aim of improving revenue generation and regional economic prosperity.

#### 1.2 Plan Area Overview

The Airport is located within the County of St. Paul No. 19, approximately 7 kilometres southeast of the municipal boundary of Elk Point. The boundaries of the Plan Area are shown in Figure 1.1, with the lands bounded by Highway 646 to the south, Range Road 62 to the west, privately owned lands to the north, and the Iron Horse Trail and privately owned lands to the east. The Plan Area is described through its five sub-areas:

- Western Lands;
- Northern Lands:
- Southern Lands;
- Eastern Lands; and
- Core Lands.



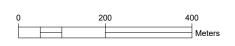








ELK POINT AIRPORT
INTERMUNICIPAL AREA STRUCTURE PLAN
FIGURE 1.1 - PLAN AREA OVERVIEW
AUGUST 2023



## 1.3 Plan Objectives

The overarching objective established by the Town, County, and STEP is that the Airport will become a regional driver of activity that affords economic and social benefits to residents and businesses. Accordingly, the IASP has been prepared with the following objectives, those being to provide:

- 1. A framework for growth and development over a 20-year horizon;
- 2. A strategy for allocating lands that will meet the needs of prospective end users; and
- 3. A land use and development concept that is systematic, orderly, and addresses all applicable constraints.

## 1.4 Interpretation

The IASP, when adopted, is a statutory plan that is intended to serve as a long-range tool that refines the broad direction articulated in the Municipal Development Plan to provide specificity for the growth of the Plan Area. The following considerations shall be noted in the interpretation of the IASP:

- 1. The County is the statutory land use authority for the Plan Area and is responsible for the interpretation and application of the IASP in future decision-making. Given the partnership established between the County and Town with respect to the operation and growth of the Airport, the County and Town shall establish a decision-making framework regarding how development and lease decisions are made within the Plan Area.
- 2. The IASP contains policies accompanied by the following terms: "shall", "should", and "may." These policies are to be interpreted as follows:
  - a. "Shall" policies must be complied with,
  - b. "Should" policies mean compliance in principle, but is subject to the discretion of the land use authority on a case-by-case basis, and
  - c. "May" policies indicate that the land use authority determines the level of compliance that is required.
- 3. The IASP should be read and interpreted in its entirety to identify all applicable policies and actions pertaining to a given decision.
- 4. Mapping presented in the IASP is conceptual in nature. Subject to County Council's approval, minor variations from the policies and the land use concept of the IASP will not require an amendment to the IASP.
- 5. In instances where all or part of the IASP conflicts or is inconsistent with the Municipal Government Act, a regional plan enacted pursuant to the Alberta Land Stewardship Act, the County's Municipal Development Plan, the hierarchically superior plan shall prevail to the extent of the conflict or inconsistency. An amendment to the IASP should be completed in a timely manner to rectify the conflict or inconsistency.
- 6. It is recognized that the federal level of government has jurisdiction over aeronautics. In instances where policies of the IASP adopted pursuant to the County's statutory role over land use conflicts with the federal government's jurisdiction on aeronautics, the federal government shall prevail to the extent of the conflict or inconsistency.

## 2 PLANNING PROCESS

The preparation of the IASP followed a systematic planning process as shown in Figure 2.1.

Figure 2.1 - Planning Process Overview



## 2.1 Economic Opportunities

The Elk Point Airport Intermunicipal Area Structure Plan – Economic Opportunities Report (Final Report, May 4, 2023) is included in Appendix A. The Economic Opportunities Report addresses contextual economic and aviation industry conditions of greatest relevance that may influence future growth and development at the Airport, assesses the trends exhibited at comparable airports, identifies aviation service requirements, enumerates the highest potential opportunities for the facility, and assesses prerequisite investments and land requirements. A total of 14 categories of economic activities were assessed for their potential at the Airport given the conditions noted previously, culminating in the identification of the opportunities of highest priority:

- Aerial applicators;
- Aerial work providers;
- Remotely Piloted Aircraft System (RPAS) cargo services;
- Private aircraft hangars;
- Fly-in outfitting customers;

- Refuelling services;
- Filming;
- Non-aviation laydown and storage;
- RPAS-based aerial work; and
- Military training.

## 2.2 Plan Area Analysis

The Elk Point Airport Intermunicipal Area Structure Plan – Plan Area Analysis Report (Final Report, May 26, 2023) is included in Appendix B. The Plan Area Analysis Report was prepared to gain a clear understanding of the natural and manmade constraints that affect the development potential of the Plan Area, including the spatial distribution of potential land uses, future assessment requirements, and compatibility factors requiring specific policies in the IASP. The Plan Area Analysis Report assessed the following subject matter areas:

- Land use planning context;
- Land ownership;
- · Existing uses;
- Topographic conditions;
- Soil and geotechnical conditions;
- · Species at Risk;
- Significant historical sites and cultural activities;

- Provincial highway infrastructure;
- Oil and gas infrastructure;
- Aeronautical constraints;
- Agricultural usage and land capacity; and
- Land uses in the vicinity of the Plan Area.

#### 2.3 Technical Studies

The following technical studies have been prepared in support of the IASP:

- Appendix C Elk Point Airport IASP Desktop Biophysical Review for Species at Risk (March 17, 2023);
- Appendix D Stormwater Management And Servicing Options Statement Town of Elk Point Area Structure Plan, Elk Point Airport, AB (July 2023); and
- Appendix E Area Structure Plan for the Elk Point Municipal Airport, Alberta Traffic Impact Study (August 21, 2023).

## 2.4 Community and Stakeholder Engagement

Community and stakeholder engagement was completed in compliance with Section 636(1) of the Municipal Government Act and the applicable provisions of the Municipal Development Plan:

636(1) While preparing a statutory plan, a municipality must notify the following and provide a means for suggestions and representations to be made:

(a) any members of the public who may be affected by the plan;

Members of the public were informed of the ASP process in May and June 2023 through direct mailouts to landowners within 800 m of the boundary of the Plan Area, advertising in local newspapers, and advertising on the online social media pages of the Town and County.

Pursuant to the direction provided in the Municipal Development Plan, two public open houses were hosted in the afternoon and evening of June 22, 2023. Excluding the attendance of the Town, County, and STEP staff and elected officials, a cumulative total of 11 individuals signed in to the open houses to record their participation.

Forms for written comments were provided at both open houses; no comment forms were received. Email addresses were provided for representatives from the Town, County, STEP, and HM Aero; no emails with comments were received.

A statutory public meeting will be held at County Council prior to the third reading of the IASP bylaw.



June 22, 2023 Public Open House

(b) the school boards with jurisdiction in the area to which the plan preparation applies;

Three school boards were notified of the ASP process on May 4, 2023. Emails of no comment were received from St. Paul Regional School Division (June 12, 2023), Conseil Scolaire Centre-Est (June 14, 2023), and Lakeland Catholic School Division (May 5, 2023).

The Draft IASP will be circulated to the three school boards following first reading at County Council.

- (d) in the case of an area structure plan.
- (i) where the land that is the subject of the plan is adjacent to another municipality, that municipality, Section 636(1)(d)(i) is not applicable to the Plan Area.
- (ii) where the land that is the subject of the plan is within 1.6 kilometres of a provincial highway, the Minister responsible for the Highways Development and Protection Act, and

Alberta Transportation was contacted during the preparation of the IASP to request a consultation meeting; however, representatives from Alberta Transportation were unavailable.

The Draft IASP will be circulated to Alberta Transportation following first reading at County Council.

(iii) where the land that is the subject of the plan is adjacent to an Indian reserve or Metis settlement, the Indian band or Metis settlement.

Section 636(1)(d)(iii) is not applicable to the Plan Area.

Invitations to provide comments were also circulated on May 4, 2023 to Alberta Forestry, Parks and Tourism, Water Act Approvals – Capital Region, and EPEA Approvals – Capital Region. An email of no concern was received from Alberta Forestry, Parks and Tourism on June 28, 2023. No comments were received from the latter two departments.

The Draft IASP will be circulated to the four agencies for comments following first reading at County Council.

### 3 PLANNING POLICY CONTEXT AND CONFORMITY

The IASP has been prepared in conformity with hierarchically superior plans and policies, including the:

- 1. Municipal Government Act (MGA);
- 2. Alberta Land Stewardship Act (ALSA) / North Saskatchewan Regional Plan; and
- 3. County of St. Paul No. 19 Municipal Development Plan (MDP).

The IASP comprises a new level of the planning hierarchy below the MDP specific to the Plan Area and will inform future amendments to the Land Use Bylaw (LUB), as discussed in Section 7.2.

## 3.1 Municipal Government Act

The MGA empowers and regulates municipalities in how they should govern and plan for growth, including Part 17 which specifically addresses planning and development. Section 633(2) of the MGA establishes the minimum requirements for Area Structure Plans. The IASP has been prepared in compliance with the requirements of the MGA.

## 3.2 Alberta Land Stewardship Act / North Saskatchewan Regional Plan

The ALSA enables the Province to provide direction on land use planning and objectives, including economic, environmental and social objectives. The primary implementation tool of the ALSA is the ability for the Province to establish integrated planning regions and regional plans that provide prescriptive guidance to a geographically defined area. At minimum, these regional plans must establish a vision and one or more objectives for its planning region, and may be supported through prescriptive policies, thresholds, indicators, etc.

The Plan Area is located within the geographic boundary of the North Saskatchewan Regional Plan, which is being advanced pursuant to the authority of the ALSA. At the time of the IASP's adoption, the North Saskatchewan Regional Plan has not been released. The IASP may require amendments to ensure its conformity with the North Saskatchewan Regional Plan when adopted in the future.

## 3.3 County of St. Paul No. 19 Municipal Development Plan

The requirement for the IASP is established in Policy 2.2.13 of the MDP. The preparation of this IASP has been completed in compliance with all applicable requirements established through Policies 2.2.11, 2.2.12, and 2.2.13, as well as the public consultation requirements provided in Section 3.1.

#### 3.3.1 Agricultural Use Area Designation

The MDP designates the Plan Area as an "Agricultural Use Area". The objectives of the Agricultural Use Area are:

- 1. To ensure that agriculture remains an integral and viable component of the regional economy by maintaining a significant agricultural land base; and
- 2. To minimize conflicts between agricultural land and non-agricultural land users.

Policy 2.1.6 recognizes that "on agricultural lands, a wide range of uses may occur provided that such uses do not negatively impact other surrounding uses." Further criteria for non-agricultural development in the Agricultural Use area are established through Policy 2.1.1:

All lands in the County are deemed to be agricultural land, unless they have been designated by bylaw for other uses.

a. The County may require an applicant to provide an agricultural land quality assessment at the time of a rezoning application that proposes an agricultural district to non-agricultural district...

As established through the Plan Area Analysis Report, the majority of the soils in the Plan Area are characterized by conditions that impose moderately severe limitations on crop production, with select areas classified as having limited crop production potential. Accordingly, while land use efficiency for new development in the Plan Area should be prioritized to minimize agricultural disruption, growth in various sub-areas is not anticipated to cause a significant negative impact to the agricultural land capacity of the County and is consistent with Policies 2.1.1 and 2.16 of the MDP.

#### 3.3.2 Commercial and Industrial Development

The MDP establishes the following objectives for commercial and industrial development in Section 2.3:

- 1. To encourage new commercial and industrial businesses at appropriate locations.
- 2. To provide a diverse range of economic development and employment opportunities.

Applicable policies of the MDP to the IASP are identified below:

- 2.3.3: Rural commercial and industrial businesses shall be controlled by the County Council through the process of Land Use Bylaw amendment to an appropriate Industrial or Commercial District.
- 2.3.4: In consideration of a proposal for a commercial or industrial development, an assessment of the proposed development may be required which:
  - a. precisely defines the boundaries of the proposal;
  - b. designates suitable building sites;
  - c. ensures the functional integrity of the adjacent roads is maintained through the use of service roads and/or limited access points;
  - d. defines standards of development which may include architectural, landscaping and sign controls;
  - e. identifies methods and facilities for servicing; and
  - f. includes groundwater and soil permeability.
- 2.3.7: Commercial development proposals shall be reviewed in accordance with policy 2.2.11 and 2.2.12, and may require the preparation of an area structure plan, in accordance with Policy 2.2.13.
- 2.3.9: Industrial development proposals shall be reviewed in accordance with policy 2.2.11 and 2.2.12, and may require the preparation of an area structure plan, in accordance with Policy 2.2.13.

Through the technical studies completed in support of the IASP and the systematic planning concept articulated through this document, Airport-related commercial and industrial development is consistent with the relevant provisions of the MDP.

## 4 DEVELOPMENT INFLUENCES

The primary natural, manmade, and regulatory influences on future development are profiled herein. Detailed commentary on each type of influence is provided in the Plan Area Analysis Report (Appendix B).

## 4.1 Land Ownership

Two categories of land ownership apply within the Plan Area, as shown in Figure 4.1:

- At the time of the IASP's adoption in 2023, the Core Lands are publicly owned by the Province
  of Alberta (His Majesty The King in right of Alberta, as represented by the Minister of
  Transportation); and
- The Western, Northern, Eastern, and Southern Lands are privately owned.

Aviation-related private uses in the Core Lands (e.g., aircraft hangars) are currently accommodated through long-term land lease agreements. Further information on land ownership is available in Appendix B, Section 3.2.

#### **Policies and Actions**

- The preferred approach to future development in the publicly owned Core Lands is for longterm land lease agreements to be used. The IASP's references to leasehold lots in the Commercial and Private Development Areas do not refer to or imply private title or land ownership.
- 2. The continued private ownership of the Western, Northern, Eastern, and Southern Lands is anticipated in the future. The Town, County, and private landowners should work collaboratively to achieve shared objectives within the Plan Area.

## 4.2 Existing Uses

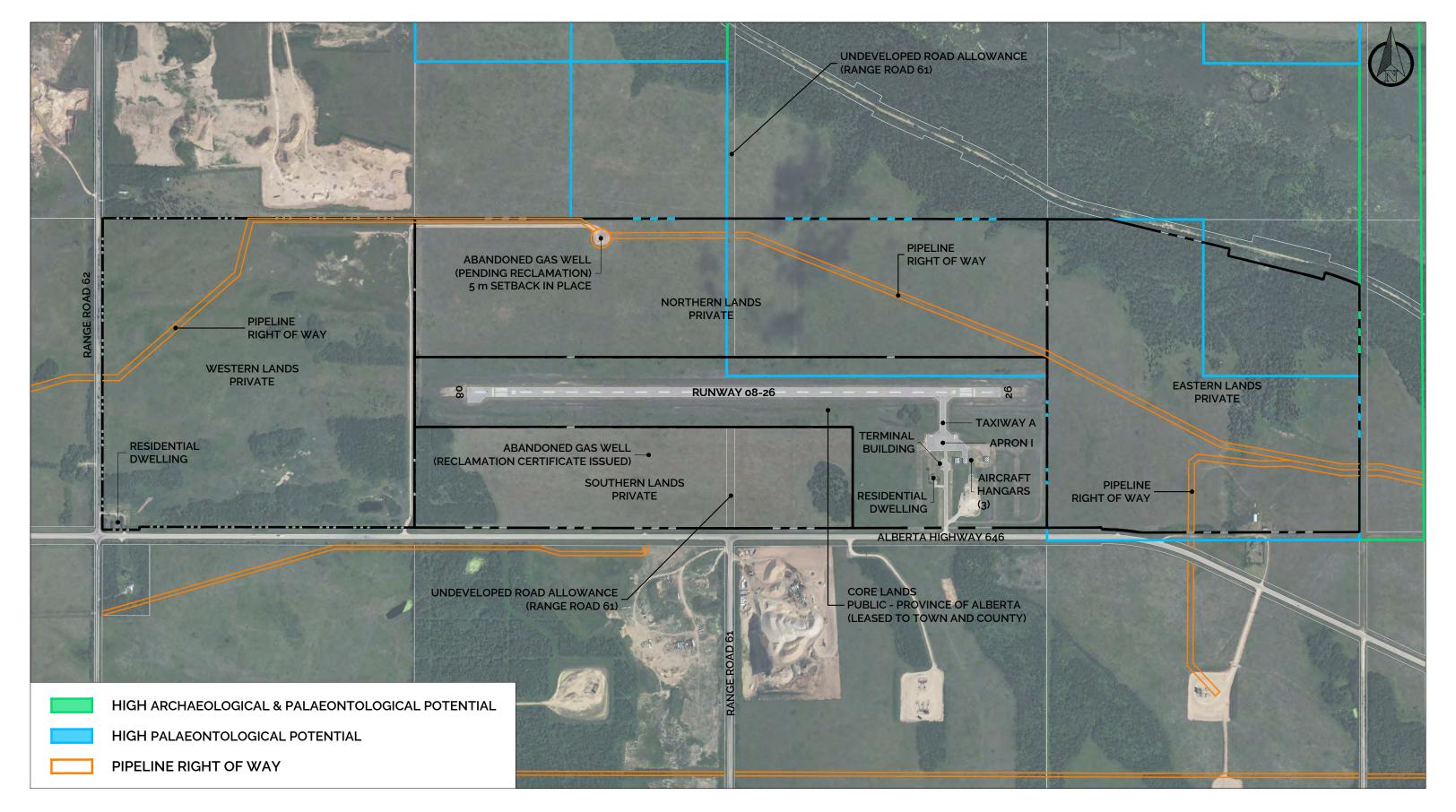
With the exception of the Core Lands containing the Airport and its associated infrastructure and structures, the Plan Area is largely in an undeveloped condition (Figure 4.1). Less than 1% of the Western, Northern, Southern, and Eastern Lands are occupied by permanent structures and limited evidence of disturbance is present in the remaining lands. The existing uses of the Plan Area are conducive to future development and do not represent a significant constraint to development.

Further information on existing uses in the Plan Area is available in Appendix B, Section 3.3.

## 4.3 Topographic Conditions

The topography of the Plan Area is generally flat with an overall modest negative slope from the southwest to northeast. The elevation of the site decreases from approximately 610 m Above Sea Level (ASL) at the southwest portion of the Western Lands to approximately 595 m ASL along the eastern portions of the Northern and Eastern Lands. The grade of the northeast portion of the Eastern Lands changes with the land giving way to the valley of the Iron Horse Trail. The topographic conditions in the Core Lands are generally suitable for the Development Concept articulated in Section 5.

Further information on the topographic conditions of the Plan Area is available in Appendix B, Section 3.4.











ELK POINT AIRPORT INTERMUNICIPAL AREA STRUCTURE PLAN FIGURE 4.1 - DEVELOPMENT INFLUENCES OVERVIEW AUGUST 2023



#### 4.4 Soil and Geotechnical Conditions

A preliminary review of soil conditions in the Plan Area was completed using the Agriculture Canada – Alberta Research Council's Soil survey of the County of St. Paul, Alberta (Alberta Soil Survey Report No. 52, 1993). The Plan Area is located within the Eastern Alberta Plain physiographic region and Lea Park bedrock geological formation, characterized as gray marine claystone containing minor amounts of silt and fine-grained sand. The Plan Area is part of the Northern Valley Plain land system, 2-3H agroclimatic zone, and Elk Point Plain physiographic district. This area is defined by an undulating and ridged till and glaciofluvial surface form.

No existing geotechnical studies or borehole datasets were available documenting the conditions of the Plan Area. Consultations with the Town's Manager of Operations did not identify significant concerns from a geotechnical perspective within the Plan Area, and local subgrade conditions have been sufficient to permit airfield paving and hangar development projects without identified issues.

Further information on the soil and geotechnical conditions of the Plan Area is available in Appendix B, Section 3.5.

#### **Policies and Actions**

1. The completion of a geotechnical investigation may be required by the County for the approval of large-scale development permits within the Plan Area, at the County's discretion.

## 4.5 Environmental Conditions and Species at Risk

A Desktop Biophysical Review for Species at Risk has been completed for the Plan Area and properties within 150 m of its boundaries. As described in Appendix C, three major habitats have been identified in the Plan Area:

- Open field (grassland) across the majority of the Plan Area;
- Forested areas along the southern portion of the Western Lands and northeastern portion of the Eastern Lands; and
- Wetlands immediately to the northeast of the Eastern Lands.

Immediately north / northeast of the Plan Area is a Key Wildlife and Biodiversity Zone associated with Simmo Lake and its associated wetlands. A small watercourse has been identified running north as a tributary to Simmo Lake.

Habitats may be present within the Plan Area for the following species:

- Fish: Lake Sturgeon;
- Reptiles and Amphibians: Canadian Toad and Northern Leopard Frog;
- Birds: Baird's Sparrow, Barn Swallow, Bobolink, Canadian Warbler, Chestnut-collared Longspur, Common Nighthawk, Ferruginous Hawk, Great Blue Heron, McCown's Longspur, Olive-sided Flycatcher, Pileated Woodpecker, Short-eared Owl, Western Wood-Pewee, Little Brown Bat, and Northern Long-eared Bat; and
- Mammals: Long-tailed Weasel.

#### **Policies and Actions**

- 1. A minimum 50 m buffer shall be maintained from all wetlands and watercourses.
- 2. Prior to new development occurring in the Core Lands, the Town and County shall commission a field survey for the verification of Species at Risk and habitats. This field survey should be conducted during the growing season and would be beneficial to be completed within appropriate breeding windows for avian species. Targeted surveys may be required to determine the presence of Species at Risk if the field survey determines that the habitat on site is suitable for specific species.

## 4.6 Significant Historical Sites and Cultural Activities

Based on the Province of Alberta's Listing of Historic Resources, a portion of the Northern Lands and the entirety of the Eastern Lands are designated as Significant Historical Sites – Palaeontological (High Potential). The northeastern quadrant of the Eastern Lands is also designated Significant Historical Sites – Archaeological (High Potential), in addition to its paleontological designation. Affected areas are shown in Figure 4.1. The Plan Area may be located within lands historically used for the traditional activities of local First Nations with corresponding cultural value.

Additional information on the applicable Significant Historical Site designations is available in Appendix B, Section 3.6.

#### **Policies and Actions**

1. Development proposed within areas subject to the Historical Resources Act shall require a Historical Resources Application prior to approval.

## 4.7 Roadway Network

The Traffic Impact Study (Appendix E) assesses the following components of the road network in the vicinity of the Plan Area: Highway 646 – Province of Alberta; Range Road 62 – County; Range Road 61 – County; Range Road 55 – County; and Elk Point Airport Access – Private. The Traffic Impact Study assessed the performance of five intersections in the vicinity of the Plan Area during weekday morning and afternoon peak hours and made the following Level of Service findings based on background conditions 1:

- Existing Conditions Intersection Analysis: Analysis indicates that all turning movements will operate with acceptable Level of Service ("A") and delay during both the morning and afternoon peak hour periods; and
- Background Conditions (2033 and 2043) Intersection Capacity Analysis: Analysis for the 2033 and 2043 future background conditions indicate study intersections will continue to operate at a Level of Service "B" or better in both the morning and afternoon peak hours with minimal delay similar to existing conditions operations and without the requirement for network improvements.

<sup>&</sup>lt;sup>1</sup> Level of service is based on the average control delay per vehicle for a given movement. Delay is an indicator of how long a vehicle must wait to complete a movement and is represented by a letter between 'A' and 'F', with 'F' being the longest delay.



Future total conditions resulting from the Development Concept (future background conditions with the additional activity modelled through the land uses of the Development Concept) were also modelled. The Development Concept at full build-out is expected to generate a total of 32 trips during the morning peak hour (16 inbound and 16 outbound) and 31 trips during the afternoon peak hour (17 inbound and 14 outbound). It was found that in both 2033 and 2043 future total conditions, peak hour traffic volumes continue to operate with significant reserve capacity and without any capacity constraints or concerns. Based on the level of development and available capacity for the future, no network improvements are anticipated to be required.

#### **Policies and Actions**

- 1. The Town and County shall collaborate with Alberta Transportation on any future initiatives relating to corridor planning and improvements for Highway 646.
- 2. The following shall require assessment and permit approval by Alberta Transportation prior to construction, pursuant to the Highways Development and Protection Act and the Highways Development and Protection Regulation:
  - a. Development within the right of way or within 300 m beyond the limit of the highway;
  - b. Development within 800 m centre point of the intersection of the highway and another highway / public roadway; and
  - c. The placement of vegetation or utility lines within 60 m of the highway centreline or 30 m beyond the limit of the highway.
- 3. Land uses with significant vehicular trip generation levels beyond the scale modelled in support of the IASP may require a supplementary Traffic Impact Study at the discretion of the County or Alberta Transportation.

#### 4.8 Oil and Gas Infrastructure

Two abandoned gas wells are located in the Plan Area, as shown in Figure 4.1:

- One abandoned gas well is located in the Northern Lands (Anadarko 8C Lindbergh 8-2-57-6).
   The well infrastructure and a supporting dirt access road remain in place, and a Reclamation Certificate has not been issued; and
- One abandoned gas well is located in the Southern Lands sub-area (E.P.G.L. Elk Point 1-2-57-6). The well was abandoned in 1989, surface reclamation has been completed with no well infrastructure or access roads in place, and a Reclamation Certificate has been issued.

The Western, Northern, and Eastern Lands are each impacted by one or more active pipelines (Figure 4.1):

- A Canadian Natural Resources Limited 88.9 mm diameter natural gas pipeline is routed through the Western, Northern, and Eastern Lands; and
- A Canadian Natural Resources Limited 88.9 mm diameter fuel gas pipeline impacts part of the Eastern Lands.

- 1. Pursuant to the Alberta Energy Regulator's Directive 079: Surface Development in Proximity to Abandoned Wells (September 2022), a 5 m setback shall be provided in the vicinity of the abandoned well in the Northern Lands, subject to future confirmation from the licensee prior to development.
- 2. Pipeline right-of-way setbacks shall be provided pursuant to the Alberta Energy Regulator's Directive 056: Energy Development Applications and Schedules (October 2018).

## 4.9 Agricultural Usage and Land Capacity

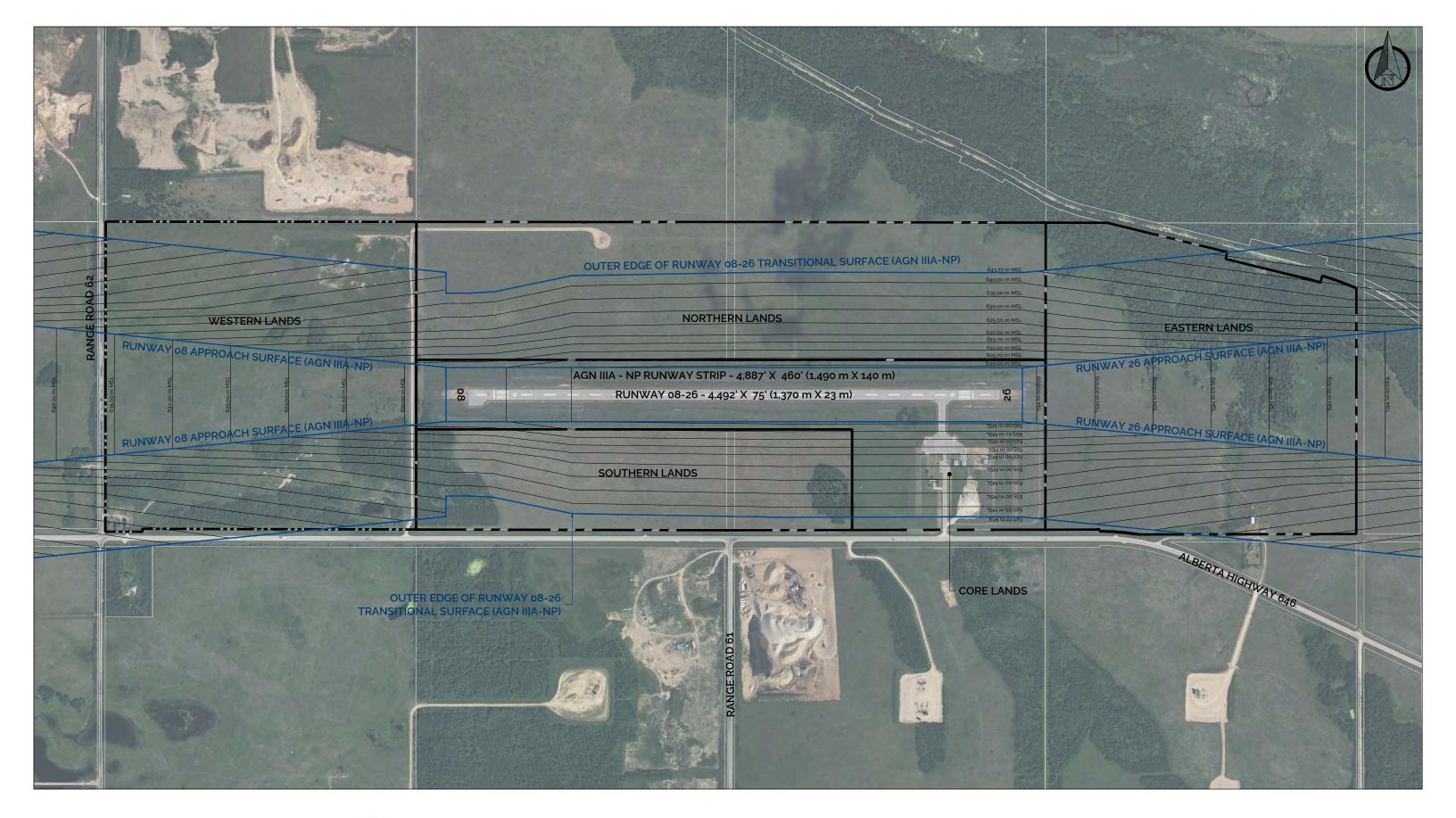
Ensuring that agriculture remains an integral and viable component of the regional economy through the preservation of a significant agricultural land base is a stated priority of the MDP for the Plan Area. The majority of the soils in the Plan Area are characterized by conditions that impose moderately severe limitations on crop production, with select areas in the east classified as having limited crop production potential. Accordingly, while land use efficiency for new development in the Plan Area should be prioritized to minimize agricultural disruption, growth in the various sub-areas is not anticipated to cause a significant negative impact to the agricultural land capacity of the County.

Further information on the agricultural usage and land capacity of the Plan Area is available in Appendix B, Section 3.11.

#### 4.10 Aeronautical Constraints

The protection of the safety and viability of aircraft operations at the Airport is an imperative priority.

- 1. All development in the Plan Area shall be subject to assessment by NAV CANADA and Transport Canada where required by each entity.
- 2. Penetrations to the Airport's Obstacle Limitation Surfaces shown in Figure 4.2 should not be permitted, including temporary and permanent buildings, structures, and vegetation. Where obstacles exist, the Town, County, and applicable landowner should work collaboratively to remove the penetration.
- 3. Land uses that generate exhaust plumes or other restrictions to visibility such as smoke, dust, or steam that may interfere with aircraft operations should not be permitted within the Plan Area without appropriate mitigation measures.
- 4. Vegetation and land uses that have the potential to attract birds and wildlife should be assessed pursuant to Transport Canada's TP1247 Land Use in the Vicinity of Aerodromes and mitigation measures integrated where required.
- 5. Noise Exposure Forecast contours are not available for the Airport. Land uses that have the potential to be negatively impacted by aircraft noise should be discouraged in the Plan Area. Where noise sensitive uses are to be approved, noise mitigation measures, notices to occupants, and other tools should be used to mitigate disturbance.
- 6. Planning and development applications in a 4,000 m radius of the Airport should be assessed by the County to identify and mitigate impacts to the operations of the Airport.











ELK POINT AIRPORT
INTERMUNICIPAL AREA STRUCTURE PLAN
FIGURE 4.2 - OBSTACLE LIMITATION SURFACES
AUGUST 2023



## 5 DEVELOPMENT CONCEPT

## 5.1 Land Use Concept

The Land Use Concept divides the Plan Area into four functional land use zones, as summarized in Table 5.1. The intent, policies, and actions applicable to each land use are discussed in the following subsections.

Land Use Zone Area (ha) Proportion (%) Airfield Area 34.0 13.7 Private Development Area 1.8 0.7 Commercial Development Area 2.4 1.0 Private Vicinity Lands 210.4 84.6 Total 248.6 100.0

Table 5.1 - Land Use Concept Distribution

#### 5.1.1 Airfield Area

The Airfield Area is comprised of Runway 08-26, Taxiway A, Apron I, and supporting facilities. The Airfield Area protects for potential future infrastructure projects and regulatory offsets. No private or commercial development is envisioned in the Airfield Area.

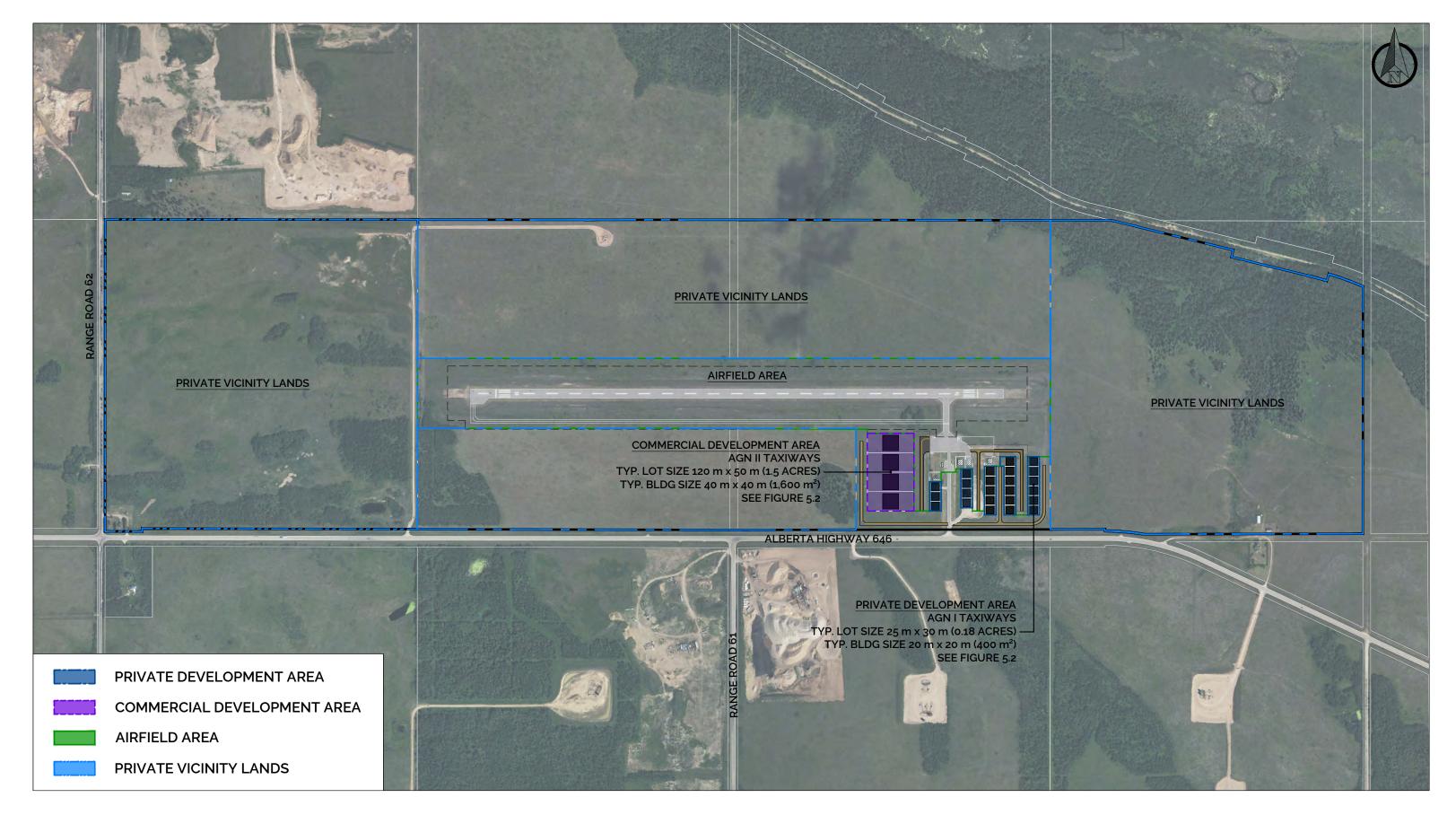
#### **Policies and Actions**

- 1. The design of all airfield infrastructure should be completed in accordance with the most current version of TP312 Aerodrome Standards and Recommended Practices and other applicable airport planning and engineering guidance.
- 2. The use of the Airfield Area shall be confined to the infrastructure and services essential to supporting aircraft and Airport operations.

## 5.1.2 Private Development Area

The Private Development Area is located to the east of the Airport Access Road and is planned for the development of smaller scale private aircraft hangars and aviation businesses. A limited number of private aircraft hangars are currently located in the Private Development Area.

- 1. Leasehold lots in the Private Development Area should have a minimum area of 750 m<sup>2</sup>, frontage of 25 m, and depth of 30 m.
- Permitted tenancies include private aircraft storage hangars and small-scale aviation businesses not requiring larger leasehold premises as are available in the Commercial Development Area.
- 3. The use of high-quality building materials and finishes and consistency between buildings is encouraged to enhance the overall appearance of the Airport. Outdoor storage and garbage facilities should be screened from view. The storage of abandoned or derelict vehicles, aircraft, and debris is discouraged.
- 4. Non-aviation equipment and material laydown and storage may be permitted on a temporary basis through lease agreements with the Town and County. Lands used for laydown and storage shall be reinstated to its pre-use condition by the tenant.



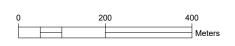


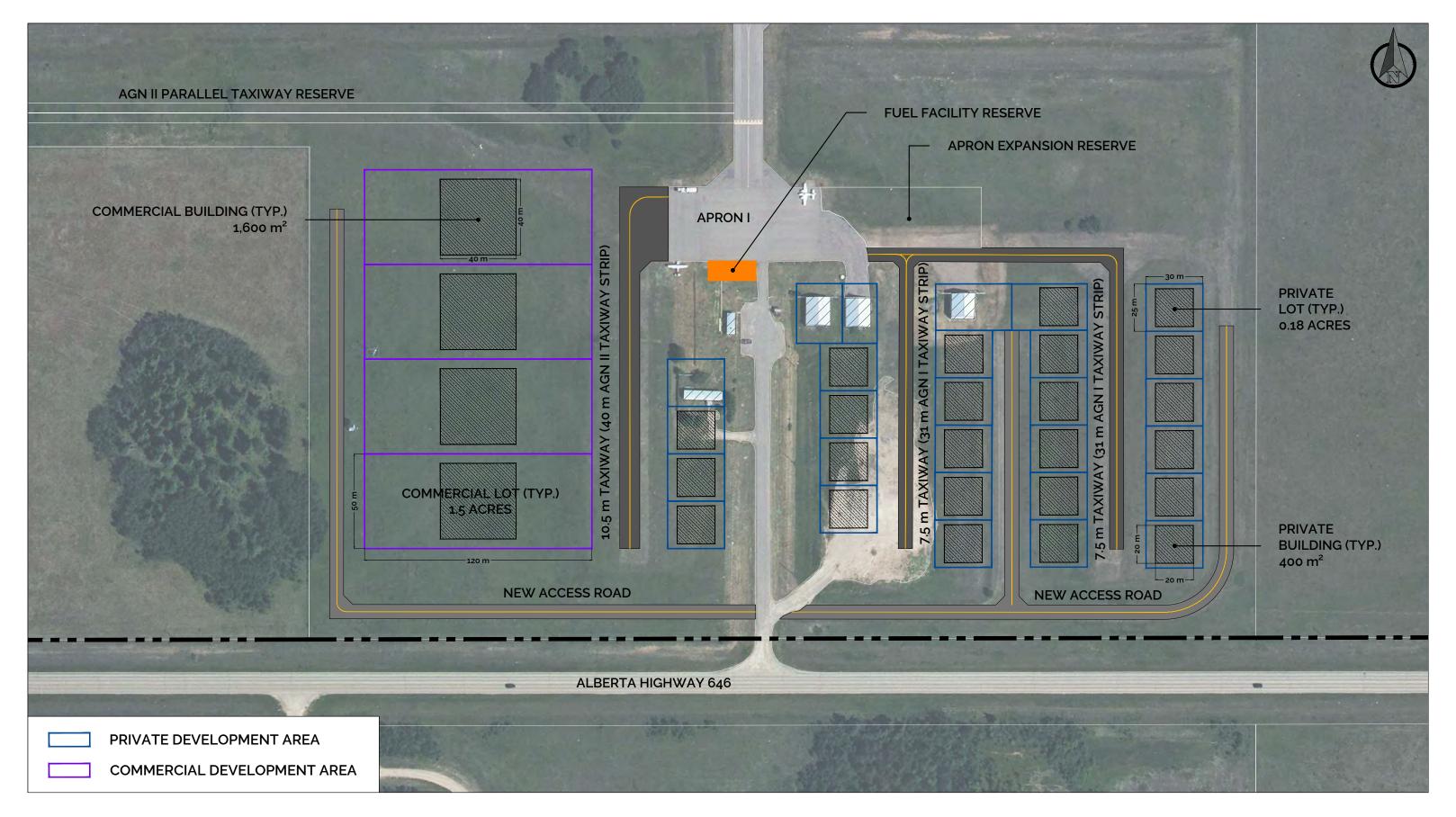






ELK POINT AIRPORT INTERMUNICIPAL AREA STRUCTURE PLAN FIGURE 5.1 - LAND USE CONCEPT AUGUST 2023





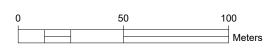








ELK POINT AIRPORT
INTERMUNICIPAL AREA STRUCTURE PLAN
FIGURE 5.2 - PRIVATE AND COMMERCIAL DEVELOPMENT AREA
AUGUST 2023



#### 5.1.3 Commercial Development Area

The Commercial Development Area is planned for the growth of larger scale aviation businesses, such as aircraft hangars, aerial applicators, aerial work operators, air cargo and courier service providers, and flight training units.

#### **Policies and Actions**

- 1. Leasehold lots in the Commercial Development Area should have a minimum area of 6,000 m<sup>2</sup>, frontage of 50 m, and depth of 120 m.
- Permitted tenancies include larger scale aircraft hangars and aviation businesses with land requirements that exceed the leasehold premises designated in the Private Development Area. Non-aviation commercial tenancies may be permitted at the discretion of the Town and County where the uses proposed are compatible with the Plan Area and where aviation market demand over time has not materialized.
- 3. The private Non-Directional Beacon should be permanently decommissioned pending interest in the absorption of leasehold lands in the Commercial Development Area.
- 4. The use of high-quality building materials and finishes and consistency between buildings is encouraged to enhance the overall appearance of the Airport. Outdoor storage and garbage facilities should be screened from view. The storage of abandoned or derelict vehicles, aircraft, and debris is discouraged.
- 5. Non-aviation equipment and materials laydown and storage may be permitted on a temporary basis through lease agreements with the Town and County. Lands used for laydown and storage shall be reinstated to its pre-use condition by the tenant.

#### 5.1.4 Private Vicinity Lands

The Private Vicinity Lands encompass the privately owned North, East, South, and West Lands. The requirement has not been identified based on anticipated market demand for new Airport-related development on the Private Vicinity Lands, nor has the need for airfield infrastructure projects (e.g., the extension of the runway) to occur on these lands. The continued use of the Private Vicinity Lands for agricultural and limited residential purposes in alignment with the Agriculture designation of the MDP and the A – Agricultural zone of the LUB is envisioned, with an emphasis on ensuring compatibility between the Private Vicinity Lands and Airport operations.

- 1. Airport-related private and commercial growth should not occur on the Private Vicinity Lands.
- 2. Land uses proposed in the Private Vicinity Lands should be evaluated for their sensitivity to aircraft noise. Land uses that have the potential to be negatively impacted by aircraft noise should be discouraged in the Private Vicinity Lands.
- 3. Planning and development applications in the Private Vicinity Lands shall be evaluated to identify impacts to aircraft and Airport operations.
- 4. The Town, County, and private landowners should work collaboratively to prevent and remove penetrations to the Airport's Obstacle Limitation Surfaces.

## 5.2 Sequence of Development

The development of the Plan Area will occur over time in response to market demand. The sequence of development will primarily be based on the most orderly and financially efficient manner in which supporting services can be extended, including taxiway and roadway access and utilities. The provision of supporting services to the Commercial and Private Development Areas is at the discretion of the Town and County, and may include:

- The proactive extension of services by the Town and County ahead of market demand, with initial capital costs borne by the municipalities either with or without external funding; or
- The extension of services on an as-required basis in response to the expression of market interest.

In general, the preferred sequence of growth in the Commercial Development Area should be from north to south, and from west to east in the Private Development Area with the incremental extension of airside and groundside access.

## **5.3 Transportation Network and Site Circulation**

Based on the trip generation levels of the Commercial and Private Development Areas estimated in the Traffic Impact Study (Appendix E), the requirement for additional vehicular accesses to Highway 646 has not been identified. The internal circulation of the Core Lands shall continue to be facilitated through the existing intersection with Highway 646.

The Private and Commercial Development Areas will require the extension of the taxiway network to provide access to Apron I and Runway 08-26.

- The preparation of internal roadways to access new leasehold lots shall be the responsibility
  of their tenants, except where roadways are already prepared. Construction standards for the
  internal roadways serving the Private and Commercial Development Areas shall be at the
  discretion of the Town and County.
- 2. The Town and County shall be responsible for maintaining the internal roadways serving the Private and Commercial Development Areas.
- 3. The preparation of taxiways and aprons to access new leasehold lots shall be the responsibility of their tenants, except where taxiways and aprons are already prepared. Taxiways and aprons shall be constructed to the standards of TP312 Aerodrome Standards and Recommended Practices and to the requirements of the Town and County.
- 4. Adjustments may be made to the internal roadway, taxiway, and apron network when such changes are compliant with all applicable requirements and do not compromise proper and orderly circulation within the Plan Area.

## 5.4 Water Supply

Municipal water services are unavailable at the Plan Area, with the terminal building and adjacent residential dwelling serviced by a shared well. Extending municipal services to the Plan Area is not economically viable based on the anticipated level of commercial and private land absorption. Water servicing for tenants requiring such services is proposed to be provided by cisterns and private water delivery.

#### **Policies and Actions**

- 1. Tenants that require water for consumption shall be responsible for providing a suitable solution that meets the requirements of the Town and County and for verifying the adequacy of water supply. Cisterns and private water delivery are the preferred method for meeting tenant water consumption requirements.
- 2. Tenants intending to develop a private well shall be required to submit a hydrogeology study to assess groundwater conditions and determine the availability and quality of groundwater within the aquifer system, to the satisfaction of the Town and County.

## 5.5 Sewage Disposal

Municipal sewer services are not available at the Plan Area. The terminal building and adjacent residential dwelling are serviced through a shared septic system. As with the extension of municipal water services, the extension of sanitary sewer services to the Airport is not economically viable based on the anticipated level of commercial and private land absorption. Tenant requirements will be met through private septic holding tanks.

#### **Policies and Actions**

1. Tenants shall be responsible for providing private septic holding tank(s) that meets their sanitary service needs and satisfies the requirements of the Town and County.

## **5.6 Stormwater Management**

The Plan Area is currently serviced by a system of open ditches and culvert crossings, which effectively collect and convey stormwater runoff towards designated outlets. The stormwater management requirements of future development will continue to be met through these overland systems.

- 1. The preferred approach to stormwater management is the use of grass swales and on-lot infiltration systems.
- Tenants shall be responsible for all stormwater management works within their leasehold boundaries, including the preparation of all ditches, culverts, on-lot infiltration systems and other infrastructure. All stormwater management works shall be designed to the satisfaction of the Town and County.
- 3. Stormwater management facilities shall be designed to limit the attraction of birds and wildlife that constitute a hazard to aircraft operations.

#### 5.7 Utilities

Electrical services are provided by ATCO through an overhead line extending along Highway 646. Three-phase electrical power is available through the Highway 646 overhead line, splitting to a single-phase service on the Core Lands along the main accessway.

Natural gas services are provided by Apex Utilities through an underground service that runs parallel to Highway 646. A 3" line runs from west to east before transitioning to a 1" line at the southern midpoint of the Plan Area. The terminal building and residential dwelling unit are the only structures currently connected to natural gas services.

#### **Policies and Actions**

- 1. Tenants shall be responsible for extending electrical and natural gas services to their leasehold with ATCO and Apex Utilities, respectively.
- 2. The Town, County, and STEP should initiate consultations with MCSnet to identify opportunities for improved fibreoptic internet services.
- 3. Utility service providers and tenants shall be responsible for planning utility alignments to the satisfaction of the Town and County. Where feasible, the co-location of utilities with the internal circulation network is preferred.

## 5.8 Emergency Services

The primary providers of emergency response services in the Plan Area are as follows:

- Elk Point Fire Department, a volunteer fire department, responds from the Elk Point Fire Hall located approximately 10 km to the west in Elk Point;
- Alberta Health Services and its contracted operators are responsible for ground ambulance services. The nearest hospitals are the Elk Point Healthcare Centre and St. Paul Healthcare Centre: and
- The nearest Royal Canadian Mounted Police detachment is located approximately 10 km to the west in Elk Point.

Emergency services are provided pursuant to the respective level of service policies and standard procedures of each entity. Additional organizations may also respond to emergencies within the Plan Area in accordance with mutual aid agreements. The St. Paul Regional Emergency Management Agency assumes responsibility for planning, coordinating, and supporting emergency agencies and resources during major emergencies and disasters.

#### **Policies and Actions**

 Where fire suppression is required pursuant to a provincial code or standard, tenants shall be responsible for all costs associated with providing a suitable water supply capable of sustaining fire flows.

## **6 IMPLEMENTATION**

The completion of the Elk Point Airport IASP equips the Town, County, STEP, and future users and tenants of the Airport with a systematic and orderly approach to accommodating new growth from a land use perspective. Stimulating growth at the Airport will require collaboration between these parties to achieve the objectives established for the Plan Area.

- 1. The requirement for the provision of Municipal Reserve shall not be required for new lots in the Private or Commercial Development Areas.
- 2. Following the adoption of the IASP, the Town, County, and STEP shall collaborate on the preparation of an Airport Strategic Implementation Report to guide the effective oversight, management, and marketing of the Airport and formalize the roles and responsibilities of each party.
- 3. The IASP and all supporting reports identified in Appendices A, B, C, D, and E shall be made publicly available by the Town, County, and STEP.
- 4. The County MDP and LUB shall be amended concurrent with the adoption of the IASP to reflect the intent of the IASP and ensure that appropriate land use controls are in place on new development.
- 5. The Town and County shall refer to the IASP in evaluating and approving development applications within the Plan Area.
- 6. The IASP shall be subject to a comprehensive review by the Town, County, and STEP on a frequency of not less than once every five calendar years. Amendments to the IASP should be initiated if:
  - a. The requirement is identified to diverge significantly from the Development Concept in the land uses proposed or their location;
  - b. Updates to hierarchically superior plans are made that will require an amendment to the IASP to ensure conformity; or
  - c. The Town, County, and their partners identify the need for new provisions to ensure the proper and orderly development of the Plan Area.

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## 1 INTRODUCTION

## 1.1 Background

Elk Point Airport (the "Airport") is located within the County of St. Paul No. 19 (the "County"), approximately 7 kilometres southeast of the municipal boundary of the Town of Elk Point (the "Town"). The Airport lands are owned by the Province of Alberta (the "Province") and are leased to the Town and County through a joint agreement extending from October 1, 2016 to September 30, 2026.

The exploration and pursuit of economic development and regional growth opportunities is a key priority for both the Town and County. The *Town of Elk Point 2022-2025 Strategic Plan* establishes the following mission for the municipality:

By collaborating with partners within and beyond, Elk Point is a safe and prosperous regional centre that attracts people to succeed where they live.

Under the pillar of *Quality Infrastructure that Contributes to a Sustainable Environment* and goal of *Continued Excellence in Capital Infrastructure*, the Town's 2022-2025 Strategic Plan establishes the tactic of:

[Leveraging] the Town's airport as a business and tourism driver that connects Elk Point to the wider world.

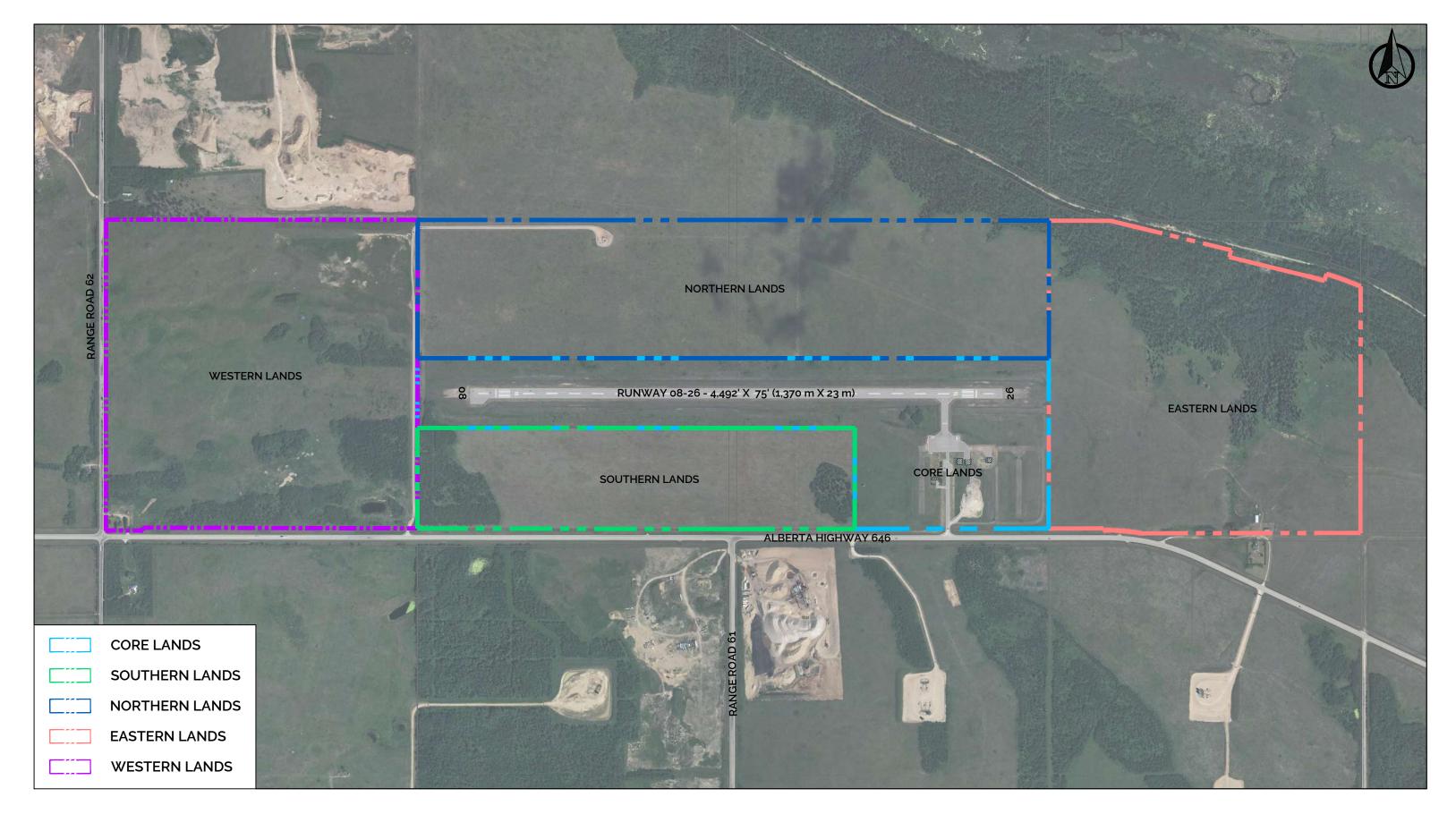
Similarly, the County's 2022 and 2023 Strategic Plans outline the opportunity to collaborate with the Town for the maintenance and improvements of this local airport, in addition to numerous directions with respect to economic development.

## 1.2 Project Objectives

In October 2022, the Town, County, and St. Paul / Elk Point Economic Development Alliance (STEP) retained the services of HM Aero Aviation Consulting ("HM Aero") and its subconsultant, McIntosh Perry Consulting Engineers ("McIntosh Perry") to complete an Intermunicipal Area Structure Plan (IASP) for the Airport (the "Project"). The Project is divided into four primary phases:

- 1. **Plan Area Analysis Report:** The completion of a detailed review to identify constraints and factors that will influence subsequent land use planning.
- 2. **Economic Opportunities Report:** The assessment of high-likelihood opportunities for the growth and development of the Airport, including supporting contextual research and stakeholder engagement.
- 3. **Intermunicipal Area Structure Plan:** Based on the high likelihood opportunities identified for the Plan Area and applicable constraints, a statutory IASP and accompanying municipal planning amendments will be prepared and adopted.
- 4. **Airport Strategy Implementation Report:** A multiyear strategy will be provided to guide the pursuit of growth and development opportunities, renewal of capital infrastructure, and effective administration and operations.

The following Economic Opportunities Report represents the completion of Phase 2 of the Project. This document has been prepared to explore contextual economic and aviation industry conditions of greatest relevance that may influence future growth and development at the Airport, assess the trends exhibited at comparable airports, identify end user aviation service requirements, enumerate the highest potential opportunities for the facility, and assess prerequisite investments and land requirements. This report considers the development of the Plan Area shown in Figure 1.1.











ELK POINT AIRPORT INTERMUNICIPAL AREA STRUCTURE PLAN **ECONOMIC OPPORTUNITIES REPORT** 

FIGURE 1.1 - PLAN AREA OVERVIEW

MAY 2023



#### 1.3 Informant Interviews

HM Aero's approach to the Economic Opportunities Report combines independent research and analysis of existing data with information-gathering through interviews with key informants. In addition to meetings with the project partners (Town, County, and STEP), representatives from the following organizations were consulted by phone, videoconference, and email:

- Aerium Analytics;
- Alberta Health Services;
- Alberta Hub;
- Apex Utilities;
- ATCO;
- Bonnyville Air Services;
- Canadian Natural Resources;

- CoyWolf Technologies;
- Landview Drones;
- MCSNet;
- Private Hangar Tenants (2);
- · Ranchland Outfitters;
- Smokey Burn Ag Air; and
- Strathcona Resources.

Perspectives shared by these organizations are integrated in the analysis and findings of this report, where applicable.

## 2 AIRPORT PROFILE

Section 2 explores the baseline conditions of the Airport from an economic development perspective, including the suitability of its infrastructure for current and potential future users, its activity levels and types of existing users, and overall strategic advantages and weaknesses that will influence future opportunities that may be attracted.

## 2.1 Airport Infrastructure and Services

#### 2.1.1 Runway 08-26

Runway 08-26 is a 4,492 ft. x 75 ft. paved and lighted facility that supports aircraft arrivals and departures. Runway 08-26 was rehabilitated in 2012 and new LED lighting was installed in 2019. At 4,492 ft., the runway at Elk Point Airport is the third longest among the ten airports in the surrounding region, exceeded only by:

- Lac La Biche Airport, with a 5,704 ft. runway; and
- Lloydminster Airport, with a 5,579 ft. runway.

The length and width of Runway 08-26 is sufficient to support a full range of general aviation, flight training, corporate, and commercial aircraft, up to turboprop regional aircraft such as the Beechcraft King Air 200 / 300 / 350. As a comparison to demonstrate the capabilities afforded by the Airport's runway length and width, the 4,434 ft. x 75 ft. runway at Bonnyville is regularly used by charter operators serving the resource sector with the 18-seat Beechcraft 1900 and 50-seat De Havilland Canada Dash 8-300 from destinations in Alberta and Saskatchewan (e.g., Edmonton, Calgary, Saskatoon), as well as corporate aircraft such as the Cessna Citation 560.

In 2017, the Town commissioned a preliminary engineering design for an extension to Runway 08-26 to the east that would increase its total length to 5,000 ft. based on the request of a prospective resource corporation to support operations by the turbofan Cessna Citation 560 (a small corporate jet) and turboprop Beechcraft 1900 (an 18-passenger regional airliner). This project was not advanced. While aircraft runway performance varies based on arrival and departure weights, weather conditions, and runway surface conditions, Runway 08-26 is sufficient in length for the opportunities identified for the Airport within the foreseeable future.

#### 2.1.2 Taxiway A and Apron I

Taxiway A is a 325 ft. x 47 ft. paved and lighted surface that facilitates aircraft taxiing between Runway 08-26 and Apron I. Apron I is a 260 ft. x 125 ft. paved area that is used for aircraft loading and unloading, parking, and associated servicing activities. As with Runway 08-26, Taxiway A and Apron I are sufficient in size for a full range of regional aircraft and would be able to support aircraft such as the Beechcraft 1900, Dornier 328, and Dash 8-300.

#### 2.1.3 Visual and Electronic Navigation Aids

Visual and electronic navigation aids support aircraft operations during periods of darkness and lower visibility weather conditions. As noted previously, a new pilot-controlled LED airfield lighting system was installed in 2019, including medium-intensity runway, taxiway, and apron edge lighting; two illuminated Wind Direction Indicators; illuminated signage; and an aerodrome beacon. The lighting system is a key advantage for the Airport and enables the facility to support 24-hour operations, as well as improved situational awareness during periods of reduced visibility.

New privately initiated Instrument Flight Procedures are scheduled to be published by NAV CANADA in June 2023. The GPS-based non-precision RNAV (GNSS) Instrument Approach Procedures will permit arrivals and departures during Instrument Meteorological Conditions, with a minimum visibility of 1 ½ Statute Miles and a Minimum Descent Altitude of 329 ft. Above Ground Level.

A privately maintained Non-Directional Beacon located at the Airport also provides electronic navigation functions. However, most of these assets are gradually being decommissioned across the country in favour of GPS-based procedures, and minimal operational advantages are understood to be conferred by this system.

Taken together, the airfield lighting system and Instrument Flight Procedures (when published) will offer very good year-round availability for aircraft operations at the Airport.

#### 2.1.4 Aircraft and Pilot Support Services

Limited support services are available at the Airport for aircraft operators, pilots, and passengers. The sole service provided is the terminal building – a 700 ft<sup>2</sup> prefabricated structure that includes a basic but well-maintained lounge area and washroom. Tie-down anchors are available for visiting aircraft that are staying for extended periods adjacent to Apron I.

Aircraft support services that are commonly provided at comparable community airports but that are not available in Elk Point include:

- Self-service 100 Low Lead (100 LL / avgas) or Jet A-1 (jet fuel) refuelling facilities. The nearest airports with refuelling services are St. Paul Municipal Airport (avgas, 40 km west), Bonnyville Regional Airport (avgas and jet fuel, 45 km north), Cold Lake Regional Airport (avgas and jet fuel, 75 km northeast), and Lloydminster Airport (avgas and jet fuel, 80 km southeast). A hangar tenant has installed an above-ground avgas tank that is used on an informal basis by the local pilots;
- Weather observation and reporting; however, the proximity of the Airport to facilities with these capabilities (Bonnyville Regional Airport, 45 km north; Lloydminster Airport, 80 km southeast) decreases this need; and
- De-icing capabilities.

Therefore, Elk Point offers minimal services for based and visiting aircraft operators other than its basic terminal facilities and is situated in proximity to numerous other facilities that provide higher levels of service for such operators.

#### 2.1.5 Airfield Maintenance and Level of Service

Year-round maintenance at the Airport is provided by the Town and County, including essential tasks such as infrastructure condition inspections and repairs, grass cutting, and winter maintenance. Winter maintenance is typically the most operationally limiting factor at municipally owned community airports without dedicated staff. In the case of Elk Point, snow clearing is typically completed within 1-3 days of a snow event, a level of service that is comparable to or better than that of other similar community airports.

The Town and County have approved the preparation of an Airport Processes and Procedures Manual in 2023 that will document the maintenance procedures and level of service standards to be provided at the Airport and identify opportunities for operational improvements. It is anticipated that this process will further strengthen the year-round availability of the Airport through effective maintenance.

### 2.1.6 Utilities and Services

Limited utilities and services have been extended to the Airport:

- **Potable water and sanitary sewer services** from the Town have not been extended to the Airport. A single well and septic tank / drain field supports the terminal building and residence.
- **Electrical services** are provided by ATCO through an overhead line extending along Highway 646. Three-phase electrical power is available through the Highway 646 overhead line, splitting to a single-phase service on the Airport property along the main accessway. Electrical services are currently provided to the airfield, terminal building, and residence and can be extended to new developments.
- **Natural gas services** are provided by Apex Utilities through an underground service that runs parallel to Highway 646. A 3" line runs from west to east before transitioning to a 1" line at the southern midpoint of the Plan Area. The terminal building and residential dwelling unit are the only structures currently connected to natural gas services. Consultations with Apex Utilities indicated that there is natural gas capacity to support new development, and that the 1" line can potentially be upgraded if required to accommodate a significant increase in demand.
- **Telephone and internet services** are provided to the residential dwelling unit by Telus. It is understood that basic rural internet services (non-fibreoptic) are provided to the Airport.
  - MCSNet was consulted to identify opportunities for improved internet services at the Airport. MCSNet is currently able to provide a 100 mbps dedicated connection through radio signals to properties at the Airport, assuming a clear line of sight. MCSNet is scheduled in the spring / summer of 2023 to install fibreoptic internet services along Highway 646, and the opportunity exists to upgrade internet services at the Airport up to 1,000 mbps as part of that project.

The availability of electrical and natural gas services at the Airport and their capacity to be extended to new developments is a prerequisite factor to new growth that has been fulfilled. Additionally, planned internet upgrades in the vicinity of the Airport by MCSNet may represent an opportune strategy to improve internet services on-site, a factor that is increasingly becoming a prerequisite for aviation commercial tenants.

The Site Servicing Options Statement to be prepared as part of Phase 3 will explore the most appropriate strategy for water and sewer services based on the requirements of end users and the costs of servicing, including the consideration of full municipal services versus private well and septic.

# 2.2 Existing Users and Activity Levels

#### 2.2.1 Based Aircraft Operators and Activity Levels

Based on data reported in the Canadian Civil Aircraft Register as of March 2023, there are 10 general aviation aircraft registered to owners located in Elk Point and the surrounding area. Approximately half of these aircraft are reported to be based at the Airport, with the remainder located at private airstrips and other airports. The aircraft types based at the Airport are all single-engine fixed-wing aircraft that are understood to be used for private recreation purposes.

Activity levels by based aircraft operators are not routinely tracked for the Airport. Based on estimated usage levels of privately owned general aviation aircraft (e.g., 2-5 flights per aircraft per month), general aviation aircraft operators based at the Airport may generate an estimated 20 to 50 flights per month, or 240 to 600 flights per year.

## 2.2.2 Itinerant Aircraft Operators and Activity Levels

Itinerant operations by aircraft not permanently based at the Airport (i.e., visiting from other airports) is an important source of activity. As aircraft movement levels are not consistently recorded at the Airport, the types of itinerant users were explored through data voluntarily provided by pilots on a signin sheet in the terminal building (beginning in mid-2021) and flight operations data submitted by Alberta Health Services for the agency's air ambulance program.

Based on the terminal building sign-in sheet, a total of 27 arrivals were voluntarily reported between June 4, 2021 and November 28, 2022 (Table 2.1). Using this data, itinerant activity can be broadly classified into three groups:

- 1. **Private Aircraft**: Arrivals by private aircraft for business or recreational / discretionary purposes represented 40% of all records;
- 2. **Commercial:** Arrivals in this category comprised 30% of all records and included flights by corporate operators, aerial surveying and infrastructure inspection missions, and Instrument Flight Procedure inspections; and
- 3. Air Ambulance: Patient transfer missions comprised 30% of recorded arrivals.

It is noted that the sign-in data underreports actual activity levels at the Airport as providing this information is voluntary and pilots may not be aware of the sign-in book. When compared with the Alberta Health Services and NAV CANADA datasets below, actual activity levels likely exceed those recorded in the sign-in book.

2021 2022 **Arrival** Type Apr. - Jun. Jul. - Sep. Oct. - Dec. Jan. - Mar. Apr. - Jun. Jul. - Sep. Oct. - Nov. Commercial 2 1 2 3 Air 3 2 1 2 Ambulance Private / 2 1 1 5 2 Recreation Total 2 2 4 2 9 6 2

Table 2.1 - Terminal Building Sign-In Sheet Data

Alberta Health Services is responsible for the provision of air ambulance services in Elk Point, with flights operated by contracted providers: CanWest Air supports the fixed-wing program, and the Shock Trauma Air Rescue Service (STARS) operates the rotary-wing program. The purpose of the air ambulance program is to transport urgent and non-urgent patients from geographically distant communities to local, regional or tertiary care hospitals. As shown in Table 2.2, the number of air ambulance transfer missions operating to and from the Airport has increased in recent years from 7 in 2020-21 to 14 in 2021-22 and 22 in an eight-month period in 2022. This data further substantiates the predominant role of air ambulance activity in the overall composition the Airport's itinerant traffic.

Table 2.2 - Air Ambulance Patient Transfer Data

Mission Type	April 1, 2020 to March 31, 2021	April 1, 2021 to March 31, 2022	April 1, 2022 to November 30, 2022 (partial year's data)
Transports To Elk Point	3	4	4
Transports From Elk Point	4	10	18
Total	7	14	22

NAV CANADA, the entity responsible for Canada's air navigation system, has provided data on the number of arrivals and departures destined to, or originating from, the Airport under Visual Flight Rules (VFR) and Instrument Flight Rules (IFR) flight plans. This represents a consistent source of data in that it includes all flight plans filed with NAV CANADA but does not include movements for which a flight plan is not filed, therefore under-representing total activity at the Airport.

As shown in Figure 2.1, the number of arrivals and departures recorded by NAV CANADA has fluctuated between 2013 and 2021. The greatest number of arrivals and departures occurred in 2014 (66 arrivals and departures on VFR and IFR flight plans), before decreasing to between 17 and 35 annual flights between 2016 and 2019. Arrivals and departures have increased in both 2020 and 2021 to 35 and 50 flights, respectively.

Figure 2.1 - NAV CANADA Flight Plan Data

## 2.3 Development Context

The pace of historical land development at the Airport also provides context on future growth prospects. Three general aviation hangars have been developed by private entities at the Airport, all of which continue to be in use for aircraft storage:

- 1987: A 0.18-acre lot is absorbed for the development of a 1,920 ft<sup>2</sup> metal clad hangar;
- **1997:** A 0.14-acre lot is leased for the development of a 1,920 ft<sup>2</sup> metal clad hangar and aircraft fuel storage tank; and
- 2013: A 0.24-acre lot is absorbed for the construction of a 1,600 ft<sup>2</sup> metal clad hangar.

Given the limited number of hangars that have been built at the Airport, a clear trend cannot be identified other than that new hangars have historically been developed every 10 to 16 years, with 10 years having passed since the newest hangar was built. All development at the Airport has been for general aviation aircraft hangars that are used primarily for recreational purposes.

The Town offers unserviced development lots for lease. A total of 17 lots are available as of March 2023 with areas ranging between 0.18 acres and 0.28 acres, as shown in yellow in Figure 2.2. Unpaved taxiways and roads provide airside and groundside access, respectively. All development to-date has occurred through multiyear land lease agreements, with lease rates set at a highly competitive rate of \$500.00 per year for a standard lot size.

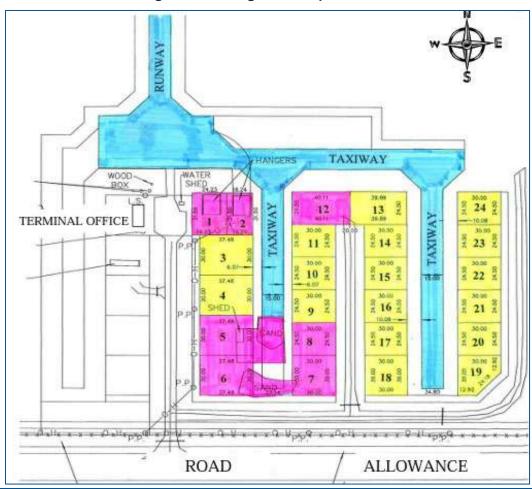


Figure 2.2 - Hangar Development Plan

# 3 REGIONAL ECONOMIC CONTEXT REVIEW

## 3.1 Catchment Area Delineation

The definition of an airport's catchment area is a tool to conceptualize the region that it most directly serves. The composition of a catchment area can then be analyzed as far as it influences demand for aviation services by residents, the composition of the workforce as it affects business attraction, and other considerations. The catchment area of the Airport / Plan Area is defined by the following Census Subdivisions, as shown in Figure 3.1:

- Town of Elk Point;
- County of St. Paul No. 19;
- Town of St. Paul;
- Unipouheos 121 Reserve; and
- Puskiakiwenin 122 Reserve.

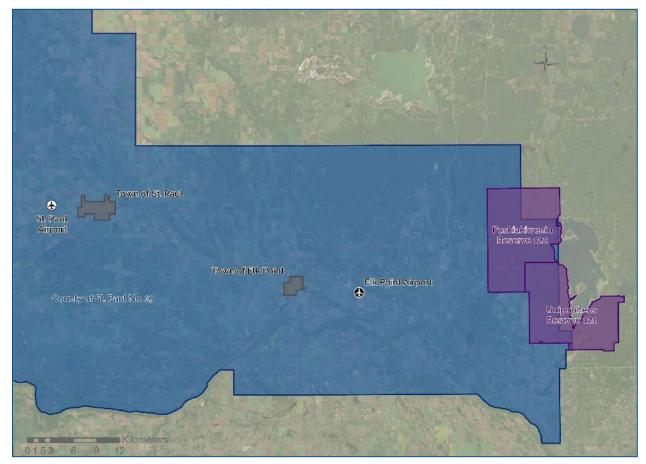


Figure 3.1 - Elk Point Airport Catchment Area

The catchment area is served by two airports: Elk Point Airport, which is the subject of this report; and St. Paul Municipal Airport (Section 4.5). Therefore, demand for aviation services and opportunities for end users that have identified a need to be located in the catchment area is split between two airports, creating competition within the catchment area for the attraction of new development.

The concept of a catchment area is fluid and cannot be precisely defined. The above-noted Census Subdivisions have been selected given their geographic proximity to the Plan Area and the Airport has a locational advantage in serving these populations. However, other airports located outside of the catchment area can pull demand from within the catchment area based on value proposition factors such as broader service offerings, cost competitiveness, or superior facilities. Using demand for passenger air services as one example, the entirety of Elk Point Airport's catchment area is within the catchment areas of Edmonton International Airport and Lloydminster Airport – both facilities offer these services that are unavailable in Elk Point.

## 3.2 Demographic Characteristics

#### 3.2.1 Population Size

Catchment area population data was reviewed for five census periods, covering the 20-year span of 2001 to 2021 to identify trends over time. As shown in Figure 3.2, the population of the catchment area has increased modestly from 13,664 residents in 2001 to 15,007 residents in 2021. This represents an overall increase of 9.8% over the 20-year period, or an average of 0.5% per year. In the 2021 census, the catchment area population increased by 1.7% versus 2016, lagging by the provincial and national increases of 4.8% and 5.2%, respectively. This growth rate between census periods (2016 to 2021) is also lower than in previous periods where the catchment area population grew by 5.8% between 2011 and 2016 and by 1.9% between 2006 and 2011.

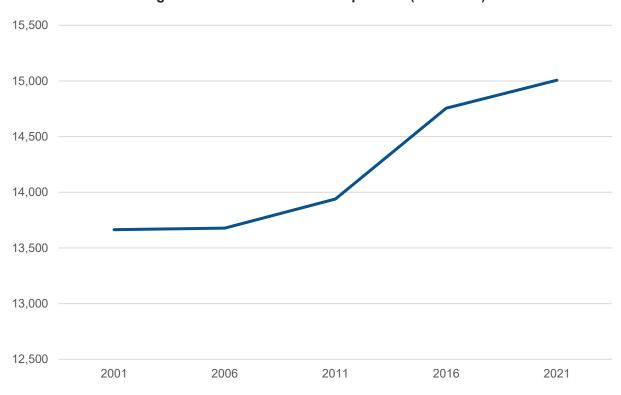


Figure 3.2 - Catchment Area Population (2001-2021)

Population change over time has not been uniformly experienced within the catchment area, as shown in Figure 3.3. Population growth on a percentage basis between 2001 and 2021 was led by the Puskiakiwenin and Unipouheos Reserves with growth rates of 30.6% and 49.3%, respectively. The Town of St. Paul grew by 15.8% and the County of St. Paul grew at a more modest rate of 2.7%. The Town of Elk Point was the sole Census Subdivision that experienced an overall trend of decline with its population decreasing by 3.2% between 2001 and 2021 from 1,445 residents to 1,399 residents.

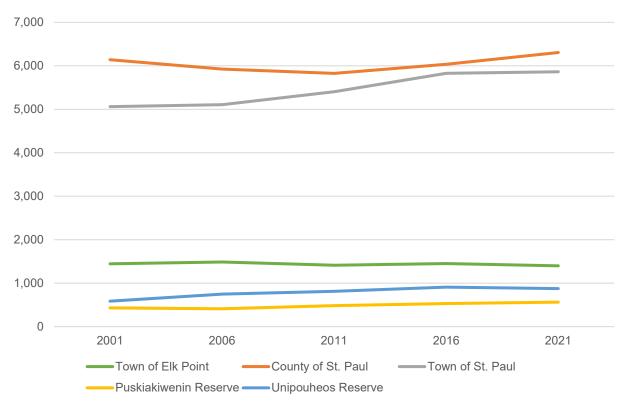


Figure 3.3 - Catchment Area Census Subdivision Populations (2001-2021)

New home construction is also reviewed as an indicator of community growth. Statistics Canada publishes data on the number of occupied private dwellings by period of construction. As shown in Table 3.1, new home construction across the catchment area was at its highest between 1961 and 1980, with 2,035 of the 5,765 private dwellings (35%) built in this period. The total number of dwellings constructed has declined in all five census subdivisions in the most recent period (2016 to 2021) versus the preceding period, and this was the second period of consecutive decline for the County of St. Paul and Town of St. Paul. In the most recent period, Elk Point exhibited no new private dwelling construction, which is consistent with its stable population between 2011, 2016, and 2021.

Table 3.1 - Catchment Area Census Subdivision Private Dwellings by Period of Construction

Period	Town of Elk Point	County of St. Paul	Town of St. Paul	Puskiakiwen in Reserve	Unipouheos Reserve	Catchment Area
1960 or before	95	375	295	0	10	775
1961 to 1980	255	730	1000	15	35	2035
1981 to 1990	110	485	240	30	20	885
1991 to 2000	70	285	260	35	55	705
2001 to 2005	0	90	90	0	25	205
2006 to 2010	30	235	195	15	30	505
2011 to 2015	40	180	135	30	50	435
2016 to 2021	0	125	60	15	20	220

Population size is a high-level indicator of several dimensions as far as economic development is concerned, with the following insights drawn from the dataset:

- The catchment area population is modest. At a cumulative total of approximately 15,000 residents as of 2021, the catchment area (if equated as a single entity) would be the 22<sup>nd</sup> largest municipality in Alberta. The scale of the local market for aviation services is limited by this factor.
- Despite having a catchment area population similar in size to smaller cities such as Cold Lake, Brooks, and Camrose, the catchment area is served by two separate and similar equipped municipal airports.
- While the catchment area population has increased in all reviewed periods between 2001 and 2021, the pace of this growth has been modest and lower than provincial and national averages. The continuation of this trend should be beneficial for the prospects of the Plan Area, but the gap between the catchment area and larger population centres will widen.
- Although the catchment area population is increasing, the municipality nearest to the Plan Area (Elk Point) exhibits a stagnant / modestly declining population size. This represents a challenge for both resident demand for aviation services and the size of the workforce available to prospective businesses. However, the increasing populations of the Puskiakiwenin and Unipouheos Reserves is a noteworthy and positive trend.

### 3.2.2 Population Growth Outlook

The Province's 2021 to 2046 (July 2, 2021) population projections indicate that the Albertan population is expected to increase by approximately 1.9M people by 2046 and become more concentrated in the urban centres of the Calgary-Edmonton corridor. The Cold Lake Census Division (CD 12) includes Elk Point and is expected to see an average annual increase of approximately 0.5%, below the provincial average of 1.4%. The 2022 to 2046 (July 5, 2022) medium growth population projections carried forward the same assumed growth rate for the region of 0.5% annually. This is consistent with the historical growth rate experienced in the catchment area between 2001 and 2021 as described previously in Section 3.2.1.

Work is currently underway for an application to be made to the Province's Rural Renewal Stream to develop a program that will support the attraction and retention of new residents in Elk Point, with Elk Point to progress towards becoming a designated community. Through the creation of supports for new immigrants and collaboration with local employers, Elk Point may benefit from the attraction of additional residents, boosting its population growth outlook.

#### 3.2.3 Population Incomes

Population incomes are an indicator of the discretionary financial resources that residents of the catchment area can dedicate to aviation, and by extension can influence local demand for recreational general aviation and private hangar development. This hobby is faced with rising used and new aircraft prices, insurance rates, and fuel prices. Therefore, access to recreational general aviation is generally limited to individuals with higher discretionary incomes.

Income data from the 2021 Statistics Canada census was reviewed for the five catchment area Census Subdivisions and benchmarked against the province-wide values. As shown in Table 3.2, median and average incomes across all five Census Subdivisions are lower than provincial benchmark values. This difference in income narrows in the Towns of Elk Point and St. Paul and County of St. Paul; however, average total incomes in these three municipalities are \$7,000 to \$9,000 less than the provincial average. This difference is more pronounced in the Puskiakiwenin and Unipouheos Census Subdivisions.

Table 3.2 - Catchment Area Median and Average Population Income Data (20	20)

	Elk Point	St. Paul County	St. Paul	Puskiakiwenin Reserve	Unipouheos Reserve	Alberta
Median total income in 2020 among recipients	\$43,600	\$40,800	\$41,600	\$29,800	\$26,400	\$44,800
Average total income in 2020 among recipients	\$53,300	\$51,450	\$53,650	\$37,800	\$32,800	\$60,850
Median employment income in 2020 for full-year full-time workers	\$63,600	\$62,000	\$60,000	\$42,000	\$40,800	\$70,500
Average employment income in 2020 for full-year full-time workers	\$72,800	\$65,900	\$67,100	\$51,000	\$46,000	\$85,200

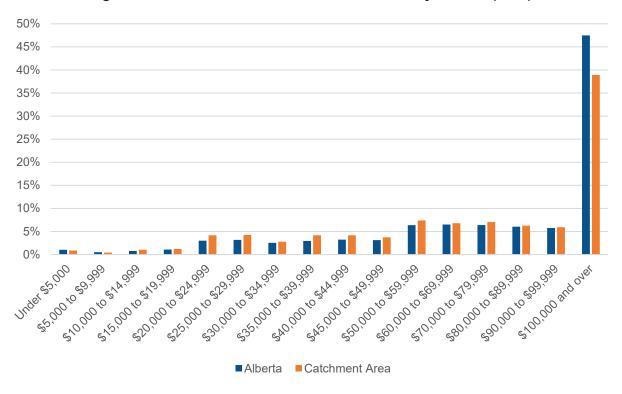
The total incomes for the population aged 15 years and over in private households was also reviewed to analyze the distribution of incomes across the catchment area population. As shown in Figure 3.4, while the overall distribution of incomes across the population on a proportional basis is similar to the Alberta-wide composition, the catchment area Census Subdivisions have a lower proportion of higher earning individuals in the \$100,000 and over bracket (10% vs. 14% for Alberta). This difference is comparable when reviewing household incomes; as shown in Figure 3.5, 47% of households province-wide have household incomes exceeding \$100,000, whereas this value is 39% for the catchment area.

Therefore, overall demand for discretionary aviation services at the Airport may be modest versus other markets in Alberta on account of the lower overall earnings of residents of the catchment area and the decreased proportion of high-income individuals and households. This is anticipated to have a corresponding effect on the potential scale of future recreational general aviation demand from residents and land absorption for private hangars.

Figure 3.4 - Catchment Area Individual Incomes by Bracket (2020)



Figure 3.5 - Catchment Area Household Incomes by Bracket (2020)



## 3.2.4 Workforce Education and Skills

Workforce composition and education data can be used to identify the degree to which prospective companies interested in becoming established at the Airport are able to recruit skilled labour to support their operations. Table 3.3 reviews the highest educational attainment for the workforce-aged population of the catchment area and compares it to the province-wide levels. The catchment area has a slightly higher than average level of individuals without a certificate, diploma, or degree; however, this level of attainment in the County and both Towns is comparable to the provincial average. The proportion of residents that have completed a postsecondary certificate, diploma, or degree is approximately 11% lower than the provincial average, with higher rates of individuals completing their high school diploma or equivalency and not pursuing further studies or training. The catchment area is well represented in the proportion of residents that pursue a skilled apprenticeship or trades certificate or diploma, exceeding the provincial average by approximately 4%, indicating a regional propensity for participation in the skilled trades.

Table 3.3 - Highest Certificate, Diploma, or Degree for the Population Aged 25 to 64 Years

Education Category	Town of Elk Point	County of St. Paul	Town of St. Paul	Puskiak- iwenin Reserve	Unipou- heos Reserve	Catchm- ent Area	Alberta
No certificate, diploma or degree	11%	12%	12%	34%	40%	14%	10%
High (secondary) school diploma or equivalency certificate	35%	35%	31%	20%	21%	32%	25%
Postsecondary certificate, diploma or degree	54%	53%	58%	46%	39%	54%	65%
Total	100%	100%	100%	100%	100%	100%	100%
Apprenticeship or trades certificate or diploma	13%	18%	10%	8%	9%	14%	10%

The skillset of the catchment area's workforce can also be explored through the field of study chosen by its residents. As shown in Table 3.4, the largest proportion of the workforce (28%) pursued training in architecture, engineering, and related trades. Within this category, most residents are classified as being trained in construction trades, as mechanics and repair technologies / technicians, and in precision production. This is consistent with the propensity for individuals to pursue apprenticeships, trades certificates, and trades diplomas. Therefore, aviation employers may benefit from access to a workforce that is specialized in skilled trades, including individuals trained as technicians, mechanics, and in precision production. This opportunity is caveated with the understanding that, despite the representation of this type of education in the regional workforce, Aircraft Maintenance Engineers, technicians, and other skilled trades require specialized training to support aviation employers.

Table 3.4 - Field of Study for the Population Aged 25 to 64 Years in Private Households

Field of Study	Town of Elk Point	County of St. Paul	Town of St. Paul	Puskiaki- wenin Reserve	Unipouh- eos Reserve	Catchment Area
Architecture, engineering, and related trades	26%	35%	21%	17%	30%	28%
Business, management and public administration	18%	17%	19%	17%	19%	18%
Health and related fields	18%	11%	22%	9%	15%	16%
Education	10%	11%	13%	17%	15%	12%
Personal, protective and transportation services	13%	7%	9%	22%	15%	9%
Social and behavioural sciences and law	5%	7%	6%	0%	7%	6%
Agriculture, natural resources and conservation	4%	8%	2%	9%	0%	5%
Humanities	3%	2%	2%	9%	0%	2%
Mathematics, computer and information sciences	3%	1%	4%	0%	0%	2%
Physical and life sciences and technologies	0%	1%	3%	0%	0%	1%
Visual and performing arts, and communications technologies	0%	1%	1%	0%	0%	1%
Total	100%	100%	100%	100%	100%	100%

# 3.3 Economic Sectors of Importance

North American Industry Classification System data for the catchment area was reviewed to identify economic sectors of importance and current and potential linkages that exist with aviation services and the Airport. The role of Elk Point and St. Paul as regional service centres is highlighted in the predominance of employment in these municipalities in the health care, education services, and retail trade sectors, with the former driving demand for air ambulance access at the Airport and the Elk Point Healthcare Centre helipad. Based on the dataset in Table 3.5 and from engagement with STEP, two economic sectors of the highest importance with direct aviation linkages are discussed in detail herein: agriculture and oil and gas.

This discussion is essential when contextualized by the key principle that for aviation service businesses, their justification for becoming established at the Airport is based on serving the identified requirements of one or more end users, among other factors, and the anticipation of a sufficient return on investment. The composition of the regional economy is essential, as this represents the types of businesses (end users) that may require aviation services that operate from the Airport on a permanent or visiting basis.

Table 3.5 - Labour Force Categorized per the North American Industry Classification System

North American Industry Classification System	Town of Elk Point	County of St. Paul	Town of St. Paul	Puskiaki- wenin Reserve	Unipouhe- os Reserve	Catchment Area
Health care and social assistance	17.9%	8.1%	21.2%	12.8%	14.0%	14.4%
Educational services	7.9%	10.9%	11.1%	17.9%	11.6%	10.9%
Retail trade	7.9%	7.9%	15.5%	5.1%	4.7%	10.7%
Agriculture, forestry, fishing and hunting	2.9%	19.2%	1.1%	0.0%	0.0%	9.5%
Mining, quarrying, and oil and gas extraction	15.7%	10.0%	7.0%	10.3%	9.3%	9.4%
Construction	6.4%	9.3%	5.2%	7.7%	7.0%	7.3%
Public administration	2.1%	5.2%	7.3%	15.4%	25.6%	6.6%
Other services	7.1%	6.9%	5.2%	0.0%	0.0%	5.9%
Accommodation and food services	6.4%	2.2%	7.8%	0.0%	0.0%	4.7%
Transportation and warehousing	6.4%	5.5%	2.5%	5.1%	4.7%	4.4%
Administrative and support, waste management and remediation services	1.4%	2.4%	3.2%	5.1%	4.7%	2.8%
Professional, scientific and technical services	2.1%	3.6%	2.0%	0.0%	0.0%	2.6%
Industry not applicable	2.1%	1.3%	1.4%	10.3%	14.0%	2.1%
Finance and insurance	3.6%	1.9%	2.1%	0.0%	0.0%	2.1%
Manufacturing	4.3%	1.2%	1.2%	0.0%	0.0%	1.4%
Wholesale trade	0.0%	1.9%	1.2%	0.0%	0.0%	1.4%
Arts, entertainment and recreation	0.0%	0.9%	1.8%	0.0%	0.0%	1.1%
Information and cultural	0.0%	0.9%	1.4%	0.0%	0.0%	1.0%
Real estate and rental and leasing	0.0%	0.4%	1.1%	0.0%	4.7%	0.8%
Utilities	2.1%	0.3%	0.4%	0.0%	0.0%	0.5%
Management of companies and enterprises	1.4%	0.3%	0.0%	0.0%	0.0%	0.3%

#### 3.3.1 Agriculture

The agricultural sector is one of the primary economic pillars of the catchment area, particularly in the County. The agricultural sector includes the cropping of coarse grains (i.e., wheat, barley, canola); pea fields; and cattle, dairy, hog, and poultry farms. The scale of various crops grown in the region in summarized in Table 3.6. Based on data published by the Statistics Canada Census of Agriculture, key indicators of this sector in the County include:

- A total of 671 farms;
- 317,589 acres of cropping;
- 230,958 acres of pastureland; and
- \$153M in gross farm receipts.

The importance of the agricultural sector extends beyond the catchment area to the broader region. Based on data provided by Alberta HUB, the nine counties in the region jointly have over 3M acres in cultivated production and over \$1.8B in gross farm receipts.

Table 3.6 - Crop Production, County of St. Paul (2021)

Crop	Canola	Wheat	Barley	Alfalfa	Oats	Field Peas
Acres – 2021	77,954	58,152	50,995	66,852	21,823	8,052
% Change from 2016	23.0%	38.9%	0.3%	-8.7%	-12.3%	35.4%
Source: Statistics Canada Census of Agriculture, Alberta HUB						

The aviation and agricultural cropping sectors are interconnected through the provision of pesticide and fungicide application services by aerial operators. Fixed and rotary-wing aircraft are extensively used to support the Canadian agricultural sector through the time-efficient and uniform application of chemical treatments without soil compaction and limited crop damage, thereby contributing to the overall productivity of crop producers. Bonnyville Air Services and Smokey Burn Ag Air are the companies based in the region surrounding the Plan Area that provides aerial application services, in addition to out-of-region businesses such as Wetaskiwin Aerial Applicators.

Research and development are ongoing on the use of Remotely Piloted Aircraft Systems (RPAS) in the agricultural sector crop monitoring, surveying, and aerial application. Several businesses and institutions have begun offering agriculture-specific training on the use of RPAS. Health Canada's Pest Management Regulatory Agency has not yet approved the use of RPAS for aerial pesticide application. A working group for Remotely Piloted Aerial Application Systems has been established and work is underway with the Pest Management Regulatory Agency on potential pathways for approval under the Pest Control Products Act.

Potential synergies and business opportunities at the Airport as a result of the regional agricultural sector are discussed in Section 5.1.

#### 3.3.2 Oil and Gas

The oil and gas sector is a key force in the regional economy, assisted by the location of Elk Point relative to the Cold Lake Oil Sands Area. Based on data published by Alberta HUB, total annual oil production in the County is 14,791,424 barrels of oil equivalent (BOE) per year. This sector is further explored through the following points:

- The Lindbergh field commenced operations in 2012 as a pilot and in 2015 as Phase 1. This field is part of the Lloydminster Formation, is operated by Strathcona Resources, and has a current capacity of 18,000 barrels per day with approval for 40,000 barrels per day. The Lindbergh site is located approximately 15 km northeast of the Plan Area;
- CNRL and Cenovus operate over 8,000 oil and gas wells throughout the County; and
- The Frog Lake Energy Resources Corp. has been expanding its presence.

The oil and gas sector also supports the local transportation, manufacturing, equipment supplier, and service-oriented business ecosystem. Examples of Elk Point businesses that benefit from the functioning of the oil and gas sector include B&R Eclel's Transport, E-Can Oilfield Services, Hahn Welding & Oilfield Services, Hoffman's Tank Truck Service, Shock Oilfield, Strad Oilfield Rentals, etc. The oil and gas sector drives aviation activity in support of its operations in two primary ways:

1. Executives, management, staff members, and cargo are transported to and from oil and gas sites by air in a time efficient manner, providing improved access to remote worksites. In fly-in / fly-out operations located considerable distances from major urban centres, rotational transportation of crews is completed by air. In less remote locations, air transportation is primarily used by senior staff, management, and technical specialists for limited duration visits to oil and gas facilities, as well as the movement of goods and cargo

Bonnyville Regional Airport is the primary facility used for oil and gas workforce services in the region, with companies such as CNRL and Strathcona Resources chartering aircraft operators from Calgary and Edmonton to support their operations. Strathcona Resources, for example, maintains a significant operation a 20-minute drive from Elk Point Airport through its Lindbergh Steam-Assisted Gravity Drainage facility. However, Bonnyville is used for Strathcona Resource's staff flights to this facility due to:

- Its location relative to the company's Tucker and Orion facilities (55 km north of Bonnyville) and Lindbergh operation (55 km south). A single charter flight to Bonnyville can accommodate staff travelling to all three facilities while only adding approximately 15 minutes in driving time to the Lindbergh facility compared to Elk Point Airport;
- Strathcona Resources sharing capacity on charter services with a peer company with projects in the vicinity of the Tucker and Orion sites. This assists in the cost effectiveness of utilizing charter air carrier services but would likely not be supported if operations were to move to Elk Point, further from the peer company's northern operations; and
- Its superior rental car capacity and hotel access compared to Elk Point.

Similarly, CNRL's workforce transportation needs in the region are served through charter operations between Calgary and Bonnyville.

2. Fixed and rotary wing commercial operators are engaged in a variety of aerial work functions, such as pipeline and infrastructure inspections and helicopter remote site access. RPAS are increasingly being deployed in support of these functions for the oil and gas sector.

Potential business opportunities at the Airport associated with the oil and gas sector are discussed in Sections 5.2 and 5.11.

## 3.4 Strategic Assets

The strategic position of Elk Point from an economic development perspective includes the consideration of its highway connectivity and proximity to key markets; residential, commercial, and industrial growth planning; and established economic development partnerships. These factors together assist in the degree to which Elk Point is attractive from an economic development perspective.

### 3.4.1 Highway Connectivity and Market Proximity

Elk Point and the Airport benefit from the ground access provided by the provincial highway network, including:

- Highway 36, extending from near the Coutts border crossing northwards to Smoky Lake County and Lac La Biche County. Highway 36 is a high load corridor and provides transborder and domestic ground transportation access to the energy resources of northeast Alberta;
- Highway 41 extends from the Wild Horse Border Crossing northwards to Medicine Hat, Wainwright, Elk Point, and further to Bonnyville and Cold Lake. As with Highway 36, Highway 41 is a high load route and provides domestic and transborder connectivity to the various markets of northeast Alberta; and
- Connectivity to Edmonton is facilitated by Highways 16 and 631 and Highways 29 and 646.

Through the well-developed network of provincial highways, Elk Point benefits from its proximity to the major urban metropolitan area of Edmonton (2h20m by road) and destinations throughout northeast Alberta.

### 3.4.2 Residential, Commercial, and Industrial Development Planning

The Town and County have partnered to develop two IASPs (Buffalo Trail North and Buffalo Trail South) to guide the growth and development of the lands that comprise the northern and southern gateways to Elk Point along Highway 41, as shown in Figure 3.6 and Figure 3.7. While the land use concepts for these areas have not been made publicly available to-date, the planning processes being undertaken by the Town and County will serve as the first step in positioning the Buffalo Trail areas for residential, industrial, and commercial growth. With development over time, this may stand to increase the population of Elk Point, bringing new residents to the region that require employment opportunities and potentially access to aviation services.

Two reports prepared by Colliers International addressing the type and scale of development that may be feasible for Elk Point have been reviewed as part of this Project:

- Land Use & Market Analysis: Town of Elk Point/County of St. Paul Intermunicipal Fringe, As of December 2020 (December 10, 2020); and
- Development Feasibility Audit: Town of Elk Point/County of St. Paul Intermunicipal Fringe, As of July 2022 (November 7, 2022).

Key findings from the 2020 and 2022 reports with respect to the local market include that:

- The economic base of Elk Point has traditionally been agriculture and oil and gas related, with associated retail trade, health, education, and manufacturing sectors having evolved as an extension of these primary industries;
- Relative to other communities in northeastern Alberta, Elk Point was viewed to have stagnated
  in its residential and commercial development in the preceding years, attributable to the health
  of the oil and gas sector and its lack of regional recreation amenities;

- The current supply of serviced residential lots as of 2022 is estimated to meet historic demand for 5 to 20 years. The exception to this observation may be access to rural serviced clustered acreage development;
- Demand for commercial and industrial lots is sporadic and difficult to predict, given the composition of the local economy and the relationship with the oil and gas sector; and
- Even at an accelerated rate of growth spurred by concentrated economic development efforts, Elk Point would need between 15 and 30 years to evolve to the population and activity levels of St. Paul and Bonnyville.

Therefore, while the Town and County are proactively moving to be ready for potential residential, commercial, and / or industrial growth through future-oriented planning, expectations regarding the speed at which these lands may be absorbed and local growth occurs are tempered by the research by Colliers. This is consistent with the previously described provincial average population growth rates forecast for the Cold Lake Census Division between 2022 and 2046. In any scenario, the proximity of the Airport to Elk Point and the Buffalo Trail North and South expansion areas will make it optimally positioned to serve the needs of the Town's current and future residents.

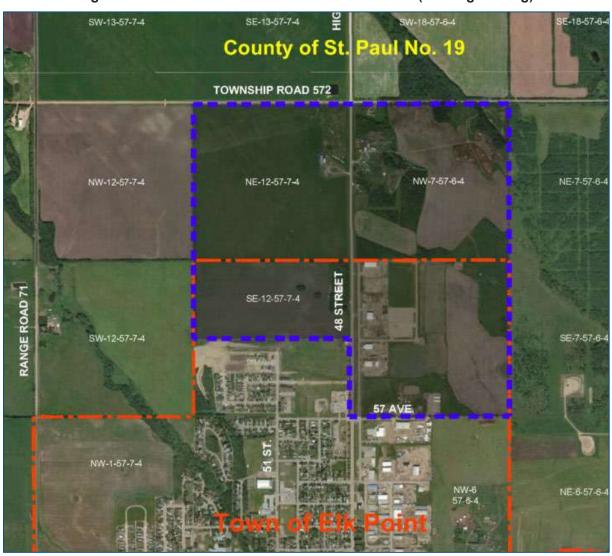


Figure 3.6 - Buffalo Trail North Area Structure Plan (ISL Engineering)



Figure 3.7 - Buffalo Trail South Area Structure Plan (ISL Engineering)

### 3.4.3 Established Economic Development Partnerships

The degree to which new business opportunities may be attracted to the Airport is aided by a series of established partnerships and roles with respect to economic development. The primary entities integrated in economic development capacities include:

- St. Paul / Elk Point Economic Development Alliance (STEP): STEP functions as a centralized economic development partnership, with focusses including business and investment attraction and retention.
- Town of Elk Point: In addition to the municipality's participation in STEP, economic development efforts are completed internally by Town Staff and Council, led by the Chief Administrative Officer. The involvement of Town Staff brings an Elk Point-forward perspective to economic development efforts pertaining to the Airport.
- County of St. Paul: The County's involvement in the Airport from a shared leaseholder, operational, and land use jurisdiction perspective positions it as being a key partner for setting the conditions required for business development success. The County has a direct influence on the way the Airport is maintained and in ensuring its development approval process and taxation levels are conducive to business success.
- Alberta HUB: This organization serves as the regional economic development alliance for northeast Alberta and provides support in this capacity to its members, including the Town and County. Through the involvement of the Town, County, and STEP in Alberta HUB, these entities benefit from the regional sharing of knowledge and opportunity marketing.

In addition, increasingly strong partnerships are being developed with First Nations and Metis communities in the region, including the Frog Lake First Nation. Through structured collaboration and shared objective setting among all entities identified above, it is anticipated that the Airport's growth potential may be effectively marketed on the provincial and national stages.

## 4 REGIONAL AIRPORT ANALYSIS

Ten public use airports, including Elk Point, are located within the broader Alberta HUB economic region of northeast Alberta: Lloydminster, Bonnyville, Lac La Biche, Vegreville, St. Paul, Cold Lake, Vermilion, Two Hills, and Athabasca (Figure 4.1). These airports are municipally owned and operated and share commonalities in terms of the size of their surrounding communities (cities and towns with fewer than 30,000 residents) and predominant industries in their economic contexts. By extension, these airports are comparable in their overall demand for services and their access to prospective end users.

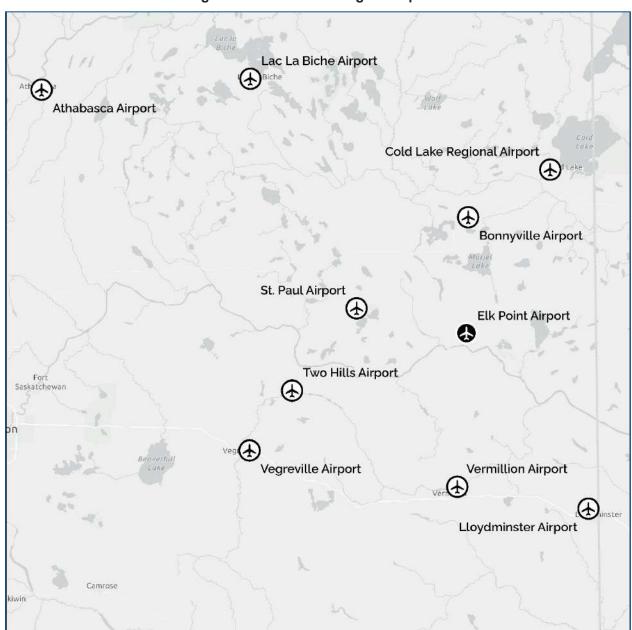


Figure 4.1 - Economic Region Airports

# 4.1 Lloydminster Airport

Lloydminster Airport is owned and operated by the City of Lloydminster, directly serves the 32,000 residents of Lloydminster, and jointly serves the 8,000 residents of the County of Vermilion River with Vermilion Airport. Lloydminster is a significant regional service centre, and its local economy is anchored by the petroleum and agriculture industries and bears the distinction of being the heavy oil capital of the world.

The facility is operated as a certified airport and year-round maintenance is provided by dedicated staff. The airfield includes a 5,600 ft. paved and lighted runway supported by Instrument Flight Procedures, a turf crosswind runway, and the sole NAV CANADA Flight Service Station in the region. A terminal building capable of supporting regional air services including CATSA pre-screening is available for air carrier and charter use, and ground handling services including refuelling and de-icing are provided by the municipality and Border City Aviation.

Lloydminster Airport is the busiest of the reviewed airports and is the only facility supporting scheduled passenger air services (WestJet Link to Calgary). Resource companies with operations in the community routinely operate chartered flights to the airport using 18 to 50-seat regional aircraft. Border City Aviation is the based business that provides recreational and professional pilot training. Thirteen general aviation hangars have been constructed, with additional developable lands available. A helicopter commercial services company opened at the airport in 2016 but subsequently withdrew approximately two years later owing to challenges with establishing a viable business in the region.



Oil and gas sector charter aircraft parked at Lloydminster Airport

**Table 4.1 - Lloydminster Airport Comparison** 

Criteria	Elk Point Airport	Lloydminster Airport
Distance from Elk Point	-	80 km southeast
Operator	Town of Elk Point County of St. Paul	City of Lloydminster
Regulatory Status	Registered Aerodrome	Certified Airport
Primary Runway	4,492 ft. – Paved	5,579 ft. – paved
Lighting	Yes	Yes
Instrument Approach Procedures	Yes (Upcoming)	Yes
Fuelling Services	None	Avgas, Jet Fuel
Support Services	Terminal Building Aircraft Parking	Terminal Building Aircraft Parking Ground Handling / Fixed-Base Operator NAV CANADA Flight Services
Year-Round Maintenance	Yes – Limited	Yes
Closest Municipality Population	Elk Point – 1,399	Lloydminster – 31,582
Distance from Nearest Commercial Service Airport	Edmonton International Airport – 2h30m	Edmonton International Airport  – 2h40m  Saskatoon International Airport  – 2h40m
NAV CANADA Five-Year Average Annual Arrivals and Departures (2017-2021)	34	5,840
Tenants	Private Hangars (3)	Border City Aviation Private Hangars (13)
Primary Users	Medevac General Aviation	Medevac Flight Training Charter Services WestJet Link – Scheduled Services to Calgary General Aviation

# 4.2 Bonnyville Regional Airport

Bonnyville Regional Airport is one of the two civilian facilities serving the M.D. of Bonnyville, the other being Cold Lake Regional Airport. The airport supports approximately 6,000 residents of the Town of Bonnyville and jointly serves the 13,000 residents of the M.D. of Bonnyville. The local economy of Bonnyville is driven by the heavy oil and gas, agriculture, forestry, and natural resources sectors, in addition to its role as a regional service centre. The oil and gas sector is of particular importance, with Bonnyville located near the Cold Lake Oil Sands (estimated 200 billion barrels) and Athabasca Oil Sands (estimated 1.3 trillion barrels). Based on data from Alberta HUB, the oil and gas sector support a surrounding ecosystem of over 500 active businesses, with over 50 firms providing oil field services and more than 60 firms that serve as contractors or sub-contractors. This has also led to Imperial Oil, CNRL, Cenovus, and Strathcona Resources establishing major presences in and around Bonnyville.

Bonnyville Regional Airport supports aircraft operations with its comparably sized 4,400 ft. paved and lighted runway. Support services available for aircraft operators include Instrument Flight Procedures, avgas and jet fuel services, a terminal building, and aircraft parking. Year-round maintenance is provided by the M.D.

On the basis of the arrivals and departures data provided by NAV CANADA, Bonnyville is the second busiest of the reviewed airports, handling a five-year average of 2,953 reported operations per year. The sole commercial business based at the airport is Bonnyville Air Services, an aerial applicator serving the agricultural sector. However, one of its main roles is handling daily charter services from Calgary and Edmonton that support the aforementioned oil and gas sector businesses. These services are operated by aircraft in the 18 to 50-seat category, such as the Beechcraft 1900 and De Havilland Canada Dash 8. The importance of the airport to the oil and gas sector is reflected in financial contributions and facility investments made by companies such as those made by Cenovus in previous years. As described in Section 3.3.2, a number of advantages motivate oil and gas operators to use Bonnyville as their charter service destination versus Elk Point, including its location relative to the facilities of the various companies in the region, the sharing of charter capacity between operators, and improved rental car capacity and hotel access.

A total of 12 private hangars have also been constructed at the airport and over 50 aircraft are registered to private and corporate owners located in Bonnyville.

**Table 4.2 - Bonnyville Airport Comparison** 

Criteria	Elk Point Airport	Bonnyville Regional Airport	
Distance from Elk Point	-	45 km north	
Operator	Town of Elk Point County of St. Paul	M.D. of Bonnyville	
Regulatory Status	Registered Aerodrome	Registered Aerodrome	
Primary Runway	4,492 ft. – Paved	4,434 ft. – paved	
Lighting	Yes	Yes	
Instrument Approach Procedures	Yes (Upcoming)	Yes	
Fuelling Services	None	Avgas, Jet Fuel	
Support Services	Terminal Building Aircraft Parking	Terminal Building Aircraft Parking	
Year-Round Maintenance	Yes – Limited	Yes	
Closest Municipality Population	Elk Point – 1,399	Bonnyville – 6,404	
Distance from Nearest Commercial Service Airport	Edmonton International Airport – 2h30m	Edmonton International Airport – 2h50m	
NAV CANADA Five-Year Average Annual Arrivals and Departures (2017-2021)	34	2,953	
Tenants	Private Hangars (3)	Bonnyville Air Services Private Hangars (12)	
Primary Users	Medevac General Aviation	Medevac Charter Services – Oil and Gas Sector Aerial Application General Aviation	

# 4.3 Lac La Biche Airport

Lac La Biche Airport is operated by the County of Lac La Biche and is the primary facility serving the 7,700 residents of Lac La Biche County and 3,100 residents of the Hamlet of Lac La Biche. Lac La Biche County is the main economic hub for industrial activity in the region and is anchored by the oil and gas, tourism, logistics, and forestry sectors.

Lac La Biche Airport supports operations with its 5,700 ft. runway (the longest among the reviewed airports); lighting, Instrument Flight Procedures, and maintenance to ensure its year-round availability; and supporting services include jet fuel and avgas refuelling, a terminal building, and aircraft parking.

One of the defining users that is unique among the reviewed airports is the provincial Wildfire Management Branch air tanker base, which supports wildfire suppression operations in the surrounding Lac La Biche Fire Region. The airport is also the base of operations for Alberta Central Airways, an air ambulance and charter service provider; as well as Delta Helicopters and Star Helicopters which provide rotary-wing aerial work and charter services. A total of six private hangars have been erected by general aviation users.

Table 4.3 - Lac La Biche Airport Comparison

Criteria	Elk Point Airport	Lac La Biche Airport	
Distance from Elk Point	-	130 km northwest	
Operator	Town of Elk Point County of St. Paul	County of Lac La Biche	
Regulatory Status	Registered Aerodrome	Registered Aerodrome	
Primary Runway	4,492 ft. – Paved	5,704 ft. – paved	
Lighting	Yes	Yes	
Instrument Approach Procedures	Yes (Upcoming)	Yes	
Fuelling Services	None	Avgas, Jet Fuel	
Support Services	Terminal Building Aircraft Parking	Terminal Building Aircraft Parking	
Year-Round Maintenance	Yes – Limited	Yes	
Closest Municipality Population	Elk Point – 1,399	Lac La Biche – 3,120	
Distance from Nearest Commercial Service Airport	Edmonton International Airport – 2h30m	Edmonton International Airport – 2h45m	
NAV CANADA Five-Year Average Annual Arrivals and Departures (2017-2021)	34	2,004	
Tenants	Private Hangars (3)	Alberta Central Airways Delta Helicopters Star Helicopters Alberta Wildfire Suppression Base Private Hangars (6)	
Primary Users	Medevac General Aviation	Medevac Wildfire Suppression Aerial Work General Aviation	

# 4.4 Vegreville Regional Airport

Vegreville Regional Airport is the sole facility serving the County of Minburn and Town of Vegreville; these two municipalities have a combined population of 8,703 residents. The local economy is centred on the oil and gas, food and agriculture, and industrial hemp sectors.

The infrastructure of Vegreville Regional Airport is comparable to Elk Point, with a single paved 4,000 ft. runway, lighting, Instrument Flight Procedures, and a terminal building. Avgas refuelling is available by arrangement with the Vegreville Flying Club.

Development and overall activity levels are higher at Vegreville compared to Elk Point. 18 aircraft are registered to owners in Vegreville compared to 10 in Elk Point, nine private hangars have been developed (three in Elk Point), and approximately 12 times as many arrivals and departures are recorded by NAV CANADA. Although Vegreville is more active in its usage compared to Elk Point, its core types of users are largely the same: general aviation and medevac access. There are no established on-site aviation service businesses.

Table 4.4 - Vegreville Regional Airport Comparison

Criteria	Elk Point Airport	Vegreville Regional Airport	
Distance from Elk Point	-	90 km southwest	
Operator	Town of Elk Point County of St. Paul	Town of Vegreville	
Regulatory Status	Registered Aerodrome	Registered Aerodrome	
Primary Runway	4,492 ft. – Paved	4,001 ft. – Paved	
Lighting	Yes	Yes	
Instrument Approach Procedures	Yes (Upcoming)	Yes	
Fuelling Services	None	Avgas	
Support Services	Terminal Building Aircraft Parking	Terminal Building Aircraft Parking	
Year-Round Maintenance	Yes – Limited	Yes – Limited	
Closest Municipality Population	Elk Point – 1,399	Vegreville – 5,689	
Distance from Nearest Commercial Service Airport	Edmonton International Airport – 2h30m	Edmonton International Airport – 1h15m	
NAV CANADA Five-Year Average Annual Arrivals and Departures (2017-2021)	34	416	
Tenants	Private Hangars (3)	Private Hangars (9)	
Primary Users	Medevac General Aviation	Medevac General Aviation	

# 4.5 St. Paul Municipal Airport

St. Paul Municipal Airport, with Elk Point, is one of the two airports serving the County of St. Paul. The facility directly serves the Town of St. Paul's population of approximately 5,900 residents and jointly serves the County's population of 6,300 residents, along with Elk Point Airport.

St. Paul Municipal Airport is smaller than Elk Point from an infrastructure perspective, supporting aircraft operations with its 3,500 ft. runway (1,000 ft. shorter than Elk Point's). Both airports provide lighting, Instrument Flight Procedures, aircraft parking, and terminal buildings, although St. Paul also benefits from having avgas refuelling available on-site.

Despite being the smaller of the two airports from an infrastructure perspective, St. Paul has a higher level of overall activity. For the period of April 2020 to March 2021, St. Paul supported 118 air ambulance transfers versus 7 from Elk Point; for April 2021 to December 2021, St. Paul supported 98 missions to Elk Point's 10. Aircraft movement levels are approximately ten times higher at St. Paul and 10 private aircraft hangars have been developed, in addition to a facility for a general aviation aircraft maintenance provider. Together, both airports share a similar role of supporting medevac and general aviation activity.

New growth opportunities at St. Paul Municipal Airport are marketed by STEP on behalf of the Town of St. Paul and County, with the unique relationship of both the County and STEP being involved in the airport in addition to Elk Point's. However, new growth at the airport in terms of the number of based tenants has not occurred in over 10 years.

Table 4.5 - St. Paul Municipal Airport Comparison

Criteria	Elk Point Airport	St. Paul Municipal Airport
Distance from Elk Point	-	40 km west
Operator	Town of Elk Point County of St. Paul	Town of St. Paul County of St. Paul
Regulatory Status	Registered Aerodrome	Registered Aerodrome
Primary Runway	4,492 ft Paved	3,498 ft. – Paved
Lighting	Yes	Yes
Instrument Approach Procedures	Yes (Upcoming)	Yes
Fuelling Services	None	Avgas
Support Services	Terminal Building Aircraft Parking	Terminal Building Aircraft Parking
Year-Round Maintenance	Yes – Limited	Yes – Limited
Closest Municipality Population	Elk Point – 1,399	St. Paul – 5,863
Distance from Nearest Commercial Service Airport	Edmonton International Airport – 2h30m	Edmonton International Airport – 2h15m
NAV CANADA Five-Year Average Annual Arrivals and Departures (2017-2021)	34	353
Tenants	Private Hangars (3)	Aircraft Maintenance Provider Aerial Applicator Private Hangars (10)
Primary Users	Medevac General Aviation	Medevac General Aviation

# 4.6 Cold Lake Regional Airport

Cold Lake Regional Airport is owned and operated by the City of Cold Lake and is one of two civilian airports serving the M.D. of Bonnyville, with the other being Bonnyville Regional Airport. The Department of National Defence also maintains Canadian Forces Base Cold Lake, a nationally significant hub for Royal Canadian Air Force activity that carries the distinction of being the largest fighter base in Canada. Cold Lake Regional Airport directly serves the approximately 16,000 residents of Cold Lake and jointly serves the 13,000 residents of the M.D. of Bonnyville.

Infrastructure available at the airport includes a 3,000 ft. paved and lighted runway, Instrument Flight Procedures, avgas and jet fuel facilities, aircraft parking, and a new terminal building. The City of Cold Lake provide year-round maintenance.

Despite the larger size of the catchment area served by Cold Lake Regional Airport, the facility sees limited use by air ambulance and corporate operators (air ambulance operations typically occur at the Canadian Forces Base) and instead primarily serves based and itinerant general aviation users. A total of 18 private hangars have been erected at the airport, airside infrastructure has been extended to serve further growth, and approximately 70 general aviation aircraft are registered to owners in Cold Lake. The propensity of general aviation can be attributed to the larger population of Cold Lake, the strong aviation connections in the region with the Royal Canadian Air Force presence, and higher disposable incomes from individuals in the oil and gas sector.

The City has undertaken several studies over the past decade to explore the feasibility of scheduled passenger air services being launched in the community, including from the Canadian Forces Base and the regional airport.

Table 4.6 - Cold Lake Regional Airport Comparison

Criteria	Elk Point Airport	Cold Lake Regional Airport
Distance from Elk Point	-	75 km northeast
Operator	Town of Elk Point County of St. Paul	City of Cold Lake
Regulatory Status	Registered Aerodrome	Registered Aerodrome
Primary Runway	4,492 ft. – Paved	3,005 ft. – paved
Lighting	Yes	Yes
Instrument Approach Procedures	Yes (Upcoming)	Yes
Fuelling Services	None	Avgas, Jet Fuel
Support Services	Terminal Building Aircraft Parking	Terminal Building Aircraft Parking
Year-Round Maintenance	Yes – Limited	Yes
Closest Municipality Population	Elk Point – 1,399	Cold Lake - 15,661
Distance from Nearest Commercial Service Airport	Edmonton International Airport – 2h30m	Edmonton International Airport  – 3h30m
NAV CANADA Five-Year Average Annual Arrivals and Departures (2017-2021)	34	310
Tenants	Private Hangars (3)	Private Hangars (18)
Primary Users	Medevac General Aviation	General Aviation

# 4.7 Vermilion Airport

Vermilion Airport is the sole facility supporting the Town of Vermilion and one of two airports serving the County of Vermilion River, the other being Lloydminster Airport. The airport directly serves the 3,948 residents of Vermilion and jointly serves the 7,994 residents of the County with Lloydminster Airport.

Vermilion Airport was constructed in 1976 and supports aircraft with its 3,400 ft. runway (approximately 1,200 ft. shorter than Elk Point's), with operations further restricted by an 1,100 ft. threshold displacement required due to a grain elevator to the southeast. Lighting, aircraft parking, avgas refuelling, and a terminal building are provided; however, Instrument Flight Procedures are unavailable.

The facility is primarily a general aviation airport. A total of 25 general aviation aircraft are registered to owners in Vermilion and five private hangars have been developed, including one multi-unit hangar. Data from the Town of Vermilion indicates that there are seven active aircraft at the facility. Four of the five hangars have been built over the last decade. Activity levels are higher than Elk Point, with approximately 140 arrivals and departures reported on average. On-airport camping by pilots is welcomed, and an Airport Master Plan released in 2019 focussed its opportunities assessment on supporting additional general aviation growth, residential hangar homes, and airside commercial development. 30 acres of the airport property were subdivided for non-aviation use in 2014.

**Table 4.7 - Vermilion Airport Comparison** 

Criteria	Elk Point Airport	Vermilion Airport
Distance from Elk Point	-	60 km south
Operator	Town of Elk Point County of St. Paul	Town of Vermilion
Regulatory Status	Registered Aerodrome	Registered Aerodrome
Primary Runway	4,492 ft. – Paved	3,378 ft. – Paved
Lighting	Yes	Yes
Instrument Approach Procedures	Yes (Upcoming)	No
Fuelling Services	None	Avgas
Support Services	Terminal Building Aircraft Parking	Terminal Building Aircraft Parking
Year-Round Maintenance	Yes – Limited	Yes – Limited
Closest Municipality Population	Elk Point – 1,399	Vermilion – 3,948
Distance from Nearest Commercial Service Airport	Edmonton International Airport – 2h30m	Edmonton International Airport – 2h00m
NAV CANADA Five-Year Average Annual Arrivals and Departures (2017-2021)	34	144
Tenants	Private Hangars (3)	Private Hangars (5)
Primary Users	Medevac General Aviation	Medevac General Aviation

The Town of Vermilion's 2022-2026 Strategic Plan includes the determination of the future of the airport as one of its priorities, including the relative benefits of upgrading vs. decommissioning the facility. At the time of this report's preparation, the Town of Vermilion is in the midst of completing community engagement to discuss the future direction of the airport. The online survey gauges resident views on the importance of medevac services and general aviation, acceptance of incurring debt for future airfield rehabilitation projects, and redevelopment potential. This may indicate a decreasing level of support within the Town Council for the continued operation of the facility.

# 4.8 Two Hills Airport

Two Hills Airport is the sole airport that serves the County of Two Hills and Town of Two Hills, with a combined population of 4,828 residents. The populations of Elk Point and Two Hills are comparable, as are the mainstays of their local economies. The agriculture and oil and gas sectors are the main economic drivers in this area, as well as a growing manufacturing sector.

Two Hills Airport is the smallest of the reviewed facilities and is comprised of a 2,900 ft. runway, lighting, and taxiway and apron. By comparison, Elk Point offers a runway that is 1,600 ft. longer and will benefit from Instrument Flight Procedures in the near future, offering improved year-round availability compared to Two Hills. Medevac service is supported from Two Hills Airport, although these flights were suspended in the winter of 2022-23 owing to concerns about winter maintenance, pilot experience, and available infrastructure.

A single general aviation hangar has been developed at the airport, and the small number of aircraft arrivals and departures recorded by NAV CANADA is indicative of the overall limited usage of the facility.

**Table 4.8 - Two Hills Airport Comparison** 

Criteria	Elk Point Airport	Two Hills Airport
Distance from Elk Point	-	70 km southwest
Operator	Town of Elk Point County of St. Paul	County of Two Hills
Regulatory Status	Registered Aerodrome	Registered Aerodrome
Primary Runway	4,492 ft. – Paved	2,900 ft. – Paved
Lighting	Yes	Yes
Instrument Approach Procedures	Yes (Upcoming)	No
Fuelling Services	None	No
Support Services	Terminal Building Aircraft Parking	Terminal Building
Year-Round Maintenance	Yes – Limited	Yes – Limited
Closest Municipality Population	Elk Point – 1,399	St. Paul – 1,416
Distance from Nearest Commercial Service Airport	Edmonton International Airport – 2h30m	Edmonton International Airport – 1h30m
NAV CANADA Five-Year Average Annual Arrivals and Departures (2017-2021)	34	25
Tenants	Private Hangars (3)	Private Hangars (1)
Primary Users	Medevac General Aviation	Medevac General Aviation

# 4.9 Athabasca Regional Airport

Athabasca Regional Airport is the sole airport that serves Athabasca County, with a population of 6,959 residents including 2,759 residents in the nearby Town of Athabasca. The regional economy is bolstered by the County's proximity to the Athabasca, Peace River, and Cold Lake Oil Sands, with the area functioning as a service hub for industrial activity in these resource areas. The forestry sector is also a driver of the economy, centred on the Al-Pac mill and associated operations in the areas of Athabasca and Boyle. The agricultural sector is the third primary component of the economy.

The airfield includes a 4,000 ft. paved and lighted runway with Instrument Flight Procedures, as well as an apron and a supporting network of taxiways. Four larger multi-aircraft general aviation hangars have been developed at the site, and it is understood that the facility is primarily used by based private aircraft, air ambulance operators, and other itinerant traffic. There are no aviation businesses located at the airport.

A strategic plan has been published for the airport that outlines short-term (5-year) and long-term (10-year) goals. Goals in the short-term include jet fuel sales, improvements to the tie-downs and plugins, lighting upgrades, airfield painting, and the installation of a weather system. Identified long term goals include the rehabilitation of the runway and taxiways. Requests for Proposals were issued by Athabasca County in October 2022 and January 2023 seeking interest from the private sector in overseeing the operation of the airport with the goal of reducing the financial impacts borne by the municipality in its provision as a service. However, both RFPs have been cancelled, potentially due to lack of acceptable bids.

Table 4.9 - Athabasca Regional Airport Comparison

Criteria	Elk Point Airport	Athabasca Regional Airport
Distance from Elk Point	-	180 km northwest
Operator	Town of Elk Point County of St. Paul	Athabasca County
Regulatory Status	Registered Aerodrome	Registered Aerodrome
Primary Runway	4,492 ft. – Paved	4,003 ft. – Paved
Lighting	Yes	Yes
Instrument Approach Procedures	Yes (Upcoming)	Yes
Fuelling Services	None	Avgas
Support Services	Terminal Building Aircraft Parking	Terminal Building
Year-Round Maintenance	Yes – Limited	Yes – Limited
Closest Municipality Population	Elk Point – 1,399	Athabasca – 2,759
Distance from Nearest Commercial Service Airport	Edmonton International Airport – 2h30m	Edmonton International Airport – 2h00m
NAV CANADA Five-Year Average Annual Arrivals and Departures (2017-2021)	34	Unavailable
Tenants	Private Hangars (3)	Private Hangars (4)
Primary Users	Medevac General Aviation	Medevac General Aviation

# 4.10 Key Findings

Based on the review of the comparable airports in the surrounding Alberta HUB region, each example can be broadly classified into one of two types: commercial service airports and general aviation airports. Commercial airports are facilities that support a significant level of based or itinerant business-related activity, including aerial work, air taxi providers, charter passenger services, and scheduled passenger services. Lloydminster, Bonnyville, and Lac La Biche are the three airports that fit this category among the ten reviewed. General aviation airports are the facilities that primarily serve private aircraft, medevac flights, and limited commercial use. The seven airports in this category include Elk Point, Athabasca, Vegreville, St. Paul, Cold Lake, Vermilion, and Two Hills.

### 4.10.1 Commercial Service Airports

Among the commercial service airports, three distinct roles have been established:

- Lac La Biche is the hub for wildfire suppression activity and supports three fixed and rotarywing tenants engaged in the provision of aerial work, air taxi, and charter services;
- Lloydminster is the sole airport supporting scheduled passenger air services and a based Flight Training Unit, and also routinely handles charter flights supporting the oil and gas sector; and
- Bonnyville's activity is anchored by a considerable number of oil and gas charter flights from Calgary and Edmonton that support companies with established presences in the area, as well as agricultural aerial application.

Lessons can be drawn from each of these examples in terms of proximity to end users:

- Lac La Biche is located at the southern boundary of the Lac La Biche Forest Area and is well
  sited to provide aerial access for wildfire suppression throughout this zone, with the next air
  tanker bases being in Slave Lake and Fort McMurray. Its location relative to the Cold Lake and
  Athabasca Oil Sands areas is also an advantage for the aerial work providers based at the
  airport, enabling them to effectively meet the needs of their customers.
- The concentration of charter activity at Bonnyville is tied to the established presences in and around the community of Imperial Oil, CNRL, and Cenovus. Despite their smaller populations, Bonnyville benefits from locational advantages relative to end users in the oil and gas sector.
- Lloydminster Airport serves the largest population in the reviewed area and is able to support passenger air services due to resident and business demand. Charter activity at the airport primarily supports Husky Energy's operations and the demand for executive, management, and specialized staff travel. Lloydminster was the base for a rotary-wing commercial operator (Provincial Helicopters) from 2016 until 2017/2018; however, the company withdrew after being unable to establish a viable business serving the local oil and gas sector, again exemplifying the importance of end user requirements in support of new aviation activity.

Accordingly, the commercial success of each of these airports is closely tied to their proximity to end users, primarily in the oil and gas sector in this region. In the cases of Bonnyville and Lac La Biche, this consideration outweighs the smaller populations of their closest communities compared to other reviewed airports (e.g., Cold Lake being larger than Bonnyville, and six communities being larger than Lac La Biche). This also shows that although Elk Point Airport's airfield is similarly sized and equipped to Bonnyville, the availability of airside infrastructure is not the sole determining factor of traffic attraction – instead, it is an enabling factor in meeting an end user's business case.

## 4.10.2 General Aviation Airports

Elk Point and the six other general aviation airports share several common characteristics. With the exception of Cold Lake (the second largest of the ten communities), these facilities serve nearby towns or cities of between 1,400 and 5,900 residents, in addition to the populations of surrounding counties and municipal districts. Airfield infrastructure at each facility includes a single paved runway with lengths of between 2,900 ft. and 4,500 ft., with Elk Point having the longest runway. Lighting is provided at all airports and Instrument Flight Procedures are provided at five of the seven facilities. Elk Point and Two Hills are the two facilities without publicly available fuel sales; however, only Cold Lake sells both avgas and jet fuel, with the remaining facilities dispensing avgas only. This is consistent with the primary user base of these facilities – piston engine general aviation aircraft that consume avgas.

On-site development is comprised exclusively of general aviation hangars at the reviewed airports in this category. Cold Lake, St. Paul, and Vegreville are the three most developed facilities from this perspective, supporting 18, 10, and 9 private hangars, respectively. Among the remaining airports, between 1 and 5 hangars are supported. Although there are select examples of larger general aviation hangars, these structures are modest in their size and construction, with sizes of between 2,000 ft<sup>2</sup> and 3,000 ft<sup>2</sup>. With the exception of Cold Lake, the pace of new development at each airport has been fairly limited over the last decade, with up to one to three hangars having been constructed at growing airports.

The history of the reviewed general aviation airports is also worth noting. Each of these facilities were initially constructed through the Alberta Airport Development Program based on the identified need in the early 1970s for an airport network to provide an alternate means of access to communities, and to enhance the potential of third-level air carrier service. Alberta Transportation oversaw the construction of each facility from the late 1970s into the early 1980s: Vegreville (1975), Vermilion (1976), Athabasca (1977), St. Paul (1978), Cold Lake (1979), Two Hills (1979), and Elk Point (1983). The justification for the province's involvement in building these airports centred first on community safety through the provision of public air services (medevac and wildfire operations). The support of local and regional economic development is understood to have been a secondary goal. Therefore, this historical approach to justifying new airport construction underlies how numerous communities with limited demand for aviation services from a business or economic perspective are equipped with such facilities, as the rationale of supporting medevac services was the primary reason.

The consideration being given by Athabasca County and Town of Vermilion to potential alternative futures for their airports is worth noting. Given the capital and operating financial pressures faced by smaller municipalities, aging facilities constructed during the late 20<sup>th</sup> century requiring rehabilitation and upgrades, and / or lack of perceived benefits, municipalities both within and beyond the Alberta HUB region are increasingly taking a critical look at whether there is a continued need to operate publicly funded airports.

Taking the above discussions into consideration, Elk Point and the six additional airports are assessed as being in a stable state with limited growth and roles centred on supporting private general aviation and medevac operations. Aside from the general aviation growth exhibited at Cold Lake, there are no examples of a reviewed airport making substantial progress on diversifying their role or pivoting into handling based commercial operations.

## 5 TARGET OPPORTUNITIES IDENTIFICATION

With a comprehensive understanding of the Airport established in Section 2, the catchment area in Section 3, and the circumstances at the other airports in the region in Section 4, consideration is given to the economic opportunities of Elk Point Airport in Section 5. The preliminary opportunities outlined in the following subsections are supported through the areas of research identified previously, as well as analyses of the regional and provincial aviation and aerospace sectors.

The intent of the opportunities scan is to identify growth prospects that achieve one or more of the following objectives:

- Increase the Airport's operating revenues and improve its financial sustainability;
- Confer direct and indirect economic benefits to the region (e.g., by supporting new on-site employment and the efficient operations of other businesses in the area); and
- Result in social benefits that improve the quality of life for residents of the catchment area.

# 5.1 Agricultural Aviation

## 5.1.1 Fixed and Rotary-Wing Aerial Application

As described in Section 3.3.1, the agricultural sector is one of the pillars of the regional economy and a significant source of employment. Approximately 320,000 acres are in productive cropping use and over \$150M is generated in gross farm receipts. Aerial application businesses support agricultural growers through the spraying of pesticides, fungicides, insecticides, and herbicides and the dispersion of fertilizer and seeds. Advantages of deploying fixed and rotary-wing aircraft in these capacities for crop producers include leaving no wheel tracks, trampling, or rutting of fields and the ability to spray in damp conditions, in addition to the functional benefits of the product that is applied.

The aerial application sector is prevalent across Alberta given the vast amount of crop production that occurs. The Alberta Aerial Applicators Association identifies 18 companies in Alberta in its database as of 2023, with the two companies closest to Elk Point being Bonnyville Air Services (45 km north) and Wetaskiwin Aerial Applicators (200 km southwest). St. Paul Municipal Airport also is the base for four aerial application aircraft registered to Smokey Burn Ag Air.



Aerial application aircraft of Smokey Burn Ag Air at St. Paul Municipal Airport

Elk Point Airport is used on a recurring basis by aerial applicators based at other facilities while spraying fields in the vicinity of Elk Point, typically for a period of one to two weeks per year. Aircraft and supporting infrastructure are temporarily relocated to the Airport to serve as a base of operations while spraying in the area, reducing the transit time to and from fields and increasing productivity and efficiency. To gain a better understanding of local demand for aerial application services, Bonnyville Air Services and Smokey Burn Ag Air were consulted. Perspectives shared by these operators are as follows:

- Smokey Burn Ag Air shared that local farmers make limited use of aerial applicators due to multi-generational preferences for ground-based methods;
- Bonnyville Air Services noted that for higher speed turbine-powered aircraft such as the Air Tractor operated by their company, the irregularly shaped and hilly fields in the area increases the time required to treat each field. As applicators bill per acre as opposed to per hour, extended timelines to spray a field decreases their revenue generating potential;
- Smokey Burn Ag Air suggested that residents in the rural areas may be less accepting of the noise from aerial application given the lack of this activity historically; and
- Bonnyville Air Services indicated potential interest in exploring local demand for application services. If demand were identified, this activity could be facilitated by the company deploying its trailer-based support infrastructure and aircraft or through the development of a modest satellite base. Smokey Burn Ag Air did not identify the need to commence operations at an additional airport.

Taking these points and the broader understanding of the aerial application sector together, the likelihood of Elk Point Airport serving as a permanent base / headquarters of an aerial applicator is low. However, an opportunity may exist for the Airport to support aerial applicators using the facility as temporary bases of operations with their mobile infrastructure or semi-permanent facilities (e.g., shipping containers, mobile jet fuel tanks) on an as-required basis. Accommodating this type of activity supports the needs of the local agricultural sector and could be a modest source of operating revenues through a daily use fee or land lease for a semi-permanent operational base with airside access. Therefore, this opportunity is advanced for planning and pursuit.

### 5.1.2 RPAS Aerial Application

The agricultural sector is undergoing a period of change through the adoption of RPAS in crop scouting, observation, and precision agriculture. To-date, Group 1 RPAS (weights of less than 21 lb) have been put into service in crop scouting and observation roles. Given their small sizes, limited ranges, and attainable training requirements, farmers typically operate these systems directly from their lands, with minimal crossover with the airport environment. Accordingly, an opportunity is not anticipated to exist for the Airport in this respect.

The next major RPAS application in the agricultural sector is expected to be in aerial application. RPAS can currently be used for seeding and fertilizing applications. Health Canada's Pest Management Review Agency has not yet provided full-scale approval of dispersing pesticides, herbicides, and fungicides from RPAS. Technological advancements will also be required – RPAS currently on the market are suited to the spot application of treatments, while larger units (or formations of smaller units) may be required to conduct large-scale application like conventional fixed and rotary-wing aircraft. The degree to which the use of RPAS in the aerial application sector will disrupt conventional fixed and rotary-wing operators remains to be seen, but a competitive advantage may be realized if operating costs can be lowered. Given the irregularly shaped and hilly fields in the vicinity of Elk Point and the challenges with high-speed fixed-wing application, an opportunity may exist for RPAS-based aerial application in the local agricultural sector.

The likelihood of RPAS-based aerial application representing an opportunity for the Airport remains to be seen but is expected to be low. The current generation of multirotor aerial application RPAS, such as the DJI Agras series, can be operated directly from farms and benefit from doing so to maximize their operational range. Landview Drones, one of the main Canadian players in the agricultural RPAS sector, views the adoption of RPAS directly by farmers as being one of the prime opportunities that exists. Even if deployed by specialized aerial application companies instead of by farmers, it is speculated that vertical takeoff or short takeoff RPAS would still preferably be launched at or near their intended application areas to maximize operational endurance. Future use cases will depend on changes to the



Aerial application RPAS (DJI)

regulatory environment and technological maturation, but the development of an RPAS-based aerial application business at the Airport is viewed as being unlikely based on the information available. Therefore, this opportunity is not advanced for planning or pursuit.

## 5.2 Aerial Work Operations

### 5.2.1 Fixed and Rotary-Wing Aerial Work

Aerial work means a commercial air service other than an air transport or flight training service, and typically encompasses businesses performing specialized tasks such as agriculture (Section 5.1.1), construction, photography, surveying, observation and patrol, and search and rescue. In the surrounding region and northern Alberta more broadly, numerous fixed and rotary-wing operators provide aerial work services primarily to the oil and gas sector, including aerial construction support, cargo transportation, and pipeline / infrastructure inspection. The nearest companies to Elk Point are:

- Bi-Air Application Services, a rotary-wing aerial applicator based in Blackfoot;
- Bonnyville Air Services, a fixed-wing aerial applicator based at Bonnyville Regional Airport;
- Border City Aviation at Lloydminster Airport, providing fixed-wing charter and pipeline patrol services; and
- Star Helicopters, a rotary-wing operator based at a private heliport near Cold Lake.

As noted in Section 4.1, Lloydminster Airport formerly was a subbase of operations for a rotary-wing aerial work provider beginning in 2016, but the company withdrew approximately two years later owing to challenges with establishing a viable business in the region.

Table 5.1 shows the distribution of the Transport Canada-approved aerial work operators across Alberta. Of the 72 recognized operators, 28% are based in the major urban areas of Calgary and Edmonton. The distribution of the remaining 52 operators is more dispersed across the province. The clusters of fixed and rotary-wing operators in Grande Prairie, Fort McMurray, Slave Lake, and Whitecourt are closely related to the support of the oil and gas sector, as well as the additional challenges with access further north in the province.

Table 5.1 - Distribution of Aerial Work Operators in Alberta

Location	Operators	Location	Operators
Calgary	12	Berwyn	1
Edmonton	8	Peace River	1
Red Deer	5	Edson	1
Grande Prairie	4	Stony Plain	1
Fort McMurray	3	Bonnyville	1
Okotoks	3	Drayton Valley	1
Whitecourt	3	Adrossan	1
Strathmore	2	Onoway	1
Slave Lake	2	Bow Island	1
Taber	2	Blackfoot	1
High River	2	Blue Ridge	1
Medicine Hat	2	Calling Lake	1
Lethbridge	2	Lloydminster	1
Redwater	1	Caroline	1
Beiseker	1	Manning	1
Cold Lake	1	Wetaskiwin	1
Brooks	1	Drumheller	1
Nordegg	1	Total	72

Although the oil and gas sector is a major driver of aerial work activity in Alberta, a less significant proportion of these operations are expected to take place in the region surrounding Elk Point – oil and gas companies operating in the vicinity of the community generally benefit from having access by road to their operational sites, simplifying the transportation of crews, cargo, and specialized equipment.

Pipeline patrol missions in the region are currently flown by operators based at other airports, with a single company able to flexibly deploy their aircraft from their base to meet customer needs across a range of locations. While pipeline patrol aircraft routinely stop at the Airport for pilot breaks, minimal services (including refuelling) are available upon arrival.

The likelihood of a fixed or rotary-wing aerial work operator establishing a permanent base or subbase at the Airport is viewed as low. The Airport is available for use by operators based at other airports when required to support customers in the region – for example, a rotary-wing operator that is required to temporarily support facility improvements nearby could operate from the Airport for the duration of their contract. During such instances, aerial work providers may choose to stage their operations from the Airport, although this is unlikely without access to jet fuel facilities and other amenities for crews. Pipeline patrol operations in the region similarly may stop at Elk Point mid-mission, but there is not a compelling reason to do so without the availability of fuel. Therefore, the primary opportunity to support any future aerial work operations in the region is dependent on the provision of refuelling infrastructure and amenities for visiting pilots / crews. This is discussed further in Section 5.6.

#### 5.2.2 RPAS Aerial Work

The advances made in RPAS technology in terms of their flight capabilities (range, endurance, payload) and onboard mission equipment (e.g., remote sensing units, cameras) has enabled considerable growth in the use of these tools for aerial work functions. The use case for RPAS in aerial work is commonly articulated through the "3 D's" – RPAS are deployed for tasks that are Dirty, Dull, and / or Dangerous and where operational, safety, and financial benefits may be realized versus a crewed fixed or rotary-wing aircraft. RPAS themselves do not represent an end use case; instead, this technology must be leveraged to serve an existing economic sector with an identified need and defined benefits to represent a use case. In the vicinity of Elk Point, the two economic sectors with the most clearly definable use cases for RPAS are the agricultural sector and the oil and gas industry.

The current and future application of RPAS in agricultural aerial work is discussed in Section 5.1; as noted previously, the deployment of RPAS in the agricultural sector is not anticipated to represent a high likelihood opportunity for the Airport.

With respect to the oil and gas sector, smaller Group I (< 21 lb) RPAS are currently used for tasks such as infrastructure inspection, aerial photography and surveying, and wildlife deterrence. The limited endurance / range of these units, requirement for operators to maintain a visual line of sight, and the limited ground infrastructure required generally results in oil and gas users deploying RPAS directly from their work sites. Status quo Group I operations therefore do not represent an opportunity for the Airport and while existing or upstart RPAS operators may choose to be based at an aerodrome, doing so is typically not integral to their business's functioning.

The use of larger Group II (21-55 lb) and Group III (< 1,320 lb) RPAS in support of the oil and gas sector could represent a higher likelihood opportunity for the Airport. Larger Group II and III RPAS deployed as part of long range pipeline patrol missions may require an airstrip for takeoff, landing, and servicing. The primary constraint that, when addressed, will influence the commercial scalability and economic efficiencies of RPAS is Beyond Visual Line of Sight (BVLOS) operations. BVLOS enables RPAS to be operated without direct visual reference from the operator, and significant research, development, testing, and regulatory preparation efforts are underway by the private sector, post-secondary institutions, and the government.

While the future path of integration of larger Group II and III RPAS in BVLOS operations in support of the regional oil and gas sector continues to evolve, this opportunity is identified for pursuit and planning for the Airport. Although BVLOS and RPAS testing in Alberta is concentrated in the vicinity of the Foremost UAS Test Range, the region surrounding Elk Point represents an opportunity for applied use case testing given its proximity to oil and gas operations.

# **5.3** Air Cargo and Distribution

The air cargo and goods distribution sector in Alberta is anchored by Calgary International Airport and Edmonton International Airport. Calgary International Airport supports dedicated domestic and transborder cargo services by operators such as Cargojet, DHL Aviation, and FedEx, as well as long-haul international operations by Cathay Pacific Cargo and Cargolux. Edmonton International Airport also supports service by Cargojet and FedEx. In addition to the dedicated freighter services at both airports, airlines transport cargo in the holds of their passenger flights through their in-house cargo divisions (e.g., Air Canada Cargo, WestJet Cargo). In 2021, Calgary and Edmonton handled 94,087 and 31,850 tonnes of air cargo and 8,145 and 2,004 cargo flights, respectively. Edmonton has invested in a \$36M air cargo facility program, including the expansion of the cargo apron, upgraded fuelling infrastructure, and expanded cold storage; as well as a \$300M project announced in 2022 to convert 2,000 acres of land into a global cargo handling hub.

Currently, the inbound and outbound air cargo needs of Elk Point are understood to be met through ground transportation to and from Edmonton and Calgary, either directly from distribution facilities in these regions or with an interim stop in local facilities such as the facilities of FedEx and Purolator in Lloydminster and Loomis Express in Vermilion. Relay Distributing operates a daily scheduled courier service to Elk Point and other nearby communities that originates in Lloydminster. Given the modest driving times between Elk Point and cargo facilities in Lloydminster (1h15m), Vermilion (30m), and Edmonton (2h30m) and limited volumes of high value of time inbound and outbound cargo requiring onward air transportation, this hub and spoke model of service likely yields numerous advantages for freight operators.

Given the disproportionately large and well-established roles of Edmonton International Airport and Calgary International Airport as distribution centres and hubs for air cargo activity, excellent road access throughout the economic region, the high operating costs of regional air cargo operations, and limited market size, the likelihood of Elk Point supporting scheduled cargo air services or assuming a role as a regional air cargo distribution hub is viewed as being negligible.

While the operating costs associated with crewed regional air cargo services and limited inbound and outbound demand to the Elk Point market generally limits their application in the catchment area, an opportunity may exist for the Airport to support the proliferation of RPAS in cargo transportation. The use of RPAS in air cargo to replace crewed aircraft or ground vehicles is nascent and is largely still in the research, development, and testing phase. In the Canadian context, Drone Delivery Canada and Volatus Aerospace are two of the emerging players in the RPAS air cargo sphere.

In 2018, Drone Delivery Canada began linking the island community of Moose Factory in Ontario with Moosonee by RPAS for the short-range, limited payload transportation of medical supplies, food, and mail. Drone Delivery Canada commenced operations in 2022 for a 12-month term from Edmonton International Airport, operating short-range cargo services by RPAS from the airport to off-site recipients. In March 2023, Drone Delivery Canada and Transport Canada entered into an agreement for the provision of one of the company's Condor heavy-lift drones for testing and operational evaluations. The Condor is planned to have a 180 kg payload and range of 200 km.

Volatus Aerospace has been issued a Canadian Transportation Agency license for domestic service, all-cargo aircraft. Volatus is targeting the middle mile cargo market and recently announced its intention to purchase the long-range Natilus autonomous cargo aircraft, with a 4.3-metric ton cargo capacity.

Other examples of the evolution of the RPAS cargo sector include FedEx's intention to begin testing autonomous cargo delivery drones being developed by Elroy Air in 2023. These units are intended to have a payload of 300 to 500 lbs and ranges of up to 480 km. Ameriflight, a feeder airline that operates on behalf of UPS, has announced its intention to purchase 20 Natilus Kona cargo drones, and UPS has announced its intention to purchase 150 crewed electrical Vertical Takeoff and Landing aircraft for cargo operations that can potentially be converted for autonomous operations in the future. The Beta Technologies platform ordered by UPS is planned to have a payload of 635 kg and range of 400 km.

To-date, RPAS-based cargo transportation has generally been confined to short-range routes, and operations the scale of Edmonton to Elk Point (200 km) have not been trialed owing primarily to the performance limitations of platforms in development. However, the community's proximity to the air cargo hub of Edmonton International Airport, the Airport Authority's emerging approach to collaboration with RPAS development and testing, and development of longer-range cargo RPAS such as Drone Delivery Canada's Condor could position Elk Point as an early use / testing case for medium range cargo movement. In this capacity, the Airport could function as a secured hub for RPAS arrivals and departures, located near the community but away from built-up areas and with ample development room for ground facilities.

Weaknesses that would have to be contended with in this model include the potentially limited demand for RPAS air courier services given the small population and business base of the community, the inconvenience of customers travelling to the Airport to receive their delivery versus in-town delivery spots, and the unclear path to the maturation and adoption of this potential business model in the region.

The pathway for the development of medium-range intercommunity RPAS operations for the movement of cargo is not clearly defined, and the application of this preliminary opportunity to the Airport will require further research and collaboration with industry and government stakeholders. As the use case for Elk Point would also apply to larger markets through the economic region, a key opportunity exists for the Town, County, and STEP to collaborate with Alberta HUB to participate in a regional-level approach to pursuing this type of RPAS-based air cargo activity. This opportunity is therefore advanced for pursuit and planning. Elk Point Airport would likely be one destination among several to be integrated in intercommunity BVLOS cargo drone testing. From an infrastructure perspective, this may include the provision of hangar space or common use facilities for prospective RPAS cargo operators, secured areas for operations, and high-quality internet / telecommunication services to support the data requirements of RPAS operators.

### **5.4 Private Aircraft Hangars**

Elk Point Airport supports three hangars on lots leased to private tenants for the secure and enclosed storage of private general aviation aircraft. The Airport is a suitable facility for general aviation aircraft operators, offering new leasehold lots with airside and groundside access

Lots sized for general aviation aircraft hangars are leased by the Town at a rate of \$500 per year as of 2023, or approximately \$0.66 per m² per year. Therefore, lots leased for private hangars are a very modest source of operating revenues. Lease rates could be raised to increase operating revenues (Vermilion charges \$1.18 per m², Cold Lake charges \$1.28 per m², and Lloydminster charges \$1.75 per m²), although applying a higher rate (e.g., Cold Lake's) would only result in an incremental gain in revenue of approximately \$430 for a total annual lease rate of \$930 per lot. Assuming all 17 lots identified by the Town are absorbed at an assumed size of 730 m² per lot and a lease rate of \$1.28 per m², an additional \$16,000 in operating revenues would be generated for the Airport.

The target market for the development of new hangars at the Airport is private aircraft owners that have identified a need for enclosed storage. As reviewed in Section 4, each of the comparator airports in the economic region accommodate private hangar development and therefore compete with Elk Point for the attraction of this type of growth. Although each facility has unique competitive advantages (e.g., on-site businesses, airfield infrastructure, more cost-effective lease rates, etc.), this dynamic enables aircraft owners to choose the airport that is closest to their home community. Convenience becomes one of the primary criteria in selecting where an individual will develop their hangar, all other factors being similar. This shrinks the Airport's catchment area to primarily Elk Point and the surrounding 30-50 km area – beyond this ring, other airports such as St. Paul, Vermilion, Two Hills, Lloydminster, and Bonnyville are more easily accessed from an owner's place of residence.

Local demand for private hangars is influenced by the number of aircraft owners in the catchment area community's population. Table 5.2 provides a high-level overview of the surrounding airports, including the population of their closest community, number of private hangars, and number of privately registered aircraft. Across the reviewed airports, an average of 1.42 private hangars exist per 1,000 residents, with Elk Point being above average at 2.14 hangars per 1,000 residents. An average of 4.11 privately registered aircraft per 1,000 residents was identified across the nine communities, with Elk Point again above average at 7.15 aircraft per 1,000 residents. Although other factors influence aircraft ownership and hangar demand beyond population size (e.g., discretionary income), this dataset indicates that potential demand at the Airport is partially influenced by the population of Elk Point and the surrounding region. The Airport may be able to attract demand away from airports serving other communities; however, the growth of its core local market will remain partially influenced by local demographic trends.

This opportunity is advanced for planning and pursuit, while noting that the scale of anticipated demand is expected to be limited.

Private **Private Aircraft Privately** Airport / Population Private Hangars per Registered per 1,000 1,000 Community (2021)**Hangars** Aircraft Residents Residents 0.41 Lloydminster 31,582 13 47 1.49 Cold Lake 15,661 18 1.15 68 4.34 Bonnyville 6.404 12 1.87 50 7.81 St. Paul 10 1.71 11 1.88 5,863 Vegreville 5,689 9 1.58 18 3.16 Vermilion 3,948 5 1.27 25 6.33 Lac La Biche 3,120 6 1.92 13 4.17 Two Hills 1,416 1 0.71 1 0.71 Elk Point 1.399 3 2.14 10 7.15

Table 5.2 - Private Hangar Demand by Community

# **5.5 Fly-In Outfitting Customers**

Outfitters located in Elk Point and the surrounding region are frequently used by US-based customers for hunting expeditions. From consultation with Ranchland Outfitters, it is understood that most American guests travel by commercial airlines into Edmonton International Airport before driving to Elk Point. 5-6 hunting groups annually travel by private or chartered turboprop and turbofan aircraft to reach the region. These groups typically arrive at Lloydminster Airport and are transported by road to Elk Point due to the lack of refuelling services at Elk Point Airport. This represents a lost source of potential revenue for the Airport when the airfield infrastructure and local demand would otherwise support these operators.

An opportunity may exist for the Airport to handle an increased level of fly-in tourism if the services required by arriving groups are made available, increasing revenues and providing indirect economic benefits to local outfitters by facilitating easier guest transportation. The scale of this opportunity is tied to the broader strength of the local outfitter sector and cross-border tourism. The revenue benefits for the Airport are anticipated to be modest based on the limited historical number of private and chartered aircraft that visit for hunting purposes; however, the proximity of the facility to local outfitters would position it as an ideal gateway as activity grows in this sector if appropriately marketed.

At comparable airports (e.g., Lloydminster), visitors coming by air on their way to outfitters are generally treated similar to the arrival of other itinerant aircraft: the airport serves as an arrival and parking facility for the duration of the trip, with the remainder of the logistics established between the customer and outfitter. In the case of Elk Point, more active involvement will be required between the Airport partners (Town, County, and STEP) and outfitters in the region to identify conditions for mutual success and ensure the facility is being marketed as an option to customers by the outfitters.

The support of local tourism outfitters and fly-in tourism is identified as a medium likelihood opportunity. From an economic development perspective, the role of the Airport partners (Town, County, and STEP) is anticipated to be centred on the provision of the infrastructure required by fly-in tourism groups and coordinating with local outfitters to ensure that visitors are aware of the availability and services of the Airport. This opportunity is advanced for planning and pursuit.

### 5.6 Refuelling Services

Public-use avgas and jet fuel facilities are not currently provided at the Airport, although one hangar tenant has installed an above-ground avgas storage tank that is used by pilots based on-site. Accordingly, pilots requiring refuelling may choose to use St. Paul Municipal Airport (avgas), Bonnyville Regional Airport (avgas and jet fuel), Cold Lake Regional Airport (avgas and jet fuel), and Lloydminster Airport (avgas and jet fuel).

Municipal airport owners commonly install avgas and / or jet fuel tanks and self-serve cardlock systems to serve based and itinerant aircraft operators. Refuelling services are both a business opportunity, through the attraction of aircraft requiring mid-route fuelling; as well as a service that enables revenue to be generated from other business opportunities, such as fly-in tourism, agricultural aviation, military training, etc. The market for refuelling services could include:

- Current and potential future aircraft owners based at the Airport. The needs of this market segment are currently met through the privately installed avgas tank;
- Medevac operators;
- Corporate, aerial survey, infrastructure inspection, and military flights; and
- Visiting general aviation aircraft.

Given the lack of aircraft movement data and the absence of aircraft visiting requiring refuelling services owing to the lack of such facilities, an estimate of fuel sales and the potential market size cannot be provided. This uncertainty must also be weighed against the capital and operating costs of fuel sales – for a 25,000 L jet fuel and 10,000 L avgas self-service system, \$600,000 is an approximate cost estimate for acquisition and installation. Town Staff would have to be trained on administering the fuel system, including routine inspections and quality assurance, and additional insurance and liability requirements would be associated with entering this market. Elk Point would also compete against other airports in the region to attract aircraft requiring refuelling in terms of its convenience, fuel price, and other amenities that make for an attractive fuel stop (e.g., terminal facilities).

With the preceding considerations acknowledged, the commencement of refuelling services at the Airport has been identified as an opportunity for planning and pursuit moving forward.

### 5.7 Filming

The Albertan film sector has experienced a period of considerable success in recent years, driven by factors such as the expansion of production infrastructure (e.g., the Calgary Film Centre), the 2020 provincial Film and Television Tax Credit, new workers entering the industry, the favourable exchange rate for US-based media companies, and critically acclaimed productions. The 2023 provincial budget included a \$100M increase in funding for the Film and Television Tax Credit, affirming the government's supportive stance and the economic potential of this sector.

Although the film sector is nascent in Elk Point and the surrounding region, early steps are being taken to attract activity in this industry. In 2021, the Town and County individually adopted a Film Friendly Community Policy that affirms the STEP region as a destination for creative industries and outlines the commitments, requirements, and incentives for production to occur in the region. Elk Point currently has three filming locations identified in the provincial database, and several community airports throughout the province (e.g., Beiseker, Claresholm, High River, Pincher Creek, and Vulcan) are identified as film sites.

Given the Airport's low activity levels, sparsely populated land use context, and well-maintained airfield infrastructure, the facility may represent an opportunity for film and television productions that are looking to have maximum flexibility while shooting in an aviation environment. The rental of the Airport for film and television production can also be offered on a highly cost competitive basis, aligning with the preliminary strategy of the STEP region's approach of pursuing smaller independent film makers looking for lower cost facilities.

As production sites are determined on a project-specific basis, the scale of this potential opportunity cannot reliably be estimated. However, film and television productions commonly bring spin-off economic benefits to their host communities, and the framework and leadership has already been established with STEP for these opportunities to be pursued. Therefore, the inclusion of the Airport in broader filming attraction efforts is an opportunity that is recommended for planning and pursuit.

## **5.8 Military Training**

Elk Point is located near a series of Canada's largest military installations, including Canadian Forces Bases Cold Lake (65 km northeast), Edmonton (180 km southwest), and Wainwright (120 km south). These facilities host significant concentrations of activity by the Canadian Armed Forces, including:

- CFB Cold Lake: Four operational and training tactical fighter squadrons, 417 Combat Support Squadron (operating helicopters), and 10 Field Technical Training Squadron;
- CFB Edmonton: 3<sup>rd</sup> Canadian Division and 408 Tactical Helicopter Squadron; and
- CFB Wainwright: 3<sup>rd</sup> Canadian Division Training Centre and the Canadian Manoeuvre Training Centre. Wainwright also hosts Exercise Maple Resolve, the military's cornerstone annual training exercise.

Elk Point Airport is used on an annual basis by the Canadian Armed Forces to conduct training on airfield pavement condition assessments using specialized ground penetrating radar.

Given the limited activity at the Airport, its proximity to helicopter units based at Edmonton and Cold Lake, and the pre-existing training relationship established with the Canadian Armed Forces, opportunities may exist for the facility to be used in an expanded training role for the Royal Canadian Air Force. Further consultations with the Canadian Armed Forces will be required to assess this opportunity and determine whether it has merit for pursuit. The likelihood of helicopter training occurring at Elk Point must be considered alongside the military's well-developed helipad and airport infrastructure at Canadian Forces Base Edmonton (heliport) and Wainwright (helicopter and airport with 7,000 ft. runway).

Royal Canadian Air Force training would be supportable under the justification of assisting the Canadian Armed Forces in its operational readiness, although the revenue generation potential of this opportunity is low. Landing and / or parking fees could be levied but would disincentivize the Royal Canadian Air Force from operating at the Airport given the number of alternative airports in the region, including those owned by the Canadian Armed Forces. Revenues could be realized through jet fuel sales if the infrastructure were in place, although this is not currently the case. Despite these considerations, this opportunity is advanced for further assessment and potentially pursuit.

### 5.9 Non-Aviation Land Development

Consideration was given to opportunities for the development of complimentary non-aviation commercial and industrial users at the Airport, such as manufacturing, highway-oriented service commercial businesses, storage, warehousing, etc. The development of non-aviation land uses near airports is commonplace across Canada for reasons that can include access to the airport's core aviation functions that assist in business operations (e.g., air cargo access), lower land costs, and / or the permission of land uses with externalities (e.g., noise, traffic) that would otherwise disturb nearby sensitive land uses such as residential areas. Among the reviewed airports in the region, Lloydminster, Bonnyville, Lac La Biche, and Vermilion are the four facilities with adjacent or nearby commercial and industrial parks, although the relationships and potential siting motivation between commercial and industrial businesses and their respective airport cannot be identified.

Research by Colliers International in 2020 and 2022 in support of the Buffalo Trail North and South IASPs considered local demand for commercial and industrial lots and found the following:

- 14.9 acres of industrial land has been developed, or approximately 1.5 acres per year;
- 32.3 acres of serviced and unserviced industrial land remains available;
- The current supply of serviced conventional industrial lots was estimated to meet historic levels of demand for another 5 to 20 years (22 years based on historical absorption levels); and
- The absence of serviced highway commercial and business industrial development sites must be weighed against the cost of developing and servicing these types of lots being two to three times their market value. This challenges the business case for development.

As will be explored through Phase 3, it is expected that the costs of extending municipal potable water and sanitary sewer services to the Airport (approximately 7 km) will significantly exceed the costs of servicing industrial lands in or near the Town's boundary. Given that the upfront servicing costs for industrial lands in Elk Point represent a challenging return on investment, it is not expected that servicing land at the Airport for non-aviation commercial or industrial growth will be economical. Further, a limited land supply (approximately 17 acres) is available within the publicly owned Core Lands of the Plan Area. Land intensive non-aviation industrial and commercial uses may rapidly deplete the developable lots of the Airport, necessitating the involvement of neighbouring private landowners.

Additionally, a clear linkage has not been identified between the types of resource and agriculturealigned commercial and industrial businesses that have succeeded in Elk Point to-date with the current activities that occur at the Airport. The exception could be if one of the preceding opportunities that improve the efficient operations of local businesses (e.g., RPAS-based air cargo) is successfully achieved – however, the preceding limitations in terms of land supply and servicing would continue to apply. Therefore, the pursuit of non-aviation commercial and industrial uses requiring servicing is not identified as an opportunity for pursuit or planning. Given the ease of access from the Airport to Highways 41 and 646, a non-aviation function that may warrant consideration is the use of development lands as outdoor laydown / storage yards. Laydown and storage requirements may be identified by oil and gas and wind energy companies and local businesses on an ongoing or limited duration basis in support of major projects and could be an opportunity to generate leasing revenues in the intervening years before a higher and better use of the lands (e.g., aviation commercial activity) develops. Yard preparation and grading completed by tenants could also decrease the costs of readying airside development lots post-decommissioning. The use of the Airport as a temporary laydown / storage yard is therefore advanced as an opportunity for pursuit and planning.

### 5.10 Flight Training

The entry of new professional pilots into the aviation sector is critical to replacing individuals leaving the workforce through retirement or pursuing new careers and to accommodate forecast growth in air travel demand in the coming years. Demand for new pilots has been estimated on several occasions recently, including:

- The Canadian Council for Aviation & Aerospace in 2018 estimated that 7,300 new professional pilots would be needed in Canada by 2025,
- In 2020, CAE through its 2020-2029 Pilot Demand Outlook forecasted the need for over 260,000 new professional pilots globally over the next decade; and
- Consultancy Oliver Wyman, in March 2021, forecasted the requirement for approximately 34,000 new pilots globally by 2025.

Post-pandemic air travel recovery and resurged demand is further supporting the need for pilot training and hiring.

Based on a review of Transport Canada's database and supplemental research by HM Aero, 25 Flight Training Units are located in Alberta providing training to the Commercial Pilots License level. As shown in Table 5.3, the Calgary and Edmonton metropolitan areas support significant clusters of fixed and rotary-wing flight training activity, with 10 of the 25 Flight Training Units located in these two areas at airports such as Springbank, Villeneuve, Cooking Lake, Josephburg, and Parkland. Seven of the 25 businesses are located in medium-sized cities (Fort McMurray, Grande Prairie, Lethbridge, Medicine Hat, and Red Deer), with the remaining 10 facilities located in smaller centres with populations of approximately 30,000 or less. However, the Flight Training Units in Okotoks, High River, Olds, and Beiseker are all within driving distance of Calgary and likely derive a sizable proportion of their student base from this city.

Lloydminster-based Border City Aviation formerly offered flight training from St. Paul Municipal Airport for a short duration; however, training was discontinued due to noise concerns with nighttime operations from nearby residents.

**Table 5.3 - Distribution of Albertan Flight Training Units** 

Location	Population	Flight Training Units
Calgary	1,306,784	6
Edmonton	1,010,899	4
Red Deer	100,844	2
Lethbridge	98,406	1
Fort McMurray	76,000	1
Grande Prairie	64,141	2
Medicine Hat	63,271	1
Lloydminster	31,582	1
Okotoks	30,405	1
High River	14,324	1
Whitecourt	9,927	1
Olds	9,209	1
Claresholm	3,804	1
Three Hills	3,042	1
Beiseker	754	1

Six post-secondary aviation programs have been developed by institutions in-house or through affiliations with external Flight Training Units. These programs are distributed between the province's two largest cities, three programs in medium-sized urban areas, and one program located in the small community of Three Hills that is operated through Prairie College (Table 5.4). Following the October 2022 announcement by the Province and WestJet of their planned partnership to advance the aviation sector in Alberta, the provincial government's 2023 budget included \$6M in funding for Mount Royal University to expand its offerings to include a Bachelor of Aviation Management program. This support will result in the addition of 120 seats to the program over four years. The 2023 budget also included \$4.5M for bursaries for students in high-demand aviation programs, supporting up to 450 students over three years. The 2023 budget announcement builds on a previous \$8.2M funding announcement made in 2022 (\$7.1M in capital and \$1.1M in operating funding) supporting Mount Royal University's program.

Table 5.4 - Distribution of Alberta Post-Secondary Aviation Programs

Location	Post-Secondary Institution	Flight Training Provider	Program(s)
Calgary	Mount Royal University		Aviation Diploma, Bachelor of Aviation Management (in development)
Edmonton	Solomon College	Cooking Lake Aviation	Aviation Management & Pilot Training Diploma
Fort McMurray	Keyano College	McMurray Aviation	Business Aviation Diploma
Medicine Hat	Medicine Hat College	Super T Aviation	Aviation Management Certificate
Red Deer	Red Deer Polytechnic	Sky Wings Aviation	Diploma in Aviation
Three Hills	Prairie College		Mission Aviation Associate of Arts

From an airfield and airspace perspective, the Airport is well-suited to fixed and rotary-wing flight training. The facility benefits from a sufficiently long runway to support student requirements, lighting and Instrument Flight Procedures for night and instrument ratings, uncongested airspace with easy access to practice areas, and limited nearby residential land uses that would be disturbed by high frequency training flights and nighttime training. The Airport could also be offered as a more cost-effective option compared to larger airports in the vicinity of Calgary and Edmonton. However, a series of challenges must be considered in assessing the likelihood of a Flight Training Unit establishing at the Airport:

- The size of the catchment area (estimated at 15,000 residents) represents a limited market for local students for a prospective business. Although the catchment area for a Flight Training Unit at Elk Point could extend northwards to Bonnyville and Cold Lake owing to the lack of such businesses at these airports, demand to the south and west is affected by the availability of Border City Aviation in Lloydminster and the numerous schools in the Edmonton region;
- Given the distance of Elk Point Airport from Edmonton (approximately 2h30m) and the number
  of established Flight Training Units in the vicinity of the city, a business in Elk Point would
  struggle to capture demand from the Edmonton Metropolitan Region, a significant market of
  potential students;
- For individuals pursuing flying as a recreational hobby, the high costs of flight training (a Private Pilots License generally costs over \$10,000) may be challenging in the local market given the comparatively lower incomes of residents of the catchment area (Section 3.2.3);
- Limited supports are available in Elk Point for a Flight Training Unit seeking to host out-of-town students for the duration of their training. Rental housing options, restaurants, and other amenities required for out-of-town students are critical to a business effectively serving this market, with the alternative being the business bearing the significant upfront costs of establishing these services themselves; and
- Flight training businesses contend with high operating costs, lean margins, and instability in demand, disincentivizing risk-taking in the form of the capital costs associated with building new facilities and purchasing new aircraft. In recent years, an increasing challenge has been Flight Training Units struggling to retain Certified Flight Instructors that are being hired by commercial air carriers amid an industry-wide skilled labour shortage, further challenging the ability of these businesses to scale and grow their operations.

Therefore, three models could culminate in a Flight Training Unit opening at the Airport:

- 1. An existing Flight Training Unit based at another airport could open a satellite / sub-base at the Airport to serve local demand for aviation training, relocate part of their operations owing to challenges at their home airport, and / or to serve as a partner to a post-secondary institution establishing a training program. As noted previously, Elk Point's catchment area is unlikely to be a sufficiently large market to justify a Flight Training Unit opening an additional base of operations, and examples of businesses opening reliever facilities due to airport-related challenges are limited; or
- 2. An upstart Flight Training Unit could choose the Airport as its base of operations for the advantages noted above. However, an upstart business would still need to contend with the challenges described previously; and / or
- 3. A post-secondary institution seeking to establish an aviation curriculum could make use of the Airport for the delivery of training.

With respect to the third model identified above, an existing post-secondary institution or training facility in the region could identify a strategic opportunity to expand its program offerings through professional flight training (e.g., Lakeland College, Portage College, University nuhelot'įne thaiyots'į nistameyimâkanak Blue Quills). Except for Mount Royal University and Prairie College, post-secondary institutions with aviation programs in Alberta rely on affiliated Flight Training Units to decrease the specialized resources (staff, aircraft, maintenance, etc.) required in-house to support such programming. Portage College, for example, is in the process of developing a partnership in Cold Lake for the provision of an Aircraft Maintenance Engineering – Structural training program. The technical complexities in accreditation and the magnitude of the capital investment required to launch such a program has motivated Portage College's search for partnerships to deliver this training, further underscoring this consideration.

The post-secondary partnership model represents a challenge at Elk Point Airport due to the lack of a potential partner business / training provider on-site, and the implementation of such a program is largely external to the Town and County's purview as an airport operator, although the municipalities with STEP could advocate with post-secondary institutions in region to start a program and be supporting partners insofar as the Airport is concerned (e.g., by waiving fees, preparing hangar facilities, etc.). Potential interest could be explored further with University nuhelot'ine thaiyots'i nistameyimâkanak Blue Quills given the proximity of the institution to St. Paul Municipal Airport and Elk Point Airport.

Taken together, the likelihood of a Flight Training Unit establishing at the Airport as its main base or subbase / satelitte base is viewed as being low. Despite this low likelihood, it is recommended that sufficient lands be reserved for such a purpose, that opportunities of this type be marketed as part of broader Airport-related initiatives, and that outreach be completed on an ongoing basis with post-secondary institutions in the region that may have an interest in establishing aviation programming.

### 5.11 Oil and Gas Charter Services

As described in Section 3.3.2, the oil and gas sector is a key driver of the regional economy with major companies including Cenovus, CNRL, and Strathcona Resources having an established presence in the area. Chartered air carrier services are commonly used by major oil and gas companies to move staff between corporate centres (e.g., Calgary, Edmonton) and field offices and work sites. The workforce transportation needs of CNRL and Strathcona Resources are both served through Bonnyville Regional Airport, with charter services provided by operators using the 18-seat Beechcraft 1900 and 50-seat De Havilland Canada Dash 8.

Despite Elk Point's proximity to established oil and gas operations such as the Strathcona Resources Lindbergh facility and CNRL's presence through the region, oil and gas charter services to the Airport are viewed as being unlikely, barring a major development project near the community that would result in unique staff transportation requirements that deviate from status quo operations. This stance is taken for the following reasons:

- Bonnyville supports field offices for several oil and gas companies and is located closer to major facilities north of the community. Although Elk Point Airport is closer to operations such as the Strathcona Resources Lindbergh facility, Bonnyville Regional Airport enables a single charter flight to more efficiently serve staff travelling both north and south;
- Select oil and gas operators using Bonnyville have established shared charter service agreements, assisting in making such flights more cost effective for each company; and
- Bonnyville Regional Airport benefits from dedicated on-site staff for winter maintenance, ensuring its year-round availability at a higher level of service compared to Elk Point.

The oil and gas companies that are dominant in the region place high priorities on achieving optimized operational efficiency. Therefore, the decision by multiple companies to have their charter services routed through Bonnyville despite the comparability of Elk Point Airport from an airfield infrastructure perspective is anticipated to be reflective of the former airport's alignment with each entity's operational priorities. Accordingly, this is identified as a low likelihood opportunity that is not recommended for planning or pursuit. However, it is recommended that the operational availability of the Airport be brought to the attention of local resource companies during broader discussions of their plans in the area in case an unforeseen aviation need arises that could be satisfied through the facility.

### **5.12 Residential Airpark**

Airparks are a unique form of residential development with homes that can be classified into one of two types: residential dwellings located at an airport on the same property as a hangar, and residential dwellings that include integrated hangars in the same structure. The primary market for residential airparks is private aircraft owners that seek to embrace the unique lifestyle of living at an airport on the basis of the convenient access to their aircraft. Residential airparks and hangar homes are common in the United States, with some sources estimating that over 500 such developments exist. Examples are more limited in the Canadian context:

- Okotoks Air Ranch was developed in 1999 and includes a component of airport-oriented hangar homes as part of the broader residential subdivision project. Aircraft operations are supported from a 3,000 ft. paved runway and turf taxiways.
- Twin Island Airpark is a privately developed facility with a 2,900 ft. turf runway that is overseen
  by its resident's association. 11 residential properties with access to the airpark have been
  developed.
- Wetaskiwin Airport is owned and operated by the City of Wetaskiwin. The facility has a 3,900 ft. paved runway, lighting, Instrument Flight Procedures, and a variety of on-site businesses. Residential hangar home development was spearheaded by Skyport Properties on lands conveyed from the City, with 90 freehold lots created to be developed over three phases. The first phase of development commenced in 2011 and 17 lots have been sold, with several used for hangar homes.
- Candle Lake Airpark is located in the resort village of Candle Lake, Saskatchewan. The airpark is operated by the local flying club, has a 2,600 ft. turf runway, and has been developed with numerous residential hangar homes.
- Mabel Lake Airpark in British Columbia was developed in 1991 and is part of the Mabel Lake Resort & Marina. More than 50 homes access the airstrip, and the community features a ninehole golf course and marina. Aircraft operations occur from a 2,900 ft. turf runway.

The development of the Twin Island Airpark and Wetaskiwin Airport Skyport indicates that there may be demand for this form of residential product in the regional market – however, given the niche nature of this type of home, it is challenging to quantify this demand. The Skyport project at Wetaskiwin has not been moved forward beyond its initial phase. While Vermilion Airport's 2019 Master Plan (Section 4.7) considered opportunities for residential hangar homes, only four lots were allocated for such purposes and this concept does not appear to have been advanced by the municipality.

Permitting residential airpark development at the Airport, if successful, could assist with the attraction of new residents to the catchment area by offering a type of residential product that is not widely available elsewhere in Alberta, attracting a niche type of buyer. In doing so, this would yield economic and social benefits associated with population growth, increase taxation in the County, and add to the activity levels at the Airport through new aircraft based on-site. Revenue benefits depend on the model of development — all residential airparks reviewed in Canada occur through fee simple land transactions as opposed to the more commonplace arrangement of lease agreements at airports.

Therefore, most of the revenue is derived on a one-time basis through the purchase and sale. Ongoing operating revenues could be generated through airport access fees. However, these would have to be priced competitively so as not to disincentivize buyers.

As noted in the Plan Area Analysis Report, approximately 17 acres of the 104-acre Core Lands are foreseeably developable for airside purposes. Land requirements beyond this area are subject to the potential acquisition of other lands (e.g., the Southern Lands) by an end user and subsequent access agreement to the Core Lands, or the acquisition of the lands in question by the municipality and a lease agreement with the end user. Given that buyers interested in a residential dwelling at the Airport would presumably also be embracing key elements of the rural lifestyle, it is anticipated that larger lot sizes (3.0 acres or more) would be viewed as desirous from the target market. However, this form of development would rapidly decrease the supply of developable lands in the Core Lands and require the joint participation of one of the neighbouring land owners – mostly likely, the owner of the Southern Lands.

Finally, it is observed that all airpark-style developments reviewed in Canada have been initiated by private parties as opposed to municipal airport owners – in the case of Wetaskiwin, the municipal airport owner (the City of Wetaskiwin) turned over the Skyport lands to a private developer for airpark purposes. This observation does not preclude the Town and County from moving forward with this concept; however, it may indicate hesitancy among municipal owners due to uncertainty regarding market demand, unwillingness to sell lands on a fee simple basis, and / or lack of perceived sufficient financial return based on the costs of readying airpark lots for development. Taking these considerations together, the residential airpark concept has not been identified as a preferred opportunity for the Airport.

### 5.13 Aircraft Maintenance, Repair, and Overhaul

The maintenance, repair, and overhaul sector is a crucial part of the aviation industry and a considerable source of skilled employment for Aircraft Maintenance Engineers, technicians, support staff, and other roles. Approved Maintenance Organizations (AMOs) are certified by Transport Canada across a number of categories, such as aircraft, avionics, components, engines, structures, etc.

A total of 129 AMOs are identified in Transport Canada's database for Alberta. The distribution of these AMOs throughout the province is shown in Table 5.5 (locations identified in Transport Canada's database have been simplified and consolidated for ease of interpretation). Close to two thirds (64%) of all AMOs are located in Calgary, Edmonton, and their surrounding areas. A further 19 AMOs are located in the cities of Red Deer, Grande Prairie, Airdrie, Fort McMurray, and Whitecourt, or 15% of all records. The remaining 28 AMOs (22%) are distributed in communities across the province. This dataset includes AMOs that provide services to a range of customers and organizations that primarily or exclusively function as in-house maintenance service providers to support the aircraft operations of their company – e.g., a Flight Training Unit or air carrier that has a recognized AMO to serve its fleet.

The concentration of AMOs in Calgary and Edmonton is reflective of the significance of the aviation sector in these major urban centres and the larger supply of customers that exist for maintenance services, especially in the corporate and commercial aviation sectors. Red Deer Regional Airport, positioned between the markets of Calgary and Edmonton, is home to the third largest concentrations of AMOs in the province, including a non-destructive examination service provider, two avionics shops, and four in-house AMOs associated with rotary-wing, flight training, and wildfire suppression commercial operators based at the facility. Red Deer Regional Airport is in the midst of a multiyear capital expansion program that has included the extension of its primary runway to 7,500 ft. and widening to 150 ft. to support larger airline, cargo, and heavy maintenance aircraft, strengthening select airfield pavements, and extending roadway access and servicing to 220 acres of runway-adjacent real estate.

Table 5.5 - Distribution of Approved Maintenance Organizations in Alberta

Location	AMOs	Location	AMOs		
Calgary	52	Berwyn	1		
Edmonton	30	Lloydminster	1		
Red Deer	7	Hinton	1		
Grande Prairie	3	Medicine Hat	1		
Airdrie	3	Olds	1		
Fort McMurray	3	Flagstaff County	1		
Whitecourt	3	Peace River	1		
High River	2	Three Hills	1		
Okotoks	2	Cochrane	1		
Wetaskiwin	2	Alhambra	1		
Blackfoot	1	Slave Lake	1		
Manning	1	La Crete	1		
Lethbridge	1	Drayton Valley	1		
Fort St. John *	1	Lac La Biche	1		
Millet	1	Kelowna *	1		
Bow Island	1	Kinuso	1		
	Total				

<sup>\*</sup> The Transport Canada database includes two out-of-province records in its Albertan dataset

In the vicinity of Elk Point, the nearest AMOs are:

- Border City Aviation in Lloydminster, rated for all non-specialized work on single and twin
  piston engine Cessna and Piper aircraft. Border City Aviation internally services its fleet of
  single and twin-engine aircraft that are used for its flight training, charter, and rental business
  lines, as well as external customers; and
- Alberta Central Airways in Lac La Biche, rated for all non-specialized work on the Beechcraft King Air series of aircraft and select sheet metal work. Alberta Central Airways' AMO is understood to internally service its fleet of Beechcraft King Airs used in charter and medevac services.

Additionally, an Aircraft Maintenance Engineer provides services from St. Paul Municipal Airport. From an AMO attraction perspective, Elk Point contends with several challenges:

- The Airport is located approximately 2h30m and 5h00m from the major clusters of aviation and aerospace activity in Edmonton and Calgary, respectively. The Airport does not benefit from being collocated in the same region with concentrations of commercial and private aircraft operators requiring maintenance services;
- Established commercial and corporate operators in the region have internal AMOs or preexisting relationships with external AMOs to satisfy their requirements. New commercial operators in the area would require AMO services, but the growth potential of this market is viewed as being small as discussed in Section 5.2;

- Demand for general aviation aircraft maintenance is limited by the small number of aircraft owners based near the Airport and the established presence of Border City Aviation in Lloydminster and an independent Aircraft Maintenance Engineer in St. Paul serving this market segment; and
- The primary institution offering training for Aircraft Maintenance Engineers is the Southern Alberta Institute of Technology's Art Smith Aero Centre for Training and Technology, located at the Calgary International Airport. AMOs based in and around Calgary have convenient access to the annual pool of newly trained graduates that may be established in the region following their studies.

Taking the foregoing factors together, the likelihood of Elk Point attracting an upstart AMO or the satellite operation of an existing AMO is viewed as being low and not worth dedicating specific investment attraction efforts to. The approach taken for this market segment is recommended to be the preparation of airside commercial development lands and the identification of this opportunity as part of broader marketing efforts.

### **5.14Scheduled Passenger Air Services**

Scheduled passenger air services involve the transportation of customers between an origin and destination on a predetermined schedule on a unit rate basis. Scheduled passenger air carrier services would offer significant benefits to travellers in Elk Point's catchment area through the provision of a time-effective transportation option to a major air transportation centre (Calgary or Edmonton) and onward destinations. Such a service would yield social and economic benefits through the provision of additional intercommunity transportation options for residents, tourists, and business travellers, and would generate revenue through aeronautical fees, passenger fees, terminal use agreements, etc.

Scheduled passenger services in the region are explored through four airports:

- Edmonton International Airport: Edmonton International Airport is located 2h30m from Elk Point by road and is the second busiest airport in Alberta and fifth busiest in Canada by passenger traffic. Edmonton is a significant centre for domestic, transborder, and international airline activity and supports well-developed route networks from Air Canada, Flair Airlines, Swoop, and WestJet. Edmonton International Airport's catchment area extends throughout the region and encompasses Elk Point and the surrounding area.
- Lloydminster Airport: Lloydminster Airport is located 1h10m from Elk Point by road and supports scheduled passenger air services to Calgary International Airport by WestJet. WestJet's services are provided through a Capacity Purchase Agreement with Pacific Coastal Airlines under the WestJet Link brand using 34-seat Saab 340 aircraft, with service set to increase to daily frequency in May 2023. Passengers using this route benefit from the onward connectivity provided in Calgary to WestJet's domestic, transborder, and international route network.
- CFB Cold Lake / Cold Lake Regional Airport: Cold Lake formerly supported scheduled services by Northwestern Air, operating twice a week from CFB Cold Lake's Medley Terminal using the 19-seat Jetstream 32. Northwestern Air withdrew from the Cold Lake market in 2011 following a significant decrease in passenger utilization of the route, primarily due to oil and gas operators no longer using the carrier due to internal safety audit policies that precluded the use of the older Jetstream 32.

The City of Cold Lake has commissioned a number of studies to examine the improvements that would be required at Cold Lake Regional Airport to support scheduled passenger air services. No route announcements have been made to-date and the Regional Airport is not currently equipped to support scheduled services due to its uncertified status and inadequate airfield and terminal infrastructure.

• Bonnyville Regional Airport: Integra Air (now defunct) commenced service between Bonnyville and Calgary International Airport in 2015, initially operating flights five days per week using the Jetstream 31 and Beechcraft King Air. Flights were terminated in 2018 with the closure of the airline, and Bonnyville has not supported scheduled service since that point.

Although scheduled passenger air carrier services would be beneficial to Elk Point and the surrounding region and well received by its residents and businesses, this opportunity has not been identified as a feasible market for pursuit for the following reasons:

- Demand in Elk Point's catchment area is currently met through the regional services to Calgary
  offered from Lloydminster Airport and the widespread connectivity provided at Edmonton
  International Airport. Edmonton International Airport in particular is expected to result in
  significant leakage of passengers from Elk Point owing to its diverse range of options in terms
  of airlines, direct and connecting services, and price points (e.g., full-service and Ultra LowCost Carriers);
- Elk Point's catchment area (approximately 15,000 residents) is likely prohibitively small for sufficient passenger demand to be generated. The market is also expected to be more price sensitive owing to its lower household incomes, limiting the fares and yields that could be gained by a potential carrier and leading to leakage to Edmonton and / or Lloydminster if driving to those airports is more cost effective than flying from Elk Point;
- Elk Point Airport is operated as a registered aerodrome and not as a certified airport. This
  regulatory status prevents scheduled services per the requirements of Transport Canada.
  Significant capital and ongoing operational investments would be required to achieve
  certification;
- Although the airfield infrastructure would be sufficient for small regional airliners, the terminal building cannot support inbound and outbound passenger handling, security screening, baggage handling, airline administrative space, etc.;
- Elk Point is not a Canadian Air Transport Security Authority (CATSA) designated airport for
  pre-board screening services. CATSA services are essential to support secured operations
  and seamless onward connectivity from Edmonton or Calgary. Even if CATSA designation
  was secured, services would likely only be offered on a cost-recovery basis by the agency,
  increasing the overhead of passenger services; and
- Regional air services in general have been vulnerable in recent years due to aging aircraft fleets in the sub-50 seat category; the withdrawal of Air Canada from several smaller markets and the retirement of its 18, 37, and 50-seat fleets; as well as challenges with retaining pilots at regional air carriers due to the pilot shortage and upward flow to major airlines.

Therefore, the pursuit of scheduled passenger air services has not been identified as a feasible opportunity for pursuit for Elk Point Airport.

### **5.15 Opportunities Summary**

Table 5.6 summarizes each of the opportunities assessed in the preceding sections, including their likelihood across the short-term (1-5 year) and medium-term (6-10 year) planning horizons, benefits to the Airport, high-level strategy, prerequisite investments, and land requirements. Opinions are not provided on the likelihood of each sector in the long-term (11+ years) planning horizon, as the attainment of these opportunities will be influenced by increasingly uncertain changes in the local economy and demographic composition, technological advancement in the aviation and aerospace sector, and potential successes achieved within the short and medium term.

As identified in Table 5.6, the following opportunities are recommended for pursuit and planning based on the findings of this report:

- Fixed and rotary-wing aerial application;
- Fixed and rotary-wing aerial work;
- RPAS-based air cargo and courier services;
- Private aircraft hangars;
- The support of fly-in outfitting customers;
- Refuelling services;
- Filming; and
- Non-aviation industry laydown and storage

The following opportunities may be applicable to the Airport, pending further consultations and research with industry and governmental stakeholders:

- RPAS-based aerial work in support of the oil and gas sector; and
- Military training by the Canadian Armed Forces.

### **Table 5.6 - Opportunities Summary**

	Likeli	ihood				
Opportunity	Short-Term (1-5 Years)	Medium- Term (6-10 Years)	Benefits – Revenue, Economic, and Social	High-Level Strategy	Prerequisite Investments and / or Land Requirements	
Agricultural Aviation – Fixed and Rotary-Wing Aerial Application	Medium	Medium	Support of regional agricultural sector New source of skilled employment and workforce attraction if businesses locate on-site Limited operating revenues (< \$3,000	Pursuit and further planning recommended	Airside commercial development lands to be prepared to facilitate prospective businesses, including leasehold areas for temporary use by trailers or mobile infrastructure  Fuelling (jet and avgas) facilities recommended	
Agricultural Aviation – RPAS Aerial Application	Low	Low	annually) from fuel sales and access fees	Pursuit not recommended	Not applicable	
Aerial Work Operations  – Fixed and Rotary- Wing Aerial Work	Medium	Medium	Support of regional oil and gas sector New source of skilled employment and workforce attraction if businesses locate on-site Limited operating revenues (< \$10,000 annually) from fuel sales and lease agreements	Pursuit and further planning recommended	Airside commercial development lands to be prepared to facilitate prospective businesses Fuelling (jet and avgas) facilities recommended	
Aerial Work Operations  – RPAS Aerial Work		ssessment uired	Support of regional oil and gas sector New source of skilled employment and workforce attraction if businesses locate on-site Revenue generating potential requires further assessment	Further research and outreach with oil and gas stakeholders required Elk Point to be integrated as part of regional marketing efforts, potentially led by Alberta HUB	Airside commercial development lands to be prepared to facilitate prospective businesses Internet service upgrades recommended to support RPAS data requirements	
Air Cargo and Distribution – RPAS Courier Services	Low	Medium	Support of local businesses and residents in time effective delivery services  Revenue generating potential requires further assessment	Pursuit and further planning recommended  Elk Point to be integrated as part of regional marketing efforts, potentially led by Alberta HUB	Airside commercial development lands to be prepared to facilitate prospective businesses	
Private Aircraft Hangars	Low	Low	Limited operating revenues (< \$5,000 annually) from lease agreements and fuel sales	Pursuit and further planning recommended	Private hangar development lands to be prepared to facilitate prospective tenants	

	Likelihood					
Opportunity	Short-Term (1-5 Years)	Medium- Term (6-10 Years)	Benefits – Revenue, Economic, and Social	High-Level Strategy	Prerequisite Investments and / or Land Requirements	
Fly-In Outfitting Customers	Medium	Medium	Support of local outfitters through improved access for their customers Limited operating revenues (< \$5,000 annually) from parking fees and fuel sales	Pursuit and further planning recommended	Fuelling (jet and avgas) facilities recommended	
Refuelling Services	Medium	Medium	Scale of potential operating revenues from fuel sales requires further assessment Enables the Airport to attract a broader array of commercial and private users	Pursuit and further planning recommended	Fuelling (jet and avgas) facilities recommended	
Filming	Low	Medium	Support of the Albertan film and media industry, as well as local businesses benefiting from production Limited operating revenues (< \$5,000 annually) from access fees	Pursuit and further planning recommended	To be determined based on production-specific requirements	
Military Training		ssessment uired	Support of the functioning and capabilities of the Canadian Armed Forces Limited operating revenues (< \$10,000 annually) from fuel sales	Further outreach with the Canadian Armed Forces required	Fuelling (jet and avgas) facilities recommended Other requirements to be identified with the Canadian Armed Forces	
Non-Aviation Land Development – Laydown and Storage	Low	Medium	Support of the functioning of regional businesses, including oil and gas companies, wind power projects, etc. Limited operating revenues (< \$10,000 annually) from fuel sales	Pursuit and further planning recommended	Vacant lands with roadway access to be reserved	

	Likelihood					
Opportunity	Short-Term (1-5 Years)	Medium- Term (6-10 Years)	Benefits – Revenue, Economic, and Social	High-Level Strategy	Prerequisite Investments and / or Land Requirements	
Flight Training	Low	Low	Integration of the Airport in the training requirements for the Canadian aviation sector  Provision of local skilled / professional training opportunities  New source of skilled employment and workforce attraction if businesses locate on-site  Limited operating revenues (< \$10,000 annually) from lease agreements	Opportunity can be included as part of broader Airport marketing Targeted outreach with potential Flight Training Units could be completed Potential outreach with prospective pos-secondary institutions	Airside commercial development lands to be prepared to facilitate prospective businesses	
Oil and Gas Charter Services	Low	Low	Support of the functioning of the regional oil and gas sector Limited operating revenues (< \$10,000 annually) from fuel sales and landing fees	Active pursuit not recommended Opportunities at the Airport can be raised with regional oil and gas operators as part of ongoing dialogues	Not applicable	
Residential Airpark	Low	Low	Accommodation of regional population growth  One-time revenues from lot sales and ongoing revenues from access agreements and fuel sales	Pursuit not recommended	Not applicable	
Aircraft Maintenance, Repair, and Overhaul	Low	Low	New source of skilled employment and workforce attraction  Limited operating revenues (< \$10,000 annually) from lease agreements  Increased activity and fuel sales from customer aircraft	Active pursuit not recommended Opportunity can be included as part of broader Airport marketing	Airside commercial development lands to be prepared to facilitate prospective businesses	
Scheduled Passenger Air Services	Low	Low	Improved regional access for residents and businesses Operating revenues from terminal building fees, landing / parking fees, and fuel sales	Pursuit not recommended	Not applicable	

### **6 REQUIREMENTS AND NEXT STEPS**

### 6.1 Land Use, Infrastructure, and Service Requirements

Based on the highest likelihood opportunities enumerated in Section 5 for pursuit in the future, identified herein are the development land requirements for inclusion in the IASP (Phase 3) and the recommended investments to the Airport's infrastructure and services for inclusion in the Airport Strategy Implementation Report (Phase 4). Two primary types of development lands are identified for inclusion in the IASP:

- 1. Airside private development lots are intended to be absorbed for smaller private aircraft hangars similar to the type that has been developed at the Airport historically. The typical lot size for this type of use is to be set at a frontage of 25 m and depth of 30 m (750 m² / 0.19 acres), with the lands to the east of the terminal building to be planned for this type of development. Airside access to these lots is recommended to be provided by 7.5 m wide taxiways with 31.0 m (15.5 m each side of taxiway centreline) object-free strips, satisfying the Aircraft Group Number I provisions of TP312 Aerodrome Standards and Recommended Practices (5<sup>th</sup> Edition).
- 2. Airside commercial development lots are intended to be absorbed for prospective larger scale commercial tenants (e.g., agricultural applicators, Flight Training Units, RPAS-based cargo distribution, aerial work providers). The typical lot size for this category would be set with a frontage of 50 m and depth of 60 m for a total area of 3,000 m² (0.74 acres). Airside access to these lots is recommended to be provided by 10.5 m wide taxiways with 40.0 m (20.0 m each side of taxiway centreline) object-free strips, satisfying the Aircraft Group Number II provisions of TP312 Aerodrome Standards and Recommended Practices (5<sup>th</sup> Edition). The airside commercial development lots are envisioned to be developed west of the terminal, creating separation from current and future general aviation users.

Lands are also recommended to be reserved through the IASP for the current and potential future core operational services of the Airport, including the terminal building, caretaker's residence, vehicle parking lot, and Field Electric Centre.

Based on the target end users for the Airport and the anticipated scale of development, land use requirements have not been identified for the privately owned Southern, Western, Northern, and Eastern Lands of the Plan Area. It is expected that the development reasonably foreseeable within a 20-year planning horizon (and potentially for the ultimate term) can be accommodated within the Provincially owned Core Lands. Therefore, acquisition needs have not been identified through the Economic Opportunities Report.

Potential investments in infrastructure and services beyond the airside improvements identified above are as follows:

- The installation of self-service cardlock avgas and jet fuel above-ground storage tanks and dispensing equipment is recommended;
- The most appropriate strategy for potable water and sanitary sewer services (private services or extending municipal servicing) will be assessed in Phase 3;
- Natural gas services can be extended by Apex Utilities to airside commercial tenants on an as-required basis;
- Electrical services can be extended by Atco to airside commercial and private tenants on an as-required basis;

- Improved internet services are anticipated to be a requirement for potential future aviation commercial business tenants. Upcoming internet service upgrades in the Airport's vicinity planned by MCSNet may represent an appropriate opportunity to proactively address this deficiency; and
- Consideration will be given through the Airport Strategy Implementation Report on whether the attainment of the opportunities identified herein would be assisted through the preparation of common-use hangar / business facilities (e.g., hangar space available for short to long-term rental by prospective operators).

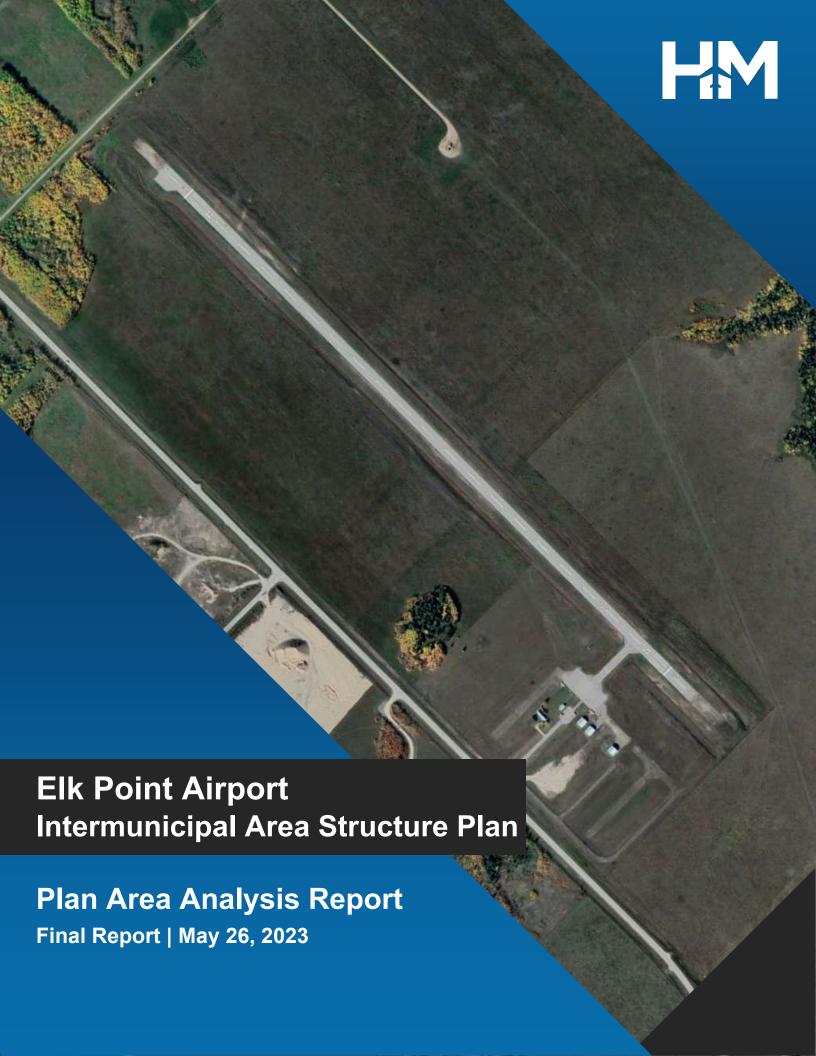
Detailed specifications, recommended timelines, cost estimates, and strategies for the implementation of these investments will be identified through the Airport Strategy Implementation Report.

### 6.2 Next Steps

The Economic Opportunities Report has explored the highest potential business development and growth opportunities for the Airport and Plan Area, fulfilling the objectives of Phase 2 of the Project. With the land and infrastructure requirements of these opportunities clearly understood, this information will be used in combination with the considerations identified through the Plan Area Analysis Report (Phase 1, delivered under separate cover) to inform the preparation of the IASP in Phase 3. A business development strategy to pursue the highest potential opportunities identified herein will be prepared through Phase 4 – Airport Strategy Implementation Report for future use by the Town, County, and STEP.



# **Appendix B - Plan Area Analysis Report**



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## 1 INTRODUCTION

### 1.1 Background

Elk Point Airport (the "Airport") is located within the County of St. Paul No. 19 (the "County"), approximately 7 kilometres southeast of the municipal boundary of the Town of Elk Point (the "Town"). The Airport lands are owned by the Province of Alberta (the "Province") and are leased to the Town and County through a joint agreement extending from October 1, 2016 to September 30, 2026.

The exploration and pursuit of economic development and regional growth opportunities is a key priority for both the Town and County. The *Town of Elk Point 2022-2025 Strategic Plan* establishes the following mission for the municipality:

By collaborating with partners within and beyond, Elk Point is a safe and prosperous regional centre that attracts people to succeed where they live.

Under the pillar of *Quality Infrastructure that Contributes to a Sustainable Environment* and goal of *Continued Excellence in Capital Infrastructure*, the Town's 2022-2025 Strategic Plan establishes the tactic of:

[Leveraging] the Town's airport as a business and tourism driver that connects Elk Point to the wider world.

Similarly, the County's 2022 and 2023 Strategic Plans outline the opportunity to collaborate with the Town for the maintenance and improvements of this local airport, in addition to numerous directions with respect to economic development.

### 1.2 Project Objectives

In October 2022, the Town, County, and St. Paul / Elk Point Economic Development Alliance (STEP) retained the services of HM Aero Aviation Consulting ("HM Aero") and its subconsultant, McIntosh Perry Consulting Engineers ("McIntosh Perry") to complete an Intermunicipal Area Structure Plan (IASP) for the Airport (the "Project"). The Project is divided into four primary phases:

- 1. **Plan Area Analysis Report:** The completion of a detailed review to identify constraints and factors that will influence subsequent land use planning.
- 2. **Economic Opportunities Report:** The assessment of high-likelihood opportunities for the growth and development of the Airport, including supporting contextual research and stakeholder engagement. Phase 2 will be finalized through the Economic Opportunities Report.
- 3. **Intermunicipal Area Structure Plan:** Based on the high likelihood opportunities identified for the Plan Area and applicable constraints, a statutory IASP and accompanying municipal planning amendments will be prepared and adopted.
- 4. **Airport Strategy Implementation Report:** A multiyear strategy will be provided to guide the pursuit of growth and development opportunities, renewal of capital infrastructure, and effective administration and operations.

The Plan Area Analysis Report represents the completion of Phase 1 of the Project and has been prepared to gain a clear understanding of the natural and manmade constraints that affect the development potential of the Plan Area, including the spatial distribution of potential land uses, future assessment requirements, and compatibility factors that will require specific policies in the IASP.

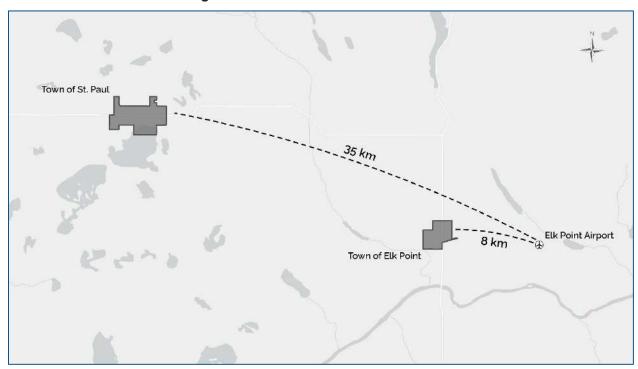
### 2 PLAN AREA OVERVIEW AND REGIONAL CONTEXT

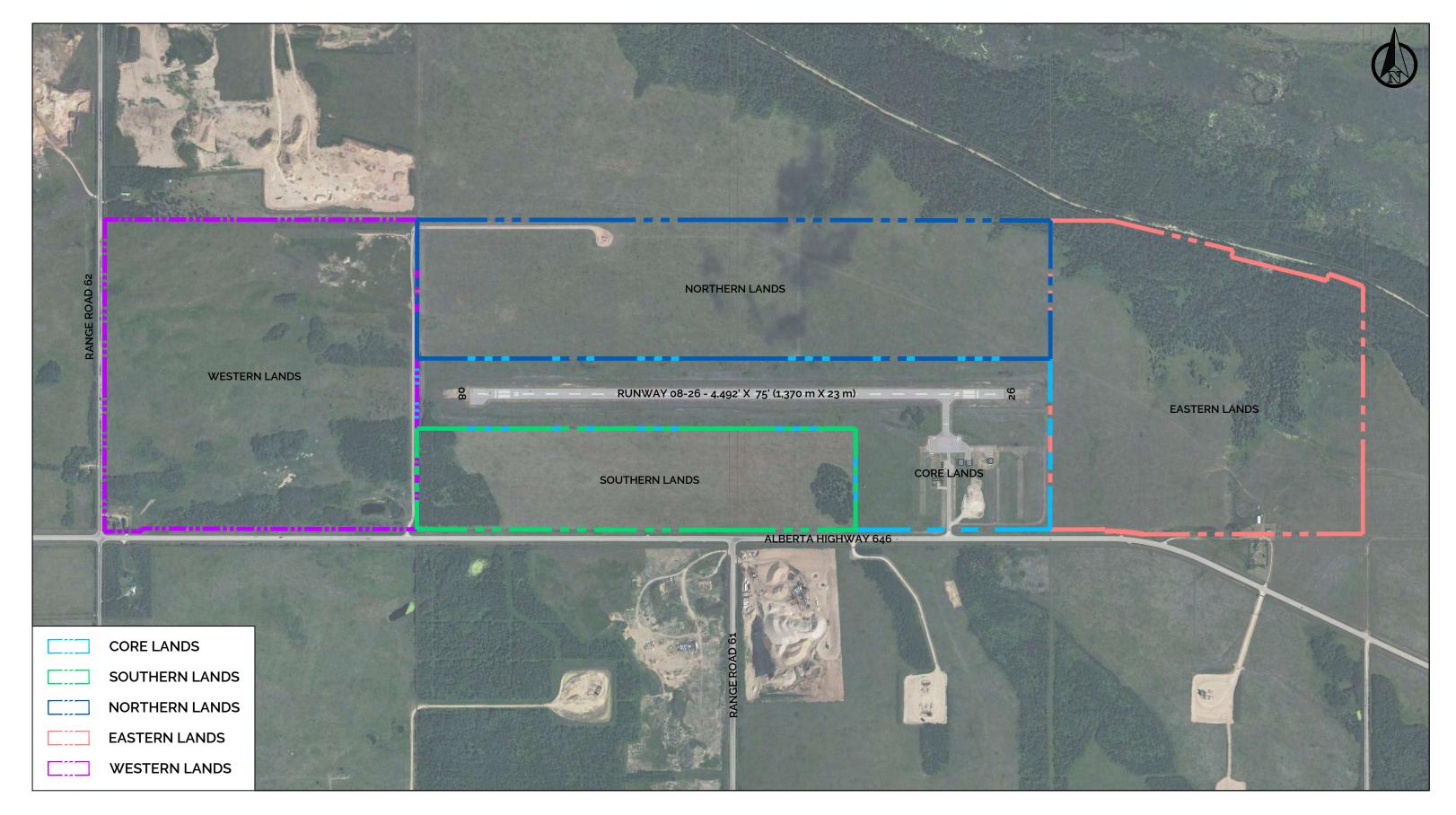
The Plan Area is a 626-acre (253-hectare) land assembly that is located approximately 8 km southeast of the Town of Elk Point along Highway 646 in the County of St. Paul, as shown in Figure 2.1. Contextualized at the regional scale, the Plan Area is located in the eastern portion of the County, approximately 35 km southeast of St. Paul.

The Plan Area is shown in Figure 2.2. For assessment purposes, the Plan Area is divided into five sub-areas, those being the:

- Western Lands;
- Northern Lands;
- Southern Lands;
- Eastern Lands; and
- Core Lands.

Figure 2.1 - Plan Area Location Context







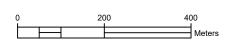






ELK POINT AIRPORT INTERMUNICIPAL AREA STRUCTURE PLAN PLAN AREA ANALYSIS REPORT

FIGURE **2.2 - PLAN AREA OVERVIEW**MAY 2023



### 3 PLAN AREA ANALYSIS

### 3.1 Land Use Planning Context

The land use planning context for the Plan Area is defined by the Municipal Government Act, Alberta Land Stewardship Act, Municipal Development Plan, and Land Use Bylaw.

#### 3.1.1 Municipal Government Act

The *Municipal Government Act* (MGA) empowers and regulates municipalities in how they should govern and plan for growth, including Part 17 which specifically addresses planning and development. With reference to the Project, Section 633(2) of the MGA establishes the minimum requirements for Area Structure Plans. The IASP to be advanced in Phase 3 will be prepared in compliance with the requirements of the MGA.

### 3.1.2 Alberta Land Stewardship Act

The Alberta Land Stewardship Act (ALSA) enables the Province to provide direction on land use planning and objectives, including economic, environmental and social objectives. The primary implementation tool of the ALSA is the ability for the Province to establish integrated planning regions and regional plans that provide prescriptive guidance to a geographically defined area. At minimum, these regional plans must establish a vision and one or more objectives for its planning region, and may be supported through prescriptive policies, thresholds, indicators, etc.

The Plan Area is located within the geographic boundary of the North Saskatchewan Regional Plan, which is being advanced pursuant to the authority of the ALSA. A timeline is not available on the release or adoption of the North Saskatchewan Regional Plan; therefore, it is premature to comment on the constraints, if any, this document may have on the development of the Plan Area. The IASP may require amendments to ensure its conformity with the North Saskatchewan Regional Plan, when adopted in the future.

### 3.1.3 County of St. Paul No. 19 Municipal Development Plan

The County of St. Paul No. 19 Municipal Development Plan (Bylaw 2021-14, July 2022 Consolidation) outlines the permitted development and use of lands in the County. The Municipal Development Plan (MDP) addresses future land use and growth areas, the process of how lands are developed, the transportation network, and the delivery of municipal services.

The MDP designates the Plan Area as an "Agricultural Use Area". The objectives and select policies of most relevance for Agricultural Use Areas insofar as non-agricultural development is concerned are identified in Table 3.1. Table 3.1 also includes relevant excerpts from Section 2.3 of the MDP – Commercial and Industrial Development to identify considerations for future aviation-related commercial and industrial activity in the Plan Area. Taken together, the objective and policy language of the MDP indicates that:

- Aeronautical commercial and industrial development is a supportable objective, with economic development and the creation of employment opportunities being priorities of the MDP;
- Given the value of agricultural systems, land use efficiency will be important when introducing commercial and industrial activity while limiting the degradation of such systems; and
- 3. Comprehensive planning through an Area Structure Plan will be required to guide the appropriate development of commercial and industrial uses. Land use planning specifics will be addressed in Phase 3 of the Project, including potential amendments to the MDP to support the adoption of the IASP.

**Table 3.1 - Preliminary Review of Municipal Development Plan** 

Objective / Policy	Development Implications	
Section 2.1 -	- Agriculture	
Objective 2.1.1: To ensure that agriculture remains an integral and viable component of the regional economy by maintaining a significant agricultural land base.	Future land use planning and development should maximize the space efficiency of end users to minimize disturbances to the agricultural land base.	
Objective 2.1.2: To minimize conflicts between agricultural land and non-agricultural land users.	New non-agricultural land uses introduced to the Plan Area must be compatible with agricultural operations.	
Policy 2.1.1.a.: The County may require an applicant to provide an agricultural land quality assessment at the time of a rezoning application that proposes to change an agricultural district to a non-agricultural district In determining suitability for non-agricultural land use designations, the County may also consider site improvements or site-specific characteristics (e.g. wetlands, shelterbelts, etc.).	Future land use planning and development should maximize the space efficiency of end users to minimize disturbances to the agricultural land base. Prime agricultural areas should be avoided to the degree possible in future development in the Plan Area.	
<b>Policy 2.1.2:</b> The County recognizes the right to farm and encourages agricultural operations in all areas of the County.	Consideration will be given to opportunities for the continuation of agricultural cropping in the Plan Area.	
Policy 2.1.6: On agricultural lands, a wide range of uses may occur provided that such uses do not negatively impact other surrounding uses.	Diversified compatible land uses may be considered for the Plan Area.	
Section 2.3 – Commercial a	and Industrial Development	
Objective 2.3.1: To encourage new commercial and industrial businesses at appropriate locations.	Opportunities will be identified through the Economic Opportunities Report and planned for through the IASP to achieve economic development and employment objectives.	
Objective 2.3.2: To provide a diverse range of economic development and employment opportunities.		
Policy 2.3.3: Rural commercial and industrial businesses shall be controlled by the County Council through the process of Land Use Bylaw amendment to an appropriate Industrial or Commercial District.	Required Land Use Bylaw amendments will be identified following the preparation of the IASP for the consideration of the County.	
Policy 2.3.4: In consideration of a proposal for a commercial or industrial development, an assessment of the proposed development may be required which: a. precisely defines the boundaries of the proposal; b. designates suitable building sites; c. ensures the functional integrity of the adjacent roads is maintained through the use of service roads and/or limited access points; d. defines standards of development which may include architectural, landscaping and sign controls; e. identifies methods and facilities for servicing; and f. includes groundwater and soil permeability.	The future development of the Plan Area will be planned in accordance with a statutory IASP. The IASP will outline requirements for future airport-related commercial and industrial development in a manner that satisfies Policy 2.3.4.	
Policy 2.3.7: Commercial development proposals shall be reviewed in accordance with policy 2.2.11 and 2.2.12, and may require the preparation of an area structure plan, in accordance with Policy 2.2.13.	The future development of the Plan Area will be planned in accordance with a statutory IASP in accordance with Section 633 of the Municipal	
Policy 2.3.9: Industrial development proposals shall be reviewed in accordance with policy 2.2.11 and 2.2.12, and may require the preparation of an area structure plan, in accordance with Policy 2.2.13	Government Act. All applicable evaluation criteria identified in Policies 2.2.11 and 2.2.13 will be addressed.	

### 3.1.4 County of St. Paul No. 19 Land Use Bylaw

The County of St. Paul No. 19 Land Use Bylaw (Bylaw 2021-13, July 2022 Consolidation) provides prescriptive direction on acceptable land uses by property. The Land Use Bylaw (LUB) is intended to achieve the orderly and economic development of land.

The entirety of the Plan Area is designated in the LUB as A – Agricultural District. Per Section 8.2(1) of the LUB, the primary purpose of the Agricultural District is to:

"...preserve agriculturally productive land and encourage the development of those agricultural activities associated with farming. The District also provides for the development of non-agricultural operations based on the potential capability, suitability and environmental compatibility of the land to support the use."

The permitted and discretionary uses of the LUB are identified in Table 2.3. The types of uses that are currently allowed in the Plan Area on a permitted or discretionary basis are consistent with the purpose for this district described above. However, the Agricultural District policies do not capture the types of commercial and industrial development (aeronautical and non-aeronautical) that may potentially be identified in Phase 2 and planned for in Phase 3. It is anticipated that an amendment to the LUB will be required in Phase 3 concurrent with the adoption of the IASP to ensure the as of right permission of anticipated end uses and the creation of appropriate regulations that will ensure orderly development.

Table 3.2 - Land Use Bylaw Permitted and Discretionary Uses (Agricultural District)

Permitted Uses	Discretionary Uses		
a. Buildings and Uses Accessory to Permitted Uses b. Extensive Agriculture c. Greenhouse or Plant Nursery d. Manufactured Homes less than 10 Years of Age from Date of Development Application e. Minor Home Occupations f. Public Utility Buildings and Installations g. Single Detached Dwellings h. Transfer Stations	a. Agricultural Service Centres b. Basement Suites c. Bed and Breakfast Establishments d. Buildings and Uses Accessory to Discretionary Uses e. Day Care Facilities f. Extensive Recreation g. Garage Suites h. Institutional and Public Uses i. Intensive Agriculture j. Intensive Recreation k. Kennels	I. Major Home Occupations m. Manufactured Homes more than 10 Years of Age from Date of Development Application n. Manufactured Home Parks o. Natural Resource Extraction and Processing p. Social Care Facilities q. Stockpiling of Aggregate for Sale r. Veterinary Clinics s. Wind Energy Conversion Systems t. Work Camp	

### 3.2 Land Ownership

The Plan Area lands are owned by three separate parties, as identified in Table 3.3, shown in Figure 3.1, and summarized as follows:

- The Core Lands occupied by the Airport are owned by the Province of Alberta and are leased to the Town and County through a joint agreement extending from October 1, 2016 to September 30, 2026, with an area of approximately 104 acres;
- The Western Lands, municipally known as 57001 Range Road 62, are privately owned by Aarbo Ranching Ltd., with an area of approximately 158 acres; and
- The Northern, Southern, and Eastern Lands are privately owned by Daune Gagne, with an area of approximately 364 acres.

Discussions between the Town, County, and Province have been underway for several years regarding the potential transfer of the Core Lands from the Province, and the current lease agreement has not been a limitation on the historical operation and limited development of the Airport. The current ownership structure of the Core Lands has not been identified as a constraint and will be addressed through the future Airport Strategy Implementation Report in Phase 4.

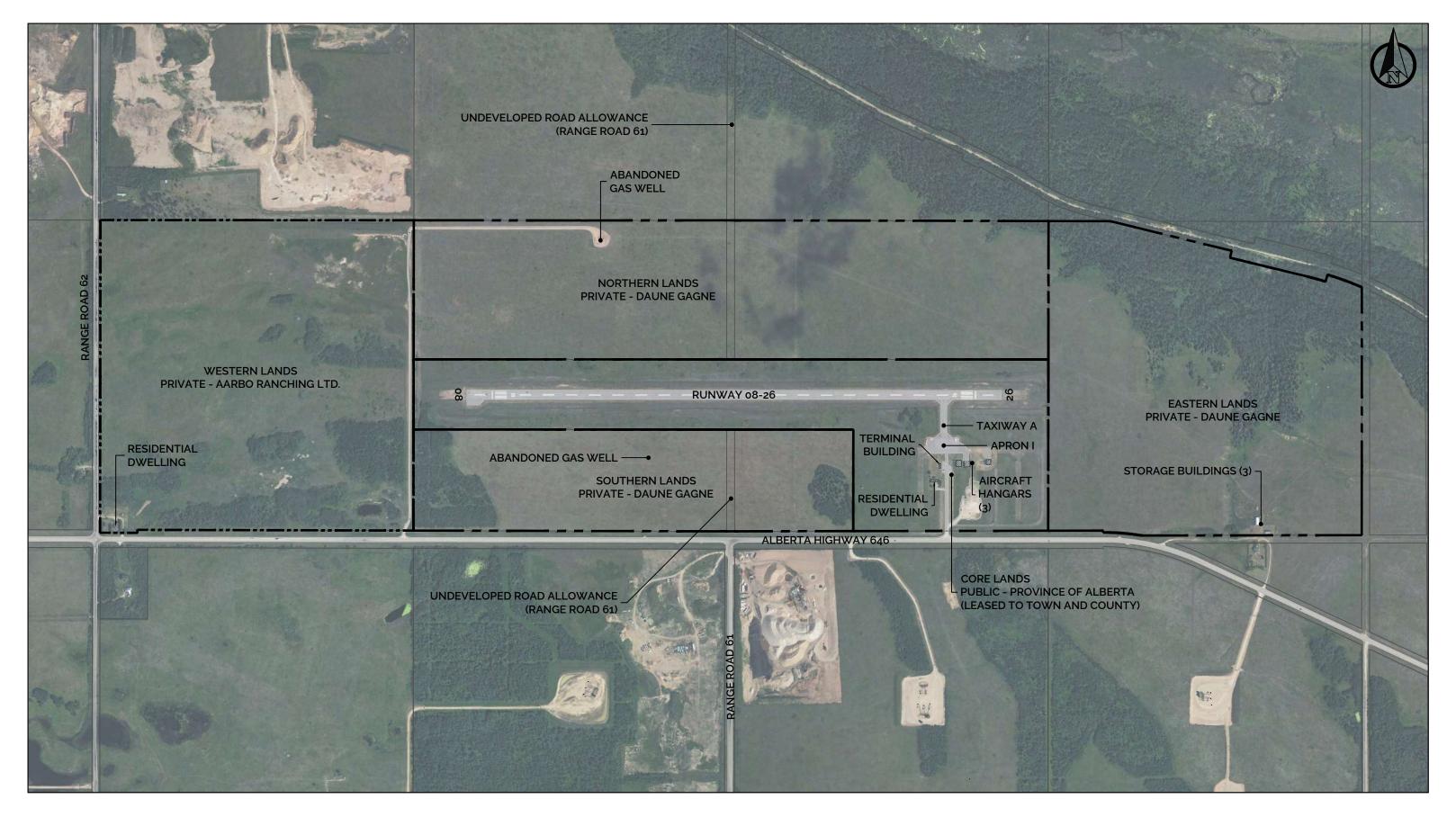
The private ownership of the Western, Northern, Southern, and Eastern Lands introduces complexity to the future of the Airport. These privately held lands, with a combined area of 522 acres, are contiguous to the Core Lands and define the immediate context of the Airport. Challenges introduced through this model of adjacent land ownership include:

- Penetrations to the Approach Obstacle Limitation Surfaces from vegetation on private lands
  has required the displacement of both runway thresholds and impacts the facility's Instrument
  Flight Procedures. Obstacle removals require negotiation with private landowners, as the
  facility does not benefit from federal Airport Zoning Regulations or restrictive covenants, and
  the municipal Land Use Bylaw cannot be used for this purpose;
- The runway is limited to its present length due to private land ownership on each end, limiting
  a future extension project if required for a prospective end user; and
- Based on a preliminary estimate and subject to detailed development planning, approximately
  17 acres of the 104-acre Core Lands are foreseeably developable for aviation commercial
  uses. Land requirements beyond this area are subject to the potential acquisition of these
  lands by an end user and subsequent access agreement to the Core Lands, or the acquisition
  of the lands in question by the municipality and a lease agreement with the end user. In either
  scenario, development potential is influenced by private land interests.

Therefore, the private land ownership structure for the lands surrounding the Airport is viewed as a current constraint. Depending on the land requirement findings of the Economic Opportunities Report in Phase 2 and associated development planning in Phase 3, further commentary will be offered on whether private land ownership in the Plan Area is a limitation on the future economic potential of the facility, including strategies for resolution if so.

Table 3.3 - Plan Area Land Ownership

Municipal Address	Legal Description	Area (acres)	Ownership
-	Plan 8320524 Public Work (Airport) Containing 42.28 Hectares (104.48 Acres) More Or Less	103.92	Public – Her Majesty The Queen in right of Alberta, as represented by the Minister of Transportation
57001 Range Road 62	Meridian 4 Range 6 Township 57 Section 2 Quarter South West Containing 64.7 Hectares (160 Acres) More Or Less Excepting Thereout: (A) 0.417 Of A Hectare (1.03 Acres) More Or Less For Road As Shown On Road Plan 6430ks (B) 0.439 Of A Hectare (1.33 Acres) More Or Less For Road As Shown On Road Plan 395rs	157.64	Private – Aarbo Ranching Ltd.
-	Meridian 4 Range 6 Township 57, Section 2, Quarter South East Containing 64.7 Hectares (160 Acres) More Or Less Excepting Thereout: A) 0.417 Hectares (1.03 Acres) More Or Less, As Shown On Road Plan 6430ks B) 0.615 Hectares (1.52 Acres) More Or Less, As Shown On Road Plan 395rs C) 14.46 Hectares (35.73 Acres) More Or Less, As Shown On Road Plan 8320524	121.72	
-	Meridian 4 Range 6 Township 57, Section 1, Quarter South West Containing 64.7 Hectares (160 Acres) More Or Less Excepting Thereout: A) 0.417 Hectares (1.03 Acres) More Or Less, As Shown On Road Plan 6430ks B) 0.615 Hectares (1.52 Acres) More Or Less, As Shown On Road Plan 395rs C) 27.46 Hectares (67.86 Acres) More Or Less, As Shown On Road Plan 8320524	89.59	Private – Daune Gagne
-	Meridian 4 Range 6 Township 57, Section 1, Quarter South East Containing 64.7 Hectares (160 Acres) More Or Less. Excepting Thereout: A) 4.48 Acres More Or Less For Right Of Way And 2.07 Acres More Or Less For Extra Right Of Way Taken By The Canadian National Railway Company As Shown On Railway Plan 1700eo B) 0.58 Acres More Or Less For Road As Shown On Plan 395rs	152.87	





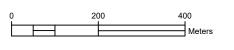






ELK POINT AIRPORT INTERMUNICIPAL AREA STRUCTURE PLAN PLAN AREA ANALYSIS REPORT

FIGURE **3.1** - PLAN AREA LAND OWNERSHIP AND EXISTING USES MAY 2023



# 3.3 Existing Uses

Based on the project team's site visit in November 2022, a review of 2022 aerial imagery and supporting data provided by the County, the existing uses of the Plan Area are shown in Figure 3.1 and Table 3.4. With the exception of the Core Lands containing the Airport and its associated infrastructure and structures, the Plan Area is largely in an undeveloped condition. Less than 1% of the Western, Northern, Southern, and Eastern Lands are occupied by permanent structures and limited evidence of disturbance is present in the remaining lands.

Subject to the other constraints explored in subsequent sections, the existing uses of the Plan Area are conducive to future development and are not anticipated to represent a significant constraint.

Table 3.4 - Plan Area Existing Uses

Plan Sub- Area	Existing Land Uses	Considerations
	Airfield infrastructure (runway, taxiway, apron, and supporting infrastructure)	None identified
Core Lands	Airport terminal building	None identified
Core Lanus	Single detached residential dwelling, rented to the Airport Caretaker	None identified
	Aircraft storage hangars (3)	None identified
Western Lands	Single detached residential dwelling and garage located at the southwest sub-area corner	Potential land use sensitivities associated with aircraft noise  Potential aversion to the visual impacts of new development
	Vacant / undeveloped pasture and treed areas	None identified
	Vacant / undeveloped pasture	None identified
Northern Lands	Undeveloped road allowance for Range Road 61	None identified – municipal road closure process may be initiated if required for development in future
	Abandoned gas well and access road located at the northwest portion of the sub-area	See Section 3.9
	Vacant / undeveloped pasture and treed areas	None identified
Southern Lands	Undeveloped road allowance for Range Road 61	None identified – municipal road closure process may be initiated if required for development in future
	Abandoned gas well located in the central portion of the sub-area	See Section 3.9
Eastern Lands	Three storage buildings located in the southeast portion of the sub-area	None identified
Lalius	Vacant / undeveloped pasture and treed areas	None identified

## 3.4 Topographic Conditions

The topography of the Plan Area is generally flat with an overall modest negative slope from the southwest to northeast. The elevation of the site decreases from approximately 610 m Above Sea Level (ASL) at the southwest portion of the Western Lands to approximately 595 m ASL along the eastern portions of the Northern and Eastern Lands as shown in Figure 3.2. The grade of the northeast portion of the Eastern Lands changes with the land giving way to the valley of the Iron Horse Trail.

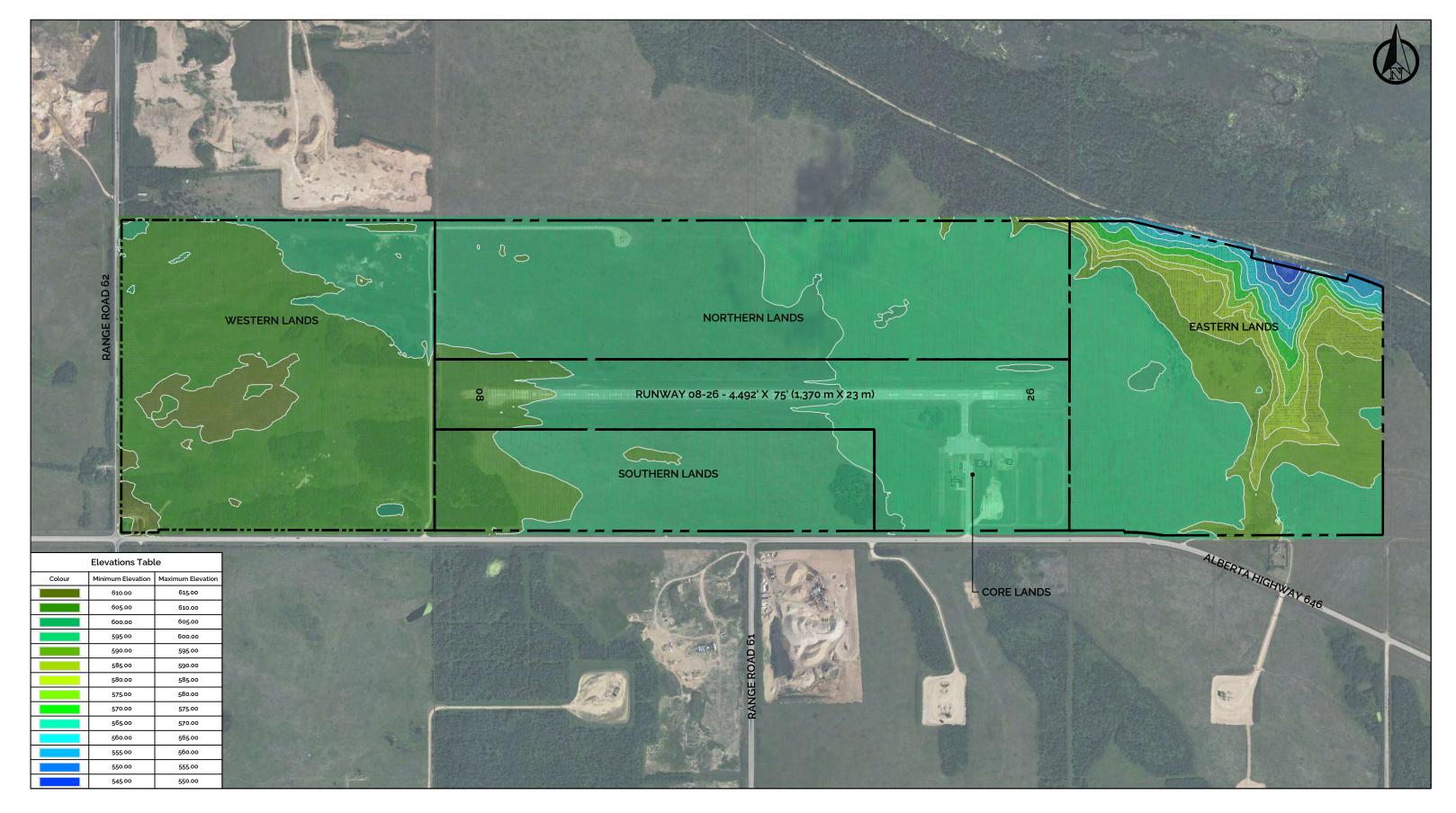
With the exception of the falling terrain at the northeast portion of the Eastern Lands, the Plan Area's topography has not been identified as a significant constraint for the type of development that may conceivably occur at the Airport.

### 3.5 Soil and Geotechnical Conditions

A preliminary review of soil conditions in the Plan Area was completed using the Agriculture Canada – Alberta Research Council's *Soil survey of the County of St. Paul, Alberta (Alberta Soil Survey Report No. 52, 1993)*. The Plan Area is located within the Eastern Alberta Plain physiographic region and Lea Park bedrock geological formation, characterized as gray marine claystone containing minor amounts of silt and fine grained sand. The Plan Area is part of the Northern Valley Plain land system, 2-3H agroclimatic zone, and Elk Point Plain physiographic district. This area is defined by an undulating and ridged till and glaciofluvial surface form.

No existing geotechnical studies or borehole datasets were available documenting the conditions of the Plan Area. Consultations with the Town's Manager of Operations did not identify significant concerns from a geotechnical perspective within the Plan Area, and local subgrade conditions have been sufficient to permit airfield paving and hangar development projects without identified issues.

The Plan Area's geotechnical conditions have not been identified as a significant constraint for future development, subject to detailed analysis at the time of development on the suitability for the type of improvements being considered. A detailed geotechnical analysis was not included within the scope of work for this Project.



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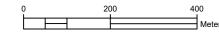








ELK POINT AIRPORT INTERMUNICIPAL AREA STRUCTURE PLAN PLAN AREA ANALYSIS REPORT FIGURE 3.2 - PLAN AREA TOPOGRAPHY



## 3.6 Environmental Conditions and Species at Risk

A Desktop Biophysical Review for Species at Risk has been completed by McIntosh Perry and is included in Appendix A. The Desktop Biophysical Review includes the Plan Area and properties within 150 m of its boundaries. The Desktop Biophysical Review conducted for the Plan Area identified all habitats that have the potential to be impacted by future development. By identifying the potential habitats located within the Plan Area, McIntosh Perry was able to determine the possibility for wildlife species use and identify associated sensitivities. The Desktop Biophysical Review used available data resources in addition to the professional experience of the project team to determine the potential for Species At Risk occurrences. Background reviews included the federal Species at Risk Public Registry, Species Profile, COSEWIC Assessment and Status Reports, and provincial Species at Risk registries and strategies.

Three major habitats have been identified in the Plan Area:

- Open field (grassland) across the majority of the Plan Area;
- Forested areas along the southern portion of the Western Lands and northeastern portion of the Eastern Lands; and
- Wetlands immediately to the northeast of the Eastern Lands.

Immediately north / northeast of the Plan Area is a Key Wildlife and Biodiversity Zone associated with Simmo Lake and its associated wetlands. A small watercourse has been identified running north as a tributary to Simmo Lake.

Based on a review of the habitats associated with the Plan Area, it is not anticipated that the following species will be encountered within the Plan Area or associated with the structures within: American White Pelican, Black Tern, Clark's Grebe, Horned Grebe, Piping Plover, Trumpeter Swan, and Western Grebe.

Habitats may be present within the Plan Area for the following species:

- Fish: Lake Sturgeon;
- Reptiles and Amphibians: Canadian Toad and Northern Leopard Frog;
- Birds: Baird's Sparrow, Barn Swallow, Bobolink, Canadian Warbler, Chestnut-collared Longspur, Common Nighthawk, Ferruginous Hawk, Great Blue Heron, McCown's Longspur, Olive-sided Flycatcher, Pileated Woodpecker, Short-eared Owl, Western Wood-Pewee, Little Brown Bat, and Northern Long-eared Bat; and
- Mammals: Long-tailed Weasel.

Provided a minimum 50 m buffer is maintained from the identified wetland and watercourse, it is not expected that there would be significant impacts to the Species at Risk associated with the aquatic habitat. Further, concentrating development to the Core Lands would mean that several of the forested species would also not likely be impacted.

It is the recommendation of McIntosh Perry that a single field survey be conducted for verification of Species At Risk and habitats. This single field survey should be conducted during the growing season and would be beneficial to be completed within appropriate breeding windows for avian species. Targeted surveys may be required to determine the presence of Species at Risk if the single field survey determines that the habitat on site is suitable for specific species.

## 3.7 Significant Historical Sites and Cultural Activities

Historic Resources are land sections that possess known historic resources or have high potential for their presence, including palaeontological resources. This dataset is provided for the Province to assist in the protection of historic resources. Based on the Province of Alberta's Listing of Historic Resources, a portion of the Northern Lands and the entirety of the Eastern Lands are designated as Significant Historical Sites – Palaeontological (High Potential). The northeastern quadrant of the Eastern Lands are also designated Significant Historical Sites – Archaeological (High Potential), in addition to its paleontological designation. Affected areas are shown in Figure 2.2.

The Historical Resource Value for the affected lands in the Plan Area is 5 – High Potential, p – palaeontological. Accordingly, the Northern and Eastern Lands would be subject to the submission of a Historical Resources Application prior to development according to the requirements of the *Historical Resources Act*, and potentially a Historic Resources Impact Assessment.

The Plan Area may be located within lands historically used for the traditional activities of local First Nations with corresponding cultural value. Engagement with the Frog Lake First Nation is recommended to better understand the relationship of the Plan Area to the traditional activities and cultural values from a First Nations perspective.

## 3.8 Provincial Highway Infrastructure

The southern boundary of the Plan Area abuts the right of way of a provincially designated major highway: Highway 646. Pursuant to the *Highways Development and Protection Act* and the *Highways Development and Protection Regulation*, the following cannot occur without assessment and a permit from Alberta Transportation:

- Development within the right of way or within 300 m beyond the limit of the highway;
- Development within 800 m centre point of the intersection of the highway and another highway / public roadway; and
- The placement of vegetation or utility lines within 60 m of the highway centreline or 30 m beyond the limit of the highway.

The extents of these areas are shown in Figure 3.4. Although this is not integrated in the *Highways Development and Protection Regulation*, the Alberta Transportation website states that the general minimum setback for all development is 70 m from the highway centreline or no closer than 40 metres from the highway right-of-way boundary, except where these distances must be increased to allow for highway widening.

Pursuant to Section 636 of the MGA, Alberta Transportation will be required to be consulted during the preparation of the IASP. It is anticipated that further clarity on potential setback distances within the Plan Area may be established through this engagement.

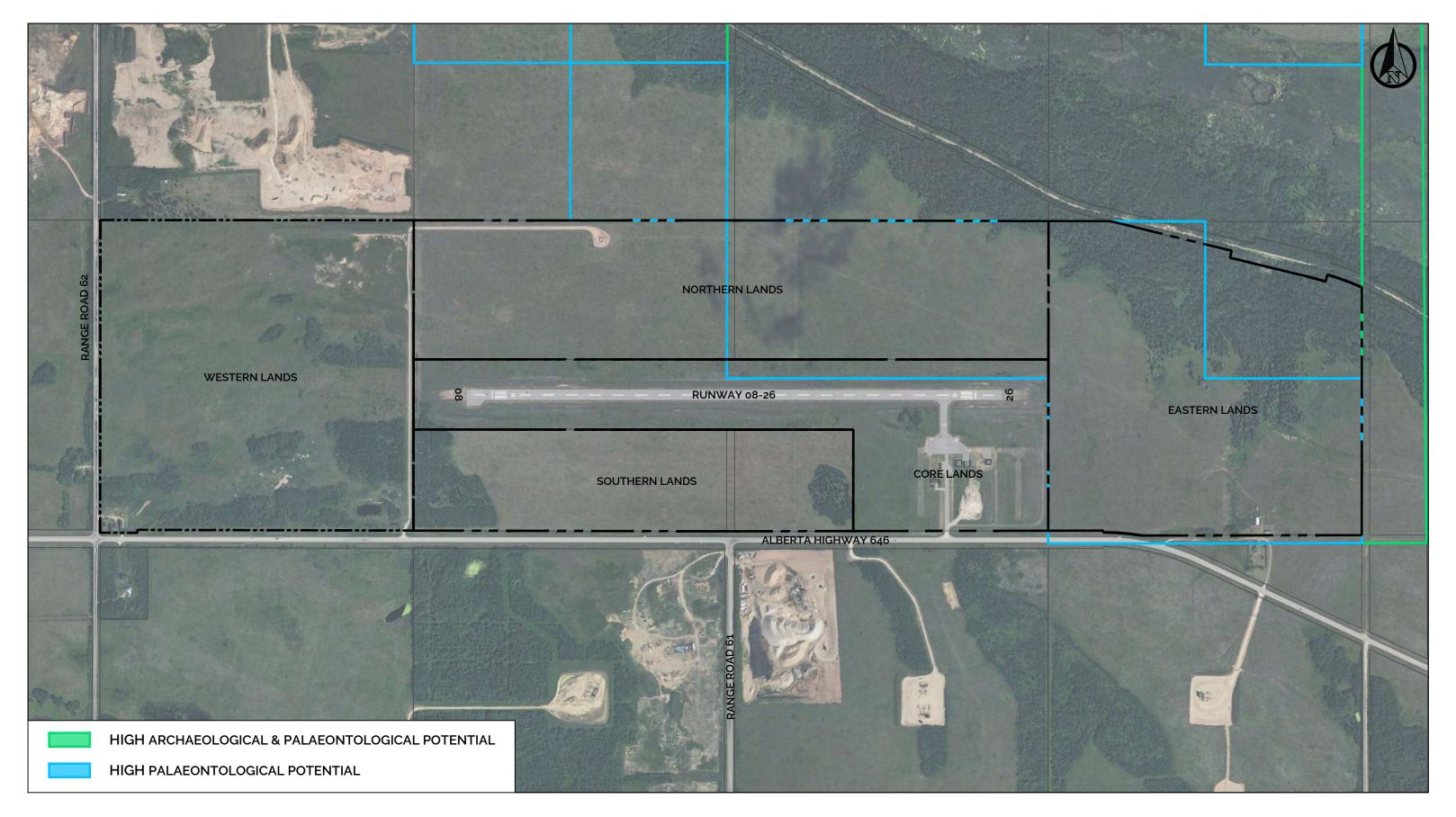


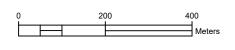








FIGURE 3.3 - PLAN AREA SIGNIFICANT HISTORICAL SITE CONSTRAINTS
MAY 2023



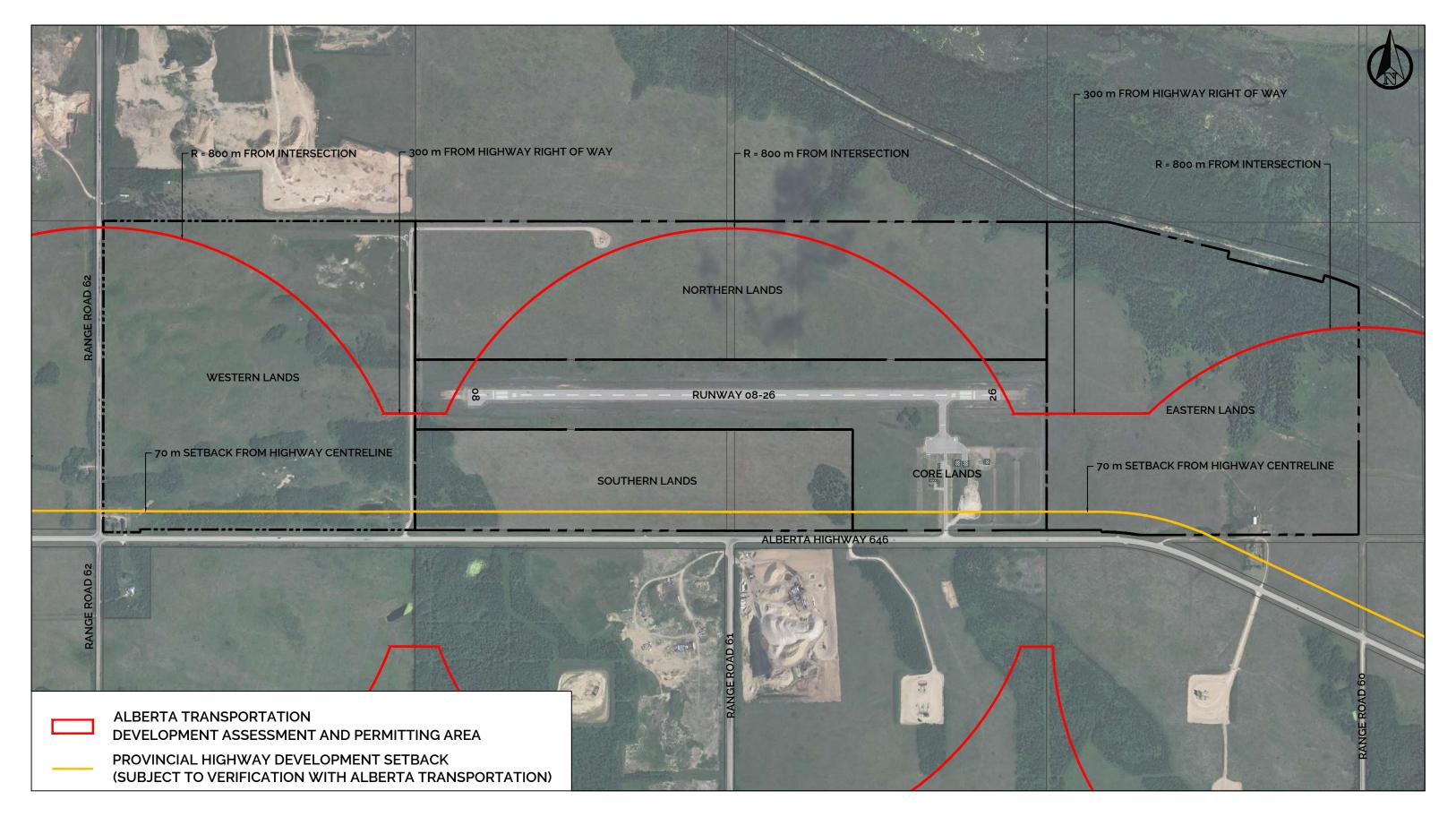










FIGURE 3.4 - PLAN AREA PROVINCIAL HIGHWAY CONSTRAINTS
MAY 2023



### 3.9 Oil and Gas Infrastructure

Through a desktop review of the County's internal GIS system, oil and gas infrastructure and associated compatibility considerations have been identified within the Plan Area. Assessed infrastructure is shown in Figure 3.5.

#### 3.9.1 Abandoned Wells

Two abandoned gas wells are located in the Plan Area:

- One abandoned gas well is located in the Northern Lands (Anadarko 8C Lindbergh 8-2-57-6).
   The well infrastructure and a supporting dirt access road remain in place, and a Reclamation Certificate has not been issued; and
- One abandoned gas well is located in the Southern Lands sub-area (E.P.G.L. Elk Point 1-2-57-6). The well was abandoned in 1989, surface reclamation has been completed with no well infrastructure or access roads in place, and a Reclamation Certificate has been issued.

Pursuant to the Alberta Energy Regulator's *Directive 079: Surface Development in Proximity to Abandoned Wells (September 2022)*, a 5 m setback is provided as a constraint in the vicinity of the abandoned well in the Northern Lands, subject to future confirmation from the licensee (Canadian Natural Resources Limited) prior to development. The requirement to establish a setback from the abandoned well in the Southern Lands has not been identified, given that a Reclamation Certificate has been issued.

#### 3.9.2 Pipelines

The Western, Northern, and Eastern Lands are each impacted by one or more active pipelines:

- A Canadian Natural Resources Limited 88.9 mm diameter natural gas pipeline is routed through the Western, Northern, and Eastern Lands; and
- A Canadian Natural Resources Limited 88.9 mm diameter fuel gas pipeline impacts part of the Eastern Lands.

As the pipelines identified above are reported to have zero levels of hydrogen sulfide (H<sub>2</sub>S), setback requirements pursuant to the Alberta Energy Regulator's *Directive 056: Energy Development Applications and Schedules (October 2018)* are limited to the pipeline right-of-way.

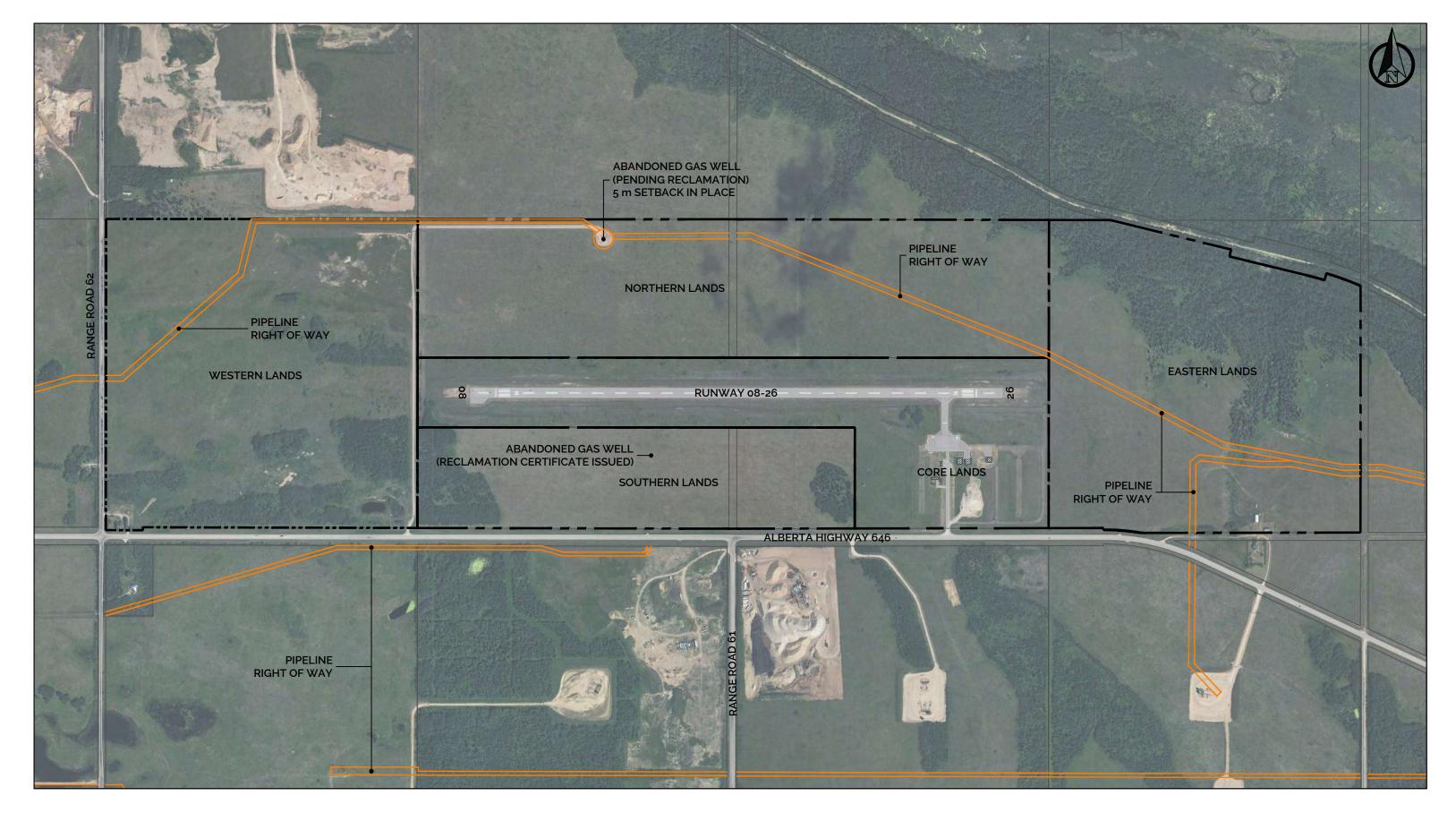


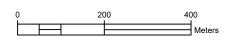








FIGURE 3.5 - PLAN AREA OIL & GAS INFRASTRUCTURE CONSTRAINTS
MAY 2023



### 3.10 Aeronautical Constraints

The protection of the safety and viability of aircraft operations at the Airport is an imperative priority. Assessed herein are the primary aeronautical constraints that would be applicable within the Plan Area on future development. All development concepts prepared through the future IASP will consider these matters and other regulatory requirements.

#### 3.10.1 Obstacle Limitation Surfaces

Obstacle Limitation Surfaces are three-dimensional planes that are established to protect the airspace surrounding the Airport. Criteria for Obstacle Limitation Surfaces are established in Transport Canada's TP312 – Aerodrome Standards and Recommended Practices (5<sup>th</sup> Edition). As a registered aerodrome (as opposed to a certified airport), Elk Point is not required to be developed and operated in compliance with TP312 or to protect Obstacle Limitation Surfaces. However, the Instrument Approach Procedures that are scheduled to be published for the Airport in June 2023 are designed based on the protection of such surfaces, as required per Transport Canada's Advisory Circular (AC) No. 301-001: Procedure to be followed in order to support Instrument Approach Procedures (IAP) at a non-certified aerodrome (Issue No. 5). Therefore, the protection of Obstacle Limitation Surfaces pursuant to Advisory Circular No. 301-001 is a requirement to enable the future availability of its Instrument Approach Procedures. Two types of Obstacle Limitation Surfaces are established for the Airport:

- Approach Surfaces protecting the airspace along the extended runway centreline to ensure safety in the final approach and departure paths; and
- Transitional Surfaces protecting the airspace parallel to the runway centreline and connecting to the Approach Surfaces.

The Airport's Obstacle Limitation Surfaces are designed to the Aircraft Ground Number IIIA – Non-Precision requirements of AC 301-001 and TP312 5<sup>th</sup> Edition, with the specifications as provided in Table 3.5. The height limits of the Obstacle Limitation Surfaces measured in m ASL are shown in Figure 3.6. Development in the Plan Area, including natural and manmade obstacles, should be designed so as to avoid penetrations to the Obstacle Limitation Surfaces.

**Table 3.5 - Obstacle Limitation Surface Specifications** 

Category	Runway 08-26 Specification							
Runway Strip								
Strip width (each side of runway centreline)	70 m							
Strip length (prior to runway threshold)	60 m							
Approach Surfaces								
Length of inner edge (each side of runway	70 m							
Distance from runway threshold	60 m							
Divergence	10%							
Length	2,500 m							
Slope	3.33%							
Transitional Surfaces								
Slope (lower segment)	25.00%							
Slope (upper segment)	14.30%							

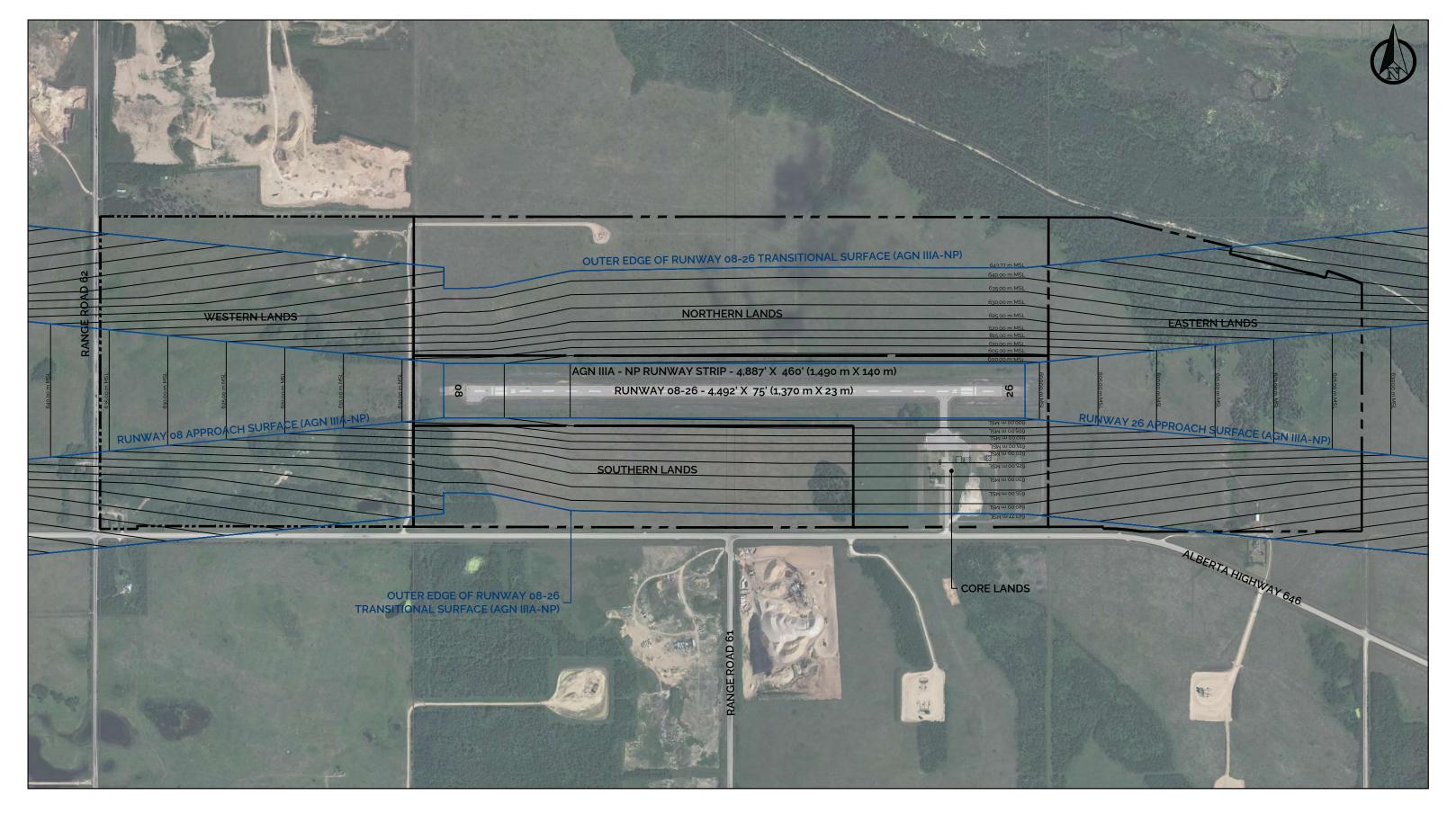


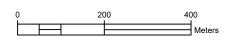








FIGURE 3.6 - PLAN AREA OBSTACLE LIMITATION SURFACES
MAY 2023



#### 3.10.2 Bird and Wildlife Hazards

Certain land uses have the potential to attract birds and wildlife to the Airport and introduce hazards to the safety of airborne and ground aircraft operations, through increased risks of collisions. Wildlife of all types is recognized by Transport Canada as being hazardous to aircraft because they can cause structural or engine damage, with this hazard being greatest at and in the vicinity of aerodromes due to the concentration of aircraft activity close to the ground.

For constraint analysis purposes, the entirety of the Plan Area is defined by HM Aero as being within the Primary Hazard Zone, that being the airspace in which aircraft are at or below altitudes of 1,500 ft. Above Ground Level (AGL). Table 3.6 reproduces the guidance material published by Transport Canada in *TP1247 – Land Use in the Vicinity of Aerodromes (9<sup>th</sup> Edition)* on the potential acceptability of certain land uses according to their wildlife attracting hazard level. As shown, the Primary Hazard Zone includes stringent guidelines on the appropriateness of a large number of uses near airports, including agricultural and animal-related operations, open bodies of water (e.g., sewage lagoons, stormwater management facilities), waste processing facilities and landfills, and select commercial uses. However, TP1247 also notes that:

- Land-use acceptability is site sensitive and dynamic. While TP1247 categorizes each use into
  whether it is recommended or not, the document acknowledges that actual bird and wildlife
  hazards vary with the real-world specifics of the given use; and
- Although a wide array of land uses pose bird and wildlife hazards, design and operational
  mitigation measures can be implemented to decrease the hazard and potentially make it
  acceptable.

Airport and aviation-related uses are generally identified as being compatible from a bird and wildlife hazard perspective, subject to detailed pre-development assessment. Therefore, bird and wildlife hazards are not identified as an outright constraint, but instead as a factor that will require integration in the policies of the IASP and addressing as development proposals occur in the future.

#### 3.10.3 Restrictions to Visibility

The limitation of land uses that may generate exhaust plumes or other restrictions to visibility for pilots while on the ground and airborne is essential to safe operations at the Airport. Examples of restrictions to visibility that can be generated from commercial or industrial land uses include smoke, dust, or steam

All land uses proposed for the Airport should be assessed for their potential to generate exhaust plumes or other restrictions to visibility, such as smoke, dust, or steam. Where sufficient volumes of such restrictions are generated in a manner that cannot be mitigated to minimize impacts to aircraft operations, the land use in question is not recommended in the Plan Area.

Table 3.6 - Bird and Wildlife Land Use Acceptability

Land Use	Land Use Acceptability – Primary Hazard Zone
Putrescible waste landfills	No
Food waste hog farms	No
Fish processing/packing plants	No
Horse racetracks	No
Wildlife refuges	No
Waterfowl feeding stations	No
Open or partially enclosed waste transfer stations	No
Cattle paddocks	No
Poultry factory farms	No
Sewage lagoons	No
Marinas/fishing boats/fish cleaning facilities	No
Golf courses	No
Municipal parks	No
Picnic areas	No
Dry waste landfills	No
Enclosed waste transfer facility	No
Wet/dry recycling facility	No
Marshes, swamps & mudflats	No
Stormwater management ponds	No
Plowing/cultivating/haying	No
Commercial shopping mall/plazas	No
Fast food restaurants	No
Outdoor restaurants	No
School yards	No
Community & recreation centers	No
Vegetative compost facilities	Yes
Natural habitats	Yes
Inactive agricultural fields	Yes
Inactive hay fields	Yes
Rural ornamental & farm ponds	Yes
Residential areas	Yes
	Putrescible waste landfills Food waste hog farms Fish processing/packing plants Horse racetracks Wildlife refuges Waterfowl feeding stations Open or partially enclosed waste transfer stations Cattle paddocks Poultry factory farms Sewage lagoons Marinas/fishing boats/fish cleaning facilities Golf courses Municipal parks Picnic areas Dry waste landfills Enclosed waste transfer facility Wet/dry recycling facility Marshes, swamps & mudflats Stormwater management ponds Plowing/cultivating/haying Commercial shopping mall/plazas Fast food restaurants Outdoor restaurants School yards Community & recreation centers Vegetative compost facilities Natural habitats Inactive agricultural fields Inactive hay fields Rural ornamental & farm ponds

Table 1

### 3.10.4 Aircraft Noise and Land Use Sensitivity

Aircraft noise is the primary externality of the operations that occur at the Airport from a land use sensitivity perspective. TP1247 includes a set of non-regulatory guidelines that can be used by planners and land use decision-makers as a tool to evaluate development near airports. Part IV of TP1247 addresses aircraft noise, with Noise Exposure Forecast (NEF) contours identified as the system that is used to predict overall subjective reaction to noise based on factors such as the number of times that disturbance occurs in a day, the daily distribution of noise events, aircraft types, runway utilization, etc. Guidance material on the acceptability of different land uses relative to each NEF contour is also provided.

A significant amount of background data is required to complete the technical analysis for the preparation of NEF contours, including input such as aircraft activity levels, aircraft types, day-night split, and runway utilization. In absence of this data, NEF contours have not been prepared as any inputs used by HM Aero would be generally hypothetical in nature as opposed to being grounded in the actual utilization of the Airport.

Notwithstanding the foregoing, it is recognized that all zones of the Plan Area are located in close proximity to Runway 08-26 and have the potential to be affected by noise from aircraft on the ground and inflight. Transport Canada articulates in TP1247 that it does not support or advocate for incompatible land uses (especially residential housing) in areas affected by aircraft noise. These areas may begin as low as the least restrictive NEF 25 contour, with impacts increasing closer to the Airport. Based on the experience of HM Aero in preparing NEF contours at comparable airports, it is reasonable to assume that the NEF 25 contour may impact parts of the Plan Area, particularly the Western and Eastern Lands under the Runway 08-26 arrival and departure paths. Therefore, the IASP will be structured so as not to introduce new land uses that may be sensitive to disturbance from aircraft noise without appropriate mitigation measures.

### 3.10.5 Navigation Aids and Electronic Interference

Electronic systems that are used to aid in-flight aircraft navigation have the potential to be disrupted by development in their vicinity that interferes with their signals. One ground-based navigation aid is located within the Plan Area: a privately maintained Non-Directional Beacon (NDB) located in the Core Lands to the west of the terminal building. TP1247 presents the following guidance on development in the vicinity of NDBs, recommending that:

- All proposed structures within 200 m of an NDB antenna be assessed; and
- All proposed steel towers, power lines, metal buildings, etc., within 1,000 m of an NDB antenna, for which the subtended vertical angle measured from the base of the NDB antenna structure exceeds 3°, be assessed.

Applying these guidelines as shown in Figure 3.6, the majority of the Plan Area is located within the geographic boundaries in which development proposals should be submitted to NAV CANADA for assessment prior to construction. Development in these zones is not prohibited outright, but instead should be submitted for assessment by NAV CANADA to identify any negative impacts. With the decommissioning of ground-based NDBs across Canada, this compatibility factor will be negated if the NDB in the Plan Area is removed from service in the future.

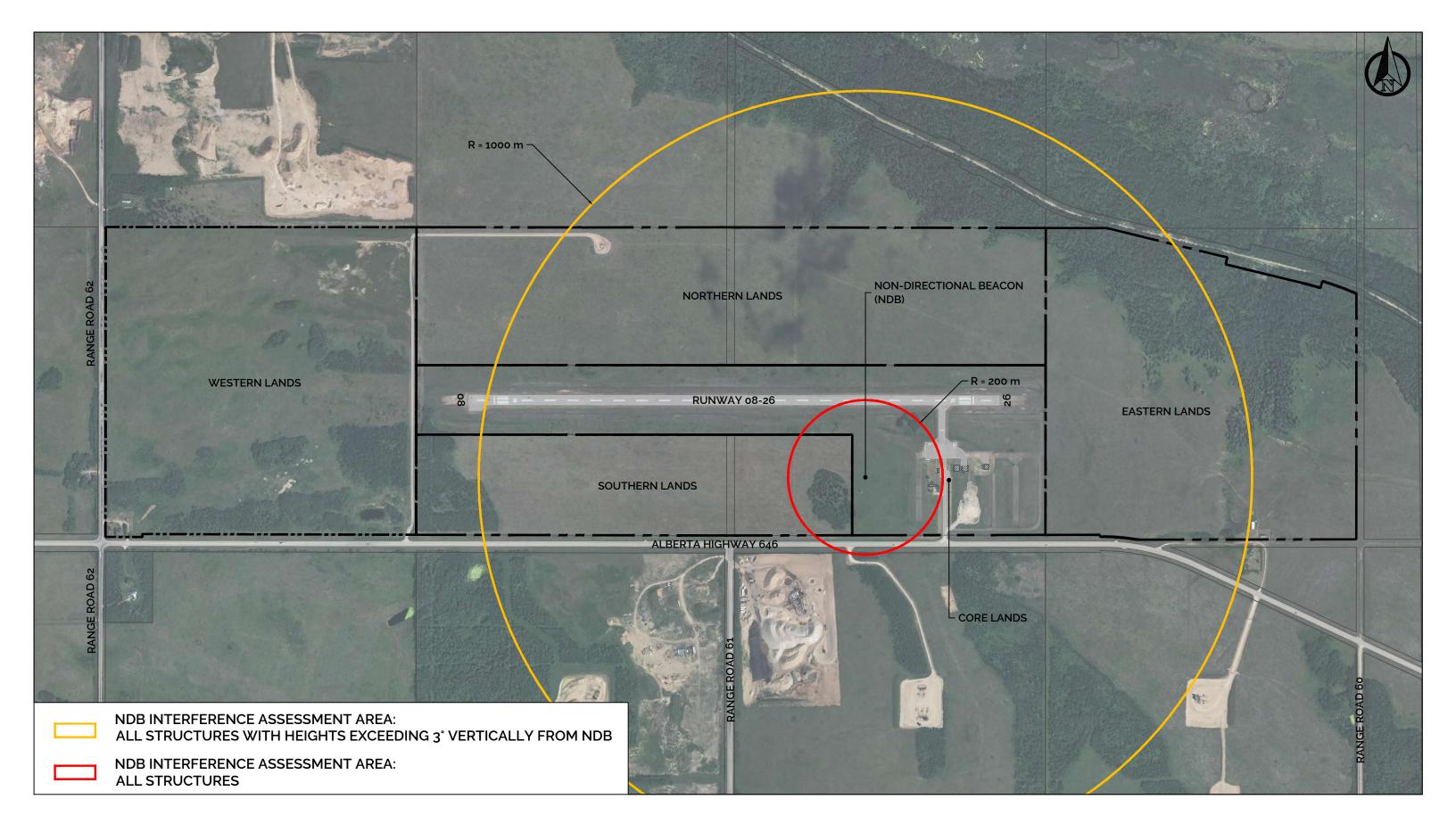










FIGURE 3.7 - PLAN AREA NON-DIRECTIONAL BEACON (NDB)
INTERFERENCE ASSESSMENT ZONES



## 3.11 Agricultural Usage and Land Capacity

As noted in Section 3.1.3, ensuring that agriculture remains an integral and viable component of the regional economy through the preservation of a significant agricultural land base is a stated priority of the MDP for the Plan Area. Accordingly, Canada Land Inventory (CLI) data (shown in Figure 3.8) is reviewed as a methodology for determining the capabilities of the Plan Area for agriculture. Observations are as follows:

- **Western Lands:** The majority of this sub-area has a CLI rating of 3 (moderately severe limitations exist that restrict the range of crops or require special conservation practices) and 6 (soils that are capable only of producing perennial forage crops and for which improvement practices are not feasible).
- **Eastern Lands:** The majority of the Eastern Lands are assigned a CLI rating of 6 (soils that are capable only of producing perennial forage crops and for which improvement practices are not feasible). The southern and western portion of this sub-area has a CLI rating of 3 (moderately severe limitations exist that restrict the range of crops or require special conservation practices).
- Northern, Southern, and Core Lands: These sub-areas have a CLI rating of 3 (moderately severe limitations exist that restrict the range of crops or require special conservation practices). The northeast corner of the Northern Lands has a CLI rating of 6 (soils that are capable only of producing perennial forage crops and for which improvement practices are not feasible).

Therefore, the majority of the soils in the Plan Area are characterized by conditions that impose moderately severe limitations on crop production, with select areas in the east classified as having limited crop production potential. Accordingly, while land use efficiency for new development in the Plan Area should be prioritized to minimize agricultural disruption, growth in various sub-areas is not anticipated to cause a significant negative impact to the agricultural land capacity of the County.

Farmland assessment data was reviewed to verify current agricultural activities within the Plan Area. Current uses are shown in Figure 3.9, with observations as follows:

- Western Lands: Numerous designations apply to this sub-area. Approximately 46 acres of the 158 acre property are classified as non-irrigated arable land with a condition rating of 37%.
   37 acres of tree or formerly treed areas are classified as non-irrigated pasture and assigned a condition rating of 7%. The balance of the property is classified as non-irrigated pasture with condition ratings of between 23% and 33%.
- **Northern Lands:** The majority of this sub-area is classified as non-irrigated pasture with a condition rating of 27%.
- **Eastern Lands:** 89 acres of the Eastern Lands are classified as non-irrigated pasture with a condition rating of 27%. The treed area to the northeast with falling terrain is assigned a condition rating of 5.5%.
- **Southern Lands:** The majority of this sub-area is classified as non-irrigated pasture with a condition rating of 30%, with the exception of the treed areas that are assigned condition ratings of 5.5% and 9.5%.

Data was not available on the Core Lands. This review is consistent with the observations made with respect to the Plan Area's CLI ratings and indicates that future disruption that would occur through development can likely be accommodated on pasturelands with comparatively low condition ratings, consistent with the prioritization assigned through the MDP to prime agricultural land preservation.

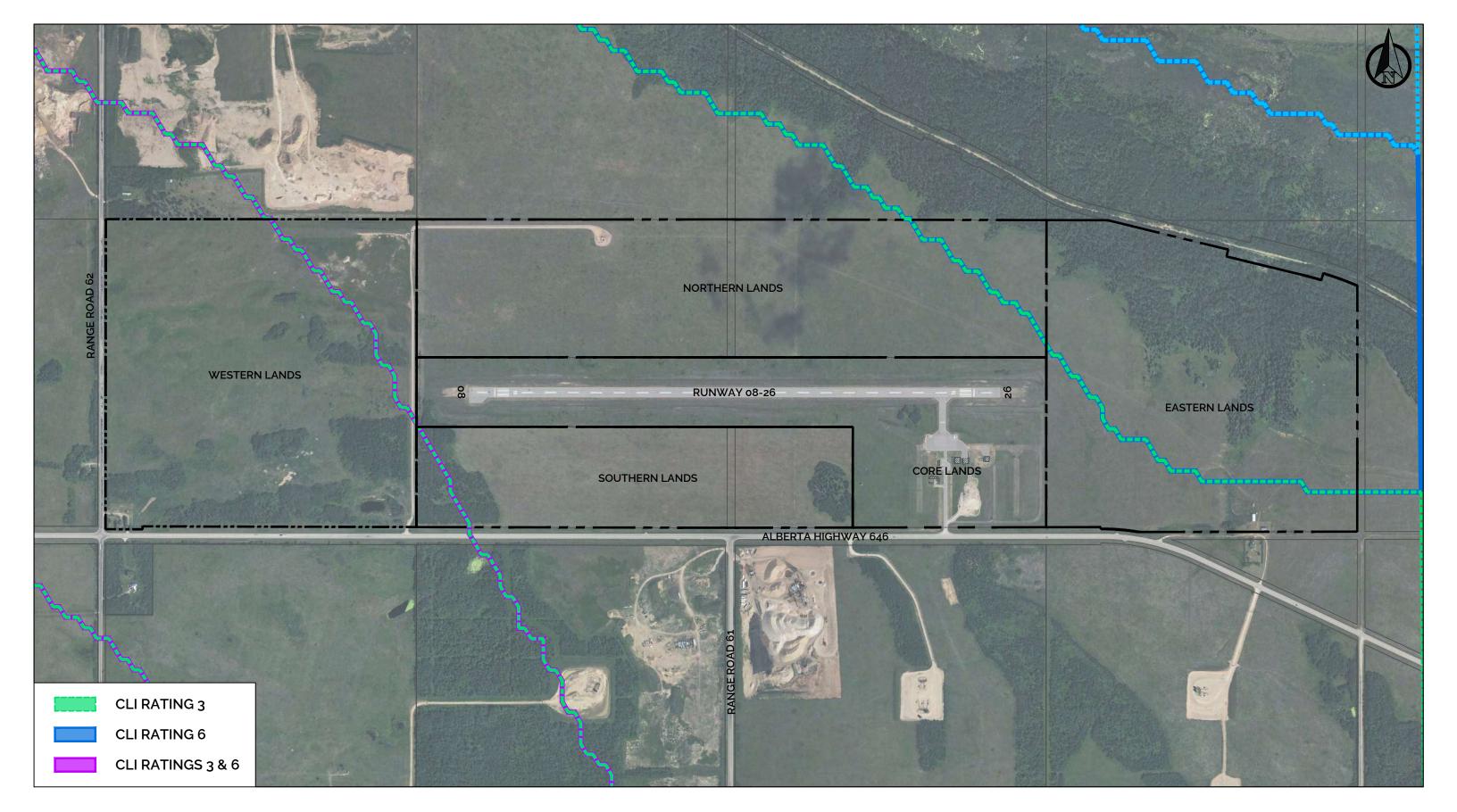


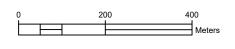


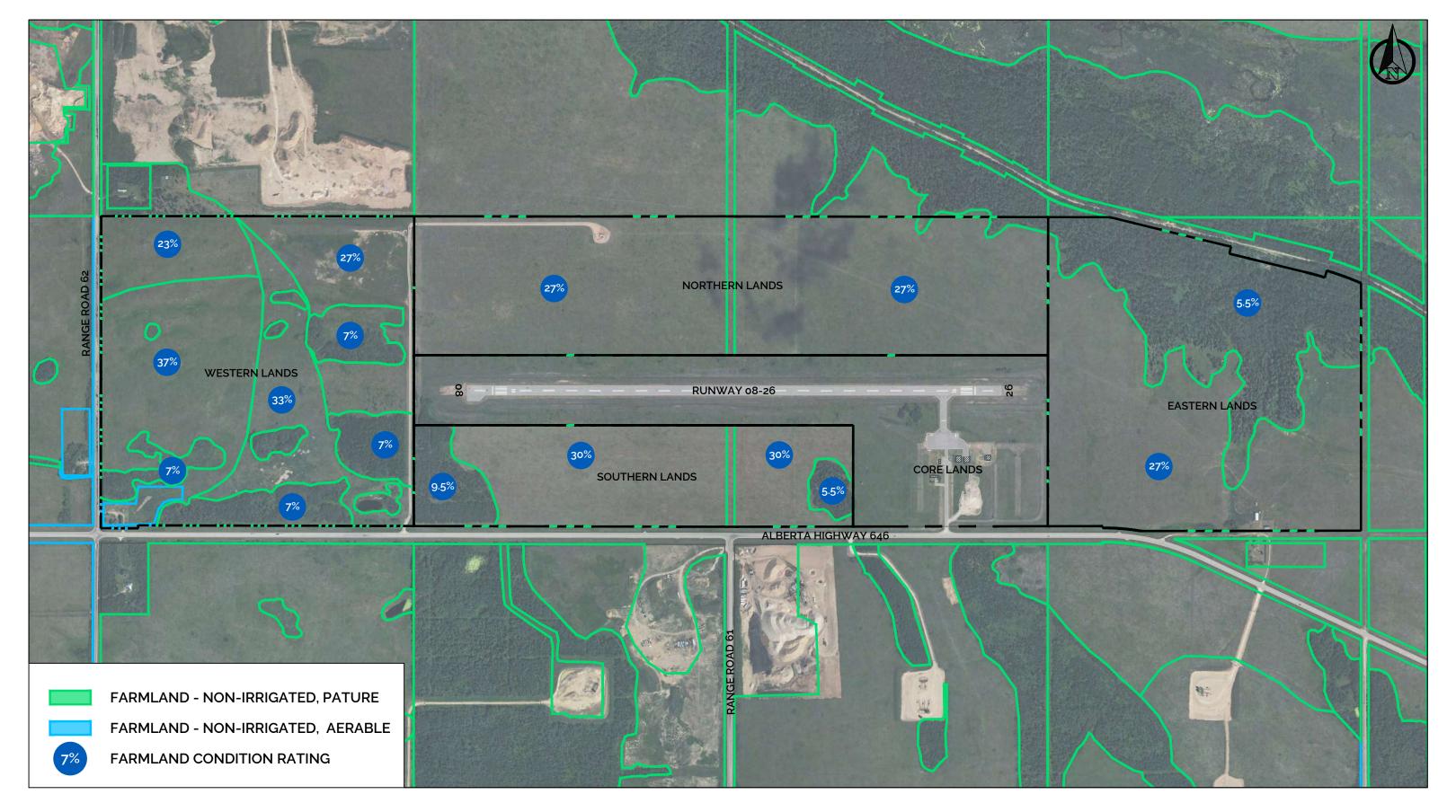






FIGURE 3.8 - PLAN AREA CANADA LAND INVENTORY DATA
MAY 2023







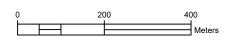






ELK POINT AIRPORT INTERMUNICIPAL AREA STRUCTURE PLAN PLAN AREA ANALYSIS REPORT
FIGURE 3.9 - PLAN AREA FARMLAND ASSESSMENT

FIGURE 3.9 - PLAN AREA FARMLAND ASSESSMENT
MAY 2023



## 4 PLAN AREA VICINITY ANALYSIS

To understand the conditions of the lands in the vicinity of the Plan Area, an approximately 1.5 km buffer (the length of two quarter sections) was established for assessment. This section focuses primarily on the existing and planned uses in the vicinity of the Plan Area in order to identify potential compatibility constraints that may arise from increased activity at the Airport stemming from new development.

The primary findings from the review of the existing and planned uses in the vicinity of the Plan Area are as follows and as shown in Figure 4.1:

- Northwest: The northwest vicinity area encompasses four quarter sections accessed from Range Road 62 and bisected by the Iron Horse Trail. All parcels in this area are designated as A – Agricultural District in the LUB. The dominant land uses identified include a series of aggregate resource areas and a single manufactured residential dwelling.
- **North and Northeast:** The eight quarter sections to the north and northeast are agriculturally zoned and remain in an undeveloped state, comprised of pastureland and vegetated areas. The Iron Horse Trail bisects the lands to the north.
- **East:** The two quarter sections to the east under the Runway 26 approach path remain in a largely undeveloped state, with the exception of two active gas wells along the southern boundary. These lands are designated as A Agricultural District and are primarily comprised of pastureland and vegetated areas, as well as Simmo Lake.
- Southeast: The four quarter sections to the southeast are bisected by Highway 646. Three quarter sections are agriculturally designated and remain in a largely undeveloped state comprised of pastureland and vegetation, with the exception of a series of active gas wells and a residential dwelling located immediately south of the Eastern Lands. An approximately 40 lot country residential subdivision has been developed off of Township Road with six dwellings constructed to-date.
- **South:** The lands to the south are bisected by Range Road 61 and are agriculturally zoned. Existing uses include a single residential dwelling, an active gas well, and several aggregate areas.
- **Southwest:** The four quarter sections to the southwest are occupied by a single residential dwelling and a series of active gas wells. The lands are agriculturally designated and largely remain in an undeveloped state.
- **West:** The lands to the west under the Runway 08 approach are primarily undeveloped, with the exception of a residential dwelling and multiple active gas wells. The majority of the lands in the vicinity to the west are pastureland and vegetation.

Considering the above, the existing and planned uses in the vicinity of the Plan Area are not expected to pose a significant constraint to development concepts advanced through the IASP. Residents of the several individual residential dwellings and the country estate subdivision to the southeast may be exposed to higher levels of aircraft noise as a result of increased Airport activity post-development. However, the limited population density associated with existing and planned residential development is not expected to be sufficiently high for this to be a major constraint. Views of residents in the vicinity of the Plan Area will be explored through future stakeholder engagement processes.

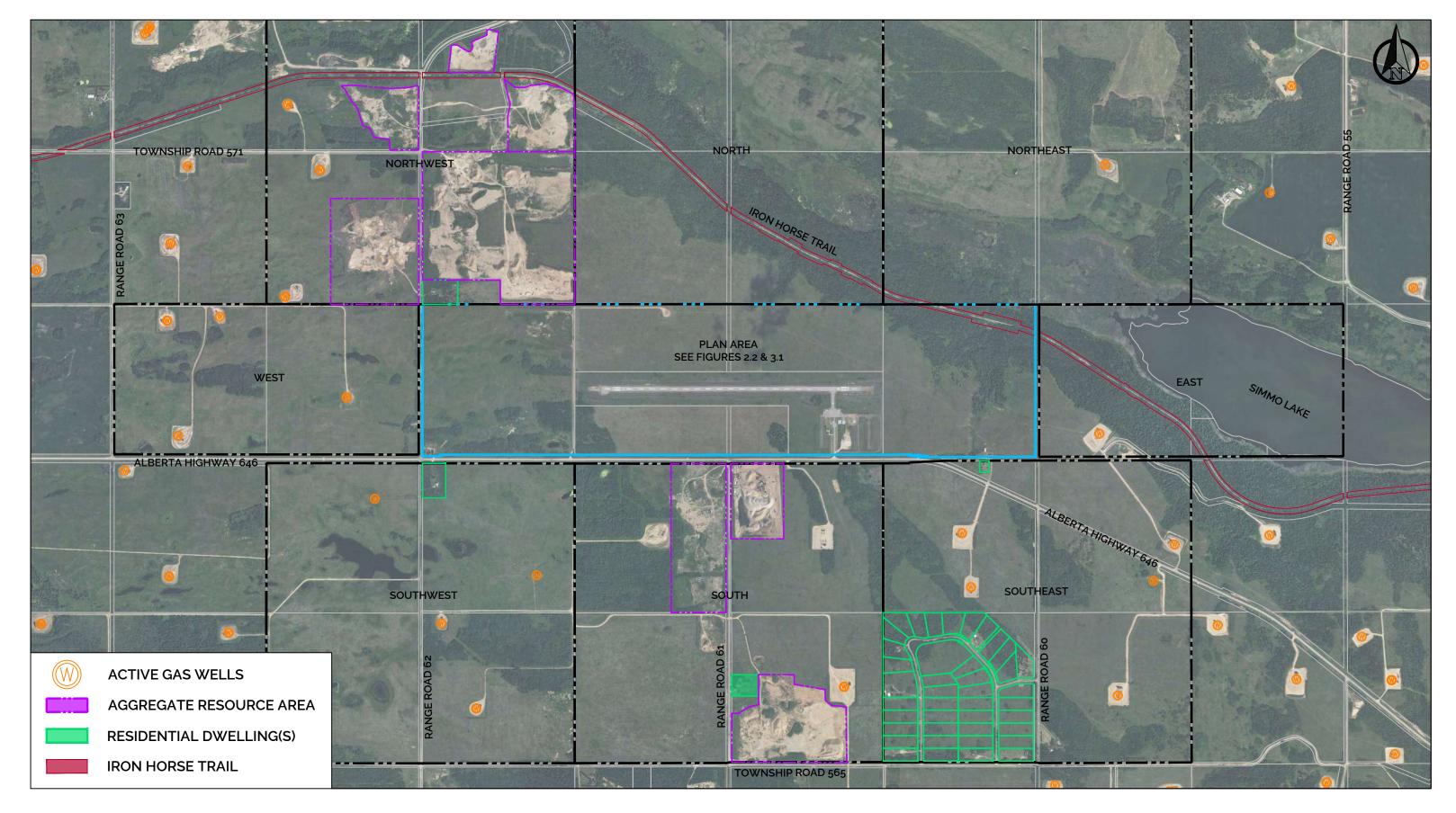


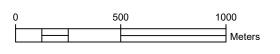








FIGURE 4.1 - PLAN AREA VICINITY EXISTING LAND USES
MAY 2023



## 5 PLANNING IMPLICATIONS AND NEXT STEPS

This report has explored manmade and natural constraints both within, and in the vicinity of, the Plan Area. The Plan Area Analysis Report represents the completion of Phase 1 of the Project and will be used in combination with the Economic Opportunities Report (Phase 2, to be delivered under separate cover) to inform the preparation of the IASP in Phase 3. Table 5.1 summarizes the main implications identified through this review, including constraints that will be integrated in the conceptual planning process for the IASP, as well as requirements for future consultations, assessments, and / or approval within and beyond the timelines of this project.

**Table 5.1 - Summarized Planning Implications** 

Assessment Topic	Development Planning Implications	Further Assessment / Consultation / Approval Requirements
Land Use Planning Context – Municipal Government Act	None identified.	MGA requirements for statutory Area Structure Plans to be complied with in Phase 3.
Land Use Planning Context – Alberta Land Stewardship Act	None identified.	The IASP may require amendment in the future based on the provincial adoption of the North Saskatchewan Regional Plan.
Land Use Planning Context – Municipal Development Plan	None identified.	MDP requirements for statutory Area Structure Plans to be complied within Phase 3. Requirements for MDP amendments, if any, will be identified in Phase 3.
Land Use Planning Context – Land Use Bylaw	None identified.	Requirements for LUB amendments, if any, will be identified in Phase 3.
Land Ownership	Private ownership of the Northern, Eastern, Southern, and Western Lands (522 of 626 acres); only 104 acres are under direct municipal control, of which approximately 17 acres are developable. Uncertainty regarding private landowner interest in future development on their properties.	Consultations with Plan Area landowners are required at the outset / throughout Phase 3 to identify specific implications.
Existing Uses	Potential land use sensitivities associated with the residential property in the Western Lands.	Municipal road closure process may be required in the future for the undeveloped allowance for Range Road 61 bisecting the Southern and Northern Lands.  Consultations with Plan Area landowners are required at the outset / throughout Phase 3 to identify specific concerns.
Topographic Conditions	Avoidance of development in the vicinity of the falling terrain at the northeast portion of the Eastern Lands.	None identified.
Soil and Geotechnical Conditions	None identified.	Geotechnical assessments may be required to verify the suitability of site conditions with future development proposals.

Assessment Topic	Development Planning Implications	Further Assessment / Consultation / Approval Requirements
Environmental Conditions	The Desktop Biophysical Review indicates the presence of multiple habitats as well as the potential for numerous Species at Risk within the Plan Area.	A field investigation is recommended to further assess the usage of the Plan Area by wildlife and Species at Risk. Once the presence and usage are evaluated, additional inferences can be made to determine potential impacts.
Significant Historical Sites and Cultural Activities	Northern and Eastern Lands impacted by one or more High Potential Significant Historical Sites designations.  Plan Area may be located within lands historically used for the traditional activities of local First Nations with corresponding cultural value.	Northern and Eastern Lands would be subject to the submission of a Historical Resources Application prior to development within the Northern and Eastern Lands, and potentially a Historic Resources Impact Assessment.  Consultation with local First Nations recommended at the outset of Phase 3.
Provincial Highway Infrastructure	Setbacks will be required from Highway 646, assumed at 70 m from highway centreline based on preliminary review.	Consultation with Alberta Transportation required at the outset of Phase 3.  Future development proposals within the majority of the Plan Area will require assessment and permit issuance by Alberta Transportation.
Oil and Gas Infrastructure – Abandoned Wells	Abandoned well in the Northern Lands will require a 5 m setback and protection of access corridor.	None identified.
Oil and Gas Infrastructure – Pipelines	Western, Northern, and Eastern Lands impacted by one or more active pipelines; no development will be permitted within the rights-of-way.	None identified.
Aeronautical Constraints – Obstacle Limitation Surfaces	Establishment of minimum setbacks from runway strip and maximum developable heights.  Western and Eastern Lands most significantly impacted by height limits.	Assessment by Transport Canada required for all development in the Plan Area.
Aeronautical Constraints – Bird and Wildlife Hazards	Establishment of policies regarding land uses that result in bird and wildlife hazards.	Assessment of potential bird and wildlife hazards for new land uses required.
Aeronautical Constraints – Restrictions to Visibility	Establishment of policies regarding land uses that cause restrictions to visibility.	Assessment of potential restrictions to visibility of new land uses required.
Aeronautical Constraints - Noise and Land Use Sensitivity	Limitation of land uses that are sensitive to aircraft noise and establishment of policies regarding noise mitigation.	Assessment of noise sensitivity of proposed land uses required.
Aeronautical Constraints – Navigation Aids and Electronic Interference	Establishment of policies regarding land uses that may interfere with Instrument Flight Procedures, including maximum developable heights.	Assessment by NAV CANADA required for all development in the Plan Area.
Agricultural Usage and Capacity	New growth to be directed to areas with less favourable CLI classifications and lower assigned ratings.	None identified.
Plan Area Vicinity	Potential land use sensitivities associated with existing and planned residential properties in the vicinity of the Plan Area.	Consultation with residents / landowners in the vicinity of the Plan Area required in Phase 3.



Appendix C - Desktop Biophysical Review for Species at Risk

### **MEMORANDUM**

From: McIntosh Perry Consulting Engineers Ltd.

6240 Highway 7, Suite # 200, Woodbridge, Ontario, L4H 4G3

To: HM AERO Aviation Consulting

532 Montreal Road, Suite # 209, Ottawa, Ontario, K1K 4R4

Date: March 17, 2023

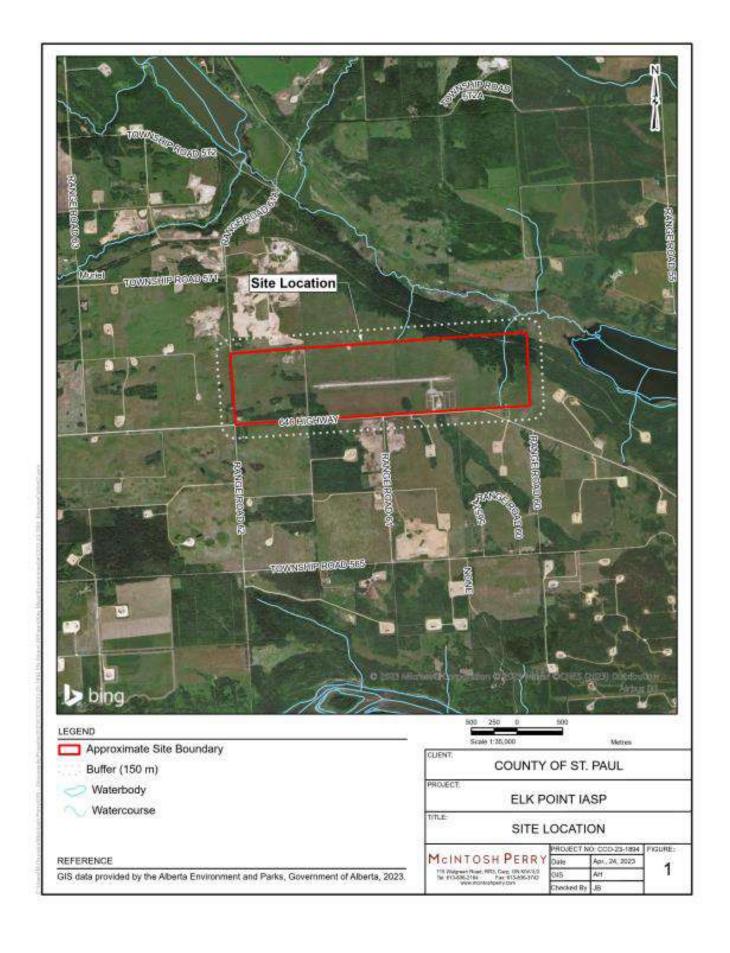
Re: Elk Point Airport IASP – Desktop Biophysical Review for Species at Risk

6023 AB-646, Lindbergh, Alberta, TOA 2JO

### Introduction

The Town of Elk Point and County of St. Paul No. 19 proposes an Intermunicipal Area Structure Plan (IASP) for the Elk Point Airport. This will provide a potential for future development of lands within the Area Structure Plan, allowing the airport to be a strategic asset for the Town and County, providing general aviation services, creating economic development with significant direct and indirect financial gains (increase in related regional business and employment).

McIntosh Perry Consulting Engineers (MP) was retained by HM AERO Aviation Consulting to provide technical services in support of the IASP at the Elk Point Airport, located at 6023 AB-646, Lindbergh, Alberta (**Figure 1**). The services provided within this memorandum include the results of the Desktop Biophysical review of the Airport grounds and property within 150m, hereafter referred to as the subject site.



## **Project Summary**

The Desktop Biophysical Review conducted for the subject site identified all habitats that have the potential to be impacted by the project. By identifying the potential habitats present on the subject site, MP staff were able to determine the possibility for wildlife species use and identify associated sensitivities. McIntosh Perry utilized available data resources in addition to professional experience in order to determine potential for Species At Risk (SAR) occurrences on the subject site. Background reviews inclusive of the federal Species at Risk Public Registry, Species Profile, COSEWIC Assessment and Status Reports and provincial Species at Risk registries and strategies, were conducted. Additionally, utilizing MP's SAR experience and knowledge, occurrence data was reviewed for each identified species to determine the likelihood of SAR habitat occurrences on the subject site.

# Methodology / Background Data Review

The following outlines the procedures utilized to determine both habitat and potential SAR occurrences on the subject site.

### Policy and Legislative Context

MP carried out a review of relevant federal legislation and Species at Risk Listings. The following sources were used.

- Species at Risk Public Registry (Canada, 2021) for:
  - Residence descriptions/ rationales;
  - o Critical habitat orders, reports ands statements; and
  - Identification of critical habitat.
- COSEWIC Assessment and Status Report
- SARA Recovery Strategies and Management Plans
- Applicable Provincial Status of Species at Risk

#### Provincial Landscape Species Determination

A SAR evaluation of available resources based on relevancy of information, credibility of data, and availability of data for the subject location and provincial landscape was completed. This evaluation yielded credible sources that MP used to aid in species occurrence determinations. A list of resources in addition to the federal registries included:

- NatureServe Explorer Pro (2022) application.
- Alberta Species at Risk (Alberta, 2022).

#### Regional Species Occurrences

MP evaluated species occurrences within the province, for those likely to occur within the regional area (i.e., Elk Point, County of St. Paul) based on species range, and ecoregion data. MP's GIS department preformed a preliminary screening to identify natural heritage features within the broader regional area, as well as a species query of elemental SAR occurrences. Resources are listed below.

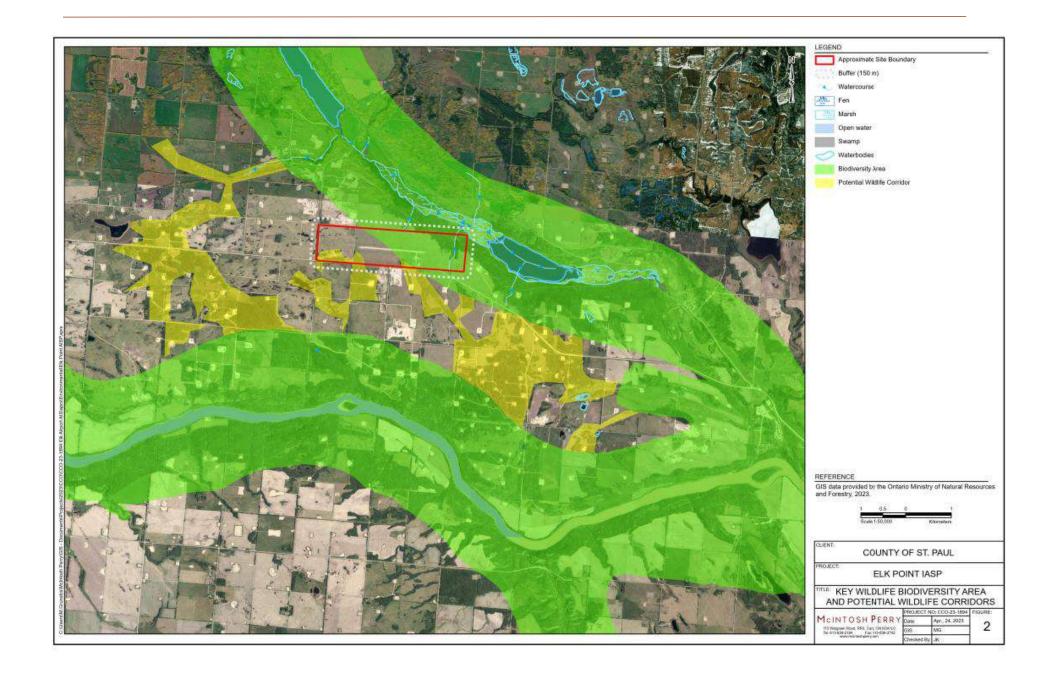
- Queried the NatureServe Explorer Pro (2022) application for broader landscape species occurrence data;
- Usage of the Alberta Fish and Wildlife Internet Mapping Tool- Public (Alberta, 2022a), and
- The Alberta Wildlife Sensitivity Mapping (2022) Layers.

The wildlife sensitivities that were identified during the query have been mapped and can be seen on Figure 2.

### Aerial Imagery and Mapping / Habitat Evaluations

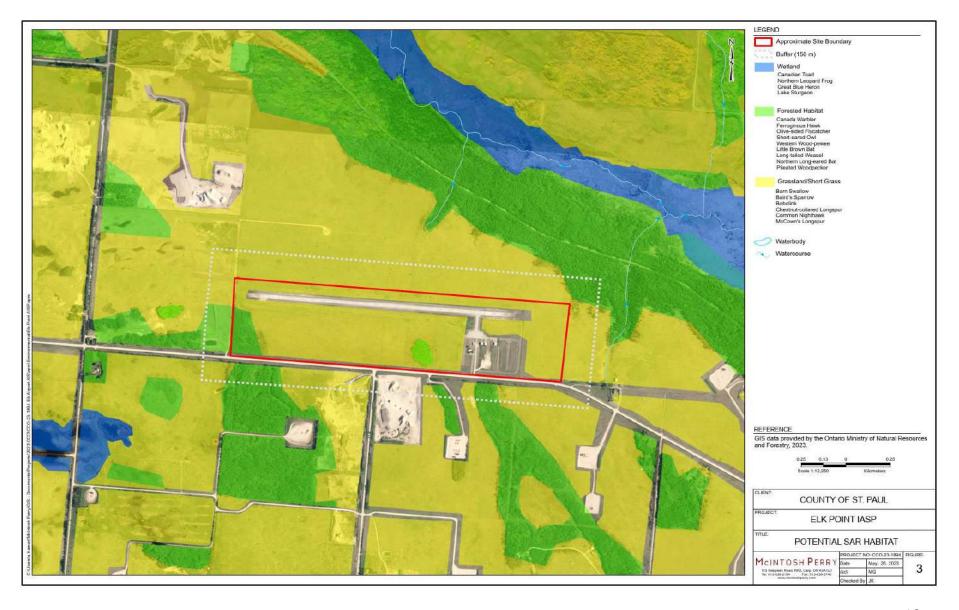
MP compared the species occurrences within the regional area, against the habitat found within the subject site in order to assess the likelihood of habitat usage. Habitat found on the property was determined through the use of aerial imagery, GIS mapping of surrounding habitat and natural heritage features.

• This was determined by evaluating the properties features with the preferred habitat of the species.



# **Existing Conditions**

A preliminary review using aerial imagery and GIS mapping outlined three major habitat types: open field (grassland), forested (northeast and southwest corners), and wetlands (northeast tip of the subject property) (**Figure 3**). The eastern half of the subject property contains a Key Wildlife and Biodiversity Zone related to Simmo Lake and its associated wetlands to the north of the subject property. A small watercourse is found on the east side of the subject property running north as a tributary to Simmo Lake.



# Species At Risk

Once the potential for a species was determined within a regional area, the habitat available locally was evaluated to determine the likelihood of the species presence on the subject property. The following **Table 1** identifies species that were identified during the background biophysical review. These species have been evaluated to determine the likelihood of habitat suitability within the features found within the subject property.

SAR within the Vicinity of the Study Area								
Common Name	Scientific Name	Provincial Status	SARA Status	COSEWIC Assessment Status	Other Applicable Legislation	Species Habitat Description		
				Bir	ds			
American White Pelican	Pelecanus erythrorhynchos	Sensitive	Not Listed	Not At Risk	N/A	Nesting occurs in large colonies on islands located in remote brackish and freshwater lakes. Nests are formed from shallow depressions in the ground. Feeding occurs on the lakes themselves, with pelicans flying great distances to forage in richer feeding sites.		
Baird's Sparrow	Centronyx bairdii	May Be At Risk	Special Concern	Special Concern	Migratory Bird Convention Act (MBCA)	Species breeds in large mixed grass patches and fescue prairies with moderate grass height, few shrubs, and some litter. Some non-native habitats may meet these features, but breeding success is low in some of these habitats, such as hay fields and croplands.		
Barn Swallow	Hirundo rustica	May Be At Risk	Threatened	Special Concern	МВСА	Species prefers a wide range of open habitats for foraging inclusive of grassy fields, pastures, various agricultural crops, lake and river shorelines, cleared right-of-way, cottage areas, farmyards, islands, wetlands, and subarctic tundra. Species is known to nest on ledges and outcroppings in sheltered areas (building overhangs, under bridges) in proximity to adequate feeding grounds.		
Black Tern	Chilidonias niger	Sensitive	Not Listed	Not At Risk	МВСА	Species prefers fresh marshes and lakes for all life stages. Although they prefer larger marshes, black terns can sometimes be found in smaller marshes or wet meadows. In migration, they can be found on larger lakes or coastal waters.		
Bobolink	Dolichonyx oryzivorous	Sensitive	Threatened	Special Concern	МВСА	Since most of the tall-grass prairie in North America has been converted to agricultural land, bobolink has converted to hayfields and meadows for usable habitat, nesting in forage		

	SAR within the Vicinity of the Study Area								
Common Name	Scientific Name	Provincial Status	SARA Status	COSEWIC Assessment Status	Other Applicable Legislation	Species Habitat Description			
						crops. This species also utilizes other grassland habitats including wet prairie, graminoid peatlands and abandoned fields that are dominated by tall grasses, as well as remnants of tall-grass prairie.			
Canada Warbler	Wilsonia canadensis	May Be At Risk	Threatened	Special Concern	МВСА	Species is found most abundantly in wet, mixed deciduous-coniferous forest with a well-developed shrub layer. It can also be found in old-growth forests with a high density of shrubs occurring in canopy openings and riparian shrub forests.			
Chestnut- collared Longspur	Calcarius ornatus	May Be At Risk	Threatened	Endangered	МВСА	Species prefers level to short- or mixed-grass prairie, even grazed or mowed, optimally with low sward density and minimal litter depth. The preferred topography is level to rolling uplands and moist lowlands.			
Clark's Grebe	Aechmophorus clarkia	May Be At Risk	Not Listed	Not Listed	МВСА	Nesting occurs at the shallow margins of medium to large lakes, as well as marshes. Breeding sites normally consist of dense vegetative stands of cattails, rushes or willows, or less favourably, thick mats of floating aquatic plants. As the nests are floating, nesting habitat is protected from wind and wave action to prevent nest flooding. Water depth must also allow adults to dive as an escape from threats. Foraging takes place in open water			
Common Nighthawk	Chordeiles minor	Sensitive	Special Concern	Special Concern	МВСА	Species prefers nesting on vegetation free surfaces, such as sand dunes, burned areas, rocky outcrops, and gravel rooftops. Species is an aerial forager, relying on insect populations surrounding the nest site for survival. This species is sporadically encountered over its very wide range in Canada however some populations are			

SAR within the Vicinity of the Study Area								
Common Name	Scientific Name	Provincial Status	SARA Status	COSEWIC Assessment Status	Other Applicable Legislation	Species Habitat Description		
						adapted for utilizing rooftops in urban areas though many seemingly suitable rooftops may remain unused by the species.		
Ferruginous Hawk	Buteo regalis	At Risk (Endangered)	Threatened	Special Concern	N/A	Species is considered a native grassland specialist, strongly dependent on native grasslands. East of the Rocky Mountains, they are dependant on populations of Richardson's ground squirrel. Because of this dependence, some species success has occurred in moderate levels of cropland, as these areas may be preferred by Richardson's ground squirrel. Nesting can occur on a variety of structures including trees, utility structures, farm buildings, abandoned farm machinery, haystacks and artificial platforms.		
Great Blue Heron	Ardea Herodias	Sensitive	Not Listed	Not Listed	МВСА	Species can be found in meadows as well as open shallow water at the edges of lakes, streams, rivers, ponds, sloughs, ditches, marshes and mudflats. Breeding colonies occur in trees, building stick nests high off the ground.		
Horned Grebe	Podiceps auratus	Sensitive	Special Concern	Special Concern	МВСА	Species utilizes fresh and occasionally brackish water on semi- permanent or permanent ponds, as well as marshes, and shallow bays on lake borders. Breeding sites normally consist of dense emergent vegetation, providing nesting material, concealment, anchorage, and protection for young.		
McCown's Longspur	Rhynchophanes mccownii	May Be At Risk	Threatened	Threatened	МВСА	Species utilizes dry, sparse, short cropped grasslands with few shrubs or forbs for breeding. Habitat may include short-grass prairie, non-native pastures, closely grazed mixed-grass prairie and some cultivated fields.		

SAR within the Vicinity of the Study Area								
Common Name	Scientific Name	Provincial Status	SARA Status	COSEWIC Assessment Status	Other Applicable Legislation	Species Habitat Description		
Olive-sided Flycatcher	Contopus cooperi	May Be At Risk	Special Concern	Special Concern	МВСА	Species is often associated with old-growth forest in or near wetland areas bordering open areas for foraging. They utilize high perches from which they fly out to intercept flying insects and then return to the same perch. Nesting usually occurs in conifers.		
Pileated Woodpecker	Dryocopus pileatus	Sensitive	Not Listed	Not Listed	МВСА	Species makes use of mature deciduous, coniferous, or mixed forests that are scattered with a supply of large dead trees for both forage and nesting habitats.		
Piping Plover	Charadrius melodus circumcintus	At Risk (Endangered)	Endangered	Endangered	МВСА	Piping Plovers nest on the sandy or gravel shores of larger prairie lakes, or shallow, saline lakes.		
Short-eared Owl	Asio flammeus	May Be At Risk	Special Concern	Threatened	N/A	Species makes use of many open habitats, including grasslands, peat bogs, marshes, sand-sage concentrations, old pastures, and agricultural fields. Nesting occurs on the ground in dense grasslands as well as tundra areas with small willows. Shorteared owls roost in conifers adjacent to open areas or on the ground, sheltered by tall grasses or forbs.		
Trumpeter Swan	Cygnus buccinator	Sensitive (Species of Special Concern)	Not Listed	Not At Risk	МВСА	Species requires lakes and marshes with adequate room to take off (approximately 100m). There must be shallow, stable levels of unpolluted fresh water, emergent vegetation an island, muskrat ( <i>Ondatra zibethicus</i> ) house, or other structure for nesting, and low human disturbance. Water levels have no marked seasonal fluctuations; waters have no strong wave action or currents and the water must be shallow enough for the swans to dig for the tubers and roots of aquatic plants.		

	SAR within the Vicinity of the Study Area					
Common Name	Scientific Name	Provincial Status	SARA Status	COSEWIC Assessment Status	Other Applicable Legislation	Species Habitat Description
Western Grebe	Aechmophorus occidentalis	At Risk (Threatened)	Special Concern	Special Concern	МВСА	Nesting occurs at the shallow margins of medium to large lakes, as well as marshes. Breeding sites normally consist of dense vegetative stands of cattails, rushes or willows, or less favourably, thick mats of floating aquatic plants. As the nests are floating, nesting habitat is protected from wind and wave action to prevent nest flooding. Water depth must also allow adults to dive as an escape from threats. Foraging takes place in open water.
Western Wood-Pewee	Contopus sordidulus	May Be At Risk	Not Listed	Not Listed	МВСА	Species uses forests and forest edges near streams with large trees. Areas of habitat include open woodlands or open understories under pinyon pine, cottonwood, sycamore, ponderosa pine, aspen and spruce trees, avoiding dense forests.
				Mam	mals	
Little Brown Myotis	Myotis lucifugus	May Be At Risk (Endangered)	Endangered	Endangered	N/A	Species tends to overwinter in caves and mines as hibernacula. In the summer, females establish maternity colonies, often in buildings or large-diameter trees. Waterways provide foraging habitat, as feeding occurs over water along forest edges. Large open fields are commonly avoided.
Long-tailed Weasel	Mustela frenata	May Be at Risk	Not Listed	Not At Risk	N/A	Species is found in forests, open woodlands, prairies and alpine habitats.
Northern Myotis	Myotis septentrionalis	May Be At Risk (Endangered)	Endangered	Endangered	N/A	Species tends to overwinter in caves and mines as hibernacula.  In the summer, females establish maternity colonies, often in buildings or large-diameter trees. Waterways provide foraging

SAR within the Vicinity of the Study Area						
Common Name	Scientific Name	Provincial Status	SARA Status	COSEWIC Assessment Status	Other Applicable Legislation	Species Habitat Description
						habitat, as feeding occurs over water along forest edges and forest gaps. Large open fields are commonly avoided.
				Reptiles and	Amphibians	
Canadian Toad	Canadian Toad  Bufo hemiophrys  May Be At Risk  Not Listed  Not At Risk  Not At Ris					
Northern Leopard Frog	Lithobates pipiens	At Risk (Threatened)	Special Concern	Special Concern	N/A	Species is associated with clear, freshwater systems, although they can withstand moderate salinity. Breeding can occur within both permanent and semi-permanent wetlands, usually with emergent vegetation. The tadpoles develop in the slow reaches of streams and backwaters, as they are poorly adapted to cope with water currents. Feeding areas for young-of-year, juveniles and adults are located along the margins of water bodies. Immature frogs remain closer to the water; more mature frogs may forage some distance away from the water. Feeding habitat consists of open and semi-open areas with short vegetation. Hibernacula occur in well-oxygenated water that does not freeze to the bottom, and can be associated with rocks, logs, leaf litter, or depressions in the sand or mud.
Fish						
Lake Sturgeon (Saskatchewan	Acipenser fulvescens	Endangered	Pending	Endangered	Fisheries Act	Species spawns in fast-moving waters at the base of falls, rapids, or dams. Larvae require gravel substrates. Other life stages are more generalist in nature. (COSEWIC, 2017).

SAR within the Vicinity of the Study Area						
Common Name	Scientific Name	Provincial Status	SARA Status	COSEWIC Assessment Status	Other Applicable Legislation	Species Habitat Description
River population)						

#### **SAR Habitat Evaluation**

#### American White Pelican (Pelecanus erythrorhynchos)

Based on the desktop review, the subject site contains no suitable habitat. However, due to its location near Simmo and Moosehills Lakes, the subject property may be used as a flight corridor for finding forage as well as migration for the species. The lakes and wetland to the north contain suitable stop over habitat.

#### Baird's Sparrow (Centronyx bairdii)

The subject site may contain suitable habitat for this species. Grassland exists within the subject site, and if uncultured could provide habitat for all life stages of the species.

#### Barn Swallow (Hirundo rustica)

The subject site may provide suitable habitat for the Barn Swallow's life processes in the form of nesting habitat. The airport structure may contain adequate overhangs and ledges for the species to nest, such as sheltered overhangs (aircraft hangars) that may provide adequate surfaces for nest building. The area surrounding the property may also provide adequate feeding grounds for the species due to the presence of open partially treed grassy areas in proximity to the site. This species may use this open area for aerial foraging if adequate insects are present to sustain species. The Barn Swallow typically forages at low altitude close to the ground, above and surrounding water features.

#### Black Tern (Chilidonias niger)

The subject site contains no suitable habitat according to the background review evaluation. However, due to its location near Simmo and Moosehills Lakes, which are black tern habitat, the subject site may be used as a flight corridor for finding forage as well as migration.

#### Bobolink (Dolichonyx oryzivorous)

Based on the desktop review, the subject site contains suitable habitat. Grassland exists within the subject site, and if uncultured or agricultural, could provide habitat for all life stages.

#### Canada Warbler (Wilsonia canadensis)

Based on the review, the subject site contains suitable habitat. Wet forest along the northeast and southwest corners of the subject site may provide habitat for the species. The subject site is also in proximity to a large wetland to the north, with fringes that could be utilized by the species.

#### Chestnut-collared Longspur (Calcarius ornatus)

Based on the desktop review, the subject site contains suitable habitat. Grasslands along the west side of the subject site and around the airstrip may provide adequate habitat for this species.

#### Clark's Grebe (Aechmophorus clarkii)

Based on the desktop review, the subject site contains no suitable habitat. Species prefers open water with large marshlands. However, due to its location near Simmo and Moosehills Lakes, the subject site may be used as a flight corridor. The lakes and wetland to the north outside the site may contain suitable habitat.

#### Common Nighthawk (Chordeiles minor)

The subject site may provide suitable habitat for the Common Nighthawk's life processes in the form of foraging habitat. The area surrounding the site may be used for feeding grounds by this arial forager however the species tends to utilize habitat at a larger landscape scale often foraging high above ground level. Species may also be found nesting if adequate gravel areas exist within the study area.

#### Ferruginous Hawk (Buteo regalis)

The subject site may provide suitable habitat for the Ferruginous Hawk's life processes in the form of foraging habitat. The subject site falls outside (north) of the known range for the species, however, instances may occur, possibly dependant on the range of prey species.

#### Great Blue Heron (Ardea Herodias)

Species is likely to be found foraging on the subject site along the watercourse on the east side of the subject site. Foraging habitat also exists on the grassy areas. Nesting habitat exists along the edges of the forested areas, especially near the watercourse on the east side of the subject site as well as the marsh and lakes to the north.

#### Horned Grebe (Podiceps auratus)

Based on the desktop review, the subject site contains no suitable habitat. Species prefers ponding water with marshlands. However, due to its location near Simmo and Moosehills Lakes, the subject site may be used as a flight corridor. The lakes and wetland to the north may contain suitable habitat.

#### McCown's Longspur (Rhynchophanes mccownii)

Based on the background review, this species has the potential to be present within the grassland located on the subject site, as habitat for foraging for adult (mainly seeds) and nestlings (invertebrates, especially grasshoppers) exists.

#### Olive-sided Flycatcher (Contopus cooperi)

Based on this background review, habitat exists within the subject site for this species. The fringes of the forested areas to the northeast and the southwest next to the open grassy areas provide foraging habitat as well as potentially providing nesting habitat as well.

#### Pileated Woodpecker (Dryocopus pileatus)

Depending on the age of the forested regions, if dead or snag trees exist, it is potetial habitat for this species.

#### Piping Plover (Charadrius melodus circumcintus)

Based on this background review and aerial photography, there is no habitat present for the life stages of Piping Plover. The subject site may be a flyway for migrating populations, however.

#### Short-eared Owl (Asio flammeus)

Based on this background review, habitat may exist along the edges of the forested areas of the subject site as well as the grassland area for foraging, roosting and potentially nesting.

#### Trumpeter Swan (Cygnus buccinator)

Based on the desktop review, the subject site contains no suitable habitat. Species prefers large areas of calm water with shallows. However, due to its location near Simmo and Moosehills Lakes, the subject site may be used as a flight corridor. The lakes and wetland to the north may contain suitable habitat.

#### Western Grebe (Aechmophorus occidentalis)

Based on the desktop review, the subject site contains no suitable habitat. Species prefers open water with large marshlands. However, due to its location near Simmo and Moosehills Lakes, the subject site may be used as a flight corridor. The lakes and wetland to the north contain suitable habitat.

#### Western Wood-Pewee (Contopus sordidulus)

Based on the desktop review, the subject site contains suitable habitat for this species. Depending on composition, the forested areas within the subject site may provide habitat, especially on the east side, bordering the waterway.

#### Little Brown Bat (Myotis lucifugus)

Based on the desktop review, the subject site may contain suitable habitat for this species. Depending on occurrence of snag trees, maternity colonies may exist within the subject site. The watercourse on the east side of the subject site, as well as its proximity to the wetlands and lakes to the north, also provide foraging habitat for this species.

#### Long-tailed Weasel (Mustela frenata)

Based on the desktop review, the subject site contains suitable habitat for this species. Depending on the composition and density of small mammals and birds, the subject site may be used as habitat for foraging.

#### Northern Long-eared Bat (Myotis septentrionalis)

Based on the desktop review, the subject site may contain suitable habitat for this species. Depending on occurrence of snag trees, maternity colonies may exist within the subject site. The watercourse on the east side of the subject site, as well as its proximity to the wetlands and lakes to the north, also provide foraging habitat for this species.

#### Canadian Toad (Bufo hemiophrys)

Based on the desktop review, the subject site may provide suitable habitat for this species. A key wildlife and Biodiversity Zone associated with Simmo Lake and the wetlands to the west of Simmo Lake occupy the eastern half of the subject site. A small watercourse runs toward the north across the east side of the subject site. These areas are potential habitat for all life stages of this species. The forested habitat in the northeast as well as the southwest corner could provide overwintering habitat for Canadian toad hibernacula.

#### Northern Leopard Frog (Lithobates pipiens)

Based on the desktop review, the subject site may provide suitable habitat. A key wildlife and Biodiversity Zone associated with Simmo Lake and the wetlands to the west of Simmo Lake occupy the eastern half of the subject site. A small watercourse runs toward the north across the east side of the subject site. These areas are potential habitat for all life stages. Less dense areas of the grassland located within the subject site may also provide adult foraging habitat.

#### Lake Sturgeon (Acipenser fulvescens)

Based on the desktop review, the subject site may provide suitable habitat for larval and young of year life processes and foraging, due to the presence of a watercourse on the east side of the site.

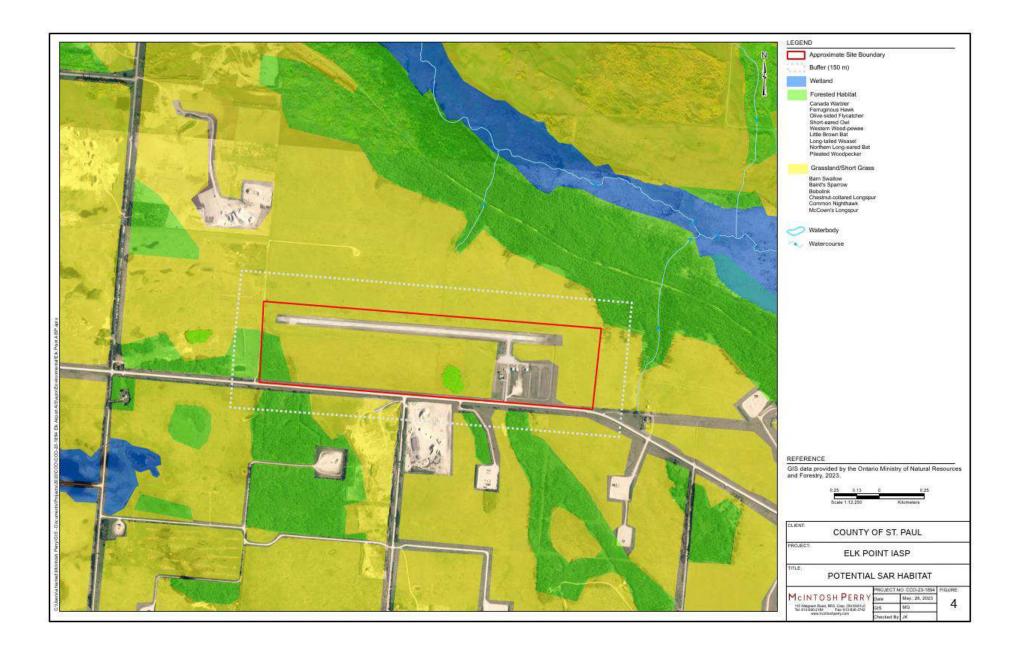
The watercourse on the east side of the subject site may provide habitat for the following additional fish species: Longnose Sucker (*Catostomus Catostomus*), Mooneye (*Hiodon tergisus*), Northern Pike (*Esox lucius*), Quillback (*Carpiodes cyprinus*), Shorthead Riverhorse (*Moxostoma macrolepidotum*), Silver Riverhorse (*Moxostoma anisurum*), Walleye (*Sander vitreus*), and White Sucker (*Catostomus commersonii*). All of these species are listed within the Province of Alberta as 'Secure' or 'Undetermined'. None of these species have status through the SARA or COSEWIC.

#### **Recommendations**

Based on a review of the habitats associated with the subject site, it is not anticipated that the following species will be encountered within the subject site or associated with the structures within: American White Pelican, Black Tern, Clark's Grebe, Horned Grebe, Piping Plover, Trumpeter Swan, and Western Grebe.

However, habitat may be present within the subject site for the following: Lake Sturgeon, Canadian Toad, Northern Leopard Frog, Baird's Sparrow, Barn Swallow, Bobolink, Canadian Warbler, Chestnut-collared Longspur, Common Nighthawk, Ferruginous Hawk, Great Blue Heron, McCown's Longspur, Olive-sided Flycatcher, Pileated Woodpecker, Short-eared Owl, Western Wood-Pewee, Little Brown Bat, Long-tailed Weasel and Northern Long-eared Bat. Provided a minimum 50 m (larger is preferred) buffer is maintained from the study area wetland and watercourse it is not expected that there would be significant impacts to the SAR associated with the aquatic habitat.

If a smaller Plan Area were to be proposed such as that found in **Figure 4** several of the forested species would also not likely be impacted by the proposed works. Figure 4 outlines the species that would need to be considered for a field investigation of the existing habitat in this situation, however the critical habitat of most of these species will remain undisturbed and feeding habitat would likely remain available.



It is our recommendation that an additional investigation in the form of a single field survey be conducted for verification of SAR habitat with the potential for SAR species to be observed. This single field survey should be conducted during the growing season and would be beneficial to be completed within appropriate breeding windows for avian species. Targeted surveys may be required to determine the presence of SAR if the single field survey determines that the habitat on site is suitable for specific species.

#### **Conclusion**

The results of the Desktop Biophysical Review have determined the potential presence of multiple habitats as well as the potential for numerous SAR species to utilize the subject site of the Elk Point Airport, located at 6023 AB-646, Lindbergh, Alberta. To adequately identify the usage of the subject site by wildlife and SAR, further investigations are required. Once presence and usage are evaluated, additional inferences can be made to determine the potential impacts as a result of the Intermunicipal Area Structure Plan.

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## Appendix D - Stormwater Management and Servicing Options Statement

# STORMWATER MANAGEMENT AND SERVICING OPTIONS STATEMENT TOWN OF ELK POINT AREA STRUCTURE PLAN ELK POINT AIRPORT, AB



Project No.: CCO-23-1894

Prepared for:

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July 2023

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## STORMWATER MANAGEMENT AND SERVICING OPTIONS STATEMENT TOWN OF ELK POINT AREA STRUCTURE PLAN ELK POINT AIRPORT, AB

CCO-23-1894

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McINTOSH PERRY iii

#### 1.0 INTRODUCTION

McIntosh Perry Consulting Engineers Limited (McIntosh Perry) and HM Aero Aviation Consulting (HM Aero) have been retained by the Town of Elk Point, the County of St. Paul No. 19, and St. Paul / Elk Point Economic Development Alliance (STEP) to provide engineering design services in support of the Intermunicipal Area Structure Plan (IASP) for the Elk Point Airport, Alberta. The project has been divided into four main phases, over which the potential uses, economic opportunities, and implementation strategy to support the future development of the project lands will be analyzed and provided. The project consists of the addition of multiple private and commercial aviation areas, as well as the corresponding services and access roadways.

#### 2.0 PURPOSE

The main purpose of this report is to provide an overview of the potential options for servicing the airport development in accordance with the recommendations and guidelines from County of St. Paul, while considering the parameters defined by the Plan Area Analysis Report and the Economic Opportunities Report prepared by HM Aero Aviation Consulting in March 2023.

Through this report, MP will provide recommendations on the types of servicing that are suitable for the development. Typically, there are three main types of servicing to consider:

- Private:
- Communal; and
- Municipal.

It is understood that where municipal sewage services and municipal water services exist, they are the preferred form of servicing for settlement areas. Intensification and redevelopment within settlement areas on existing municipal sewage services and municipal water services should be promoted, wherever feasible.

Where municipal services and municipal water services are not provided, municipalities may allow the use of private communal sewage services and private communal water services.

Where municipal sewage services and municipal water services or private communal sewage services and private communal water services are not provided, individual on-site sewage services and individual on-site water services may be used provided that site conditions are suitable for the long-term provision of such services with no negative impacts. In settlement areas, these services may only be used for infilling and minor rounding out of existing development.

Communal water and sewage systems are shared facilities for the treatment and distribution of water and the collection, treatment, and disposal of sewage, respectively. These systems are not connected to a Municipal System. For communal development, the Municipality is responsible for ownership of these systems.

Where a development is not connecting to full municipal services in a settlement area, a Servicing Options Statement is generally requested. The Servicing Options Statement demonstrate that the option to connect to full municipal and/or communal services was investigated and determines:

- An evaluation of the proximity of existing or committed full municipal services or communal services and the ultimate potential for future connection to full municipal services for the whole area proposed for development;
- Where a development application is known or anticipated as being one of a number of proposals for
  the same development area, the evaluation of servicing options should not be isolated to the sitespecific proposal, but should be completed within the context of the development potential for the
  whole area as determined through consultation with the municipality and based on proposed or
  existing municipal servicing plans and growth management objectives;
- An overview of the environmental suitability of the site for the proposed services, which generally addresses:
  - Environmental constraints;
  - Suitability of the terrain;
  - o Performance of services in similar developments in the surrounding area; and
  - o The scale, density and type of use proposed.
- Evaluation of the relative potential and merit of each service option to serve the proposed development; and
- Documentation of the decision-making process and rationale that led to the determination of the servicing option proposed.

In addition to the servicing component, this report will also review and confirm the stormwater management impacts and mitigation methods proposed to facilitate the redevelopment of the site.

#### 3.0 SITE DESCRIPTION

The subject property is located on Highway 646 in the County of St. Paul, Alberta. It consists of 253 ha of land situated approximately 8 km southeast of the Town of Elk Point. It has been subdivided into five areas, being the Western, Northern, Southern, Eastern, and Core Lands. The subject site is bounded by Alberta Highway 646 to the south, a mixture of grass and woodlands to the east, a mixture of grass, woodlands, and an aggregate pit to the north, and Range Road 62 to the west. The Site Location Plan is included in Figure 1.

The focus of this Servicing Options Statement will be on the development of the Core Lands, which contain the existing airport infrastructure, including the runway, a terminal, a residence, and three hangars. It also contains the areas for further development, including the commercial aviation lots, private airside lots, as well as corresponding services and access roadways. Access is proposed to be facilitated through an existing driveway off Alberta Highway 646 and the addition of access roads in the southern portion of the Core Lands connected to the existing driveway.

The existing services include but are not limited to stormwater drainage, drinking water (well), sanitary (septic), natural gas, and electrical. Design considerations will be based on the latest versions of the Town of St. Paul Engineering Design standards (December 2009).

#### 4.0 BACKGROUND INFORMATION

The Elk Point Airport Plan Area Analysis Report (March 2023), prepared by HM Aero, serves as a comprehensive assessment of the constraints and limiting factors pertaining to the proposed expansion of the Elk Point airport, which is a significant component of the St. Paul/Elk Point Economic Development Alliance (STEP). The expansion plan entails the incorporation of 28 private hangars and four (4) aviation commercial buildings, alongside the existing infrastructure consisting of one (1) residence, one (1) terminal, and three (3) hangars.

#### 5.0 ENVIRONMENTAL SUITABILITY AND EVALUATION

#### 5.1 Suitability of Terrain

#### 5.1.1 Terrain

The property is bounded by oil well and a quarry to the northwest, pasture to the east and a mix of forested and sparsely treed pasture area to the west and the Highway 646 to the south. The proposed property is approximately 250 hectares.

The existing property is generally sloped towards the northeast direction, where it enters the Moosehill Wetland Complex, which flows from west to east toward the Simmo Lake. The site topography of the property is characterized by relatively gentle slopes for the majority of the area, with a notable valley situated northeast of the property that slopes towards the Moosehill wetland complex. The elevation across the site varies, ranging from 610.15 meters at the southwest boundary to 554.0 meters at the northeast boundary.

#### 5.1.2 Soils

McIntosh Perry has completed a preliminary review of the Soil survey (Alberta Soil Survey Report,1993) for the County of St. Paul to evaluate the suitability of the soil conditions to service the proposal development. The subject area is located within the Eastern Alberta Plain physiographic region and Lea Park bedrock geological formation characterized as gray marine claystone containing minor amounts of silt and fine-grained sand. The evaluation was limited to the available soil survey data and upon further confirmation of the proposed layout is recommended to warrant an on-site hydrogeological and terrain assessments to further investigate the soil feasibility to service the development.

#### 5.1.3 Groundwater Supply

As part of the detailed design phase, it will be necessary to conduct a hydrogeology study to assess the groundwater conditions and determine the availability and quality of groundwater within the aquifer system. This study will be crucial in establishing whether the aquifer system can adequately meet the water demands of the proposed development while ensuring that the groundwater supply meets acceptable drinking water

quality standards or may need additional treatments. Based on our understanding, no existing concerns were brought forward from the project team and given the minimal usage of an airport in comparison to a rural estate lot subdivision, groundwater supply is not anticipated to be a concern at this time.

#### 5.2 Performance of Services in Similar Developments

The nearest municipal services are approximately 8 kilometres west of the proposed development in Elk Point.

There are no communal services within the existing subdivision immediately adjacent to the proposed airport complex. Private wells and septic systems are a common and practical means of servicing development within these and neighbouring rural areas. Outside of urban areas where existing servicing systems are in place, it is typical for residential and commercial sites within rural areas to rely on private services for their water, sewage, and other necessary utilities.

#### 5.3 Suitability of Development

#### 5.3.1 Municipal

Extending municipal services to the proposed development is not economically viable. The proposed development will only have four (4) commercial lots and the closest municipal services are 8 kilometres away. To facilitate the extension of existing Municipal Servicing, there would be extensive cost and timing impacts anticipated. At a minimum, the following mandatory tasks are anticipated to extend the existing municipal services:

#### Pre-design

- Topographical Survey,
- · Geotechnical investigation,
- · Confirmation if pumping stations are required, and
- Confirmation of the desire of the Municipality to construct and maintain those elements in perpetuity, etc.

#### Design

- · Municipal design of the extension,
- · Review of utility conflicts,
- · Review of rock elevations, and
- Pump/pressure stations, etc.

#### Construction

- Construction and reinstatement of municipal water and sanitary extension and municipal roadway,
- Traffic control, and
- Temporary widening / staging impacts etc.

For reference, the pipe installation alone was reviewed over the 8km section, at unit rates of \$780/m and \$584/m for watermain (150mm) and sanitary sewer (200mm) respectively, the costs for the pipe extensions alone would exceed \$11,000,000. The additional elements noted above, have the potential to more than

double that estimate. Based on the above, the need to extend services to handle future growth 8 kilometres outside the limits of Elk Point is unwarranted at this time.

#### 5.3.2 Communal Servicing

For communal servicing to function properly, the development would require a more compact lot layout with high occupancy rates.

Communal servicing is not recommended for the following reasons:

- The development is not compact, (i.e., rural commercial lots with minimal servicing requirements);
- The scale of the development is below the threshold to make it economical; and
- All development in the immediately surrounding area has taken place on private water supply and sewage disposal systems. Resources to operate and maintain communal servicing is non-existent for this area.

Communal servicing is broken down into communal well and septic services:

Private wells and communal wells are more or less the same costs to drill, however, the pump for communal wells is the more costly. In addition, a communal well will require water services to be run to the various locations with applicable valves and piping, which may not be as economical given the distance from along the 4 servicing lots. The area is not large enough to have a watermain with services off the main, as is typical in an urban subdivision.

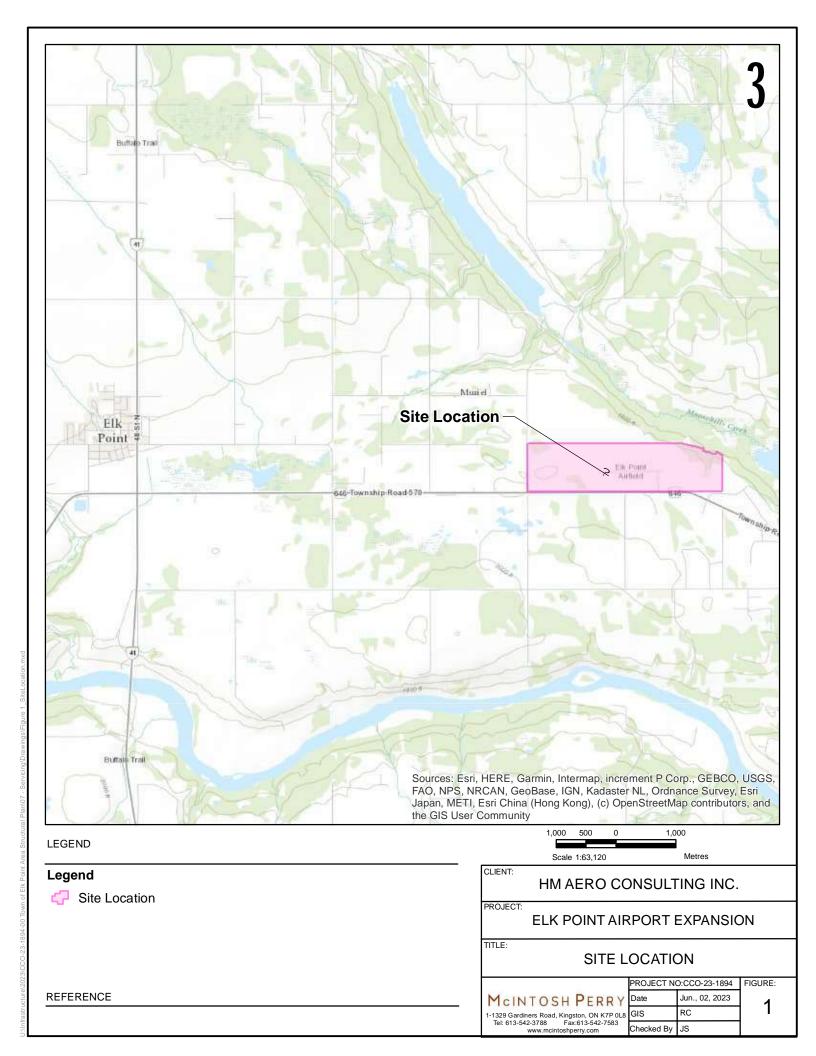
The major cost though is not only the construction costs but, the up-keep and maintenance on the system in perpetuity. This can be challenging as the Airport does not likely have staff on hand to manage such work. The hard cost of the communal well and services to the 4 lots is anticipated to be in the range of \$100,000 - \$150,000 depending on depth of drilling required. The cost to permit the commercial lots to be on private services to the Airport is \$0, and would be borne completely by the developer of that land.

Private septic vs. communal septic is similar in that the costs to construct. But the maintenance in perpetuity again is the biggest drawback. It is difficult to confirm costs of the system without knowing the use of the lots. Typical rates of \$15-\$25/L of system can be seen whether private or communal, however the piping, maintenance holes and pump stations would all have to be factored in once the grading plan is complete. Unlike the wells, sanitary is typically designed such that it is gravity fed. Another major drawback to the small communal systems is that the grading will need to be confirmed or each commercial lot acceptable to install a pump station on site, which again comes with maintenance and concerns.

The hard costs of the communal septic system, piping, maintenance holes are anticipated to be in the range of \$250,000 to \$500,000 depending on the underlying soils, rock depth, imported material, pump station requirements etc. The costs to the Airport to permit private services is \$0, and would be borne completely by the developer of that land.

#### 5.3.3 Private Servicing

The proposed development is suitable for private services since there are only four (4) commercial lots proposed to require servicing. Based on the available information, the existing structures appear to be serviced privately, and the current servicing arrangements seem to be sufficient to meet the demands of the facilities. The costs for private servicing, similar to a rural subdivision is passed onto the purchaser of the lots. The Airport would not be anticipated to install these features, which provides the purchaser more flexibility in their overall lot design once purchased.



#### 6.0 EXISTING SERVICES

The existing residential dwelling unit and terminal building are serviced by well and septic systems located between the two buildings. The septic system outlets approximately 90m to the west of the tank. The remaining hangars on the property are not currently serviced by wells or septic systems.

The subject property is currently serviced by a system of open ditches and culvert crossings, which effectively collect and convey stormwater runoff towards designated outlets. Section 8.0 of this report focuses on the stormwater management aspects of the site and offers additional details regarding the outlets and their associated considerations.

The airport is currently being serviced by natural gas lines which run from west to east along Highway 646. Additionally, there is a valve located in the Southern Lands and a 200-series meter located within the Core Lands. The service line diameter is 3" prior to the valve, which then transitions to a line with a diameter of 1" before passing the development area. The potential to increase the 1" diameter segment of the service line to support the proposed development plan can be further investigated if necessary.

Electrical service is currently provided to the property through a single-phase electrical line that is extended from a three-phase overhead line along Highway 646.

Locations of the communication utilities have not been received, but will be reviewed and service locations will be coordinated prior to the detailed design.

Currently, Highway 646 has existing natural gas and electrical/communications, however, no municipal water, municipal storm sewers or municipal sanitary exists to service the property.

#### 7.0 SERVICING PLAN

#### 7.1 Watermain Design

The water servicing for the site is proposed to be provided by groundwater wells. Four (4) potable water wells are anticipated to be needed for the servicing based on the proposed layout of the site. Each well will provide water to a commercial aviation lot on the westerly side of the development. The exacts number of wells needed for the development, as well are their locations, will be confirmed during detail design.

Water servicing shall be in accordance with the Town of St. Paul Design Standards (2009). The service shall include a minimum cover of 2.70m below the finished grade.

It is noted that the site currently lacks fire department connections, however, once the proposed development's footprint and building envelopes are determined, opportunities to incorporate fire protection systems like on-site cisterns will be evaluated.

Design parameters for the water system is given in the Table 1.

Table 1: Water Design Parameters (Town of St. Paul Design Standards, 2009)

Parameter	Total
Consumption Rate	22,500 L/Ha/d
Maximum Day Peaking Factor	2.0
Maximum Hour Peaking Factor (2.0 X Max Day)	4.0
Average Daily Demand (Per commercial lot)	0.08 L/sec
Maximum Daily Demand (Per commercial lot)	0.16 L/sec
Peak Hour Demand (Per commercial lot)	0.31 L/sec

#### 7.2 Sanitary Sewer Design

The proposed sanitary service for the site will be provided by septic system(s) throughout the property. As previously mentioned, the existing septic system is located between the residential dwelling unit and the terminal building. Potential options for expansion will be coordinated prior to the detailed design.

Based on the proposed commercial development layout, the potential locations for four (4) septic systems are marked within the site-servicing options plan. The site-servicing options plan can be found in Figure 3 of Section 8.2 for reference and consideration. Detailed sizing and servicing connections for these septic systems will be developed during the detailed design.

Sanitary demand design parameters are estimated from the Town of St. Paul Design Standards (2009) and summarized in the Table 2.

Table 2: Sanitary Design Parameters

Parameter	Total
Total Commercial Lot Area	2.40 ha
Total Population	60 Persons
Peaking Factor (Based on Harmon's Equation)	3.0
Wet Weather Inflow and Groundwater Infiltration Allowance	0.12 L/sec
Peak Sewage Flow	1.44 L/sec
Total Estimated Peak Wet Weather Flow	1.56L/sec

#### 7.3 Storm Sewer Design

The proposed major and minor storm servicing for the site will be provided by means of open roadside ditches and grass swales connected using culvert crossings under roadways. Section 8 – Stormwater Management will

elaborate the proposed stormwater management (SWM) strategy to facilitate the development. At this stage, a Stormwater Management (SWM) plan has been developed to evaluate the feasibility of the development and identify appropriate best management practices (BMPs), while more specific information concerning pre and post development flow rates, outfalls, ditching, as well as quality and quantity controls, will be provided during the detailed design stage.

#### 7.4 Gas/Electrical/Communications

It is expected that a new service connection for the natural gas, electrical, and communication services can be extended from the municipal right-of-way. As the design is further developed, an electrical and mechanical engineer will be required to confirm the servicing load and whether a new service is required to be brought in or simply extended.

It has been noted that the potential to upsize the diameter of the 1" existing natural gas service line running across the development area can be explored based on confirmation of the current and required capacities. Given the spatial area of the buildings on site, it may be more efficient to have individual servicing (propane tanks) for each private hanger structure, in comparison to the excavation and extension of servicing to all the different units. This will be further explored in detailed design, however, given the possibility of individual servicing, gas availability is not believed to be a concern.

#### 8.0 STORMWATER MANAGEMENT

The proposed stormwater management system will be designed in accordance with the Stormwater Management Guidelines for the province of Alberta (January 1999) to address four (4) key concerns associated with the receiving drainage systems.

- Water Quantity (addresses flooding concerns);
- Water Quality (addresses pollution and contamination concerns);
- Erosion Potential (addresses in-stream erosion concerns); and
- Baseflow Augmentations (addresses groundwater recharge and in-stream low-flow maintenance concerns).

The proposed development will have an increase in impervious areas which may increase the runoff leaving the subject property. The proposed development may also contribute to increased suspended solids in the storm runoff, which may deteriorate the quality of runoff leaving the site. As such, the following design criteria are anticipated to advance the proposed development with no adverse impacts on the receiving drainage systems.

- Water quantity controls are anticipated to attenuate the 2-,5-,25- and 100-year design storm events in the post-development conditions to pre-development flow levels.
- Water quality controls of Level 1 Protection based on the findings from the Plan Area Analysis Report, March 2023.

- Onsite temporary and permanent erosion and sediment control measure shall be required to minimize sediment transport during and after construction.
- To enhance baseflow augmentations and to promote groundwater recharge, measures will be taken to prevent any runoff from occurring during a 5mm storm (i.e.: the 5mm storm will remain on site).

#### 8.1 Pre-Development Drainage

Under the existing conditions, the subject site was delineated into four (4) catchments based on their divides, valleys, and outlet locations using site-specific LiDAR data. The pre-development drainage plan illustrating the catchment boundaries and other drainage characteristics is included in Figure -2.

Catchment area A1 is comprised of the Southern Lands and most of the Core Lands. It is covered by grasslands and some wooded areas, as well as of the majority of the existing development on subject property. It contains a portion of the aircraft runway, the apron, three (3) hangers, an access roadway, a terminal, and a residential dwelling. Runoff generated within this catchment is split by a local divide, however ultimately sheet drains in a south-easterly direction and is collected by a roadside ditch along Highway 646. This roadside ditch conveys runoff in an easterly direction, before turning north and outletting to a low-lying wetland area known as the Moosehills Creek Wetland Complex (the wetland).

Catchment area A2 is comprised of the remaining portion of the Core Lands, as well as the Northern and Eastern Lands. It contains the remaining portion of the aircraft runway, farming and residential structures, a gravel access driveway, grasslands, woodlands, and farmlands. Runoff generated withing this catchment is also split by local divides, but generally drains in a northerly direction towards the wetland.

Catchment area A3 is comprised of the northern portion of the Western Lands. It is mainly covered by grasslands, but also contains woodlands and some gravel areas. Runoff generated in this catchment area will generally drain in a northerly direction off of the property towards the adjacent aggregate pit.

Catchment area A4 is comprised of the southern portion of the Western Lands. It is covered by grass and woodlands, as well as small gravel areas, a residential dwelling, and a pond. Runoff generated in this area will generally flow in a southeasterly direction. It is then collected by the Highway 646 roadside ditch, which flows east and eventually outlets to the wetland.

#### 8.2 Post-Development Drainage

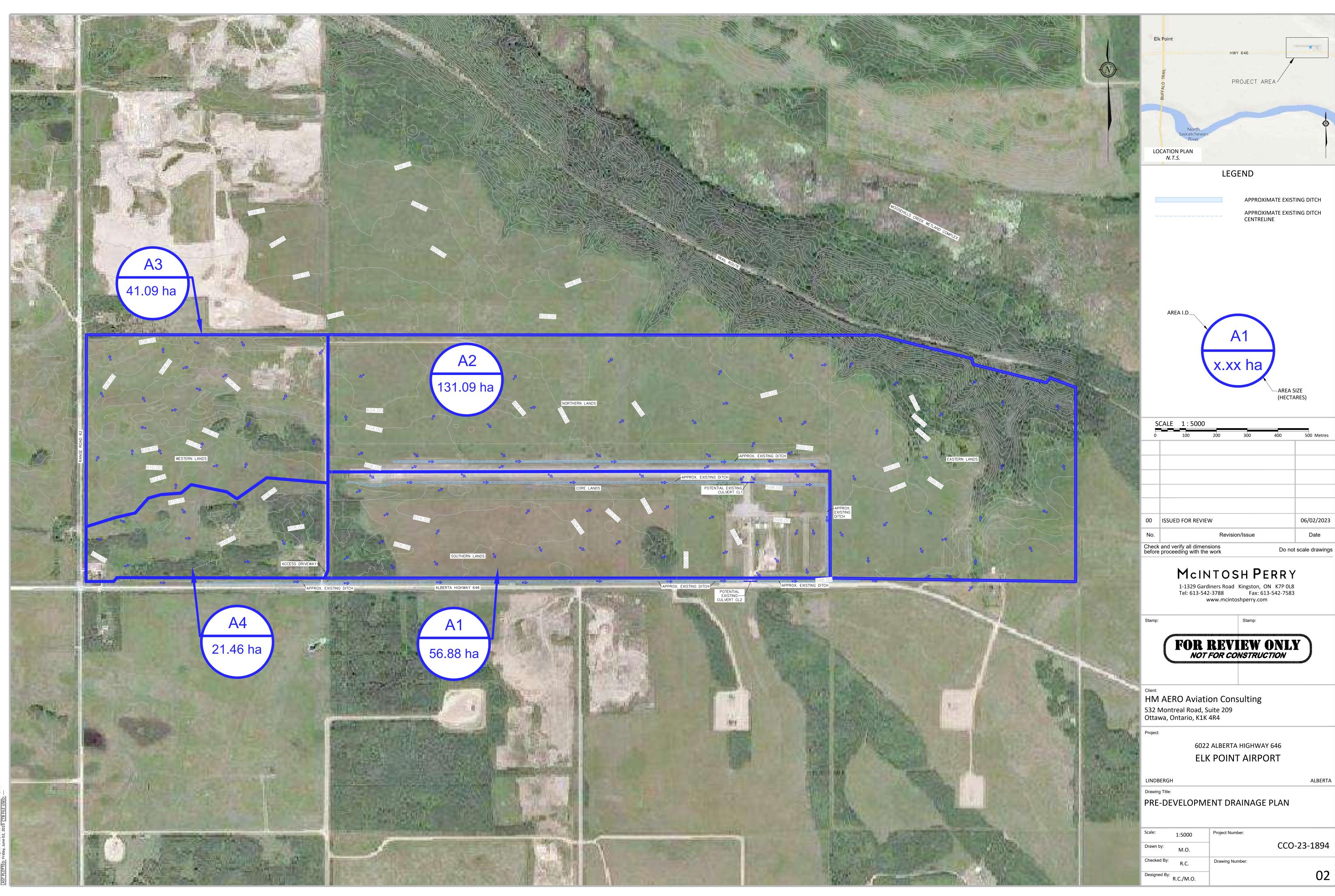
Under the proposed conditions, the subject site was delineated into four (4) catchments based on their divides, valleys, and outlet locations using site-specific LiDAR data. The post-development drainage plan illustrating the catchment boundaries and other drainage characteristics is included in Figure 3.

Catchment area B1 represents catchment area A1 under proposed conditions. Private and commercial aviation structures will be constructed, along with the corresponding utility services and access roadways. Runoff generated in this catchment will be directed to a series of proposed roadside ditches. It will then be conveyed in a southern direction across the development towards the Highway 646 roadside ditch.

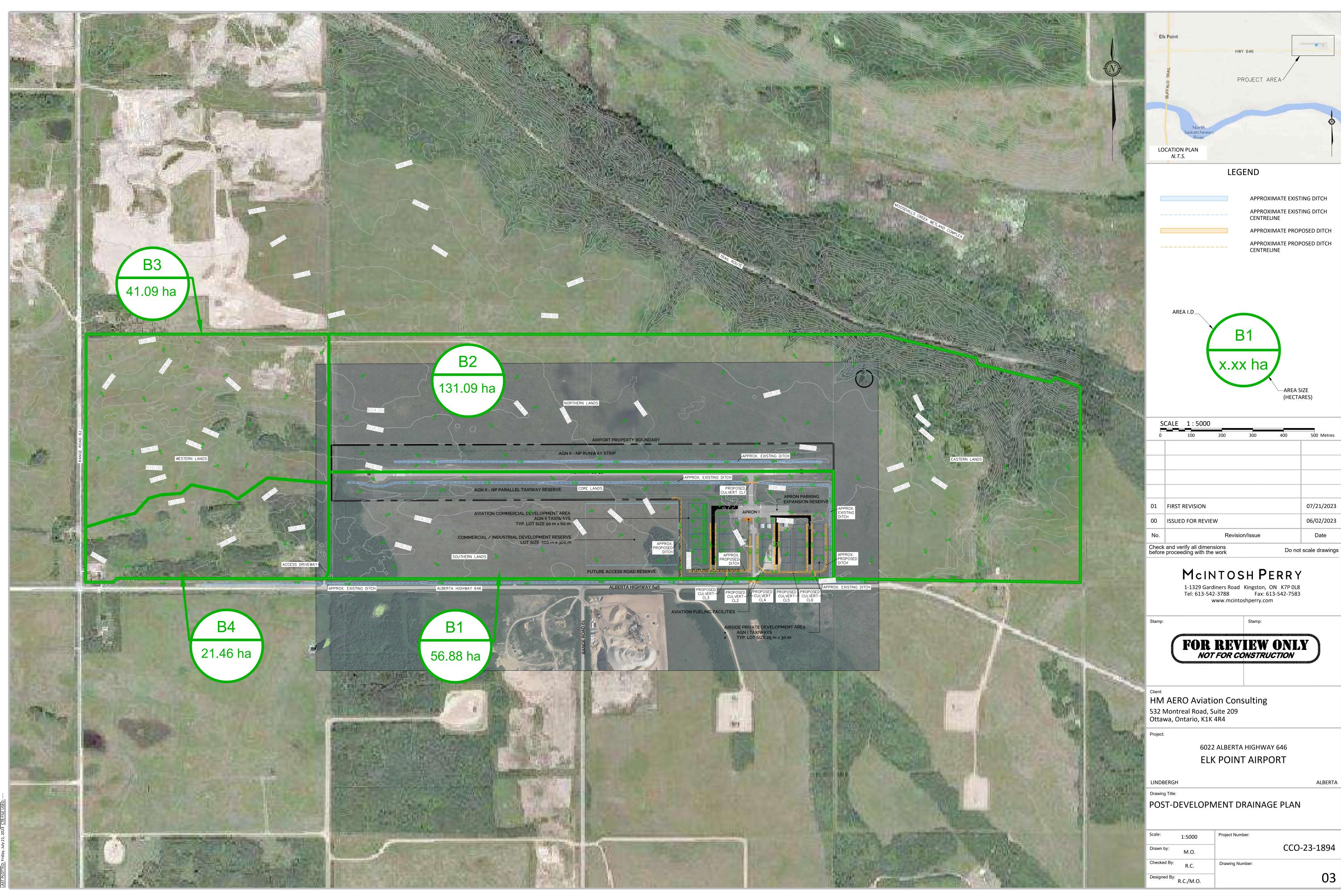
## STORMWATER MANAGEMENT AND SERVICING OPTIONS STATEMENT TOWN OF ELK POINT AREA STRUCTURE PLAN ELK POINT AIRPORT, AB

CCO-23-1894

Catchment areas B2, B3, and B4 represent catchment areas A2, A3, and A4, respectively, under post-development conditions and will not be altered. Runoff generated in these catchments will continue to drain as in existing conditions and will ultimately outlet to the wetland.



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#### 8.3 Stormwater Management Practice Selection

A high-level stormwater management feasibility assessment was completed to evaluate the most suitable Best Management Practices (BMPs) for the proposed development according to the preliminary assessment of the pre- and post-development drainage areas. Based on the proposed plans, the expansion at Elk Point Airport will be limited to the Core Lands. As a result, the implementation of Best Management Practices (BMPs) is deemed necessary within this specific area. The lands to the north, south, east, and west will remain in their existing conditions, and thus, no additional or new services will be required for those areas.

At present, runoff generated within the Core Lands is collected and conveyed through a system of roadside ditches and culverts. As part of the proposed stormwater management strategy, the performance of these existing features will be evaluated. If necessary, additional improvements will be incorporated to effectively accommodate the anticipated development expansion. This approach aims to assess the effectiveness of the current drainage infrastructure while considering any enhancements required to ensure efficient stormwater management within the Core Lands of the Elk Point Airport.

Table 3 presents a concise summary of the site-specific best management practices (BMPs) that have been identified as appropriate measures to achieve the required quality and quantity controls for the Elk Point Airport expansion. These BMP features are specifically developed to minimize any potential adverse impacts on the receiving drainage systems.

Table 3 – Stormwater Management - BMPs Feasibility

BMP Feature	Remarks	Limitations
Grass Swales	<ul> <li>Quantity control can be achieved by incorporating a flow control</li> <li>Quality control can be achieved by creating a flat bottom with gentle gradient</li> <li>Viable option for quality and quantity control</li> </ul>	<ul> <li>Require flat terrain and gentle gradient</li> <li>Require seasonal and annual maintenance</li> </ul>
Dry Detention Basins	<ul> <li>Quantity control can be achieved by incorporating a flow control</li> <li>Viable option for quantity control</li> <li>Not a stand-alone option for quality control but can be used in combination with other systems.</li> </ul>	<ul> <li>Requires flat terrain and open available area</li> <li>Requires seasonal and annual maintenance</li> <li>May cause ponding issues</li> <li>Depending on the drawdown period may attract waterflow</li> </ul>

On-lot Infiltration Systems	<ul> <li>Quality control can be achieved by allocating sufficient volume for infiltration</li> <li>Viable option for quality control and base flow augmentation</li> <li>Not a viable stand-alone option for quantity control but can be used in combination with other systems.</li> </ul>	<ul> <li>Require suitable geotechnical conditions</li> <li>Not feasible for sites with shallow bedrock and/or seasonal groundwater tables</li> <li>Requires periodic maintenance and upkeep</li> </ul>
Combination of Grass swale with infiltration system (Preferred Solution)	<ul> <li>Check dams will be incorporated to control flow</li> <li>Quality control can be achieved by creating a flat bottom with gentle gradient in combination with an infiltration trench</li> <li>Viable option for quality, quantity controls and baseflow augmentation</li> </ul>	Similar limitations to     Grass Swales and     Infiltration Systems

The implementation of the recommended best management practices (BMPs) outlined above will enable to meet the required quality and quantity control requirements for the Elk Point Airport expansion. The specific size and location of these BMP facilities will be determined and finalized during the detail design phase, which will include the preparation of a site plan encompassing the building envelope and other associated services. This phase will allow for a comprehensive evaluation of the site's requirements, ensuring that the BMPs are strategically located and adequately sized to effectively manage stormwater and minimize any potential adverse impacts on the surrounding environment.

#### 9.0 CONCLUSION / RECOMMENDATIONS

MP has undertaken a comprehensive review of potential options for servicing the airport development, aligning with the recommendations and guidelines provided by the County of St. Paul. This evaluation takes into account the parameters and considerations outlined in the Plan Area Analysis Report and the Economic Opportunities Report. The following recommendations are put-forth to service the proposal expansion.

Private services are the preferred option for the proposed subdivision based on the following:

- Municipal services are not an option at this time, since they are confined to a neighbouring municipality, approximately 8 km away and the development is only four (4) lots which require servicing.
- Due to the size of the development and the fact that private services have a satisfactory performance record in the area, communal services are not recommended.
- The proposed privately serviced development is not anticipated to have any negative impacts on the neighbouring properties. A Hydrogeological and Terrain Assessment will be required to confirm that the development will not cause any water supply issues.

- Fire flow requirements will need to be reviewed to ensure the sufficient flow is available during a fire scenario and on-site cisterns or similar systems will be designed based on the building envelopes.
- A site-specific stormwater management plan will be developed with best management practices such as grass swales and dry detention basins to achieve the necessary quality and quantity controls.

Based on the information presented in this report, the expansion of the Elk Point airport is deemed feasible, and we recommend that the Town of Elk Point consider implementing on-site private services to cater to the proposed development.

As for next steps, a detailed site servicing and stormwater management plans will be designed and developed to service the development expansion.

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#### 10.0 STATEMENT OF LIMITATIONS

This report was produced for the exclusive use of Elk Point Airport expansion, part of St. Paul/Elk Point Economic Development Alliance (STEP). The purpose of the report is to assess the servicing and stormwater management options for the proposed development and provide recommendations and designs for the post-construction scenario that comply with the local and provincial guidelines and standards. McIntosh Perry reviewed the site information and background documents listed in Section 4.0 of this report. While the previous data was reviewed by McIntosh Perry, no field verification/measures of any information were conducted.

Any use of this review by a third party, or any reliance on decisions made based on it, without a reliance report is the responsibility of such third parties. McIntosh Perry accepts no responsibility for damages, if any, suffered by any third party as a result of decisions or actions made based on this review.

The findings, conclusions and/or recommendations of this report are only valid as of the date of this report. No assurance is made regarding any changes in conditions subsequent to this date. If additional information is discovered or becomes available at a future date, McIntosh Perry should be requested to re-evaluate the conclusions presented in this report, and provide amendments, if required.

#### **Appendix E - Traffic Impact Study**

## AREA STRUCTURE PLAN FOR THE ELK POINT MUNICIPAL AIRPORT, ALBERTA TRAFFIC IMPACT STUDY



**Project No.: CCO-23-1894** 

#### Prepared for:

HM AERO Aviation Consulting 532 Montreal Road, Suite 209 Ottawa, ON K1K 4R4

#### Prepared by:

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August 21, 2023

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### 1.0 INTRODUCTION

The Town of Elk Point, in partnership with the County of St. Paul No. 19 (the "Client") via the formation of Intermunicipal Development Plan (IDP) proposes an Area Structure Plan (ASP) which will encompass the Town of Elk Point airport and surrounding area.

McIntosh Perry ("MP") in partnership with HM AERO Aviation Consulting has been retained to prepare a Traffic Impact Study (TIS) for the Area Structure Plan (ASP) for the Town of Elk Point airport (hereinafter referred to as the 'Site'), which is located at 6023 AB-646, Lindbergh, Alberta. The study will focus on determining the impact of the potential future development of the airport and lands within the ASP. The study recommends improvements as necessary for the transportation network, consistent with the municipal roads within the study area and Highway 646.

#### 2.0 PROPOSED DEVELOPMENT

The airport is located on the north side of Highway 646, approximately 550 m east of the Highway 646 and Range Road 61 intersection. The proposed ASP will provide a potential for future development of lands within the study area, allowing the airport to be a strategic asset for the Town and County. Important components of the ASP and IDP is the development and maintenance of a safe, efficient, multi-modal networks to aptly accommodate and transport residents and visitors of both municipalities. The location of the Elk Point Airport, its existing access and surrounding area road network is illustrated in **Figure 2-1**.



Figure 2-1: Project Site and Surrounding Area

#### 3.0 EXISTING CONDITIONS

The existing study area network consists of the roadways identified below. Posted speeds for each roadway was based on GIS data obtained from St. Paul's County GIS portal.

#### 3.1 Existing Road Network

**Highway 646** is a provincial highway under the jurisdiction of Alberta. The roadway runs in the east-west direction and has a two-lane cross-section with one lane per direction. The road is paved with shoulders. Highway was assumed to have a posted speed of 100 km/hr.

Range Road 62 is classified as a collector roadway and is under the jurisdiction of the County of St. Paul. The roadway runs in the north-south direction and consists of a two-lane cross-section with one lane per direction. There are no sidewalks or bike lanes or shoulders on this road. The roadway was assumed to have a posted speed of 80 km/hr.

**Range Road 61** is classified as a country road and is under the jurisdiction of the County of St. Paul. The roadway runs in the north-south direction and consists of a two-lane cross-section with one lane per direction. There are no sidewalks or bike lanes or shoulders on this road. The roadway was assumed to have a posted speed of 80 km/hr.

**Range Road 60** is classified as a country roadway and is under the jurisdiction of the County of St. Paul. The roadway runs in the north-south direction and consists of a two-lane cross-section with one lane per direction. There are no sidewalks or bike lanes or shoulders on this road. The roadway was assumed to have a posted speed of 80 km/hr.

Range Road 55 is classified as a collector roadway and is under the jurisdiction of the County of St. Paul. The roadway runs in the north-south direction and consists of a two-lane cross-section with one lane per direction. There are no sidewalks or bike lanes or shoulders on this road. The roadway was assumed to have a posted speed of 80 km/hr.

**Elk Point Airport Access** is classified as a private road. The roadway runs in the north-south direction and consists of a two-lane cross-section with one lane per direction. The road surface is paved, and the roadway was assumed to have a posted speed of 80 km/hr.

## 3.2 Study Intersections

For the purposes of this study, a total of five (5) study intersections will be assessed. All study intersections are existing intersections, located along the Highway 646 corridor and operate on stop control. Intersections assessed as part of this study are identified below and were reviewed based on desktop analysis:

- Highway 646 and Range Road 62
- Highway 646 and Range Road 61

- Highway 646 and Elk Point Airport Access
- Highway 646 and Range Road 60
- Highway 646 and Range Road 55

**Highway 646 and Range Road 62,** as illustrated in **Figure 3-1**, is a four-leg intersection. All the approaches have a shared left-through-right turning lane. The intersection is two-way stop-controlled with stop signs on Range Road 62. The intersection is in a rural surrounding with two travel lanes, i.e., one lane per direction. East to the intersection, there is access to two residential developments on either side of Highway 646. There are no sidewalk facilities on roadways approaching the intersection or crossings at this intersection.



Figure 3-1: Highway 646 and Range Road 62

**Highway 646 and Range Road 61,** as illustrated in **Figure 3-2,** is a three-leg intersection. West and eastbound approaches consist of a left and right shared through lane respectively, with the Range Road 61 having a shared northbound left/right lane. It is assumed that the stop sign is on Range Road 61. The intersection is in a rural surrounding with two travel lanes, i.e., one lane per direction. East to the intersection, there is access to Elk Point Airport. There are no sidewalk facilities on roadways approaching the intersection or crossings at this intersection.



Figure 3-2: Highway 646 and Range Road 61

**Highway 646 and Range Road 60,** as illustrated in **Figure 3-3**, is a three-leg intersection. West and eastbound approaches consist of a left and right shared through lane respectively, with the Range Road 60 having a shared left/right northbound lane. It is assumed that the stop sign for the intersection is located on Range Road 60. The intersection is in a rural surrounding with two travel lanes, i.e., one lane per direction. The Google Earth imagery shows Range Road 60 continuing north of the intersection; however, the road seems to be undeveloped. There are no pedestrian sidewalk facilities on roadways approaching the intersection or crossings at this intersection.



Figure 3-3: Highway 646 and Range Road 60

**Highway 646 and Range Road 55,** as illustrated in **Figure 3-4**, is a three-leg intersection. West and eastbound approaches consist of a left and right shared through lane respectively, with the Range Road 55 having a shared left/right northbound lane. The intersection has a stop sign on Range Road 55. The intersection is in a rural surrounding the intersection is in a rural surrounding with two travel lanes, i.e., one lane per direction. There are no pedestrian sidewalk facilities on roadways approaching the intersection or crossings at this intersection.



Figure 3-4: Highway 646 and Range Road 55

**Highway 646 and Elk Point Airport Access,** as illustrated in **Figure 3-5**, is a three-leg intersection. The west and east bound traffic approaches consist of a left and right shared through lane respectively and the airport access has a shared left/right southbound lane. The airport access road is assumed to operate under a stop-controlled condition. The intersection is in a rural surrounding and has farmlands within the proximity to the intersection. There are no pedestrian sidewalk facilities on roadways approaching the intersection or crossings at this intersection.

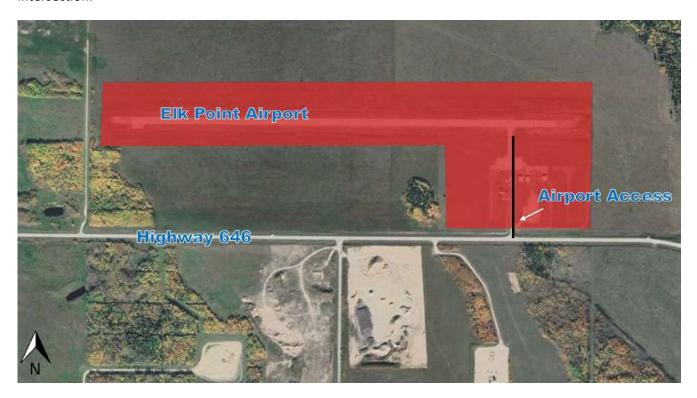


Figure 3-5: Highway 646 and Elk Point Airport Access

## 3.3 Existing Pedestrian and Cycling Facilities

There are no existing sidewalks or bicycle facilities within the vicinity of study area.

## 3.4 Existing Transit System

There is no transit service within the study area.

#### 3.5 Existing Traffic Volume

Traffic volumes for existing conditions were obtained from turning movement counts (TMC) commissioned by MP and conducted by McElhanney Edmonton on May 3, 2023. The collected traffic volume data was found to be satisfactory. Imbalances between study intersections were attributed to farmland/ residential driveways between intersections. Traffic volumes for existing study conditions are provided in **Figure 3-6**Error! Reference source not found. with collected Traffic data used for this study provided in **Appendix B** 

Signalized Intersection

Stop-Controlled Intersection

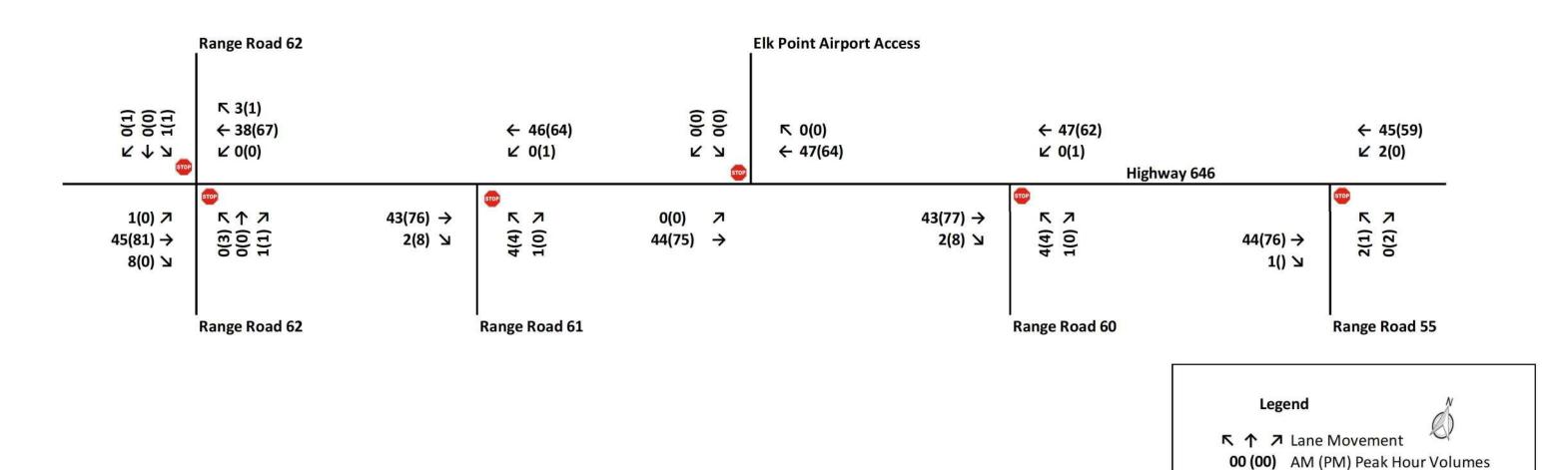


Figure 3-6: Existing (2023) Traffic Volumes

## 3.6 Existing Conditions Traffic Analysis

Study intersection operations were assessed using the Synchro 11 software. Intersection operations performance metrics are reported in terms of Level of Service (LOS), delays, volume-to-capacity (v/c) ratios, and 95th percentile queues. Level of service is based on the average control delay per vehicle for a given movement. Delay is an indicator of how long a vehicle must wait to complete a movement and is represented by a letter between 'A' and 'F', with 'F' being the longest delay. **Table 3:1** summarizes the LOS thresholds for two-way stop controlled (TWSC) intersections as defined by HCM 6<sup>th</sup> edition.

Level of Service (LOS)	Control Delay (seconds/veh)
Α	≤ 10
В	> 10 - 20
С	> 20 - 35
D	> 35 - 55
E	> 55 - 80
F	> 80

Table 3:1: LOS Criteria for unsignalized Intersections

The existing intersection operations were analyzed for the weekday AM and weekday PM peak hours under stop-controlled conditions. Analysis indicates that all turning movements will operate with acceptable LOS and delay during both the AM and PM peak hour periods. The overall operation results are provided in **Table 3:2** and detailed results are provided in **Appendix D**.

Table 3:2: Existing Conditions Intersection Analysis

			AM F	Peak Hou	r		PM F	Peak Hou	r
Intersection	Approach	LOS	v/c Ratio	Delay (s)	Queue (m)	LOS	v/c Ratio	Delay (s)	Queue (m)
	EB-LTR	Α	0.00	8	ı	Α	-	-	-
Range Road 62 &	NB-LTR	Α	0.00	9	3	Α	0.01	10	8
Highway 646	SB-LTR	Α	0.00	9	2	Α	0.00	9	3
Range Road 61 &	WB-LT	Α	-	-	-	Α	0.00	8	-
Highway 646	NB-LR	Α	0.01	10	13	Α	0.01	10	10
Range Road 60 &	WB-LT	Α	-	-	-	Α	0.00	7	-
Highway 646	NB-LR	Α	0.01	10	8	Α	0.01	10	6
Range Road 55 &	NB-LR	Α	0.00	9	3	Α	0.00	9	3
Highway 646	NWB-LT	Α	0.00	7	-	Α	-	-	-

### 4.0 FUTURE BACKROUND CONDITIONS

#### 4.1 Growth rate

An annual 2% growth rate of was applied thought-out the study network for all intersection approach turning movements for the future 2033 and 2043 study 10-year and 20-year horizons to capture typical network growth.

## 4.2 Background Study Area Development

A review of study area development plans and consultation with Town of Elk Point and County of St. Paul No. 19 staff confirmed that there are no development growth plans for the study area, and there has been little to no development growth in recent years.

A review of Elk Point statistics indicate residential growth has been stagnant over the last 5 years (no growth). Over the last 10 years there has been an addition of 25 residential units which occurred between 2013 and 2015 representing a total growth of approximately 3.6 % from 2013. Based on the stagnation in recent years and no development change since 2015, municipal staff have indicated that residential growth beyond 1% is unlikely for current study area up to future 2043 study horizon.

As such, a conservative measure of a 1.5 % residential growth has been applied to existing residential density (a total of 10 units) for the purpose of this study. Traffic associated with these future residential units have been applied to both 2033 and 2043 study horizons as another conservative measure.

A review of population and labour force statistics within the Elk Point community has exhibited a consistent decline in both categories in recent years. As a result, no commercial growth was included for the study area for the assessed study horizons. Municipal statistical trends used to attribute network growth and background study area residential trip development have been provided in **Appendix C**.

## 4.3 Future (2033) Background Traffic Volumes

Background traffic volumes were determined by applying applicable annual growth to existing conditions traffic volumes to the future 2033 horizon and assigning trips generated by the background study area development to the study road network. The future 2033 background traffic volumes are provided in **Figure 4-1**.

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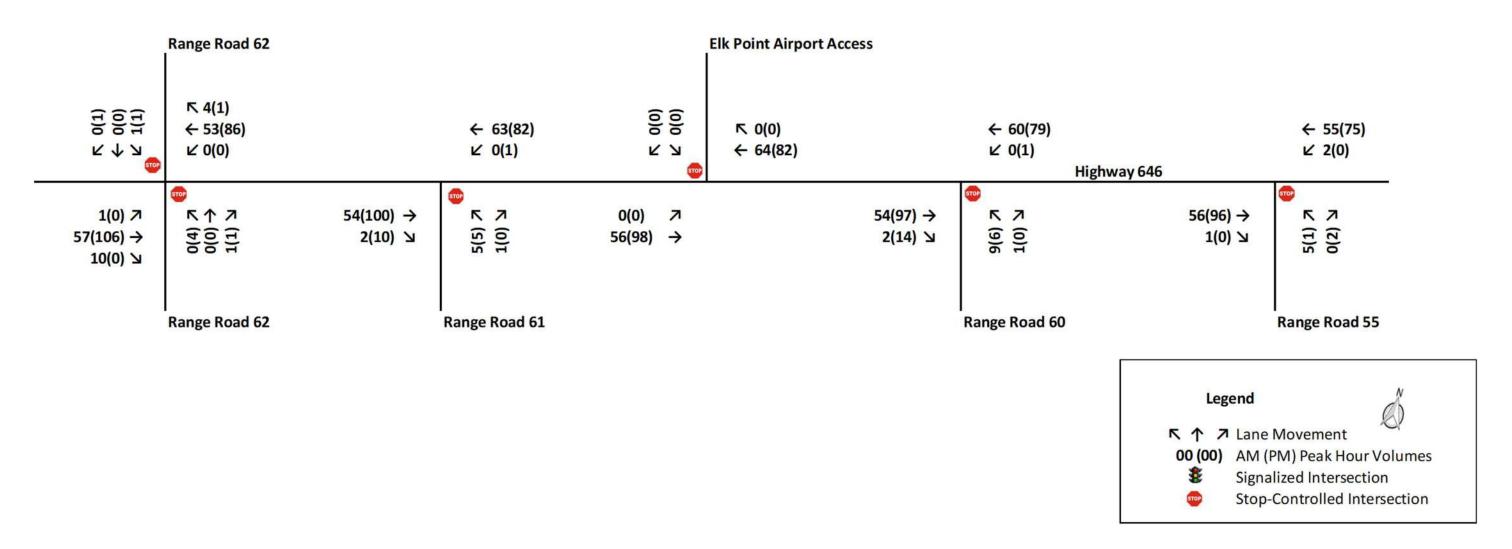


Figure 4-1: Background Traffic Volumes (2033)

## 4.4 Future (2033) Background Conditions Traffic Analysis

Intersection capacity analysis for future (2033) background traffic conditions were completed for study area intersections to determine future operational measures of performance during the AM and PM peak periods.

A summary of intersection operations for future background conditions is provided in **Table 4:1** detailed result is provided in **Appendix D.** 

			AM I	Peak Hou	r		PM I	Peak Houi	r
Intersection	Approach	LOS	v/c Ratio	Delay (s)	Queue (m)	LOS	v/c Ratio	Delay (s)	Queue (m)
	EB-LTR	Α	0.00	8	-	Α	/-	-	-
Range Road 62 & Highway 646	NB-LTR	Α	0.00	9	3	В	0.01	10	8
	SB-LTR	Α	0.00	9	3	Α	0.03	9	3
Danga Dand 61 9 Highway 646	WB-LT	Α	-	-	-,	А	0.00	9	-
Range Road 61 & Highway 646	NB-LR	В	0.01	10	12	В	0.01	11	10
Danga Dand CO 9 Highway CAC	WB-LT	Α	ı	-	<u> </u>	А	0.00	8	-
Range Road 60 & Highway 646	NB-LR	В	0.02	10	13	В	0.01	11	12
Danga Dand FF 9 Highway 646	NB-LR	Α	0.01	9	4	Α	0.00	9	2
Range Road 55 & Highway 646	NWB-LT	Α	0.00	7	-	Α	-	-	-

Table 4:1: Background Conditions (2033) Intersection Capacity Analysis

Intersection analysis for the 2033 future background conditions indicate study intersections will continue to operate good level of service B or better in both the AM and PM peak hours within minimal delay similar to existing condition operations.

Analysis indicate that turning movements at all intersections will operate with significant reserve capacity. As such, network improvements would not be required under 2033 background conditions. With the increase of traffic volumes due to background conditions the network exhibits no operational constraints. The study area has the potential to accommodate increased development given the available capacity along the boundary road network.

## 4.5 Future (2043) Background Traffic Volumes

Background traffic volumes were determined by applying applicable annual growth to existing conditions traffic volumes to the future 2043 horizon and assigning trips generated by the background study area development to the study road network. The Future 2043 background traffic volumes are provided in **Figure 4-2**.

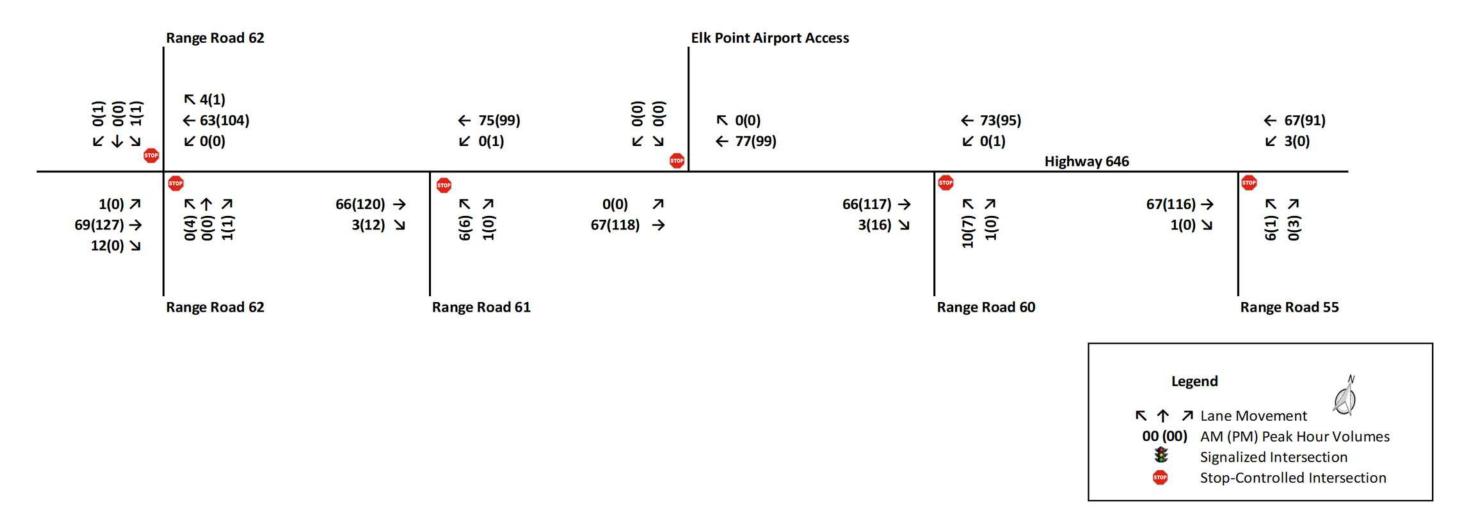


Figure 4-2: Background Traffic Volumes (2043)

## 4.6 Future (2043) Background Conditions Traffic Analysis

Intersection capacity analysis for future (2043) background traffic conditions were completed for study area intersections to determine future operational measures of performance during the weekday AM and PM peak periods.

A summary of intersection operations for future background conditions is provided in **Table 4:2** detailed result is provided in **Appendix D**.

			AMI	Peak Hou	r		PM	Peak Hour	
Intersection	Approach	LOS	v/c Ratio	Delay (s)	Queue (m)	LOS	v/c Ratio	Delay (s)	Queue (m)
	EB-LTR	Α	0.00	8	-	Α	-	-	-
Range Road 62 & Highway 646	NB-LTR	Α	0.00	9	3	В	0.01	11	6
	SB-LTR	Α	0.00	10	3	Α	0.00	10	3
Dance Dand C1 & Highway C4C	WB-LT	Α	-	-	/-/	Α	0.00	9	2
Range Road 61 & Highway 646	NB-LR	В	0.01	10	12	В	0.01	11	12
Dance Dand CO & Highway CAC	WB-LT	Α	-	- 4	-	Α	0.00	8	1
Range Road 60 & Highway 646	NB-LR	В	0.01	10	12	В	0.01	11	10
Dance Dand FF 9 Highway CAC	NB-LR	Α	0.00	9	3	Α	0.01	9	3
Range Road 55 & Highway 646	NWB-LT	Α	0.00	7	-	Α	-	-	-

Table 4:2: Background Conditions (2043) Intersection Capacity Analysis

Intersection analysis for the 2043 future background conditions indicate study intersections will continue to operate good level of service B or better in both the AM and PM peak hours within minimal delay.

Similar to 2033 background assessment, analysis for future 2043 background conditions continue to indicate that turning movements at all intersections will operate with significant reserve capacity. improvements for the 2043 background network would not be required based on the minimal level of development anticipated. The network continues to exhibit no operational constraints and the available network capacity continues to provide potential to accommodate increased area development.

#### 5.0 FUTURE TOTAL CONDITIONS

#### **5.1** Elk Point Airport Development

The proposed development at Elk Point Airport includes building a 400m<sup>2</sup> private aircraft storage hanger and a 1600 m<sup>2</sup> Commercial building consisting of an administrative office, workstations and other aviation commercial business. The ASP will let the airport and surrounding lands to be leveraged as an economic development and diversification center for the Town and County. The main goal of ASP and IDP is the

## Area Structure Plan for the Elk Point Municipal Airport, Alberta Traffic Impact Study

development and maintenance of a safe, efficient, multi-modal networks to aptly accommodate and transport residents and visitors of both municipalities.

## **5.2** Trip Generation

Trips for the proposed development were derived from the ITE Trip Generation Manual 11<sup>th</sup> Edition for Land Use Code (LUC) 022, General Aviation Airport (022). Directional splits for inbound and outbound trips during the weekday AM and weekday PM peak hours were based on ITE data. The projected trip generation for the subject site is summarized in Table 5:1

Site		Density	ITE Code	Item	AM	l Peak Ho	our	PIV	l Peak Ho	ur
Component		ĺ			In	Out	Total	In	Out	Total
			General	Directional Distribution	50%	50%	100%	55%	45%	100%
Airport	20	Employees	Aviation Airport (022)	(Average Rate)	0.79	0.79	1.58	0.86	0.71	1.57
			, ,	Gross Trips	16	16	32	17	14	31

Table 5:1: Site Trip Generation

## 5.3 Trip Distribution and Assignment

Distribution and assignment of vehicular trips generated by the proposed development was based on existing travel patterns. Site generated traffic volumes assigned to study intersections during the AM and PM peak hours are presented in **Figure 5-1.** 

## 5.4 Future (2033) Total Traffic Volumes

The Future (2033) total traffic volumes were derived by adding future (2033) background traffic volumes and forecasted site traffic volume for the AM and PM peak periods. The Future (2033) total traffic volumes are presented in **Figure 5-2.** 

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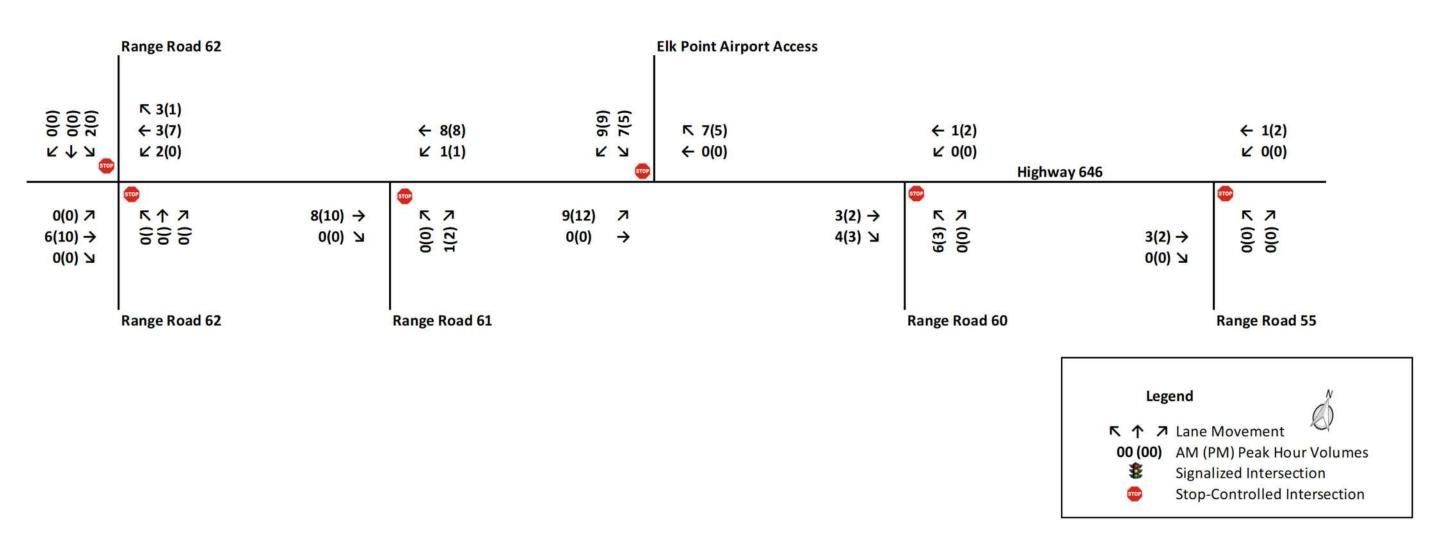


Figure 5-1: Site Generated Traffic Volume

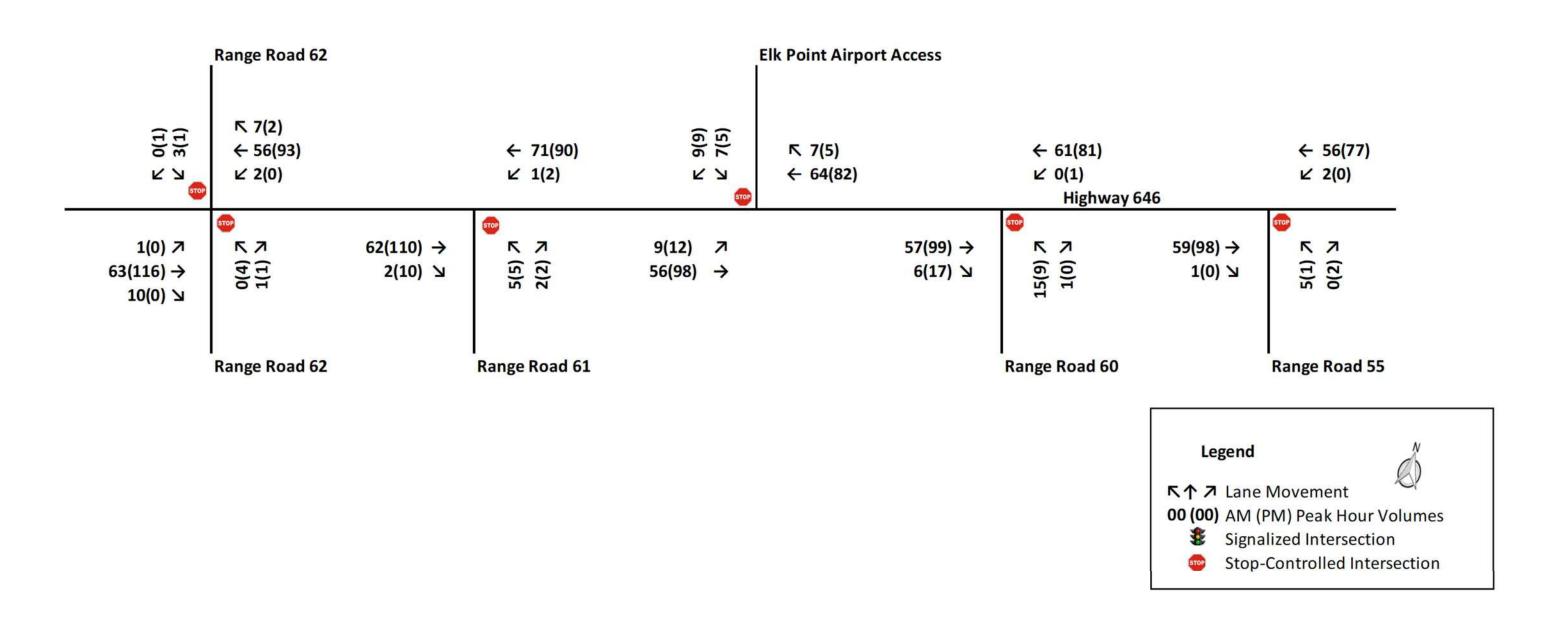


Figure 5-2: Total Traffic Volumes (2033)

## 5.5 Future (2033) Total Traffic Operations

Intersection capacity analysis for the future (2033) total traffic conditions was completed for study area intersections to determine the future operational measures of performance during the AM and PM weekday peak periods. Lane configurations remained the same as existing and future background conditions.

**Table 5:2** shows the capacity analysis result for future total (2033) conditions.

NB-LR

**NWB-LT** 

Α

Α

**AM Peak Hour PM Peak Hour Approac** Intersection v/c Delay Queue v/c Delay Queue h LOS LOS Ratio (s) (m) **Ratio** (m) (s) EB-LTR 0.00 8 3 Α Α 7 1 WB-LTR Α 0.00 A Range Road 62 & Highway 646 0.00 9 2 В 8 NB-LTR Α 0.01 10 0.00 10 4 10 3 SB-LTR Α Α 0.00 WB-LT Α 0.001 7 /-Α 0.00 9 2 Range Road 61 & Highway 646 NB-LR В 0.01 10 13 В 0.01 11 11 Highway 646 & Elk Point Airport 0.008 7 2 0.01 EB-LT Α Α 7 1 Access SB-LR 0.025 9 9 Α 0.02 9 9 Α WB-LT Α Α 0.00 8 Range Road 60 & Highway 646 17 NB-LR В 0.03 10 Α 11 14 0.02

Table 5:2: Future Total Conditions (2033) Intersection Capacity Analysis

With upgrades to the existing airport the network peak hour traffic volumes continue to operate with significant reserve capacity without any capacity constraints or concerns. Analysis indicates that all study intersection movements will operate with a maximum queue of 17 m and delay of no more than 11 s.

0.01

0.00

9

7

4

Α

Α

0.00

9

3

Based on the level of development and available capacity for the future total 2033 study horizon no network improvements are currently proposed for the study area.

## 5.6 Future (2043) Total Traffic Volumes

Range Road 55 & Highway 646

The Future (2043) total traffic volumes were derived by summing future (2043) background traffic volumes and forecasted site traffic volume for the AM and PM peak periods. The Future (2043) total traffic volumes are presented in **Figure 5-3.** 

**ト**↑ **7** Lane Movement

**00 (00)** AM (PM) Peak Hour Volumes Signalized Intersection

Stop-Controlled Intersection

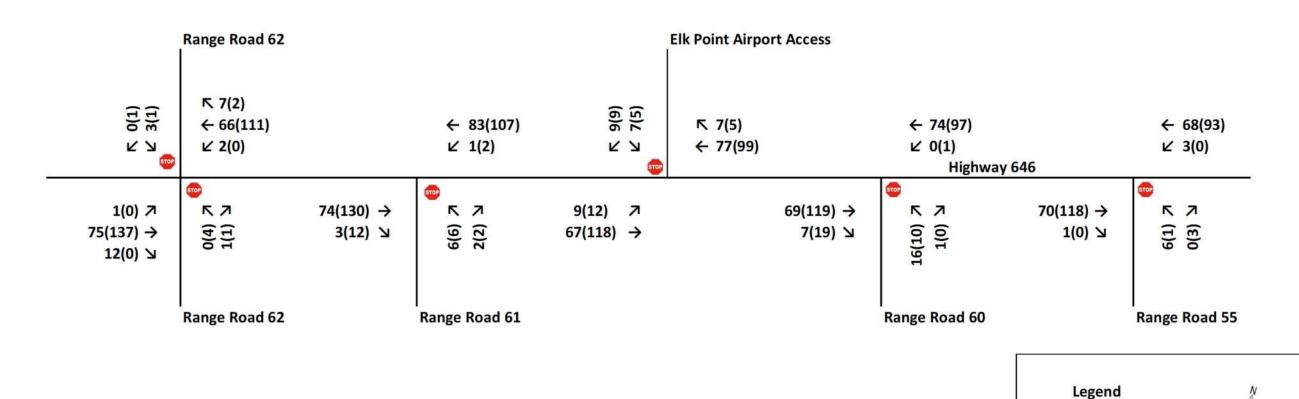


Figure 5-3: Total Traffic Volumes (2043)

## 5.7 Future (2043) Total Traffic Operations

Intersection capacity analysis for the future (2043) total traffic conditions was completed for study area intersections to determine the future operational measures of performance during the AM and PM weekday peak periods. Under this study horizon network configurations continue to remain consistent with existing and future background conditions.

The overall intersections operation results are provided in **Table 5:3** for future total 2043 conditions.

**AM Peak Hour PM Peak Hour** Approac Intersection LO v/c v/c Delay Queue LO **Delay** Queue h S Ratio **(s)** (m) S **Ratio** (s) (m) **EB-LTR** Α 0.00 8 2 Α 2 0.00 9 В 0.01 7 Range Road 62 & Highway 646 NB-LTR Α 11 SB-LTR Α 0.01 10 4 Α 0.00 10 4 WB-LT 7 Α 0.00 Α 0.00 9 Range Road 61 & Highway 646 NB-LR В 0.02 11 13 В 0.02 11 13 EB-LT Α 0.01 7 1 Α 0.01 8 3 Highway 646 & Elk Point 9 Airport Access 0.03 9 0.02 10 8 SB-LR Α Α 0.00 WB-LT Α Α 8 Range Road 60 & Highway 646 18 NB-LR 0.04 11 0.02 11 13 9 4 9 3 NB-LR Α 0.01 Α 0.01 Range Road 55 & Highway 646 **NWB-LT** Α 7 1 0.00 Α

Table 5:3: Future Total Conditions (2043) Intersection Capacity Analysis

Like future total 2033 Conditions, the results for 2043 total conditions shows that all the study intersections will operate well under capacity. The overall study network will be well situated to accommodate future development growth and increase traffic related to this growth.

Due to slow nature of growth and development that has been exhibit in recent years for this community the needs for widening of roads, additional network connections and signalization can potentially be averted for an extended period of time.

Should further density be proposed or even introduction of new business at the airport be considered, additional new development can capitalize on the available capacity of the surrounding boundary road network.

## 6.0 FINDINGS AND RECOMMENDATIONS

## 6.1 Findings

- 1. The Town of Elk Point, in partnership with the County of St. Paul No. 19 with the formation of Intermunicipal Development Plan (IDP) proposes an area structure plan which will encompass the Town of Elk Point airport and surrounding area.
- 2. The existing access to the Airport is to be maintained.
- 3. The proposed development is expected to generate a total of 32 trips during the AM peak hour (16 inbound and 16 outbound) and 31 trips during the PM peak hour (17 inbound and 14 outbound).
- 4. The traffic analysis results shows that, all the study intersections will operate with significant reserve capacity with low delay and queues for all assessed study horizons.
- 5. All development generated AM and PM peak hour volumes for future study horizons can be accommodated on the boundary road network and the proposed development will have minimal impact on the wider boundary area road network.

#### **6.2** Recommendations

Based on study analysis no recommendations are being proposed regarding to improvements of existing boundary road network. Where possible however the municipality can seek to encourage further development in the study area to utilize the significant existing network capacity.

Prepared by,

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Reviewed by

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Meliecused Selibosio Mehemed Delibasic, M.Sc., P.Eng., Transportation and Traffic Engineer

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## EXHIBIT A - SITE PLAN



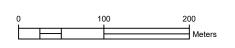








ELK POINT AIRPORT INTERMUNICIPAL AREA STRUCTURE PLAN DEVELOPMENT CONCEPT PLAN MAY 2023



## EXHIBIT B – TRAFFIC DATA

Wed May 3, 2023

Full Length (6 AM-10 AM, 3 PM-7 PM)

All Classes (Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles

on Crosswalk)

All Movements

ID: 1063948, Location: 53.889601, -110.797136



## **McElhanney**

Provided by: McElhanney Edmonton #201, 13455 - 114 Ave Nw, Edmonton, AB, T5M 2E2, CA

Leg Direction	Range Ro		2			Highwa Westbo						Range R Northbo		62				Highway 6 Eastbound	646					
Time	R	Γ	L U	J <b>App</b>	Ped*	R	T	L U	J <b>A</b> j	pp P	ed*	R	T	L	U	App P	ed*	R	T	L	U	App P	ed*	Int
2023-05-03 6:00AM	0	0	0 (	0	0	0	6	0 (	0	6	0	0	0	0	0	0	0	0	1	0	0	1	0	7
6:15AM	0	0	0 (	0 0	0	0	4	0 (	0	4	0	0	0	0	0	0	0	0	9	0	0	9	0	13
6:30AM	1	0		) 1	0		8	0 (	0	8	0	0	0	0	0	0	0	0	9	0	0	9	0	18
6:45AM	0	0	0	0	0	0	11	0 (	0 :	11	0	0	0	0	0	0	0	0	6	1	0	7	0	18
Hourly Total		00		) 1	0		29	-		29	0	0	0	0	0	0	0	0	25	1	0	26	0	56
7:00AM	_	0		0	0		9			10	0	0	0	0	0	0	0	7	11	0	0	18	0	28
7:15AM	<u> </u>	0		) 1	0		8			10	0	0	0	0	0	0	0	0	18	0	0	18	0	29
7:30AM		0		0	0	0	9		0	9	0	1	0	0	0	1	0	1	3	0	0	4	0	14
7:45AM	_	0		0	0		12			12	0	0	0	0	0	0	0	0	13	1	0	14	0	26
Hourly Total		0		) 1	0		38	0 (		41	0	1	0	0	0	1	0	8	45	1	0	54	0	97
8:00AM	<u> </u>	0		0	0	0	16			16	0	0	0	0	0	0	0	0	6	0	0	6	0	22
8:15AM		0		) 1	0		9		0	9	0	0	0	0	0	0	0	0	6	0	0	6	0	16
8:30AM	<u> </u>	0		) 1	0		13			13	0	1	0	0	0	1	0		13	1	0	14	0	29
8:45AM		0		0	0		5		0	5	0	0	0	0	0	0	0	0	7	0	0	7	0	12
Hourly Total		0		) 2	0		43			43	0	1	0	0	0	1	0	0	32	1	0	33	0	79
9:00AM		0		0	0	0	10	0 (		10	0	0	0		0	0	0	0	15	0	0	15	0	25
9:15AM	0	0	0 (	0	0		7	1 (	0	8	0	0	0	0	0	0	0	0	7	0	0	7	0	15
9:30AM	<u> </u>	0		0	0		9		0	9	0	0	0	0	0	0	0	0	8	0	0	8	0	17
9:45AM	0	0	0	0	0	0	15	0 (	0 :	15	0	0	0	0	0	0	0	0	8	0	0	8	0	23
Hourly Total		0		0	0		41	1 (	0 4	42	0	0	0	0	0	0	0	0	38	0	0	38	0	80
3:00PM	0	0	0 (	0	0	0	11	0 (	0 :	11	0	0	0	1	0	1	0	0	6	0	0	6	0	18
3:15PM	0	0	0	0	0	0	27	0 (	0 :	27	0	0	0	1	0	1	0	0	11	0	0	11	0	39
3:30PM	1	0	0	1	0	0	13	0 (	0 :	13	0	0	0	2	0	2	0	0	8	0	0	8	0	24
3:45PM	0	0	0 (	0	0	0	25	0 (	0 :	25	0	0	0	0	0	0	0	0	13	0	0	13	0	38
Hourly Total	1 (	0	0	1	0	0	76	0 (	0 :	76	0	0	0	4	0	4	0	0	38	0	0	38	0	119
4:00PM	0	0	0 (	0	0	0	19	0 (	0 :	19	0	0	0	1	0	1	0	0	6	0	0	6	0	26
4:15PM	1	0	0 (	1	0	0	16	0 (	0 :	16	0	0	0	1	0	1	0	0	19	0	0	19	0	37
4:30PM	0	0	0 (	0	0	1	22	0 (	0 :	23	0	0	0	0	0	0	0	0	26	0	0	26	0	49
4:45PM	0	0	1 (	) 1	0	0	21	0 (	0 :	21	0	0	0	2	0	2	0	0	14	0	0	14	0	38
Hourly Total	1 (	0	1 (	2	0	1	78	0 (	0 :	79	0	0	0	4	0	4	0	0	65	0	0	65	0	150
5:00PM	0	0	0 (	0	0	0	8	0 (	0	8	0	1	0	0	0	1	0	0	22	0	0	22	0	31
5:15PM	0	0	0	0	0	0	11	0 (	0 :	11	0	0	0	0	0	0	0	0	12	0	0	12	0	23
5:30PM	0	0	0 (	0	0	0	16	0 (	0 :	16	0	0	0	0	0	0	0	0	14	0	0	14	0	30
5:45PM	0	0	0	0	0	0	17	0 (	0 :	17	0	0	0	0	0	0	0	0	12	0	0	12	0	29
Hourly Total	0	0	0 (	0	0	0	52	0 (	0 !	52	0	1	0	0	0	1	0	0	60	0	0	60	0	113
6:00PM	0	0	0	0	0	0	7	0 (	0	7	0	0	0	0	0	0	0	0	11	0	0	11	0	18
6:15PM	0	0		0	0	_	13	0 (		13	0	0	0	0	0	0	0	0	9	0	0	9	0	22
6:30PM	_	0		0	0		8	0 (		8	0	0	0	0		0	0	0	4	0		4	0	12
6:45PM	0	0	0		0		8	0 (		8	0		0	0		0	0	0	10	0		10	0	18
Hourly Total	0	0	0 (	0	0	0	36	0 (	0 :	36	0	0	0	0	0	0	0	0	34	0	0	34	0	70
Total	3	0	4	7	0	4	393	1 (	0 3	98	0	3	0	8	0	11	0	8 3	337	3	0	348	0	764
% Approach	42.9% 0%	6 57.	1% 0%	6 <b>-</b>	-	1.0% 9	98.7%	0.3% 0%	6	-	-	27.3% 0	% 7	2.7% (	)%	-	-	2.3% 96.8	8%	0.9% 0	%	-	-	-
% Total	0.4% 0%	6 O.	.5% 0%	6 <b>0.9%</b>	-	0.5% 5	51.4%	0.1% 0%	6 <b>52.1</b>	%	-	0.4% 0	)%	1.0% (	)%	1.4%	-	1.0% 44.	1%	0.4% 0	% 4	15.5%	-	-
Lights	3	0	2	5	-	1	340	0 (	<b>3</b> -	41	-	1	0	4	0	5	-	3 2	276	2	0	281	-	632
% Lights	100% 0%	6 50.	.0% 0%	6 <b>71.4%</b>	-	25.0% 8	86.5%	0% 0%	6 <b>85.7</b>	%	-	33.3% 0	% 5	60.0% C	)% 4	15.5%	-	37.5% 81.9	9% (	66.7% 0	% 8	80.7%	-	82.7%
Single-Unit Trucks	0	0	0 (	0	-	0	13	0 (	0 :	13	-	1	0	2	0	3	-	1	21	0	0	22	-	38
% Single-Unit Trucks	0% 0%	6	0% 0%	6 <b>0%</b>	-	0%	3.3%	0% 0%	6 <b>3.3</b>	%	-	33.3% 0	% 2	25.0% (	)% 2	27.3%	-	12.5% 6.2	2%	0% 0	%	6.3%	-	5.0%
Articulated Trucks	0	0	2	) 2	-	3	36	1 (		40	-	1	0	2	0	3	-		35	1	0	40	-	85
% Articulated Trucks	0% 0%	6 50.	.0% 0%	6 <b>28.6%</b>	-	75.0%	9.2%	100% 0%	6 <b>10.1</b>	%	-	33.3% 0	% 2	25.0% (	)% 2	27.3%	-	50.0% 10.4	4% 3	33.3% 0	% 1	1.5%	-	11.1%
Buses	0		0		-	0	4	0 (		4	-	0	0	0	0	0	-	0	5	0		5	-	9
% Buses	0% 0%	6	0% 0%		-		1.0%	0% 0%			-	0% 0		0% 0		0%	-	0% 1.				1.4%	-	1.2%
Bicycles on Road			0		-	0	0	0 (		0	-	0		0		0	-	0	0	0		0	-	0
% Bicycles on Road			0% 0%		-	0%	0%	0% 0%		%	-	0% 0		0% 0		0%	-		0%	0% 0		0%	-	0%
c, cics on redu	1 0,007	-	2.007	. 3/0		1 0/0	570	2,307		. •		5700		2,00	. •	2.0		3,0		0,00	. •	3.0	l	

Leg	Range l	Road	62				Highway	646				Range	Roa	d 62			Highway	y 646				
Direction	Southbo	ound					Westboui	nd				North	oun	d			Eastboui	nd				
Time	R	T	L	U	<b>App</b> Pe	d*	R	T	L	U	<b>App</b> Ped*	R	T	I	U	<b>App</b> Ped*	R	T	L	U	<b>App</b> Ped*	Int
Pedestrians	-	-	-	-	-	0	-	-	-	-	- 0	-	-			- 0	-	-	-	-	- 0	
% Pedestrians	-	-	-	-	-	-	-	-	-	-		-	-				-	-	-	-		-
Bicycles on Crosswalk	-	-	-	-	-	0	-	-	-	-	- 0	-	-			- 0	-	-	-	-	- 0	
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-		-	-				-	-	-	-		-

<sup>\*</sup>Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, T: Thru, U: U-Turn

Wed May 3, 2023

Full Length (6 AM-10 AM, 3 PM-7 PM)

All Classes (Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road,

Bicycles on Crosswalk) All Movements

ID: 1063948, Location: 53.889601, -110.797136

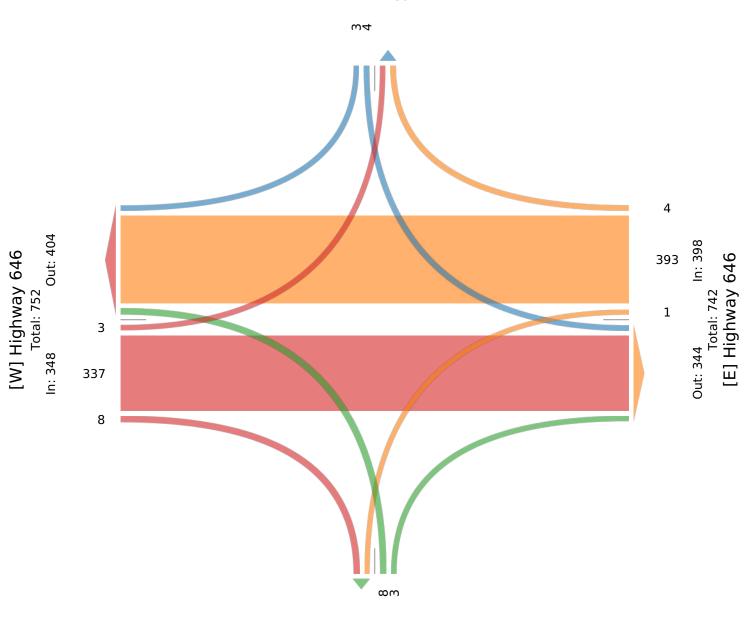


# **McElhanney**

Provided by: McElhanney Edmonton #201, 13455 - 114 Ave Nw, Edmonton, AB, T5M 2E2, CA

## [N] Range Road 62

Total: 14 In: 7 Out: 7



Out: 9 In: 11 Total: 20 [S] Range Road 62

Wed May 3, 2023 AM Peak (7 AM - 8 AM)

All Classes (Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)

All Movements

ID: 1063948, Location: 53.889601, -110.797136



## **McElhanney**

Provided by: McElhanney Edmonton #201, 13455 - 114 Ave Nw, Edmonton, AB, T5M 2E2, CA

Leg	Ran	ge F	Road 6	2			Highw	ay 646					Range	Roa	d 62				Highwa	y 646					
Direction	Sou	thbo	und				Westbo	ound					Northb	oun	1				Eastbou	ınd					
Time	R	Т	L	U	App	Ped*	R	T	L	U	App	Ped*	R	T	L	U	App I	ed*	R	T	L	U	App	Ped*	Int
2023-05-03 7:00AM	0	0	0	0	0	0	1	9	0	0	10	0	0	0	0	0	0	0	7	11	0	0	18	0	28
7:15AM	0	0	1	0	1	0	2	8	0	0	10	0	0	0	0	0	0	0	0	18	0	0	18	0	29
7:30AM	0	0	0	0	0	0	0	9	0	0	9	0	1	0	0	0	1	0	1	3	0	0	4	0	14
7:45AM	0	0	0	0	0	0	0	12	0	0	12	0	0	0	0	0	0	0	0	13	1	0	14	0	26
Total	0	0	1	0	1	0	3	38	0	0	41	0	1	0	0	0	1	0	8	45	1	0	54	0	97
% Approach	0%	0%	100%	0%	-	-	7.3%	92.7%	0%	0%	-	-	100%	0% (	)%(	)%	-	-	14.8%	83.3%	1.9%	0%	-	-	-
% Total	0%	0%	1.0%	0%	1.0%	-	3.1%	39.2%	0%	0% 4	42.3%	-	1.0%	0% (	)%(	)%	1.0%	-	8.2%	46.4%	1.0%	0%	55.7%	-	-
PHF	-	-	0.250	-	0.250	-	0.375	0.792	-	-	0.854	-	0.250	-	-	- (	0.250	-	0.286	0.625	0.250	-	0.750	-	0.836
Lights	0	0	1	0	1	-	0	31	0	0	31	-	1	0	0	0	1	-	3	37	0	0	40	-	73
% Lights	0%	0%	100%	0%	100%	-	0%	81.6%	0%	0% :	75.6%	-	100%	0% (	)%(	)% :	100%	-	37.5%	82.2%	0%	0%	74.1%	-	75.3%
Single-Unit Trucks	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	1	5	0	0	6	-	6
% Single-Unit Trucks	0%	0%	0%	0%	0%	-	0%	0%	0%	0%	0%	-	0%	0% (	)% (	)%	0%	-	12.5%	11.1%	0%	0%	11.1%	-	6.2%
Articulated Trucks	0	0	0	0	0	-	3	6	0	0	9	-	0	0	0	0	0	-	4	2	1	0	7	-	16
% Articulated Trucks	0%	0%	0%	0%	0%	-	100%	15.8%	0%	0% :	22.0%	-	0%	0% (	)% (	)%	0%	-	50.0%	4.4%	100%	0%	13.0%	-	16.5%
Buses	0	0	0	0	0	-	0	1	0	0	1	-	0	0	0	0	0	-	0	1	0	0	1	-	2
% Buses	0%	0%	0%	0%	0%	-	0%	2.6%	0%	0%	2.4%	-	0%	0% (	)% (	)%	0%	-	0%	2.2%	0%	0%	1.9%	-	2.1%
Bicycles on Road	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0
% Bicycles on Road	0%	0%	0%	0%	0%	-	0%	0%	0%	0%	0%	-	0%	0% (	)%(	)%	0%	-	0%	0%	0%	0%	0%	-	0%
Pedestrians	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bicycles on Crosswalk	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

<sup>\*</sup>Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, T: Thru, U: U-Turn

Wed May 3, 2023

AM Peak (7 AM - 8 AM)

All Classes (Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road,

Bicycles on Crosswalk) All Movements

ID: 1063948, Location: 53.889601, -110.797136

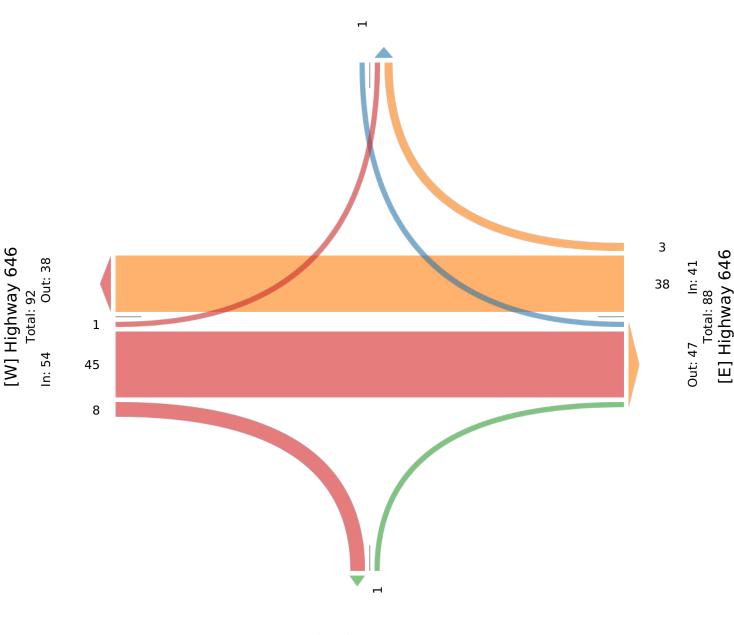


# **McElhanney**

Provided by: McElhanney Edmonton #201, 13455 - 114 Ave Nw, Edmonton, AB, T5M 2E2, CA

## [N] Range Road 62

Total: 5 In: 1 Out: 4



Out: 8 In: 1 Total: 9 [S] Range Road 62

Wed May 3, 2023

PM Peak (4:15 PM - 5:15 PM) - Overall Peak Hour All Classes (Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road,

Bicycles on Crosswalk)

All Movements

ID: 1063948, Location: 53.889601, -110.797136



## **McElhanney**

Provided by: McElhanney Edmonton #201, 13455 - 114 Ave Nw, Edmonton, AB, T5M 2E2, CA

1 0	Range Ro		62				Highw	5					Range F							iway 64	16				
Direction	Southbou						Westbo						Northbo							bound					
Time	R	T	L	U	App I	ed*	R	T	L	U	App I	Ped*	R	T	L	U	App P	ed*	R	T	L	U	App I	Ped*	Int
2023-05-03 4:15PM	1	0	0	0	1	0	0	16	0	0	16	0	0	0	1	0	1	0	0	19	0	0	19	0	37
4:30PM	0	0	0	0	0	0	1	22	0	0	23	0	0	0	0	0	0	0	0	26	0	0	26	0	49
4:45PM	0	0	1	0	1	0	0	21	0	0	21	0	0	0	2	0	2	0	0	14	0	0	14	0	38
5:00PM	0	0	0	0	0	0	0	8	0	0	8	0	1	0	0	0	1	0	0	22	0	0	22	0	31
Total	1	0	1	0	2	0	1	67	0	0	68	0	1	0	3	0	4	0	0	81	0	0	81	0	155
% Approach	50.0% 09	% 50	0.0% (	)%	-	-	1.5% 9	98.5%	0% (	)%	-	-	25.0% (	0%	75.0% (	)%	-	-	0%	100%	)% (	)%	-	-	-
% Total	0.6% 09	% 0	).6% (	)%	1.3%	-	0.6%	43.2%	0% (	)% 4	43.9%	-	0.6% (	0%	1.9% (	)%	2.6%	-	0%	52.3%	)% (	)% 5	52.3%	-	-
PHF	0.250	- 0.	.250	- (	).500	-	0.250	0.761	-	-	0.739	-	0.250	-	0.375	-	0.500	-	-	0.779	-	-	0.779	-	0.791
Lights	1	0	1	0	2	-	1	58	0	0	59	-	0	0	2	0	2	-	0	70	0	0	70	-	133
% Lights	100% 09	% 10	00% 0	)% 1	100%	-	100%	36.6%	0% (	)% 8	86.8%	-	0% (	0%	66.7% (	)% !	50.0%	-	0%	86.4%	)% (	)% 8	36.4%	-	85.8%
Single-Unit Trucks	0	0	0	0	0	-	0	2	0	0	2	-	0	0	1	0	1	-	0	0	0	0	0	-	3
% Single-Unit Trucks	0% 09	%	0% 0	)%	0%	-	0%	3.0%	0% (	)%	2.9%	-	0% (	0%	33.3% (	)% :	25.0%	-	0%	0% (	)% (	)%	0%	-	1.9%
Articulated Trucks	0	0	0	0	0	-	0	6	0	0	6	-	1	0	0	0	1	-	0	10	0	0	10	-	17
% Articulated Trucks	0% 09	%	0% 0	)%	0%	-	0%	9.0%	0% (	)%	8.8%	-	100% (	0%	0% (	)% :	25.0%	-	0%	12.3%	)% (	)% 1	12.3%	-	11.0%
Buses	0	0	0	0	0	-	0	1	0	0	1	-	0	0	0	0	0	-	0	1	0	0	1	-	2
% Buses	0% 09	%	0% 0	)%	0%	-	0%	1.5%	0% (	)%	1.5%	-	0% (	0%	0% (	)%	0%	-	0%	1.2%	)% (	)%	1.2%	-	1.3%
Bicycles on Road	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0
% Bicycles on Road	0% 09	%	0% 0	)%	0%	-	0%	0%	0% (	)%	0%	-	0% (	0%	0% (	)%	0%	-	0%	0% (	)% (	)%	0%	-	0%
Pedestrians	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bicycles on Crosswalk	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

<sup>\*</sup>Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, T: Thru, U: U-Turn

Wed May 3, 2023

PM Peak (4:15 PM - 5:15 PM) - Overall Peak Hour All Classes (Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)

All Movements

ID: 1063948, Location: 53.889601, -110.797136



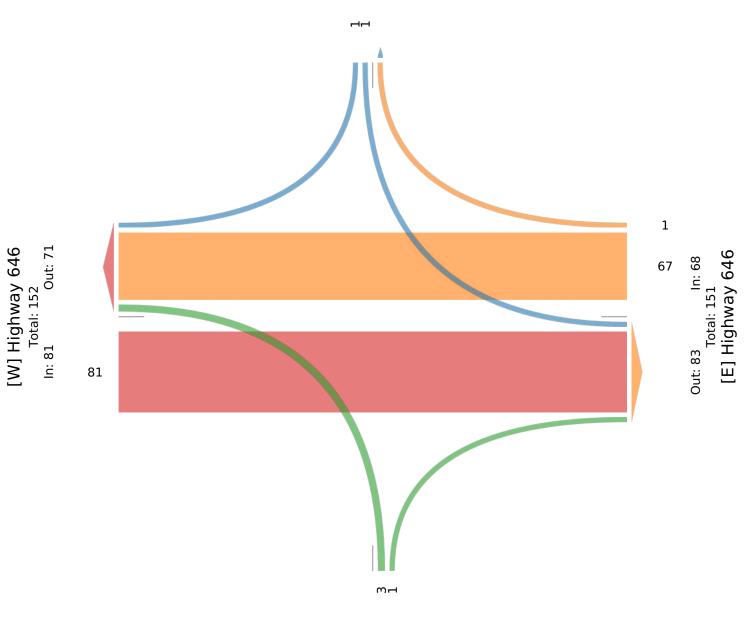
# **McElhanney**

Provided by: McElhanney Edmonton #201, 13455 - 114 Ave Nw, Edmonton, AB, T5M 2E2, CA

## [N] Range Road 62

Total: 3

In: 2 Out: 1



Out: 0 In: 4
Total: 4
[S] Range Road 62

Wed May 3, 2023
Full Length (6 AM-10 AM, 3 PM-7 PM)
All Classes (Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)

All Movements

ID: 1063949, Location: 53.889586, -110.772428



Provided by: McElhanney Edmonton #201, 13455 - 114 Ave Nw, Edmonton, AB, T5M 2E2, CA

Leg	Highway 6					Range Ro					Highway 6	546				
Direction	Westboun		T 7		D. 14	Northbou		* *		D. 10	Eastbound		* *		D. 18	Total
Time	T	L	U	App	Ped*	R	L	U	App	Ped*	R	T	U	App	Ped*	
2023-05-03 6:00A	_	0	0	6	0	0	0	0	0	0	1	2	0	3	0	9
6:15A		1	0	4	0	0	1	0	1	0		9	0	9	0	14
6:30A	_	0	0	8	0	0	0	0	0	0		6	0	9	0	17
6:45A		2	0	10	0	0	3	0	3	0		1	0	7	0	
Hourly To		3	0	28	0	0	4	0	4	0		18	0	28 9	0	2:
7:00A		0		10	0		2		2	0						33
7:15A	_	0	0	7	0	0	2	0	0	0		21	0	23	0	1
7:30A		0	0	8	0	0	0	0		0		4	0	9	0	2
7:45A		0		15 40	0		5	0	6	0		9 43		45	0	9
Hourly To			0			0		0		0			0	9	0	20
8:00A	_	0		16	0		1	0	1	0		9	0			
8:15A		0	0	7	0	0	2	0	2	0		5	0	6	0	1: 2:
8:30A	_	0	0	12	0	0	1	0	1	0	0	16	0	16 7	0	
8:45A		0	0	5	0	0	0	0	0	0		7	0		0	82
Hourly To		0	0	40			4	0	4	0		37	0	38		
9:00A	_	0	0	10	0	0	0	0	0	0		12	0	14	0	24
9:15A		0	0	6	0	0	2	0	2	0		6	0	8	0	10
9:30A		0	0	9	0	0	1	0	1	0		7	0	8	0	2:
9:45A		0	0		0	0	1	0	1	0		8	0	8	0	79
Hourly To	_	0	0	37	0	0	4	0	4	0		33	0	38	0	18
3:00F		1	0	12	0	0	0	0	0	0		6	0	6	0	34
3:15F	_	0	0	24	0	0	1	0	1	0		9	0	9	0	2'
3:30F		0	0	14	0	0	1	0	1	0		9	0	12	0	3
3:45F Hourly To		0	0	23 73	0	0	2	0	2	0		12 36	0	14 41	0	110
4:00F				15	0	0					0					23
		0	0		0	0	3	0	3	0		5	0	5 21	0	39
4:15F		0	0	17 21	0	0	1	0	1	0		21	0	21	0	
4:30F 4:45F	_	0	0	18	0	0	1	0		0		22 15	0	18	0	3
		0	0	71	0	0	6	0	6	0		63	0	68	0	14
Hourly To 5:00F			0	9				0	1				0		0	3:
		1	0		0	0	1	0		0		18		21		24
5:15P	_	0		10 12	0	0	2	0	2	0		12	0	12 14	0	30
5:30P		0	0	15	0	0	4	0	4	0		13 12	0	12	0	28
5:45P		1	0	46	0		8	0	8	0		55	0	59	0	
Hourly To																
6:00F 6:15F		0	0	7 13	0	0	0	0	0	0		9	0	10	0	23
6:30F		0	0	6	0	0	2	0	2	0		3	0	10 3	0	1:
6:45F	_	0	0	7		0										10
			0	33	0	0	2	0	2	0		8	0	32	0	67
Hourly To		0										30				
To	_	5	0	368	0		35	0	36	0		315	0	349	0	753
% Approa		1.4%	0%	-	-	2.8%	97.2%	0%	-	-	9.7%	90.3%	0%	-	-	
% To		0.7%	0%	48.9%	-	0.1%	4.6%	0%	4.8%	-	4.5%	41.8%	0%	46.3%	-	
Ligh		3	0	318	-	0	29	0	29	-	26	259	0	285	-	632
% Ligh		60.0%	0%	86.4%	-	0%	82.9%	0%	80.6%	-	76.5%	82.2%	0%	81.7%	-	83.9%
Single-Unit Truc		0	0	14	-	0	1	0	1	-	1	23	0	24	-	39
% Single-Unit Truc			0%	3.8%	-	0%	2.9%	0%	2.8%		2.9%	7.3%	0%	6.9%	-	5.2%
Articulated Truc		2	0	33	-	1	4	0	5	-	6	29	0	35	-	73
% Articulated Truc	_		0%	9.0%	-	100%	11.4%	0%	13.9%		17.6%	9.2%	0%	10.0%	-	9.7%
Bus		0	0	3	-	0	1	0	1		1	4	0	5	-	
% Bus			0%	0.8%	-	0%	2.9%	0%	2.8%	-	2.9%	1.3%	0%	1.4%	-	1.2%
Bicycles on Ro	<b>ad</b> 0	0	0	0	-	0	0	0	0	-	0	0	0	0	-	(

Leg		Highway 646	6				Range Roa	d 61				Highway 646					
Direction		Westbound					Northboun	d				Eastbound					
Time		T	L	U	App	Ped*	R	L	U	App	Ped*	R	T	U	App	Ped*	Int
	% Bicycles on Road	0%	0%	0%	0%	-	0%	0%	0%	0%	-	0%	0%	0%	0%	-	0%
	Pedestrians	-	-	-	-	0	-	-	-	-	0	-	-	-	-	0	
	017 1 1																

% Bicycles on Crosswalk	-	-	-	-	-	-	-	-
*Pedestrians and Bicycles of	n Crossw	alk. L:	Left	R: Right.	Т:	Thru.	U: U-Tı	ırn

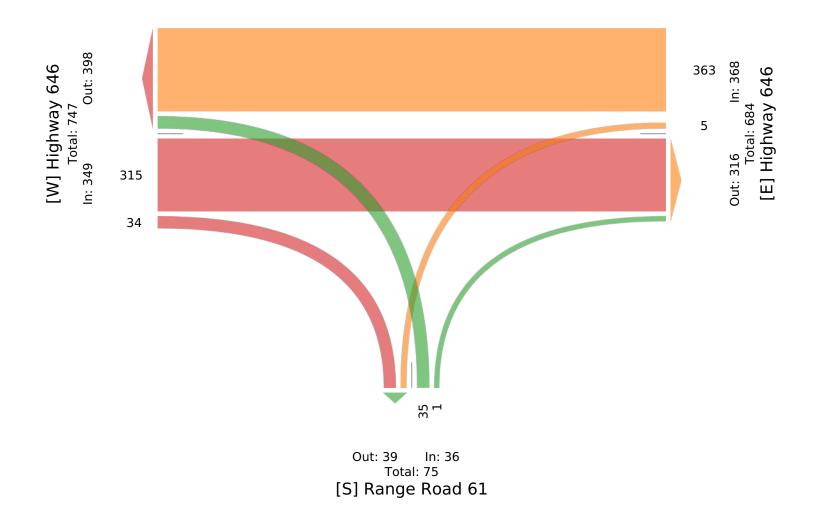
Bicycles on Crosswalk

Wed May 3, 2023 Full Length (6 AM-10 AM, 3 PM-7 PM) All Classes (Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk) All Movements M

## **McElhanney**

Provided by: McElhanney Edmonton #201, 13455 - 114 Ave Nw, Edmonton, AB, T5M 2E2, CA

ID: 1063949, Location: 53.889586, -110.772428



Wed May 3, 2023

AM Peak (7:15 AM - 8:15 AM)

All Classes (Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road,

Bicycles on Crosswalk)

All Movements

ID: 1063949, Location: 53.889586, -110.772428



### **McElhanney**

Leg	Highway (	546				Range Roa	d 61				Highway (	646				
Direction	Westboun	d				Northboun	d				Eastbound	l				
Time	Т	L	U	App	Ped*	R	L	U	App	Ped*	R	Т	U	App	Ped*	Int
2023-05-03 7:15AM	7	0	0	7	0	1	2	0	3	0	2	21	0	23	0	33
7:30AM	8	0	0	8	0	0	0	0	0	0	0	4	0	4	0	12
7:45AM	15	0	0	15	0	0	1	0	1	0	0	9	0	9	0	25
8:00AM	16	0	0	16	0	0	1	0	1	0	0	9	0	9	0	26
Tota	46	0	0	46	0	1	4	0	5	0	2	43	0	45	0	96
% Approach	100%	0%	0%	-	-	20.0%	80.0%	0%	-	-	4.4%	95.6%	0%	-	-	-
% Total	47.9%	0%	0%	47.9%	-	1.0%	4.2%	0%	5.2%	-	2.1%	44.8%	0%	46.9%	-	-
PHI	0.719	-	-	0.719	-	0.250	0.500	-	0.417	-	0.250	0.512	-	0.489	-	0.727
Lights	39	0	0	39	-	0	1	0	1	-	2	35	0	37	-	77
% Lights	84.8%	0%	0%	84.8%	-	0%	25.0%	0%	20.0%	-	100%	81.4%	0%	82.2%	-	80.2%
Single-Unit Trucks	0	0	0	0	-	0	0	0	0	-	0	5	0	5	-	5
% Single-Unit Trucks	0%	0%	0%	0%	-	0%	0%	0%	0%	-	0%	11.6%	0%	11.1%	-	5.2%
Articulated Trucks	5	0	0	5	-	1	2	0	3	-	0	3	0	3	-	11
% Articulated Trucks	10.9%	0%	0%	10.9%	-	100%	50.0%	0%	60.0%	-	0%	7.0%	0%	6.7%	-	11.5%
Buses	2	0	0	2	-	0	1	0	1	-	0	0	0	0	-	3
% Buses	4.3%	0%	0%	4.3%	-	0%	25.0%	0%	20.0%	-	0%	0%	0%	0%	-	3.1%
Bicycles on Road	0	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0
% Bicycles on Road	0%	0%	0%	0%	-	0%	0%	0%	0%	-	0%	0%	0%	0%	-	0%
Pedestrians	-	-	-	-	0	-		-	-	0	-	-	-	-	0	
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bicycles on Crosswall	-	-	-	-	0	-	-	-	-	0	-	-	-	-	0	
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

<sup>\*</sup>Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, T: Thru, U: U-Turn

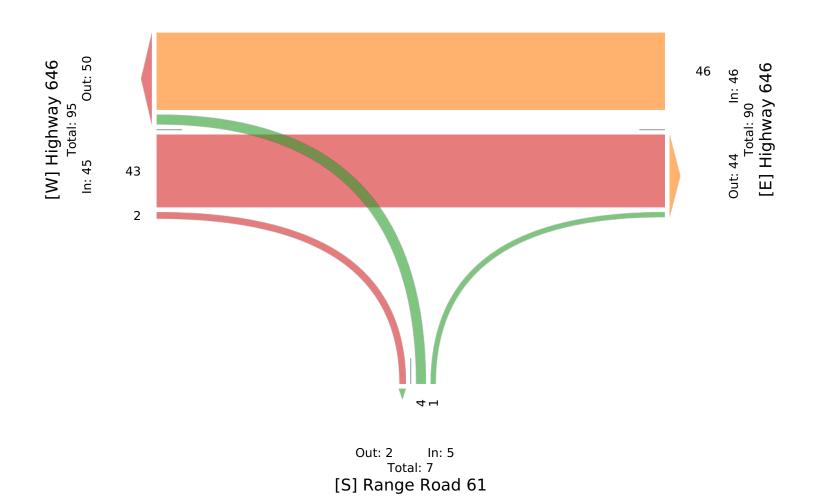
Wed May 3, 2023 AM Peak (7:15 AM - 8:15 AM) All Classes (Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk) All Movements



## **McElhanney**

Provided by: McElhanney Edmonton #201, 13455 - 114 Ave Nw, Edmonton, AB, T5M 2E2, CA

ID: 1063949, Location: 53.889586, -110.772428



Wed May 3, 2023

PM Peak (4:15 PM - 5:15 PM) - Overall Peak Hour All Classes (Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road,

Bicycles on Crosswalk)

All Movements

ID: 1063949, Location: 53.889586, -110.772428



### **McElhanney**

Leg	Highway 6	46				Range	Road 61				Highway 6	46				
Direction	Westbound	l				Northb	ound				Eastbound					
Time	T	L	U	App	Ped*	R	L	U	App	Ped*	R	T	U	App	Ped*	Int
2023-05-03 4:15PM	17	0	0	17	0	0	1	0	1	0	0	21	0	21	0	39
4:30PM	21	0	0	21	0	0	1	0	1	0	2	22	0	24	0	46
4:45PM	18	0	0	18	0	0	1	0	1	0	3	15	0	18	0	37
5:00PM	8	1	0	9	0	0	1	0	1	0	3	18	0	21	0	31
Total	64	1	0	65	0	0	4	0	4	0	8	76	0	84	0	153
% Approach	98.5%	1.5%	0%	-	-	0%	100%	0%	-	-	9.5%	90.5%	0%	-	-	-
% Total	41.8%	0.7%	0%	42.5%	-	0%	2.6%	0%	2.6%	-	5.2%	49.7%	0%	54.9%	-	-
PHF	0.762	0.250	-	0.774	-	-	1.000	-	1.000	-	0.667	0.864	-	0.875	-	0.832
Lights	56	0	0	56	-	0	4	0	4	-	3	70	0	73	-	133
% Lights	87.5%	0%	0%	86.2%	-	0%	100%	0%	100%	-	37.5%	92.1%	0%	86.9%	-	86.9%
Single-Unit Trucks	1	0	0	1	-	0	0	0	0	-	0	0	0	0	-	1
% Single-Unit Trucks	1.6%	0%	0%	1.5%	-	0%	0%	0%	0%	-	0%	0%	0%	0%	-	0.7%
Articulated Trucks	6	1	0	7	-	0	0	0	0	-	5	5	0	10	-	17
% Articulated Trucks	9.4%	100%	0%	10.8%	-	0%	0%	0%	0%	-	62.5%	6.6%	0%	11.9%	-	11.1%
Buses	1	0	0	1	-	0	0	0	0	-	0	1	0	1	-	2
% Buses	1.6%	0%	0%	1.5%	-	0%	0%	0%	0%	-	0%	1.3%	0%	1.2%	-	1.3%
Bicycles on Road	0	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0
% Bicycles on Road	0%	0%	0%	0%	-	0%	0%	0%	0%	-	0%	0%	0%	0%	-	0%
Pedestrians	-	-	-	-	0	-	-	-	-	0	-	-	-	-	0	
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	0	-	-	-	-	0	
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

<sup>\*</sup>Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, T: Thru, U: U-Turn

Wed May 3, 2023

PM Peak (4:15 PM - 5:15 PM) - Overall Peak Hour All Classes (Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)

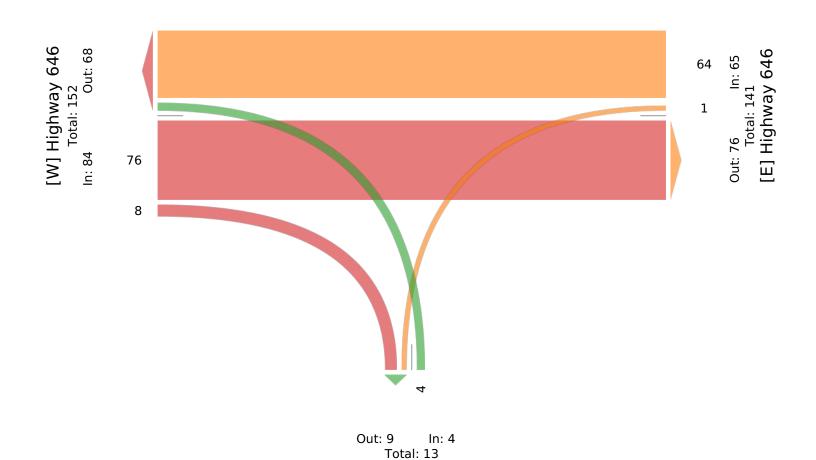
All Movements

ID: 1063949, Location: 53.889586, -110.772428



## **McElhanney**

Provided by: McElhanney Edmonton #201, 13455 - 114 Ave Nw, Edmonton, AB, T5M 2E2, CA



[S] Range Road 61

Wed May 3, 2023

Full Length (6 AM-10 AM, 3 PM-7 PM)

All Classes (Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road,

Bicycles on Crosswalk)

All Movements

ID: 1063950, Location: 53.88961, -110.763972



### **McElhanney**

Leg	Airport Acce	ess				Highw	ay 646				Highway 64	16				
Direction	Southbound					Westb					Eastbound					1
Time	R	L	U	Арр	Ped*	R	T	U	Арр	Ped*	Т	L	U	Арр	Ped*	Int
2023-05-03 6:00AM	0	0	0	0	0	0	6	0	6	0	2	0	0	2	0	8
6:15AM	0	0	0	0	0	0	4	0	4	0	9	0	0	9	0	
6:30AM	0	0	0	0	0	0	8	0	8	0	6	0	0	6	0	14
6:45AM	0	0	0	0	0	0	10	0	10	0	1	0	0	1	0	
Hourly Total	. 0	0	0	0	0	0	28	0	28	0	18	0	0	18	0	46 18
7:00AM	1	0	0	1	0	0	9	0	9	0	8	0	0	8	0	18
7:15AM	0	0	0	0	0	0	8	0	8	0	23	0	0	23	0	
7:30AM		0	0	0	0	0	7	0	7	0		0	0	4	0	
7:45AM		0	0	0	0	_	15	0	15	0		0	0	9	0	
Hourly Total		0	0	1	0		39	0	39	0		0	0	44	0	
8:00AM	_	0	0	0	0		17	0	17	0	8	0	0	8	0	
8:15AM		0	0	0	0		6	0	6	0	6	0	0	6	0	
8:30AM		0	0	0	0	_	12	0	12	0	16	0	0	16	0	
8:45AM		0	0	0	0		5	0	5	0	7	0	0	7	0	
Hourly Total	0	0	0	0	0		40	0	40	0		0	0	37	0	
9:00AM		0	0	0	0		10	0	10	0		0	0	12	0	
9:15AM		0	0	0	0	_	6	0	6	0	6	0	0	6	0	
9:30AM 9:45AM		0	0	0	0		9	0	9		7	0	0	7	0	
		0	0	0	0	_		0	38	0	33	0	0	33	0	
Hourly Total 3:00PM		0	0	0	0		38 13	0	13	0		0	0	6	0	
3:15PM		0	0	0	0	_	23	0	23	0		0	0	9	0	
3:30PM		0	0	0	0		16	0	16	0		0	0	8	0	
3:45PM		0	0	0	0		23	0	23	0		0	0	12	0	
Hourly Total		0	0	0	0	_	75	0	75	0	35	0	0	35	0	
4:00PM		0	0	0	0	_	15	0	15	0	5	0	0	5	0	
4:15PM		0	0	0	0		17	0	17	0	20	0	0	20	0	-
4:30PM		0	0	0	0		21	0	21	0		0	0	22	0	-
4:45PM		0	0	0	0		18	0	18	0		0	0	13	0	
Hourly Total	. 0	0	0	0	0	0	71	0	71	0	60	0	0	60	0	
5:00PM	0	0	0	0	0	0	8	0	8	0	20	0	0	20	0	
5:15PM	0	0	0	0	0	0	11	0	11	0	12	0	0	12	0	23
5:30PM	0	0	0	0	0	0	12	0	12	0	15	0	0	15	0	
5:45PM	0	0	0	0	0	0	16	0	16	0	11	0	0	11	0	
Hourly Total	. 0	0	0	0	0	0	47	0	47	0	58	0	0	58	0	105
6:00PM	0	1	0	1	0	0	7	0	7	0	7	2	0	9	0	
6:15PM		0	0	0	0	0	14	0	14	0		0	0	11	0	
6:30PM		0	0	0	0	0	7	0	7	0	4	0	0	4	0	
6:45PM		0	0	0	0	_	7	0	7	0	8	0	0	8	0	
Hourly Total	. 0	1	0	1	0	0	35	0	35	0	30	2	0	32	0	
Total		1	0	2	0	0	373	0	373	0		2	0	317	0	692
% Approach		50.0%	0%	-	-	0%	100%	0%	-	-	99.4%	0.6%	0%		-	-
% Total		0.1%	0%	0.3%	-	0%	53.9%	0%	53.9%	-	45.5%	0.3%	0%	45.8%	-	-
Lights		1	0	2	-	0	320	0	320	-	254	2	0	256	-	578
% Lights	_	100%	0%	100%	-	0%	85.8%	0%	85.8%	-	80.6%	100%	0%	80.8%	-	83.5%
Single-Unit Trucks	0	0	0	0	-	0	13	0	13	-	23	0	0	23	-	36
% Single-Unit Trucks		0%	0%	0%	-	0%	3.5%	0%	3.5%	-	7.3%	0%	0%	7.3%	-	5.2%
Articulated Trucks		0	0	00/	-	0	37	0	37	-	34	0	0	34	-	71
% Articulated Trucks		0%	0%	0%	-	0%	9.9%	0%	9.9%	-	10.8%	0%	0%	10.7%	-	10.3%
Buses		0	0	000	-	0	3	0	3	-	1 20/	0	0	1 20/	-	1.00/
% Buses			0%	0%		0%	0.8%	0%	0.8%		1.3%	0%		1.3%		1.0%
Bicycles on Road	0	0	0	0	-	0	0	0	0		0	0	0	0	-	0

Leg	Airport Access	6				Highw	ay 646				Highway 646					
Direction	Southbound					Westbo	ound				Eastbound					
Time	R	L	U	App	Ped*	R	Т	U	App	Ped*	T	L	U	App	Ped*	Int
% Bicycles on Road	0%	0%	0%	0%	-	0%	0%	0%	0%	-	0%	0%	0%	0%	-	0%
Pedestrians	-	-	-	-	0	-	-	-	-	0	-	-	-	-	0	
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bicycles on Crosswall	-	-	-	-	0	-	-	-	-	0	-	-	-	-	0	
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

<sup>\*</sup>Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, T: Thru, U: U-Turn

Wed May 3, 2023

Full Length (6 AM-10 AM, 3 PM-7 PM)

All Classes (Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road,

Bicycles on Crosswalk) All Movements

ID: 1063950, Location: 53.88961, -110.763972



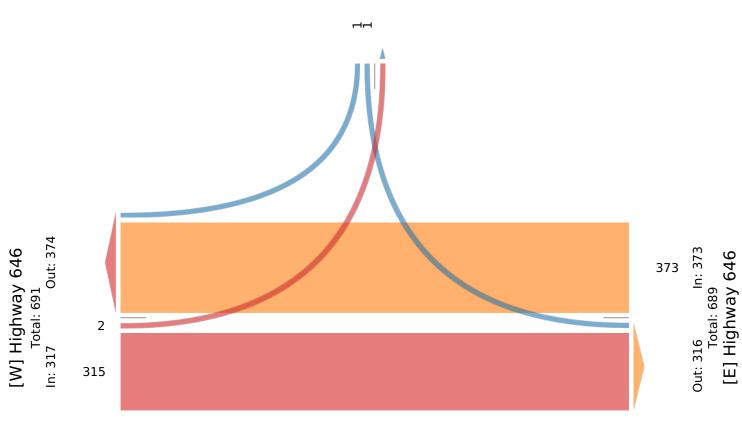
# **McElhanney**

Provided by: McElhanney Edmonton #201, 13455 - 114 Ave Nw, Edmonton, AB, T5M 2E2, CA

#### [N] Airport Access

Total: 4

In: 2 Out: 2



Wed May 3, 2023

AM Peak (7:15 AM - 8:15 AM)

All Classes (Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road,

Bicycles on Crosswalk)

All Movements

ID: 1063950, Location: 53.88961, -110.763972



### **McElhanney**

Leg	Airpor	t Acce	ess			Highwa	ıy 646				Highway 64	16				
Direction	South	ound				Westbo	und				Eastbound					
Time	R	L	U	App	Ped*	R	T	U	App	Ped*	T	L	U	Арр	Ped*	Int
2023-05-03 7:15AM	0	0	0	0	0	0	8	0	8	0	23	0	0	23	0	31
7:30AM	0	0	0	0	0	0	7	0	7	0	4	0	0	4	0	11
7:45AM	0	0	0	0	0	0	15	0	15	0	9	0	0	9	0	24
8:00AM	0	0	0	0	0	0	17	0	17	0	8	0	0	8	0	25
Tota	0	0	0	0	0	0	47	0	47	0	44	0	0	44	0	91
% Approach	0%	0%	0%	-	-	0%	100%	0%	-	-	100%	0%	0%	-	-	-
% Total	0%	0%	0%	0%	-	0%	51.6%	0%	51.6%	-	48.4%	0%	0%	48.4%	-	-
PHI	-	-	-	-	-	-	0.691	-	0.691	-	0.478	-	-	0.478	-	0.734
Lights	0	0	0	0	-	0	40	0	40	-	33	0	0	33	-	73
% Lights	0%	0%	0%	-	-	0%	85.1%	0%	85.1%	-	75.0%	0%	0%	75.0%	-	80.2%
Single-Unit Trucks	0	0	0	0	-	0	0	0	0	-	7	0	0	7	-	7
% Single-Unit Trucks	0%	0%	0%	-	-	0%	0%	0%	0%	-	15.9%	0%	0%	15.9%	-	7.7%
Articulated Trucks	0	0	0	0	-	0	5	0	5	-	4	0	0	4	-	9
% Articulated Trucks	0%	0%	0%	-	-	0%	10.6%	0%	10.6%	-	9.1%	0%	0%	9.1%	-	9.9%
Buses	0	0	0	0	-	0	2	0	2	-	0	0	0	0	-	2
% Buses	0%	0%	0%	-	-	0%	4.3%	0%	4.3%	-	0%	0%	0%	0%	-	2.2%
Bicycles on Road	0	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0
% Bicycles on Road	0%	0%	0%	-	-	0%	0%	0%	0%	-	0%	0%	0%	0%	-	0%
Pedestrians	-	-	-	-	0	-	-	-	-	0	-	-	-	-	0	
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	0	-	-	-	-	0	
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

<sup>\*</sup>Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, T: Thru, U: U-Turn

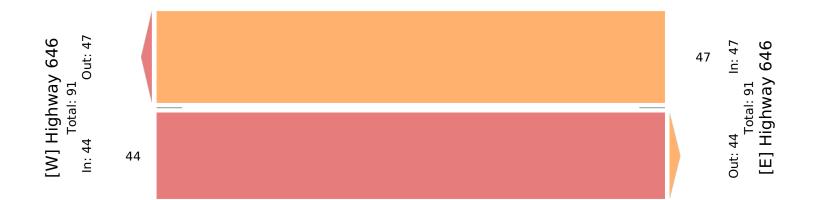
Wed May 3, 2023
AM Peak (7:15 AM - 8:15 AM)
All Classes (Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements



### **McElhanney**

Provided by: McElhanney Edmonton #201, 13455 - 114 Ave Nw, Edmonton, AB, T5M 2E2, CA

ID: 1063950, Location: 53.88961, -110.763972



Wed May 3, 2023

PM Peak (4:15 PM - 5:15 PM) - Overall Peak Hour All Classes (Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road,

Bicycles on Crosswalk) All Movements

ID: 1063950, Location: 53.88961, -110.763972



### McElhanney

Leg	Airpor	t Acce	ess			Highwa	ay 646				Highway 64	16				
Direction	South	ound				Westbo	und				Eastbound					
Time	R	L	U	App	Ped*	R	T	U	App	Ped*	T	L	U	App	Ped*	Int
2023-05-03 4:15PM	0	0	0	0	0	0	17	0	17	0	20	0	0	20	0	37
4:30PM	0	0	0	0	0	0	21	0	21	0	22	0	0	22	0	43
4:45PM	0	0	0	0	0	0	18	0	18	0	13	0	0	13	0	31
5:00PM	0	0	0	0	0	0	8	0	8	0	20	0	0	20	0	28
Total	0	0	0	0	0	0	64	0	64	0	75	0	0	75	0	139
% Approach	0%	0%	0%	-	-	0%	100%	0%	-	-	100%	0%	0%	-	-	-
% Total	0%	0%	0%	0%	-	0%	46.0%	0%	46.0%	-	54.0%	0%	0%	54.0%	-	-
PHI	-	-	-	-	-	-	0.762	-	0.762	-	0.852	-	-	0.852	-	0.808
Lights	0	0	0	0	-	0	54	0	54	-	68	0	0	68	-	122
% Lights	0%	0%	0%	-	-	0%	84.4%	0%	84.4%	-	90.7%	0%	0%	90.7%	-	87.8%
Single-Unit Trucks	0	0	0	0	-	0	2	0	2	-	0	0	0	0	-	2
% Single-Unit Trucks	0%	0%	0%	-	-	0%	3.1%	0%	3.1%	-	0%	0%	0%	0%	-	1.4%
Articulated Trucks	0	0	0	0	-	0	7	0	7	-	6	0	0	6	-	13
% Articulated Trucks	0%	0%	0%	-	-	0%	10.9%	0%	10.9%	-	8.0%	0%	0%	8.0%	-	9.4%
Buses	0	0	0	0	-	0	1	0	1	-	1	0	0	1	-	2
% Buses	0%	0%	0%	-	-	0%	1.6%	0%	1.6%	-	1.3%	0%	0%	1.3%	-	1.4%
Bicycles on Road	0	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0
% Bicycles on Road	0%	0%	0%	-	-	0%	0%	0%	0%	-	0%	0%	0%	0%	-	0%
Pedestrians	-	-	-	-	0	-	-	-	-	0	-	-	-	-	0	
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	0	-	-	-	-	0	
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

<sup>\*</sup>Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, T: Thru, U: U-Turn

Wed May 3, 2023

PM Peak (4:15 PM - 5:15 PM) - Overall Peak Hour All Classes (Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)

All Movements

ID: 1063950, Location: 53.88961, -110.763972



### **McElhanney**



Wed May 3, 2023 Full Length (6 AM-10 AM, 3 PM-7 PM) All Classes (Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)

All Movements

ID: 1063951, Location: 53.887289, -110.747611



Leg Direction		Highway 6 Westbound			_		Range Ro Northbou			_		Highway 6 Eastbound	46			_	
Гіте		Т	L	U	Арр	Ped*	R	L	U	Арр	Ped*	R	Т	U	Арр	Ped*	Int
2023-	05-03 6:00AM	6	0	0	6	0	0	0	0	0	0	1	2	0	3	0	9
	6:15AM	2	1	0	3	0	0	1	0	1	0	0	9	0	9	0	13
	6:30AM	8	0	0	8	0	0	0	0	0	0	3	6	0	9	0	1
	6:45AM	8	2	0	10	0	0	3	0	3	0	6	1	0	7	0	20
	Hourly Total	24	3	0	27	0	0	4	0	4	0	10	18	0	28	0	59
	7:00AM	10	0	0	10	0	0	2	0	2	0	0	9	0	9	0	2
	7:15AM	7	0	0	7	0	1	2	0	3	0	2	21	0	23	0	3:
	7:30AM	8	0	0	8	0	0	0	0	0	0	0	4	0	4	0	12
	7:45AM	15	0	0	15	0	0	1	0	1	0	0	10	0	10	0	20
	Hourly Total	40	0	0	40	0	1	5	0	6	0		44	0	46	0	9:
	8:00AM	17	0	0	17	0	0	1	0	1	0	0	8	0	8	0	2
	8:15AM	7	0	0	7	0	0	2	0	2	0	1	5	0	6	0	1
	8:30AM	12	0	0	12	0	0	1	0	1	0	0	16	0	16	0	2:
	8:45AM	5	0	0	5	0	0	0	0	0	0	0	7	0	7	0	12
	Hourly Total	41	0	0	41	0	0	4	0	4	0	1	36	0	37	0	8:
	9:00AM	10	0	0	10	0	0	0	0	0	0	2	12	0	14	0	2
	9:15AM	4	0	0	4	0	0	2	0	2	0		6	0	8	0	14
	9:15AM 9:30AM	9	0	0	9	0	0	1	0	1	0	1	7	0	8	0	18
	9:45AM	12	0	0	12	0	0	1	0	1	0	0	8	0	8	0	2:
															38	0	7:
	Hourly Total	35 13	0	0	35 14	0	0	0	0	4	0	5	33	0	6	0	20
	3:00PM		1							0							
	3:15PM	25	0	0	25	0	0	1	0	1	0		9	0	9	0	3!
	3:30PM	16	0	0	16	0	0	1	0	1	0		8	0	11	0	28
	3:45PM	23	0	0	23	0	0	0	0	0	0	2	12	0	14	0	33
	Hourly Total	77	1	0	78	0	0	2	0	2	0	5	35	0	40	0	120
	4:00PM	16	0	0	16	0	0	3	0	3	0	0	5	0	5	0	24
	4:15PM	16	0	0	16	0	0	1	0	1	0	0	21	0	21	0	38
	4:30PM	21	0	0	21	0	0	1	0	1	0	2	22	0	24	0	40
	4:45PM	18	0	0	18	0	0	1	0	1	0	3	14	0	17	0	30
	Hourly Total	71	0	0	71	0	0	6	0	6	0	5	62	0	67	0	14
	5:00PM	7	1	0	8	0	0	1	0	1	0	3	20	0	23	0	32
	5:15PM	10	0	0	10	0	0	2	0	2	0	0	13	0	13	0	2
	5:30PM	12	0	0	12	0	0	4	0	4	0	1	14	0	15	0	3
	5:45PM	15	0	0	15	0	0	1	0	1	0	0	11	0	11	0	2
	Hourly Total	44	1	0	45	0	0	8	0	8	0	4	58	0	62	0	11!
	6:00PM	7	0	0	7	0	0	0	0	0	0	1	9	0	10	0	17
	6:15PM	13	1	0	14	0	0	0	0	0	0	0	11	0	11	0	2:
	6:30PM	7	0	0	7	0	0	2	0	2	0	0	4	0	4	0	13
	6:45PM	7	0	0	7	0	0	0	0	0	0	1	8	0	9	0	10
	Hourly Total	34	1	0	35	0	0	2	0	2	0	2	32	0	34	0	7:
	Total	366	6	0	372	0	1	35	0	36	0	34	318	0	352	0	760
	% Approach	98.4%	1.6%	0%	-	-	2.8%	97.2%	0%	-	-	9.7%	90.3%	0%	-	-	
	% Total	48.2%		0%	48.9%	-	0.1%	4.6%	0%	4.7%	-	4.5%	41.8%	0%	46.3%	-	
	Lights	316	3	0	319	-	0	29	0	29	-	26	259	0	285	-	63
	% Lights	86.3%	50.0%	0%	85.8%	-	0%	82.9%	0%	80.6%	-	76.5%	81.4%	0%	81.0%	-	83.39
Sing	le-Unit Trucks	15	0	0	15	-	0	1	0	1	-	1	21	0	22	-	3
	le-Unit Trucks	4.1%	0%	0%	4.0%	-	0%	2.9%	0%	2.8%	-	2.9%	6.6%	0%	6.3%	-	5.09
	culated Trucks	32	3	0	35	-	1	4	0	5	_	6	34	0	40	-	8
	culated Trucks	8.7%		0%	9.4%	-	100%	11.4%	0%	13.9%	_	17.6%	10.7%	0%	11.4%	-	10.59
,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	Buses	3	0	0	3	-	0	1	0	1	-	1	4	0	5	-	10107
	% Buses	0.8%	0%		0.8%	_	0%	2.9%	0%	2.8%		2.9%	1.3%	0%	1.4%	_	1.29
	cycles on Road	0.070	0	0	0.070	-	0	0	0	0		0	0	0	0		1,2/

Leg	Highway 646	i				Range Road	60				Highway 646					
Direction	Westbound					Northbound					Eastbound					
Time	T	L	U	App	Ped*	R	L	U	App	Ped*	R	T	U	App	Ped*	Int
% Bicycles on Road	0%	0%	0%	0%	-	0%	0%	0%	0%	-	0%	0%	0%	0%	-	0%
											1					

L	% Bicycles on Road	0%	0%	0%	0%	-	0%	0%	0%	0%	-	0%	0%	0%	0%	-	0%
	Pedestrians	-	-	-	-	0	-	-	-	-	0	-	-	-	-	0	
	% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	0	-	-	-	-	0	
	% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

<sup>\*</sup>Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, T: Thru, U: U-Turn

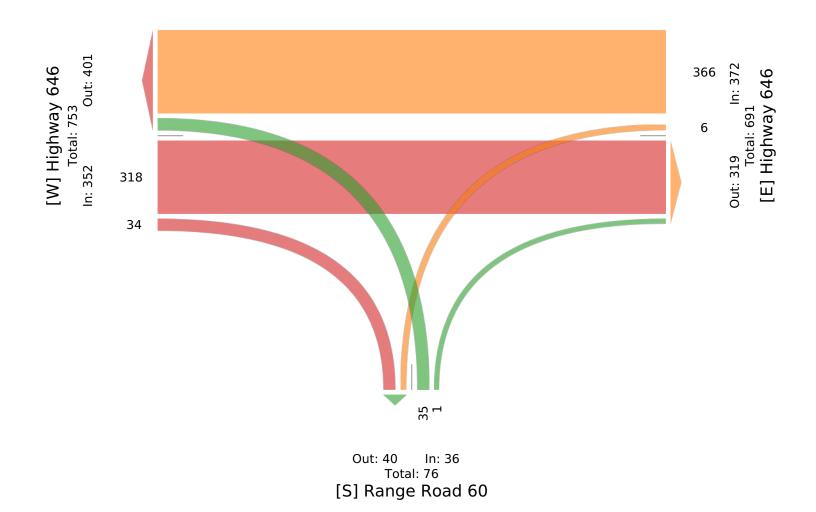
Wed May 3, 2023 Full Length (6 AM-10 AM, 3 PM-7 PM) All Classes (Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk) All Movements



## **McElhanney**

Provided by: McElhanney Edmonton #201, 13455 - 114 Ave Nw, Edmonton, AB, T5M 2E2, CA

ID: 1063951, Location: 53.887289, -110.747611



Wed May 3, 2023

AM Peak (7:15 AM - 8:15 AM)

All Classes (Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road,

Bicycles on Crosswalk)

All Movements

ID: 1063951, Location: 53.887289, -110.747611



### **McElhanney**

Leg	Highway 6	546				Range Roa	d 60				Highway (	646				
Direction	Westboun	d				Northboun	d				Eastbound	l				
Time	T	L	U	App	Ped*	R	L	U	App	Ped*	R	T	U	Арр	Ped*	Int
2023-05-03 7:15AM	7	0	0	7	0	1	2	0	3	0	2	21	0	23	0	33
7:30AM	8	0	0	8	0	0	0	0	0	0	0	4	0	4	0	12
7:45AM	15	0	0	15	0	0	1	0	1	0	0	10	0	10	0	26
8:00AM	17	0	0	17	0	0	1	0	1	0	0	8	0	8	0	26
Total	47	0	0	47	0	1	4	0	5	0	2	43	0	45	0	97
% Approach	100%	0%	0%	-	-	20.0%	80.0%	0%	-	-	4.4%	95.6%	0%	-	-	-
% Total	48.5%	0%	0%	48.5%	-	1.0%	4.1%	0%	5.2%	-	2.1%	44.3%	0%	46.4%	-	-
PHF	0.691	-	-	0.691	-	0.250	0.500	-	0.417	-	0.250	0.512	-	0.489	-	0.735
Lights	40	0	0	40	-	0	1	0	1	-	2	34	0	36	-	77
% Lights	85.1%	0%	0%	85.1%	-	0%	25.0%	0%	20.0%	-	100%	79.1%	0%	80.0%	-	79.4%
Single-Unit Trucks	0	0	0	0	-	0	0	0	0	-	0	6	0	6	-	6
% Single-Unit Trucks	0%	0%	0%	0%	-	0%	0%	0%	0%	-	0%	14.0%	0%	13.3%	-	6.2%
Articulated Trucks	5	0	0	5	-	1	2	0	3	-	0	3	0	3	-	11
% Articulated Trucks	10.6%	0%	0%	10.6%	-	100%	50.0%	0%	60.0%	-	0%	7.0%	0%	6.7%	-	11.3%
Buses	2	0	0	2	-	0	1	0	1	-	0	0	0	0	-	3
% Buses	4.3%	0%	0%	4.3%	-	0%	25.0%	0%	20.0%	-	0%	0%	0%	0%	-	3.1%
Bicycles on Road	0	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0
% Bicycles on Road	0%	0%	0%	0%	-	0%	0%	0%	0%	-	0%	0%	0%	0%	-	0%
Pedestrians	-	-	-	-	0	-		-	-	0	-	-	-	-	0	
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	0	-	-	-	-	0	
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

<sup>\*</sup>Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, T: Thru, U: U-Turn

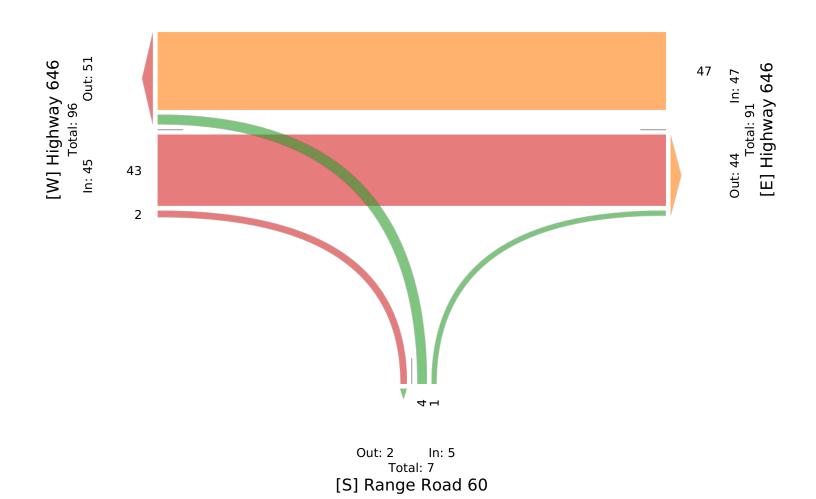
Wed May 3, 2023 AM Peak (7:15 AM - 8:15 AM) All Classes (Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk) All Movements



## **McElhanney**

Provided by: McElhanney Edmonton #201, 13455 - 114 Ave Nw, Edmonton, AB, T5M 2E2, CA

ID: 1063951, Location: 53.887289, -110.747611



Wed May 3, 2023

PM Peak (4:15 PM - 5:15 PM) - Overall Peak Hour All Classes (Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road,

Bicycles on Crosswalk)

All Movements

ID: 1063951, Location: 53.887289, -110.747611



### **McElhanney**

Leg	Highway 6					_	Road 60				Highway 6	46				
Direction	Westbound					Northb	ound				Eastbound					
Time	T	L	U	App	Ped*	R	L	U	App	Ped*	R	T	U	App	Ped*	Int
2023-05-03 4:15PM	16	0	0	16	0	0	1	0	1	0	0	21	0	21	0	38
4:30PM	21	0	0	21	0	0	1	0	1	0	2	22	0	24	0	46
4:45PM	18	0	0	18	0	0	1	0	1	0	3	14	0	17	0	36
5:00PM	7	1	0	8	0	0	1	0	1	0	3	20	0	23	0	32
Total	62	1	0	63	0	0	4	0	4	0	8	77	0	85	0	152
% Approach	98.4%	1.6%	0%	-	-	0%	100%	0%	-	-	9.4%	90.6%	0%	-	-	-
% Total	40.8%	0.7%	0%	41.4%	-	0%	2.6%	0%	2.6%	-	5.3%	50.7%	0%	55.9%	-	-
PHF	0.738	0.250	-	0.750	-	-	1.000	-	1.000	-	0.667	0.875	-	0.885	-	0.826
Lights	53	0	0	53	-	0	4	0	4	-	3	70	0	73	-	130
% Lights	85.5%	0%	0%	84.1%	-	0%	100%	0%	100%	-	37.5%	90.9%	0%	85.9%	-	85.5%
Single-Unit Trucks	2	0	0	2	-	0	0	0	0	-	0	0	0	0	-	2
% Single-Unit Trucks	3.2%	0%	0%	3.2%	-	0%	0%	0%	0%	-	0%	0%	0%	0%	-	1.3%
Articulated Trucks	6	1	0	7	-	0	0	0	0	-	5	6	0	11	-	18
% Articulated Trucks	9.7%	100%	0%	11.1%	-	0%	0%	0%	0%	-	62.5%	7.8%	0%	12.9%	-	11.8%
Buses	1	0	0	1	-	0	0	0	0	-	0	1	0	1	-	2
% Buses	1.6%	0%	0%	1.6%	-	0%	0%	0%	0%	-	0%	1.3%	0%	1.2%	-	1.3%
Bicycles on Road	0	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0
% Bicycles on Road	0%	0%	0%	0%	-	0%	0%	0%	0%	-	0%	0%	0%	0%	-	0%
Pedestrians	-	-	-	-	0	-	-	-	-	0	-	-	-	-	0	
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	0	-	-	-	-	0	
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

<sup>\*</sup>Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, T: Thru, U: U-Turn

Wed May 3, 2023

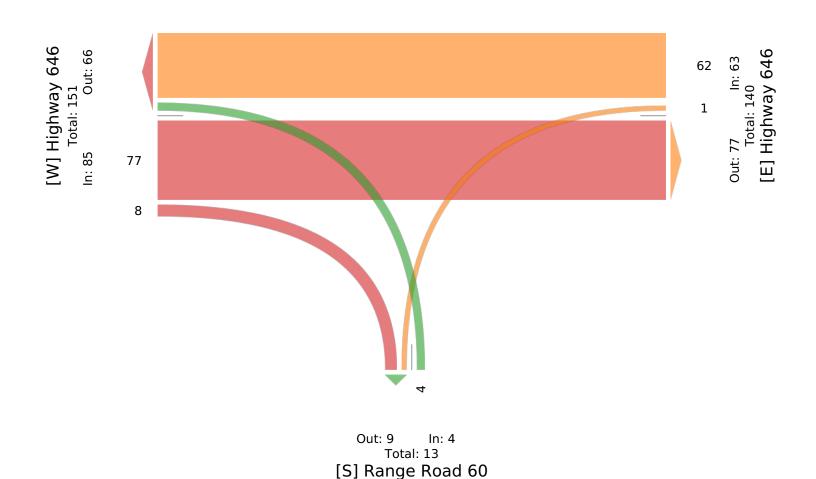
PM Peak (4:15 PM - 5:15 PM) - Overall Peak Hour All Classes (Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)

All Movements

ID: 1063951, Location: 53.887289, -110.747611



## **McElhanney**



Wed May 3, 2023

Full Length (6 AM-10 AM, 3 PM-7 PM)

All Classes (Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road,

Bicycles on Crosswalk) All Movements

ID: 1063946, Location: 53.879228, -110.722866



### **McElhanney**

Leg Direction	Highway 6					Range Roa					Highway 64 Eastbound	16				
Time	T	L	U	Арр	Ped*	R	L	U	App	Ped*	R	T	U	Арр	Ped*	Int
2023-05-03 6:00AM	5	0	0	<u>лүү</u> 5	0	0	1	0	<u>лүү</u> 1	0	0	3	0	<u>лүү</u> 3	0	9
6:15AM	5	0	0	5	0	0	0	0	0	0		7	0	7	0	12
6:30AM	8	0	0	8	0	0	1	0	1	0		8	0	8	0	17
6:45AM	9	0	0	9	0	0	1	0	1	0		1	0	1	0	11
Hourly Total	27	0	0	27	0	0	3	0	3	0		19	0	19	0	49
7:00AM	6	0	0	6	0	0	0	0	0	0	1	7	0	8	0	14
7:15AM	7	1	0	8	0	0	1	0	1	0		22	0	23	0	32
7:30AM	8	0	0	8	0	0	0	0	0	0		4	0	4	0	12
7:45AM	17	0	0	17	0	0	0	0	0	0		10	0	10	0	27
Hourly Total	38	1	0	39	0	0	1	0	1	0		43	0	45	0	85
8:00AM	13	1	0	14	0	0	1	0	1	0	0	8	0	8	0	23
8:15AM	9	0	0	9	0	0	0	0	0	0	0	6	0	6	0	15
8:30AM	9	0	0	9	0	0	0	0	0	0	0	13	0	13	0	22
8:45AM	6	0	0	6	0	0	0	0	0	0	1	10	0	11	0	17
Hourly Total	37	1	0	38	0	0	1	0	1	0	1	37	0	38	0	77
9:00AM	8	0	0	8	0	0	0	0	0	0	1	9	0	10	0	18
9:15AM	4	1	0	5	0	1	1	0	2	0	2	5	0	7	0	14
9:30AM	13	1	0	14	0	0	1	0	1	0	1	6	0	7	0	22
9:45AM	10	0	0	10	0	0	1	0	1	0	0	9	0	9	0	20
Hourly Total	35	2	0	37	0	1	3	0	4	0	4	29	0	33	0	74
3:00PM	13	0	0	13	0	0	0	0	0	0	0	7	0	7	0	20
3:15PM	24	0	0	24	0	0	0	0	0	0	0	7	0	7	0	31
3:30PM	17	0	0	17	0	0	0	0	0	0	1	10	0	11	0	28
3:45PM	24	0	0	24	0	0	0	0	0	0	0	11	0	11	0	35
Hourly Total	78	0	0	78	0	0	0	0	0	0	1	35	0	36	0	114
4:00PM	17	0	0	17	0	0	0	0	0	0	0	5	0	5	0	22
4:15PM	13	0	0	13	0	0	0	0	0	0	0	19	0	19	0	32
4:30PM	17	0	0	17	0	1	1	0	2	0	0	21	0	21	0	40
4:45PM	18	0	0	18	0	0	0	0	0	0	0	13	0	13	0	31
Hourly Total	65	0	0	65	0	1	1	0	2	0	0	58	0	58	0	125
5:00PM	11	0	0	11	0	1	0	0	1	0	0	23	0	23	0	35
5:15PM	5	0	0	5	0	0	0	0	0	0	0	9	0	9	0	14
5:30PM	15	0	0	15	0	0	0	0	0	0	0	14	0	14	0	29
5:45PM	12	0	0	12	0	0	0	0	0	0		15	0	15	0	27
Hourly Total	43	0	0	43	0	1	0	0	1	0	0	61	0	61	0	105
6:00PM		0	0	5	0	0	0	0	0	0		7	0	8	0	13
6:15PM		0	0	14	0	0	0	0	0	0		8	0	8	0	22
6:30PM		0	0	8	0	0	0	0	0	0		8	0	8	0	16
6:45PM		0	0	4	0	0	0	0	0	0		6	0	6	0	10
Hourly Total		0	0	31	0	0	0	0	0	0		29	0	30	0	61
Total		4	0	358	0		9	0	12	0		311	0	320	0	690
% Approach			0%	-	-	25.0%	75.0%		-		2.8%	97.2%	0%	-	-	-
% Total			0%	51.9%	-	0.4%	1.3%	0%	1.7%		1.3%	45.1%	0%	46.4%	-	-
Lights		3	0	304	-	3	8	0	11	-	7	253	0	260	-	575
% Lights	85.0%		0%	84.9%	-	100%	88.9%	0%	91.7%	-	77.8%	81.4%	0%	81.3%	-	83.3%
Single-Unit Trucks	16	1	0	17	-	0	1	0	1	-	2	18	0	20	-	38
% Single-Unit Trucks	4.5%		0%	4.7%	-	0%	11.1%	0%	8.3%	-	22.2%	5.8%	0%	6.3%	-	5.5%
Articulated Trucks	34	0	0	34	-	0	0	0	0	-	0	36	0	36	-	70
% Articulated Trucks	9.6%	0%		9.5%		0%	0%		0%		0%	11.6%	0%	11.3%	-	10.1%
Buses		0	0	3		0	0	0	0		0	4	0	4		7
% Buses	0.8%	0%		0.8%	-	0%	0%		0%	-	0%	1.3%	0%	1.3%	-	1.0%
Bicycles on Road	0	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0

Direction Westbound Northbound Eastbound		l .
		l
Time T L U App Ped* R L U App Ped* R T U A	<b>App</b> Ped*	Int

% Bicycles on Road	0%	0%	0%	0%	-	0%	0%	0%	0%	-	0%	0%	0%	0%	-	0%
Pedestrians	-	-	-	-	0	-	-	-	-	0	-	-	-	-	0	
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	0	-	-	-	-	0	
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

<sup>\*</sup>Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, T: Thru, U: U-Turn

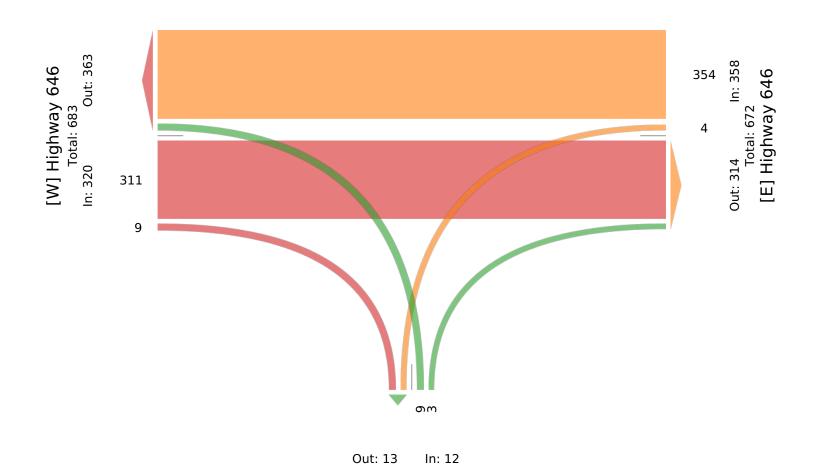
Wed May 3, 2023 Full Length (6 AM-10 AM, 3 PM-7 PM) All Classes (Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk) All Movements

ID: 1063946, Location: 53.879228, -110.722866



## **McElhanney**

Provided by: McElhanney Edmonton #201, 13455 - 114 Ave Nw, Edmonton, AB, T5M 2E2, CA



Total: 25 [S] Range Road 55

Wed May 3, 2023

AM Peak (7:15 AM - 8:15 AM)

All Classes (Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road,

Bicycles on Crosswalk) All Movements

ID: 1063946, Location: 53.879228, -110.722866



### **McElhanney**

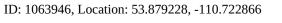
Leg	Highway 64	46				Range	Road 55				Highway (					
Direction	Westbound					Northb	oound				Eastbound	l				
Time	T	L	U	App	Ped*	R	L	U	App	Ped*	R	T	U	App	Ped*	Int
2023-05-03 7:15AM	1 7	1	0	8	0	0	1	0	1	0	1	22	0	23	0	32
7:30AM	8	0	0	8	0	0	0	0	0	0	0	4	0	4	0	12
7:45AM	17	0	0	17	0	0	0	0	0	0	0	10	0	10	0	27
8:00AM	13	1	0	14	0	0	1	0	1	0	0	8	0	8	0	23
Total	<b>l</b> 45	2	0	47	0	0	2	0	2	0	1	44	0	45	0	94
% Approach	95.7%	4.3%	0%	-	-	0%	100%	0%	-	-	2.2%	97.8%	0%	-	-	-
% Total	47.9%	2.1%	0%	50.0%	-	0%	2.1%	0%	2.1%	-	1.1%	46.8%	0%	47.9%	-	-
PHI	0.662	0.500	-	0.691	-	-	0.500	-	0.500	-	0.250	0.500	-	0.489	-	0.734
Lights	38	1	0	39	-	0	2	0	2	-	1	35	0	36	-	77
% Lights	84.4%	50.0%	0%	83.0%	-	0%	100%	0%	100%	-	100%	79.5%	0%	80.0%	-	81.9%
Single-Unit Trucks	1	1	0	2	-	0	0	0	0	-	0	4	0	4	-	6
% Single-Unit Trucks	2.2%	50.0%	0%	4.3%	-	0%	0%	0%	0%	-	0%	9.1%	0%	8.9%	-	6.4%
Articulated Trucks	4	0	0	4	-	0	0	0	0	-	0	5	0	5	-	9
% Articulated Trucks	8.9%	0%	0%	8.5%	-	0%	0%	0%	0%	-	0%	11.4%	0%	11.1%	-	9.6%
Buses	2	0	0	2	-	0	0	0	0	-	0	0	0	0	-	2
% Buses	4.4%	0%	0%	4.3%	-	0%	0%	0%	0%	-	0%	0%	0%	0%	-	2.1%
Bicycles on Road	0	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0
% Bicycles on Road	0%	0%	0%	0%	-	0%	0%	0%	0%	-	0%	0%	0%	0%	-	0%
Pedestrians	-	-	-	-	0	-	-	-	-	0	-	-	-	-	0	
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	0	-	-	-	-	0	
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

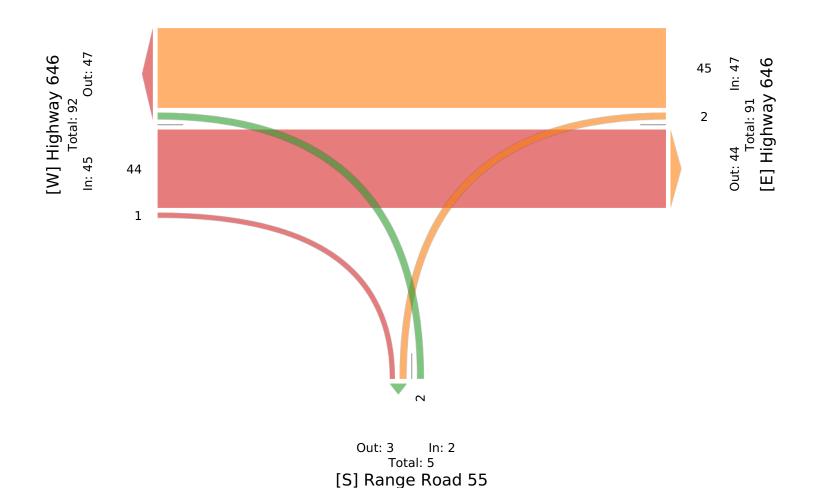
<sup>\*</sup>Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, T: Thru, U: U-Turn

Wed May 3, 2023 AM Peak (7:15 AM - 8:15 AM) All Classes (Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk) All Movements



## **McElhanney**





Wed May 3, 2023

PM Peak (4:15 PM - 5:15 PM) - Overall Peak Hour All Classes (Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road,

Bicycles on Crosswalk)

All Movements

ID: 1063946, Location: 53.879228, -110.722866



### **McElhanney**

Leg	Highway 6	646				Range Road	d 55				Highw	ay 646				
Direction	Westbound	i				Northbound	d				Eastbo	und				
Time	T	L	U	App	Ped*	R	L	U	App	Ped*	R	T	U	App	Ped*	Int
2023-05-03 4:15PM	13	0	0	13	0	0	0	0	0	0	0	19	0	19	0	32
4:30PM	17	0	0	17	0	1	1	0	2	0	0	21	0	21	0	40
4:45PM	18	0	0	18	0	0	0	0	0	0	0	13	0	13	0	31
5:00PM	11	0	0	11	0	1	0	0	1	0	0	23	0	23	0	35
Total	59	0	0	59	0	2	1	0	3	0	0	76	0	76	0	138
% Approach	100%	0%	0%	-	-	66.7%	33.3%	0%	-	-	0%	100%	0%	-	-	-
% Total	42.8%	0%	0%	42.8%	-	1.4%	0.7%	0%	2.2%	-	0%	55.1%	0%	55.1%	-	-
PHF	0.819	-	-	0.819	-	0.500	0.250	-	0.375	-	-	0.826	-	0.826	-	0.863
Lights	49	0	0	49	-	2	1	0	3	-	0	69	0	69	-	121
% Lights	83.1%	0%	0%	83.1%	-	100%	100%	0%	100%	-	0%	90.8%	0%	90.8%	-	87.7%
Single-Unit Trucks	2	0	0	2	-	0	0	0	0	-	0	0	0	0	-	2
% Single-Unit Trucks	3.4%	0%	0%	3.4%	-	0%	0%	0%	0%	-	0%	0%	0%	0%	-	1.4%
Articulated Trucks	7	0	0	7	-	0	0	0	0	-	0	6	0	6	-	13
% Articulated Trucks	11.9%	0%	0%	11.9%	-	0%	0%	0%	0%	-	0%	7.9%	0%	7.9%	-	9.4%
Buses	1	0	0	1	-	0	0	0	0	-	0	1	0	1	-	2
% Buses	1.7%	0%	0%	1.7%	-	0%	0%	0%	0%	-	0%	1.3%	0%	1.3%	-	1.4%
Bicycles on Road	. 0	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0
% Bicycles on Road	0%	0%	0%	0%	-	0%	0%	0%	0%	-	0%	0%	0%	0%	-	0%
Pedestrians	-	-	-	-	0	-	-	-	-	0	-	-	-	-	0	
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	0	-	-	-	-	0	
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

<sup>\*</sup>Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, T: Thru, U: U-Turn

Wed May 3, 2023

PM Peak (4:15 PM - 5:15 PM) - Overall Peak Hour All Classes (Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)

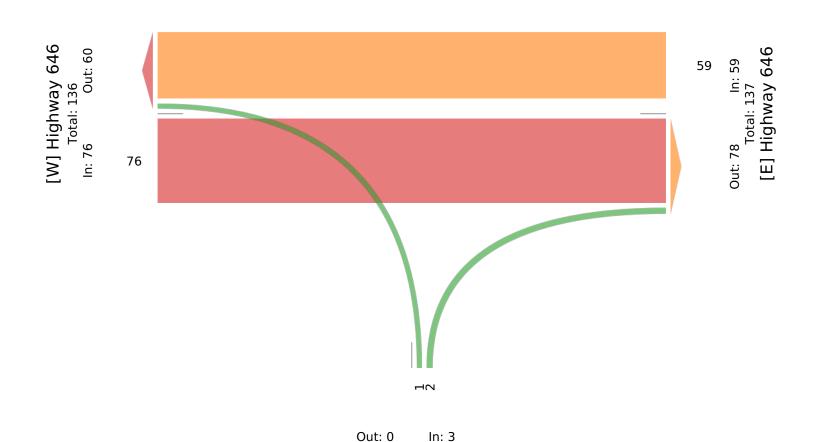
All Movements

ID: 1063946, Location: 53.879228, -110.722866



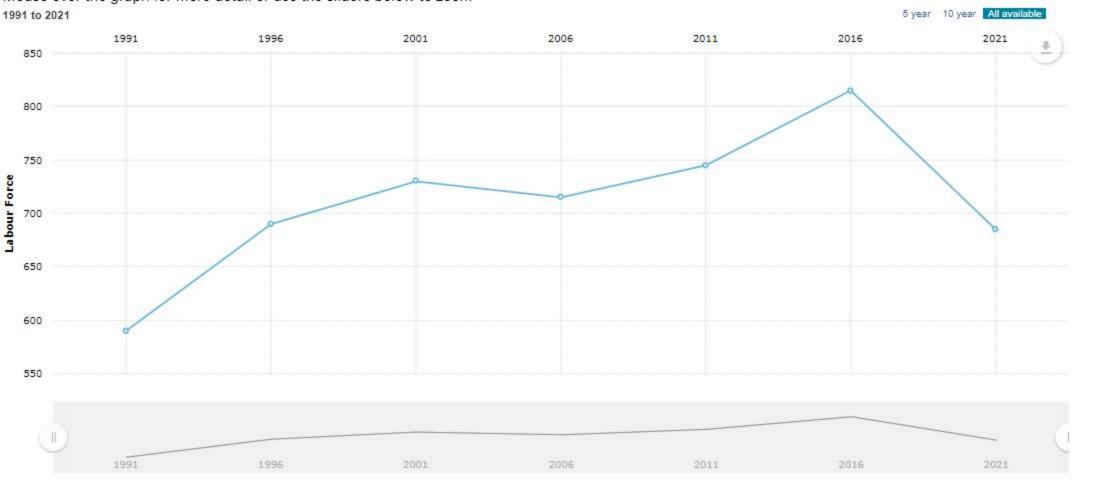
## **McElhanney**

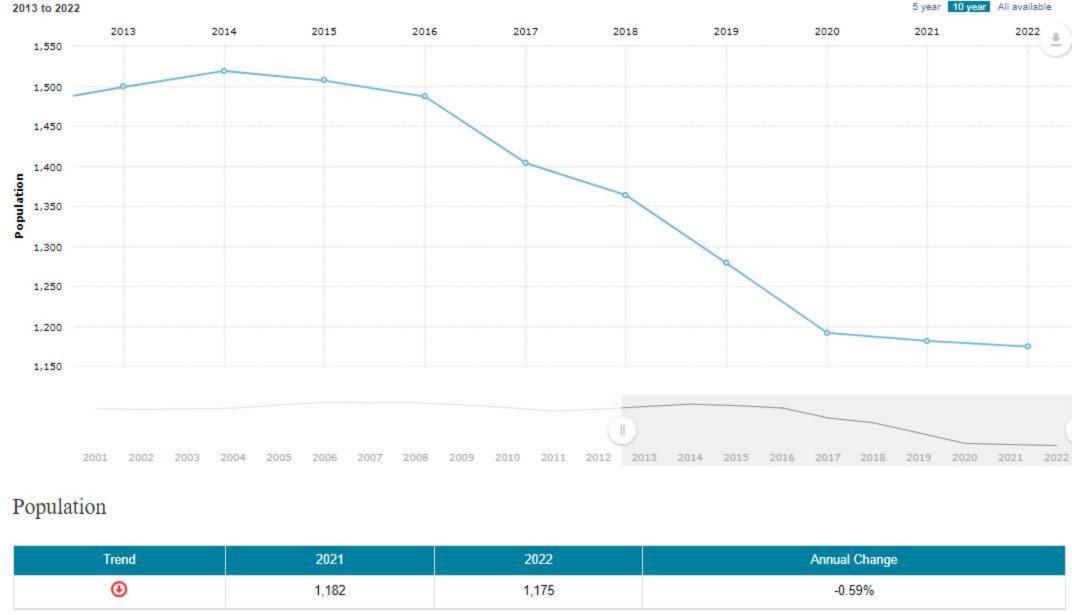
Provided by: McElhanney Edmonton #201, 13455 - 114 Ave Nw, Edmonton, AB, T5M 2E2, CA

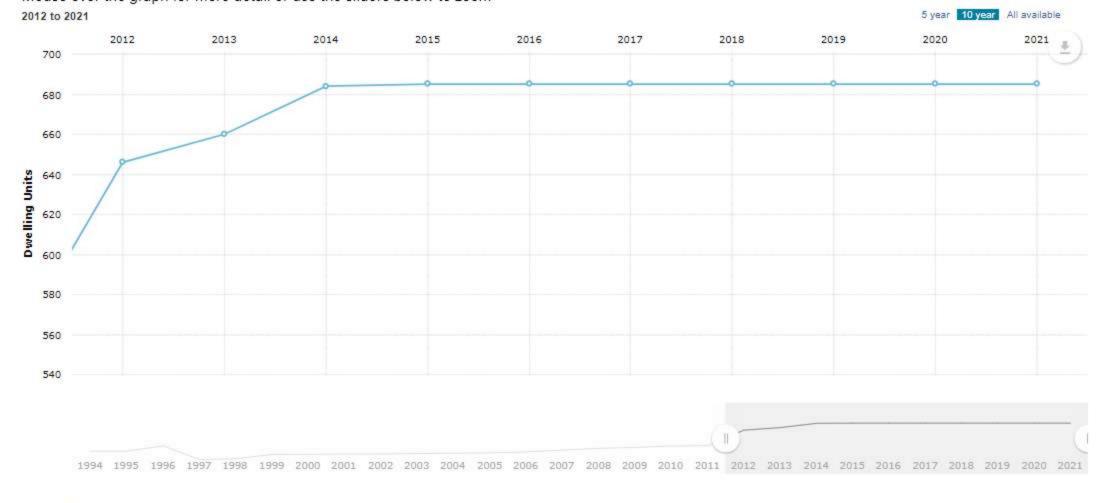


Total: 3 [S] Range Road 55

# EXHIBIT C – MUNICIPAL STATISTICAL TRENDS AND BACKGROUND TRIPS







### **Dwelling Units**

Trend	2020	2021	Annual Change
0	685	685	0

Site Component	Units	ITE Code	Item	ΙA	M Peak Ho	ur	PI	M Peak Ho	ur
Site Component	Ullits	TTE Code	HeIII	In	Out	Total	In	Out	Total
		Single Family	Directional Distribution	25%	75%	100%	63%	37%	100%
Residential	10	Detached (LUC 210)	(Fitted Curve)	Ln(T) =	0.91 Ln(X	) + 0.12	Ln(T) =	0.94 Ln(X	) + 0.27
		( = 3 = 10)	Gross Trips	2	7	9	7	4	11

### EXHIBIT D - TRAFFIC ANALYSIS RESULTS

Intersection												
Int Delay, s/veh	0.3											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		4			4			4			4	
Traffic Vol, veh/h	1	45	8	0	38	3	0	0	1	1	0	0
Future Vol, veh/h	1	45	8	0	38	3	0	0	1	1	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage	,# -	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	84	84	84	84	84	84	84	84	84	84	84	84
Heavy Vehicles, %	100	7	50	0	18	100	0	0	0	0	0	0
Mvmt Flow	1	54	10	0	45	4	0	0	1	1	0	0
Major/Minor N	/lajor1		_	Major2		_	Minor1		N	Minor2		
Conflicting Flow All	49	0	0	64	0	0	108	110	59	109	113	47
Stage 1	-	-	-	-	-	-	61	61	-	47	47	- ',
Stage 2	_	_	-	-	_	_	47	49	-	62	66	_
Critical Hdwy	5.1	-	-	4.1	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	_	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	_	_	_	_	-	6.1	5.5	_	6.1	5.5	_
Follow-up Hdwy	3.1	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1106	_	_	1551	_	-	876	784	1012	874	781	1028
Stage 1	-	-	-	-	-	-	955	848	-	972	860	-
Stage 2	-	-	-	-	_	-	972	858	-	954	844	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1106	-	-	1551	-	-	875	783	1012	872	780	1028
Mov Cap-2 Maneuver	-	-	-	-	-	-	875	783	-	872	780	_
Stage 1	-	-	-	-	-	-	954	847	-	971	860	-
Stage 2	-	-	-	-	-	-	972	858	-	952	843	-
J.												
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.2			0			8.6			9.1		
HCM LOS							А			Α		
Minor Lane/Major Mvm	t N	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR S	SBLn1			
Capacity (veh/h)		1012	1106	-	-	1551	-	-	872			
HCM Lane V/C Ratio		0.001	0.001	-	-	_	-	_	0.001			
HCM Control Delay (s)		8.6	8.3	0	-	0	-	-				
HCM Lane LOS		Α	Α	A	-	A	-	-	Α			
HCM 95th %tile Q(veh)		0	0	-	-	0	-	-	0			

Intersection						
Int Delay, s/veh	0.5					
		EDD	WDI	MOT	NDI	NDD
	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	<b>∱</b>	0	0	<b>-</b> 4	¥	4
Traffic Vol, veh/h	43	2	0	46	4	1
Future Vol, veh/h	43	2	0	46	4	1
Conflicting Peds, #/hr	0	_ 0	0	0	0	0
	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #		-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	73	73	73	73	73	73
Heavy Vehicles, %	7	0	0	15	75	100
Mvmt Flow	59	3	0	63	5	1
N 4 - 1 - 1/N 41 - 1 - 1	. !1		4-10		4'1	
	ajor1		Major2		Minor1	
Conflicting Flow All	0	0	62	0	124	61
Stage 1	-	-	-	-	61	-
Stage 2	-	-	-	-	63	-
Critical Hdwy	-	-	4.1	-	7.15	7.2
Critical Hdwy Stg 1	-	-	-	-	6.15	-
Critical Hdwy Stg 2	-	-	-	-	6.15	-
Follow-up Hdwy	-	-	2.2	-	4.175	4.2
Pot Cap-1 Maneuver	-	-	1554	-	724	786
Stage 1	-	-	-	-	805	-
Stage 2	-	-	-	-	803	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	_	-	1554	-	724	786
Mov Cap-2 Maneuver	_	_	-	_	724	-
Stage 1	_	_	_	_	805	_
Stage 2	_	_	_	_	803	_
Stuge 2					003	
Approach	EB		WB		NB	
HCM Control Delay, s	0		0		9.9	
HCM LOS					Α	
Ndinan Lana/Ndaian Ndonat		IDI1	EDT	EDD	WDI	WDT
Minor Lane/Major Mvmt		VBLn1	EBT	EBR		WBT
Capacity (veh/h)		736	-	-	1554	-
HCM Lane V/C Ratio		0.009	-	-	-	-
HCM Control Delay (s)		9.9	-	-	0	-
LICM Land LOC		Λ			Λ	-
HCM Lane LOS HCM 95th %tile Q(veh)		A 0	-	-	A 0	-

Intersection						
Int Delay, s/veh	0					
		<b>FDT</b>	WDT	WIDD	CDI	CDD
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		ની	1		¥	
Traffic Vol, veh/h	0	44	47	0	0	0
Future Vol, veh/h	0	44	47	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage	e,# -	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	73	73	73	73	73	73
Heavy Vehicles, %	0	9	15	0	0	0
Mvmt Flow	0	60	64	0	0	0
					-	
				_		
	Major1		Major2	N	/linor2	
Conflicting Flow All	64	0	-	0	124	64
Stage 1	-	-	-	-	64	-
Stage 2	-	-	-	-	60	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	_	_		_	5.4	_
Critical Hdwy Stg 2	_	_	_	_	5.4	_
Follow-up Hdwy	2.2	_	_	_	3.5	3.3
Pot Cap-1 Maneuver	1551	_		_	876	1006
•	1331	_	_	-	964	-
Stage 1	-		-			
Stage 2	-	-	-	-	968	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1551	-	-	-	876	1006
Mov Cap-2 Maneuver	-	-	-	-	876	-
Stage 1	-	-	-	-	964	-
Stage 2	-	-	-	-	968	-
Approach	EB		WB		SB	
HCM Control Delay, s	0		0		0	
HCM LOS	U		U			
HOW LOS					Α	
Minor Lane/Major Mvm	nt	EBL	EBT	WBT	WBR :	SBLn1
Capacity (veh/h)		1551			_	
HCM Lane V/C Ratio		-		_	_	_
HCM Control Delay (s)		0			_	0
HCM Lane LOS			-			A
	١	A	-	-	-	
HCM 95th %tile Q(veh	)	0	-	-	-	-

Intersection						
Int Delay, s/veh	0.5					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	<b>^</b>			सी	¥	
Traffic Vol, veh/h	43	2	0	47	4	1
Future Vol, veh/h	43	2	0	47	4	1
Conflicting Peds, #/hr	0	0	0	0	0	0
•	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage,	# 0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	73	73	73	73	73	73
Heavy Vehicles, %	7	0	0	15	75	100
Mvmt Flow	59	3	0	64	5	1
Major/Minor Ma	ajor1	N	Major2		Minor1	
	0	0	62	0	125	61
Conflicting Flow All		U	02		61	01
Stage 1	-	-	-	-	64	
Stage 2	-	-	4.1	-	7.15	7.2
Critical Hdwy Critical Hdwy Stg 1		-	4.1	-	6.15	1.2
Critical Hdwy Stg 2	-	-	-		6.15	
3 0	-	-	2.2	-	4.175	4.2
Follow-up Hdwy	-	-	1554		723	786
Pot Cap-1 Maneuver	-	-	1004	-	805	700
Stage 1	-	-	-	-	802	-
Stage 2 Platoon blocked, %	-	-	-	-	802	-
	-	-	155/	-	722	786
Mov Cap-1 Maneuver	-	-	1554	-	723	
Mov Cap-2 Maneuver	-	-	-	-	723	-
Stage 1	-	-	-	-	805	-
Stage 2	-	-	-	-	802	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		0		9.9	
HCM LOS					Α	
Minor Lane/Major Mvmt	N	NBLn1	EBT	EBR	WBL	WBT
	<u> </u>					WDI
Capacity (veh/h)		735	-	-	1554	-
HCM Control Polov (a)		0.009	-	-	-	-
HCM Long LOS		9.9	-	-	0	-
HCM Lane LOS HCM 95th %tile Q(veh)		A 0	-	-	A 0	-
			_	_		_

Intersection						
Int Delay, s/veh	0.3					
		NDD	СГТ	CED	NIVAZI	NWT
	<u>NBL</u>	NBR	SET	SER	NWL	
Lane Configurations	¥	^	<b>-</b>	1	2	<u>ન</u>
Traffic Vol, veh/h	2	0	44	1	2	45
Future Vol, veh/h	2	0	44	1	2	45
Conflicting Peds, #/hr	0	0	0	0	0	0
	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #		-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	86	86	86	86	86	86
Heavy Vehicles, %	0	0	11	0	0	13
Mvmt Flow	2	0	51	1	2	52
Major/Minor Mi	nor1	ı	Major1		//oior?	
	nor1		Major1		Major2	
Conflicting Flow All	108	52	0	0	52	0
Stage 1	52	-	-	-	-	-
Stage 2	56	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	894	1021	-	-	1567	-
<u>J</u>	976	-	-	-	-	-
Stage 2	972	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	893	1021	-	-	1567	-
	893	-	-	-	-	-
Stage 1	976	-	-	-	-	-
	971	_	_	_	_	_
3.ag3 <b>L</b>						
Approach	NB		SE		NW	
HCM Control Delay, s	9		0		0.3	
HCM LOS	Α					
Minor Lane/Major Mvmt		VBLn1	NWL	NWT	SET	SER
				INVVI	SEI	SER
Capacity (veh/h)		893	1567	-	-	-
HCM Lane V/C Ratio		0.003		-	-	-
HCM Control Delay (s)		9	7.3	0	-	-
HCM Lane LOS		Α	Α	Α	-	-
HCM 95th %tile Q(veh)		0	0	-	-	-

Movement	NB	SB
	ND	
Directions Served	LTR	LTR
Maximum Queue (m)	5.9	4.4
Average Queue (m)	0.4	0.2
95th Queue (m)	3.1	2.1
Link Distance (m)	496.7	734.3
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

### Intersection: 2: Range Road 61 & Highway 646

Movement	NB
Directions Served	LR
Maximum Queue (m)	17.8
Average Queue (m)	3.2
95th Queue (m)	13.3
Link Distance (m)	788.8
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (m)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Movement
Directions Served
Maximum Queue (m)
Average Queue (m)
95th Queue (m)
Link Distance (m)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (m)
Storage Blk Time (%)
Queuing Penalty (veh)

Movement	NB
Directions Served	LR
Maximum Queue (m)	15.7
Average Queue (m)	1.5
95th Queue (m)	8.2
Link Distance (m)	1098.0
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (m)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

### Intersection: 5: Range Road 55 & Highway 646

Movement	NB
Directions Served	LR
Maximum Queue (m)	5.4
Average Queue (m)	0.4
95th Queue (m)	2.7
Link Distance (m)	1229.5
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (m)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

#### **Network Summary**

Intersection												
Int Delay, s/veh	0.4											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		4			4			4			4	
Traffic Vol, veh/h	0	81	0	0	67	1	3	0	1	1	0	1
Future Vol, veh/h	0	81	0	0	67	1	3	0	1	1	0	1
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage,	,# -	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	79	79	79	79	79	79	79	79	79	79	79	79
Heavy Vehicles, %	0	14	0	0	10	0	0	0	100	0	0	0
Mvmt Flow	0	103	0	0	85	1	4	0	1	1	0	1
Major/Minor N	1ajor1		N	Major2		N	Vinor1		N	Minor2		
Conflicting Flow All	86	0	0	103	0	0	189	189	103	190	189	86
Stage 1	-	-	-	-	-	-	103	103	-	86	86	-
Stage 2	-	-	-	-	-	-	86	86	-	104	103	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	7.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	4.2	3.5	4	3.3
Pot Cap-1 Maneuver	1523	-	-	1502	-	-	776	709	740	774	709	978
Stage 1	-	-	-	-	-	-	908	814	-	927	827	-
Stage 2	-	-	-	-	-	-	927	827	-	907	814	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1523	-	-	1502	-	-	775	709	740	772	709	978
Mov Cap-2 Maneuver	-	-	-	-	-	-	775	709	-	772	709	-
Stage 1	-	-	-	-	-	-	908	814	-	927	827	-
Stage 2	-	-	-	-	-	-	926	827	-	905	814	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0			0			9.7			9.2		
HCM LOS							Α			Α		
Minor Lane/Major Mvm	t N	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR :	SBLn1			
Capacity (veh/h)		766	1523	-	-	1502	-		863			
HCM Lane V/C Ratio		0.007	-	-	-	-	-	_	0.003			
HCM Control Delay (s)		9.7	0	-	-	0	-	-	9.2			
HCM Lane LOS		Α	A	-	-	A	-	-	Α			
HCM 95th %tile Q(veh)		0	0	-	-	0	-	-	0			

Intersection						
Int Delay, s/veh	0.3					
	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	ĵ.			ની	N/	
Traffic Vol, veh/h	76	8	1	64	4	0
Future Vol, veh/h	76	8	1	64	4	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage,	# 0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	83	83	83	83	83	83
Heavy Vehicles, %	8	63	100	11	75	100
Mymt Flow	92	10	100	77	5	0
IVIVIII( I IOW	12	10		,,	J	U
Major/Minor Ma	ajor1	١	/lajor2	1	Minor1	
Conflicting Flow All	0	0	102	0	176	97
Stage 1	-	-	-	-	97	-
Stage 2	-	-	-	-	79	-
Critical Hdwy	-	-	5.1	-	7.15	7.2
Critical Hdwy Stg 1	_	_	-	_	6.15	-
Critical Hdwy Stg 2	_	_	_	-	6.15	_
Follow-up Hdwy	_	_	3.1		4.175	4.2
Pot Cap-1 Maneuver	_	_	1050	_	672	747
Stage 1	_	_	1000	_	772	- 171
Stage 2	_		-	_	788	
Platoon blocked, %		-	-		700	-
	-	-	1000	-	/71	7.47
Mov Cap-1 Maneuver	-	-	1050	-	671	747
Mov Cap-2 Maneuver	-	-	-	-	671	-
Stage 1	-	-	-	-	772	-
Stage 2	-	-	-	-	787	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		0.1		10.4	
HCM LOS	U		0.1		В	
TICIVI LOS					D	
Minor Lane/Major Mvmt	1	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)		671	-	-	1050	
HCM Lane V/C Ratio		0.007	-	_	0.001	-
HCM Control Delay (s)		10.4	-	_	8.4	0
HCM Lane LOS		В	_	_	Α	A
HCM 95th %tile Q(veh)		0	_		0	-
HOW FORM /ORIGINALITY		U	•	•	U	

Intersection						
Int Delay, s/veh	0					
					05:	
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		4	Þ		¥	
Traffic Vol, veh/h	0	75	64	0	0	0
Future Vol, veh/h	0	75	64	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage,	,# -	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	81	81	81	81	81	81
Heavy Vehicles, %	0	9	13	0	0	0
Mvmt Flow	0	93	79	0	0	0
Major/Minor N	1ajor1	N	/lajor2	ı	/linor2	
Conflicting Flow All	79	0	<u> </u>	0	172	79
	19	-	-		79	- 19
Stage 1				-	93	
Stage 2	- 11	-	-	-		- / 2
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1532	-	-	-	823	987
Stage 1	-	-	-	-	949	-
Stage 2	-	-	-	-	936	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1532	-	-	-	823	987
Mov Cap-2 Maneuver	-	-	-	-	823	-
Stage 1	-	-	-	-	949	-
Stage 2	-	-	-	-	936	-
Approach	EB		WB		SB	
HCM Control Delay, s	0		0		0	
HCM LOS	U		U		A	
TICIVI LOS						
Minor Lane/Major Mvmt	t	EBL	EBT	WBT	WBR S	SBLn1
Capacity (veh/h)		1532	-	-	-	-
HCM Lane V/C Ratio		-	-	-	-	-
HCM Control Delay (s)		0	-	-	-	0
HCM Lane LOS		Α	-	-	-	Α
HCM 95th %tile Q(veh)		0	-	-	-	-

Note   Note
Movement
Lane Configurations
Traffic Vol, veh/h 77 8 1 62 4 0 Future Vol, veh/h 77 8 1 62 4 0 Conflicting Peds, #/hr 0 0 0 0 0 0 0 0 Sign Control Free Free Free Free Free Free Stop Stop RT Channelized - None - None Storage Length 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
Future Vol, veh/h Conflicting Peds, #/hr O O O O O O O O O O O O O O O O O O O
Conflicting Peds, #/hr   O   O   O   O   O   O   O   O   Stop
Sign Control         Free         Free         Free         Free         Stop Stop RT Channelized         - None
RT Channelized         None
Storage Length       -       -       -       0       0         Veh in Median Storage, #       0       -       -       0       0         Grade, %       0       -       -       0       0         Peak Hour Factor       83       83       83       83       83         Heavy Vehicles, %       9       63       1       11       75       100         Mvmt Flow       93       10       1       75       5       0         Major/Minor       Major1       Major2       Minor1         Conflicting Flow All       0       0       103       0       175       98         Stage 1       -       -       -       98       -         Stage 2       -       -       -       98       -         Stage 2       -       -       -       6.15       -         Critical Hdwy Stg 1       -       -       -       6.15       -         Critical Hdwy Stg 2       -       -       -       6.15       -         Critical Hdwy Stg 2       -       -       -       6.73       746     <
Weh in Median Storage, #         0         -         -         0         0         -           Grade, %         0         -         -         0         0         -           Peak Hour Factor         83         83         83         83         83         83           Heavy Vehicles, %         9         63         1         11         75         100           Mvmt Flow         93         10         1         75         5         0           Major/Minor         Major/Minor         Major         Minor         1         75         5         0           Major/Minor         Major/Minor         Major         Minor         1         75         5         0           Major/Minor         Major         Minor         1         75         5         0           Major/Minor         Major         Minor         1         75         98
Grade, %         0         -         -         0         0         -           Peak Hour Factor         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83
Peak Hour Factor         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         84           Malor         Age         4         4         10         4
Major/Minor
Mymt Flow         93         10         1         75         5         0           Major/Minor         Major1         Major2         Minor1           Conflicting Flow All         0         0         103         0         175         98           Stage 1         -         -         -         98         -           Stage 2         -         -         -         77         -           Critical Hdwy         -         -         4.11         -         7.15         7.2           Critical Hdwy Stg 1         -         -         -         6.15         -           Critical Hdwy Stg 2         -         -         -         6.15         -           Follow-up Hdwy         -         -         2.209         -         4.175         4.2           Pot Cap-1 Maneuver         -         1495         -         673         746           Stage 1         -         -         -         790         -           Platoon blocked, %         -         -         -         672         746           Mov Cap-1 Maneuver         -         1495         -         672         746           Mov Cap-2 Maneuver </td
Major/Minor         Major1         Major2         Minor1           Conflicting Flow All         0         0         103         0         175         98           Stage 1         -         -         -         98         -           Stage 2         -         -         -         77         -           Critical Hdwy         -         -         4.11         -         7.15         7.2           Critical Hdwy Stg 1         -         -         -         6.15         -           Critical Hdwy Stg 2         -         -         -         6.15         -           Follow-up Hdwy         -         -         2.209         -         4.175         4.2           Pot Cap-1 Maneuver         -         1495         -         673         746           Stage 1         -         -         -         772         -           Stage 2         -         -         -         672         746           Mov Cap-1 Maneuver         -         1495         -         672         -           Stage 1         -         -         -         -         772         -           Stage 2         -
Conflicting Flow All         0         0         103         0         175         98           Stage 1         -         -         -         98         -           Stage 2         -         -         -         77         -           Critical Hdwy         -         -         4.11         -         7.15         7.2           Critical Hdwy Stg 1         -         -         -         6.15         -           Critical Hdwy Stg 2         -         -         -         6.15         -           Follow-up Hdwy         -         -         2.209         -         4.175         4.2           Pot Cap-1 Maneuver         -         1495         -         673         746           Stage 1         -         -         -         772         -           Stage 2         -         -         -         672         746           Mov Cap-1 Maneuver         -         1495         -         672         746           Mov Cap-2 Maneuver         -         -         -         772         -         -         572         -         -         789         -           Approach         EB <t< td=""></t<>
Conflicting Flow All         0         0         103         0         175         98           Stage 1         -         -         -         98         -           Stage 2         -         -         -         77         -           Critical Hdwy         -         -         4.11         -         7.15         7.2           Critical Hdwy Stg 1         -         -         -         6.15         -           Critical Hdwy Stg 2         -         -         -         6.15         -           Follow-up Hdwy         -         -         2.209         -         4.175         4.2           Pot Cap-1 Maneuver         -         1495         -         673         746           Stage 1         -         -         -         772         -           Stage 2         -         -         -         672         746           Mov Cap-1 Maneuver         -         1495         -         672         746           Mov Cap-2 Maneuver         -         -         -         772         -         -         572         -         -         789         -           Approach         EB <t< td=""></t<>
Conflicting Flow All         0         0         103         0         175         98           Stage 1         -         -         -         98         -           Stage 2         -         -         -         77         -           Critical Hdwy         -         -         4.11         -         7.15         7.2           Critical Hdwy Stg 1         -         -         -         6.15         -           Critical Hdwy Stg 2         -         -         -         6.15         -           Follow-up Hdwy         -         -         2.209         -         4.175         4.2           Pot Cap-1 Maneuver         -         1495         -         673         746           Stage 1         -         -         -         772         -           Stage 2         -         -         -         672         746           Mov Cap-1 Maneuver         -         1495         -         672         746           Mov Cap-2 Maneuver         -         -         -         772         -         -         572         -         -         789         -           Approach         EB <t< td=""></t<>
Stage 1       -       -       -       98       -         Stage 2       -       -       -       777       -         Critical Hdwy       Stg 1       -       -       -       6.15       -         Critical Hdwy Stg 2       -       -       -       6.15       -         Follow-up Hdwy       -       -       2.209       -       4.175       4.2         Pot Cap-1 Maneuver       -       1495       -       673       746         Stage 1       -       -       -       772       -         Stage 2       -       -       -       790       -         Platoon blocked, %       -       -       -       -       746         Mov Cap-1 Maneuver       -       1495       -       672       746         Mov Cap-2 Maneuver       -       -       -       672       -         Stage 1       -       -       -       772       -         Stage 2       -       -       -       789       -         Approach       EB       WB       NB         HCM LOS       B         Minor Lane/Major Mvmt       NBLn1 <t< td=""></t<>
Stage 2       -       -       -       77       -         Critical Hdwy       -       -       4.11       -       7.15       7.2         Critical Hdwy Stg 1       -       -       -       6.15       -         Critical Hdwy Stg 2       -       -       -       6.15       -         Follow-up Hdwy       -       -       2.209       -       4.175       4.2         Pot Cap-1 Maneuver       -       -       1495       -       673       746         Stage 1       -       -       -       -       790       -         Stage 2       -       -       -       -       746         Mov Cap-1 Maneuver       -       -       1495       -       672       746         Mov Cap-2 Maneuver       -       -       -       672       -         Stage 2       -       -       -       772       -         Stage 2       -       -       -       789       -         Approach       EB       WB       NB         HCM LOS       B         Minor Lane/Major Mvmt       NBLn1       EBT       EBR       WBL       WBT
Critical Hdwy       -       -       4.11       -       7.15       7.2         Critical Hdwy Stg 1       -       -       -       6.15       -         Critical Hdwy Stg 2       -       -       -       6.15       -         Follow-up Hdwy       -       -       2.209       -       4.175       4.2         Pot Cap-1 Maneuver       -       -       1495       -       673       746         Stage 1       -       -       -       -       790       -         Platoon blocked, %       -       -       -       -       790       -         Mov Cap-1 Maneuver       -       -       1495       -       672       746         Mov Cap-2 Maneuver       -       -       -       672       -         Stage 1       -       -       -       772       -         Stage 2       -       -       -       789       -         Approach       EB       WB       NB         HCM Control Delay, s       0       0.1       10.4         HCM Control Delay, s       0       0.1       10.4         HCM Lane/Major Mvmt       NBLn1       EB
Critical Hdwy Stg 1       -       -       -       6.15       -         Critical Hdwy Stg 2       -       -       -       6.15       -         Follow-up Hdwy       -       -       2.209       -       4.175       4.2         Pot Cap-1 Maneuver       -       1495       -       673       746         Stage 1       -       -       -       790       -         Stage 2       -       -       -       790       -         Platoon blocked, %       -       -       -       -       -         Mov Cap-1 Maneuver       -       1495       -       672       746         Mov Cap-2 Maneuver       -       -       -       672       -         Stage 1       -       -       -       772       -         Stage 2       -       -       -       789       -         Approach       EB       WB       NB         HCM Control Delay, s       0       0.1       10.4         HCM LOS       B     Minor Lane/Major Mvmt  NBLn1  EBT  EBR  WBL  WBT  Capacity (veh/h)  Approach  But Approach  Capacity (veh/h)  Approach  Capacity (veh/h)  Capacity (veh/h)  Capacity (veh/h)  Capacity (veh/h)  Capacity (veh/h)  Capacit
Critical Hdwy Stg 2       -       -       -       6.15       -         Follow-up Hdwy       -       -       2.209       -       4.175       4.2         Pot Cap-1 Maneuver       -       -       1495       -       673       746         Stage 1       -       -       -       -       790       -         Platoon blocked, %       -       -       -       -       -         Mov Cap-1 Maneuver       -       -       1495       -       672       746         Mov Cap-2 Maneuver       -       -       -       672       -       -       672       -         Stage 1       -       -       -       -       789       -       -       -       -       789       -         Approach       EB       WB       NB       NB       NB       HCM LOS       B         Minor Lane/Major Mvmt       NBLn1       EBT       EBR       WBL       WBT         Capacity (veh/h)       672       -       -       1495       -       -       0.001       -       -       0.001       -       -       -       -       0.001       -       -       -       <
Follow-up Hdwy - 2.209 - 4.175 4.2  Pot Cap-1 Maneuver - 1495 - 673 746  Stage 1 772 - 772  Stage 2 790 - 790  Platoon blocked, % 672 746  Mov Cap-1 Maneuver - 1495 - 672 746  Mov Cap-2 Maneuver - 672 - 672 - 789  Stage 1 772 - 789 - 789  Stage 2 789 - 789  Approach EB WB NB  HCM Control Delay, s 0 0.1 10.4  HCM LOS B  Minor Lane/Major Mvmt NBLn1 EBT EBR WBL WBT  Capacity (veh/h) 672 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 - 1495 -
Pot Cap-1 Maneuver         -         -         1495         -         673         746           Stage 1         -         -         -         772         -           Stage 2         -         -         -         790         -           Platoon blocked, %         -         -         -         -           Mov Cap-1 Maneuver         -         1495         -         672         746           Mov Cap-2 Maneuver         -         -         -         672         -           Stage 1         -         -         -         772         -           Stage 2         -         -         -         789         -           Approach         EB         WB         NB           HCM Control Delay, s         0         0.1         10.4           HCM LOS         B           Minor Lane/Major Mvmt         NBLn1         EBT         EBR         WBL         WBT           Capacity (veh/h)         672         -         -         1495         -         -         0.001         -           HCM Lane V/C Ratio         0.007         -         0.001         -         -         0.001         -
Stage 1       -       -       -       772       -         Stage 2       -       -       -       790       -         Platoon blocked, %       -       -       -       -       -         Mov Cap-1 Maneuver       -       -       1495       -       672       746         Mov Cap-2 Maneuver       -       -       -       672       -       -       672       -         Stage 1       -       -       -       -       772       -       -       789       -         Approach       EB       WB       NB       NB       NB       HCM LOS       B       B       Minor Lane/Major Mvmt       NBLn1       EBT       EBR       WBL       WBT       WBT       Capacity (veh/h)       -       -       1495       -       -       0.001       -       -       0.001       -       -       -       0.001       -       -       -       0.001       -       -       0.001       -       -       -       0.001       -       -       0.001       -       -       0.001       -       -       0.001       -       -       0.001       -       -       0.001 <td< td=""></td<>
Stage 2       -       -       -       790       -         Platoon blocked, %       -       -       -       -       -         Mov Cap-1 Maneuver       -       -       1495       -       672       746         Mov Cap-2 Maneuver       -       -       -       672       -         Stage 1       -       -       -       772       -         Stage 2       -       -       -       789       -         Approach       EB       WB       NB         HCM Control Delay, s       0       0.1       10.4         HCM LOS       B         Minor Lane/Major Mvmt       NBLn1       EBT       EBR       WBL       WBT         Capacity (veh/h)       672       -       -       1495       -         HCM Lane V/C Ratio       0.007       -       0.001       -
Stage 2       -       -       -       790       -         Platoon blocked, %       -       -       -       -       -         Mov Cap-1 Maneuver       -       -       1495       -       672       746         Mov Cap-2 Maneuver       -       -       -       -       672       -         Stage 1       -       -       -       -       772       -         Stage 2       -       -       -       -       789       -         Approach       EB       WB       NB         HCM Control Delay, s       0       0.1       10.4         HCM LOS       B         Minor Lane/Major Mvmt       NBLn1       EBT       EBR       WBL       WBT         Capacity (veh/h)       672       -       -       1495       -         HCM Lane V/C Ratio       0.007       -       0.001       -
Platoon blocked, %       -       -       -         Mov Cap-1 Maneuver       -       -       1495       -       672       746         Mov Cap-2 Maneuver       -       -       -       -       672       -         Stage 1       -       -       -       -       772       -         Stage 2       -       -       -       -       789       -         Approach       EB       WB       NB         HCM Control Delay, s       0       0.1       10.4         HCM LOS       B         Minor Lane/Major Mvmt       NBLn1       EBT       EBR       WBL       WBT         Capacity (veh/h)       672       -       -       1495       -         HCM Lane V/C Ratio       0.007       -       0.001       -
Mov Cap-1 Maneuver         -         -         1495         -         672         746           Mov Cap-2 Maneuver         -         -         -         -         672         -           Stage 1         -         -         -         -         772         -           Stage 2         -         -         -         -         789         -           Approach         EB         WB         NB         NB           HCM Control Delay, s         0         0.1         10.4         HCM LOS         B           Minor Lane/Major Mvmt         NBLn1         EBT         EBR         WBL         WBT           Capacity (veh/h)         672         -         -         1495         -           HCM Lane V/C Ratio         0.007         -         0.001         -
Mov Cap-2 Maneuver         -         -         -         672         -           Stage 1         -         -         -         772         -           Stage 2         -         -         -         789         -           Approach         EB         WB         NB           HCM Control Delay, s         0         0.1         10.4           HCM LOS         B           Minor Lane/Major Mvmt         NBLn1         EBT         EBR         WBL         WBT           Capacity (veh/h)         672         -         1495         -           HCM Lane V/C Ratio         0.007         -         0.001         -
Stage 1         -         -         -         772         -           Stage 2         -         -         -         789         -           Approach         EB         WB         NB           HCM Control Delay, s         0         0.1         10.4           HCM LOS         B           Minor Lane/Major Mvmt         NBLn1         EBT         EBR         WBL         WBT           Capacity (veh/h)         672         -         -         1495         -           HCM Lane V/C Ratio         0.007         -         0.001         -
Stage 2         -         -         -         789         -           Approach         EB         WB         NB           HCM Control Delay, s         0         0.1         10.4           HCM LOS         B           Minor Lane/Major Mvmt         NBLn1         EBT         EBR         WBL         WBT           Capacity (veh/h)         672         -         -         1495         -           HCM Lane V/C Ratio         0.007         -         0.001         -
Approach         EB         WB         NB           HCM Control Delay, s         0         0.1         10.4           HCM LOS         B           Minor Lane/Major Mvmt         NBLn1         EBT         EBR         WBL         WBT           Capacity (veh/h)         672         -         -         1495         -           HCM Lane V/C Ratio         0.007         -         -         0.001         -
HCM Control Delay, s   0   0.1   10.4     HCM LOS   B
HCM Control Delay, s   0   0.1   10.4     HCM LOS   B
Minor Lane/Major Mvmt         NBLn1         EBT         EBR         WBL         WBT           Capacity (veh/h)         672         -         -         1495         -           HCM Lane V/C Ratio         0.007         -         -         0.001         -
Minor Lane/Major Mvmt NBLn1 EBT EBR WBL WBT Capacity (veh/h) 672 1495 - HCM Lane V/C Ratio 0.007 0.001 -
Capacity (veh/h) 672 - 1495 - HCM Lane V/C Ratio 0.007 - 0.001 -
Capacity (veh/h) 672 - 1495 - HCM Lane V/C Ratio 0.007 - 0.001 -
Capacity (veh/h) 672 1495 - HCM Lane V/C Ratio 0.007 0.001 -
HCM Lane V/C Ratio 0.007 0.001 -
HCM Control Delay (s) 10.4 7.4 0
HCM Lane LOS B A A
HCM 95th %tile Q(veh) 0 0 -

Intersection						
Int Delay, s/veh	0.2					
		NDD	CET	CED	NIVACI	N 1) A / T
	NBL	NBR	SET	SER	NWL	NWT
Lane Configurations	¥	_	4			र्स
Traffic Vol, veh/h	1	2	76	0	0	59
Future Vol, veh/h	1	2	76	0	0	59
Conflicting Peds, #/hr	0	0	0	0	0	0
	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage,	# 0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	86	86	86	86	86	86
Heavy Vehicles, %	0	0	9	0	0	14
Mvmt Flow	1	2	88	0	0	69
				_		
	nor1		Major1		Major2	
Conflicting Flow All	157	88	0	0	88	0
Stage 1	88	-	-	-	-	-
Stage 2	69	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	_
Follow-up Hdwy	3.5	3.3	-	_	2.2	-
Pot Cap-1 Maneuver	839	976	_	_	1520	_
Stage 1	940	-	_	_	-	_
Stage 2	959	_	_	_	_	_
Platoon blocked, %	707		_	_		_
Mov Cap-1 Maneuver	839	976	_		1520	
Mov Cap-1 Maneuver	839	970		-	1320	-
	940		-	-	-	
Stage 1		-	-	-	-	-
Stage 2	959	-	-	-	-	-
Approach	NB		SE		NW	
HCM Control Delay, s	8.9		0		0	
HCM LOS	A				J	
TIOWI LOS						
Minor Lane/Major Mvmt		NBLn1	NWL	NWT	SET	SER
Capacity (veh/h)		926	1520	-	-	-
HCM Lane V/C Ratio		0.004	-	-	-	-
HCM Control Delay (s)		8.9	0	-	-	-
HCM Lane LOS		A	A	_	_	-
HCM 95th %tile Q(veh)		0	0	-	-	-
110W 70W 70W Q(VCH)		J	U			

Movement	NB	SB
Directions Served	LTR	LTR
Maximum Queue (m)	14.0	7.3
Average Queue (m)	1.4	0.4
95th Queue (m)	7.6	3.1
Link Distance (m)	496.7	734.3
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

### Intersection: 2: Range Road 61 & Highway 646

Movement	NB
Directions Served	LR
Maximum Queue (m)	18.0
Average Queue (m)	2.0
95th Queue (m)	10.0
Link Distance (m)	788.8
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (m)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Movement
Directions Served
Maximum Queue (m)
Average Queue (m)
95th Queue (m)
Link Distance (m)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (m)
Storage Blk Time (%)
Queuing Penalty (veh)

Movement	NB
Directions Served	LR
Maximum Queue (m)	11.4
Average Queue (m)	1.1
95th Queue (m)	6.4
Link Distance (m)	1098.0
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (m)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

### Intersection: 5: Range Road 55 & Highway 646

Movement	NB
Directions Served	LR
Maximum Queue (m)	3.0
Average Queue (m)	0.4
95th Queue (m)	2.5
Link Distance (m)	1229.5
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (m)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

#### **Network Summary**

Intersection												
Int Delay, s/veh	0.2											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		4			4			4			4	
Traffic Vol, veh/h	1	57	10	0	53	4	0	0	1	1	0	0
Future Vol, veh/h	1	57	10	0	53	4	0	0	1	1	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage,	# -	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	84	84	84	84	84	84	84	84	84	84	84	84
Heavy Vehicles, %	100	7	50	0	18	100	0	0	0	0	0	0
Mvmt Flow	1	68	12	0	63	5	0	0	1	1	0	0
Major/Minor N	lajor1		1	Major2		N	/linor1		N	/linor2		
Conflicting Flow All	68	0	0	80	0	0	142	144	74	143	148	66
Stage 1	-	-	-	-	-	-	76	76	-	66	66	-
Stage 2	-	-	-	-	-	-	66	68	-	77	82	-
Critical Hdwy	5.1	-	-	4.1	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	3.1	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1086	-	-	1531	-	-	832	751	993	831	747	1003
Stage 1	-	-	-	-	-	-	938	836	-	950	844	-
Stage 2	-	-	-	-	-	-	950	842	-	937	831	-
Platoon blocked, %	1001	-	-	4501	-	-	001		000	0.5.5		4005
Mov Cap-1 Maneuver	1086	-	-	1531	-	-	831	750	993	829	746	1003
Mov Cap-2 Maneuver	-	-	-	-	-	-	831	750	-	829	746	-
Stage 1	-	-	-	-	-	-	937	835	-	949	844	-
Stage 2	-	-	-	-	-	-	950	842	-	935	830	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.1			0			8.6			9.3		
HCM LOS							Α			Α		
Minor Lane/Major Mvmt	1	VBLn1	EBL	EBT	EBR	WBL	WBT	WBR :	SBI n1			
Capacity (veh/h)		993	1086			1531	-	-	829			
HCM Lane V/C Ratio		0.001		_	_	-	_	_	0.001			
HCM Control Delay (s)		8.6	8.3	0	_	0	-	_	9.3			
HCM Lane LOS		Α	A	A	_	A	_	_	Α.			
HCM 95th %tile Q(veh)		0	0	-	-	0	-	-	0			
/ 54. / 54. 6 (1011)												

Intersection						
Int Delay, s/veh	0.5					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	<b>1</b>			4	¥	
Traffic Vol, veh/h	54	2	0	63	5	1
Future Vol, veh/h	54	2	0	63	5	1
Conflicting Peds, #/hr	0	0	0	0	0	0
	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	Jiop -	None
Storage Length	_	-	_	-	0	-
Veh in Median Storage, #	# 0	_	_	0	0	_
Grade, %	0	_	_	0	0	
Peak Hour Factor	73	73	73	73	73	73
Heavy Vehicles, %	7	0	0	15	75	100
Mymt Flow	74	3	0	86	73	100
IVIVIIIL I IOW	74	J	U	00	,	ļ.
Major/Minor Ma	ajor1	N	/lajor2	N	/linor1	
Conflicting Flow All	0	0	77	0	162	76
Stage 1	-	-	-	-	76	-
Stage 2	-	-	-	-	86	-
Critical Hdwy	-	-	4.1	-	7.15	7.2
Critical Hdwy Stg 1	-	-	-	-	6.15	-
Critical Hdwy Stg 2	-	-	-	-	6.15	-
Follow-up Hdwy	-	-	2.2	-	4.175	4.2
Pot Cap-1 Maneuver	-	-	1535	-	686	769
Stage 1	-	-	_	-	791	-
Stage 2	_	-	_	-	782	-
Platoon blocked, %	-	_		_		
Mov Cap-1 Maneuver	_	_	1535	_	686	769
Mov Cap-2 Maneuver	_	_	-	_	686	-
Stage 1	_	_	_	_	791	_
Stage 2		_			782	
Stage 2	_		_		702	<u>-</u>
Approach	EB		WB		NB	
HCM Control Delay, s	0		0		10.2	
HCM LOS					В	
Minor Lane/Major Mvmt	N	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)		699	-	-	1535	-
HCM Lane V/C Ratio		0.012	-	-	-	-
HCM Control Delay (s)		10.2	-	-	0	-
HCM Lane LOS HCM 95th %tile Q(veh)		В	-	-	Α	-
		0			0	

Intersection						
Int Delay, s/veh	0					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		4	Þ		N/F	
Traffic Vol, veh/h	0	56	64	0	0	0
Future Vol, veh/h	0	56	64	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-		-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage	e,# -	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	73	73	73	73	73	73
Heavy Vehicles, %	0	9	15	0	0	0
Mymt Flow	0	77	88	0	0	0
IVIVIIIL I IUW	U	11	00	U	- 0	U
Major/Minor N	Major1	<u> </u>	Major2	N	/linor2	
Conflicting Flow All	88	0	-	0	165	88
Stage 1	-	-	-	-	88	-
Stage 2	_	_		_	77	_
Critical Hdwy	4.1	_	_	_	6.4	6.2
Critical Hdwy Stg 1		_	_	_	5.4	- 0.2
Critical Hdwy Stg 2	_	_	_	_	5.4	_
Follow-up Hdwy	2.2	_	_	_	3.5	3.3
Pot Cap-1 Maneuver	1520	-	-	-	830	976
		-	-		940	970
Stage 1	-	-	-	-		
Stage 2	-	-	-	-	951	-
Platoon blocked, %	.=	-	-	-		.=.
Mov Cap-1 Maneuver	1520	-	-	-	830	976
Mov Cap-2 Maneuver	-	-	-	-	830	-
Stage 1	-	-	-	-	940	-
Stage 2	-	-	-	-	951	-
Approach	EB		WB		SB	
HCM Control Delay, s	0		0		0	
	U		U			
HCM LOS					Α	
Minor Lane/Major Mvm	nt	EBL	EBT	WBT	WBR :	SBLn1
Capacity (veh/h)		1520	_			
HCM Lane V/C Ratio		-	_	_	_	_
HCM Control Delay (s)		0		_		0
HCM Lane LOS		A		_	-	A
HCM 95th %tile Q(veh)	١	0	-	-	-	A -
ncivi yotti %tile Q(ven)	)	U	-	-	-	-

Intersection						
Int Delay, s/veh	0.8					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	<u>^</u>			4	¥	
Traffic Vol, veh/h	54	2	0	60	9	1
Future Vol, veh/h	54	2	0	60	9	1
Conflicting Peds, #/hr	0	0	0	0	0	0
•	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None		None	<u> </u>	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage,	# 0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	73	73	73	73	73	73
Heavy Vehicles, %	7	0	0	15	75	100
Mvmt Flow	74	3	0	82	12	1
Major/Minor	olor1		/alar)		Minor1	
	ajor1		Major2		Minor1	7/
Conflicting Flow All	0	0	77	0	158	76
Stage 1	-	-	-	-	76	-
Stage 2	-	-	-	-	82	7.0
Critical Hdwy	-	-	4.1	-	7.15	7.2
Critical Hdwy Stg 1	-	-	-	-	6.15	-
Critical Hdwy Stg 2	-	-	-	-	6.15	-
Follow-up Hdwy	-	-	2.2	-	4.175	4.2
Pot Cap-1 Maneuver	-	-	1535	-	690	769
Stage 1	-	-	-	-	791	-
Stage 2	-	-	-	-	786	-
Platoon blocked, %	-	-	4505	-	(00	7/0
Mov Cap-1 Maneuver	-	-	1535	-	690	769
Mov Cap-2 Maneuver	-	-	-	-	690	-
Stage 1	-	-	-	-	791	-
Stage 2	-	-	-	-	786	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		0		10.3	
HCM LOS	U		U		В	
HOW EOS						
Minor Lane/Major Mvmt	1	VBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)		697	-	-	1535	-
HCM Lane V/C Ratio		0.02	-	-	-	-
HCM Control Delay (s)		10.3	-	-	0	-
HCM Lane LOS		В	_	_	Α	_
HCM 95th %tile Q(veh)		0.1			0	

Intersection						
Int Delay, s/veh	0.5					
		NDD	СЕТ	CED	NINAZI	NI\A/T
Movement	NBL	NBR	SET	SER	NWL	NWT
Lane Configurations	¥	0	ĵ.	1	0	ની
Traffic Vol, veh/h	5	0	56	1	2	55
Future Vol, veh/h	5	0	56	1	2	55
Conflicting Peds, #/hr	0	0	_ 0	0	0	0
	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage,		-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	86	86	86	86	86	86
Heavy Vehicles, %	0	0	11	0	0	13
Mvmt Flow	6	0	65	1	2	64
N 4 = 1 = 1/N 41 = = 1	!1		11-11		1-1-1-	
	inor1		Major1		Major2	
Conflicting Flow All	134	66	0	0	66	0
Stage 1	66	-	-	-	-	-
Stage 2	68	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	864	1003	-	-	1549	-
Stage 1	962	-	-	-	-	-
Stage 2	960	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	863	1003	-	-	1549	-
Mov Cap-2 Maneuver	863	-	-	-	-	-
Stage 1	962	-	-	-	-	-
Stage 2	959	_	_	_	_	_
Jiago Z	,,,					
Approach	NB		SE		NW	
HCM Control Delay, s	9.2		0		0.3	
HCM LOS	Α					
NA!		UDI 1	N I) A / I	NI) A/T	CET	CED
Minor Lane/Major Mvmt		VBLn1	NWL	NWT	SET	SER
Capacity (veh/h)			1549	-	-	-
HCM Lane V/C Ratio		0.007		-	-	-
HCM Control Delay (s)		9.2	7.3	0	-	-
HCM Lane LOS		Α	Α	Α	-	-
HCM 95th %tile Q(veh)		0	0	-	-	-
		_				

Movement	NB	SB
Directions Served	LTR	LTR
Maximum Queue (m)	7.4	4.4
Average Queue (m)	0.3	0.3
95th Queue (m)	2.9	2.7
Link Distance (m)	496.7	734.3
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

### Intersection: 2: Range Road 61 & Highway 646

Movement	NB
Directions Served	LR
Maximum Queue (m)	18.9
Average Queue (m)	2.6
95th Queue (m)	11.9
Link Distance (m)	788.8
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (m)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Movement
Directions Served
Maximum Queue (m)
Average Queue (m)
95th Queue (m)
Link Distance (m)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (m)
Storage Blk Time (%)
Queuing Penalty (veh)

Movement	NB
Directions Served	LR
Maximum Queue (m)	18.0
Average Queue (m)	3.2
95th Queue (m)	12.8
Link Distance (m)	1098.0
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (m)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

### Intersection: 5: Range Road 55 & Highway 646

Movement	NB	NW
Directions Served	LR	LT
Maximum Queue (m)	5.4	1.4
Average Queue (m)	0.7	0.0
95th Queue (m)	3.7	1.0
Link Distance (m)	1229.5	519.0
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

#### **Network Summary**

Intersection												
Int Delay, s/veh	0.3											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		4			4			4			4	
Traffic Vol, veh/h	0	106	0	0	86	1	4	0	1	1	0	1
Future Vol, veh/h	0	106	0	0	86	1	4	0	1	1	0	1
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage,	,# -	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	79	79	79	79	79	79	79	79	79	79	79	79
Heavy Vehicles, %	0	14	0	0	10	0	0	0	100	0	0	0
Mvmt Flow	0	134	0	0	109	1	5	0	1	1	0	1
Major/Minor N	1ajor1			Major2			/linor1		N	/linor2		
Conflicting Flow All	110	0	0	134	0	0	244	244	134	245	244	110
Stage 1	-	-	-	-	-	-	134	134	-	110	110	-
Stage 2	-	-	-	-	-	-	110	110	-	135	134	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	7.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	4.2	3.5	4	3.3
Pot Cap-1 Maneuver	1493	-	-	1463	-	-	714	661	708	713	661	949
Stage 1	-	-	-	-	-	-	874	789	-	900	808	-
Stage 2	-	-	-	-	-	-	900	808	-	873	789	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1493	-	-	1463	-	-	713	661	708	712	661	949
Mov Cap-2 Maneuver	-	-	-	-	-	-	713	661	-	712	661	-
Stage 1	-	-	-	-	-	-	874	789	-	900	808	-
Stage 2	-	-	-	-	-	-	899	808	-	871	789	-
•												
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0			0			10.1			9.4		
HCM LOS							В			Α		
Minor Lane/Major Mvm	t N	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR:	SBLn1			
Capacity (veh/h)		712	1493	-		1463	-	-				
HCM Lane V/C Ratio		0.009	-	_	_	00	_		0.003			
HCM Control Delay (s)		10.1	0	-	-	0	-	-				
HCM Lane LOS		В	A	-	-	A	-	-	Α			
HCM 95th %tile Q(veh)		0	0	-	-	0	-	-	0			

Intersection						
Int Delay, s/veh	0.3					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	4			सी	¥	
Traffic Vol, veh/h	100	10	1	82	5	0
Future Vol, veh/h	100	10	1	82	5	0
Conflicting Peds, #/hr	0	0	0	0	0	0
-	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage,	# 0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	83	83	83	83	83	83
Heavy Vehicles, %	8	63	100	11	75	100
Mvmt Flow	120	12	1	99	6	0
Major/Minor M	aiar1	ı	/laior?		Minor1	
	ajor1		<u>Major2</u> 132		227	126
Conflicting Flow All	0	0	132	0	126	120
Stage 1 Stage 2	-	-	-	-	101	
<u> </u>	-	-	5.1	-	7.15	7.2
Critical Hdwy Critical Hdwy Stg 1		-	J. I	-	6.15	1.2
Critical Hdwy Stg 2	-	-	-		6.15	
	-	-	3.1	-	4.175	4.2
Follow-up Hdwy	-	-	1019		625	716
Pot Cap-1 Maneuver	-	-	1019	-	747	710
Stage 1	-	-	-	-	769	-
Stage 2 Platoon blocked, %	-	-	-	-	709	-
	-	-	1019	-	624	716
Mov Cap-1 Maneuver	-	-		-	624	/10
Mov Cap-2 Maneuver	-	-	-	-	747	
Stage 1	-	-	-	-	768	-
Stage 2	-	-	-	-	708	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		0.1		10.8	
HCM LOS					В	
Minor Lane/Major Mvmt	N	NBLn1	EBT	EBR	WBL	WBT
		624			1019	VVDI
Capacity (veh/h) HCM Lane V/C Ratio		0.01	-		0.001	-
HCM Control Delay (s)		10.8	-	-	8.5	0
HCM Lane LOS		10.8 B	-	-	6.5 A	A
HCM 95th %tile Q(veh)		0	-	-	0	-
HOW 75th 70the Q(Veh)		U		-	U	_

Intersection						
Int Delay, s/veh	0					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	LDL	<u>₽</u>	₩ <u>₩</u>	אטוי	JDL W	אשכ
Traffic Vol, veh/h	0	98	82	0	0	0
Future Vol, veh/h	0	98	82	0	0	0
Conflicting Peds, #/hr	0	0	02	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-		Jiop -	None
Storage Length	_	-	_	-	0	-
Veh in Median Storage		0	0	-	0	-
Grade, %	-	0	0	_	0	_
Peak Hour Factor	81	81	81	81	81	81
Heavy Vehicles, %	0	9	13	0	0	0
Mymt Flow	0	121	101	0	0	0
IVIVIIICT IOVV	U	121	101	U	U	U
	/lajor1		Major2		/linor2	
Conflicting Flow All	101	0	-	0	222	101
Stage 1	-	-	-	-	101	-
Stage 2	-	-	-	-	121	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1504	-	-	-	771	960
Stage 1	-	-	-	-	928	-
Stage 2	-	-	-	-	909	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1504	-	-	-	771	960
Mov Cap-2 Maneuver	-	-	-	-	771	-
Stage 1	-	-	-	-	928	-
Stage 2	-	-	-	-	909	-
Approach	EB		WB		SB	
HCM Control Delay, s HCM LOS	0		0		0	
HCIVI LUS					Α	
Minor Lane/Major Mvm	t	EBL	EBT	WBT	WBR S	SBLn1
Capacity (veh/h)		1504	-	-	-	-
HCM Lane V/C Ratio		-	-	-	-	-
HCM Control Delay (s)		0	-	-	-	0
HCM Lane LOS		Α	-	-	-	Α
HCM 95th %tile Q(veh)		0	-	-	-	-
		•				

Intersection						
Int Delay, s/veh	0.4					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	₽			ની	N/F	
Traffic Vol, veh/h	97	14	1	79	6	0
Future Vol, veh/h	97	14	1	79	6	0
Conflicting Peds, #/hr	0	0	0	0	0	0
•	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage,	# 0	_	-	0	0	-
Grade, %	0	_	_	0	0	_
Peak Hour Factor	83	83	83	83	83	83
Heavy Vehicles, %	9	63	1	11	75	100
Mymt Flow	117	17	1	95	73	0
IVIVIIIL I IOVV	117	17		73	,	U
Major/Minor Major/Minor	ajor1	<u> </u>	Major2	<u> </u>	Minor1	
Conflicting Flow All	0	0	134	0	223	126
Stage 1	-	-	-	-	126	-
Stage 2	-	_	-	_	97	_
Critical Hdwy	_	_	4.11	_	7.15	7.2
Critical Hdwy Stg 1	_	_		_	6.15	
Critical Hdwy Stg 2	_	_	_	_	6.15	_
Follow-up Hdwy	_		2.209		4.175	4.2
Pot Cap-1 Maneuver	-	-	1457	_	628	716
		_		-	747	710
Stage 1	-	-	-			
Stage 2	-	-	-	-	772	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1457	-	627	716
Mov Cap-2 Maneuver	-	-	-	-	627	-
Stage 1	-	-	-	-	747	-
Stage 2	-	-	-	-	771	-
Approach	EB		WB		NB	
					10.8	
HCM Control Delay, s	0		0.1			
HCM LOS					В	
Minor Lane/Major Mvmt	1	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)		627			1457	
HCM Lane V/C Ratio		0.012	_		0.001	-
HCM Control Delay (s)		10.8	_	-	7.5	0
HCM Lane LOS						
		В	-	-	A	Α
HCM 95th %tile Q(veh)		0	-	-	0	-

Intersection						
Int Delay, s/veh	0.2					
Movement	NBL	NBR	SET	SER	NWL	NWT
Lane Configurations	W		<b>1</b>			4
Traffic Vol, veh/h	1	2	96	0	0	75
Future Vol, veh/h	1	2	96	0	0	75
Conflicting Peds, #/hr	0	0	0	0	0	0
	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage,	# 0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	86	86	86	86	86	86
Heavy Vehicles, %	0	0	9	0	0	14
Mvmt Flow	1	2	112	0	0	87
Major/Minor Mi	nor1	N	Major1	N	/lajor2	
Conflicting Flow All	199	112	0	0	112	0
Stage 1	112	- 112	-	U	112	-
Stage 2	87	-	-	-	-	-
Critical Hdwy	6.4	6.2	-		4.1	-
Critical Hdwy Stg 1	5.4	0.2	-	-	4.1	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
3 0	3.5	3.3	-	-	2.2	-
Follow-up Hdwy	794	947	-		1490	
Pot Cap-1 Maneuver	918		-	-	1490	-
Stage 1		-	-	-	-	-
Stage 2	941	-	-	-	-	-
Platoon blocked, %	704	947	-	-	1490	-
Mov Cap-1 Maneuver	794 794		-	-	1490	-
Mov Cap-2 Maneuver	918	-	-	-	-	-
Stage 1		-	-	-	-	-
Stage 2	941	-	-	-	-	-
Approach	NB		SE		NW	
HCM Control Delay, s	9.1		0		0	
HCM LOS	Α					
Minor Lane/Major Mvmt	N	NBLn1	NWL	NWT	SET	SER
	<u> </u>				JL I	JLK
Capacity (veh/h) HCM Lane V/C Ratio		890	1490	-	-	-
HCM Control Delay (s)		0.004 9.1	0	-	-	-
HCM Lane LOS		9.1 A	A		-	-
HCM 95th %tile Q(veh)		0	0	-	_	-
HOW 75th 70the Q(VEH)		U	U	_		_

Movement	NB	SB
Directions Served	LTR	LTR
Maximum Queue (m)	15.4	4.5
Average Queue (m)	1.4	0.3
95th Queue (m)	7.6	2.7
Link Distance (m)	496.7	734.3
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

### Intersection: 2: Range Road 61 & Highway 646

Movement	NB
Directions Served	LR
Maximum Queue (m)	16.2
Average Queue (m)	1.8
95th Queue (m)	9.6
Link Distance (m)	788.8
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (m)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Movement
Directions Served
Maximum Queue (m)
Average Queue (m)
95th Queue (m)
Link Distance (m)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (m)
Storage Blk Time (%)
Queuing Penalty (veh)

Movement	NB
Directions Served	LR
Maximum Queue (m)	16.1
Average Queue (m)	2.6
95th Queue (m)	11.6
Link Distance (m)	1098.0
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (m)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

### Intersection: 5: Range Road 55 & Highway 646

Movement	NB
Directions Served	LR
Maximum Queue (m)	3.1
Average Queue (m)	0.2
95th Queue (m)	1.6
Link Distance (m)	1229.5
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (m)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

#### **Network Summary**

Intersection												
Int Delay, s/veh	0.2											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		4			4			4			4	
Traffic Vol, veh/h	1	67	12	0	56	4	0	0	1	1	0	0
Future Vol, veh/h	1	67	12	0	56	4	0	0	1	1	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage,	, # -	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	84	84	84	84	84	84	84	84	84	84	84	84
Heavy Vehicles, %	100	7	50	0	18	100	0	0	0	0	0	0
Mvmt Flow	1	80	14	0	67	5	0	0	1	1	0	0
Major/Minor N	1ajor1		ľ	Major2		ľ	Minor1		N	Minor2		
Conflicting Flow All	72	0	0	94	0	0	159	161	87	160	166	70
Stage 1	_	-	-	-	-	-	89	89	-	70	70	-
Stage 2	-	-	-	-	-	-	70	72	-	90	96	-
Critical Hdwy	5.1	-	-	4.1	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	3.1	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1082	-	-	1513	-	-	811	735	977	810	730	998
Stage 1	-	-	-	-	-	-	923	825	-	945	841	-
Stage 2	-	-	-	-	-	-	945	839	-	922	819	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1082	-	-	1513	-	-	810	734	977	808	729	998
Mov Cap-2 Maneuver	-	-	-	-	-	-	810	734	-	808	729	-
Stage 1	-	-	-	-	-	-	922	824	-	944	841	-
Stage 2	-	-	-	-	-	-	945	839	-	920	818	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.1			0			8.7			9.5		
HCM LOS							Α			Α		
Minor Lane/Major Mvmt	· .	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR S	SRI n1			
Capacity (veh/h)		977	1082	LDI -	LDK -	1513	WDI	WDR .	808			
HCM Lane V/C Ratio		0.001		-	-	1019	-		0.001			
HCM Control Delay (s)		8.7	8.3	0	-	0	-	-	9.5			
HCM Lane LOS		6.7 A	0.3 A	A	-	A	-	-	9.5 A			
HCM 95th %tile Q(veh)		0	0	A .	-	0	-	-	0			
HOW FOR FORME Q(VCII)		- 0	- 0			- 0			U			

Intersection						
Int Delay, s/veh	0.5					
		EDD	WDI	MDT	NDI	NDD
	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	<b>^</b>	2	0	<u>र्</u> स	Y	1
Traffic Vol, veh/h	64	3	0	68	6	1
Future Vol, veh/h	64	3	0	68	6	1
Conflicting Peds, #/hr	0	_ 0	0	0	0	0
	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage,		-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	73	73	73	73	73	73
Heavy Vehicles, %	7	0	0	15	75	100
Mvmt Flow	88	4	0	93	8	1
Major/Minor Ma	nior1		Injer2		liner1	
	ajor1		Major2		Minor1	00
Conflicting Flow All	0	0	92	0	183	90
Stage 1	-	-	-	-	90	-
Stage 2	-	-	-	-	93	-
Critical Hdwy	-	-	4.1	-	7.15	7.2
Critical Hdwy Stg 1	-	-	-	-	6.15	-
Critical Hdwy Stg 2	-	-	-	-	6.15	-
Follow-up Hdwy	-	-	2.2	-	4.175	4.2
Pot Cap-1 Maneuver	-	-	1515	-	665	754
Stage 1	-	-	-	-	779	-
Stage 2	-	-	-	-	776	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1515	-	665	754
Mov Cap-2 Maneuver	-	-	-	-	665	-
Stage 1	_	_	-	_	779	_
Stage 2	_	_	_	_	776	_
Jugo 2					, , ,	
Approach	EB		WB		NB	
HCM Control Delay, s	0		0		10.4	
HCM LOS					В	
Minor Long/Major Muset		IDI1	CDT	<b>LDD</b>	WDI	WDT
Minor Lane/Major Mvmt	ľ	VBLn1	EBT	EBR		WBT
Capacity (veh/h)		676	-	-	1515	-
HCM Lane V/C Ratio		0.014	-	-	-	-
HCM Control Delay (s)		10.4	-	-	0	-
HCM Lane LOS		В	-	-	Α	-
HCM 95th %tile Q(veh)		0	-	-	0	-
How roun roune Q(ven)		U			U	

Intersection						
Int Delay, s/veh	0					
		CDT.	MOT	WED	CDI	CDD
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		4	<b>^}</b>		¥	
Traffic Vol, veh/h	0	65	70	0	0	0
Future Vol, veh/h	0	65	70	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage,	# -	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	73	73	73	73	73	73
Heavy Vehicles, %	0	9	15	0	0	0
Mvmt Flow	0	89	96	0	0	0
Major/Minor M	loior1	N	//oior?		/linar?	
	lajor1		Major2		/linor2	0/
Conflicting Flow All	96	0	-	0	185	96
Stage 1	-	-	-	-	96	-
Stage 2	-	-	-	-	89	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
	1510	-	-	-	809	966
Stage 1	-	-	-	-	933	-
Stage 2	-	-	-	-	940	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1510	-	-	-	809	966
Mov Cap-2 Maneuver	-	-	-	-	809	-
Stage 1	-	-	-	-	933	-
Stage 2	-	-	_	_	940	-
g • <b>-</b>						
Approach	EB		WB		SB	
HCM Control Delay, s	0		0		0	
HCM LOS					Α	
Minor Lane/Major Mvmt		EBL	EBT	WBT	WBR S	SRI n1
		1510	LUI	1101	VIDIC .	JULITI
Capacity (veh/h)			-	-	-	-
HCM Control Doloy (c)		-	-	-	-	-
HCM Long LOS		0	-	-	-	0
HCM Lane LOS		A	-	-	-	Α
HCM 95th %tile Q(veh)		0	-	-	-	-

Intersection						
Int Delay, s/veh	0.5					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	<u></u>			4	¥	
Traffic Vol, veh/h	64	3	0	70	6	1
Future Vol, veh/h	64	3	0	70	6	1
Conflicting Peds, #/hr	0	0	0	0	0	0
	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage,	# 0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	73	73	73	73	73	73
Heavy Vehicles, %	7	0	0	15	75	100
Mvmt Flow	88	4	0	96	8	1
Major/Minor Ma	ajor1	N	/lajor2	N	/linor1	
Conflicting Flow All	0	0	92	0	186	90
Stage 1	-	U	92	-	90	90
Stage 2		-		-	96	-
Critical Hdwy	-	-	4.1	-	7.15	7.2
Critical Hdwy Stg 1	-	-		-	6.15	1.2
	-	-	-		6.15	
Critical Hdwy Stg 2		-	2.2	-	4.175	- 4.2
Follow-up Hdwy	-	-				
Pot Cap-1 Maneuver	-	-	1515	-	663	754
Stage 1	-	-	-	-	779	-
Stage 2	-	-	-	-	773	-
Platoon blocked, %	-	-	1515	-	//2	754
Mov Cap-1 Maneuver	-	-	1515	-	663	754
Mov Cap-2 Maneuver	-	-	-	-	663	-
Stage 1	-	-	-	-	779	-
Stage 2	-	-	-	-	773	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		0		10.4	
HCM LOS					В	
Minar Lang/Major Mymat		JDI n1	ГОТ	EDD	WDI	WDT
Minor Lane/Major Mvmt	ľ	VBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)		675	-	-	1515	-
HCM Lane V/C Ratio		0.014	-	-	-	-
HCM Control Delay (s)		10.4	-	-	0	-
HCM Lane LOS		В	-	-	A	-
HCM 95th %tile Q(veh)		0	-	-	0	-

Intersection						
Int Delay, s/veh	0.4					
Movement	NBL	NBR	SET	SER	NWL	NWT
Lane Configurations	¥		<b>1</b>			4
Traffic Vol, veh/h	3	0	65	1	3	67
Future Vol, veh/h	3	0	65	1	3	67
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-		-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage,		-	0	-	-	0
Grade, %	0	_	0	-		0
Peak Hour Factor	86	86	86	86	86	86
Heavy Vehicles, %	0	0	11	0	0	13
Mymt Flow	3		76	1	3	78
WWW.CT IOW	J	J	70	•	U	70
	linor1		Major1		Major2	
Conflicting Flow All	161	77	0	0	77	0
Stage 1	77	-	-	-	-	-
Stage 2	84	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	835	990	-	-	1535	-
Stage 1	951	-	-	-	-	-
Stage 2	944	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	833	990	-	-	1535	-
Mov Cap-2 Maneuver	833	-	-	-	-	-
Stage 1	951	-	-	-	-	-
Stage 2	942	-	-	-	-	-
Annroach	NB		CE		NIM	
Approach			SE		NW	
HCM Control Delay, s	9.3		0		0.3	
HCM LOS	A					
Minor Lane/Major Mvmt		NBLn1	NWL	NWT	SET	SER
Capacity (veh/h)		833	1535	_	_	-
HCM Lane V/C Ratio		0.004		_	_	_
HCM Control Delay (s)		9.3	7.4	0	-	-
HCM Lane LOS		A	Α	A	_	_
HCM 95th %tile Q(veh)		0	0	-	-	-
115W 75W 70W Q(VCH)		U	U			

Movement	NB	SB
Directions Served	LTR	LTR
Maximum Queue (m)	4.5	5.9
Average Queue (m)	0.3	0.2
95th Queue (m)	2.9	2.5
Link Distance (m)	496.7	734.3
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

### Intersection: 2: Range Road 61 & Highway 646

Movement	NB
Directions Served	LR
Maximum Queue (m)	17.7
Average Queue (m)	2.6
95th Queue (m)	11.9
Link Distance (m)	788.8
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (m)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Movement
Directions Served
Maximum Queue (m)
Average Queue (m)
95th Queue (m)
Link Distance (m)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (m)
Storage Blk Time (%)
Queuing Penalty (veh)

Movement	NB
Directions Served	LR
Maximum Queue (m)	16.5
Average Queue (m)	2.6
95th Queue (m)	11.5
Link Distance (m)	1098.0
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (m)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

### Intersection: 5: Range Road 55 & Highway 646

Movement	NB
Directions Served	LR
Maximum Queue (m)	5.4
Average Queue (m)	0.5
95th Queue (m)	3.0
Link Distance (m)	1229.5
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (m)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

#### **Network Summary**

Intersection												
Int Delay, s/veh	0.3											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		4			4			4			4	
Traffic Vol, veh/h	0	127	0	0	104	1	4	0	1	1	0	1
Future Vol, veh/h	0	127	0	0	104	1	4	0	1	1	0	1
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage,	,# -	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	79	79	79	79	79	79	79	79	79	79	79	79
Heavy Vehicles, %	0	14	0	0	10	0	0	0	100	0	0	0
Mvmt Flow	0	161	0	0	132	1	5	0	1	1	0	1
Major/Minor N	/lajor1		ľ	Major2		ľ	Minor1		N	Minor2		
Conflicting Flow All	133	0	0	161	0	0	294	294	161	295	294	133
Stage 1	-	-	-	-	-	-	161	161	-	133	133	-
Stage 2	-	-	-	-	-	-	133	133	-	162	161	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	7.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	4.2	3.5	4	3.3
Pot Cap-1 Maneuver	1464	-	-	1430	-	-	662	620	681	661	620	922
Stage 1	-	-	-	-	-	-	846	769	-	875	790	-
Stage 2	-	-	-	-	-	-	875	790	-	845	769	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1464	-	-	1430	-	-	661	620	681	660	620	922
Mov Cap-2 Maneuver	-	-	-	-	-	-	661	620	-	660	620	-
Stage 1	-	-	-	-	-	-	846	769	-	875	790	-
Stage 2	-	-	-	-	-	-	874	790	-	843	769	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0			0			10.5			9.7		
HCM LOS							В			Α		
Minor Lane/Major Mvm	t N	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR S	SRI n1			
Capacity (veh/h)	. 1	665	1464	LDI	LDIX	1430	-	VVDIX .	769			
HCM Lane V/C Ratio		0.01	1404	-	-	1430	_		0.003			
HCM Control Delay (s)		10.5	0	-	-	0	-	_	9.7			
HCM Lane LOS		В	A	-	-	A	-	-	7. <i>1</i>			
HCM 95th %tile Q(veh)		0	0	_	_	0	_	_	0			
115W 75W 70W 2(VOII)			- 0			- 0						

Intersection						
Int Delay, s/veh	0.3					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	<u>₽</u>	LDI	WDL	<u>₩Ы</u>	₩.	אטוז
Traffic Vol, veh/h	120	12	1	99	<b>T</b>	0
Future Vol, veh/h	120	12		99		0
		0	1		6	
Conflicting Peds, #/hr	0		0	0	O Cton	O Ctop
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-		-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage,		-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	83	83	83	83	83	83
Heavy Vehicles, %	8	63	100	11	75	100
Mvmt Flow	145	14	1	119	7	0
Major/Minor M	Najar1		//oior?		Minor1	
	1ajor1		Major2		Minor1	150
Conflicting Flow All	0	0	159	0	273	152
Stage 1	-	-	-	-	152	-
Stage 2	-	-	-	-	121	-
Critical Hdwy	-	-	5.1	-	7.15	7.2
Critical Hdwy Stg 1	-	-	-	-	6.15	-
Critical Hdwy Stg 2	-	-	-	-	6.15	-
Follow-up Hdwy	-	-	3.1	-	4.175	4.2
Pot Cap-1 Maneuver	-	-	992	-	585	690
Stage 1	-	-	-	-	725	-
Stage 2	-	-	-	-	752	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	_	992	-	584	690
Mov Cap-2 Maneuver	_	_	-	_	584	-
Stage 1	_	_	_	_	725	_
Stage 2		_	_	_	751	<u>-</u>
Stage 2	-		-		731	<del>-</del>
Approach	EB		WB		NB	
HCM Control Delay, s	0		0.1		11.2	
HCM LOS					В	
		IDI 4	EDT	<b>EDD</b>	ME	WDT
Minor Lane/Major Mvmt	t ľ	NBLn1	EBT	EBR		WBT
Capacity (veh/h)		584	-	-	992	-
HCM Lane V/C Ratio		0.012	-	-	0.001	-
HCM Control Delay (s)		11.2	-	-	8.6	0
HCM Lane LOS		В	-	-	Α	Α
HCM 95th %tile Q(veh)		0	-	-	0	-

Intersection						
Int Delay, s/veh	0					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	LDL	4	<b>₩</b>	VVDIX	¥.	JUIN
Traffic Vol, veh/h	0	118	99	0	0	0
Future Vol, veh/h	0	118	99	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None		None	- -	None
Storage Length	_	-	_	-	0	-
Veh in Median Storage,		0	0	_	0	_
Grade, %	-	0	0	_	0	_
Peak Hour Factor	81	81	81	81	81	81
Heavy Vehicles, %	0	9	13	0	0	0
Mymt Flow	0	146	122	0	0	0
IVIVIII( I IOW	U	140	122	U	U	U
	lajor1		Major2		Minor2	
Conflicting Flow All	122	0	-	0	268	122
Stage 1	-	-	-	-	122	-
Stage 2	-	-	-	-	146	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1478	-	-	-	726	935
Stage 1	-	-	-	-	908	-
Stage 2	-	-	-	-	886	-
Platoon blocked, %		-	-	-		
	1478	-	-	-	726	935
Mov Cap-2 Maneuver	-	-	-	-	726	-
Stage 1	-	-	-	-	908	-
Stage 2	-	-	-	-	886	-
Approach	EB		WB		SB	
HCM Control Delay, s	0		0		0	
HCM LOS	U		U			
FICIVI LOS					Α	
Minor Lane/Major Mvmt		EBL	EBT	WBT	WBR S	SBLn1
Capacity (veh/h)		1478	-	-	-	-
HCM Lane V/C Ratio		-	-	-	-	-
HCM Control Delay (s)		0	-	-	-	0
		Α	_	-	_	Α
HCM Lane LOS		, ,				
HCM Lane V/C Ratio HCM Control Delay (s)		0		-	-	0

Intersection						
Int Delay, s/veh	0.4					
		EDD	WDI	WDT	NDI	NDD
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	ĵ.	4.		4	Y	
Traffic Vol, veh/h	117	16	1	95	7	0
Future Vol, veh/h	117	16	1	95	7	0
Conflicting Peds, #/hr	0	0	0	0	0	0
<u> </u>	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage,	# 0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	83	83	83	83	83	83
Heavy Vehicles, %	9	63	1	11	75	100
Mvmt Flow	141	19	1	114	8	0
WWW. Tiow		17	•	• • •	0	U
	ajor1	N	Major2	1	Minor1	
Conflicting Flow All	0	0	160	0	267	151
Stage 1	-	-	-	-	151	-
Stage 2	-	-	-	-	116	-
Critical Hdwy	_	_	4.11	_	7.15	7.2
Critical Hdwy Stg 1	_	_		_	6.15	-
Critical Hdwy Stg 2	_	_	_	-	6.15	_
Follow-up Hdwy	_		2.209		4.175	4.2
Pot Cap-1 Maneuver	-	-	1425	-	590	691
•		-	1423		726	
Stage 1	-		-	-		-
Stage 2	-	-	-	-	756	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1425	-	589	691
Mov Cap-2 Maneuver	-	-	-	-	589	-
Stage 1	-	-	-	-	726	-
Stage 2	-	-	-	-	755	-
			14/5		NE	
Approach	EB		WB		NB	
HCM Control Delay, s	0		0.1		11.2	
HCM LOS					В	
Minor Lang/Major Mumt	N	NBLn1	EDT	EBR	\\/DI	WBT
Minor Lane/Major Mvmt	ľ		EBT			WBI
Capacity (veh/h)		589	-		1425	-
HCM Lane V/C Ratio		0.014	-	-	0.001	-
HCM Control Delay (s)		11.2	-	-	7.5	0
HCM Lane LOS		В	-	-	Α	Α
HCM 95th %tile Q(veh)		0	-	-	0	-

Intersection						
Int Delay, s/veh	0.2					
Movement	NBL	NBR	SET	SER	NWL	NWT
Lane Configurations	W		<b>f</b>			4
Traffic Vol, veh/h	1	3	116	0	0	91
Future Vol, veh/h	1	3	116	0	0	91
Conflicting Peds, #/hr	0	0	0	0	0	0
	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-		-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage,	# 0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	86	86	86	86	86	86
Heavy Vehicles, %	0	0	9	0	0	14
Mvmt Flow	1	3	135	0	0	106
Major/Minor M	inor1	N	Major1	n.	Major2	
	241	135	0	0	135	0
Conflicting Flow All	135	130		U	133	-
Stage 1	106	-	-	-	-	-
Stage 2 Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	0.2	-	-	4.1	-
	5.4		-	-		-
Critical Hdwy Stg 2	3.5	3.3	-	-	2.2	-
Follow-up Hdwy	752	919	-	-	1462	
Pot Cap-1 Maneuver	896		-	-	1402	-
Stage 1	923	-	-	-		
Stage 2	923	-	-	-	-	-
Platoon blocked, %	750	010	-	-	14/2	-
Mov Cap-1 Maneuver	752	919	-	-	1462	-
Mov Cap-2 Maneuver	752	-	-	-	-	-
Stage 1	896	-	-	-	-	-
Stage 2	923	-	-	-	-	-
Approach	NB		SE		NW	
HCM Control Delay, s	9.2		0		0	
HCM LOS	Α					
Minor Lane/Major Mvmt		NBLn1	NWL	NWT	SET	SER
					JLI	JLI
Capacity (veh/h) HCM Lane V/C Ratio		871 0.005	1462	-	-	-
		9.2	-	-	-	-
HCM Control Delay (s) HCM Lane LOS			0 A	-	-	-
HCM 95th %tile Q(veh)		A 0	0	-	-	-

Movement	NB	SB
Directions Served	LTR	LTR
Maximum Queue (m)	13.6	5.9
Average Queue (m)	1.0	0.5
95th Queue (m)	6.3	3.4
Link Distance (m)	496.7	734.3
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

### Intersection: 2: Range Road 61 & Highway 646

Movement	WB	NB
Directions Served	LT	LR
Maximum Queue (m)	2.9	20.0
Average Queue (m)	0.1	2.4
95th Queue (m)	2.0	11.6
Link Distance (m)	533.7	788.8
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

### Intersection: 3: Highway 646 & Elk Point Airport Access

Movement
Directions Served
Maximum Queue (m)
Average Queue (m)
95th Queue (m)
Link Distance (m)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (m)
Storage Blk Time (%)
Queuing Penalty (veh)

Movement	WB	NB
Directions Served	LT	LR
Maximum Queue (m)	1.4	15.5
Average Queue (m)	0.0	2.3
95th Queue (m)	1.0	10.2
Link Distance (m)	1835.7	1098.0
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

### Intersection: 5: Range Road 55 & Highway 646

Movement	NB
Directions Served	LR
Maximum Queue (m)	5.1
Average Queue (m)	0.4
95th Queue (m)	2.7
Link Distance (m)	1229.5
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (m)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

#### **Network Summary**

Network wide Queuing Penalty: 0

Intersection												
Int Delay, s/veh	0.4											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		4			4			4			4	
Traffic Vol, veh/h	1	63	10	2	56	7	0	0	1	3	0	0
Future Vol, veh/h	1	63	10	2	56	7	0	0	1	3	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None		-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage,	# -	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	84	84	84	84	84	84	84	84	84	84	84	84
Heavy Vehicles, %	100	7	50	0	18	100	0	0	0	0	0	0
Mvmt Flow	1	75	12	2	67	8	0	0	1	4	0	0
Major/Minor M	lajor1		ı	Major2		ľ	/linor1		N	/linor2		
Conflicting Flow All	75	0	0	87	0	0	158	162	81	159	164	71
Stage 1	-	-	-	-	-	-	83	83	-	75	75	-
Stage 2	-	-	-	-	-	-	75	79	-	84	89	-
Critical Hdwy	5.1	-	-	4.1	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	3.1	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1078	-	-	1522	-	-	813	734	985	811	732	997
Stage 1	-	-	-	-	-	-	930	830	-	939	836	-
Stage 2	-	-	-	-	-	-	939	833	-	929	825	-
Platoon blocked, %		-	-		-	-						
	1078	-	-	1522	-	-	811	733	985	809	731	997
Mov Cap-2 Maneuver	-	-	-	-	-	-	811	733	-	809	731	-
Stage 1	-	-	-	-	-	-	929	829	-	938	835	-
Stage 2	-	-	-	-	-	-	938	832	-	927	824	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.1			0.2			8.7			9.5		
HCM LOS							Α			Α		
Minor Lane/Major Mvmt		NBLn1	EBL	EBT	EBR	WBL	WBT	WBR S	SBLn1			
Capacity (veh/h)		985	1078	-	-	1522	-	-	809			
HCM Lane V/C Ratio		0.001	0.001	-	-	0.002	-	-	0.004			
HCM Control Delay (s)		8.7	8.3	0	-	7.4	0	-	9.5			
HCM Lane LOS		Α	Α	A	-	A	A	-	A			
HCM 95th %tile Q(veh)		0	0	-	-	0	-	-	0			

lad and add an						
Intersection	0 1					
Int Delay, s/veh	0.6					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	î,			र्स	N/	
Traffic Vol, veh/h	62	2	1	71	5	2
Future Vol, veh/h	62	2	1	71	5	2
Conflicting Peds, #/hr	0	0	0	0	0	0
	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	Jiop -	None
Storage Length	_	-	_	-	0	-
Veh in Median Storage,			_	0	0	
Grade, %	π 0 0	-	-	0	0	
Peak Hour Factor	73	73	73	73	73	73
	7			15	75	
Heavy Vehicles, %		0	0			100
Mvmt Flow	85	3	1	97	7	3
Major/Minor Ma	ajor1	Λ	/lajor2	1	Minor1	
Conflicting Flow All	0	0	88	0	186	87
Stage 1	-	-	-	-	87	-
Stage 2	_	_	_	_	99	_
Critical Hdwy			4.1	_	7.15	7.2
Critical Hdwy Stg 1	-	-	4.1	-	6.15	1.2
	-	_				
Critical Hdwy Stg 2	-	-	-	-	6.15	-
Follow-up Hdwy	-	-	2.2	-	4.175	4.2
Pot Cap-1 Maneuver	-	-	1520	-	663	757
Stage 1	-	-	-	-	781	-
Stage 2	-	-	-	-	771	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1520	-	662	757
Mov Cap-2 Maneuver	-	-	-	_	662	-
Stage 1	_		_	_	781	_
Stage 2	-	-	-	-	770	-
Jiaye Z	_	_	_	_	770	_
Approach	EB		WB		NB	
HCM Control Delay, s	0		0.1		10.3	
HCM LOS					В	
Minor Long/Maior M.		IDI1	EDT	EDD	WDI	MDT
Minor Lane/Major Mvmt	ľ	VBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)		687	-	-	1520	-
HCM Lane V/C Ratio		0.014	-	-	0.001	-
HCM Control Delay (s)		10.3	-	-	7.4	0
HCM Lane LOS		В	-	-	Α	Α
HCM 95th %tile Q(veh)		0	-	-	0	-

Intersection						
Int Delay, s/veh	1.4					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		4	₽		N/F	
Traffic Vol, veh/h	9	56	64	7	7	9
Future Vol, veh/h	9	56	64	7	7	9
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-		-	None
Storage Length	-	-	_	-	0	-
Veh in Median Storage	,# -	0	0	-	0	-
Grade, %	-	0	0	_	0	_
Peak Hour Factor	73	73	73	73	73	73
Heavy Vehicles, %	0	9	15	0	0	0
Mymt Flow	12	77	88	10	10	12
IVIVIIIL FIOW	12	11	00	10	10	12
Major/Minor N	Najor1	N	/lajor2	N	/linor2	
Conflicting Flow All	98	0	-	0	194	93
Stage 1	_	_	-	_	93	_
Stage 2	_	_	_	_	101	_
Critical Hdwy	4.1	_	_	_	6.4	6.2
Critical Hdwy Stg 1	T. I	_	_	<u>-</u>	5.4	0.2
Critical Hdwy Stg 2	-	-	-		5.4	
	2.2		-			3.3
Follow-up Hdwy		-	-	-	3.5	
Pot Cap-1 Maneuver	1508	-	-	-	799	970
Stage 1	-	-	-	-	936	-
Stage 2	-	-	-	-	928	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1508	-	-	-	793	970
Mov Cap-2 Maneuver	-	-	-	-	793	-
Stage 1	-	-	-	-	929	-
Stage 2	-	-	-	-	928	-
J						
A In	- ED		WD		CD	
Approach	EB		WB		SB	
HCM Control Delay, s	1		0		9.2	
HCM LOS					Α	
Minor Lane/Major Mvm	t	EBL	EBT	WBT	WBR :	SRI n1
	ı		LUI	VVDI	VVDIX .	
Capacity (veh/h)		1508	-	-	-	884
HCM Cantral Dalay (a)		0.008	-	-		0.025
HCM Control Delay (s)		7.4	0	-	-	9.2
HCM Lane LOS		Α	Α	-	-	Α
HCM 95th %tile Q(veh)	)	0	-	-	-	0.1

Intersection						
Int Delay, s/veh	1.2					
	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	Þ			4	Y	
Traffic Vol, veh/h	57	6	0	61	15	1
Future Vol, veh/h	57	6	0	61	15	1
Conflicting Peds, #/hr	0	0	0	0	0	0
	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #		-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	73	73	73	73	73	73
Heavy Vehicles, %	7	0	0	15	75	100
Mvmt Flow	78	8	0	84	21	1
NA - ! /NA!	.!1		1-!0		M: 1	
	ajor1		Major2		Minor1	
Conflicting Flow All	0	0	86	0	166	82
Stage 1	-	-	-	-	82	-
Stage 2	-	-	-	-	84	-
Critical Hdwy	-	-	4.1	-	7.15	7.2
Critical Hdwy Stg 1	-	-	-	-	6.15	-
Critical Hdwy Stg 2	-	-	-	-	6.15	-
Follow-up Hdwy	-	-	2.2	-	4.175	4.2
Pot Cap-1 Maneuver	-	-	1523	-	682	763
Stage 1	-	-	-	-	786	-
Stage 2	-	-	-	-	784	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1523	-	682	763
Mov Cap-2 Maneuver	-	-	-	-	682	-
Stage 1	-	-	-	-	786	-
Stage 2	_	_	_	_	784	_
Otago 2					, , ,	
Approach	EB		WB		NB	
HCM Control Delay, s	0		0		10.4	
HCM LOS					В	
Minor Lane/Major Mvmt	N	NBLn1	EBT	EBR	WBL	WBT
				LDIN		VVDI
Capacity (veh/h) HCM Lane V/C Ratio		687	-	-	1523	-
		0.032	-	-	-	-
HCM Long LOS		10.4	-	-	0	-
HCM OF the Of tille Of tech		В	-	-	A	-
HCM 95th %tile Q(veh)		0.1	-	-	0	-

Intersection						
Int Delay, s/veh	0.5					
		NDD	CET	CED	NIVA	N 1) A /T
Movement	NBL	NBR	SET	SER	NWL	NWT
Lane Configurations	¥		Þ	4	-	4
Traffic Vol, veh/h	5	0	59	1	2	56
Future Vol, veh/h	5	0	59	1	2	56
Conflicting Peds, #/hr	0	0	0	0	0	_ 0
	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage,		-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	86	86	86	86	86	86
Heavy Vehicles, %	0	0	11	0	0	13
Mvmt Flow	6	0	69	1	2	65
Major/Minor M	inor1	1	Major1	N	/lajor2	
Conflicting Flow All	139	70	0	0	70	0
Stage 1	70	-	-	-	70	-
Stage 2	69	-	-	_		
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	0.2	-	-	4.1	_
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	859	998	-	-	1544	-
	958	990		-	1044	_
Stage 1	959	-	-	-		
Stage 2	959	-	-	-	-	-
Platoon blocked, %	050	000	-	-	1511	-
Mov Cap-1 Maneuver	858	998	-	-	1544	-
Mov Cap-2 Maneuver	858	-	-	-	-	-
Stage 1	958	-	-	-	-	-
Stage 2	958	-	-	-	-	-
Approach	NB		SE		NW	
HCM Control Delay, s	9.2		0		0.3	
HCM LOS	A		U		0.0	
TIOM EGG	,,					
Minor Lane/Major Mvmt		NBLn1	NWL	NWT	SET	SER
Capacity (veh/h)		858	1544	-	-	-
HCM Lane V/C Ratio		0.007		-	-	-
HCM Control Delay (s)		9.2	7.3	0	-	-
HCM Lane LOS		Α	Α	Α	-	-
HCM 95th %tile Q(veh)		0	0	-	-	-

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	3.6	1.4	6.0	7.6
Average Queue (m)	0.1	0.0	0.2	0.5
95th Queue (m)	2.6	1.0	2.2	3.7
Link Distance (m)	986.4	1601.0	496.7	734.3
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

### Intersection: 2: Range Road 61 & Highway 646

Movement	NB
Directions Served	LR
Maximum Queue (m)	20.1
Average Queue (m)	3.1
95th Queue (m)	13.1
Link Distance (m)	788.8
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (m)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

### Intersection: 3: Highway 646 & Elk Point Airport Access

Movement	EB	SB
Directions Served	LT	LR
Maximum Queue (m)	5.4	7.9
Average Queue (m)	0.2	3.3
95th Queue (m)	2.0	9.3
Link Distance (m)	533.7	363.4
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

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Movement	NB
Directions Served	LR
Maximum Queue (m)	20.0
Average Queue (m)	5.4
95th Queue (m)	16.6
Link Distance (m)	1098.0
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (m)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

### Intersection: 5: Range Road 55 & Highway 646

Movement	NB
Directions Served	LR
Maximum Queue (m)	5.4
Average Queue (m)	0.7
95th Queue (m)	3.7
Link Distance (m)	1229.5
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (m)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

#### **Network Summary**

Network wide Queuing Penalty: 0

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Movement	Intersection												
Traffic Vol, veh/h		0.3											
Traffic Vol, veh/h	Movement	EBI	EBT	EBR	WBI	WBT	WBR	NBI	NBT	NBR	SBI	SBT	SBR
Traffic Vol, veh/h											752		Join
Future Vol, veh/h Conflicting Peds, #/hr O O O O O O O O O O O O O O O O O O O	J	0		0	0		2	4		1	1		1
Sign Control   Free   Free   Free   Free   Free   Free   Free   Free   Free   Stop   Stop		0			0		2	4		1	1	0	1
RT Channelized	Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Storage Length		Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
Veh in Median Storage, # - 0	RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Grade, %         -         0         -         -         0         -         -         0         -         -         0         -         -         0         -         -         0         -         -         0         -         -         0         -         -         0         -         -         0         -         -         0         -         79         79         79         79         79         79         79         79         79         79         79         79         79         79         79         79         79         79         79         79         79         79         79         79         79         79         79         79         79         79         79         79         79         79         79         79         79         79         79         79         79         79         79         79         79         79         79         79         79         79         79         79         79         79         79         79         79         79         79         79         79         79         79         79         79         79         79         79         79	Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Peak Hour Factor		,# -	0	-	-	0	-	-	0	-	-	~	-
Heavy Vehicles, %													
Mymit Flow         0         147         0         0         118         3         5         0         1         1         0         1           Major/Minor         Major1         Major2         Minor1         Minor2         Minor2           Conflicting Flow All         121         0         0         147         0         0         267         268         147         268         267         120           Stage 1         -         -         -         -         -         147         147         147         -         120         120         -         Stage 2         -         -         -         -         147         147         -         120         120         -         -         147         -         148         147         -         120         -         -         140         -         -         140         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         - <t< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>													
Major/Minor         Major1         Major2         Minor1         Minor2           Conflicting Flow All         121         0         0         147         0         0         267         268         147         268         267         120           Stage 1         -         -         -         -         -         147         147         147         -         120         120         -           Stage 2         -         -         -         -         147         147         147         -         120         120         -           Critical Hdwy Stg 1         -         -         -         -         6.1         5.5         -         6.1         5.5         -         6.1         5.5         -         6.1         5.5         -         6.1         5.5         -         6.1         5.5         -         6.1         5.5         -         6.1         5.5         -         6.1         5.5         -         6.1         5.5         -         6.1         5.5         -         6.1         5.5         -         6.1         5.5         -         6.1         5.5         -         6.1         5.5         -         6.1<													
Conflicting Flow All 121 0 0 147 0 0 267 268 147 268 267 120 Stage 1 147 147 - 120 120 - Stage 2 120 121 - 148 147 - Critical Hdwy Stg 1 6.1 5.5 7.2 7.1 6.5 6.2 Critical Hdwy Stg 1 6.1 5.5 - 6.1 5.5 - Critical Hdwy Stg 2 6.1 5.5 - 6.1 5.5 - Critical Hdwy Stg 2 6.1 5.5 - 6.1 5.5 - Critical Hdwy Stg 2 6.1 5.5 - 6.1 5.5 - Critical Hdwy Stg 2 6.1 5.5 - 6.1 5.5 - Critical Hdwy Stg 2 6.1 5.5 - 6.1 5.5 - Critical Hdwy Stg 2 6.1 5.5 - 6.1 5.5 - Critical Hdwy Stg 2 6.1 5.5 - 6.1 5.5 - Critical Hdwy Stg 2 6.1 5.5 - 6.1 5.5 - Critical Hdwy Stg 2 6.1 5.5 - 6.1 5.5 - Critical Hdwy Stg 2 6.1 5.5 - 6.1 5.5 - Critical Hdwy Stg 2 6.1 5.5 - 6.1 5.5 - Critical Hdwy Stg 2 6.1 5.5 6.1 5.5 6.1 5.5 6.1 5.5 6.1 5.5 6.1 5.5 6.1 5.5 6.1 5.5 6.1 5.5 6.1 5.5 6.1 5.5 6.1 5.5 6.1 5.5 6.1 5.5 6.1 5.5 6.1 5.5 6.1 5.5 6.1 5.5 6.1 5.5 6.1 5.5 6.1 5.5 6.1 5.5 6.1 5.5 6.1 5.5 6.1 5.5 6.1 5.5 6.1 5.5 6.1 5.5 6.1 5.5 6.1 5.5 6.1 5.5 6.1 5.5 6.1 5.5 6.1 5.5 6.1 5.5 6.1 5.5 6.1 5.5 6.1 5.5 6.1 5.5 6.1 5.5 6.1 5.5 6.1 5.5 6.1 5.5 6.1 5.5 6.1 5.5 6.1 5.5 6.1 5.5 - 6.1 5.5 - 6.1 5.5 - 6.1 5.5 - 6.1 5.5 - 6.1 5.5 - 6.1 5.5 - 6.1 5.5 - 6.1 5.5 - 6.1 5.5 - 6.1 5.5 - 6.1 5.5 - 6.1 5.5 - 6.1 5.5 - 6.1 5.5 - 6.1 5.5 - 6.1 5.5 - 6.1 5.5 - 6.1 5.5 - 6.1 5.5 - 6.1 5.5 - 6.1 5.5 - 6.1 5.5 - 6.1 5.5 - 6.1 5.5 - 6.1 5.5 - 6.1 5.5 - 6.1 5.5 - 6.1 5.5 - 6.1 5.5 - 6.1 5.5 - 6.1 5.5 - 6.1 5.5 - 6.1 5.5 - 6.1 5.5 - 6.1 5.5 - 6.1 5.5 - 6.1 5.5 - 6.1 5.5 - 6.1 5.5 - 6.1 5.5 - 6.1 5.5 - 6.1 5.5 - 6.1 5.5	Mvmt Flow	0	147	0	0	118	3	5	0	1	1	0	1
Conflicting Flow All 121 0 0 147 0 0 267 268 147 268 267 120 Stage 1 147 147 - 120 120 - Stage 2 120 121 - 148 147 - Critical Hdwy Stg 1 6.1 5.5 7.2 7.1 6.5 6.2 Critical Hdwy Stg 1 6.1 5.5 - 6.1 5.5 - Critical Hdwy Stg 2 6.1 5.5 - 6.1 5.5 - Critical Hdwy Stg 2 6.1 5.5 - 6.1 5.5 - Critical Hdwy Stg 2 6.1 5.5 - 6.1 5.5 - Critical Hdwy Stg 2 6.1 5.5 - 6.1 5.5 - Critical Hdwy Stg 2 6.1 5.5 - 6.1 5.5 - Critical Hdwy Stg 2 6.1 5.5 - 6.1 5.5 - Critical Hdwy Stg 2 6.1 5.5 - 6.1 5.5 - Critical Hdwy Stg 2 6.1 5.5 - 6.1 5.5 - Critical Hdwy Stg 2 6.1 5.5 - 6.1 5.5 - Critical Hdwy Stg 2 6.1 5.5 - 6.1 5.5 - Critical Hdwy Stg 2 6.1 5.5 - 6.1 5.5 - Critical Hdwy Stg 2 6.1 5.5 6.1 5.5 6.1 5.5 6.1 5.5 6.1 5.5 6.1 5.5 6.1 5.5 6.1 5.5 6.1 5.5 6.1 5.5 6.1 5.5 6.1 5.5 6.1 5.5 6.1 5.5 6.1 5.5 6.1 5.5 6.1 5.5 6.1 5.5 6.1 5.5 6.1 5.5 6.1 5.5 6.1 5.5 6.1 5.5 6.1 5.5 6.1 5.5 6.1 5.5 6.1 5.5 6.1 5.5 6.1 5.5 6.1 5.5 6.1 5.5 6.1 5.5 6.1 5.5 6.1 5.5 6.1 5.5 6.1 5.5 6.1 5.5 6.1 5.5 6.1 5.5 6.1 5.5 6.1 5.5 6.1 5.5 6.1 5.5 6.1 5.5 6.1 5.5 6.1 5.5 6.1 5.5 - 6.1 5.5 - 6.1 5.5 - 6.1 5.5 - 6.1 5.5 - 6.1 5.5 - 6.1 5.5 - 6.1 5.5 - 6.1 5.5 - 6.1 5.5 - 6.1 5.5 - 6.1 5.5 - 6.1 5.5 - 6.1 5.5 - 6.1 5.5 - 6.1 5.5 - 6.1 5.5 - 6.1 5.5 - 6.1 5.5 - 6.1 5.5 - 6.1 5.5 - 6.1 5.5 - 6.1 5.5 - 6.1 5.5 - 6.1 5.5 - 6.1 5.5 - 6.1 5.5 - 6.1 5.5 - 6.1 5.5 - 6.1 5.5 - 6.1 5.5 - 6.1 5.5 - 6.1 5.5 - 6.1 5.5 - 6.1 5.5 - 6.1 5.5 - 6.1 5.5 - 6.1 5.5 - 6.1 5.5 - 6.1 5.5 - 6.1 5.5 - 6.1 5.5 - 6.1 5.5 - 6.1 5.5													
Conflicting Flow All   121   0   0   147   0   0   267   268   147   268   267   120	Major/Minor N	1ajor1			Major2			/linor1		N	Minor2		
Stage 1			0			0	0	267	268	147	268	267	120
Critical Hdwy       4.1       -       4.1       -       -       7.1       6.5       7.2       7.1       6.5       6.2         Critical Hdwy Stg 1       -       -       -       -       6.1       5.5       -       6.1       5.5       -       6.1       5.5       -       6.1       5.5       -       6.1       5.5       -       6.1       5.5       -       6.1       5.5       -       6.1       5.5       -       6.1       5.5       -       6.1       5.5       -       6.1       5.5       -       6.1       5.5       -       6.1       5.5       -       6.1       5.5       -       6.1       5.5       -       6.1       5.5       -       6.1       5.5       -       6.1       5.5       -       6.1       5.5       -       6.1       5.5       -       6.1       5.5       -       6.1       5.5       -       6.1       5.5       -       6.1       5.5       -       6.1       5.5       -       6.1       5.5       -       6.1       5.5       -       6.1       5.5       -       6.1       5.5       -       6.1       5.2       3.5       4			-	-	-	-	_	147	147	-	120	120	-
Critical Hdwy Stg 1       -       -       -       -       6.1       5.5       -       6.1       5.5       -       6.1       5.5       -       6.1       5.5       -       6.1       5.5       -       6.1       5.5       -       6.1       5.5       -       6.1       5.5       -       6.1       5.5       -       6.1       5.5       -       6.1       5.5       -       6.1       5.5       -       6.1       5.5       -       6.1       5.5       -       6.1       5.5       -       6.1       5.5       -       6.1       5.5       -       6.1       5.5       -       6.1       5.5       -       6.1       5.5       -       6.1       5.5       -       6.1       5.5       -       6.1       5.5       -       6.1       5.5       -       6.1       5.5       -       6.1       5.5       -       6.1       5.5       -       6.1       5.5       -       6.1       5.5       -       6.1       5.5       -       6.1       5.5       -       6.1       5.5       -       6.1       5.5       -       6.2       2.2       2.2       2.2       2.2       2.	Stage 2	-	-	-	-	-	-	120	121	-	148	147	-
Critical Hdwy Stg 2         -         -         -         -         6.1         5.5         -         6.1         5.5         -           Follow-up Hdwy         2.2         -         -         2.2         -         -         3.5         4         4.2         3.5         4         3.3           Pot Cap-1 Maneuver         1479         -         1447         -         -         690         641         695         689         642         937           Stage 1         -         -         -         -         -         880         779         -         889         800         -         859         779         -         20         -         -         889         800         -         859         779         -         20         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -	Critical Hdwy	4.1	-	-	4.1	-	-	7.1		7.2			6.2
Follow-up Hdwy 2.2 - 2.2 - 3.5 4 4.2 3.5 4 3.3  Pot Cap-1 Maneuver 1479 - 1447 - 690 641 695 689 642 937  Stage 1 860 779 - 889 800 - 859 779 - 849 800 - 859 779 - 840 859 859 859 859 859 859 859 859 859 859		-	-	-	-	-	-			-			-
Pot Cap-1 Maneuver         1479         -         1447         -         690         641         695         689         642         937           Stage 1         -         -         -         -         860         779         -         889         800         -         859         779         -           Plation blocked, %         -         -         -         -         -         889         800         -         859         779         -           Mov Cap-1 Maneuver         1479         -         1447         -         -         689         641         695         688         642         937           Mov Cap-2 Maneuver         -         -         -         -         689         641         -         688         642         -         -         -         689         641         -         688         642         -         -         -         -         680         779         -         889         800         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -	3 0		-	-		-	-						
Stage 1         -         -         -         -         860         779         -         889         800         -           Stage 2         -         -         -         -         -         889         800         -         859         779         -           Platoon blocked, %         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -<			-	-		-	-						
Stage 2       -       -       -       -       889       800       -       859       779       -         Platoon blocked, %       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       - <t< td=""><td></td><td>1479</td><td>-</td><td>-</td><td>1447</td><td>-</td><td>-</td><td></td><td></td><td>695</td><td></td><td></td><td>937</td></t<>		1479	-	-	1447	-	-			695			937
Platoon blocked, %		-	-	-	-	-	-			-			-
Mov Cap-1 Maneuver         1479         -         1447         -         -         689         641         695         688         642         937           Mov Cap-2 Maneuver         -         -         -         -         -         689         641         -         688         642         -           Stage 1         -         -         -         -         -         860         779         -         889         800         -           Stage 2         -         -         -         -         -         888         800         -         857         779         -           Approach         EB         WB         WB         NB         SB         SB         NB         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -		-		-	-			889	800	-	859	779	-
Mov Cap-2 Maneuver         -         -         -         -         689         641         -         688         642         -           Stage 1         -         -         -         -         -         860         779         -         889         800         -           Stage 2         -         -         -         -         -         888         800         -         857         779         -           Approach         EB         WB         NB         SB         -         -         -         857         779         -         -           Approach         EB         WB         NB         SB         -         -         -         -         -         857         779         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         <		4.470	-	-	44	-			,	/05	(00	,	60-
Stage 1         -         -         -         -         860         779         -         889         800         -           Stage 2         -         -         -         -         -         888         800         -         857         779         -           Approach         EB         WB         NB         SB           HCM Control Delay, s         0         0         10.3         9.6           HCM LOS         B         A    Minor Lane/Major Mvmt  NBLn1  EBL  EBT  EBR  WBL  WBT  WBR SBLn1  Capacity (veh/h)  690  1479  - 1447  - 793  HCM Lane V/C Ratio  0.009  1447  - 793  HCM Control Delay (s)  10.3  0 - 0 - 9.6  HCM Lane LOS  B  A  - A  - A  - A  - A  - A  - A  -	· ·			-	144/								
Stage 2         -         -         -         -         888         800         -         857         779         -           Approach         EB         WB         NB         SB           HCM Control Delay, s         0         0         10.3         9.6           HCM LOS         B         A    Minor Lane/Major Mvmt  NBLn1  EBL  EBT  EBR  WBL  WBT  WBR SBLn1  Capacity (veh/h)  690  1479  - 1447  - 793  HCM Lane V/C Ratio  0.009  1447  - 793  HCM Control Delay (s)  10.3  0 - 0 - 9.6  HCM Lane LOS  B  A  - A  - A  - A  - A  - A  - A  -				-	-								
Approach         EB         WB         NB         SB           HCM Control Delay, s         0         0         10.3         9.6           HCM LOS         B         A             Minor Lane/Major Mvmt         NBLn1         EBL         EBT         EBR         WBL         WBT         WBR SBLn1           Capacity (veh/h)         690         1479         -         -         1447         -         -         793           HCM Lane V/C Ratio         0.009         -         -         -         -         -         0.003           HCM Control Delay (s)         10.3         0         -         -         0         -         9.6           HCM Lane LOS         B         A         -         -         A         -         -         A	•	-	-	-	-	-	-						
HCM Control Delay, s         0         0         10.3         9.6           HCM LOS         B         A             Minor Lane/Major Mvmt         NBLn1         EBL         EBT         EBR         WBL         WBT         WBR SBLn1           Capacity (veh/h)         690         1479         -         -         1447         -         -         793           HCM Lane V/C Ratio         0.009         -         -         -         -         -         0.003           HCM Control Delay (s)         10.3         0         -         -         0         -         -         9.6           HCM Lane LOS         B         A         -         -         A         -         -         A	Stage 2	-	-	-	-	-	-	გგგ	800	-	გე <i>1</i>	119	-
HCM Control Delay, s         0         0         10.3         9.6           HCM LOS         B         A             Minor Lane/Major Mvmt         NBLn1         EBL         EBT         EBR         WBL         WBT         WBR SBLn1           Capacity (veh/h)         690         1479         -         -         1447         -         -         793           HCM Lane V/C Ratio         0.009         -         -         -         -         -         0.003           HCM Control Delay (s)         10.3         0         -         -         0         -         -         9.6           HCM Lane LOS         B         A         -         -         A         -         -         A													
Minor Lane/Major Mvmt         NBLn1         EBL         EBR         WBL         WBT         WBR SBLn1           Capacity (veh/h)         690         1479         -         -         1447         -         -         793           HCM Lane V/C Ratio         0.009         -         -         -         -         -         0.003           HCM Control Delay (s)         10.3         0         -         -         0         -         -         9.6           HCM Lane LOS         B         A         -         -         A         -         A	Approach	EB			WB								
Minor Lane/Major Mvmt         NBLn1         EBL         EBR         WBL         WBT         WBR SBLn1           Capacity (veh/h)         690         1479         -         -         1447         -         -         793           HCM Lane V/C Ratio         0.009         -         -         -         -         -         0.003           HCM Control Delay (s)         10.3         0         -         -         0         -         -         9.6           HCM Lane LOS         B         A         -         A         -         A		0			0								
Capacity (veh/h) 690 1479 1447 793  HCM Lane V/C Ratio 0.009 0.003  HCM Control Delay (s) 10.3 0 0 - 9.6  HCM Lane LOS B A - A - A	HCM LOS							В			Α		
Capacity (veh/h) 690 1479 1447 793  HCM Lane V/C Ratio 0.009 0.003  HCM Control Delay (s) 10.3 0 0 - 9.6  HCM Lane LOS B A - A - A													
Capacity (veh/h) 690 1479 1447 793  HCM Lane V/C Ratio 0.009 0.003  HCM Control Delay (s) 10.3 0 0 9.6  HCM Lane LOS B A - A - A	Minor Lane/Major Mvm	t ſ	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR:	SBLn1			
HCM Lane V/C Ratio       0.009       -       -       -       -       0.003         HCM Control Delay (s)       10.3       0       -       -       0       -       -       9.6         HCM Lane LOS       B       A       -       A       -       A	Capacity (veh/h)		690	1479	-	-	1447	-	-	793			
HCM Control Delay (s) 10.3 0 0 9.6 HCM Lane LOS B A A A					-			-	-				
	HCM Control Delay (s)		10.3	0	-	-	0	-	-				
HCM 95th %tile Q(veh) 0 0 0 0				Α	-	-	Α	-	-				
	HCM 95th %tile Q(veh)		0	0	-	-	0	-	-	0			

Movement	Intersection						
Movement		0.4					
Lane Configurations   10							
Traffic Vol, veh/h         110         10         2         90         5         2           Future Vol, veh/h         110         10         2         90         5         2           Conflicting Peds, #/hr         0         0         0         0         0         0         0           Sign Control         Free         Free         Free         Free         Free         Free         Stop         Stop           RT Channelized         -         None         -         0         -         -         -         -         -         -         -			EBR	WBL			NBR
Future Vol, veh/h         110         10         2         90         5         2           Conflicting Peds, #/hr         0         0         0         0         0         0         0           Sign Control         Free         Free         Free         Free         Free         Stop         Stop         Stop         Rtop         None         N	Lane Configurations	Þ			ની	W	
Conflicting Peds, #/hr   O   O   O   O   O   O   Sign Control   Free   Free   Free   Free   Free   Stop   Stop   RT Channelized   - None   - None   - None   Storage Length     O   O   O   O	Traffic Vol, veh/h	110	10	2	90	5	2
Sign Control         Free RT	Future Vol, veh/h	110	10	2	90	5	2
RT Channelized         - None         - None         - None           Storage Length         0         0         0         0         0         0         0	Conflicting Peds, #/hr	0	0	0	0	0	0
RT Channelized         - None         - None         - None           Storage Length         0         0         0         0         0         0		Free	Free	Free	Free	Stop	Stop
Storage Length         -         -         -         0         -           Veh in Median Storage, #         0         -         -         0         0         -           Grade, %         0         -         -         0         0         -           Peak Hour Factor         83         83         83         83         83         83           Heavy Vehicles, %         8         63         100         11         75         100           Mvmt Flow         133         12         2         108         6         2           Major/Minor         Major1         Major2         Minor1         Minor1         Conflicting Flow All         0         0         145         0         251         139         139         139         139         139         139         139         139         139         139         139         139         139         139         139         139         139         139         139         139         139         139         139         139         139         139         139         139         139         139         139         139         139         139         139         139         139		-					
Weh in Median Storage, #         0         -         -         0         0         -           Grade, %         0         -         -         0         0         -           Peak Hour Factor         83         83         83         83         83         83           Heavy Vehicles, %         8         63         100         11         75         100           Mvmt Flow         133         12         2         108         6         2           Major/Minor         Major1         Major2         Minor1         Minor1         Conflicting Flow All         0         0         145         0         251         139         139         139         139         139         139         139         139         139         139         139         139         139         139         139         139         139         139         139         139         139         139         139         139         139         139         139         139         139         139         139         139         139         139         139         139         139         139         139         139         139         139         139         139		-		-		0	-
Grade, %         0         -         -         0         0         -           Peak Hour Factor         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         82           Major Mull		# O	_	_	0		_
Peak Hour Factor         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         83         84            All         4         14         2 </td <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>							
Heavy Vehicles, %         8         63         100         11         75         100           Mvmt Flow         133         12         2         108         6         2           Major/Minor         Major1         Major2         Minor1           Conflicting Flow All         0         0         145         0         251         139           Stage 1         -         -         -         139         -         139         -           Stage 2         -         -         -         112         -         -         139         -           Critical Hdwy         -         -         5.1         -         7.15         7.2         -         6.15         -         -         6.15         -         -         6.15         -         -         6.15         -         -         6.15         -         -         6.15         -         -         6.15         -         -         6.15         -         -         6.15         -         -         6.15         -         -         7.36         -         5.2         -         -         7.36         -         -         7.36         -         -         -							
Mymit Flow         133         12         2         108         6         2           Major/Minor         Major1         Major2         Minor1           Conflicting Flow All         0         0         145         0         251         139           Stage 1         -         -         -         139         -         139         -         -         139         -         -         139         -         -         139         -         -         139         -         -         139         -         -         139         -         -         139         -         -         139         -         -         139         -         -         139         -         -         139         -         -         139         -         -         139         -         -         139         -         -         139         -         -         139         -         -         139         -         -         139         -         -         -         112         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -							
Major/Minor         Major1         Major2         Minor1           Conflicting Flow All         0         0         145         0         251         139           Stage 1         -         -         -         139         -           Stage 2         -         -         -         112         -           Critical Hdwy         -         5.1         -         7.15         7.2           Critical Hdwy Stg 1         -         -         -         6.15         -           Critical Hdwy Stg 2         -         -         -         6.15         -           Follow-up Hdwy         -         3.1         -         4.175         4.2           Pot Cap-1 Maneuver         -         1006         -         604         703           Stage 1         -         -         -         759         -           Platoon blocked, %         -         -         -         -         603         703           Mov Cap-1 Maneuver         -         1006         -         603         703           Stage 1         -         -         -         757         -           Approach         EB         WB							
Conflicting Flow All         0         0         145         0         251         139           Stage 1         -         -         -         139         -           Stage 2         -         -         -         112         -           Critical Hdwy         -         -         5.1         -         7.15         7.2           Critical Hdwy Stg 1         -         -         -         6.15         -           Critical Hdwy Stg 2         -         -         -         6.15         -           Follow-up Hdwy         -         -         3.1         -         4.175         4.2           Pot Cap-1 Maneuver         -         1006         -         604         703           Stage 1         -         -         -         759         -           Platoon blocked, %         -         -         -         -         759         -           Mov Cap-1 Maneuver         -         1006         -         603         703           Mov Cap-2 Maneuver         -         -         -         757         -           Stage 1         -         -         -         757         -	IVIVIIIL FIOW	133	12	2	108	0	2
Conflicting Flow All         0         0         145         0         251         139           Stage 1         -         -         -         139         -           Stage 2         -         -         -         112         -           Critical Hdwy         -         -         5.1         -         7.15         7.2           Critical Hdwy Stg 1         -         -         -         6.15         -           Critical Hdwy Stg 2         -         -         -         6.15         -           Follow-up Hdwy         -         -         3.1         -         4.175         4.2           Pot Cap-1 Maneuver         -         1006         -         604         703           Stage 1         -         -         -         759         -           Platoon blocked, %         -         -         -         -         759         -           Mov Cap-1 Maneuver         -         1006         -         603         703           Mov Cap-2 Maneuver         -         -         -         757         -           Stage 1         -         -         -         757         -							
Conflicting Flow All         0         0         145         0         251         139           Stage 1         -         -         -         139         -           Stage 2         -         -         -         112         -           Critical Hdwy         -         -         5.1         -         7.15         7.2           Critical Hdwy Stg 1         -         -         -         6.15         -           Critical Hdwy Stg 2         -         -         -         6.15         -           Follow-up Hdwy         -         -         3.1         -         4.175         4.2           Pot Cap-1 Maneuver         -         1006         -         604         703           Stage 1         -         -         -         759         -           Platoon blocked, %         -         -         -         -         759         -           Mov Cap-1 Maneuver         -         1006         -         603         703           Mov Cap-2 Maneuver         -         -         -         757         -           Stage 2         -         -         -         757         -	Major/Minor Ma	ajor1	Λ	/lajor2	1	Minor1	
Stage 1       -       -       -       139       -         Stage 2       -       -       -       1112       -         Critical Hdwy       -       -       5.1       -       7.15       7.2         Critical Hdwy Stg 1       -       -       -       6.15       -         Critical Hdwy Stg 2       -       -       -       6.15       -         Follow-up Hdwy       -       -       3.1       -       4.175       4.2         Pot Cap-1 Maneuver       -       1006       -       604       703         Stage 1       -       -       -       759       -         Platoon blocked, %       -       -       -       -       -       759       -         Mov Cap-1 Maneuver       -       1006       -       603       703         Mov Cap-2 Maneuver       -       -       -       603       -         Stage 1       -       -       -       757       -         Approach       EB       WB       NB         HCM Control Delay, s       0       0.2       10.8         HCM Lane V/C Ratio       0.013       -       -       <							139
Stage 2       -       -       -       112       -         Critical Hdwy       -       -       5.1       -       7.15       7.2         Critical Hdwy Stg 1       -       -       -       6.15       -         Critical Hdwy Stg 2       -       -       -       6.15       -         Follow-up Hdwy       -       -       3.1       -       4.175       4.2         Pot Cap-1 Maneuver       -       -       1006       -       604       703         Stage 1       -       -       -       -       759       -         Platoon blocked, %       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -							
Critical Hdwy       -       -       5.1       -       7.15       7.2         Critical Hdwy Stg 1       -       -       -       6.15       -         Critical Hdwy Stg 2       -       -       -       6.15       -         Follow-up Hdwy       -       -       3.1       -       4.175       4.2         Pot Cap-1 Maneuver       -       -       1006       -       604       703         Stage 1       -       -       -       -       759       -         Platoon blocked, %       -       -       -       -       759       -         Mov Cap-1 Maneuver       -       -       1006       -       603       703         Mov Cap-2 Maneuver       -       -       -       603       -         Stage 1       -       -       -       757       -         Approach       EB       WB       NB         HCM Control Delay, s       0       0.2       10.8         HCM LOS       B     Minor Lane/Major Mvmt  NBLn1  EBT  EBR  WBL  WBT  Capacity (veh/h)  Approach  RCM Control Delay (s)  10.8  - 10.002  - 10.002  - 10.002  - 10.002  - 10.002  - 10.002  - 10.002  - 10.002  - 10.002  - 10.002  - 10.002  - 10.002  - 10.002  - 10.002  - 1							
Critical Hdwy Stg 1 6.15 - Critical Hdwy Stg 2 6.15 - Follow-up Hdwy 3.1 - 4.175 4.2 Pot Cap-1 Maneuver - 1006 - 604 703 Stage 1 736 - Stage 2 759 - Platoon blocked, % 603 703 Mov Cap-1 Maneuver - 1006 - 603 703 Mov Cap-2 Maneuver 603 - Stage 1 603 - Stage 2 757 -  Approach EB WB NB HCM Control Delay, s 0 0.2 10.8 HCM LOS B  Minor Lane/Major Mvmt NBLn1 EBT EBR WBL WBT Capacity (veh/h) 629 - 1006 - HCM Lane V/C Ratio 0.013 - 0.002 - HCM Control Delay (s) 10.8 - 8.6 0			-				
Critical Hdwy Stg 2 6.15 - Follow-up Hdwy - 3.1 - 4.175 4.2 Pot Cap-1 Maneuver - 1006 - 604 703	,		-				
Follow-up Hdwy 3.1 - 4.175 4.2  Pot Cap-1 Maneuver - 1006 - 604 703  Stage 1 736 - 736 - 759  Stage 2 759 - 759  Platoon blocked, % 603 703  Mov Cap-1 Maneuver - 1006 - 603 703  Mov Cap-2 Maneuver 1006 - 603 - 736 - 5139 1 736 - 736 - 736 - 736 - 736 - 736 - 737 - 757  Approach EB WB NB  HCM Control Delay, s 0 0.2 10.8  HCM LOS B  Minor Lane/Major Mvmt NBLn1 EBT EBR WBL WBT  Capacity (veh/h) 629 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 - 1006 -			-				
Pot Cap-1 Maneuver         -         -         1006         -         604         703           Stage 1         -         -         -         -         736         -           Stage 2         -         -         -         -         759         -           Platoon blocked, %         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -			-				
Stage 1       -       -       -       736       -         Stage 2       -       -       -       759       -         Platoon blocked, %       -       -       -       -       -         Mov Cap-1 Maneuver       -       -       1006       -       603       703         Mov Cap-2 Maneuver       -       -       -       603       -         Stage 1       -       -       -       736       -         Stage 2       -       -       -       757       -         Approach       EB       WB       NB         HCM Control Delay, s       0       0.2       10.8         HCM LOS       B     Minor Lane/Major Mvmt  NBLn1  EBT  EBR  WBL  WBT  Capacity (veh/h)  629  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 100		-	-				
Stage 2       -       -       -       759       -         Platoon blocked, %       -       -       -       -       -         Mov Cap-1 Maneuver       -       -       1006       -       603       703         Mov Cap-2 Maneuver       -       -       -       603       -         Stage 1       -       -       -       736       -         Stage 2       -       -       -       757       -         Approach       EB       WB       NB         HCM Control Delay, s       0       0.2       10.8         HCM LOS       B     Minor Lane/Major Mvmt  NBLn1  EBT  EBR  WBL  WBT  Capacity (veh/h)  629  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 10002  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 100		-	-	1006	-		703
Platoon blocked, %       -       -       -         Mov Cap-1 Maneuver       -       -       1006       -       603       703         Mov Cap-2 Maneuver       -       -       -       -       603       -         Stage 1       -       -       -       -       736       -         Stage 2       -       -       -       -       757       -         Approach       EB       WB       NB         HCM Control Delay, s       0       0.2       10.8         HCM LOS       B     Minor Lane/Major Mvmt  NBLn1  EBT  EBR  WBL  WBT  Capacity (veh/h)  629  - 1006  - 1006  - 1006  - 1006  - 1006  - 1006  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  -		-	-	-	-		-
Mov Cap-1 Maneuver         -         -         1006         -         603         703           Mov Cap-2 Maneuver         -         -         -         -         603         -           Stage 1         -         -         -         -         736         -           Stage 2         -         -         -         -         757         -           Approach         EB         WB         NB           HCM Control Delay, s         0         0.2         10.8           HCM LOS         B    Minor Lane/Major Mvmt  NBLn1  EBT  EBR  WBL  WBT  Capacity (veh/h)  629  - 1006  - 1006  - 1006  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  - 10002  -		-	-	-	-	759	-
Mov Cap-2 Maneuver         -         -         -         603         -           Stage 1         -         -         -         -         736         -           Stage 2         -         -         -         -         757         -           Approach         EB         WB         NB           HCM Control Delay, s         0         0.2         10.8           HCM LOS         B         B    Minor Lane/Major Mvmt  NBLn1  EBT  EBR  WBL  WBT  Capacity (veh/h)  629  - 1006  - 1006  - 10002  - HCM Control Delay (s)  10.8  - 8.6  0	Platoon blocked, %	-	-		-		
Mov Cap-2 Maneuver         -         -         -         603         -           Stage 1         -         -         -         -         736         -           Stage 2         -         -         -         -         757         -           Approach         EB         WB         NB           HCM Control Delay, s         0         0.2         10.8           HCM LOS         B         B    Minor Lane/Major Mvmt  NBLn1  EBT  EBR  WBL  WBT  Capacity (veh/h)  629  - 1006  - 1006  - 10002  - HCM Control Delay (s)  10.8  - 8.6  0	Mov Cap-1 Maneuver	-	-	1006	-	603	703
Stage 1         -         -         -         736         -           Stage 2         -         -         -         757         -           Approach         EB         WB         NB           HCM Control Delay, s         0         0.2         10.8           HCM LOS         B    Minor Lane/Major Mvmt  NBLn1  EBT  EBR  WBL  WBT  Capacity (veh/h)  629  - 1006  - HCM Lane V/C Ratio  0.013  - 0.002  - HCM Control Delay (s)  10.8  - 8.6  0		-	-	-	-	603	-
Stage 2         -         -         -         -         757         -           Approach         EB         WB         NB           HCM Control Delay, s         0         0.2         10.8           HCM LOS         B             Minor Lane/Major Mvmt         NBLn1         EBT         EBR         WBL         WBT           Capacity (veh/h)         629         -         -         1006         -           HCM Lane V/C Ratio         0.013         -         -         0.002         -           HCM Control Delay (s)         10.8         -         -         8.6         0		-	-	-	_		-
Approach         EB         WB         NB           HCM Control Delay, s         0         0.2         10.8           HCM LOS         B           Minor Lane/Major Mvmt         NBLn1         EBT         EBR         WBL         WBT           Capacity (veh/h)         629         -         -         1006         -           HCM Lane V/C Ratio         0.013         -         -         0.002         -           HCM Control Delay (s)         10.8         -         -         8.6         0	•	_	_	_	_		_
HCM Control Delay, s   0   0.2   10.8	Stuge 2					707	
HCM Control Delay, s   0   0.2   10.8							
Minor Lane/Major Mvmt         NBLn1         EBT         EBR         WBL         WBT           Capacity (veh/h)         629         -         -         1006         -           HCM Lane V/C Ratio         0.013         -         -         0.002         -           HCM Control Delay (s)         10.8         -         -         8.6         0	Approach	EB				NB	
Minor Lane/Major Mvmt         NBLn1         EBT         EBR         WBL         WBT           Capacity (veh/h)         629         -         -         1006         -           HCM Lane V/C Ratio         0.013         -         -         0.002         -           HCM Control Delay (s)         10.8         -         -         8.6         0	HCM Control Delay, s	0		0.2		10.8	
Capacity (veh/h) 629 1006 - HCM Lane V/C Ratio 0.013 0.002 - HCM Control Delay (s) 10.8 8.6 0	HCM LOS					В	
Capacity (veh/h) 629 1006 - HCM Lane V/C Ratio 0.013 0.002 - HCM Control Delay (s) 10.8 8.6 0							
Capacity (veh/h) 629 1006 - HCM Lane V/C Ratio 0.013 0.002 - HCM Control Delay (s) 10.8 8.6 0	Minor Long/Major Mumt		JDI n1	ГОТ	EDD	WDI	WDT
HCM Lane V/C Ratio 0.013 0.002 - HCM Control Delay (s) 10.8 8.6 0		ľ		FRI	FBK		WRI
HCM Control Delay (s) 10.8 8.6 0				-	-		-
				-	-		
HCM Lang LOS B - A A				-	-	8.6	
	HCM Lane LOS		В	-	-	Α	Α
HCM 95th %tile Q(veh) 0 0 -	HCM 95th %tile Q(veh)		0	-	-	0	-

Intersection						
Int Delay, s/veh	1					
	•	EDT	MOT	WED	051	000
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		4	ĵ»		W	
Traffic Vol, veh/h	12	98	82	5	5	9
Future Vol, veh/h	12	98	82	5	5	9
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage	,# -	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	81	81	81	81	81	81
Heavy Vehicles, %	0	9	13	0	0	0
Mvmt Flow	15	121	101	6	6	11
Major/Minor N	/lajor1	ı	/lajor2	N	/linor2	
						104
Conflicting Flow All	107	0	-	0	255	104
Stage 1	-	-	-	-	104	-
Stage 2	-	-	-	-	151	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1497	-	-	-	738	956
Stage 1	-	-	-	-	925	-
Stage 2	-	-	-	-	882	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1497	-	-	-	730	956
Mov Cap-2 Maneuver	-	-	-	-	730	-
Stage 1	-	-	-	-	915	-
Stage 2	-	-	-	-	882	-
Ŭ						
A 11 11 11 11 11 11 11 11 11 11 11 11 11	ΓD		WD		CD	
Approach	EB		WB		SB	
HCM Control Delay, s	0.8		0		9.3	
HCM LOS					Α	
Minor Lane/Major Mvm	t	EBL	EBT	WBT	WBR S	SBI n1
Capacity (veh/h)		1497		****	-	861
HCM Lane V/C Ratio		0.01	-	-	-	0.02
HCM Control Delay (s)		7.4	0	-	-	9.3
HCM Lane LOS			A			9.3 A
HCM 95th %tile Q(veh)		A 0		-	-	0.1
ncivi yatti %tile Q(ven)		U	-	-	-	U. I

Intersection						
Int Delay, s/veh	0.5					
	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	Þ			4	Y	
Traffic Vol, veh/h	99	17	1	81	9	0
Future Vol, veh/h	99	17	1	81	9	0
Conflicting Peds, #/hr	0	0	0	0	0	0
	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	# 0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	83	83	83	83	83	83
Heavy Vehicles, %	9	63	1	11	75	100
Mvmt Flow	119	20	1	98	11	0
	ajor1		Major2		Minor1	
Conflicting Flow All	0	0	139	0	229	129
Stage 1	-	-	-	-	129	-
Stage 2	-	-	-	-	100	-
Critical Hdwy	-	-	4.11	-	7.15	7.2
Critical Hdwy Stg 1	-	-	-	-	6.15	-
Critical Hdwy Stg 2	-	-	-	-	6.15	-
Follow-up Hdwy	-	-	2.209	-	4.175	4.2
Pot Cap-1 Maneuver	-	-	1451	-	623	713
Stage 1	-	-	-	-	745	-
Stage 2	-	-	-	-	770	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1451	-	622	713
Mov Cap-2 Maneuver	-	-	-	-	622	-
Stage 1	-	_	-	_	745	-
Stage 2	_	_	_	_	769	_
Glago Z					707	
Approach	EB		WB		NB	
HCM Control Delay, s	0		0.1		10.9	
HCM LOS					В	
Minor Lane/Major Mvmt	N	NBLn1	EBT	EBR	WBL	WBT
				LDIN		VVDI
Canacity (yeh/h)		622	-	-	1451	
Capacity (veh/h)						
HCM Lane V/C Ratio		0.017	-		0.001	-
HCM Lane V/C Ratio HCM Control Delay (s)		0.017 10.9	-	-	7.5	0
HCM Lane V/C Ratio		0.017				

Intersection						
Int Delay, s/veh	0.2					
		NES	0==	055		A 13 F
Movement	NBL	NBR	SET	SER	NWL	NWT
Lane Configurations	¥		<b>₽</b>			र्स
Traffic Vol, veh/h	1	2	98	0	0	77
Future Vol, veh/h	1	2	98	0	0	77
Conflicting Peds, #/hr	0	0	0	0	0	0
	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage,		-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	86	86	86	86	86	86
Heavy Vehicles, %	0	0	9	0	0	14
Mvmt Flow	1	2	114	0	0	90
N/a:au/N/:uau	1		1-11		1-1-1-	
	inor1		Major1		Major2	
Conflicting Flow All	204	114	0	0	114	0
Stage 1	114	-	-	-	-	-
Stage 2	90	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	789	944	-	-	1488	-
Stage 1	916	-	-	-	-	-
Stage 2	939	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	789	944	-	-	1488	-
Mov Cap-2 Maneuver	789	-	-	-	-	-
Stage 1	916	-	-	-	-	-
Stage 2	939	-	-	-	-	-
- · · g						
Annraaah	NID		CE		NII A	
Approach	NB		SE		NW	
HCM Control Delay, s	9.1		0		0	
HCM LOS	Α					
			N IV A / I	NWT	SET	SER
Minor Lane/Maior Mymt		VBLn1	INVVL			
Minor Lane/Major Mvmt		NBLn1 886	1488	-		_
Capacity (veh/h)	I	886	1488	-	-	-
Capacity (veh/h) HCM Lane V/C Ratio		886 0.004	1488	- -	-	-
Capacity (veh/h) HCM Lane V/C Ratio HCM Control Delay (s)		886 0.004 9.1	1488 - 0	- -	-	-
Capacity (veh/h) HCM Lane V/C Ratio		886 0.004	1488	- -	- - -	- - -

#### PM Peak- Total Conditions (2033)

# Intersection: 1: Range Road 62 & Highway 646

Movement	NB	SB
Directions Served	LTR	LTR
Maximum Queue (m)	13.5	5.8
Average Queue (m)	1.7	0.3
95th Queue (m)	8.2	2.8
Link Distance (m)	496.7	734.3
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

### Intersection: 2: Range Road 61 & Highway 646

Movement	WB	NB
Directions Served	LT	LR
Maximum Queue (m)	2.6	16.0
Average Queue (m)	0.1	2.1
95th Queue (m)	1.8	10.6
Link Distance (m)	533.7	788.8
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

### Intersection: 3: Highway 646 & Elk Point Airport Access

Movement	EB	SB
Directions Served	LT	LR
Maximum Queue (m)	1.4	8.2
Average Queue (m)	0.1	2.8
95th Queue (m)	1.4	8.6
Link Distance (m)	533.7	363.4
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

2033 Total Condition PM Peak SimTraffic Report
Page 1

Movement	NB
Directions Served	LR
Maximum Queue (m)	19.8
Average Queue (m)	3.6
95th Queue (m)	13.5
Link Distance (m)	1098.0
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (m)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

### Intersection: 5: Range Road 55 & Highway 646

Movement	NB
Directions Served	LR
Maximum Queue (m)	5.2
Average Queue (m)	0.6
95th Queue (m)	3.1
Link Distance (m)	1229.5
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (m)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

#### **Network Summary**

Network wide Queuing Penalty: 0

SimTraffic Report 2033 Total Condition PM Peak

Intersection												
Int Delay, s/veh	0.4											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		4			4			4			4	
Traffic Vol, veh/h	1	75	12	2	66	7	0	0	1	3	0	0
Future Vol, veh/h	1	75	12	2	66	7	0	0	1	3	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None		-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage,	# -	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	84	84	84	84	84	84	84	84	84	84	84	84
Heavy Vehicles, %	100	7	50	0	18	100	0	0	0	0	0	0
Mvmt Flow	1	89	14	2	79	8	0	0	1	4	0	0
Major/Minor M	lajor1		ı	Major2		ľ	/linor1		N	/linor2		
Conflicting Flow All	87	0	0	103	0	0	185	189	96	186	192	83
Stage 1	-	-	-	-	-	-	98	98	-	87	87	-
Stage 2	-	-	-	-	-	-	87	91	-	99	105	-
Critical Hdwy	5.1	-	-	4.1	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	3.1	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1066	-	-	1502	-	-	780	709	966	779	707	982
Stage 1	-	-	-	-	-	-	913	818	-	926	827	-
Stage 2	-	-	-	-	-	-	926	823	-	912	812	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1066	-	-	1502	-	-	778	708	966	777	706	982
Mov Cap-2 Maneuver	-	-	-	-	-	-	778	708	-	777	706	-
Stage 1	-	-	-	-	-	-	912	817	-	925	826	-
Stage 2	-	-	-	-	-	-	925	822	-	910	811	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.1			0.2			8.7			9.7		
HCM LOS							Α			Α		
Minor Lane/Major Mvmt		NBLn1	EBL	EBT	EBR	WBL	WBT	WBR S	SBLn1			
Capacity (veh/h)		966	1066	-	-	1502	-	-	777			
HCM Lane V/C Ratio		0.001	0.001	-	_	0.002	-	_	0.005			
HCM Control Delay (s)		8.7	8.4	0	-	7.4	0	-	9.7			
HCM Lane LOS		Α	Α	A	-	A	A	-	Α			
HCM 95th %tile Q(veh)		0	0	-	-	0	-	-	0			

Intersection						
Int Delay, s/veh	0.6					
	EBT	EBR	WBL	WBT	NBL	NBR
		EBK	WBL			INRK
Lane Configurations	Þ	2	1	4	Y	^
Traffic Vol, veh/h	74	3	1	83	6	2
Future Vol, veh/h	74	3	1	83	6	2
Conflicting Peds, #/hr	0	0	0	0	0	0
<u> </u>	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage,		-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	73	73	73	73	73	73
Heavy Vehicles, %	7	0	0	15	75	100
Mvmt Flow	101	4	1	114	8	3
		_		_		
	ajor1		/lajor2		/linor1	
Conflicting Flow All	0	0	105	0	219	103
Stage 1	-	-	-	-	103	-
Stage 2	-	-	-	-	116	-
Critical Hdwy	-	-	4.1	-	7.15	7.2
Critical Hdwy Stg 1	-	-	-	-	6.15	-
Critical Hdwy Stg 2	-	-	-	-	6.15	-
Follow-up Hdwy	-	_	2.2	-	4.175	4.2
Pot Cap-1 Maneuver	_	-	1499	_	632	740
Stage 1	_	_		_	767	-
Stage 2	_		_	_	756	_
Platoon blocked, %	_				750	
Mov Cap-1 Maneuver		-	1499	_	631	740
	-		1499			
Mov Cap-2 Maneuver	-	-	-	-	631	-
Stage 1	-	-	-	-	767	-
Stage 2	-	-	-	-	755	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		0.1		10.6	
HCM LOS	U		0.1		В	
HOWI LUS					D	
Minor Lane/Major Mvmt	N	VBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)		655	-		1499	-
HCM Lane V/C Ratio		0.017	_		0.001	_
HCM Control Delay (s)		10.6	_	-		0
HCM Lane LOS		В		-	Α.4	A
					0	
HCM 95th %tile Q(veh)		0.1	-	-	U	-

Intersection						
Int Delay, s/veh	1.2					
		===	145	14/55	05:	055
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		र्स	f)		¥	
Traffic Vol, veh/h	9	67	77	7	7	9
Future Vol, veh/h	9	67	77	7	7	9
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage,	# -	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	73	73	73	73	73	73
Heavy Vehicles, %	0	9	15	0	0	0
Mvmt Flow	12	92	105	10	10	12
Major/Minor M	lajor1	ı	/aior2	ı	/linor2	
			/lajor2			110
Conflicting Flow All	115	0	-	0	226	110
Stage 1	-	-	-	-	110	-
Stage 2	-	-	-	-	116	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
	1487	-	-	-	767	949
Stage 1	-	-	-	-	920	-
Stage 2	-	-	-	-	914	-
Platoon blocked, %		-	-	-		
	1487	-	-	-	760	949
Mov Cap-2 Maneuver	-	-	-	-	760	-
Stage 1	-	-	-	-	912	-
Stage 2	-	-	-	-	914	-
Annroach	EB		WD		CD	
Approach			WB		SB	
HCM Control Delay, s	0.9		0		9.3	
HCM LOS					Α	
Minor Lane/Major Mvmt		EBL	EBT	WBT	WBR S	SBLn1
Capacity (veh/h)		1487	_	-	_	856
HCM Lane V/C Ratio		0.008	_	_	_	0.026
HCM Control Delay (s)		7.4	0	_	_	9.3
HCM Lane LOS		Α	A	-	_	7.5 A
HCM 95th %tile Q(veh)		0				0.1
HOW FOUR MINE Q(VEH)		U	-		-	U. I

Intersection						
Int Delay, s/veh	1.1					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	<b>1</b>	LUK	WDL	₩ <u>₩</u>	NDL W	אטוז
Traffic Vol, veh/h	69	7	0	74	16	1
Future Vol, veh/h	69	7	0	74	16	1
Conflicting Peds, #/hr	0	0	0	0	0	0
•	Free	Free	Free	Free	Stop	Stop
RT Channelized	riee -	None		None	Stop -	None
	-	None -	-	None -	0	None -
Storage Length			-			
Veh in Median Storage,		-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	73	73	73	73	73	73
Heavy Vehicles, %	7	0	0	15	75	100
Mvmt Flow	95	10	0	101	22	1
Major/Minor M	ajor1	١	/lajor2	N	/linor1	
Conflicting Flow All	0	0	105	0	201	100
Stage 1	-	-	-	-	100	-
Stage 2	_	_	-	-	101	
Critical Hdwy		_	4.1		7.15	7.2
Critical Hdwy Stg 1	-	-	4.1	-	6.15	1.2
		-	-	-	6.15	
Critical Hdwy Stg 2	-	-	2.2	-		4.2
Follow-up Hdwy	-	-		-	4.175	
Pot Cap-1 Maneuver	-	-	1499	-	648	744
Stage 1	-	-	-	-	770	-
Stage 2	-	-	-	-	769	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1499	-	648	744
Mov Cap-2 Maneuver	-	-	-	-	648	-
Stage 1	-	-	-	-	770	-
Stage 2	-	-	-	-	769	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		0		10.7	
HCM LOS					В	
Minor Lane/Major Mvmt	N	VBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)		653	-		1499	
HCM Lane V/C Ratio		0.036	_	_	-	_
HCM Control Delay (s)		10.7	_	_	0	_
HCM Lane LOS		В	_	_	A	_
HCM 95th %tile Q(veh)		0.1	-		0	
113W 73W 70W Q(VCII)		0.1				

Intersection						
Int Delay, s/veh	0.5					
	NBL	NBR	SET	SER	NWL	NWT
Lane Configurations	¥		₽.			4
Traffic Vol, veh/h	6	0	70	1	3	68
Future Vol, veh/h	6	0	70	1	3	68
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage,	# 0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	86	86	86	86	86	86
Heavy Vehicles, %	0	0	11	0	0	13
Mymt Flow	7	0	81	1	3	79
IVIVIIICT IOVV	,	U	01	•	J	, ,
Major/Minor Mi	nor1		Major1	<b>N</b>	Najor2	
Conflicting Flow All	167	82	0	0	82	0
Stage 1	82	-	-	-	-	-
Stage 2	85	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	_	_	2.2	_
Pot Cap-1 Maneuver	828	983	_	_	1528	_
Stage 1	946	703	_		1320	
Stage 2	943	-	_	-	-	-
Platoon blocked, %	743	•	•	-	-	
	02/	002	-	-	1520	-
Mov Cap-1 Maneuver	826	983	-	-	1528	-
Mov Cap-2 Maneuver	826	-	-	-	-	-
Stage 1	946	-	-	-	-	-
Stage 2	941	-	-	-	-	-
Approach	NB		SE		NW	
HCM Control Delay, s	9.4		0		0.3	
HCM LOS	7.4 A		U		0.0	
TIOWI LOG						
Minor Lane/Major Mvmt		NBLn1	NWL	NWT	SET	SER
Capacity (veh/h)		826	1528	-	_	-
HCM Lane V/C Ratio		0.008		-	-	-
HCM Control Delay (s)		9.4	7.4	0	-	-
HCM Lane LOS		Α	Α	A	-	-
HCM 95th %tile Q(veh)		0	0	-	-	-
HOW /JULY /JULIC Q(VEIL)		U	U			

Movement	EB	NB	SB
Directions Served	LTR	LTR	LTR
Maximum Queue (m)	2.6	4.4	5.9
Average Queue (m)	0.1	0.2	0.6
95th Queue (m)	1.8	2.2	4.0
Link Distance (m)	986.4	496.7	734.3
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

### Intersection: 2: Range Road 61 & Highway 646

Movement	NB
Directions Served	LR
Maximum Queue (m)	16.7
Average Queue (m)	3.3
95th Queue (m)	13.3
Link Distance (m)	788.8
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (m)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

### Intersection: 3: Highway 646 & Elk Point Airport Access

Movement	EB	SB
Directions Served	LT	LR
Maximum Queue (m)	1.4	8.6
Average Queue (m)	0.0	3.3
95th Queue (m)	1.0	9.3
Link Distance (m)	533.7	363.4
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

SimTraffic Report 2043 Total Condition AM Peak Page 1

Movement	NB
Directions Served	LR
Maximum Queue (m)	23.8
Average Queue (m)	5.6
95th Queue (m)	17.6
Link Distance (m)	1098.0
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (m)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

### Intersection: 5: Range Road 55 & Highway 646

Movement	NB	NW
Directions Served	LR	LT
Maximum Queue (m)	5.5	2.8
Average Queue (m)	0.7	0.1
95th Queue (m)	3.7	1.4
Link Distance (m)	1229.5	519.0
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

#### **Network Summary**

Network wide Queuing Penalty: 0

SimTraffic Report 2043 Total Condition AM Peak

Intersection												
Int Delay, s/veh	0.3											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		4			4			4			4	
Traffic Vol, veh/h	0	137	0	0	111	2	4	0	1	1	0	1
Future Vol, veh/h	0	137	0	0	111	2	4	0	1	1	0	1
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	_	_	-	_	_	-	_	_	-	_	_	-
Veh in Median Storage	.# -	0	-	-	0	-	-	0	_	-	0	_
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	79	79	79	79	79	79	79	79	79	79	79	79
Heavy Vehicles, %	0	14	0	0	10	0	0	0	100	0	0	0
Mvmt Flow	0	173	0	0	141	3	5	0	1	1	0	1
Major/Minor N	/lajor1		1	Major2		1	Minor1		N	/linor2		
Conflicting Flow All	144	0	0	173	0	0	316	317	173	317	316	143
Stage 1		-	-	-	-	-	173	173	-	143	143	-
Stage 2	_	_	_	-	_	_	143	144	_	174	173	_
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	7.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	_	-	_	-	6.1	5.5		6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	4.2	3.5	4	3.3
Pot Cap-1 Maneuver	1451	-	-	1416	-	-	641	602	670	640	603	910
Stage 1	-	-	-	-	-	-	834	760	-	865	782	-
Stage 2	-	-	-	-	-	-	865	782	-	833	760	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1451	-	-	1416	-	-	640	602	670	639	603	910
Mov Cap-2 Maneuver	-	-	-	-	-	-	640	602	-	639	603	-
Stage 1	-	-	-	-	-	-	834	760	-	865	782	-
Stage 2	-	-	-	-	-	-	864	782	-	831	760	-
Ü												
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0			0			10.6			9.8		
HCM LOS							В			A		
							_					
Minor Lane/Major Mvm	t ſ	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR :	SBLn1			
Capacity (veh/h)		646	1451			1416			751			
HCM Lane V/C Ratio		0.01	-	_	_	-	_	_	0.003			
HCM Control Delay (s)		10.6	0	-	-	0	-	-	9.8			
HCM Lane LOS		В	A	_	_	A	_	_	Α.			
HCM 95th %tile Q(veh)		0	0	-	_	0	-	-	0			
70 70 2(1011)												

Intersection           Int Delay, s/veh         0.4           Movement         EBT         EBR         WBL         WBT         NBL         NBR           Lane Configurations         ↑         ↑         ↑         ↑         ↑         ↑         ↑         ↑         ↑         ↑         ↑         ↑         ↑         ↑         ↑         ↑         ↑         ↑         ↑         ↑         ↑         ↑         ↑         ↑         ↑         ↑         ↑         ↑         ↑         ↑         ↑         ↑         ↑         ↑         ↑         ↑         ↑         ↑         ↑         ♠         ↑         ♠         ♠         ♠         ♠         ♠         ♠         ♠         ♠         ♠         ♠         ♠         ♠         ♠         ♠         ♠         ♠         ♠         ♠         ♠         ♠         ♠         ♠         ♠         ♠         ♠         ♠         ♠         ♠         ♠         ♠         ♠         ♠         ♠         ♠         ♠         ♠         ♠         ♠         ♠         ♠         ♠         ♠         ♠         ♠         ♠         ♠         ♠         ♠
Movement         EBT         EBR         WBL         WBT         NBL         NBR           Lane Configurations         Image: Configuration of the co
Lane ConfigurationsLane Configura
Traffic Vol, veh/h         130         12         2         107         6         2           Future Vol, veh/h         130         12         2         107         6         2           Conflicting Peds, #/hr         0         0         0         0         0         0         0           Sign Control         Free         Free         Free         Free         Stop         Stop           RT Channelized         -         None         -         None         -         None           Storage Length         -         -         -         -         0         -         -           Veh in Median Storage, #         0         -         -         0         0         -
Future Vol, veh/h         130         12         2         107         6         2           Conflicting Peds, #/hr         0         0         0         0         0         0         0           Sign Control         Free         Free         Free         Free         Free         Stop         Stop           RT Channelized         -         None         -         None         -         None           Storage Length         -         -         -         0         -         -           Veh in Median Storage, #         0         -         -         0         0         -
Conflicting Peds, #/hr 0 0 0 0 0 0 0 0 Stop Stop Storage Length - Veh in Median Storage, # 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
Sign ControlFreeFreeFreeFreeFreeStopStopRT Channelized-None-None-NoneStorage Length0-Veh in Median Storage, #000-
RT Channelized - None - None - None Storage Length 0 - Veh in Median Storage, # 0 - 0 0 -
Storage Length 0 - Veh in Median Storage, # 0 0 0 -
Veh in Median Storage, # 0 0 0 -
Grade, % 0 0 0 -
Peak Hour Factor 83 83 83 83 83 83
Heavy Vehicles, % 8 63 100 11 75 100
Mvmt Flow 157 14 2 129 7 2
Major/Minor Major1 Major2 Minor1
Conflicting Flow All 0 0 171 0 297 164
Stage 1 164 -
Stage 2 133 -
Critical Hdwy 5.1 - 7.15 7.2
Critical Hdwy Stg 1 6.15 -
Critical Hdwy Stg 2 6.15 -
Follow-up Hdwy 3.1 - 4.175 4.2
Pot Cap-1 Maneuver 980 - 565 678
Stage 1 716 -
Stage 2 741 -
Platoon blocked, %
Mov Cap-1 Maneuver 980 - 564 678
Mov Cap-1 Maneuver 564 - 564
Stage 1 716 -
Stage 2 740 -
Approach EB WB NB
HCM Control Delay, s 0 0.2 11.2
HCM LOS B
Minor Lane/Major Mvmt NBLn1 EBT EBR WBL WBT
Willion Land Major William Real Lot Lot Will Will
Capacity (veh/h) 589 980 -
Capacity (veh/h) 589 980 - HCM Lane V/C Ratio 0.016 0.002 -
Capacity (veh/h) 589 980 - HCM Lane V/C Ratio 0.016 0.002 -

Intersection						
Int Delay, s/veh	0.9					
		- CDT	MOT	WED	CDI	CDD
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		ની	ĵ.	_	Y	-
Traffic Vol, veh/h	12	118	99	5	5	9
Future Vol, veh/h	12	118	99	5	5	9
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage,	, # -	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	81	81	81	81	81	81
Heavy Vehicles, %	0	9	13	0	0	0
Mvmt Flow	15	146	122	6	6	11
Major/Minor N	laior1	N	//oior?		linar?	
	lajor1		/lajor2		/linor2	105
Conflicting Flow All	128	0	-	0	301	125
Stage 1	-	-	-	-	125	-
Stage 2	-	-	-	-	176	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1470	-	-	-	695	931
Stage 1	-	-	-	-	906	-
Stage 2	-	-	-	-	859	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1470	-	-	-	687	931
Mov Cap-2 Maneuver	-	-	-	-	687	-
Stage 1	-	-	_	-	896	-
Stage 2	-			_	859	_
otago L					007	
Approach	EB		WB		SB	
HCM Control Delay, s	0.7		0		9.5	
HCM LOS					Α	
Minor Lane/Major Mvmt		EBL	EBT	WBT	WBR :	CDI n1
			LDI	VVDI		
Capacity (veh/h)		1470	-	-	-	826
HCM Control Dates (2)		0.01	-	-		0.021
HCM Control Delay (s)		7.5	0	-	-	9.5
HCM Lane LOS		Α	Α	-	-	Α
HCM 95th %tile Q(veh)		0	-	-	-	0.1

Intersection						
Int Delay, s/veh	0.5					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
		EBR	WBL			NBK
Lane Configurations	<b>}</b>	10	1	4	<b>Y</b>	^
Traffic Vol, veh/h	119	19	1	97	10	0
Future Vol, veh/h	119	19	1	97	10	0
Conflicting Peds, #/hr	_ 0	0	0	0	0	0
	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage,		-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	83	83	83	83	83	83
Heavy Vehicles, %	9	63	1	11	75	100
Mvmt Flow	143	23	1	117	12	0
NA ' /NA' NA			4 ' 0		a: a	
•	ajor1		Major2		Minor1	
Conflicting Flow All	0	0	166	0	274	155
Stage 1	-	-	-	-	155	-
Stage 2	-	-	-	-	119	-
Critical Hdwy	-	-	4.11	-	7.15	7.2
Critical Hdwy Stg 1	-	-	-	-	6.15	-
Critical Hdwy Stg 2	-	-	-	-	6.15	-
Follow-up Hdwy	-	-	2.209	-	4.175	4.2
Pot Cap-1 Maneuver	-	-	1418	-	584	687
Stage 1	-	-	-	-	723	-
Stage 2	-	-	-	-	753	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1418	-	583	687
Mov Cap-2 Maneuver	_	_		_	583	-
Stage 1	_		-	_	723	_
Stage 2	_				752	-
Jiaye 2	_	-	_	_	132	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		0.1		11.3	
HCM LOS					В	
	_	.D. 4	EDT	EDD	MDI	WDT
Minor Lane/Major Mvmt	ľ	VBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)		583	-		1418	-
HCM Lane V/C Ratio		0.021	-	-	0.001	-
HCM Control Delay (s)		11.3	-	-	7.5	0
HCM Lane LOS		В	-	-	Α	Α
HCM 95th %tile Q(veh)		0.1	-	-	0	-

Intersection						
Int Delay, s/veh	0.2					
Movement	NBL	NBR	SET	SER	NWL	NWT
Lane Configurations	N/		Þ			4
Traffic Vol, veh/h	1	3	118	0	0	93
Future Vol, veh/h	1	3	118	0	0	93
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage,	# 0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	86	86	86	86	86	86
Heavy Vehicles, %	0	0	9	0	0	14
Mvmt Flow	1	3	137	0	0	108
IVIVIIIC I IOW	•	J	107	U	U	100
Major/Minor M	linor1		Najor1	N	Najor2	
Conflicting Flow All	245	137	0	0	137	0
Stage 1	137	-	-	-	-	-
Stage 2	108	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	_	_	_	-	_
Critical Hdwy Stg 2	5.4	_	_	_	-	_
Follow-up Hdwy	3.5	3.3	_	_	2.2	_
Pot Cap-1 Maneuver	748	917	-	_	1459	_
Stage 1	895	-	_	_	-	_
Stage 2	921	_			_	_
Platoon blocked, %	7Z I	_		_	_	-
	748	917	-	-	1/50	
Mov Cap-1 Maneuver			-	-	1459	-
Mov Cap-2 Maneuver	748	-	-	-	-	-
Stage 1	895	-	-	-	-	-
Stage 2	921	-	-	-	-	-
Approach	NB		SE		NW	
HCM Control Delay, s	9.2		0		0	
HCM LOS	Α		U		U	
TIOWI EOU	Α					
Minor Lane/Major Mvmt	<u> </u>	VBLn1	NWL	NWT	SET	SER
Capacity (veh/h)		868	1459	-	-	-
HCM Lane V/C Ratio		0.005	-	-	-	-
HCM Control Delay (s)		9.2	0	-	-	-
HCM Lane LOS		Α	Α	-	-	-
HCM 95th %tile Q(veh)		0	0	_	-	-
		U	J			

Movement	NB	SB
Directions Served	LTR	LTR
Maximum Queue (m)	12.0	7.5
Average Queue (m)	1.4	0.7
95th Queue (m)	6.9	4.2
Link Distance (m)	496.7	734.3
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

### Intersection: 2: Range Road 61 & Highway 646

Movement	NB
Directions Served	LR
Maximum Queue (m)	19.3
Average Queue (m)	3.2
95th Queue (m)	13.3
Link Distance (m)	788.8
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (m)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

### Intersection: 3: Highway 646 & Elk Point Airport Access

Movement	EB	SB
Directions Served	LT	LR
Maximum Queue (m)	6.1	8.2
Average Queue (m)	0.3	2.3
95th Queue (m)	2.7	7.8
Link Distance (m)	533.7	363.4
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

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Movement	NB
Directions Served	LR
Maximum Queue (m)	18.8
Average Queue (m)	3.5
95th Queue (m)	13.4
Link Distance (m)	1098.0
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (m)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

### Intersection: 5: Range Road 55 & Highway 646

Movement	NB
Directions Served	LR
Maximum Queue (m)	4.1
Average Queue (m)	0.4
95th Queue (m)	2.6
Link Distance (m)	1229.5
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (m)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

#### **Network Summary**

Network wide Queuing Penalty: 0

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