BYLAW 24-002
OF
LAC LA BICHE COUNTY

A BYLAW OF LAC LA BICHE COUNTY IN THE PROVINCE OF ALBERTA TO ADOPT THE LAKEWOOD AREA STRUCTURE PLAN.

WHEREAS under the authority and pursuant to section 633 of the *Municipal Government Act*, R.S.A. 2000, Chapter M-26, as amended, Council may by bylaw adopt an area structure plan; and

WHEREAS the Council of Lac La Biche County deems it proper to adopt a new area structure plan for the Lakewood Area;

NOW THEREFORE under the authority and subject to the provisions of the *Municipal Government Act*, and by virtue of all other powers enabling it, the Council of Lac La Biche County, duly assembled, enacts as follows:

Title

1 This bylaw is called the "Lakewood Area Structure Plan" Bylaw.

Adoption

2 The document titled "Lakewood Area Structure Plan" attached to this bylaw as Schedule "B" is hereby adopted and provides a framework for the subsequent subdivision and development of part of NE-16-65-11-W4M as shown on Schedule "A" attached to this bylaw.

Severability

3 Each provision of this Bylaw is independent of all other provisions. If any such provision is declared invalid by a court of competent jurisdiction, all other provisions of this Bylaw will remain valid and enforceable.

Effective Date

4 This bylaw shall come into effect upon passing of the third reading.

THAT BYLAW 24-002 BE GIVEN FIRST READING THIS 6th DAY OF FEBRUARY, 2024

THAT BYLAW 24-002 BE GIVEN SECOND READING THIS 5th DAY OF MARCH, 2024

THAT BYLAW 24-002 BE GIVEN THIRD READING THIS 5TH DAY OF MARCH, 2024

"Original Signed"
Mayor

"Original Signed"
Chief Administrative Officer

LAKEWOOD

AREA STRUCTURE PLAN

Bylaw 24-002
Schedule B

Lac La Biche County
welcoming by nature.

Prepared for: Armand Menard
Presented by: Select Engineering Consultants Ltd.
Date: January 31, 2024
RPT-342-21001-8.5-LakewoodASP-240131

Table of Contents

List of Figures

1.0 Introduction and Purpose

The purpose of this Area Structure Plan (ASP) is to provide direction for development of a multi-parcel residential neighbourhood named Lakewood which is located west of Range Road 113 and north of Township Road 652 within Lac La Biche County **(See Figure 1)**.

The Lakewood ASP has been prepared and submitted in accordance with the Lower Athabasca Regional Plan, Lac La Biche County's Municipal Development Plan (MDP) and Land Use Bylaw (LUB). The ASP is intended to demonstrate its compatibility with County policies, regulations, and development standards.

The ASP will provide direction for the Lakewood neighbourhood and guide future development applications. A redistricting application has been submitted concurrently with this ASP.

1.1 Land Acknowledgement

We respectfully acknowledge the traditional and ancestral lands of the First Nations peoples of Treaty 6, Treaty 8 and Treaty 10 territories and the Homeland of the Metis people. Lac La Biche County continues to be home to Indigenous peoples since time immemorial, and we recognize the vital contributions of Indigenous culture, history and perspectives in our shared past, present and future.

1.2 Vision

This ASP envisions multi-lot development that allows individual landowners to sustainably develop the land to enjoy many of the recreational activities available in the Lac La Biche County Area and nearby Lakeland Provincial Recreation Area. Residents would also be able to utilize the amenities and contribute to the economic vibrancy of the nearby hamlet of Lac La Biche.

2.0 Site Context

2.1 Plan Area

The ASP is located along Range Road 113, north of Township Road 652 within Lac La Biche County **(See Figure 1)**. The site is legally described as a portion of NE16-65-11-W4M and contains 24.34 ha of land. The hamlet of Lac La Biche is located to the northwest of the site and Lakeland Provincial Recreational Area is to the north. The site is situated near Elinor Lake, and Helena Lake.

The site is generally flat with the current drainage going southeast to northwest. The majority of the site is treed with one residence in the central plan area.

2.1.1 Soil Profile

Qualitest Canada Ltd. completed a Geotechnical Investigation Report in January 2021. Qualitest completed fieldwork and took 3m deep samples of the soil to determine soil type at various locations within the site. As part of this geotechnical study, recommendations were provided for use during the construction of the gravel road, driveway accesses and the emergency access road.

This Geotechnical Investigation Report has been included in the appendix of this ASP.

2.1.2 Environmental Site Assessment

Qualitest Canada Ltd. completed a Phase I Environmental Site Assessment (ESA) Report in December 2021. A review of aerial photos, land titles, municipal and provincial databases and an interview with the current landowner were completed as part of this Assessment. A site visit was also conducted in November 2021. It was concluded by Qualitest that the land is considered to have a low environmental hazard and a Phase II ESA is not required.

The Environmental Site Assessment Report has been included in the appendix of this ASP.

2.1.3 Biophysical Environmental Assessment

Enviromak Inc. completed a Biophysical Environmental Assessment in August 2022. This assessment included a site visit in July 2021 and identified 3 wetlands within the ASP area, which were not claimed by Alberta Environment (AE). Wetlands one and three are located in the north and west areas and will be retained within the property and incorporated into environmental reserve. A buffer area of 28.5m will be provided for wetland one and 18.5m for wetland 3. This buffer will aid in protecting the wetland areas from impacts of development. Wetland 2 is approximately 0.0065 ha in size and located in the eastern portion of the ASP. This wetland is proposed to be removed and water act compensation paid through AE.

The Biophysical Environmental Assessment has been included in the appendix of this ASP.

A Wetland Assessment and Impact Report will be prepared and submitted to AE for approval to remove Wetland 2. No impacts to this wetland are permitted until AE approvals are in place.

2.1.4 Trip Generation

Bunt & Associates Engineering Ltd. completed a Trip Generation Memo in June 2023. This trip generation memo provides Lac La Biche County an understanding of the traffic volumes created by this proposed development and if further study is required. Based on the addition of less than 30 two-way trips during peak hours, it is concluded by Bunt that operations along Range Road 113 will not be unduly impacted. The anticipated low traffic volumes along Range Road 113, combined with the addition of 106 to 282 vehicles per day does not warrant the need for additional surface width to Range Road 113. No further assessments are required.

2.2 Surrounding Land Uses

Residential dwellings and crown claimed lands surround the ASP area. The lands are generally treed and in a natural state. Two 4.05ha parcels northeast of the Plan area were subdivided out of NE16-65-11-W4 in 2018. Currently these parcels have no development on site and contain a large tree stand. Land immediately Southwest of the site is registered as Crown Land. Lands to the north contains a homestead. **(See Figure 2**). The multi lot residential development will be developed to county standards and no foreseeable impact on surrounding land uses is anticipated.

2.3 Pipelines/Wells

A natural gas pipeline (ROW Plan No. 972 0640) is located in the northwest corner of the ASP area. This pipeline is operated by Sequoia Resources Corporation and, according to Alberta Energy Regulator, is currently discontinued. No abandoned wells are located within the parcel.

2.4 Historical Context

The land has been districted as Agricultural but has not been used for traditional agricultural purposes in the recent past and remains fully treed (**See Figure 2**). There is a wood framed picnic shelter on the south portion of the land and a deer observation tower on the north portion of the land, otherwise no buildings or other structures have been constructed on this site.

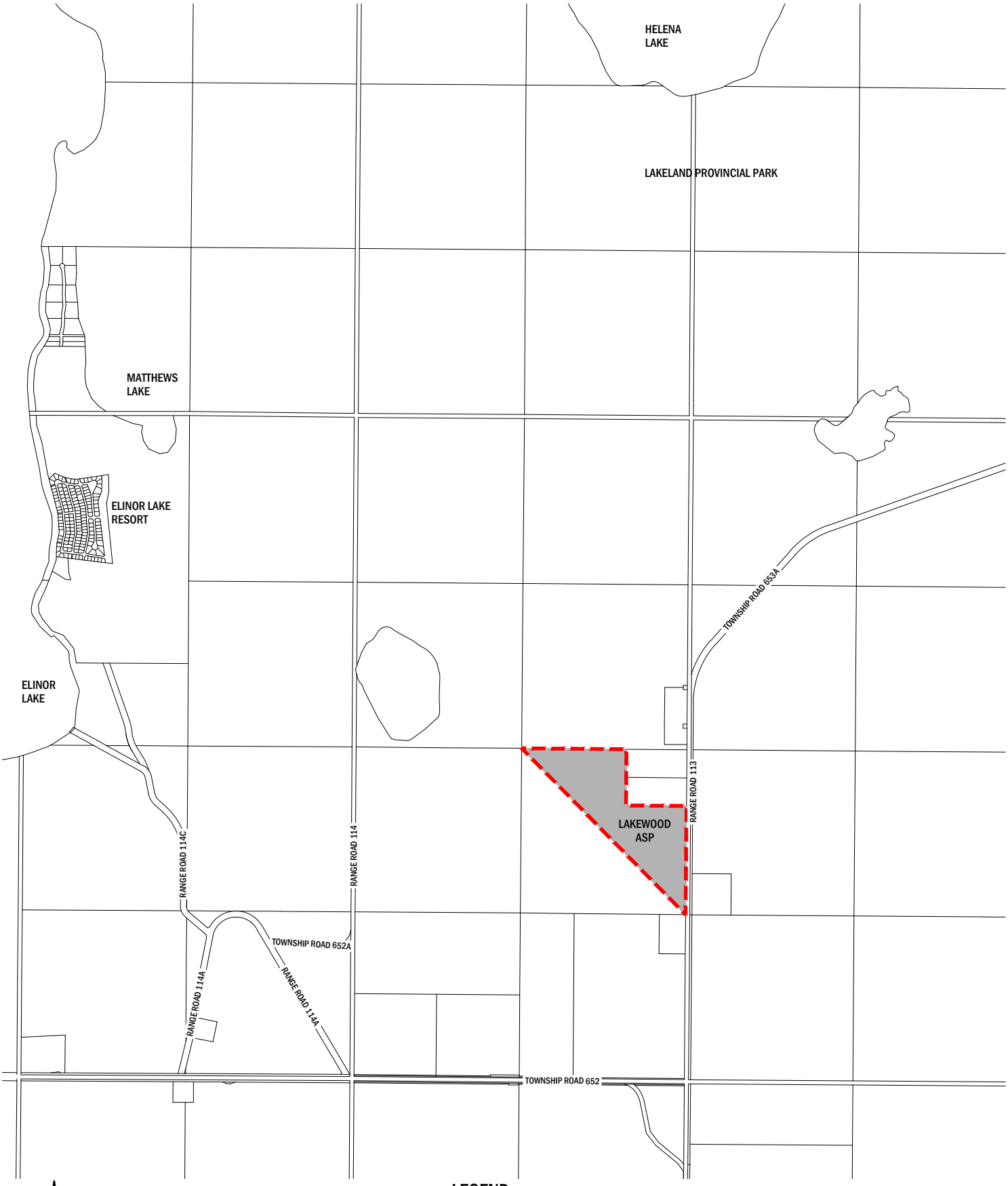

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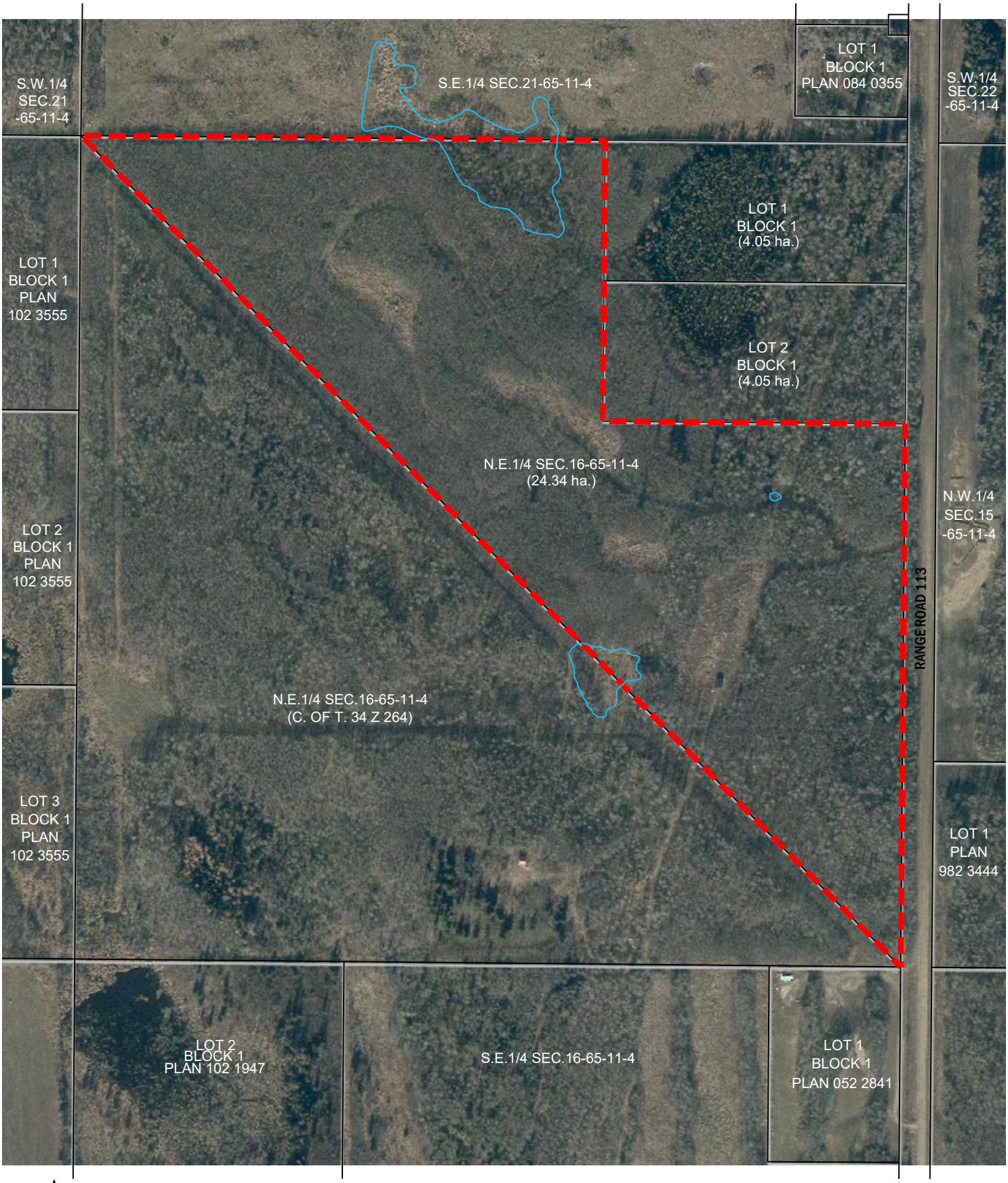
FIGURE 1



LEGEND

Wetland Areas

ASP Boundary

SITE CONTEXT

scale 1:5000

0 50 100 m

LAKEWOOD

LAC LA BICHE COUNTY

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FIGURE 2

3.0 Policy Context

3.1 Lower Athabasca Regional Plan

The Lower Athabasca Region covers the northeast corner of the Province of Alberta and includes Lac La Biche County. The Lower Athabasca Regional Plan (LARP) was approved by the Government of Alberta in August 2012 and is the overarching long range policy document for guiding growth and environmental impact decisions related to air, land, water and biodiversity in the region for the next 50 years.

This ASP aligns with the vision in the LARP by creating a people friendly community with minimal environmental impact while allowing easy access to multiple recreational and cultural activities.

3.2 Lac La Biche County Municipal Development Plan

The Lac La Biche County *Municipal Development Plan (MDP) Bylaw 22-012* came into effect October 2022 and provides a municipal level framework for growth and development in the county. This ASP aligns with multiple goals and requirements of the MDP as indicated in the below chart.

aaaTable 1: MDP Policy Compliance

Municipal Development Plan Policy	Lakewood ASP Compliance
Rural **5.3 Residential Policies** 5.3.2 The non-agricultural uses which may be allowed in the area identified as Rural include: a. the subdivision of land for residential purposes; b. industrial and commercial development which are secondary or incidental to the main farming operation; c. natural resource extractive industries such as oil and gas facilities including gas plants, forestry practices, sand and gravel operations; and d. other uses.	This ASP is in a rural area in Lac La Biche County and will allow for a multi-parcel residential neighbourhood with the required content, site plans, and the necessary supporting professional technical reports to support this development. The developer will be responsible for all associated initial infrastructure and utility costs as identified within this ASP. Individual landowners will be responsible for their own on-site water, sanitary, power, and other utility needs where required. All required technical reports, as confirmed by the County during the pre-application meeting, have been completed, support this land use and have been submitted within the appendix of this ASP.
Residential Development: 5.3.3 In the Rural Policy Area, subdivision applications proposing the second residential parcel or greater, will be subject to the following criteria:	The parcel has direct access from Range Road 113 with two access roads as well as an internal emergency service road that has been incorporated into the design to ensure safe access and exit for emergency response vehicles and residents. Each lot will have a

a. the parcel shall have direct access to a municipal or provincial roadway; b. the parcel must have a suitable building site; c. all potable water and private sewage systems can be facilitated on-site and without negative impact on adjacent land uses; d. the land does not infringe upon an approved livestock facility; and e. it is recommended that parcels be clustered (adjacent and continuous) to reduce the fragmentation of agricultural lands.	suitable building site which will be determined during the development/building permit phase. The residential development will be privately serviced to industry and municipal standards. Drainage flows leaving the property will be at predevelopment rates, having no impact on adjacent land uses. The site is located close to lakes in the area and will retain much of the topography in a natural state.
7.3 Healthy Communities 7.3.2 The County shall consider the ecological integrity of the County's natural environmental features and overall ecosystem health when undertaking or updating statutory plans, policies, bylaws, and other planning documents.	The Lakewood ASP was planned to incorporate the environmentally sensitive areas within the Plan area, while also providing Residential lots that intend to minimize the development footprint by leaving lots in a natural state as much possible to support a healthy ecosystem. Initial tree clearing will be limited to the proposed internal roadway and along driveway access locations so landowners can access the lot.
7.6 Lake and Watershed Management 7.6.1 The County will seek to protect, enhance and restore the water quality and aquatic ecosystem whenever possible by: a. retaining natural areas along waterbodies and watercourses; b. incorporating best practices to minimize soil erosion, to protect and enhance riparian zones and to conserve and enhance areas that contain habitat for federally or provincially listed plant or wildlife species; and c. conserving wetlands and establishing riparian setbacks around wetlands.	The major wetlands and natural areas on the land will be protected through the establishment of environmental reserve. This will ensure that development is not impacting sensitive ecosystems. In addition, the appropriate use of cisterns and drainage will be utilized to prevent ground and surface water contamination.

As this ASP conforms to the MDP an MDP Amendment will not be required to support this land use.

3.3 Lac La Biche County Land Use Bylaw

Lac La Biche County Land Use Bylaw No. 17-004 was established in September 2017 with the purpose of regulating and controlling the use and development of land and buildings within Lac La Biche County. To meet the unique requirements of this development the plan area will be redistricted from an Agricultural District (AG) to Estate Small Lot Residential 2 (ES2), Natural Area Protection (NAP), and Parks and Recreation (PR) Districts.

4.0 Development Objectives and Policies

4.1 Objectives

This development will be created with the intent of providing appropriately designed and minimally serviced residential recreational lots for multiple landowners (**See Figure 3)**. This development will respect the natural features of the land and provide a safe and accessible community as a base to enjoy recreational opportunities in the area. Lots are anticipated to be mainly used for RV's or trailers and can be utilized year-round. Cabins may be developed in the future but are not anticipated to have basements. Individual landowners will determine if they want to develop the land to build a dwelling on site according to the permitted uses or have recreational vehicles on site.

4.2 Policies

Policy decisions for future development of the land will be based on the criteria set out in the Land Use Bylaw and this ASP, which conform to the higher-level policy documents of the municipality and region.

A Biophysical Assessment is required by Lac La Biche County as part of the ASP submission. Should wetlands or peatlands be found on site, based on the Biophysical Assessment, then a Wetland Assessment and Impact Report (WAIR) will be required and submitted to Alberta Environment for approval of any wetlands that are going to be disturbed. Should identified wetlands be incorporated into the subdivision and protected from any disturbances, a WAIR would not be required, however Alberta Environment notification will still be required.

Three wetlands were identified within the ASP area. Two larger wetlands located in the north and west Plan areas are proposed to be retained in their natural state. An environmental reserve buffer has been provided around both wetlands to further protect the wetland areas from impacts of development. A very small wetland was also identified in the eastern Plan area and will be removed with development. A WAIR has been prepared and submitted to Alberta Environment for approval, which is required prior to any disturbance of the wetland.

5.0 Development Concept

5.1 Development Statistics

The development will consist of 30 subdivided lots. Based on the 2021 Canadian Census each private dwelling in the County occupies an average of 2.6 people. Therefore, using the below figures this development could consist of an estimated population of 78 people. This proposal has a net density of 1.6 dwelling units per residential hectare. The following table outlines the land use statistics for the proposed Development Concept.

Table 2: Land Use Statistics

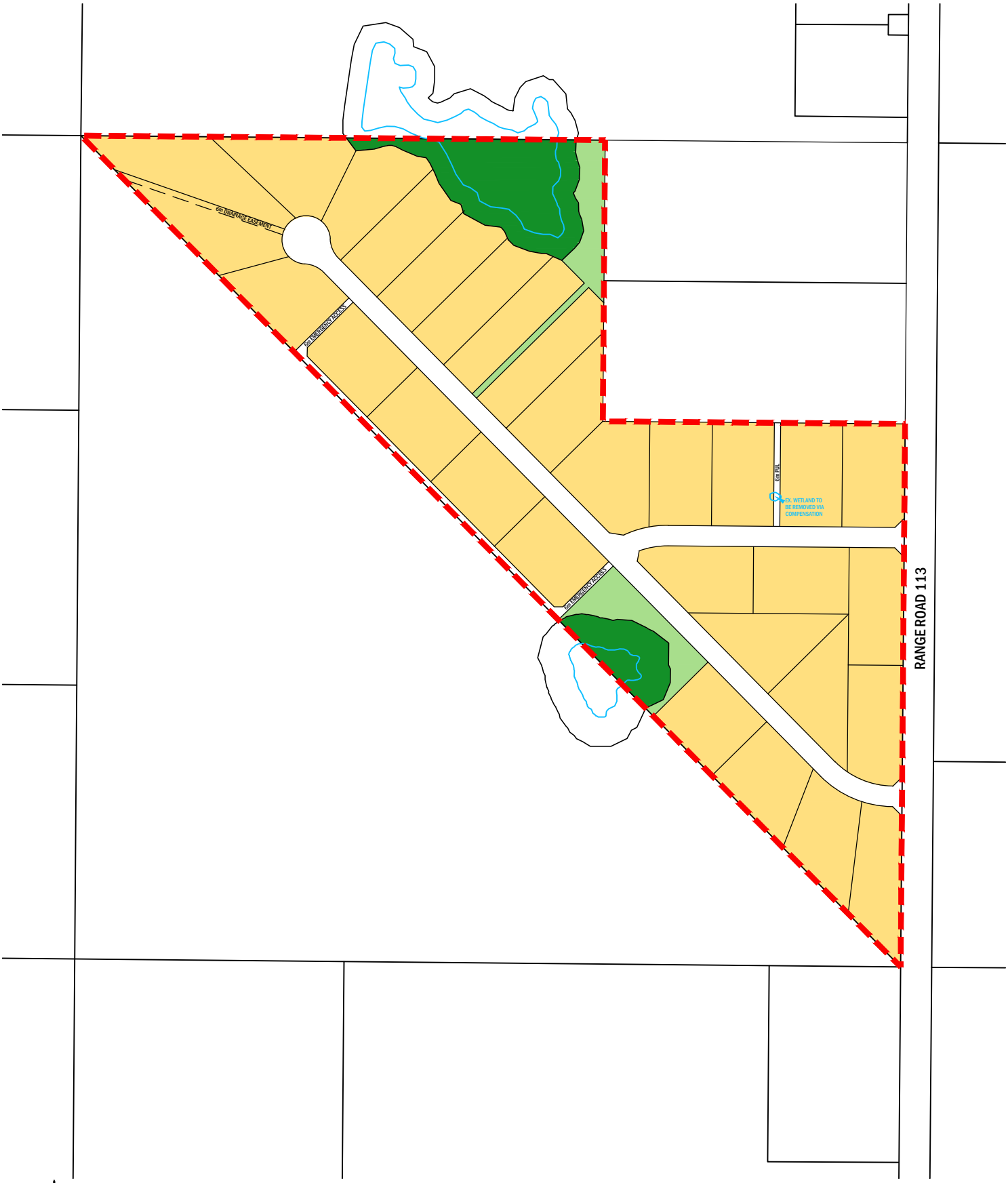
Land Uses	Ha	%
GROSS AREA	**24.34**	
Environmental Reserve	1.90	
Sub-total	1.90	
GROSS DEVELOPABLE AREA	**22.44**	
OTHER LAND USES		
Public Utility Lot	0.06	0.3%
Municipal Reserve	0.95	4.2%
Circulation	2.62	11.7%
SUB TOTAL - OTHER USES	**3.63**	**16.2%**

Table 3: Residential Land Use Analysis

Residential	Ha	%	Units	%	Population	%
Recreational Residential	18.81	83.8	30	100.0%	78	100.0
SUB TOTAL-RESIDENTIAL	**18.81**	**83.8**	**30**	**100**	**78**	**100.0**

Population Density

Recreational Residential	2.6 persons/unit



DEVELOPMENT CONCEPT

LEGEND

- Rural Residential
- Municipal Reserve
- Environmental Reserve
- ASP Boundary

scale 1:5000

0 50 100 m

LAKEWOOD
LAC LA BICHE COUNTY

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FIGURE 3

6.0 Transportation and Servicing

6.1 Servicing and Drainage

The study area shall be serviced in accordance with Lac La Biche County Design Standards and Alberta Environment Standards and Guidelines for Municipal Waterworks, Wastewater and Storm Drainage system for residential developments. **(Figure 4)**

6.1.1 Water Servicing

Water servicing within this area shall be in accordance with Lac La Biche County rural water servicing policy.

The proposed Lakewood subdivision will be restricted to private, individual water supply systems. Typical systems for these rural developments involve a buried water tank (cistern) that operates with a pressurized piping system in the building.

This method of providing water to each lot by a water cistern is the responsibility of the lot owner. The water cisterns are primarily used to store water for domestic use purposes. Each lot owner will be responsible to provide its own water based on Alberta Environment Potable Water regulations.

6.1.2 Sanitary Servicing

The proposed Lakewood residential development will require that each lot be serviced privately and independently with an approved system per each subsequent Development Permit.

Approved tanks for septic collection that can be serviced on a regular basis are the proposed alternative servicing solution for this development.

6.1.3 Stormwater Management

The proposed residential development will be designed with rural cross section roadways utilizing grassed roadside ditches and swales consistent through existing development. The site layout conforms to local drainage patterns, draining southeast to northwest. This will help minimize grading and ensure an overland drainage system with positive flows to the roadside ditch. The use of road networks, culverts and PULs will serve as a collective routing system.

The proposed study area will be graded so that the major flows will drain towards the existing downstream drainage pattern, ultimately draining to the Helena Lake located in the northwestern site of the proposed development.

The proposed drainage pattern within the Lakewood subdivision can be seen in **Figure 4**.

6.1.4 Shallow Utilities

Shallow utilities planned for this development may include natural gas servicing, power and communication. Each utility owner will be contacted and supplied with the tentative legal plan for the development to initiate design and construction planning. Shallow utilities will be installed as either underground or overhead infrastructure and supplied to each lot. All utility alignments will adhere to alignments set out in Lac La Biche County Engineering Design Standards.

The alignment and required easements/right-of-way will be confirmed at detailed design stage.

6.2 Transportation network

The site can be accessed from two all directional intersections along Range Road 113, which will connect through the internal road network by forming a "loop" within the ASP. A cul-de-sac extends northwest and is approximately 415m in length. Due to the length of this cul-de-sac a 6m emergency access is proposed along the western boundary of the ASP, which will allow for a safe exit of residents and emergency vehicles in case of fire or other emergency situations. **(See Figure 5)**.

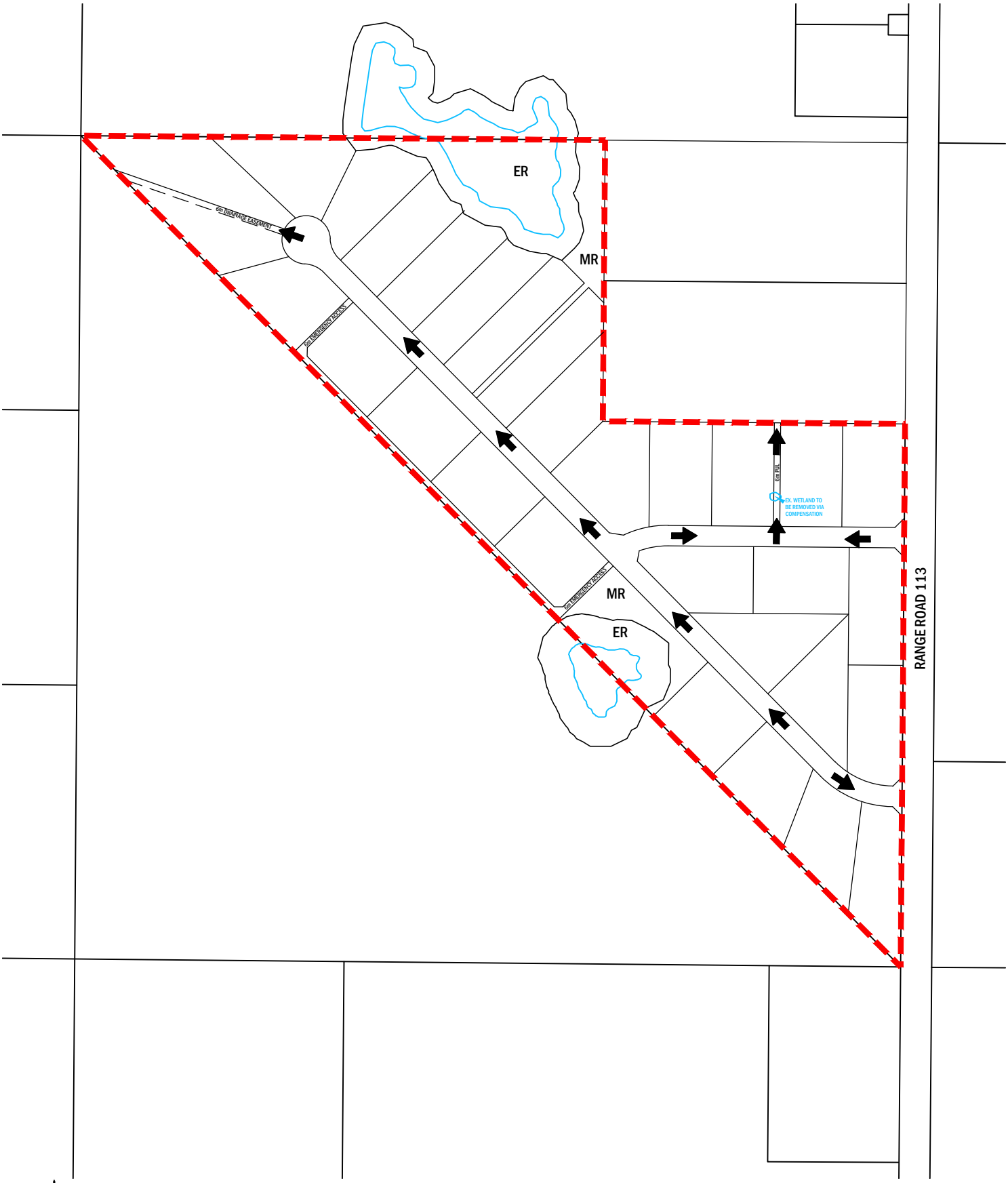
All internal roadways will be 20 metres wide and are proposed to be gravel with driveway accesses constructed to allow access to each lot. The emergency access is 6m wide also with gravel. No asphalt will be required as part of this development.

6.3 Schools, Parks and Open Space

The Municipal Government Act Section 666 stipulates that a maximum of 10% of land within a parcel will be required to be provided as municipal reserve (MR) dedication either as land dedication, cash-in-lieu, or a combination of both.

Municipal reserve parcels are located in the north central Plan area and the south Plan area and will provide additional buffer areas from the existing wetland areas. The municipal reserve areas will remain naturalized to minimize ecological impact and decrease maintenance requirements for the County. Due to the limited area of the ASP, future maintenance difficulties by the County and surrounding natural areas, no other MR areas are proposed within the Lakewood ASP. The under dedication will be paid as cash in-lieu to the County.

Two Environmental Reserve parcels will be created to preserve and protect the two large, identified wetlands within the ASP and will be redistricted as Natural Area Protection (NAP) as described within the County's Land Use Bylaw. A small wetland Is located in the eastern Plan area and totals approximately 0.0065 ha. A Wetland Assessment and Impact Report has been completed and submitted to Alberta Environment for approval to remove the wetland with development. (**See Figure 6**).



SERVICING

LEGEND

- Drainage Direction
- ASP Boundary

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LAKEWOOD
LAC LA BICHE COUNTY

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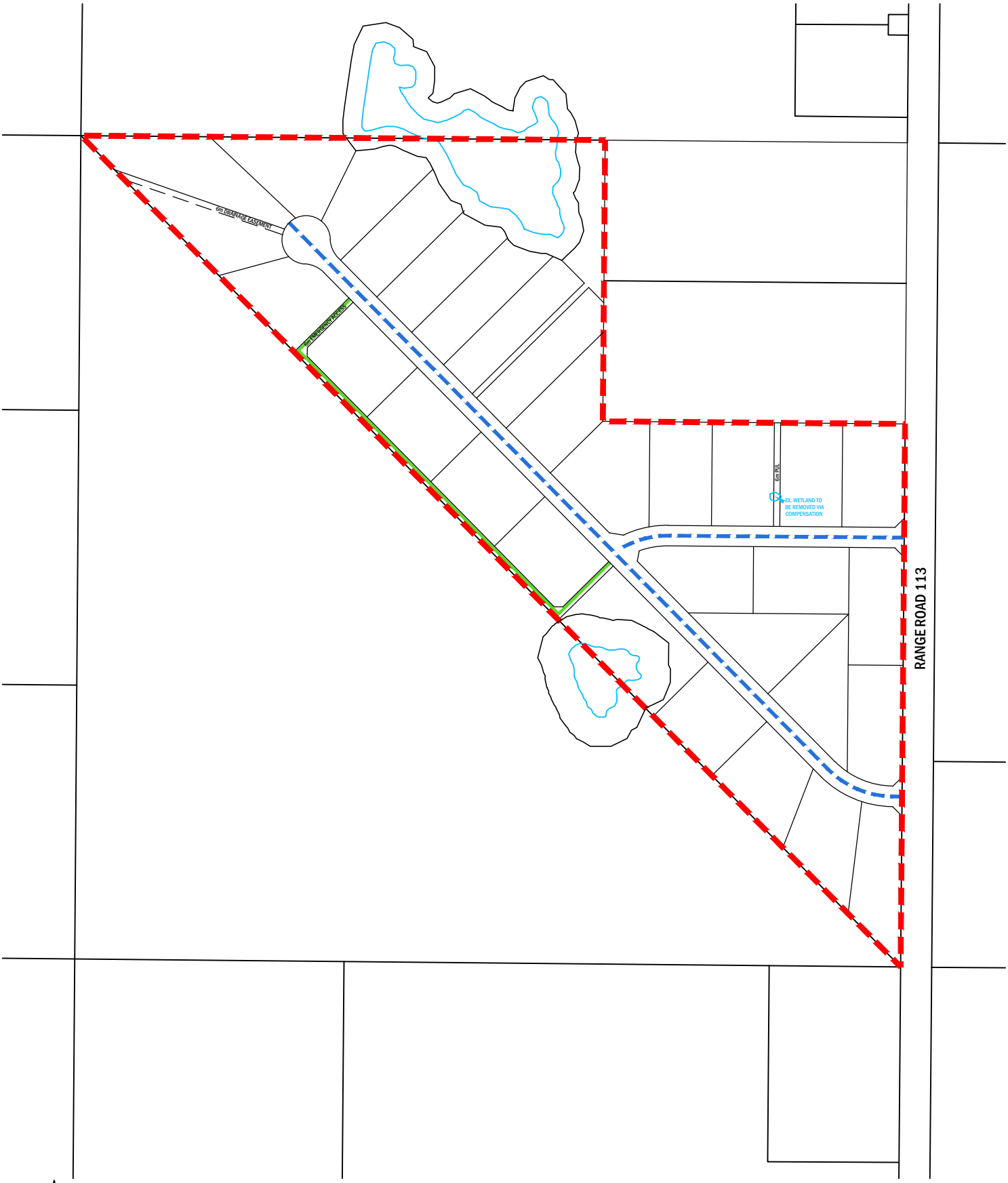
FIGURE 4



TRANSPORTATION NETWORK

LEGEND

- Rural Gravel Road
- ASP Boundary
- Gravel Emergency Access

scale 1:5000

0 50 100 m

LAKEWOOD
LAC LA BICHE COUNTY

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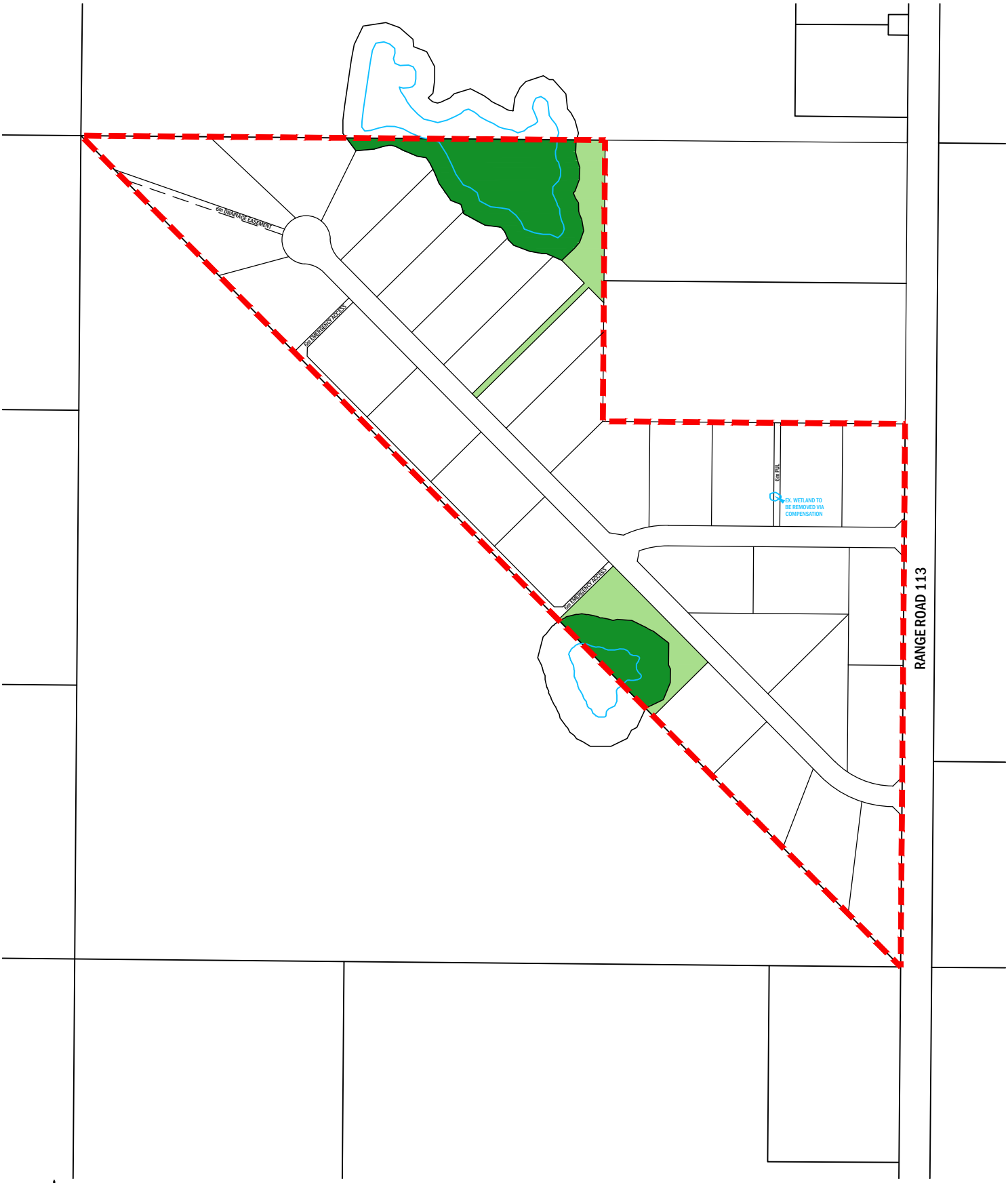
FIGURE 5



LEGEND

- Municipal Reserve
- Environmental Reserve
- ASP Boundary

OPEN SPACES

scale 1:5000

0 50 100 m

LAKEWOOD
LAC LA BICHE COUNTY

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Jjurincic November 28, 2023

FIGURE 6

7.0 Community Consultation

On November 1, 2023, Select Engineering, on behalf of the developer, held a Public Open House to discuss the proposed Lakewood Development Concept and gather public opinion regarding an Area Structure Plan application and amendment to the Land Use Bylaw. The Public Open House was hosted at McArthur Place from 6:00pm to 8:00pm. Presentation boards were set up to illustrate the proposed development and identify the process required for approval from Lac La Biche County. The Lakewood ASP contains approximately 24 hectares and is legally defined as NE16-65-11-W4M. Notifications for this event were sent out to surrounding landowners and a newspaper ad in the October 24, 2023, edition of the Lakeland This Week as per the requirements set by Lac La Biche County.

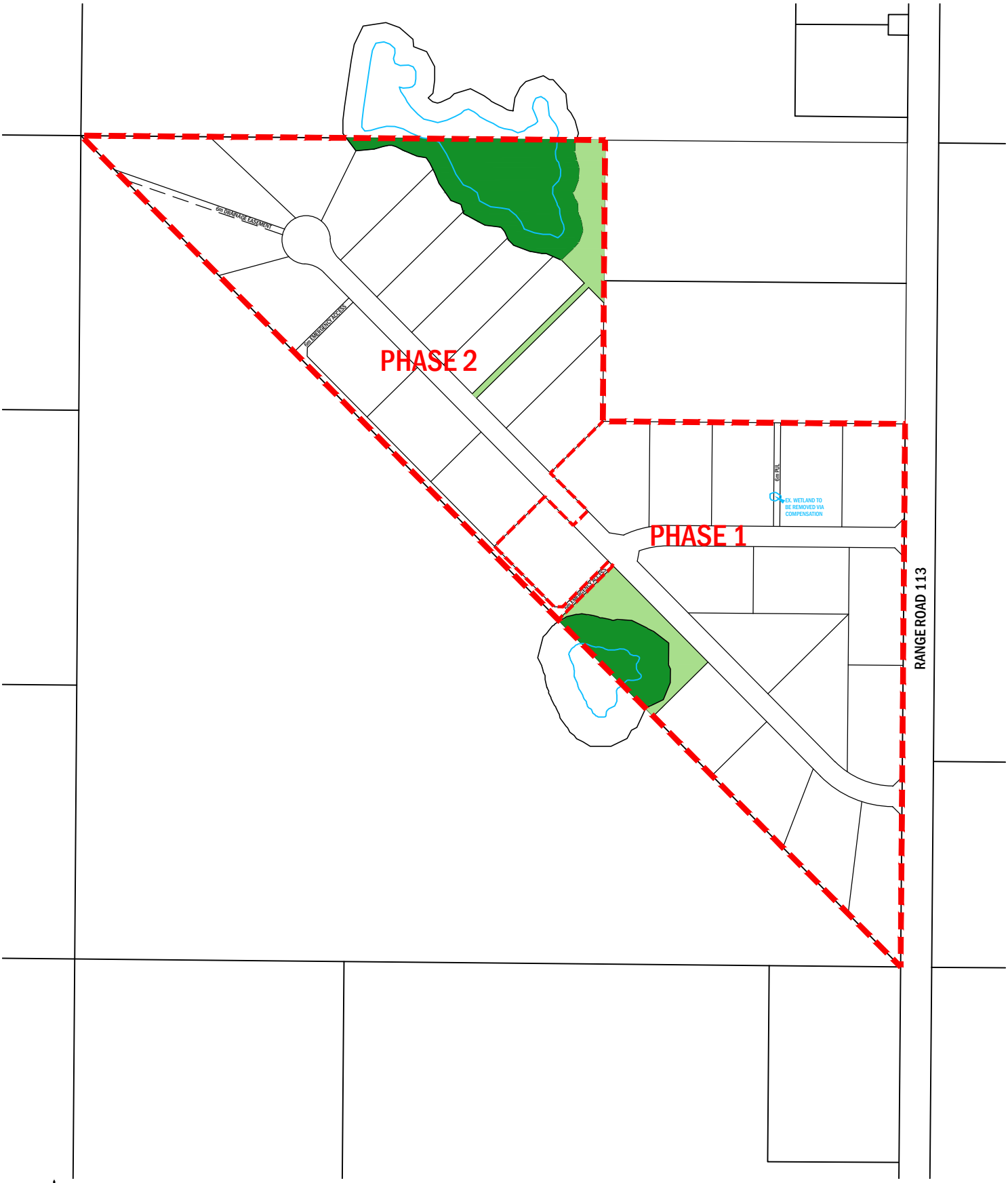
Seven people, which included the developer, engineering consultant, County administration and one surrounding landowner, were in attendance and discussed the proposed servicing, shallow utilities, traffic, and noise. Additional comments were received through email and included within a "Public Open House Summary" and submitted to the County under separate cover.

8.0 Implementation and Staging

The Lakewood ASP will be split into two phases **(See Figure 7).** The first phase extends west from Range Road 113 with both access locations and forms a "loop" roadway, which provides residents and emergency services access. This first stage of development includes approximately 16 lots and is anticipated to be developed in 2023-2024.

The second phase includes approximately 14 lots and extends from phase 1 of the development to the northwest corner of the property. This second phase will also include the development of an emergency access road along the western edge of the ASP to allow emergency vehicles and residents a secondary access in the event of an emergency. The timing of the development of Phase 2 is currently unknown but will follow the development of Phase I.

To protect the natural features of the land and meet municipal requirements, two Environmental Reserve parcels are located within the ASP area and will be dedicated in both Phase 1 and Phase 2.



STAGING

LEGEND

Staging Boundary

ASP Boundary

scale 1:5000

m 0 50 100

LAKEWOOD
LAC LA BICHE COUNTY

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Jjurincic November 28, 2023

FIGURE 7

APPENDIX A

Technical Reports

January 17, 2021 File: 292-2021-001

Select Engineering Consultants
#100, 17413 107 Ave NW
Edmonton, AB T5S 1E5

Attention: Mr. Eric Sehn
Planner

ZONING AND SUBDIVISION
65262 RGE RD 113 WITHIN NE-16-65-11-W4M
LAC LA BICHE COUNTY, ALBERTA
REVISED GEOTECHNICAL INVESTIGATION REPORT

Qualitest Canada Ltd. (Qualitest) has prepared the following geotechnical investigation report for vehicle access and roadway areas for the proposed subdivision within NE-16-65-11-W4M in Lac La Biche County, Alberta. The proposed development includes lot development for vacation homes, emergency access and gravel road areas.

The scope of work was carried out in general accordance with our proposal (File: P-2021-390 dated June 16, 2021) letter to Mr. Eric Sehn, Planner of Select Engineering. Authorization to proceed with the work was received from Mr. Sehn via an e-mail dated July 12, 2021. The revised report has been prepared based on the updated information received from Mr. Armand Menard on January 12, 2022.

The scope of work did not include an environmental assessment for potential soil and/or groundwater contamination.

1. METHODS OF INVESTIGATION

1.1 Field Program

As requested, four test pits TP21-1 to -4 were excavated depths of approximately 3.0 meters below the existing grade. The excavation was conducted on November 26, 2021, using a backhoe by Razorback Contracting Ltd. of Lac La Biche, Alberta and supervised by a full-time inspector from Qualitest. Prior to the field investigation, Qualitest contacted Alberta-One-Call to clear the primary utilities within the property. The approximate test pit locations are shown on the attached Drawing No. 292-2021-001-1 in Appendix A.

Disturbed samples were obtained from the areas during excavation. The undrained shear strength (Cpen value) of cohesive soil samples was estimated using a pocket penetrometer.

1.2 Laboratory Program

Laboratory testing included visual classification and determination of the natural water content of all soil samples. In addition, Atterberg Limits tests were carried out on selected samples.

2. SITE DESCRIPTION

2.1 Surface Conditions

At the time of this investigation, the project site was mostly flat, sloped in some areas and mostly covered in trees. A temporary picnic shelter and a deer observations tower were observed in the area. The area was covered in snow during the time of the site visit.

2.2 Soil Profile

The general subgrade soil conditions consisted of topsoil, over sandy, silty clay with some rootlets overlaying clay till, which extended to at least 3.0 meters below the existing grade, the maximum depth explored with the test pit excavating at this site. Detailed descriptions of subsurface conditions observed at the test pit locations are presented in Table 2.1. We did not undertake any ground elevations surveying during the investigation.

TABLE 2.1
SOIL PROFILE

TEST PIT NUMBER AND GPS LOCATION	SOIL PROFILE	DEPTH (m)
TP21-1	TOPSOIL, black, silty, organics, trace sand and clay	0 - 0.5
54.627829, -111.594307	CLAY sandy, some silt pockets, rootlets, brown, stiff to very stiff, low plastic	0.5 - 1.2
	CLAY TILL silty, some sand, trace gravel, cobblestone, boulders, medium plastic, brown to dark brown, very stiff to hard	1.2 - 3.0
TP21-2	TOPSOIL, black, silty, organics, trace sand and clay	0 - 0.3
54.626537, -111.596486	CLAY silty with some rootlets, brown, stiff, medium plastic	0.3 - 1.0
	CLAY TILL silty, some sand, trace gravel, cobblestone, boulders, medium plastic, brown to dark brown, very stiff to hard	1.0 - 2.8
TP21-3	TOPSOIL, black, silty, organics, trace sand and clay	0 - 0.3
54.627685, -111.598013	CLAY sandy with some silt pockets, rootlets, brown, stiff to very stiff, low plastic	0.3 - 0.7
	CLAY TILL silty, some sand, trace gravel, cobblestone, boulders, medium plastic, brown to dark brown, very stiff to hard	0.7 - 3.0
TP21-4	TOPSOIL, black, silty, organics, trace sand and clay	0 - 0.3
54.6302048, -111.6025048	CLAY silty clay with some rootlets, brown, stiff, medium plastic	0.3 - 0.5
	CLAY TILL silty, some sand, trace gravel, cobblestone, boulders, medium plastic, brown to dark brown, very stiff to hard	0.5 - 2.8

Note: All depths are below ground surface.

Calculating the volume for topsoil may not be accurate based on the information of the four test pits excavated for this site, as topsoil depth may vary between the test pit's location. The additional test pits are suggested if the exact volume for topsoil is required.

The glacial till consisted of a heterogeneous mixture of gravel, sand, silt and clay-sized particles. The glacial till strata also contained sorted deposits of the above particle sizes. In addition to the sorted deposits, a random distribution of larger particle sizes in the cobblestone range (60 to 200 mm) and boulder-sized range (larger than 200 mm) should be expected at the subject site.

2.3 Groundwater Conditions

Groundwater seepage and sloughing were not encountered during test pit excavation. The seasonal fluctuation of the groundwater table may be encountered due to precipitation and other climatic factors. Hence, the actual groundwater conditions at the time of construction could vary from those observed during this investigation.

3. LABORATORY ANALYSIS

Laboratory testing included a visual classification of all soil samples, and the natural water content determination and Atterberg limit tests were conducted on selected soil samples. Laboratory test results and soil classification are presented in Table 3.1.

TABLE 3.1
LABORATORY TEST RESULTS AND MODIFIED USC CLASSIFICATION

TEST PIT NUMBER	DEPTH (m)	MOISTURE CONTENT (%)	LIQUID LIMIT (%)	PLASTIC LIMIT (%)	PLASTICITY INDEX (%)	MODIFIED USC CLASSIFICATION
TP-21-01	0 - 0.5	-	-	-	-	OL
	0.5 - 1.2	7.4	-	-	-	CL
	1.2 - 3.0	13.6	37	18	19	CI
TP-21-02	0 - 0.3	-	-	-	-	OL
	0.3 - 1.0	13.3	-	-	-	CI
	1.0 - 2.8	13.5	35	18	17	CI
TP-21-03	0 - 0.3	-	-	-	-	OL
	0.3 - 0.7	6.4	-	-	-	CL
	0.7 - 3.0	16.7	-	-	-	CI
TP-21-04	0 - 0.3	-	-	-	-	OL
	0.3 - 0.7	13.5	-	-	-	CI
	0.5 - 2.8	18.6	40	20	20	CI

4. RECOMMENDATIONS

4.1 General

It is understood that the area will be developed for vacation homes in two phases. It is understood that a total of 27 lots, emergency access and gravel road will be developed in two phases in the area, and no traffic information is available now for the area.

Subgrade Preparation

All topsoil, organic, unsuitable and deleterious materials should be removed from the access and road areas. The area should be proof rolled to identify the soft area, if any, and to confirm the surface deflections are minimal under the influence of construction traffic in addition to an acceptable degree of compaction having been obtained. Excavate the soft areas and replace them with suitable fill material. Fill, required to bring the subgrade soil to the design sub-grade elevation on the road, should consist of on-site non-expansive fine-grained soil (i.e., silty clay or glacial till), alternatively clean granular fill could be used as well. Place the lift in thin lifts (maximum 200 mm loose) and compact to a minimum 98 percent of Standard Proctor Maximum Dry Density (SPMDD) within ±2 percent of Optimum Moisture Content (OMC).

4.2 Gravel Structures

Based on the available information following gravel structures are recommended in Table 4.1. It should be noted that the gravel structures should be reviewed when more details on the expected traffic loading are available.

TABLE 4.1
RECOMMENDED GRAVEL STRUCTURES

Emergency Access Road*	Gravel Road
125 mm Crushed Granular Base over Geotextile and Geogrid 150 mm of prepared subgrade	200 mm Crushed Granular Base over Geotextile and Geogrid 150 mm prepared subgrade

Notes:
1. *Drawing G-33, Emergency Lane Access, Lac La Biche County Specification
2. Crushed Granular Base shall meet AT specifications for Designation 2 Class 20 mm material.
3. Geotextile and Geogrid as per the County Specifications
4. Installation of Geotextile and Geogrid should be as per the manufacturer's instruction.

The crushed gravel base course should be supplied, placed and compacted in accordance with the Lac La Biche County or Alberta Transportation requirements for granular base course material. All crushed gravel base course and surface layer materials should be placed and compacted to 98 percent of SPMDD. The gravel surface should be sufficiently sloped (minimum 0.02 m/m) so that water will run off the surface to a drainage system.

Future grading and maintenance should be anticipated for gravel surface, particularly where vehicles are turning and braking. It is recommended that inspection be provided by qualified geotechnical personnel for subgrade inspection before placing the gravel in the area. Compaction testing for backfill will also be required.

5. LIMITATIONS

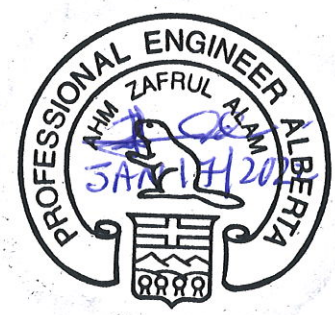
This report has been prepared for the exclusive use of Select Engineering Consultants and their agents for specific application to the proposed emergency access and roadways for the proposed subdivision within NE-16-65-11-W4M in Lac La Biche County, Alberta. It has been prepared in accordance with generally accepted geotechnical engineering practices, and no other warranty, express or implied, is made.

The acceptance of responsibility for the design/construction recommendations presented in this report is contingent on adequate and/or full-time inspection (as required, based on site conditions at the time of construction) by a representative of the Geotechnical Consultant. Qualitest will not accept any responsibility on this project for any unsatisfactory performance if adequate and/or full-time inspection is not performed by a representative of Qualitest.

We trust that this report fulfills your requirements for this project. Should you require additional information, please contact us.

6. CLOSURE

We trust the recommendations provided in this letter report meet your needs at present. Please contact Qualitest if you have any questions or require any further information.



AHM Zafrul Alam, P.Eng.
Lead Geotechnical Engineer

PERMIT TO PRACTICE

QUALITEST CANADA LTD.

PERMIT NUMBER: P-13697

Signature _____

Date JAN. 17, 2022

The Association of Professional Engineers and Geoscientists of Alberta (APEGA)

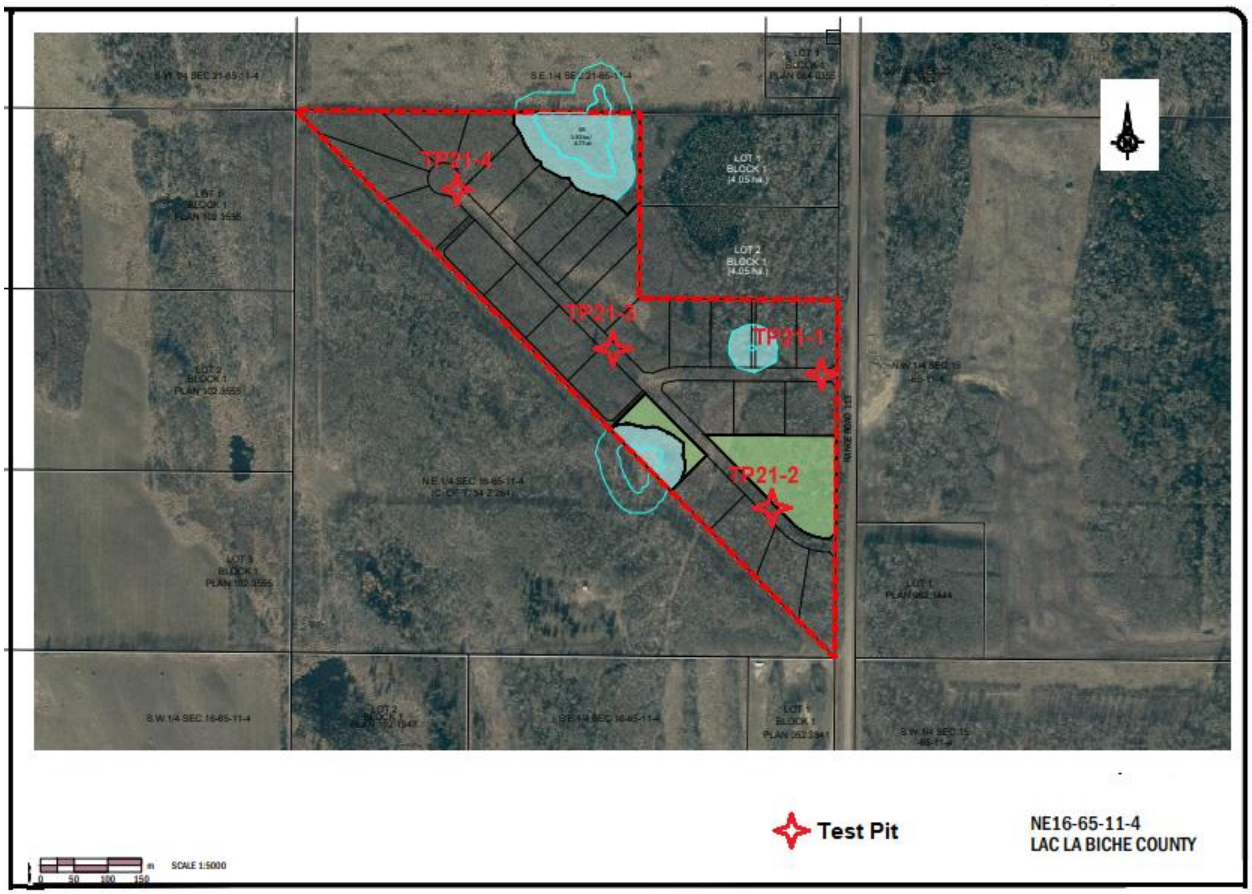
Attachments:

- Appendix A
  - Drawing No. 292-2021-001-1 - Site Plan Showing Test Pit Locations
  - Term Used in the Report
  - Modified Unified Soils Classification

APPENDIX A

Drawing No. 292-2021-001-1 - Site Plan Showing Test Pit Locations
Term Used in the Report
Modified Unified Soils Classification

DRAWING NO. 292-2021-001-1
SITE PLAN SHOWING TEST PIT LOCATIONS



CLASSIFICATION OF SOILS

Organic Soils: Soils containing a high natural organic content. Readily identified by colour, odour, spongy feel and by frequently by fibrous texture.

Fine-Grained Soils: Soils containing particles that are not visible to the naked eye. They include silts and clays. Fine-grained soils are soils having more than 50% of the dry weight smaller than particle size 0.080 mm.

Coarse-Grained Soils: Soils containing particles that are visible to the naked eye. They include gravels and sands and are generally referred to as cohesionless or non-cohesive soils. Coarse-grained soils are soils having more than 50% of the dry weight smaller than particle size 0.080 mm.

SOIL CLASSIFICATION BY PARTICLE SIZE

Classification	Particle Size	Visual Identification
Clay	<0.002 mm	Plastic particles, not visible to the necked eye
Silt	0.002-0.060 mm	Non-plastic particles, not visible to the necked eye
Sand	0.06-2.0 mm	Visible particles to 5 mm
Gravel	2.0-60 mm	5 mm to 75 mm
Cobbles	60-200 mm	75 mm to 200 mm
Boulders	>200mm	> 200 mm

TERMS DESCRIBING CONSISTENCY OR CONDITION OF SOILS

Fine-Grained Soils: Classified in relation to undrained shear strength.

Consistency	Undrained Shear Strength (kPa)	SPT N-Index (Approximate)
Very Soft	<12	0-2
Soft	12-25	2-4
Firm	25-50	4-8
Stiff	50-100	8-15
Very Stiff	100-200	15-30
Hard	>200	>30

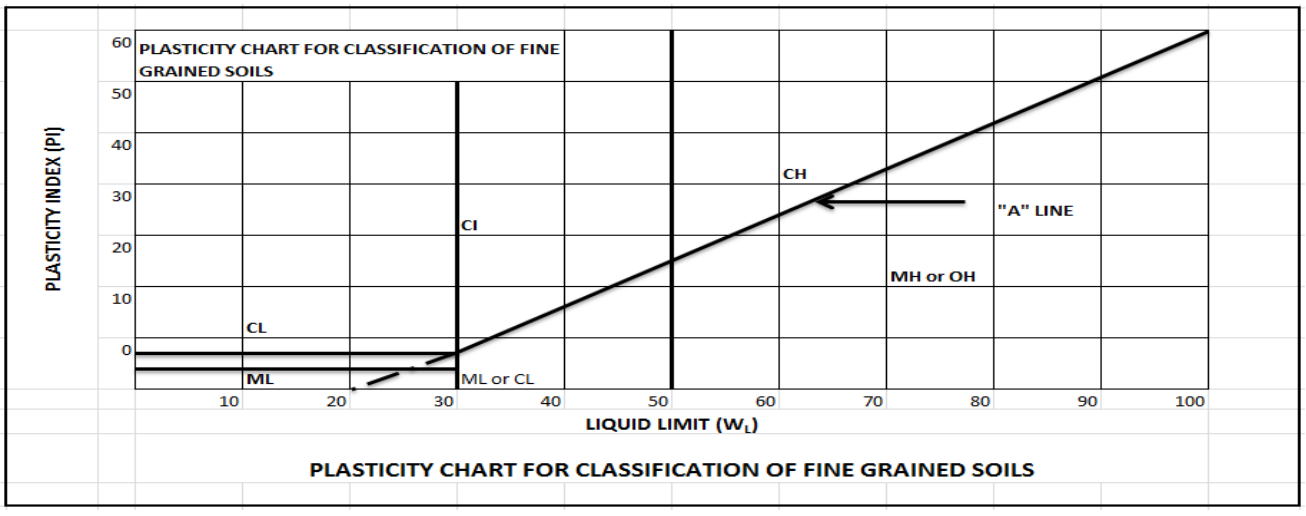
Coarse-Grained Soils: Described in terms of compactness condition and are often interpreted from the results of a Standard Penetration Test (SPT). The standard penetration test is described as the number of blows, N, required to drive a 51 mm outside diameter split barrel sampler into the soil distance of 0.3 m (from 0.15 m to 0.45 m) with a 63.5 kg weight having a free fall of 0.76 m.

Consistency	SPT N-Index (Approximate)
Very Loose	0-4
Loose	4-10
Compact	10-30
Dense	30-50
Very Dense	Over 50

QUALITEST™ Canada

MODIFIED UNIFIED SOIL CLASSIFICATION SYSTEM

MAJOR DIVISION			GROUP SYMBOL	TYPICAL DESCRIPTION	LABORATORY CLASSIFICATION CRITERIA
HIGHLY ORGANIC SOILS			Pt	PEAT AND OTHER HIGHLY ORGANIC SOILS	STRONGH COLOUR OR ODOUR AND OFTEN FIBROUS TEXTURE
COARSE -GRAINED SOILS (MORE THAN HALF BY WEIGHT LARGER THAN NO. 200 SIEVE SIZE)	GRAVELS (50% or more coarse fraction retained on No. 4 ASTM sieve size)	CLEAN SANDS	GW	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES < 5% FINES	$C_u = D_{60}/D_{10} > 4$ $C_c = (D_{30})^2/(D_{60} \times D_{10})$ between 1 to 3
			GP	POORLY-GRADED GRAVELS AND GRAVEL-SAND MIXTURES < 5% FINES	NOT MEETING ALL ABOVE REQUIREMENT FOR GW
		GRAVELS WITH FINES	GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES > 12% FINES	ATTERBERG LIMITS BELOW "A" LINE WITH PI<4
			GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES > 12% FINES	ATTERBERG LIMITS ABOVE "A" LINE WITH PI>7
	SANDS (More than 50% of coarse fraction passes No. 4 ASTM sieve size)	CLEAN SANDS	SW	WELL-GRADED SANDS, GRAVELLY SANDS < 5% FINES	$C_u = D_{60}/D_{10} > 6$ $C_c = (D_{30})^2/(D_{60} \times D_{10})$ between 1 to 3
			SP	POORLY-GRADED GRAVELS AND GRAVEL-SAND MIXTURES < 5% FINES	NOT MEETING ALL ABOVE REQUIREMENT FOR SW
		SANDS WITH FINES	SM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES > 12% FINES	ATTERBERG LIMITS BELOW "A" LINE WITH PI < 4
			SC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES > 12% FINES	ATTERBERG LIMITS ABOVE "A" LINE WITH PI > 7
FINE -GRAINED SOILS (MORE THAN HALF BY WEIGHT PASSING NO. 200 SIEVE SIZE)	SILTS Below "A" Line on plasticity chart; negligible inorganic content		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR SILTY SANDS OF SLIGHT PLASTICITY	$W_L < 50$
			MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS, FINE SANDY OR SILTY SOILS	$W_L > 50$
	SILTS Above "A" Line on plasticity chart; negligible inorganic content		CL	INORGANIC CLAYS OR LOW PLASTICITY, GRAVELLY, SANDY, OR SILTY CLAYS, LEAN CLAYS	$W_L < 30$
			CI	INORGANIC CLAYS OF MEDIUM PLASTICITY, SILTY CLAYS	$W_L > 30 < 50$
			CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS	$W_L > 50$
	ORGANIC SILTS AND ORGANIC CLAYS Below "A" Line on plasticity chart		OL	INORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY	$W_L < 50$
			OH	ORGANIC CLAYS OF HIGH PLASTICITY	$W_L > 50$



PLASTICITY CHART FOR CLASSIFICATION OF FINE GRAINED SOILS

ZONING AND SUBDIVISION
65262 RGE RD 113 WITHIN NE-16-65-11-W4M
LAC LA BICHE COUNTY, ALBERTA
ENVIRONMENTAL SITE ASSESSMENT (ESA) PHASE I

REPORT

PREPARED FOR

SELECT ENGINEERING CONSULTANTS
#100, 17413 107 AVE NW
EDMONTON, AB T5S 1E5

FILE NO.: 292-2021-002
DATE: DECEMBER 14, 2021

QUALITEST CANADA LTD.

702 - 23 Avenue, Nisku, AB T9E 7Y6
112, 13085 -115 Avenue - Surrey, BC V3R 0C3

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EXECUTIVE SUMMARY

Introduction

A Phase I Environmental Site Assessment (ESA) was conducted for the proposed Zoning and Subdivision within a portion of the property (subject property) located within the quarter section NE-16-65-11-W4M in Lac La Biche County, Alberta. The subject property is located on the west side of Range Road 113. The nearest intersection from the property is Range Road 113 and Township Road 652.

In accordance with CSA Z768-01 (R2016), the Phase I ESA consisted of a review of the available background and historic information of the property and the surrounding areas, a visual site review and interview and a report of the findings. The purpose of the Phase I ESA was to determine the potential existence of contaminants and/or environmental concerns on the subject property and the surrounding areas.

Site Description

The subject property is a combination of flat and uneven areas, including small water bodies and mostly covered with the trees with walking trails. The subject property was covered in snow during the time of the site visit. A wood-framed picnic shelter is located on the south portion of the area, and a temporary deer observation tower is located on the north portion of the area.

Environmental Hazard Potential

Based on the information reviewed and observations made during the visual site review, the subject property is considered to have a low environmental hazard. No further investigation (i.e. Phase II ESA) is required at this time.

TABLE OF CONTENTS

1. INTRODUCTION

A Phase I Environmental Site Assessment (ESA) was conducted for the proposed Zoning and Subdivision within the quarter section NE-16-65-11-W4M in Lac La Biche County, Alberta. The subject property is located on the west side of Range Road 113. The nearest intersection from the property is Range Road 113 and Township Road 652.

The scope of work was carried out in general accordance with our proposal (File: P-2021-390, dated June 16, 2021) letter to Mr. Eric Sehn, Planner of Select Engineering Consultants. Authorization to proceed with the work was received from Mr. Sehn via e-mail dated July 12, 2021. A visual site review of the subject property was conducted on November 26, 2021.

In accordance with CSA Z768-01 (R2016), the Phase I ESA consisted of a review of the available background and historic information of the property and the surrounding areas, a visual site review and interview and a report of the findings. The purpose of the Phase I ESA was to determine the potential existence of contaminants and/or environmental concerns on the subject property and the surrounding areas.

2. SITE DESCRIPTION

2.1 Subject Property

The location of the subject property is shown on the Key Plan and Surrounding Land Use Drawing No. 292-2021-001-1 and included in Appendix A. The subject property is a combination of flat and uneven areas, including small water bodies and mostly covered with the trees with walking trails. The subject property was covered in snow during the time of the site visit. A wood-framed picnic shelter is located on the south portion of the area, and a temporary deer observation tower is located on the north portion of the area.

2.2 Physiography and Regional Geology

An online review of the Alberta Energy Regulator Website (https://ags.aer.ca) for Bedrock Physiography of the area revealed the following.

Landscape: Broad boreal plains and lowlands with isolated ridges and broad hills.

Sediments: Very thick sediments contain significant aquifers within the till and along with the floors of largely buried valleys.

Bedrock: Deep mudstone-dominated bedrock does not transmit water easily; therefore, groundwater is often not sourced from bedrock.

Other: Discontinuous permafrost in the northern area.

The land surface elevation at this site is approximately 640 metres (https://en-ca.topographic-map.com/maps/qep/Lac-La-Biche).

2.3 Hydrogeology / Precipitation

Review of Lakeland County Study Area Report for Regional Groundwater Assessment (Hydrogeological Consultants Ltd., September 2002) revealed the following:

- The mean annual precipitation measured within the County was 529 millimetres based on data from 1947 to 1993.

- Surficial deposits within the County are generally less than 100 metres thick, except in areas of linear bedrock lows where the thickness may exceed 150 metres. Upper surficial deposits consist of till, meltwater deposits, and ice contact. Lower surficial deposits include pre-glacial fluvial and lacustrine materials.

- The main aquifers within the surficial materials are sand and gravel deposits. Approximately 41% of the water wells completed in the sand and gravel aquifers have yields of less than 50 m^3/day, 25% have yields ranging from 50 to 150 m^3/day, and 33% have yields greater than 150 m^3/day.

- Within the County, the uppermost bedrock is the Lea Park Formation, which consists primarily of dark grey shales of marine origin. This formation is unsuitable as a source of groundwater since it is considered essentially impermeable.

2.4 Geotechnical Investigation

A geotechnical investigation for gravel road for the proposed Zoning and Subdivision (Qualitest File No. 292-2021-001, dated December 14, 2021) revealed that the soil profile consisted of topsoil over silty clay over clay till extending to a depth of at least 3.0 meters, the maximum depth excavated by Qualitest at the site. The test pits were dray dry upon completion of excavation. Although the scope of the geotechnical assessment was not environmental, no potential environmental concerns such as adverse odour, staining, debris etc., were apparent in the soil samples collected during excavation.

3. RECORDS REVIEW

Available historical information was reviewed for items of environmental significance, including former use of the site and surrounding areas. Information searched and reviewed for the subject property included:

1. Aerial Photo Record System (APRS)

2. Alberta Land Titles

3. Planning and Development, Lac La Biche County
4. Environmental Public Health (North Zone)
5. Alberta Safety Codes Authority (ASCA)
6. Environment and Parks, Agriculture and Forestry (FOIP Office)
7. Environmental Site Assessment Repository (ESAR)
8. Alberta Energy Regulator (AER)
9. Alberta Water Well Information Database (AWWID)
10. National Pollutant Research (NPR)

3.1 Aerial Photo Record System (APRS)

Historical aerial photographs dated 1977, 1981, 1988, 1990, 1995, 2007 and 2011 were obtained for the site and examined to identify site-specific land use which may have resulted in environmental concerns on and/or adjacent to the site. Aerial photographs have been included in Appendix B. A summary of observations made has been presented below.

1977 The subject property is mostly covered with trees. Range Road 113 is visible along the east side of the property.

1981 Relatively unchanged from 1977.

1988 Relatively unchanged from 1981.

1990 Relatively unchanged from 1988.

1995 Relatively unchanged from 1990.

2007 Relatively unchanged from 1995.

2011 Relatively unchanged from 2007.

3.2 Alberta Land Titles

A summary of the Chain of Title is presented in Appendix C. The land has been owned by Armand Christian Menard of Plamondon, Alberta, since 2012. The title, utility right of ways (ROWs), caveat have been granted for the property to other individuals and companies before. No indication of environmentally-sensitive activities occurring on the subject property was given upon review of the land titles searched.

3.3 Planning and Development, Lac La Biche County

A record search by the County of Lac La Biche on July 29, 2021, revealed the following information for the subject property:

- No records of spill reports.
- No records of above-ground fuel storage tanks.
- No records of emergency response.
- No records of sewage discharge infraction or drainage infraction for this property.
- No record of any fire response infractions for this property.
- The property is currently zoned as Agriculture.
- Subdivision Application (No. 2018-S-007) for two, ten-acre lots for residential use, and to rezone from Agriculture to On-Site Estate Residential District 2 (File No. P-D-17-008).

3.4 Environmental Public Health (North Zone)

A record search by the Lac La Biche Community Health Services - North Zone on July 30, 2021, revealed no records of hazardous waste sites, abandoned land fields and contamination sources constitution a public health nuisance for the property and the surrounding areas.

3.5 Environment and Parks, Agriculture and Forestry (FOIP Office)

A record search conducted by Alberta Environment and Parks, Agriculture and Forestry (FOIP Office) of Service Alberta on July 28, 2021, has not identified any routinely available records relating to the subject property.

3.6 Alberta Safety Codes Authority (ASCA)

A record search conducted by Alberta Safety Codes Authority (ASCA) on July 21, 2021, revealed no data of pollutant release existing and former installation of storage tank system, as defined by the Fire Code, including those known to be inside the structure at the following address.

3.7 Environmental Site Assessment Repository (ESAR)

An online search of Alberta Environment’s ESAR on December 8, 2021, revealed that the Supertest Petroleum Corporation's well was located within SE-34-65-W4M and their access road was in a satisfactory condition (Reclamation Certificate No. 161, dated October 3, 1963).

3.8 Alberta Energy Regulator (AER)

An online file search of Alberta Energy Regulator (AER) One Stop on December 10, 2021, revealed that an abandoned well of Sequoia Resources Corporation is located within NE-16-65-11-W4M (i.e., the quarter section in which the subject property is located). The distance of the well is approximately 325 metres from the boundary of the subject property. An abundant natural gas line of the same company and right of ways are noticed along the west boundary of the quarter section.

3.9 Alberta Water Well Information Database (AWWID)

An online search of Alberta Water Well Information Database (AWWID) Alberta on December 10, 2021, revealed that there are no records of water wells within the quarter section NE-16-65-11-W4M in which the subject property is located. The closest water well to the subject property is located approximately 225 metres northeast of the quarter section.

3.10 National Pollutant Release Inventory (NPRI)

An online search of the National Pollutant Release Inventory (NPRI) on December 8, 2021, revealed no record of pollutant release within the quarter section NE-16-65-11-W4M in which the subject property is located and within surrounding areas.

All the file search results from Section 4.3 to 4.10 are attached in Appendix D.

4. VISUAL SITE REVIEW

Qualitest personnel conducted a visual site review of the subject property on November 26, 2021. Photographs of the subject property are presented in Appendix E. The area was mostly covered by snow during the time of the site visit. Brief summaries of the observations made during the site review are presented in the following sub-sections.

4.1 Subject Property

1. The subject properly is located on the west site of Range Road 113.

2. The subject property is mostly flat and sloped in some areas especially near the entrance and on the northwest side including small water bodies in the area.

3. A wooden picnic shelter is located on the south side of the subject property, and a temporary deer observation tower is located on the north side of the subject property.

4.2 Surrounding Area

As shown on Drawing No. 292-2021-002-1, surrounding land use in the vicinity of the site is predominantly natural forest and agricultural land and includes:

North: Agricultural land and vacation lots.

South: A trail followed by agricultural land and farming/vacation home.

East: Range Road 113 followed by farming land. An overhead power line is located on the east side of the road.

West: Agricultural land covered in trees.

A telecommunication tower is located on the east side of Range Road 113 and approximately 75 m away on the southeast side of the subject property. A small overhead electric transformer is observed within the tower area. No detailed information was available about the tower during site visit.

4.3 Storage Tanks

During the visual site review, no evidence of the Underground Storage Tank (UST) and Aboveground Tank (AST) was apparent on the subject property.

4.4 Waste Management

4.4.1 Liquid and Solid Wastes

No liquid or solid wastes are currently generated on the subject property.

4.4.2 Hazardous Substances and Waste Dangerous Goods

No liquid or hazardous substances and dangerous waste goods are currently generated on the subject property.

4.5 Surface Staining/Stressed Vegetation and Soil Fill

The area was covered in snow. No evidence of surface staining stressed vegetation or soil fill was apparent during the site visit.

4.6 Air Emissions

No obvious sources of adverse air emissions were present at the time of the visual site review.

4.7 Noise and Vibration

No obvious sources of excessive noise and/or vibration were apparent at the subject property at the time of visual site review.

4.8 Electromagnetic Fields (EMFs)

No high-tension transmission lines with the potential to generate significant EMFs are located near the subject property.

4.9 Radioactive Sources

No labelled radioactive sources with the potential to generate significant environmental concerns were apparent during the visual site review.

4.10 Building Materials

There is no building in the area. A wood-framed picnic shelter is, and a temporary deer observation tower is located in the area.

5. INTERVIEW

Qualitest personnel conducted a visual site review of the subject property on November 26, 2021, and interviewed Mr. Armand Christian Menard, the owner of the property and he has no information regarding environmental or fire hazards regarding the subject property and surrounding areas.

6. ENVIRONMENTAL HAZARD POTENTIAL

Based on the information reviewed and observations made during the visual site review, the subject property is considered to have a low environmental hazard, and no further investigation (i.e. Phase II ESA) is required at this time.

7. CLOSURE

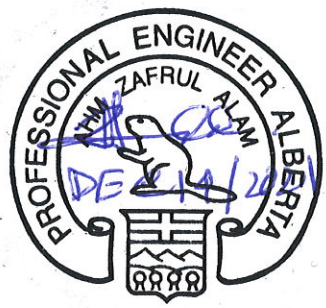
The Phase I ESA consisted of a review of Aerial Photo Record System (APRS), Alberta Land Titles, Planning and Development - Lac La Biche County, Environmental Public Health (North Zone), Alberta Safety Codes Authority (ASCA), Environmental Site Assessment Repository (ESAR), Alberta Energy Regulator (AER), Alberta Water Well Information Database (AWWID), National Pollutant Research (NPR), visual site review and interview with the owner.

This Phase I ESA report has been prepared for the exclusive use of Select Engineering Consultants and their agents for specific application to the proposed Zoning and Subdivision located within quarter section NE-16-65-11-W4M in Lac La Biche County, Alberta. It has been

prepared following generally accepted geo-environmental engineering practices, and no other warranty, express or implied, is made.

If a third party uses this report or relies on decisions made based on it, it is the responsibility of such third party. Qualitest will not be liable for any damages incurred by a third party as a result of any decision or action taken based on this report.

If this report is sent electronically, it may be digitally modified, so only the signed report sent directly by Qualitest are definitely reliable. We trust the recommendations provided in this letter report meet your needs at present. Please contact Qualitest if you have any questions or require any further information.



AHM Zafrul Alam, P.Eng.
Lead Geotechnical Engineer

PERMIT TO PRACTICE

QUALITEST CANADA LTD.

PERMIT NUMBER: P-13697

Signature _____

Date December 14, 2021

The Association of Professional Engineers and Geoscientists of Alberta (APEGA)

Attachments:

- Appendix A
  - Drawing 292-2021-002-1 Site Location and Surrounding Area
- Appendix B
  - Aerial Photographs
- Appendix C
  - Chain of Land Title
- Appendix D
  - File Search Results
- Appendix E
  - Site Photographs

8. REFERENCES

Hydrogeological Consultants Ltd. (HCL), September 2002. Regional Groundwater Assessment, Lakeland County Study Area.

Qualitest Canada Ltd. (Qualitest), December 2021, Geotechnical Assessment Report, Zoning and Subdivision for Lac La Biche County, Qualitest File No. 292-2021-001, Dated December 14, 2021.

Environmental Site Assessment Repository (ESAR), 2021 Government of Alberta Website Search.

Alberta Energy Regulator (AER), 2021 Alberta Energy Regulator Website Search.

Alberta Water Well Information Database (AWWID), 2021 Government of Alberta Website Search.

National Pollutant Research (NPR), 2021 National Pollutant Research Website Government Search.

https://en-ca.topographic-map.com, 2021 online search.

APPENDIX A

Drawing Number 292-2021-002-1 Site Location and Surrounding Area

NOTE: GOOGLE IMAGE 2021

QUALITEST™ Canada **QUALITEST CANADA** 702 - 23rd Ave Nisku, Alberta, T9E 7Y6, Canada	DRAWING TITLE: **PROPOSED ZONING AND SUBDIVISION NE-16-65-11-W4 LAC LA BICHE COUNTY, ALBERTA**		
	PROJECT: **PHASE I ENVIRONMENTAL SITE ASSESSMENT SITE LOCATION AND SURROUNDING AREA**		
	DRAWN BY: **VIGNESH GOPAL RAJA**	APPROVED BY: **ZAFRUL ALAM**	DRAWING NUMBER: **292-2021-002-1**
	SCALE: **1:25,000**	DATE: **DECEMBER 14, 2021**	

APPENDIX B

Chain of Land Title

CHAIN OF LAND TITLE
CURRENT TITLE WITH HISTORICAL DATA
65262 RGE RD, LAC LA BICHE COUNTY, ALBERTA
PORTION OF NE-16-65-11-W4M

DATE	PARTICULARS	REMARKS
Oct 12, 2018	Changes of Address for Service	Re - Armand Christian Menard Plamondon, Alberta
Sep 13, 2018	Subdivision Plan	Armand Christian Menard Plamondon, Alberta
Apr 5, 2012	Transfer of Land	Armand Christian Menard Fort McMurray, Alberta
Apr 24, 2009	Transfer of Utility Right of Way	Transferee - Paramount Energy Operating Corp.
May 2, 2008	Changes of Address for Service	Re - Paramount Energy Operating Corp.
Sep 8, 2004	Transfer of Caveat	Transferee - Paramount Energy Operating Corp.
Sep 22, 2003	Transfer of Utility Right of Way	Transferee - Altagas Services Inc.
Jun 6, 2002	Transfer of Utility Right of Way	Transferee - Encana Oil and Gas Co. Ltd.
Mar 24, 1997	Discharge of Utility Right of Way	Discharge of Utility Right of Way Partial
May 4, 1995	Utility Right of Way	Grantee - Paramount Energy Operating Corp.
Jan 31, 1992	Transfer of Land	James Stehr and Margaret Arnold Drumheller, Alberta
Aug 14, 1990	Caveat	Surface Lease Caveator - Paramount Energy Operating Corp.
Jun 10, 1981	Certificate of Title	Seppo Kinnunen Lac La Biche, Alberta
Jul 3, 1973	Certificate of Title	Her Majesty of Queen
Oct 20, 1944	Certificate of Title	Minister of Municipal Affairs The Province of Alberta, Dominion of Canada
Apr 25, 1939	Certificate of Title	Albert Long Edmonton, in the Province of Alberta, Dominion of Canada

APPENDIX C

Aerial Photographs

NOTE: THIS DRAWING WAS COMPILED USING AERIAL PHOTOGRAPH: AS5557N-185

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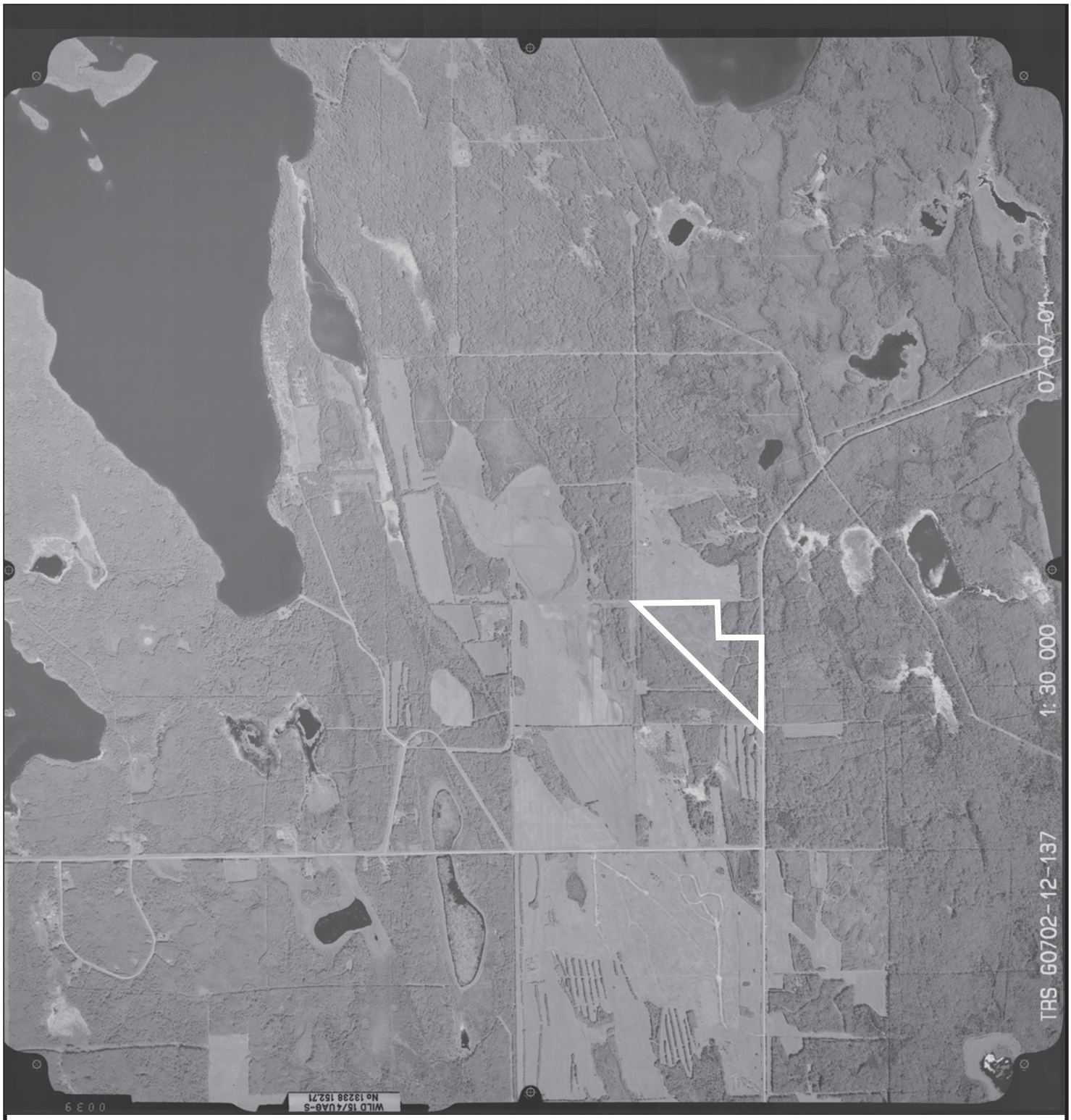
Alberta, T9E 7Y6, Canada

DRAWING TITLE: **PROPOSED ZONING AND SUBDIVISION NE-16-65-11-W4 LAC LA BICHE COUNTY, ALBERTA**		
PROJECT: **PHASE I ENVIRONMENTAL SITE ASSESSMENT AEREAL PHOTOGRAPH (2011)**		
DRAWN BY: **VIGNESH GOPAL RAJA**	APPROVED BY: **ZAFRUL ALAM**	DRAWING NUMBER: **292-2021-002-2**
SCALE: **1:5,000**	DATE: **DECEMBER 14, 2021**	



NOTE: THIS DRAWING WAS COMPILED USING AERIAL PHOTOGRAPH: G0702-12-137

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Alberta, T9E 7Y6, Canada

DRAWING TITLE: **PROPOSED ZONING AND SUBDIVISION NE-16-65-11-W4 LAC LA BICHE COUNTY, ALBERTA**

PROJECT: **PHASE I ENVIRONMENTAL SITE ASSESSMENT AEREAL PHOTOGRAPH (2007)**

DRAWN BY: **VIGNESH GOPAL RAJA**	APPROVED BY: **ZAFRUL ALAM**	DRAWING NUMBER: **292-2021-002-3**
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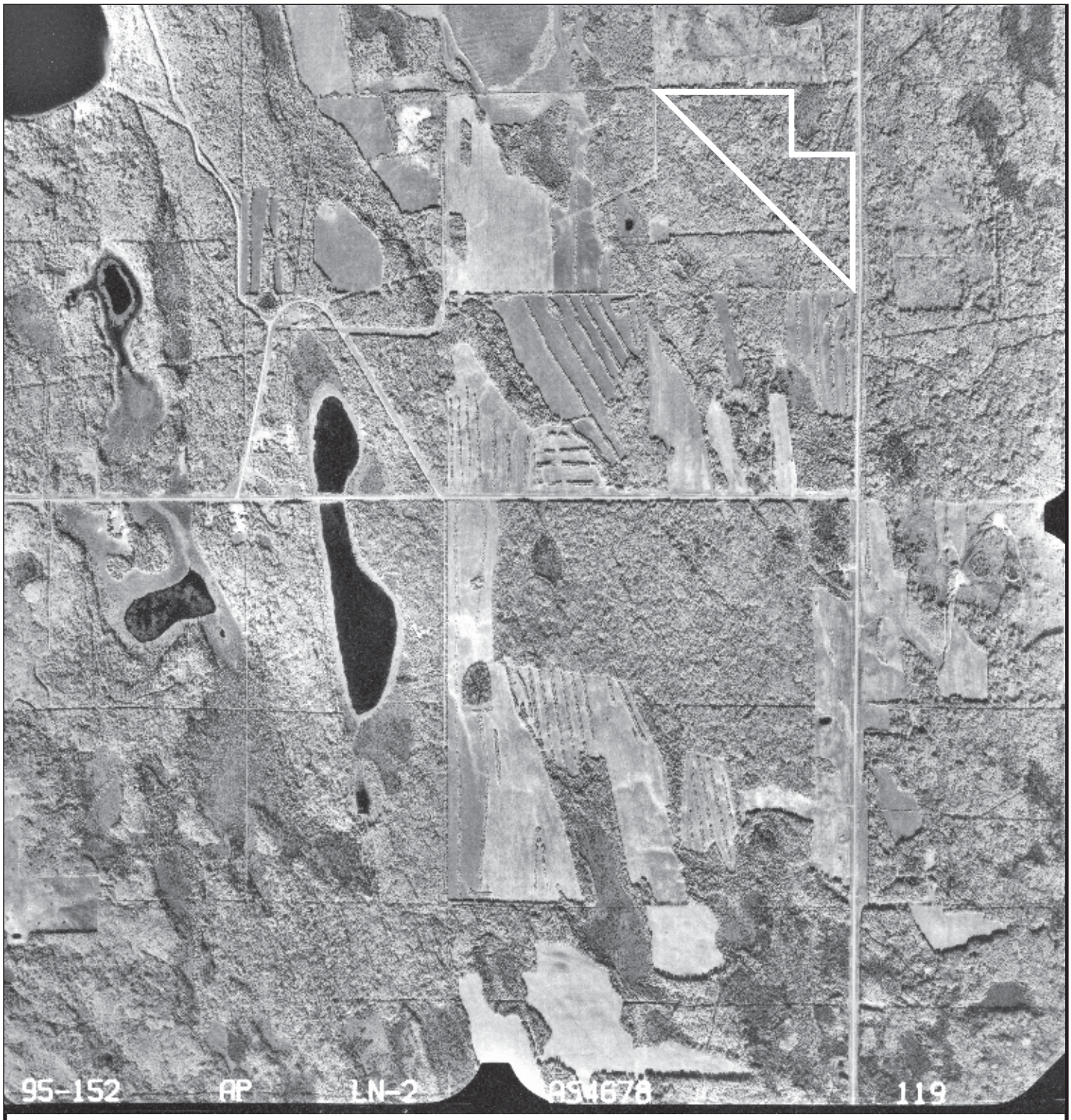

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QUALITEST CANADA
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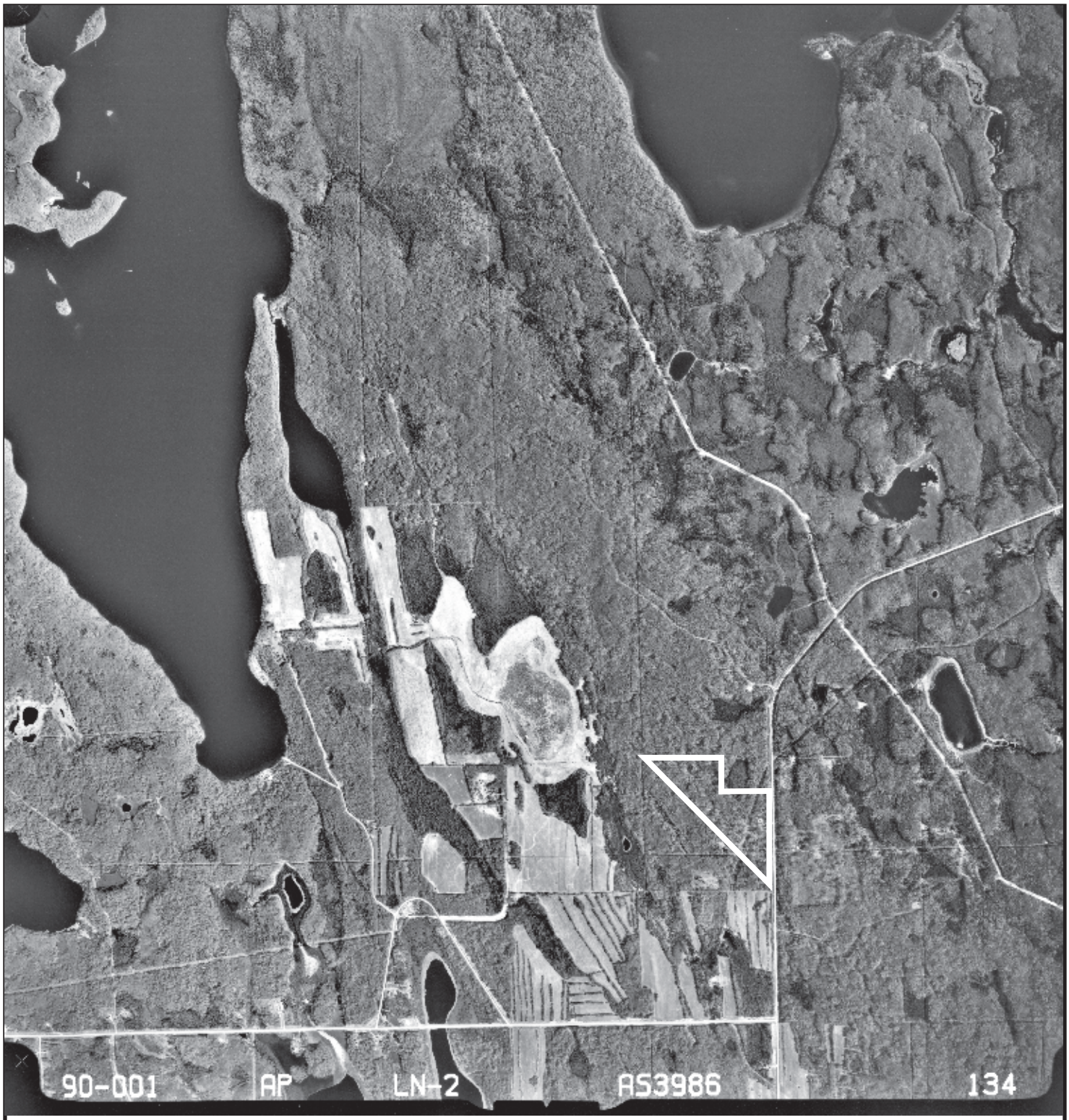
Alberta, T9E 7Y6, Canada

DRAWING TITLE: **PROPOSED ZONING AND SUBDIVISION NE-16-65-11-W4 LAC LA BICHE COUNTY, ALBERTA**		
PROJECT: **PHASE I ENVIRONMENTAL SITE ASSESSMENT AEREAL PHOTOGRAPH (1995)**		
DRAWN BY: **VIGNESH GOPAL RAJA**	APPROVED BY: **ZAFRUL ALAM**	DRAWING NUMBER: **292-2021-002-4**
SCALE: **1:20,000**	DATE: **DECEMBER 14, 2021**	



NOTE: THIS DRAWING WAS COMPILED USING AERIAL PHOTOGRAPH: AS3986

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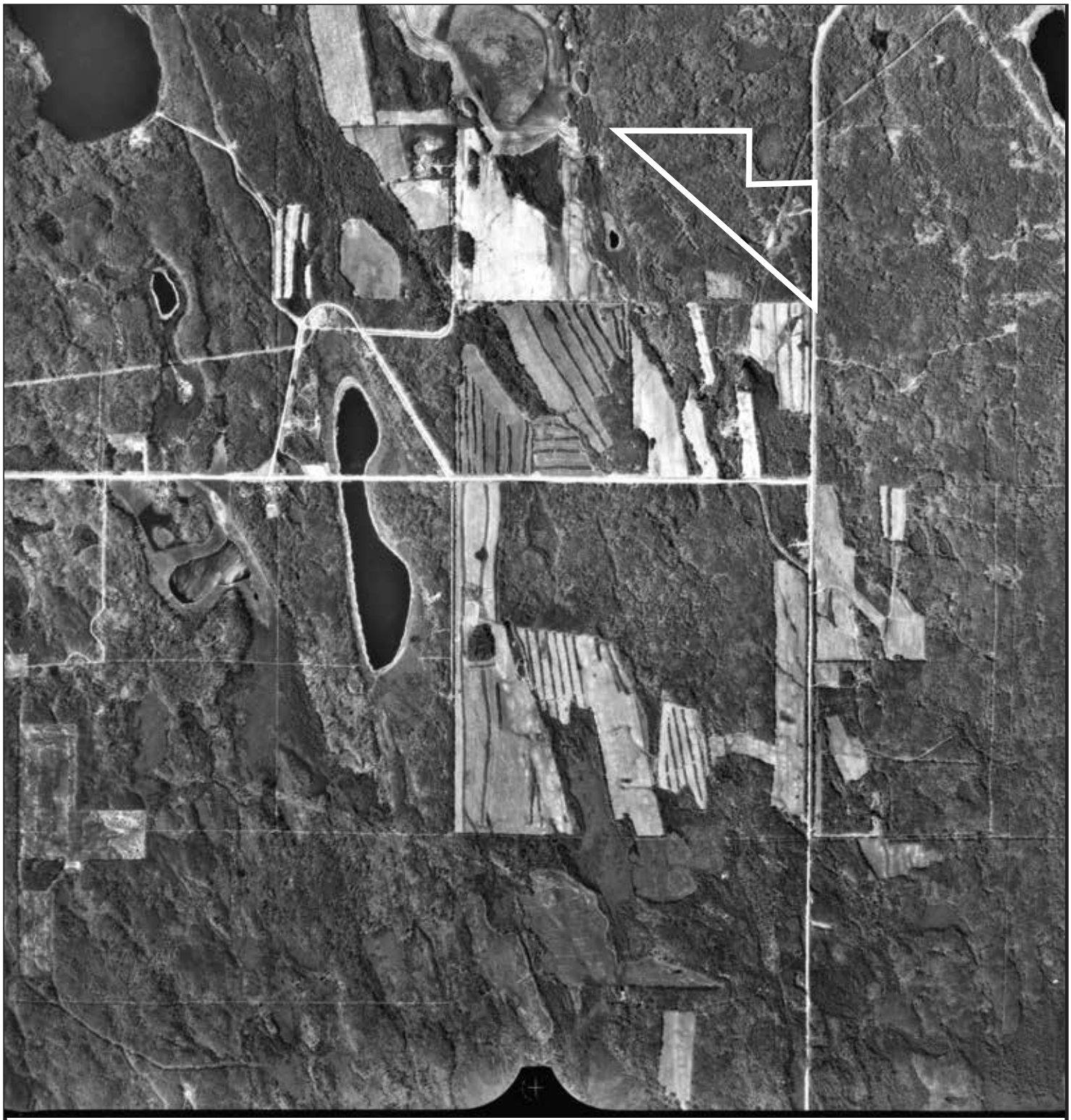
Alberta, T9E 7Y6, Canada

DRAWING TITLE: **PROPOSED ZONING AND SUBDIVISION NE-16-65-11-W4 LAC LA BICHE COUNTY, ALBERTA**		
PROJECT: **PHASE I ENVIRONMENTAL SITE ASSESSMENT AEREAL PHOTOGRAPH (1990)**		
DRAWN BY: **VIGNESH GOPAL RAJA**	APPROVED BY: **ZAFRUL ALAM**	DRAWING NUMBER: **292-2021-002-5**
SCALE: **1:30,000**	DATE: **DECEMBER 14, 2021**	



NOTE: THIS DRAWING WAS COMPILED USING AERIAL PHOTOGRAPH: F84-20

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Alberta, T9E 7Y6, Canada

DRAWING TITLE: **PROPOSED ZONING AND SUBDIVISION NE-16-65-11-W4 LAC LA BICHE COUNTY, ALBERTA**		
PROJECT: **PHASE I ENVIRONMENTAL SITE ASSESSMENT AEREAL PHOTOGRAPH (1988)**		
DRAWN BY: **VIGNESH GOPAL RAJA**	APPROVED BY: **ZAFRUL ALAM**	DRAWING NUMBER: **292-2021-002-6**
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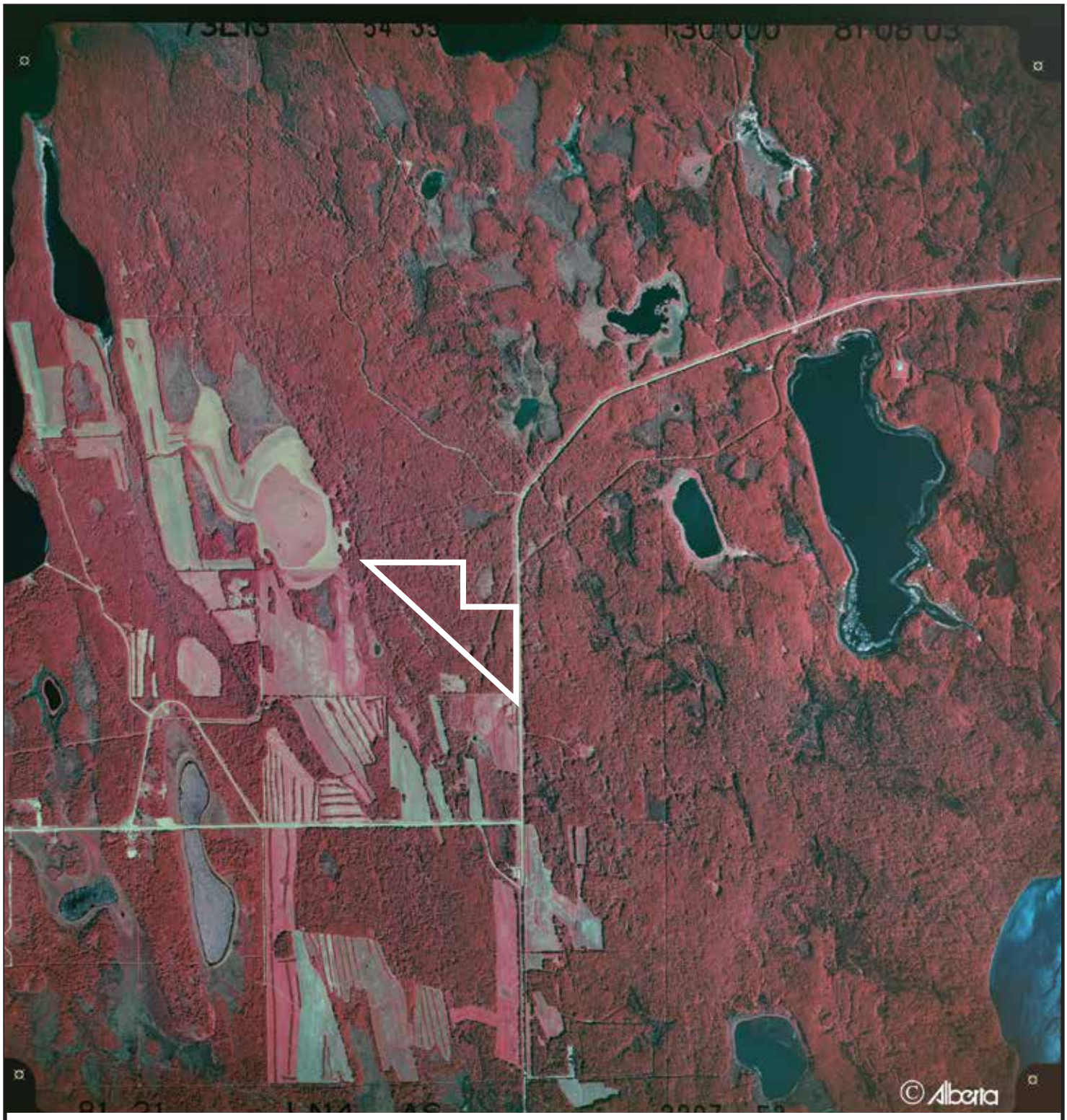

NOTE: THIS DRAWING WAS COMPILED USING AERIAL PHOTOGRAPH: AS2287

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Alberta, T9E 7Y6, Canada

DRAWING TITLE: **PROPOSED ZONING AND SUBDIVISION NE-16-65-11-W4 LAC LA BICHE COUNTY, ALBERTA**

PROJECT: **PHASE I ENVIRONMENTAL SITE ASSESSMENT AEREAL PHOTOGRAPH (1981)**

DRAWN BY: **VIGNESH GOPAL RAJA**	APPROVED BY: **ZAFRUL ALAM**	DRAWING NUMBER: **292-2021-002-7**
SCALE: **1:30,000**	DATE: **DECEMBER 14, 2021**	

NOTE: THIS DRAWING WAS COMPILED USING AERIAL PHOTOGRAPH: AS1642

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Alberta, T9E 7Y6, Canada

DRAWING TITLE: **PROPOSED ZONING AND SUBDIVISION NE-16-65-11-W4 LAC LA BICHE COUNTY, ALBERTA**		
PROJECT: **PHASE I ENVIRONMENTAL SITE ASSESSMENT AEREAL PHOTOGRAPH (1977)**		
DRAWN BY: **VIGNESH GOPAL RAJA**	APPROVED BY: **ZAFRUL ALAM**	DRAWING NUMBER: **292-2021-002-8**
SCALE: **1:15,000**	DATE: **DECEMBER 14, 2021**	

APPENDIX D

File Search Results

Lac La Biche County
Land Report

65262 RGE RD 113 (NE-16-65-11-W4)
Lac La Biche, Alberta

Prepared By: Randi Dupras
Environmental Services Coordinator
Lac La Biche County

Prepared For:

Qualitest Canada Ltd
702 - 23 Ave
Nisku, AB
T9E 7Y6

&

Lac La Biche County

Lac La Biche County
welcoming by nature.

July 29, 2021

1. **Historical Ownership and Occupancy of Property**

65262 RGE RD 113 (NE-16-65-11-W4)

1.1. 65262 RGE RD 113 (NE-16-65-11-W4)
Within Lac La Biche County

Name of Current registered owners listed:

MENARD, ARMAND CHRISTIAN

2. **Records Pertaining to Potential Contamination of the Property from Past Spills**

2.1. 65262 RGE RD 113 (NE-16-65-11-W4)

According to our records, there have been no spill reports filed regarding this property.

3. Records of Underground/ Aboveground Fuel Storage Tanks

3.1. 65262 RGE RD 113 (NE-16-65-11-W4)

According to our records, there are no records of above ground fuel storage tanks.

4. Records of Any Sewer Discharge Infractions or Drainage Infractions

4.1. 65262 RGE RD 113 (NE-16-65-11-W4)

Our records indicate no record of any sewage discharge infractions or drainage infractions for this property.

5. Records of any Easements or Utility Right of Ways Under the Property

5.1. Refer to land title

6. **Fire Response on Property**

6.1. 65262 RGE RD 113 (NE-16-65-11-W4)

Our records indicate no record of any fire response infractions for this property.

7. Records regarding zoning

7.1 65262 RGE RD 113 (NE-16-65-11-W4)

Property is currently zoned as Agriculture

Historical Information on zoning

Our records provide the following information:

Previously zoned as Agriculture

8. Records regarding development/construction dates

8.1. 65262 RGE RD 113 (NE-16-65-11-W4)

Subdivision Application (Subdivision Application No. 2018-S-007) for two, ten acre lots for residential use, and to rezone from Agriculture to On-Site Estate Residential District 2 (File No. PD-17-008).

9. Additional Information Regarding Potential Environmental Impact

1.1. 65262 RGE RD 113 (NE-16-65-11-W4)

Site Aerial:

The results of the file searches do not replace the services provided by a qualified Environmental Consultant and do not constitute a complete Environmental Site Assessment. The information on file with Lac La Biche County regarding a property does not imply the presence or absence of environmental problems or difficulties.

Environmental Public Health (North Zone)
10320-99 Street
Grande Prairie, AB T8V 6J4
Phone: 780-513-7509
AHS.NZ.EPH.RecordSearch@ahs.ca

July 30, 2021

Qualitest Canada Ltd.
702 23 Avenue
Nisku, AB T9E 7Y6

Re: Your request for records search

On July 17, 2021 our office received your request for information regarding the following property:

65262 Rge Rd 113, Lac La Biche County, Alberta
NE-16-65-11-W4M

We have conducted a search for records created in accordance with public health legislation, including records relating to hazardous waste sites, abandoned landfills and contamination sources constituting a public health nuisance.

No records responsive to your request have been located. However, it should be noted that the fact that records do not exist does not necessarily mean that the property complies with all applicable legislation.

Please be advised that the records relevant to your search may be held by other government agencies such as Alberta Environment and Parks, Alberta Energy, local municipal agencies, and others. You should contact these agencies directly for further information.

Payment for invoice NZ-2021-0070 was received so no balance is owing.

Should you have any questions or concerns please email AHS.NZ.EPH.RecordSearch@ahs.ca

Sincerely,

Environmental Public Health
Alberta Health Services – North Zone

Alberta Safety Codes Authority

A Division of the Safety Codes Council

July 21, 2021

Mr. Zafrul Alam
Qualitest Canada Ltd.
702 23 Ave
Nisku AB T9E 7Y6

EMAIL: zafrul@qualitests.com

Re: ASCA Storage Tank Search – Your File No. 393-2021-002

Dear Mr. Alam,

As per your search request dated July 15, 2021, Alberta Safety Codes Authority (ASCA) has searched the storage tank database for existing and former installations of storage tank systems, as defined by the Fire Code, including those known to be inside structures at the following address:

1. 65262 Rge Rd 113, NE-16-65-11-4, Lac La Biche AB

The search of the storage tank database determined no records were available for the address requested.

The Freedom of Information and Protection of Privacy Act governs the information provided. Please note that the database is ***not*** complete. The main limitation of the database is that it only includes information reported through registration and permitting or a survey of abandoned sites completed in 1992 and should not be considered a comprehensive inventory of all past or present storage tank sites. ASCA's storage tank systems database is solely maintained based on information provided by owners and or operators of storage tank systems; therefore, the database may not reflect information related to all existing or former storage tank systems in Alberta. Further information on storage tank systems or investigations involving a spill/release or contamination may be filed with the local fire service or Alberta Environment.

Regards,

ASCA Associate
ascatanks@safetycodes.ab.ca

Environment & Parks and Agriculture & Forestry
FOIP Office
10th Floor, 9Triple8 Jasper,
9888 Jasper Avenue NW
Edmonton, Alberta, T5J 5C6
Telephone: 780-427-4429
www.alberta.ca

Alberta Service Alberta

July 28, 2021

Mr. Zafrul Alam
Qualitest Canada Ltd.
702-23rd Avenue
Nisku, Alberta

Your File #: 393-2021-002
Order Number: FOIPRD-2021-9204

Dear Mr. Alam:

Re: Routine Disclosure Request FOIPRD-2021-9204 for Information Routinely Available Under the Environmental Protection and Enhancement (EPEA) Legislation.

Our office received your request on July 15, 2021 for the following subject records:

Location: NE Sec 16 Twp 65 Rge 11 W4M; 65262 Rge Rd 113, Lac La Biche
Name(s): Armand Christian Menard
Time Frame: Historical to Jul 15, 2021
Records: Historical records for conducting Phase I Environmental Site Assessment

Alberta Environment and Parks has conducted a search of department records based on the search parameters you provided to this office and has not identified any routinely available records relating to the subject of your request. As a result of our findings, your Routine Disclosure request has been closed.

If you have any further questions or concerns, please write or call me at 780-427-2253.

Yours truly,

Christine Watson
Access & Privacy Advisor

Alberta Environment and Parks

Alberta.ca > Environment and Parks > Land - Industrial > Programs / Services > Environmental Site Assessment Repository (ESAR)

Home | Air | Land | Waste | Water | Newsroom | About Us

Environmental Site Assessment Repository (ESAR)

Search Form | Map Search | Download Complete ESA list (Updated Weekly)

ATS Search

► SHOW HELP

W [4] - [11] - [65] - [16] -[[NE]] -[[ ]] Search

Format: MER-RGE-TWP-SEC-[QTR]-[LSD]
[ ] denotes that the quarter section and legal subdivision are optional.

PBL Search

► SHOW HELP

Plan: [ ] Block: [ ] Lot: [ ] Search

Format: Plan - [Block] - [Lot]
[ ] denotes that the Block and/or Lot are optional.

Search Results

1 Result(s)

► SHOW HELP

Name	Address	View Map	View Docs
Reclamation	7-34-65-11-4		

Note:
An ESA document does not necessarily mean the site is, or ever was, contaminated. Please refer to the studies and reports to determine the condition of the site.
Place Name, **Street Address**, and **Coordinate Searches** are avaliable on the map page

-A marker identified as ESA is the location of a site where Alberta Environment and Parks has received scientific and/or technical information

-A marker identified as REC is the location of a site where Alberta Environment and Parks has received an application for a reclamation certificate.

Comments and questions can be directed to:
ESAR-Support@gov.ab.ca

Document Results

2 Result(s)

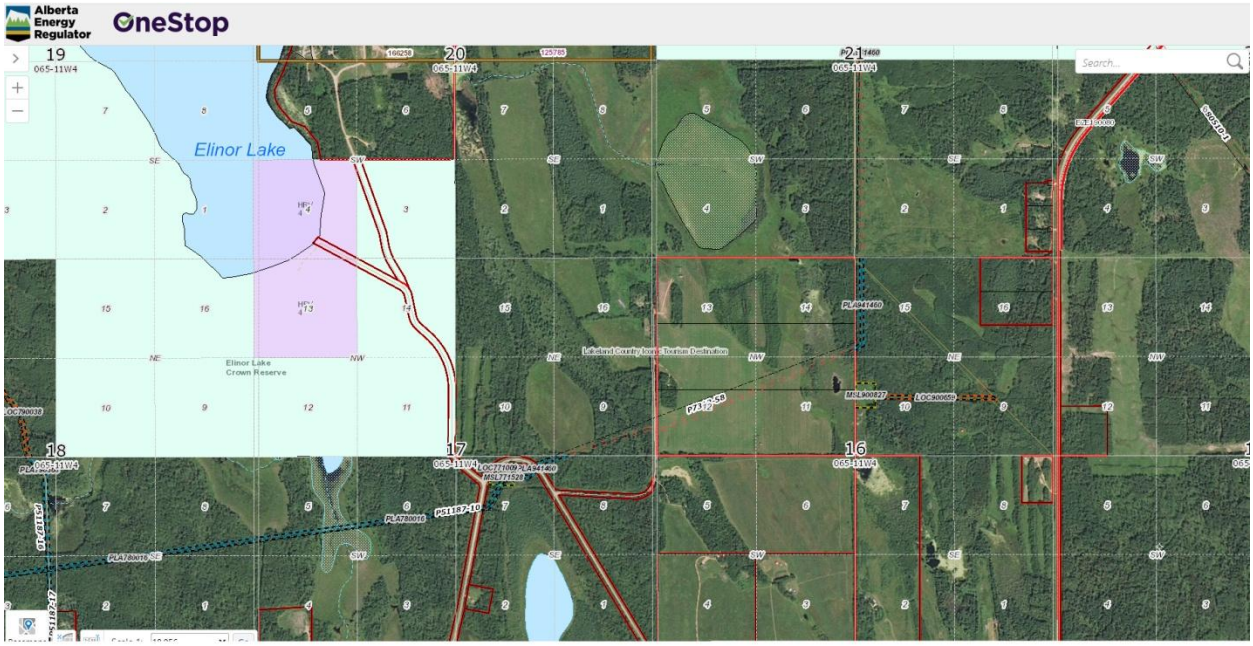
► SHOW HELP

Select	Name	Description	File Type	FileSize (MB)	Date
☑	Reclamation	Reclamation Certificate Documentation - SUPTST NUL CIG HELENA 7-34-65-11 WELL AND ACCESS ROAD	pdf	0.23	8/3/1965
☑	Reclamation	Reclamation Application Documentation - SUPTST NUL CIG HELENA 7-34-65-11 WELL AND ACCESS ROAD	pdf	0.56	5/3/1965

Your order is now available to be downloaded. Click here to download.

Document Delivery

◉ Download ○ Email [ ]


Alberta Energy Regulator
OneStop
Elinor Lake
Elinor Lake Crown Reserve
19
065-11W4
20
065-11W4
21
065-11W4
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065-11W4
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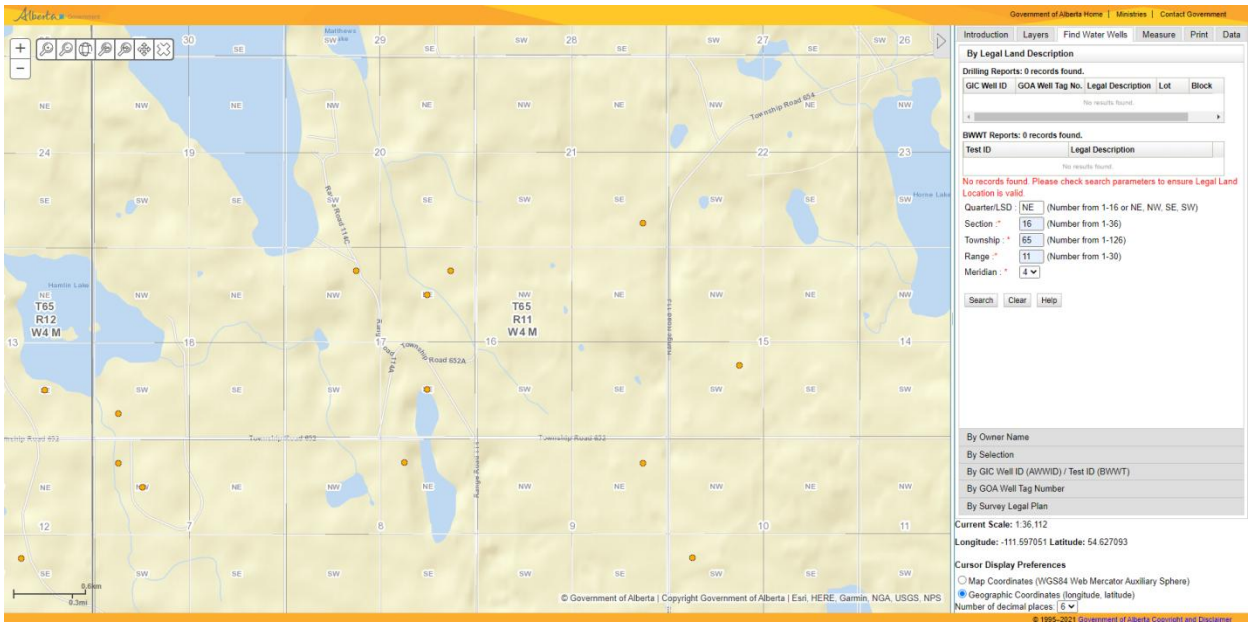
Government of Alberta Home | Ministries | Contact Government
Introduction
Layers
Find Water Wells
Measure
Print
Data
By Legal Land Description
Drilling Reports: 0 records found.
GIC Well ID
GOA Well Tag No.
Legal Description
Lot
Block
No results found.
BWWT Reports: 0 records found.
Test ID
Legal Description
No results found.
No records found. Please check search parameters to ensure Legal Land Location is valid.
Quarter/LSD : NE (Number from 1-16 or NE, NW, SE, SW)
Section :* 16 (Number from 1-36)
Township :* 65 (Number from 1-126)
Range :* 11 (Number from 1-30)
Meridian :* 4
Search
Clear
Help
By Owner Name
By Selection
By GIC Well ID (AWWID) / Test ID (BWWT)
By GOA Well Tag Number
By Survey Legal Plan
Current Scale: 1:36,112
Longitude: -111.597051 Latitude: 54.627093
Cursor Display Preferences
Map Coordinates (WGS84 Web Mercator Auxiliary Sphere)
Geographic Coordinates (longitude, latitude)
Number of decimal places: 6
T65 R12 W4 M
T65 R11 W4 M
Township Road 654
Township Road 652A
Township Road 652
Township Road 653
Range Road 114
Range Road 113
Horse Lake
Hamlin Lake
Matthews Swamp
0.6km
0.3mi
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Français

Government of Canada | Gouvernement du Canada

MENU

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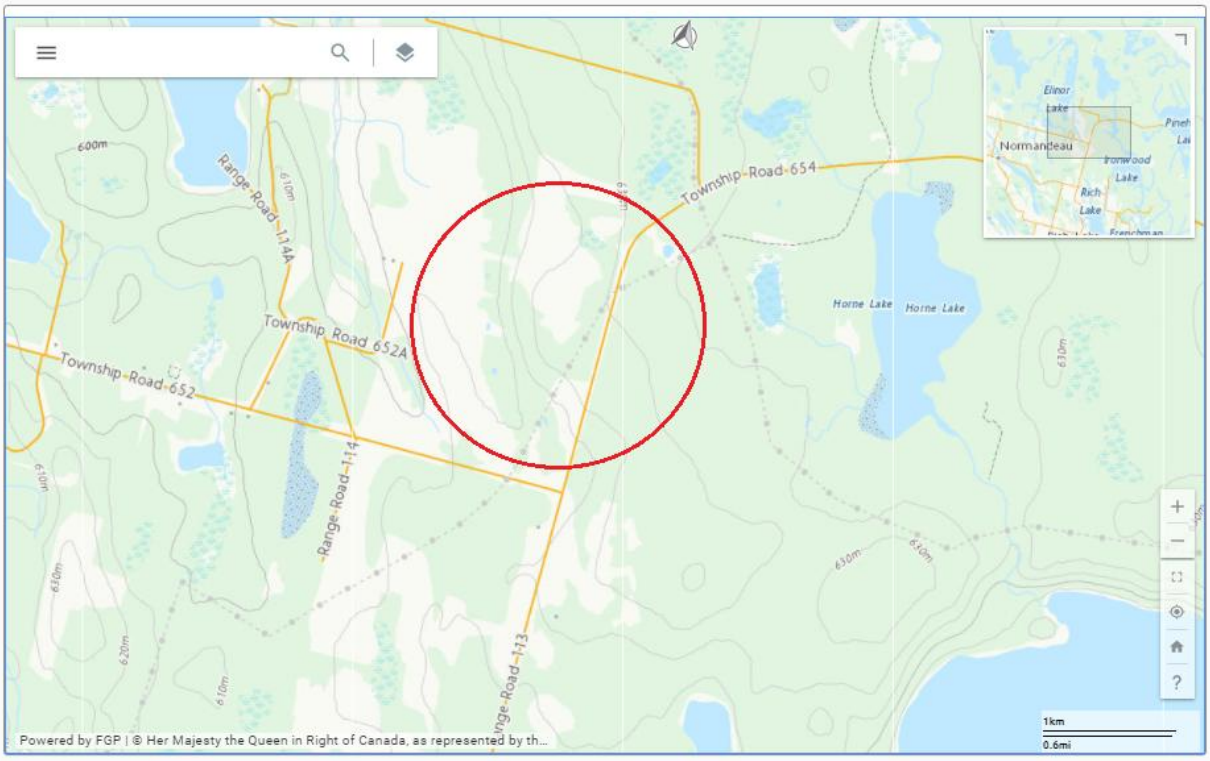
Open Maps

- Maps of reporting facilities – facility location



APPENDIX E

Site Photographs

ZONING AND SUBDIVISION
LAC LA BICHE COUNTY, ALBERTA
PHOTOGRAPHS TAKEN DURING SITE VISIT ON NOVEMBER 26, 2021

Photograph 1: Entrance, looking west from Range Road 113

Photograph 2: Trail, looking west from the entrance.

Photograph 3: Looking north from the entrance.

Photograph 4: Looking south from the entrance.

Photograph 5: Looking east from the entrance.

Photograph 6: Underground utility sign near entrance.

Photograph 7: Trail, looking northwest from the south side of the property.

Photograph 8: North boundary of the quarter section, looking west from Range Road 113.

Photograph 9: Picnic shelter.

Photograph 10: Looking west from southside of the subject property.

Photograph 11: Looing north from the southside of the subject property.

Photograph 12: Looing south from the middle of the subject property.

Photograph 13: Looking north from the middle of the subject property.

Photograph 14: Looking north from the north of the subject property.

Photograph 14: Looking northwest from the north of the subject property.

Photograph 16: Mobile house on the north side of the subject property.

Photograph 17: Looking west from Range Road 113 and south corner of the subject property.

Photograph 18: Looking northeast from RR 113 and south corner of the subject property.

BIOPHYSICAL ENVIRONMENTAL ASSESSMENT

PROPOSED DEVELOPMENT
WITHIN PARTS OF NE16-65-11-W4M
IN LAC LA BICHE COUNTY, ALBERTA

ENVIRO MAK Inc.
Environmental Management Consultants

BIOPHYSICAL ENVIRONMENTAL ASSESSMENT

PROPOSED DEVELOPMENT
WITHIN PARTS OF NE16-65-11-W4M
IN LAC LA BICHE COUNTY, ALBERTA

Submitted to:

ERIC SEHN

OF

SELECT ENGINEERING CONSULTANTS

EDMONTON, ALBERTA

Submitted by:

K.L. WALKER-MAKOWECKI

OF

ENVIROMAK INC.
ENVIRONMENTAL MANAGEMENT CONSULTANTS

EDMONTON, ALBERTA

August 24, 2022

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

AA..... Assessment Area
ABWRET..... Alberta Wetland Rapid Evaluation Tool
ACIMS..... Alberta Conservation Information Management System
AEP..... Alberta Environment and Parks
AWCS..... Alberta Wetland Classification System
COP..... Code of Practice
CPESC..... Certified Professional in Erosion and Sediment Control
DFO..... Department of Fisheries and Oceans Canada
DWS..... Downstream
DLO..... Department Licence of Occupation
EA..... Environmental Effects Assessment
EMP..... Environmental Monitoring Plan
EPP..... Environmental Protection Plan
ESA..... Environmentally Significant Area
FRL..... Fisheries Research License
FWMIS..... Fish and Wildlife Management Information System
GOA..... Government of Alberta
GOC..... Government of Canada
HADD..... Harmful Alteration, Disruption or Destruction of Fish Habitat
LAT..... Landscape Analysis Tool
LSRS..... Land Suitability Rating System
NTU..... Nephelometric Turbidity Unit
QAES..... Qualified Aquatic Environmental Specialist
RAP..... Restricted Activity Period
ROW..... Right-of-way
TSS..... Total Suspended Sediment
UPS..... Upstream
VEC..... Valued Ecosystem Component
WAIR..... Wetland Assessment and Impact Report

1.0 INTRODUCTION AND BACKGROUND

Select Engineering Consultants Ltd. (herein referred to as "Select Engineering"), on behalf of Lac La Biche County, have initiated the application and planning to develop the Area Structure Plan (ASP), zoning and subdivision of a portion of the property of NE16-65-11-W4M for residential development. The proposed development area is located within Lac La Biche County, Alberta, approximately 27 km southeast of the Hamlet of Lac La Biche. The development is intended to influence approximately 24.34 ha (60.15 ac).

The intention is to establish residential lots, emergency access and gravel road areas (Figure 3.4). Environmental Reserve (ER) and Municipal Reserve (MR) areas are also being incorporated into planning and design (Figure 3.4). Development will consist of 2 phases, with Phase 1 anticipated to begin construction in the late summer/early fall of 2022 with the potential for utility (power) installation during the winter (E. Sehn, per. comm.). The timeline for Phase 2 development has not yet been finalized (E. Sehn, per. comm.). At the time of the writing of this report, the ASP and servicing information was being prepared for submission to the County.

EnviroMak Inc. Environmental Management Consultants was contracted by Select Engineering to complete a field level biophysical environmental assessment including a wetland delineation and classification of the property, which occurred on July 28 – 29, 2021. The following provides a description of the biophysical parameters and assessment of specific features associated with the specific development and the adjacent lands around the proposed development area based on existing information and as confirmed through field reconnaissance. Potential environmental effects and preliminary avoidance, mitigation and compensation measures to be potentially implemented in coordination with the subdivision activities have been identified.

2.0 OBJECTIVES

A biophysical assessment is an assessment of the biological and physical elements of an ecosystem. The biophysical information is used to determine if environmentally sensitive lands or conservation values exist that should be protected and/or avoided in the development strategy, if various regulatory approval processes are applicable and if select avoidance, mitigation, compensation and/or monitoring may be recommended.

EnviroMak Inc. Environmental Management Consultant's overall objectives were to complete a biophysical environmental assessment of the valued ecosystem components (VECs) and to provide preliminary mitigation measures intended to support regulatory communications for the management of the development proposed for the land. The specific objectives of this assessment were:

- to conduct an existing information review including comprehensive historical aerial photography interpretation, relevant databases and files and interviews that may provide information pertinent to wetland, waterbody, and other environmental values in the study area;
- to identify, delineate and classify wetlands using historical aerial imagery to provide a desktop level assessment of wetland permanence;
- to conduct a field level identification, delineation and classification of wetlands, waterbodies and valued ecosystem components identified during the existing information review to meet the standards and expectations of the relevant policies, guidelines and directives;
- to assess the potential environmental effects and impacts that may result from the proposed development, and;
- to provide preliminary environmental protection and mitigation recommendations that minimize or eliminate impacts and monitor the health of valued ecosystem components.

3.0 ASSESSMENT AREA

The assessment area was located within Lac La Biche County, Alberta, approximately 27 km southeast of the hamlet of Lac La Biche (Figures 3.1 – 3.4). The proposed development is intended to influence approximately 24.34 ha (60.15 ac) within parts of NE16-65-11-W4M.

The immediate area of the proposed development was on private lands; however, the majority of the surrounding area was Public Land. The assessment area consisted of primarily undeveloped, mature deciduous dominant forest with a few scattered, previously cleared younger tree stands and open field grassland areas. Two constructed structures/buildings were observed within the assessment area as well as a several cleared cutlines/trails (foot and ATV/UTV access) that transected the property. The entire assessment area had perimeter fencing. However, no signs of current livestock utilization or other agriculture actives were observed within the area during the site visit, and no historical agriculture actives were noted occurring within the area during the aerial photograph review.

A few potential wetland areas were observed in the assessment area via historical aerial photography and through existing documentation, as well as a large wetland complex southwest of the area. No mapped watercourses or obvious channelized drainages were observed via historical aerial photography within the assessment area. Field reconnaissance verified that three wetlands were present. No additional features (ephemeral waterbodies, watercourses, etc.) were observed.

The assessment area was bound by Range Road 113 along the eastern boundary. One residential area was located directly south of the assessment area. Two pipeline rights-of-ways (ROWs) transected the assessment area within the northwest corner. Numerous fish-bearing lakes were within close proximity to the assessment area, including Horne Lake, Elinor Lake and Helena Lake (FWMIS 2021). The surrounding area remains primarily undeveloped, deciduous dominant treed areas with limited low-density residential areas and open agricultural (cropland) fields (Figures 3.1 – 3.4).

The proposed development area was located within the overall Lac La Biche County (2013) Municipal Development Plan (Bylaw #13-020).

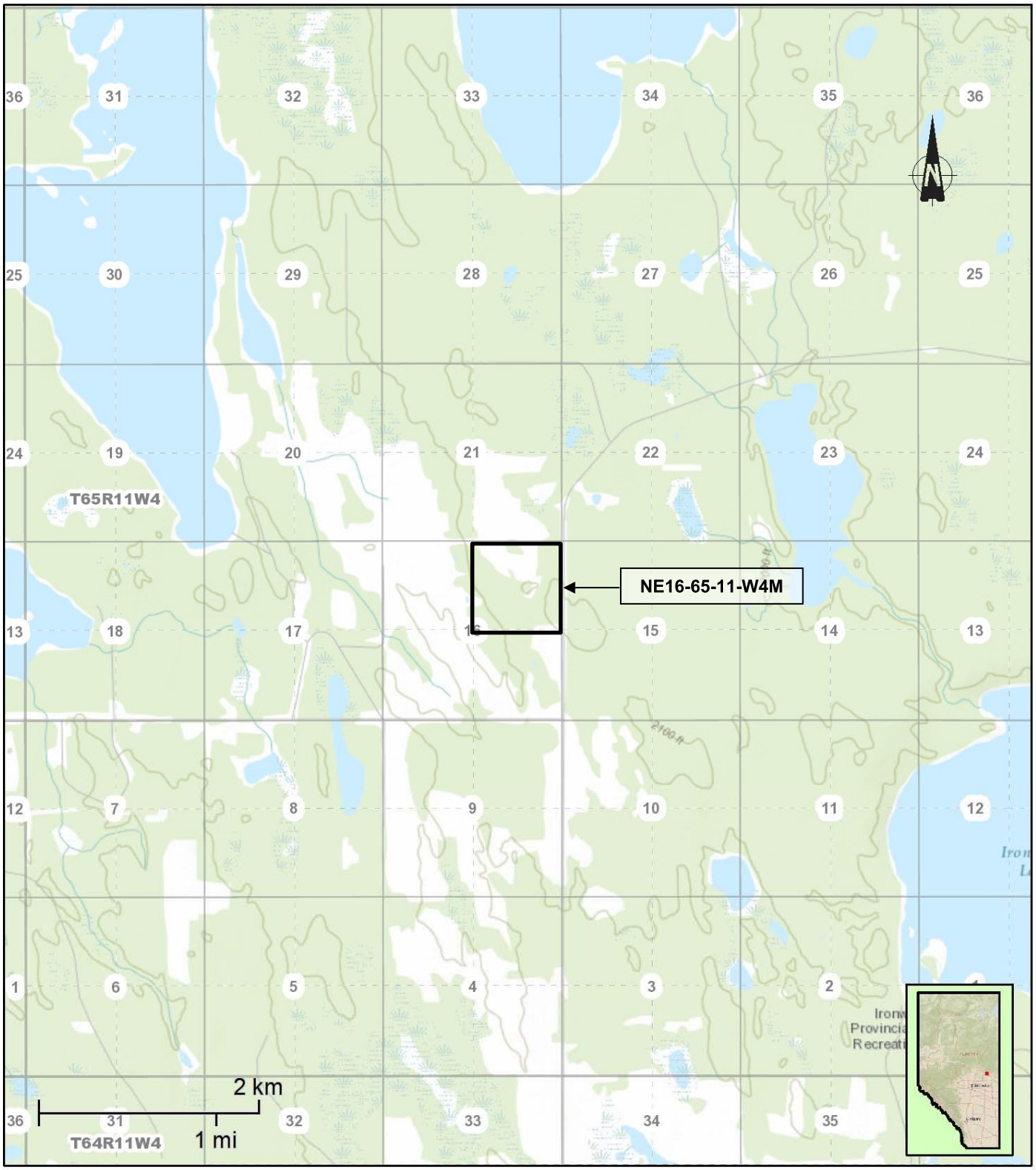


Figure 3.1. Quarter section of land containing the proposed development area in Lac La Biche County, Alberta (1:50:000; Alberta Agriculture and Forestry, GOA, Alberta Open Government License 2022).

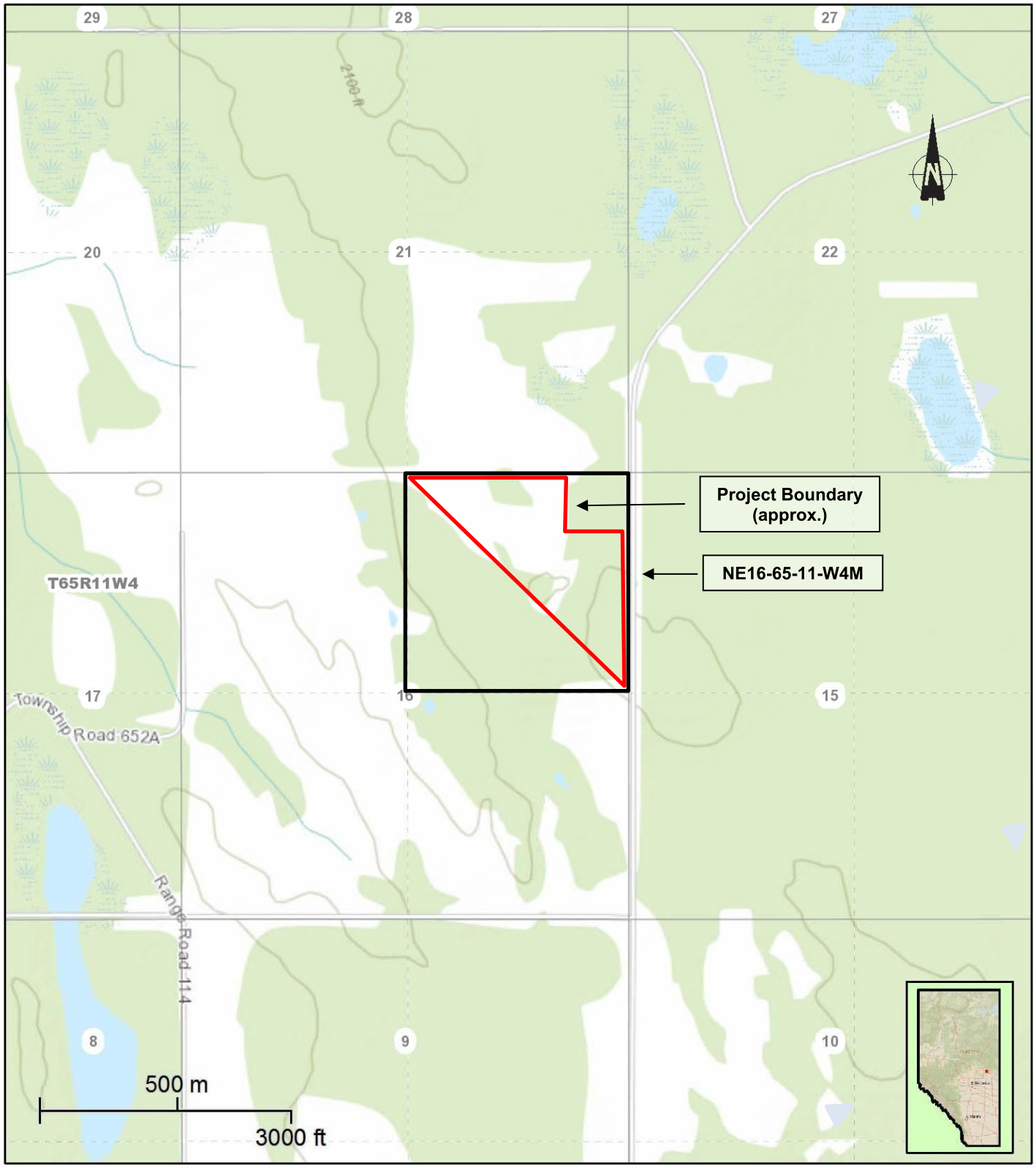


Figure 3.2a. Quarter section of land encompassing the proposed development area within Lac La Biche County, Alberta (1:20,000; Alberta Agriculture and Forestry, Government of Alberta, Alberta Open Government License 2022).

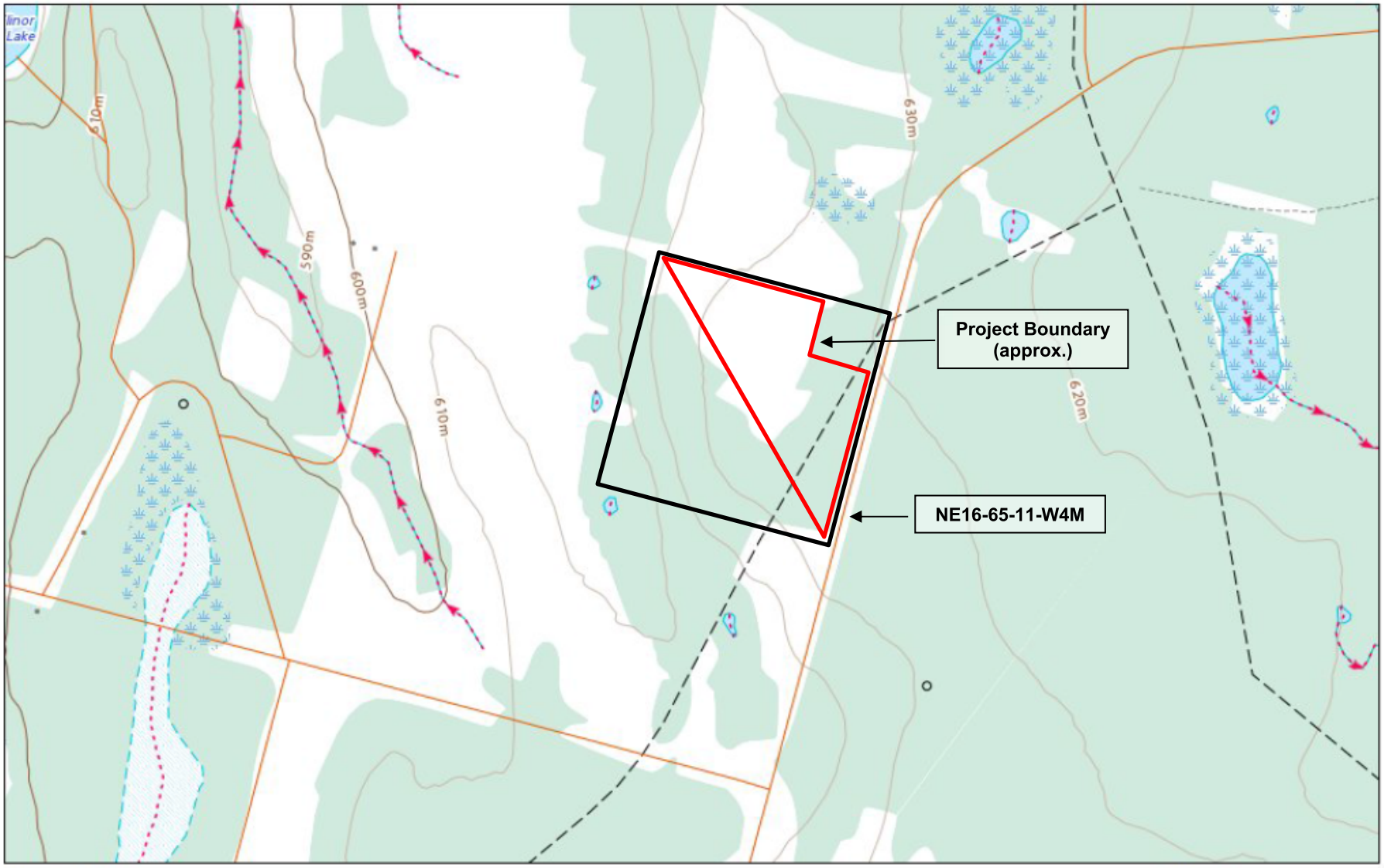


Figure 3.2b. Quarter section of land encompassing the proposed development area within Lac La Biche County, Alberta (1:17,500; Government of Canada 2022 - Natural Resources Canada, The Atlas of Canada – Toporama).

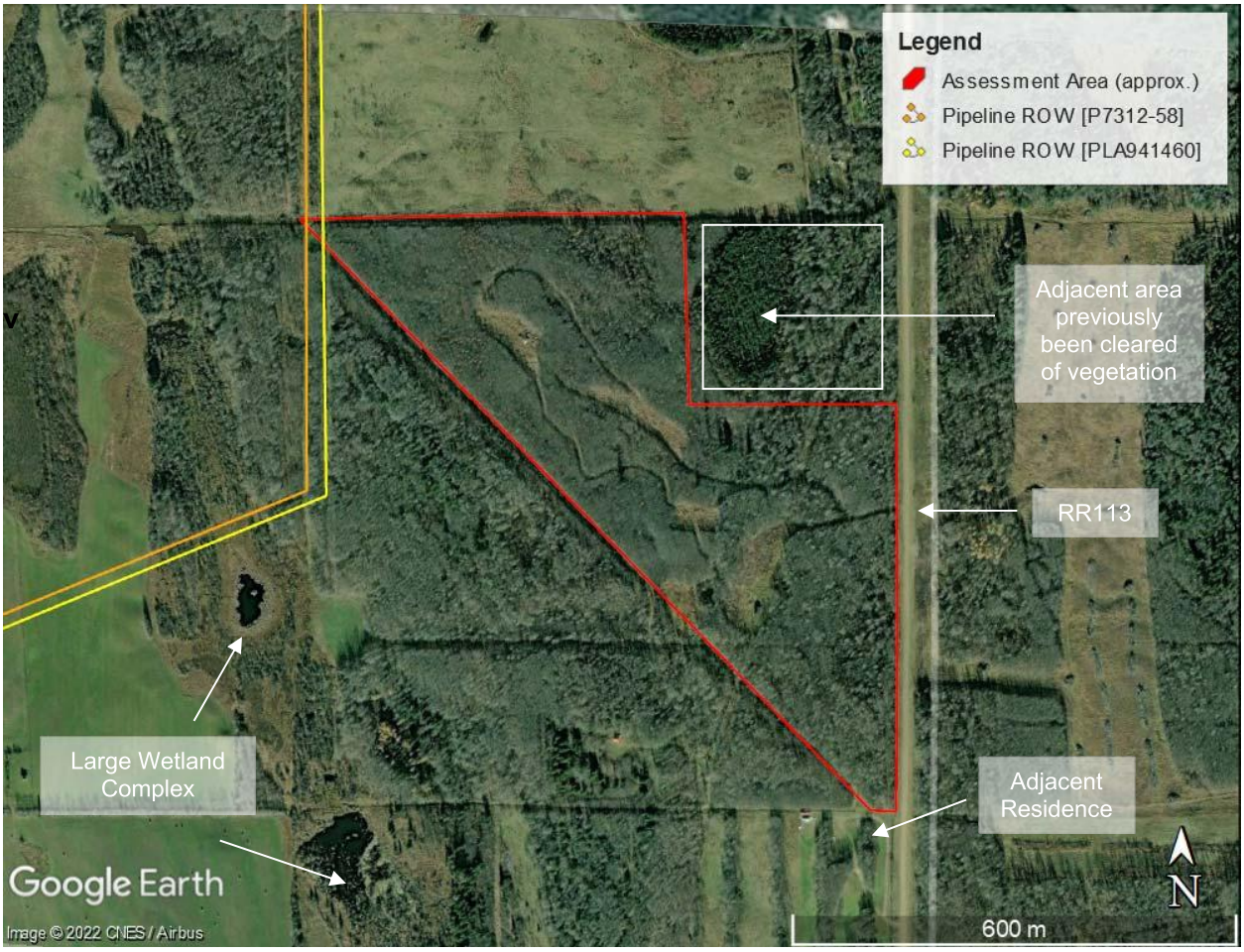


Figure 3.3. Proposed development area (outlined in red) within Lac La Biche County, Alberta in NE16-65-11-W4M (ArcMap GIS 2022; Imagery Date 2017-10-21).

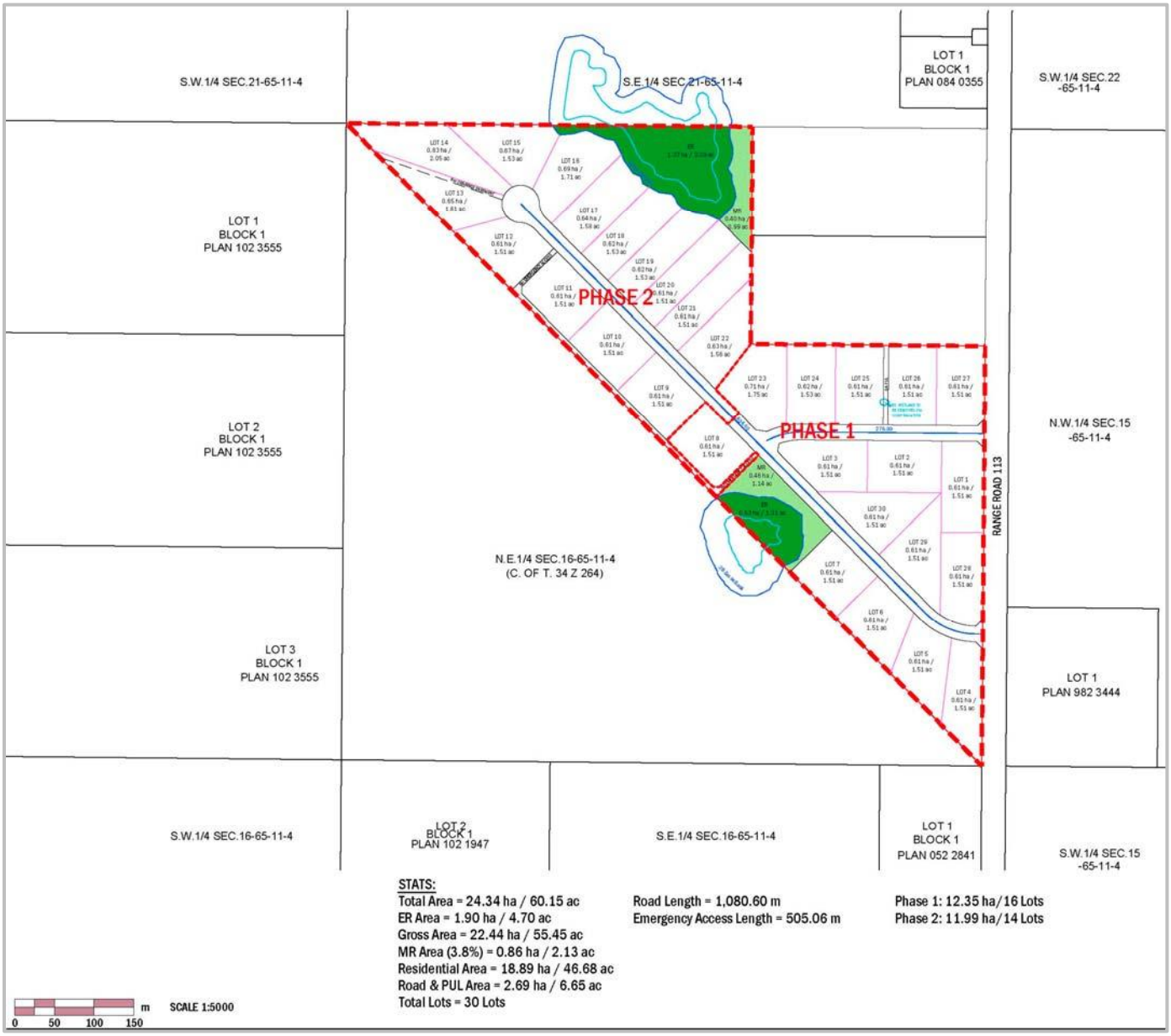


Figure 3.4. Proposed development area (outline in red) concept plan within Lac La Biche County, Alberta in NE16-65-11-W4M (Reproduced from Select Engineering Consultants - March 2, 2022; – Concept Option 7).

4.0 STUDY METHODS

4.1 Existing Information Review

The desktop existing information review included, as available and applicable, map and aerial photography interpretation and comparative examination, ground level photograph examination, existing database queries, previous studies, development plan and environmental report research, and interviews with landowners/stakeholders/regulators/proponent/others.

Valued ecosystem components (VECs) were identified from existing information including consideration of Elements-At-Risk which were collected from a variety of sources. Elements-At-Risk include plants and animals considered at risk due to being restricted to a small portion of their former range or extent based on a combination of Alberta Conservation Information Management System (ACIMS 2022) tracking and watch lists, federal endangered species lists (COSEWIC 2022), provincial at risk and may be at risk species list (GOA 2020), Fish and Wildlife Management Information System (FWMIS 2021), the Alberta Merged Wetland Inventory database (GOA 2022), Alberta Government Landscape Analysis Tool (AEP/AER 2022) and other sources.

4.2 Wetland Delineation and Historical Aerial Photograph Review

Wetlands were preliminarily identified and delineated through aerial review in accordance with the Alberta Wetland Identification and Delineation Directive (GOA 2015). The AEP (2016) Guide for Assessing Permanence of Wetland Basins was followed. Extensive aerial photography from a variety of seasons and over a specified time were procured and interpreted as per the procedures and methods set forth in the 2016 document. These aerial photographs were further assessed to preliminarily identify potential wetland boundaries for further examination in field if considered necessary. Following the identification of wetlands through the existing information reviews, a field level assessment was recommended and completed in July 2021.

4.3 Field Data Collection

Comprehensive field data collection of the property was undertaken in July 2021 under direction of a professional biologist. Biophysical field surveys generally include a foot level survey of perimeter and intersecting transects throughout the property with the purpose of identifying environmentally significant areas, key habitats and unique, rare, endangered and/or protected natural features and valued ecosystem components (VECs) (GOA 2013; GOC 2016).

In addition to the overall ground level survey, valued ecosystem components (VECs) as identified from the existing information and as may interact with the project focus may trigger component specific field surveys/assessments for sensitive, rare or endangered species and/or habitats (EnviroMak various field protocols). The methods for these specific surveys are rooted in the relevant EnviroMak field protocols which are based on relevant federal and provincial survey requirements and standards.

Vegetation: During the ground level survey, a comprehensive list of vegetation species observed was recorded, with particular focus on sensitive, rare and/or endangered species, as well as transitions between plant communities. Plant communities were evaluated, with particular focus on species composition, distribution pattern and general abundance. Species were identified using several sources, include Plants of the Western Forest - Alaska to Minnesota Boreal and Aspen (Johnson, D., Kershaw, J. and M. Pojar 2009) and Flora of Alberta (Moss, E.H. and Packer, J.G. 1983).

Wetlands: The assessment area was surveyed for the presence of wetlands with consideration of the Alberta Wetland Policy (GOA 2013) timing expectations, which indicated that classification of wetlands is expected to occur within the growing season (generally between May and October) with some flexibility for professional judgement based on conditions of a year. Wetlands were delineated per the Alberta Wetland Identification and Delineation Directive (GOA 2015). GIS information was gathered onsite with high resolution GPS equipment for delineation of wetland and natural feature boundaries. Generally, and with regard to field assessment methodology of wetland areas, the Alberta Wetland Policy (GOA 2013), Alberta Wetland Identification and Delineation Directive and Alberta Wetland Classification System are followed to identify, classify and delineate wetlands throughout Alberta. The field methods focus on gathering soils, hydrology and vegetation information sufficient to meet the classification criteria and as based on the Alberta Wetland Rapid Evaluation Tool (ABWRET) format. GIS information is gathered onsite with high resolution GPS equipment (resolution to 30 cm) for delineation of wetland and natural feature boundaries. GIS information is subsequently downloaded and transformed to shapefile and relevant products for interpretation and distribution and in adherence with the Alberta Wetland Identification and Delineation Directive as applicable (GOA 2015).

Wildlife: The wildlife survey was conducted in order to verify the presence of key wildlife habitats and/or species from the existing information review and/or identify presence of key wildlife habitats and/or species occurring within the potential footprint of disturbance during the field reconnaissance. The survey was conducted as per the EnviroMak Inc. Wildlife Sweep Protocol (2021), EnviroMak Inc. (Migratory Birds and Birds of Prey Nesting Survey Protocol (2021) and the EnviroMak Inc. Nocturnal Owl Call Playback Survey Protocol (2021) (as relevant), which are based on relevant government protocols and guidelines including the Government of Alberta's Wildlife Sweep Protocol (2020) and Sensitive Species Inventory Guidelines (2013). The survey was conducted per the conditions of the Provincial Wildlife Research Permits and Collection Licence issued to EnviroMak by AEP (2022).

4.4 Wetland Impact Assessment

Wetlands were identified and delineated, and the wetland classification was keyed out for each wetland in accordance with the Alberta Wetland Classification System (AWCS; ESRD 2015). The Alberta Wetland Rapid Evaluation Tool (ABWRET) relative value assignation provided by Alberta Environment and Parks was considered when determining the management of the wetlands based off the Wetland Mitigation

Hierarchy (AEP 2016). The Government of Alberta's (2018) Alberta Wetland Mitigation Directive provides these management options in descending order of priority: avoidance, minimization, or replacement. These various options for wetland mitigation were evaluated with consideration of wetland value, replacement rates, species present and proposed activity.

4.5 Potential Effects and Mitigation Assessment

Existing information was considered in the overall interpretation and assessment of environmental effects and recommendations for mitigation and monitoring and overall environmental protection planning. The effects and mitigation assessment component is based on a pathway of effects approach in which each potential effect identified is evaluated for possible avoidance, minimization and mitigation/compensation with consideration of the regulatory expectations.

5.0 EXISTING INFORMATION REVIEW

5.1 Climate

Climate data was gathered from Government of Canada's (2022) Canadian Climate Normals and Averages which maintains the weather station at Ranfurly (approximately 10 km from site). Ranfurly's station temperature averages 2.8 ºC annually; the July mean is 17.2 ºC, and the January mean is -13.7 ºC (GOC 2022). Mean annual precipitation is 459.9 mm with approximately 109.3 cm occurring as snowfall and 350.5 mm as rainfall (GOC 2022).

Precipitation data was also reviewed for the area of 65-11-W4M as was collected by Alberta Agriculture and Forestry through Alberta Climate Information Service (Alberta Agriculture and Forestry 2022). The calculated average total accumulated precipitation in July between the years 1955-2020 was approximately 82.12 mm (Alberta Agriculture and Forestry 2022). Recent precipitation data collected from the weather station at the Rich Lake AGDM station near the community of Rich Lake indicated that the accumulated precipitation in July 2021 was 55.8 mm, which falls slightly below the historical average for July (Alberta Agriculture and Forestry 2022). The previous months of April and May, which had accumulated precipitation amounts of 11.0 mm and 50.7 mm respectively, were slightly drier (April) and relatively normal (May), than the historical averages for those months (Alberta Agriculture and Forestry 2022). Based off these conditions, it can be anticipated that the site as it was observed during the 2021 July site survey would have been generally normal/somewhat drier conditions when considering accumulated precipitation.

5.2 Ecoregion

The assessment area was within the Boreal Forest Natural Region, Central Mixedwood subregion (GOA 2005; Table 5.1). Central Mixedwood is the largest subregion within Alberta and is categorized as a vast area of upland forests and wetlands (dominantly bogs) on generally flat – undulating plains (GOA 2005). Much of the area is used for aspen and conifer harvesting operations and intensive petroleum exploration and developments, as well as provides subsistence and income for residence and commercial options through hunting, fishing and trapping (GOA 2005). The Central Mixedwood area experiences short, warm summers and long, cold and dry winters (GOA 2005).

5.3 Topography, Soils and Terrain

The assessment area generally exhibited a hummocky, medium relief landform with a limiting slope of 9 % (Alberta Agriculture and Forestry 2022). Generally, the overall topography of the area collected from Google Earth Pro (2022) indicates the highest areas of topography along the northeast boundary, sloping towards the southwest boundary.

The assessment area was within the Thick Black/Dark Gray-Gray Soil zone of Central and East-Central Alberta (Soil Correlation Area 10; Agroclimate 2H, 3H) (Alberta Soil Information Centre 2016). The Alberta Agriculture and Forestry's (2021) Alberta Soil Information Viewer describes the soils as Orthic Gray Luvisol on medium textured. Gray Luvisol soils typically occur in boreal or mixed-wood forests, as well as transition zones between forested areas and grasslands, and are typically dominated by loamy or clay soil textures (Government of Canada 2013).

Qualitest Canada Ltd. (herein referred to as "Qualitest") conducted a geotechnical investigation of the property on November 26, 2020. Four sample locations were excavated using a backhoe and examined to a depth of approximately 3.0 metres below the existing grade (Qualitest 2020). Results indicated: "*General subgrade soil conditions consisted of topsoil over sandy, silty clay with some rootlets overlaying clay till, which extended to at least 3.0 meters below the existing grade*" (Qualitest 2020). Comprehensive, detailed descriptions of the subsurface conditions, as well as the other observations gathered during the geotechnical investigation, are provided in the Qualitest (2020) Geotechnical Investigation Report.

Table 5.1. General location descriptors of the assessment area within NE16-65-11-W4M.

Descriptor	Specific Location
Legal Land Description	NE16-65-11-W4M
[6]Lat/Long	12U 461321.47 m E, 6053563.25 m N
[6]UTM	54.628013°, -111.599123°
[5]Historical Resource Listing	None
[3]Mapped Watercourses	None
[2]Ecoregion	Boreal Forest - Central Mixedwood
[3]Municipality	Lac La Biche County
[6]Nearest Town/City	Lac La Biche, Alberta
[7]Green/White Management Area	White
[1]Soil Correlation Area	21
[3]First Nations Land	None
Protected Parks and/or ESAs ([4]Provincial and/or National; [9]Municipal)	None
[3,7]Wildlife Sensitive Ranges or Areas	None
[8]Aquatic Species at Risk Ranges	No Aquatic Species at Risk Ranges present
[8]Aquatic Species at Risk Critical Habitat	No Aquatic Species at Critical Habitat present
[3]AIS Decontamination Zone/Risk Level	White Zone – Low Risk

[1]Alberta Soil Information Centre 2016 [2]Government of Alberta 2005 [3]FWMIS 2021
[4]Government of Alberta 2014 – ESA Maps [5]Alberta Culture and Status of Women 2022
[6] Google Earth Pro 2022 (Coordinates approx.) [7]AEP/AER 2022 – LAT Report, Accessed July 22, 2022
[8] DFO 2022 [9] N/A - No Municipal ESA Study Available
ESA– Environmentally Significant Area

5.4 Agriculture

The Government of Alberta's Land Suitability Rating (LSR) system outlines the procedure for evaluating the suitability of land for agricultural production based on climate, soil and landscape. According to the Alberta Agriculture and Forestry's (2022) Alberta Soil Information Viewer, the assessment area has a Land Suitability Rating (LSR) of 2T(8) – 5MTP(2). This LSR means that 80 % of the area is considered to have slight limitations to growth due to slopes steep enough to incur a risk of excessive water erosion, and that 20 % of the area is considered to have very severe limitations to growth due to limited water holding capacity of the soil, as well as increased gravel/stone accumulation within the soil (hindering tillage potential) (Alberta Agriculture and Forestry 2022).

Based on the historical aerial photography review, no agricultural activity was noted to have occurred within the assessment area.

5.5 Environmentally Significant, Protected and Sensitive Areas and Ranges

As per the Government of Alberta's (2014) Environmentally Significant Areas Map, the assessment area of NE16-65-11-W4M was not an environmentally significant areas (ESA), as it did not score greater than 0.189. While the area was considered to have low ecological integrity, it would contribute to both water quality and quantity.

The Government of Alberta's Fish and Wildlife Management Information System (FWMIS 2021) and Landscape Analysis Tool (AEP/AER 2022) determined that the assessment area was not within any additional sensitive management areas (Table 5.1).

No additional national and/or provincial protected areas (Park, Ecological Reserve, Wildlife Sanctuary, Wilderness/Natural Area, etc.) were identified to be within the assessment area (AEP/AER 2022).

5.6 Historical Resource Listing

The Listing of Historic Resources (Alberta Culture and Status of Women 2022) did not identify any historic resources within the area of NE16-65-11-W4M (Table 5.1). Land that has been identified to contain potential historic resources are assigned a Historic Resource Value (HRV) which indicates the level of protection given to those lands. HRV 1 is awarded the highest level of protection and HRV 5 the lowest. Additionally, lands are categorized alphabetically to describe the primary historic resource category of concern (a: archaeological; c: cultural; gl: geological; h: historic period; n: natural; p: paleontological) (Alberta Culture and Status of Women 2022). Typically, if historical resources are noted during development, that work must halt until the resource has been recorded and regulatory conditions met. Further assessment of historical resources as they may be impacted by development was outside of the scope of this assessment.

According to the Government of Alberta's (2022) Heritage Resources Management Information System (HeRMIS), no heritage sites are located wholly or partially within or within direct proximity to the assessment area.

5.7 Groundwater and Geology

The Government of Alberta's (2022) Water Wells Map Viewer did not contain any well drilling reports for within the area of 16-65-11-W4M. Limited development has occurred within the general area.

The geotechnical investigation of the property conducted by Qualitest on November 26, 2020, included general groundwater observations. Overall observations were limited to the four sample locations (Qualitest 2020). Groundwater conditions observed included: "*Groundwater seepage and sloughing were not encountered during test pit excavation. The seasonal fluctuation of the groundwater table may be encountered due to precipitation and other climatic factors. Hence, the actual groundwater conditions at the time of construction could vary from those observed during this investigation* (Qualitest 2020).

5.8 Hydrology and Watershed Characteristics

The assessment area was located in the upper to middle area of the Beaver River watershed basin (GOA 2022). Per the Alberta Environment and Parks' (2022) Fish and Wildlife Management Information System, no mapped watercourses were noted within the area of NE16-65-11-W4M.

5.9 Existing Fisheries Information

Based on the existing information contained on the Alberta Environment and Parks' (2022) Fish and Wildlife Management Information System, no recorded occurrences of fish species were noted within the existing information for the assessment area (Appendix 12.2).

The nearest documented confirmed fish bearing watercourse or waterbody was Elinor Lake, located approximately 2 km northwest of the assessment area, which has been previously confirmed to contain Book Stickleback (*Culaea inconstans*), Iowa Darter (*Etheostoma exile*), Lake Whitefish (*Coregonus clupeaformis*), Northern Pike (*Northern Pike*), Spottail Shiner (*Notropis hudsonius*), Walleye (Stizostedion vitreum), White Sucker (*Catostomus commersoni*) and Yellow Perch (*Perca flavescens*), which are all classified as "Secure" species within the province of Alberta (FWMIS 2021; Government of Alberta 2020). No defined connectivity was visible between Elinor Lake and the assessment area within NE16-65-11-W4M based on aerial photography review and the site conditions observed.

No aquatic habitat features were noted to be present within the assessment area. As per the Department of Fisheries and Oceans (DFO) Aquatic Species at Risk Map (2022), no Aquatic Species at Risk Ranges and no Aquatic Species at Risk Critical Habitat were noted within the assessment area.

5.10 Existing Wildlife (Mammals, Birds, Amphibians and Reptiles) Information

A data search of the Fish and Wildlife Management Information System (FWMIS 2021) indicated the presence of four documented terrestrial wildlife species within a 2 km radius of the assessment area (Table 5.2; Appendix 12.2). This list includes the Black Tern (*Chlidonias niger*), Great Gray Owl (*Strix nebulosa*), Osprey (*Pandion haliaetus*), which are all classified as "Sensitive" species within the province of Alberta, as well as the Canadian Toad (*Anaxyrus hemiophrys*), which is classified as "May be at Risk" (Government of Alberta 2020). None of these species have federal listings (COSEWIC 2022; Government of Canada 2011). No sensitive species ranges were noted within NE16-65-11-W4M (FWMIS 2021; AER/AEP 2022).

Table 5.2. Wildlife species of concern which have been documented to occur within a 2 km radius of NE16-65-11-W4M according to the FWMIS (2021).

Common Name	Scientific Name	Provincial Status[1,2]		Federal Status[3,4]	
		General Status Listing[1]	Wildlife Act[2]	SARA[3]	COSEWIC[4]
Black Tern	*Chlidonias niger*	Sensitive	Not Listed	Not Listed	Not at Risk
Great Gray Owl	*Strix nebulosa*	Sensitive	Not Listed	Not Listed	Not at Risk
Osprey	*Pandion haliaetus*	Sensitive	Not Listed	Not Listed	Not Listed
Canadian Toad	*Anaxyrus hemiophrys*	May be at Risk	Not Listed	Not Listed	Not at Risk

[1]Government of Alberta 2020 – Alberta Species General Status Listing
[2]Government of Alberta 2018 – Alberta *Wildlife Act* [3]Government of Canada 2011 – *Species at Risk Act* (SARA)
[4]Government of Canada 2022 – Committee on the Status of Endangered Species in Canada (COSEWIC)

5.11 Existing Vegetation Information

With respect to vegetation, the Alberta Conservation Information Management System (ACIMS 2022) database did not identify any sensitive or non-sensitive element occurrences, as well as no federally listed vegetation species within the Schedule 1 of the Species at Risk Act, to be documented for within the area of NE16-65-11-W4M.

5.12 Species at Risk

No documented occurrences of federally listed Species at Risk as listed under Schedule 1 of the *Species at Risk Act* (excluding species of Special Concern for which prohibitions do not apply) were noted in the existing information for the assessment area.

5.13 Wetland Inventory and Delineation

5.13.1 Potential Wetland Inventory (AMWII)

A search of the Alberta Merged Wetland Inventory Index on the Government of Alberta's (2022) GeoDiscover Map Viewer indicated the potential presence of limited fen and swamp wetlands along the northern and eastern borders of the assessment area. The wetland database is not complete and is not expected to capture all wetlands located on a specific parcel of land. Further, in some cases, wetlands that appear present in the database may not be present in actuality.

The Alberta Wetland Rapid Evaluation Tool – Estimate of Relative Wetland Value by Section Index, accessed via the GeoDiscover Map Viewer (GOA 2022), is a dataset that provides a summary of all wetlands that are captured within the Alberta Merged Wetland Inventory and then provides both the estimated area of total wetlands within a section and the estimated class. Classes range from A-D; A being the highest valued wetlands and D being the lowest. It is estimated that there is 14 ha of class D wetlands and 25 ha of class C wetlands (40 ha total of wetlands) within 16-65-11-W4M (GOA 2022).

5.13.2 Wetland Delineation (Desktop Evaluation)

As per the Alberta Wetland Identification and Delineation Directive (GOA 2015), identification of wetlands within an area that may be impacted require at minimum a desktop evaluation to determine the likely presence of wetlands. The steps for identifying wetlands include aerial photography and topographical review for drainage patterns and potential wetland areas. Once potential wetlands have been located on the aerial images, potential connections to the wetlands also should be identified. These wetlands and wetland connections are then outlined with preliminary boundaries. Following these steps, aerial photographs (Appendix 12.1) were collected, interpreted and compared to determine the presence of wetlands and the potential for crown claims through Public Lands. The aerial photography was obtained from AEP and Google Earth Pro. The aerial photograph review spanned the years 1952 - 2017.

5.13.3 Historical Aerial Photograph Interpretation and Comparative Review

Historical aerial photographs (Appendix 12.1) were reviewed in conjunction with available historical climate and precipitation data in order to help further assess wetland permanence as per the AEP Guide for Assessing Permanence of Wetland Basins (GOA 2016). During this overall review of the aerial photographs, if any environmental features were noted, they were also identified. A descriptive summary of historical aerial photography is provided below in Table 5.3. From review, it was determined that at least two potential wetlands may be present within the assessment area, as these features appeared quite consistently on the landscape throughout the years with varying degrees of visibility and permanence (i.e. persistent open water and/or wetland vegetation). Dense tree cover of the assessment area influenced wetland detection through aerial review; therefore, a field verification of the area was warranted. A third wetland was noted during field reconnaissance; however, was not visible in aerial photographs.

Table 5.3. Historical aerial photograph interpretation summary for the proposed development area within parts of NE16-65-11-W4M between the years of 1952 – 2017.

Wetland ID	Imagery Date	Season[1]	Precip. Year Analysis[2]	Precip. Month Analysis[2]	Precip. Day Analysis[2]	Open Water/ Vegetation Signature[3]	Assessment of Permanence[4],	Photograph Description
Wetland 1	Oct 18, 1952	Fall	N/A	N/A	N/A	D	N	• Wetland 1 appears distinguishable on the landscape. • Property is entirely treed; one linear disturbance transects through south section; minimal other disturbances/developments within surrounding area. • Large wetland complex present to the southwest. • No precipitation data available prior to 1955.
	Jun 15, 1968	Summer	Normal	Dry	0.0 mm	D	N	• Limited changes; Wetland 1 remains present. • Linear cutline established transecting assessment area.
	Jun 15, 1974	Summer	Normal	Dry	0.0 mm	D	N	• Limited changes; Wetland 1 remains present.
	May 17, 1985	Spring	Normal	Wet	0.0 mm	D	N	• Limited changes; Wetland 1 remains present.
	Sep 10, 1995	Fall	Normal	Dry	0.0 mm	D	N	• Wetland 1 remains present; wetland area appears significantly more woody (tree/shrub) cover than graminoid cover compared to previous imagery. • Additional clearing taken place east of the wetland area. Two structures/buildings now present within cleared area.
	Jul 01, 2007	Summer	Dry	Dry	0.1 mm	D	N	• Limited changes; Wetland 1 remains present.
	Oct 21, 2017	Fall	Normal	Wet	0.1 mm	D	N	• Limited changes overall to wetland area throughout imagery review; Wetland 1 remains present. • Additional clearing taken place north and east of the wetland area.

Wetland ID	Imagery Date	Season[1]	Precip. Year Analysis[2]	Precip. Month Analysis[2]	Precip. Day Analysis[2]	Open Water/ Vegetation Signature[3]	Assessment of Permanence[4,]	Photograph Description
Wetland 2	Oct 18, 1952	Fall	N/A	N/A	N/A	DVI	N	• Property is entirely treed; one linear disturbance transects through south section; minimal other disturbances/developments within surrounding area. • Large wetland complex present to the southwest. • Wetland 2 not visible. • No precipitation data available prior to 1955.
	Jun 15, 1968	Summer	Normal	Dry	0.0 mm	DVI	N	• Wetland 2 not visible. • Linear cutline established transecting assessment area; cutline adjacent/overlapping wetland area.
	Jun 15, 1974	Summer	Normal	Dry	0.0 mm	DVI	N	• Wetland 2 not visible.
	May 17, 1985	Spring	Normal	Wet	0.0 mm	DVI	N	• Wetland 2 not visible. • Several small wetland areas appear present surrounding Wetland 2 area.
	Sep 10, 1995	Fall	Normal	Dry	0.0 mm	DVI	N	• Wetland 2 not visible. • Linear cutline becoming re-vegetated within Wetland 2 area. • Additional clearing taken place south of the wetland area. Two structures/buildings now present within cleared area.
	Jul 01, 2007	Summer	Dry	Dry	0.1 mm	DVI	N	• Wetland 2 not visible.
	Oct 21, 2017	Fall	Normal	Wet	0.1 mm	DVI	N	• Wetland 2 not visible. • Additional clearing taken place west and south of the wetland area.

Wetland ID	Imagery Date	Season[1]	Precip. Year Analysis[2]	Precip. Month Analysis[2]	Precip. Day Analysis[2]	Open Water/ Vegetation Signature[3]	Assessment of Permanence[4],	Photograph Description
Wetland 3	Oct 18, 1952	Fall	N/A	N/A	N/A	DVI	N	• Property is entirely treed; one linear disturbance transects through south section; minimal other disturbances/developments within surrounding area. • Large wetland complex present to the southwest. • Wetland 3 not visible. • Large wetland area present to the east. • No precipitation data available prior to 1955.
	Jun 15, 1968	Summer	Normal	Dry	0.0 mm	D	N	• Wetland 3 appears distinguishable on the landscape. • Linear cutline established transecting assessment area.
	Jun 15, 1974	Summer	Normal	Dry	0.0 mm	D	N	• Wetland 3 remains present; wetland area appears connected to large wetland to the east.
	May 17, 1985	Spring	Normal	Wet	0.0 mm	D	N	• Wetland 3 remains present; does not appear connected to large wetland to the east; appears significantly reduced in overall size.
	Sep 10, 1995	Fall	Normal	Dry	0.0 mm	D	N	• Wetland 3 remains present. • Additional clearing taken place south of the wetland area. Two structures/buildings now present within cleared area.
	Jul 01, 2007	Summer	Dry	Dry	0.1 mm	D	N	• Wetland 3 remains present; wetland area appears extending north beyond assessment area.
	Oct 21, 2017	Fall	Normal	Wet	0.1 mm	D	N	• Wetland 3 remains present; wetland area appears again extending north beyond assessment area. • Large area to the east has been previously cleared of all vegetation. • Additional clearing taken place north and east of the wetland area.

[1] Spring (April – June); Summer (June to September); Fall (September to November)
[2] Data from AgroClimatic Information Services (Agriculture and Rural Development) at http://agriculture.alberta.ca/acis/township-data-viewer.jsp
[3] W=Water present/ inundated; D=Dry and Vegetated, consistent with wetland class; DVI=Dry, Vegetated, Indistinguishable from surrounding upland vegetation
[4] Y=Yes (Reasonably permanent, a Section 3 *Public Lands Act* body of water); N=No (Not permanent, a wetland regulated under the *Water Act*)

Field verified wetland data provided in Table 6.1 and Figure 6.2.

6.0 FIELD DATA COLLECTION

6.1 Field Data Collection Date and Conditions

A field assessment of the assessment area within NE16-65-11-W4M was conducted on July 28 - 29, 2021 with a focus on recording biological and physical attributes, including assessing wetlands, present wildlife and plant species and hydrology. General features and other potential sensitivities were noted as they extended past the project limits into the surrounding lands.

The assessment was completed during warm, summer conditions. Wind was minimal throughout the assessment and no precipitation occurred. The field assessment timing was undertaken with consideration of the Alberta Wetland Policy timing expectations (between May and October during leaf out).

6.2 Overall Landscape

The area assessed had a total surface area of approximately 24.34 ha (60.15 ac). The spatial breakdown of this area, as determined through aerial photograph interpretation and ground truthing, is detailed in the text below and displayed in Table 6.1 and Figure 6.1.

- Agricultural (Pasture and/or Crop Land): The entire assessment area had perimeter fencing; however, no signs of livestock utilization or other agriculture actives were observed.
- Forested (Deciduous Dominant): Majority of the area consisted of mature, dense deciduous dominant tree stands which had a total land surface area of approximately 21.2 ha (87.16 %). The understory consisted of dense deciduous growth.
- Wetland/Waterbodies: In total, three wetlands, which had a total land surface area of approximately 0.96 ha (3.94 %) of the assessment area landscape, were identified, classified and delineated (Figure 6.2; Photographs in Appendix 12.3) including the following:
    - Wetland 1: Graminoid marsh dominant wetland extending beyond the assessment area. This entire wetland covered approximately 0.31 ha; however, only approximately 0.25 ha of the wetland was situated within the assessment area, consisting of 1.02 % of the assessment area landscape.
    - Wetland 2: Wooded swamp dominant wetland covering approximately 0.0065 ha, consisting of 0.03 % of the assessment area landscape.
    - Wetland 3: Wooded swamp dominant wetland extending beyond the assessment area. This entire wetland covered 1.34 ha; however, only approximately 0.70 ha of the wetland was situated within the assessment area, consisting of 2.89 % of the assessment area landscape.
    - Ephemeral Waterbodies: No ephemeral waterbodies were observed within the assessment area.
- Open Grassland/Cleared Areas: Four previously cleared, open graminoid areas (which had scattered tree/shrubby growth throughout), as well as numerous cleared cutlines/trails (foot and ATV/UTV access) were observed. These features covered a total of approximately 2.17 ha (8.90 %) of the landscape.

Table 6.1. Landscape and vegetation coverage within the assessment area in NE16-65-11-W4M on July 28 – 29, 2021.

Landscape Area	Landscape Type	Surface Area (ha)[1*]	Surface Area (Acres)[1]	Percent of Landscape (%)
Wetlands	Wetland 1 (Graminoid Marsh)	*0.25*	*0.61*	*1.02*
	Wetland 2 (Wooded Swamp)	*0.0065*	*0.016*	*0.03*
	Wetland 3 (Wooded Swamp)	*0.70*	*1.74*	*2.89*
	Subtotal All Wetlands	*0.96*	*2.37*	*3.94*
Wetlands		0.96	2.37	3.94
Open Grassland/Cleared (including cutlines/trails)		2.17	5.35	8.90
Forested (Deciduous Dominant)		21.22	53.43	87.16
Agricultural (Pasture and/or Crop Land)		0	0	0
Total Area		**24.34**	**61.15**	**100**

[1]Areas calculated using combination of Google Earth Pro (2022) and field ground truthing quantification results.
*Surface area only includes areas within the project boundary. Some wetlands extend across quarter sections outside of the scope of the assessment area.

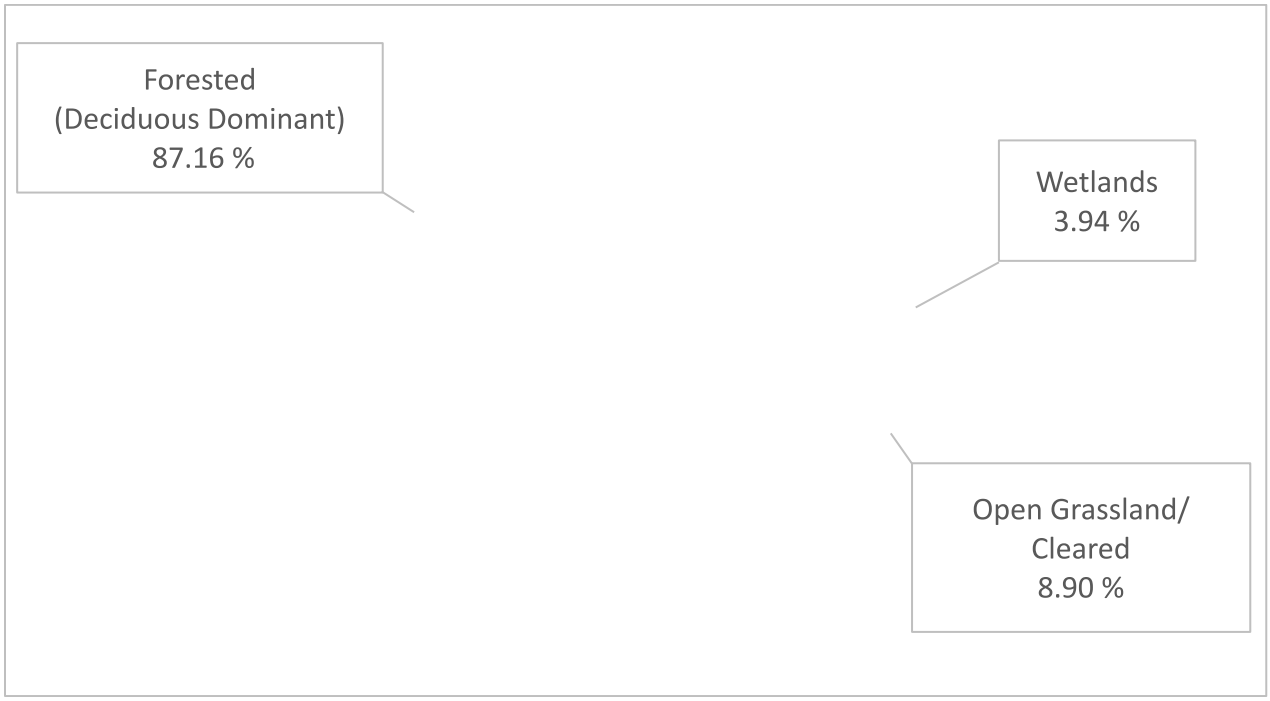


Figure 6.1. Pie chart representing landscape and vegetation coverage in percentages (%) of total surface area of the 24.34 ha (60.15 ac) assessment area within parts of NE16-65-11-W4M.

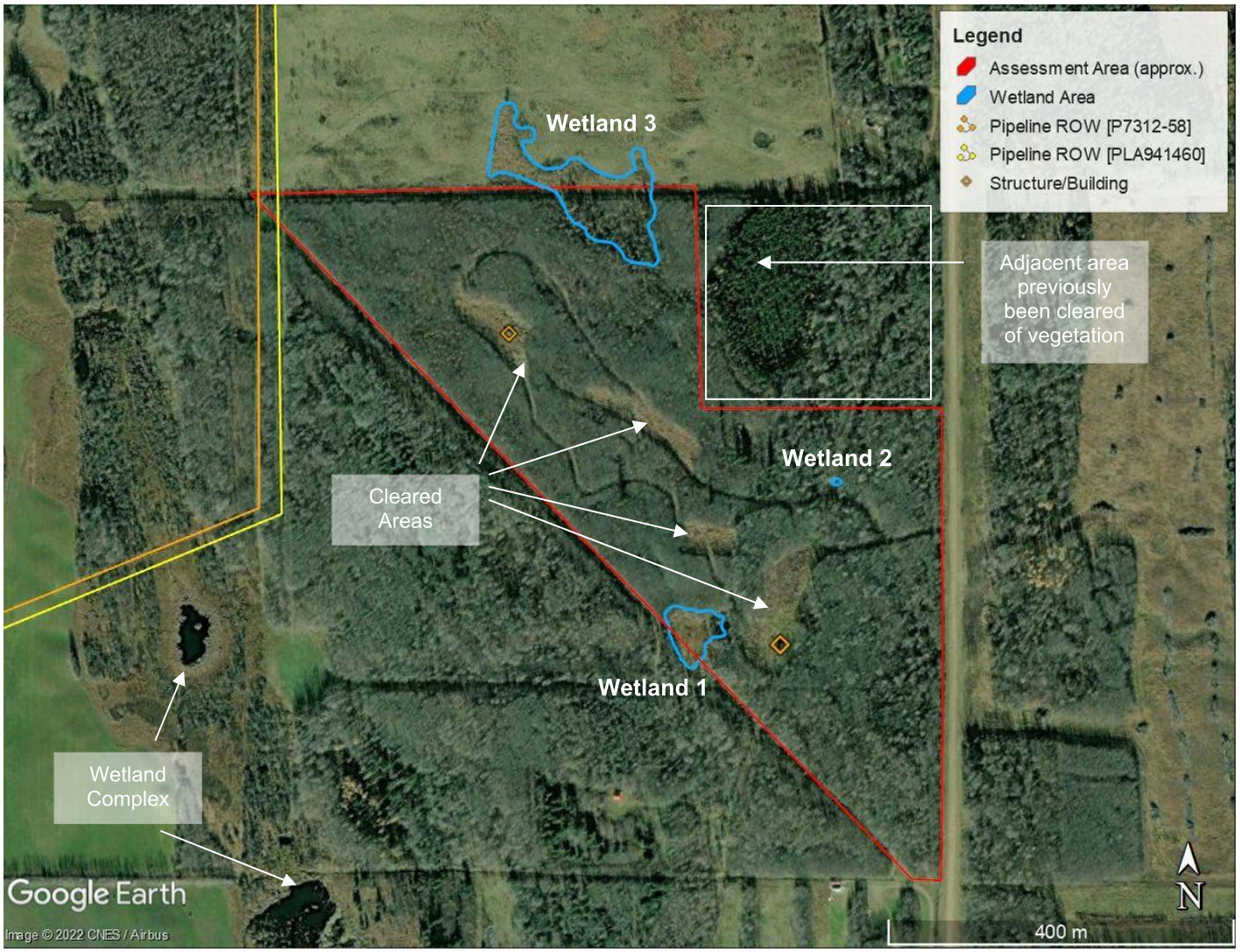


Figure 6.2. Overview map of the landscape features within the assessment area in portions of NE16-65-11-W4M observed during the field reconnaissance on July 28 – 29, 2021 (ArcMap GIS 2022; Imagery Date 2017-10-21). Wetland areas are outlined in blue and numbered in white.

6.3 Wetlands and Ephemeral Waterbodies

6.3.1 Wetland Classification

In total, during the field assessment, three wetlands were identified, delineated and assessed partially or wholly within the assessment area of NE16-65-11-W4M on July 28 – 29, 2021 (Table 6.5; Figure 6.2; Photographs in Appendix 12.3). Of the 3 wetlands, 1 was classified as a temporary graminoid dominant marsh and 2 were classified as wooded, deciduous swamps as per the Alberta Wetland Classification System (GOA 2015).

6.3.1.1 Wetland 1

Wetland 1 was a temporary, graminoid dominant wetland with scattered deciduous shrubs and trees throughout (Table 6.2; Figure 6.2; Appendix 12.3). Small, scattered pockets of standing water were also present within the southwest area of the wetland. Hydric soils were present. Wetland 1 extended south, beyond the boundary of the assessment area. This wetland feature has been continuously observed on the landscape throughout the historical aerial photography review.

6.3.1.2 Wetland 2

Wetland 2 was a deciduous wooded swamp dominant wetland (Table 6.2; Figure 6.2; Appendix 12.3). This wetland feature was significantly smaller than the other wetlands observed within the assessment area. It was situated on a re-vegetated cutline established sometime between 1952 and 1968. No open and/or standing water was observed, although other signs of hydrology were present. Hydric soils were present. This wetland feature was not observed on the landscape through the historical aerial photograph review.

6.3.1.3 Wetland 3

Wetland 3 was a deciduous wooded swamp dominant wetland (Table 6.2; Figure 6.2; Appendix 12.3). A significant amount of the woody vegetation was dying back, and several large snags were present throughout the area. No open and/or standing water was observed, although other signs of hydrology were present. Hydric soils were present. Generally, the southern portion of the wetland was more saturated than the northern portion, and the entire area appeared to slope slightly towards the south. Wetland 3 extended north, beyond the boundary of the assessment area. This wetland feature had been continuously observed on the landscape throughout the historical aerial photograph review.

6.3.2 Wetland Water Quality, Inflows and Outflows and Drainage

It would generally not be expected that overland flows would enter and/or exit any of the wetland areas within the assessment area, except potentially through drainage of surrounding landscapes during high precipitation events. No evidence of flows from surrounding areas was observed during the site visit on July 28 – 29, 2021. Each wetland was situated generally within localized depressional areas. Water quality results are presented in Appendix 12.3.

6.3.3 Wetland Vegetation

Wetlands 1 - 2 generally exhibited limited plant diversity and had a distinct wetland-upland boundary; however, Wetland 3, while also having a distinct wetland-upland boundary, was dissimilar to the previous two wetlands as small pockets of upland vegetation, as well as numerous snags and dying trees, scattered throughout the area.

No endangered or rare vegetation species were observed within the wetland, although no multi-seasonal survey to observe potential biennial or other uncommon presenters was undertaken to definitively rule out the presence or absence of any and all potential rare or endangered species.

6.3.4 Wetland Soils

Table 6.5 provides the results of soil investigations related to wetland delineation.

6.3.5 Wetland Human Use

No obvious evidence of prior disturbance or human activity directly within the wetland areas was observed during the field reconnaissance; however, numerous cleared access cutlines/trails and open areas were present within the upland areas within proximity to the wetlands.

Table 6.2. Wetland classification and information related to wetlands delineated and classified within NE16-65-11-W4M in July 2021.

Wetland (Area (ha))	Classification Codes[1]	Wetland Indicator Presence[2] (Present ✓ / Absent X)			Inlets/ Outlets (Y/N)	Fish and Fish Habitat (Y/N)	Amphibians (Y/N)	Other Wildlife (Y/N)	Crown Claimed Bed and Shore (Y/N)	Disturbances (Y/N)	Comments
		Hydrophytic Vegetation	Hydric Soil	Hydrology							
Wetland 1 (0.31 ha total; 0.25 ha within assessment area)	Graminoid Marsh [~90%, G-M-II]; and Deciduous Wooded Swamp (~10%, S-Wd) (sub-form)**	✓	✓	✓	N	N	Y	Y; See Table 6.3	No	No	▪ Wetland area not anticipated to be impacted.
Wetland 2 (0.0065 ha total)	Deciduous Wooded Swamp (~60%, S-Wd); and, Graminoid Marsh [~40%, G-M] (sub-form)	✓	✓	✓	N	N	Y	Y; See Table 6.3	No	No	▪ Wetland area anticipated to be permanent impacted.
Wetland 3 (1.34 ha total; 0.70 ha within assessment area)	Deciduous Wooded Swamp (~70%, S-Wd); and, Graminoid Marsh [~30%, G-M] (sub-form)	✓	✓	✓	N	N	Y	Y; See Table 6.3	No	No	▪ Wetland area not anticipated to be impacted.

[1]Wetland Classification Codes from Alberta Wetland Classification System (2015)
Class: Swamp (S), Marsh (M), Bog (B), Fen (F), Shallow Open Water (W)
Forms: Wooded Deciduous (Wd), Shrubby (S), Graminoid (G), Wooded Coniferous (Wc), Submersed and/or Floating Aquatic Vegetation (A), Bare (B)
Types: Freshwater (f), Slightly brackish (sb), Temporary (II), Seasonal (III), Semi-permanent (IV), Permanent (V)
*Types not applicable to Wooded Swamps based off updated Alberta Wetland Classification System (2015) which does not require full determination and breakdown of water permanence within swamps. Water permanence where applicable based on field observations.

6.4 Wildlife (Mammals, Birds, Amphibians and Reptiles)

During the field data collection on July 28 – 29, 2021, there were numerous observations and signs of wildlife heard and/or observed within the assessment area (Table 6.3); however, overall wildlife activity was considered to be low. Songbird activity was often only seen and/or heard during the early morning hours, with limited activity continuing into the late morning and afternoon. Wildlife signs observed included scat, trails, tracks and rubs from Deer (*Odocoileus* sp.) and Black Bear (*Urus americanus*). Ungulate bedding areas were also observed.

The Sandhill Crane (*Grus canadensis*) is one of the avian species observed and/or heard, which are classified as a "Sensitive" species within the province of Alberta (GOA 2020); however, observations included a large flock flying high above the assessment area, and no crane activity was observed directly within the area. Sandhill Crane is not listed federally listed under the *Species at Risk Act* (COSEWIC 2022).

No active burrows or dens, as would be protected under the Alberta *Wildlife Act,* were observed within the assessment area during the field reconnaissance. One recently active, small sized ground burrow/den was observed; however, no animal presence/activity was observed (Photographs in Appendix 12.3). Three active bird nests as well as numerous other inactive/old nests and potential cavity nests were also observed. Numerous wasp/hornet nests were present.

Habitat capable of supporting nesting raptors (such as hawks, eagles, etc.) was present throughout the assessment area, as majority of the area was treed and contained numerous large conifers and snags.

One amphibian species, the Wood Frog (*Lithobates sylvatica*), was observed within Wetlands 1 and 2. The Wood Frog is listed as "Secure" provincially and not listed federally (GOA 2020; COSEWIC 2022).

The remaining wildlife species observed were considered to be of "Secure" status within the province of Alberta (Table 6.6; GOA 2020).

Table 6.3. Wildlife and/or wildlife signs observed within the assessment area within portion of NE16-65-11-W4M on July 28 – 29, 2021.

Common Name	Scientific Name	Provincial Status[1,2]		Federal Status[3,4]	
		General Status Listing[1]	Wildlife Act[2]	SARA[3]	COSEWIC[4]
American Robin	*Turdus migratorius*	Secure	Not Listed	Not Listed	Not Listed
Black Bear	*Ursus americanus*	Secure	Not Listed	Not Listed	Not Listed
Black-capped Chickadee	*Poecile atricapillus*	Secure	Not Listed	Not Listed	Not Listed
Blue Jay	*Cyanocitta cristata*	Secure	Not Listed	Not Listed	Not Listed
Deer species	*Odocoileus* sp.	Secure	Not Listed	Not Listed	Not Listed
Flycatcher species	*Empidonax* sp.	-	-	-	-
House Sparrow	*Passer domesticus*	Secure	Not Listed	Not Listed	Not Listed
Moose	*Alces alces*	Secure	Not Listed	Not Listed	Not Listed
Red Squirrel	*Tamiasciurus hudsonicus*	Secure	Not Listed	Not Listed	Not Listed
Rose-breasted Grosbeak	*Pheucticus ludovicianus*	Secure	Not Listed	Not Listed	Not Listed
Ruffed Grouse	*Bonasa umbellus*	Secure	Not Listed	Not Listed	Not Listed
Sandhill Crane	*Grus canadensis*	Sensitive	Not Listed	Not Listed	Not Listed
Sparrow species	-	-	-	-	-
White-tailed Jack Rabbit	*Lepus townsendii*	Secure	Not Listed	Not Listed	Not Listed
Wood Frog	*Lithobates sylvatica*	Secure	Not Listed	Not Listed	Not Listed
Wren species	-	-	-	-	-

[1]Government of Alberta 2020 – Alberta Species General Status Listing
[2]Government of Alberta 2018 – Alberta *Wildlife Act*
[3]Govenment of Canada 2011 – *Species at Risk Act* (SARA)
[4]Government of Canada 2021 – Committee on the Status of Endangered Species in Canada (COSEWIC)

6.5 Vegetation

Vegetation throughout the assessment area was primarily natural, mature deciduous tree cover, with small areas of open graminoid cover and wetland area (Tables 6.1 and 6.4). The deciduous dominant forested upland areas had a canopy of primarily Balsam Poplar (*Populus balsamifera*) and Trembling Aspen (*Populus tremuloides*). The understory was densely vegetated, consisting primarily of Beaked Hazelnut (*Corylus cornuta*) and Red-osier Dogwood (*Cornus stolonifera*).

All wetlands assessed generally exhibited limited plant diversity and had a distinct wetland-upland boundary. Wetland vegetation generally consisted of graminoid cover of Reed Canary Grass (*Phalaris arundinacea*) and Beaked Sedge (*Carex rostrata*), as well as shrub cover of Basket Willow (*Salix petiolarisa*). Sparse traces of the noxious weed, Tall Buttercup (*Ranunculus acris*), was observed within Wetland 2. No other noxious and/or prohibited noxious weeds were observed within the assessment area.

The vast majority of vegetation observed during the field visit were listed within the ACIMS database with the Subnational Conservation Status Rank of S5/G5, meaning that the taxon is secure, widespread and abundant (AEP 2018) (Table 6.4). No endangered or rare vegetation species were observed during the field visit, although no multi-seasonal survey to observe potential biennial or uncommon presenters was undertaken to definitively rule out the presence or absence of all potential rare or endangered species.

Table 6.4. Vegetation observed within the assessment area in NE16-65-11-W4M on July 28 – 29, 2021.

Common Name	Scientific Name	Provincial Status[1]
Trees		
Balsam Poplar	*Populus balsamifera*	Native/Secure (S5/G5)
Basket Willow	*Salix petiolaris*	Native/Secure (S5/G5)
Trembling Aspen	*Populus tremuloides*	Native/Secure (S5/G5)
White Birch	*Betula papyrifera*	Native/Secure (S5/G5)
White Spruce	*Picea glauca*	Native/Secure (S5/G5)
Shrubs		
Beaked Hazelnut	*Corylus cornuta*	Native/Secure (S5/G5)
Bracted Honeysuckle	*Lonicera involucrata*	Native/Secure (S5/G5)
Meadow Willow	*Salix petiolaris*	Native/Secure (S5/G5)
Prickly Rose	*Rosa acicularis*	Native/Secure (S5/G5)
Red-osier Dogwood	*Cornus stolonifera*	Native/Secure (S5/G5)
Sandbar Willow	*Salix interior*	Native/Secure (S5/G5)
Wild Red Raspberry	*Rubus idaeus*	Native/Secure (S5/G5)
Willow species	*Salix* sp.	-
Forbs		
Alsike Clover	*Trifolium hybridum*	Exotic/Alien (SNA/GNR)
Bishop's Cap	*Mitella nuda*	Native/Secure (S5/G5)
Brittle-stem Hempnettle	*Galeopsis tetrahit*	Exotic/Alien (SNA/GNR)
Bunchberry	*Cornus canadensis*	Native/Secure (S5/G5)
Canada Thistle	*Cirsium arvense*	Exotic/Alien (SNA/GNR)
Coltsfoot	*Petasites frigidus*	Native/Secure (S5/G5)
Common Dandelion	*Taraxacum officinale*	Exotic/Alien (SNA/GNR)
Common Fireweed	*Chamerion angustifolium*	Native/Secure (S5/G5)
Common Horsetail	*Equisetum arvense*	Native/Secure (S5/G5)
Common Plantain	*Plantago major*	Exotic/Alien (SNA/G5)
Common Yarrow	*Achillea millefolium*	Native/Secure (S5/G5)
Dewberry	*Rubus pubescens*	Native/Secure (S5/G5)
Large Leaved Avens	*Geum macrophyllum*	Native/Secure (S5/G5)
Marsh Willowherb	*Epilobium palustre*	Native/Secure (S4/G5)
Northern Bedstraw	*Galium boreale*	Native/Secure (S5/G5)
Ostrich Fern	*Matteuccia struthiopteris*	Native/Secure (S4/G5)
Pale Touch-me-not	*Impatiens pallida*	Exotic/Alien
Perennial Sow-thistle	*Sonchus arvensis*	Noxious (SNA/GNR)
Prickly Lettuce	*Lactuca serriola*	Exotic/Alien (SNA/GNR)
Red Clover	*Trifolium pratense*	Exotic/Alien (SNA/GNR)
Tall Buttercup	*Ranunculus acris*	Noxious (SNA/G5)
Tall Lungwort	*Mertensia paniculate*	Native/Secure (S5/G5)
Violet species	*Viola* sp.	-
Wild Lily-of-the-valley	*Maianthemum canadense*	Native/Secure (S5/G5)
Wild Sarsaparilla	*Aralia nudicaulis*	Native/Secure (S5/G5)
Wild Vetch	*Vicia americana*	Native/Secure (S5/G5)
Graminoids		
Beaked Sedge	*Carex rostrata*	Native/Secure (S5/G5)
Bulrush species	*Schoenoplectus* sp.	-
Carex species	*Carex* sp.	-
Common Scouring-rush	*Equisetum hyemale*	Native/Secure (S5/G5)
Marsh Reed Grass	*Calamagrostis canadensis*	Native/Secure (S5/G5)
Various Grasses	-	-
Aquatics		
-	-	-

[1]Subnational Rank (S) S1 Extremely rare, S2 Very rare provincially, S3 Rare to uncommon provincially, S4 Common and apparently secure provincially. S5 Very common and demonstrably secure provincially. SNA Not applicable. Global Rank (G) ranging from critically imperiled (G1) to demonstrably secure (G5), GNR Unranked. NatureServe, 2020. [2]ACIMS, 2018

6.6 Species At Risk Summary

The *Species at Risk Act* aims to prevent species from becoming extinct, and to secure the necessary actions for their recovery. It applies to all federal lands in Canada; all wildlife species listed as being at risk; and their critical habitat (GOC 2011). It classifies species as being either "Extirpated", "Endangered", "Threatened" or of "Special Concern".

No species listed under the *Species at Risk Act* (COSEWIC 2021) were observed within the assessment area during the field reconnaissance on July 28 – 29, 2021.

6.7 Crown Land Claims and Land Ownership

When private land undergoes development, it is a requirement that potential provincial interests are identified, which includes the determination of whether or not a body of water may be Crown owned. The title of the beds and shores of all naturally occurring rivers, streams, watercourses and lakes is vested in the Crown in right of Alberta (as per Section 3 (1) of the *Public Lands Act*). Wetlands are claimed by the Crown on a basis of three criteria: the wetland must be a body of water, the wetland must be naturally occurring, and the wetland must be permanent (AEP 2016). Based off this criteria, seasonal shallow marshes, semi-permanent deep marshes, permanent open water wetlands, and open water saline wetlands would be potentially Crown claimable (AEP 2016).

A request was submitted to Alberta Environment and Parks Water Boundaries on September 9, 2021, regarding the wetland areas identified within the assessment area. When provided an outlined figure of the assessment area and assessed wetlands, Alberta Environment and Parks Water Boundaries Unit responded with the following information.

> "*Please note that a cursory review of the historical satellite/aerial photos of the area from 1950 to 2020 does not support the existence of any permanent and naturally occurring body of water (i.e., open surface water) within the enquired wetlands in the NE ¼ Section 16-65-11-4 as shown in the attached imagery. As such, no portion of those wetlands in that area meets the criteria for a Crown ownership claim under Section 3 of the Public Lands Act".* (S. Parseyan, per. comm.).

Assessments made by the Water Boundaries Unit do not provide any permission to alter any water feature. As the Crown in right of Alberta owns all waters on Alberta lands, regardless of the surface ownership, any activity which may affect a naturally occurring wetland will be subject to the regulatory requirements under the *Water Act*.

6.8 Human Use, Recreation and Aesthetics

The assessment area was located on private property and the entire area had been fenced. The main access into the property was gated and locked, and the general public did not appear to have unlimited access onto the site. While overall human activity and utilization within the area was considered to be limited, two constructed structures/buildings were observed within the assessment area. Several previously cleared cutlines/trails (foot and ATV/UTV access) that transected throughout the property were also present, although these areas did not appear to be maintained (i.e., mowed, trimmed, etc.) (Figure 6.2; Photographs in Appendix 12.3). Some garbage/debris surrounded the structure/building within the southern portion of the assessment area, consisting primarily of discarded building materials, wood and a metal 55 gallon drum (Photographs in Appendix 12.3). Several old, stacked wood piles were present within the northern portion of the assessment area, adjacent to the cleared cutlines/trails, as well as slash and woody debris covered the majority of the ground within the northern cleared area (Photographs in Appendix 12.3).

Two active pipeline rights-of-ways (ROWs) transect the assessment area within the northwest corner (AEP/AER 2022).

6.9 Additional Features

No additional notable features were observed within the assessment area during the July 2021 field reconnaissance.

7.0 BYLAWS AND AREA STRUCTURE PLANS

The following describes some of the relevant municipal legislation relevant to the proposed development. The proponent should be aware of any additional bylaws surrounding development in this area.

7.1 Lower Athabasca Regional Plan 2012 – 2022 (2012)

The County of Lac La Biche, as well as several other municipalities, is encompassed within the Lower Athabasca Land-use Framework Region (GOA 2008). The Lower Athabasca Regional Plan 2012 – 2022 (GOA 2012) was established to provide a long term vison for the region of Lower Athabasca through identifying strategic development directions for the region that includes the following (GOA 2012):

- *"Align the provincial policies at the regional level to balance Alberta's economic, environmental and social goals;*
- *Reflect ongoing commitment to engage Albertans, including Aboriginal peoples, in land-use planning;*
- *Use cumulative effects management approach to balance economic development opportunities and social and environmental considerations;*
- *Set desired economic, environment and social outcomes and objectives for the region;*
- *Describe the strategic, actions, approaches and tools required to achieve the desired outcomes and objectives;*
- *Establish monitoring, evaluation and reporting commitments to assess progress; and,*
- *Provide guidance to provincial and local decision-makers regarding land-use management for the region."*

The Regional Plan received contributions from the Lower Athabasca Regional Advisory Council, First Nations and Metis communities, stakeholders, municipalities and the general public (GOA 2012). Delegation authority of the development area remains with the Lac La Biche County; however, alignment with the Regional Plan will help achieve established outcomes and goals.

7.2 Lac La Biche County Municipal Development Plan and Associated Bylaws

Area structure plans, subdivision applications and development decisions must all comply with the applicable Municipal Development Plan. Therefore, the proponent must be aware of the Lac La Biche County (2013) Municipal Development Plan (Bylaw #13-020), as well as any associated bylaws and ensure development and design follow the applicable guidelines.

7.3 Lac La Biche County Area Structure Plan Application Process

As per the Lac La Biche County (2015) Area Structure Plan Application Process, "*a Natural Site Assessment evaluating potential environmentally sensitive features for lands within the Plan area"* is a required component of an area structure plan process. This Biophysical Environmental Assessment is considered a comprehensive '*Natural Site Assessment*'.

7.4 Alberta Municipal Government Act

The Alberta Municipal Government Act (MGA) requires a minimum setback distance of 6 metres for wetlands.

7.5 Lac La Biche County Riparian Setback Matrix Policy

Lac La Biche County's Riparian Setback Matrix Policy PI-63-003 recognizes the need to prevent deleterious substances, such as nutrients, sediment and bacteria, from entering waterbodies with the implementation of policy and in accordance with provincial legislation.

7.6 Lac La Biche County Environmental Reserve Encroachment Policy

Lac La Biche County's Environmental Reserve Encroachment Policy PI-63-004 deems it appropriate to deal with encroachments on environmental reserve in a consistent manner that protects the integrity of the natural environment and the specific intent of the environmental reserve designation.

8.0 POTENTIAL ENVIRONMENTAL EFFECTS AND MITIGATION

8.1 Potential Environmental Effects

The Area Structure Plan (ASP) development, zoning and subdivision of the assessment property may result in alterations to the existing landscape and/or influence surrounding landscapes and environmental features. Environmental effects on the landscape may occur with the removal of some vegetation and alteration of the morphometry of the existing landscape. The development of infrastructure/buildings, additional access, and other anthropogenic developments associated with residential communities will result in changes to existing and natural landscapes.

The current landscape has been a mix of relatively undisturbed upland and wetland areas, aside from the limited disturbances and previous tree clearing and cutline/trail establishments. Some general potential environmental effects that may be noted, observed and measured from residential developments near both upland and wetland natural areas include but are not limited to those indicated in Table 8.1.

8.2 Avoidance, Mitigation and Environmental Protection

To address the potential environmental effects that may occur as a result of land development, some considerations, mitigation and protection strategies could be considered and/or may be required (Table 8.1). Various potential effects associated with residential presence may be expected to be addressed through Best Management Practices and adherence to various regulations, guidelines and bylaws. The avoidance, minimization, mitigation and compensation/replacement measures presented are intended to address those effects identified at this stage of planning.

Table 8.1. Summary of potential environmental effects and mitigation associated with the Area Structure Plan development of lands for residential development within parts of NE16-65-11-W4M.

Ecological Component[1]	Potential Effect	Potential Mitigation
Wetlands	▪ Wetland alteration and/or elimination and associated decreased water storage capability and water quality contaminant capture, leading to potential implications to watershed ▪ Wetland alteration and/or elimination and associated reduction of amphibian, wetland bird species and aquatic furbearer habitat	▪ Three natural wetlands present and no ephemeral waterbodies ▪ Summary of wetland mitigation provided in Table 8.3; wetland replacement plan to be prepared by wetland specialist/EnviroMak Inc. in Wetland Assessment and Impact Report (WAIR) for regulatory permitting of alteration of Wetland 2 ▪ Wetlands 1 and 3 will be retained within the property and incorporated into Municipal and Environmental Reserve; each wetland area will have established non-disturbance setback/buffer ▪ Avoidance of key amphibian and wildlife vulnerable timing for scheduling of alteration of wetlands and waterbodies (Table 8.2)
Fish and Fish Habitat	▪ No fish and/or fish habitat present within assessment area	▪ None required
Water Quality and Quantity	▪ Sedimentation from infrastructure, land clearing and construction activities ▪ Nutrient enrichment of eutrophic waters from activities and/or fertilizer use ▪ Reduced water quality from enrichment or contaminants such as herbicides, pesticides and wastes ▪ Encroachment of water surface areas thus reducing water-based environmental values and altering historical drainage patterns ▪ Impacts on surface drainage patterns, surface/groundwater interfaces, etc. ▪ Impacts to groundwater recharge and quality	▪ Informed development, grading/drainage, construction and operations plans ▪ Development of EPP or ECOPlan and/or application of BMPs and environmentally sound planning for construction activities ▪ Septic system design/construction/operation to adhere to County requirements, and no release of septic waste to wetlands. ▪ Temporary erosion and sediment control measures and Best Management Practices (BMPs) as relevant ▪ Monitoring as applicable to activities and operations ▪ Any contaminants released into the environment especially ground and surface waters should be reported to the Alberta Environment and Parks Hotline via telephone at 1-800-222-6514 ▪ Drainage alteration, if applicable, may require regulatory approval
Wildlife and Wildlife Habitat	▪ Direct wildlife mortalities (i.e. destruction of migratory birds, amphibians and denning animals) ▪ Alteration, disruption and destruction of wildlife habitat due to use ▪ Altered wildlife habitats in upland and riparian areas due to clearing vegetation ▪ Tree stand alteration and reduction of habitat for tree dependent species ▪ Fragmentation of habitat and alteration of wildlife movement corridors or migration routes	▪ Minimize footprint and retain natural areas as possible; two wetlands to be retained in plan ▪ Informed development, grading/drainage, construction and operations plans ▪ Consideration of wildlife timing windows (Table 8.2) and pre-disturbance wildlife sweeps as applicable ▪ Revegetation and naturalization where possible and conducive to development plan ▪ Apply appropriate speed limits to access roads ▪ Development of EPP or ECOPlan and/or application of BMPs and environmentally sound planning for construction activities ▪ Should Species at Risk be observed, sightings should be reported to a government biologist ▪ Monitoring as applicable to activities

Ecological Component[1]	Potential Effect	Potential Mitigation
Soils and Vegetation	▪ Alteration, disruption and destruction of remaining forested areas, potentially reducing ability for species to safely move through area ▪ Alteration and potential loss of topsoil and other soil horizons ▪ Compaction of soils resulting in increased water runoff and reduced potential for seed germination, seedling emergence, root growth, nutrient uptake (Daum 2015) ▪ Alteration of existing terrestrial ecosystem to impermeable surfaces, leading to increase in temperature of surrounding area (heat island effect; EPA 2015)	▪ Minimize footprint and retain natural areas as possible; two wetlands to be retained in plan ▪ Informed development, grading/drainage, construction and operations plans ▪ Native revegetation and naturalization where possible and conducive to development plan ▪ Use seed mixes free of weeds ▪ Development of EPP or ECOPlan and/or application of BMPs and environmentally sound planning for construction activities ▪ Topsoil should be handled, stored, separated and salvaged per Best Management Practices ▪ Monitoring as applicable to activities
Invasive Species, Pests, Pathogens, Disease, Pollution and Contamination	▪ Introduction and/or spread of various invasive species ▪ Introduction and/or spread of noxious weeds and invasive plant species ▪ Introduction and/or spread of clubroot ▪ Release and/or spill of deleterious substances and/or contaminants ▪ Increased pollution including garbage, air quality reducers (i.e. dust, exhaust, etc.) and noise and light pollutants	▪ Informed development, grading/drainage, construction and operations plans ▪ Development of EPP or ECOPlan and/or application of BMPs and environmentally sound planning for construction activities ▪ Ensure residential sewage and garbage management meet municipal requirements ▪ Adherence to Alberta Clubroot requirements ▪ Use seed mixes free of weeds ▪ Remove and control noxious weeds where present ▪ Best Management Practices (BMPs) as relevant ▪ Monitoring as applicable to activities
Historical Resources	▪ No Historical Resources anticipated to be within the assessment area as determined by the existing information review	▪ If historical resources are encountered, pause activity and contact relevant regulatory agency for guidance
Cumulative Effects	▪ Reduced ecological diversity and richness ▪ Increased climate change contributions ▪ Habitat fragmentation and ecological degradation	▪ Informed development, grading/drainage, construction and operations plans ▪ Development of EPP or ECOPlan and/or application of BMPs and environmentally sound planning for construction activities ▪ In-lieu fee replacement payment for wetland alteration for Wetland 2; retention of wetlands 1 & 3 ▪ Best Management Practices (BMPs) as relevant (i.e. anti-idling, noise abatement, exhaust filters) ▪ Incorporate renewable energy and recycle/reuse/reduce principles in residential development as possible.

Table 8.2. Potential environmental restricted activity timing and setback distances identified for the Area Structure Plan for residential land development within parts of NE16-65-11-W4M.

Restriction	Restricted Activity Timing Period[3,4,5]	[4,5]Setback Distance	Site-Specific Comments*
Vulnerable Wildlife and Nesting Birds (Owls, Raptors and Migratory Birds)	February 15 – August 31	Species and disturbance level dependent	Avoid key vulnerable timing for clearing of vegetation. Conduct pre-disturbance wildlife sweep a maximum of 7 days prior to disturbance if disturbance to occur during restricted timing.
Species at Risk (SARA) - Wildlife	Species dependent	Species dependent	No SARA listed wildlife species were identified within the existing information and none were encountered during the site assessment in July 2021. All threatened and endangered species sightings should be reported to the local AEP Wildlife Biologist.
Amphibian Breeding	Mid-April to Mid-July	Species and disturbance level dependent	Common amphibians (Wood Frog) observed in Wetlands 1 and 2. Conduct pre-disturbance wildlife sweep a maximum of 7 days prior to disturbance if disturbance to occur during restricted timing.
Wetland 1	Year round	Minimum 28.5 m	Riparian Setback Matrix Model calculation applied.
Wetland 3	Year round	Minimum 18.5 m	Riparian Setback Matrix Model calculation applied.

[1]FWMIS 2021 [2]AER/AEP 2022 [3]Government of Alberta 2021 – Master Schedule of Standards and Conditions
[4]Government of Alberta 2011 - Recommended Land Use Guidelines for Protection of Selected Wildlife Species and Habitat within Grassland and Parkland Natural Regions of Alberta. Setback distance determined based on "medium level of disturbance.
[5]Government of Alberta 2013 - Sensitive Species Inventory Guidelines
*Regulatory approval/waiver may or may not allow for deviation from recommended restricted periods and setback distances.

Table 8.3. Summary of wetland mitigation associated with Area Structure Plan for residential land development within parts of NE16-65-11-W4M.

Wetland	Permanent Impact Mitigation (Fee Replacement)	Temporary Impact Mitigation	Best Management Practices associated with Wetland Alteration
Wetland 1	▪ Avoided - No permanent impact	▪ Avoided – No temporary impact	▪ Wetland 1 will be retained within the property and incorporated into Municipal and Environmental Reserve ▪ Wetland area will have established minimum 28.5 m non-disturbance setback/buffer ▪ Development and implementation of Environmental Protection Plan (EPP) or ECOPlan and/or application of BMPs including but not limited to erosion and sediment control, care of water for wetland drainage to avoid deleterious substance release to adjacent waters, prevention of spread of invasive species and noxious weeds and others
Wetland 2	▪ Alteration - Permanent impact	▪ Will be permanently altered so no temporary impacts	▪ Wetland replacement plan (in-lieu fee replacement) to be prepared by wetland specialist/EnviroMak Inc. in Wetland Assessment and Impact Report (WAIR) for regulatory permitting of alteration of Wetland 2 ▪ Alteration to abide by timing requirements and/or mitigation noted in Table 8.2
Wetland 3	▪ Avoided - No permanent impact	▪ Avoided – No temporary impact	▪ Wetland 3 will be retained within the property and incorporated into Municipal and Environmental Reserve ▪ Wetland area will have established minimum 18.5 m non-disturbance setback/buffer ▪ Development and implementation of Environmental Protection Plan (EPP) or ECOPlan and/or application of BMPs including but not limited to erosion and sediment control, care of water for wetland drainage to avoid deleterious substance release to adjacent waters, prevention of spread of invasive species and noxious weeds and others.

9.0 CONCLUSIONS AND RECOMMENDATIONS

The biophysical assessment results in the following summarized findings and recommendations.

1. Assessment Area: The biophysical assessment with field verification in July 2021 was conducted for approximately 24.34 ha (60.15 ac) of land within applicable portions of NE16-65-11-W4M.

2. Landscape Analysis: Majority of the area consisted of mature, dense deciduous dominant tree stands which covered a total land surface area of approximately 21.2 ha (87.16 %). Other existing landscape and vegetation coverage was limited to open grassland/cleared areas (including cutlines/trails) and wetland areas, which covered approximately 2.17 ha (8.90 %) and 0.96 ha (3.94 %) of surface area, respectively. No agricultural land (pastures and/or crop land) was present within the assessment area.

3. Wetlands and Ephemeral Waterbody(s): Wetland areas were identified, delineated and classified within, partially within or immediately within the assessment area based on vegetation, soils, hydrology per the applicable regulatory directives and policies during the July 2021 site visit. In total, three (3) natural wetland features were identified. No ephemeral waterbodies were identified. Wetlands 1 and 3 will be retained within the property and incorporated into Municipal and Environmental Reserve, as well as a non-disturbance setback/buffer will be established around these wetland areas (E. Sehn, per. comm.). A wetland replacement plan is to be prepared by EnviroMak Inc. in a Wetland Assessment and Impact Report (WAIR) for regulatory permitting of the anticipated permanent alterations to the area of Wetland 2.

4. Crown Claimed Bed and Shore: A request for determination of Crown claimed bed and shore was submitted to the Water Boundaries Unit of Alberta Public Lands. The Alberta Environment and Parks Water Boundaries Unit has confirmed that no permanent and naturally occurring body of water were present within the assessment area based on a cursory review of the historical satellite/aerial photos of the area. As such, no wetlands in that area meet the criteria for a Crown ownership claim under Section 3 of the *Public Lands Act* (S. Parseyan, per. comm.).

5. Wildlife: No federally listed wildlife Species at Risk as listed under Schedule 1 of the *Species at Risk Act* (excluding species of Special Concern for which prohibitions do not apply) were noted during the existing information review or observed during field reconnaissance. Therefore, no SARA permitting would be anticipated to be required. Only Schedule 1 species listed as “Endangered”, “Threatened” or “Extirpated” under SARA have prohibitions and may require permitting. Opportunity remains for wildlife movement through the treed and wetland complex area to the south and west of the property. Retention of two wetlands provides continued habitat for common amphibians and other wetland dependent wildlife.

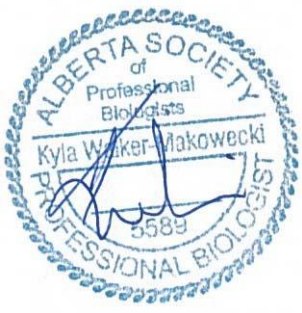
6. Vegetation: No rare or endangered plant species were identified to be within the assessment area within the existing records, and no rare or endangered plant species were observed during the field reconnaissance. Where noxious weeds are observed, they should be controlled and/or removed as part of the Weed Control Act and as per the direction of the local Alberta Agricultural fieldperson.
7. Regulatory: The various existing plans, reports and other applicable municipal legislation should be adhered to where applicable depending on the development plan details. Various regulatory permitting may be applicable to the development of these lands.
8. BMPs: Various Best Management Practices for eventual construction should be applied.

10.0 LIMITATIONS, CLOSURE AND AUTHENTICATION

In conducting the assessment and rendering our conclusions, EnviroMak gives the benefit of its best judgment based on its experience and in accordance with generally accepted professional standards for this type of assessment in present time. This report was submitted with the best information to date and on the information provided. This report has been prepared for the exclusive use of the proponent/client. Any use which any other third party makes of this report, or any reliance on or decisions to be made on it, are the responsibility of such third parties. EnviroMak accepts no responsibility for damages, if any, suffered by any other third party as a result of decisions made or actions based on this report.

Please contact EnviroMak Inc. by telephone at (780) 425-2461 (office) or email to kyla@enviromak.com with any questions or concerns.

Sincerely,



Kyla Walker-Makowecki, M.Sc., P. Biol., RT(Ag), QAES, CPESC
Principal, EnviroMak Inc.

Attachments: Bibliography and Appendices

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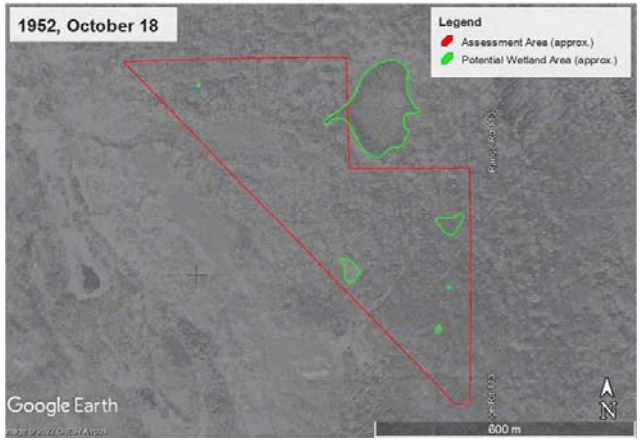
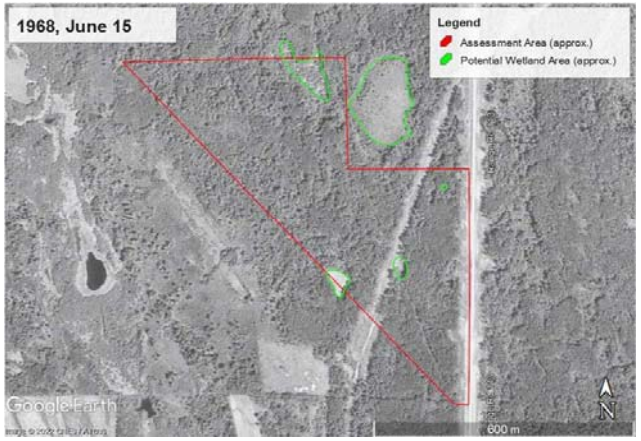
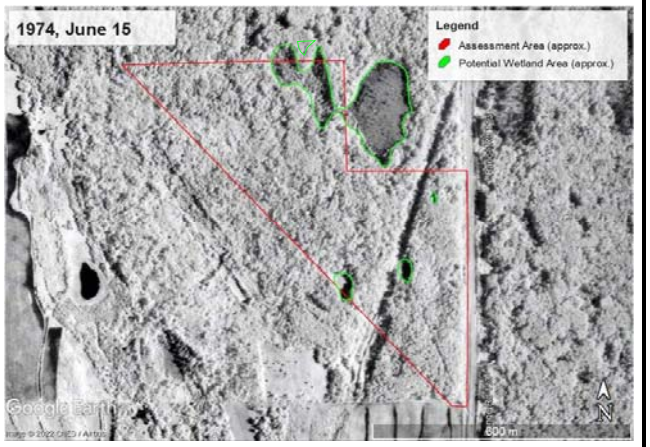
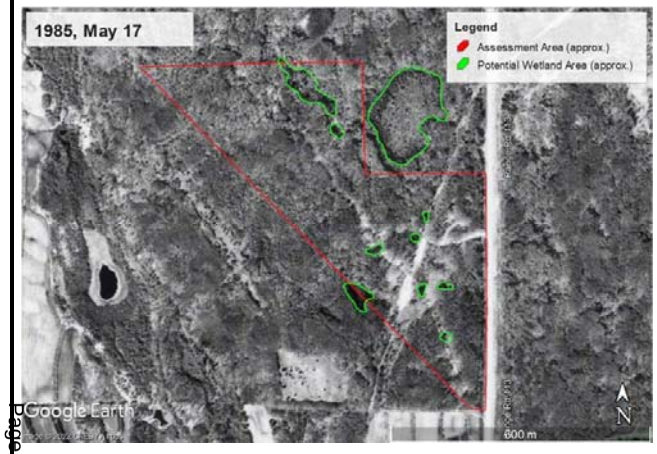
12.0 APPENDICES

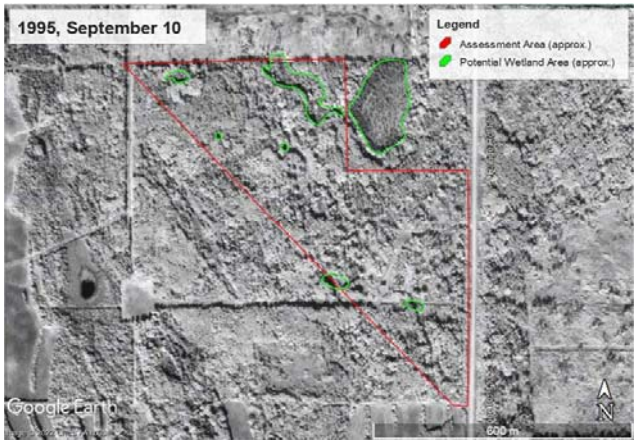
12.1 Historical Aerial Photographs



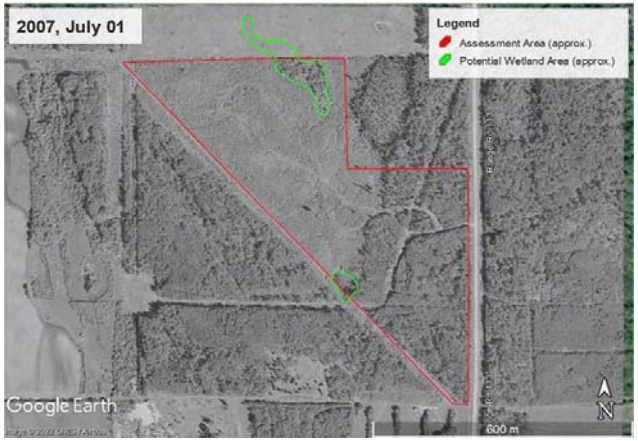








ENVIRO MAK Inc.	Area Structure Plan Development
HISTORICAL AERIAL IMAGERY 1952 – 2017	
NE16-65-11-W4M Lac La Biche County	Project No. 21-08


2007, July 01
Legend
Assessment Area (approx.)
Potential Wetland Area (approx.)
Google Earth
600 m
N


2017, October 21
Legend
Assessment Area (approx.)
Potential Wetland Area (approx.)
Google Earth
600 m
N


Field Delineation: 2021, July 28 - 29
Imagery Date: 2017, October 21
Legend
Assessment Area (approx.)
Wetland Area
Google Earth
500 m
N

12.2 Database Search Results

Date: 16/7/2021
Requestor: Environment/Conservation
Reason for Request: Environmental Assessment
SEC: 16 **TWP:** 065 **RGE:** 11 **MER:** 4

Alberta Parks

Non-sensitive EOs (updated: October 2017)

M_RR_TTT_SS	EO_ID	ECODE	S_RANK	SNAME	SCOMNAME	LAST_OBS_D

No Non-sensitive EOs Found: Next Steps - See FAQ

Sensitive EOs (updated: October 2017)

M-RR-TTT	EO_ID	ECODE	S_RANK	SNAME	SCOMNAME	LAST_OBS_D

No Sensitive EOs Found: Next Steps - See FAQ

Protected Areas (updated: October 2017)

M-RR-TTT-SS	PROTECTED_AREA_NAME	TYPE	IUCN

No Protected Areas Found

Crown Reservations/Notations (updated: October 2017)

M-RR-TTT-SS	NAME	TYPE

No Crown Reservations/Notations Found

Fish and Wildlife Internet Mapping Tool (FWIMT)

(source database: Fish and Wildlife Management Information System (FWMIS))

Species Summary Report

Report Date: 16-Jul-2021 13:21

Species present within the current extent

Fish Inventory	Wildlife Inventory	Stocked Inventory
No Species Found in Search Extent	BLACK TERN CANADIAN TOAD GREAT GRAY OWL OSPREY	No Species Found in Search Extent

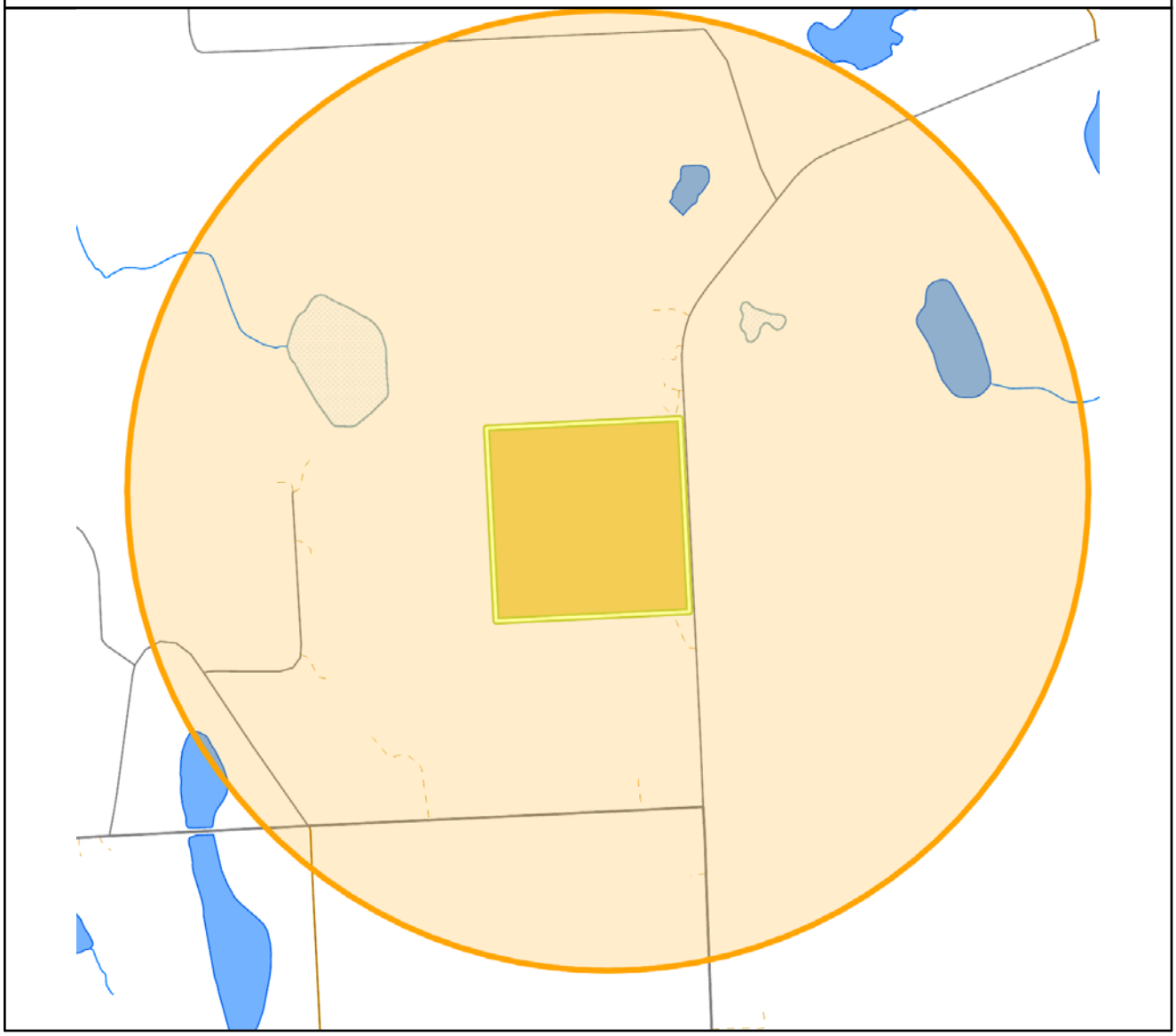
Buffer Extent

Centroid (X,Y)	Projection	Centroid (Qtr Sec Twp Rng Mer)	Radius or Dimensions
719452, 6056378	10-TM AEP Forest	NE 16 65 11 4	2 kilometers

Contact Information

For contact information, please visit:
https://www.alberta.ca/fisheries-and-wildlife-management-contacts.aspx

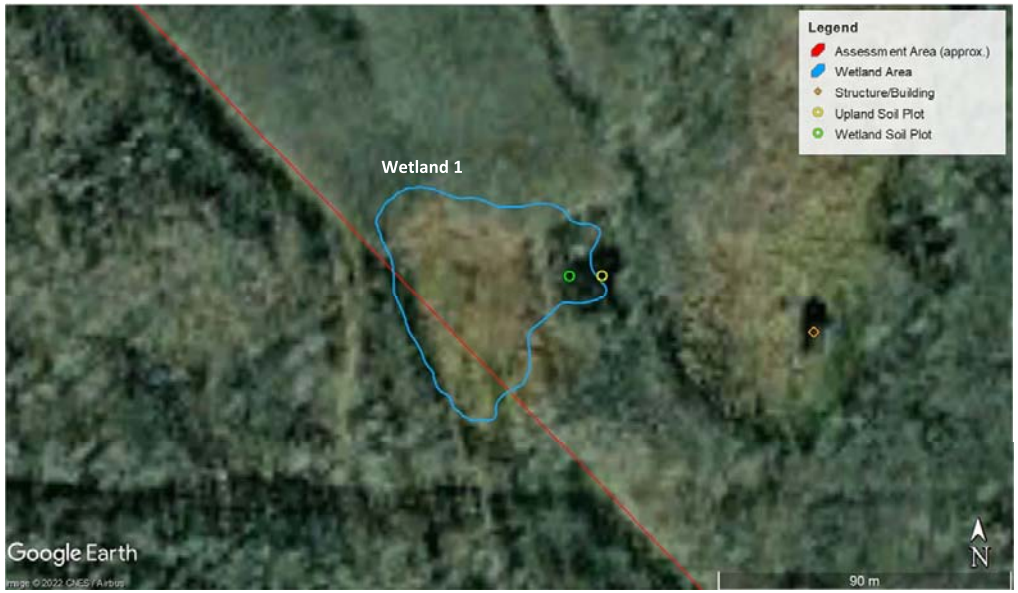
16-Jul-2021 13:21 **Map Results**



12.3 Wetland Data Summaries and Photographs

Wetland 1 Vegetation Summary							
Common Name	Scientific Name	Provincial Status[1]	Federal Status[2,3]		Indicator Status[4]	Dominant Species (✓)	Absolute Cover
		ACIMS[1]	SARA[2]	COSEWIC[3]			
Tree Stratum – 10m x 10m plot							
-	-	-	-	-	-	-	-
						Total Tree Stratum Cover =	**0 %**
Sapling/Shrub Stratum – 1m x 1m plot							
-	-	-	-	-	-	-	-
						Total Sapling/Shrub Stratum Cover =	**0 %**
Herb Stratum – 1m x 1m plot							
Reed Canary Grass	*Phalaris arundinacea*	Native (S5/G5)	Not Listed	Not Listed	FACW	✓	~ 90
						Total Herb Stratum Cover =	**~ 90 %**
						Bare Ground within (underneath) Herb Stratum Cover =	**~ 10 %**

[1]ACIMS 2022 – Subnational Rank (S) S1 Extremely rare, S2 Very rare provincially, S3 Rare to uncommon provincially, S4 Common and apparently secure provincially. S5 Very common and demonstrably secure provincially. SNA Not applicable. Global Rank (G) ranging from critically imperiled (G1) to demonstrably secure (G5), GNR Unranked
[2]Government of Canada 2011 – *Species at Risk Act* (SARA)
[3]Government of Canada 2022 – Committee on the Status of Endangered Species in Canada (COSEWIC)
[4]Lichvar, R.W., D.L. Banks, W.N. Kirchner, and N.C. Melvin 2016 – USACE National Wetland Plant List



Wetland 1 Hydrophytic Vegetation Dominance Test			
Number of Dominant Species that are OBL, FACW or FAC		Total Number of Dominant Species	
OBL Species =	0	1	
FACW Species =	1		
FAC Species =	0		
Total (A) =	**1**	**Total (B) =**	**1**
		Prevalence Index (A/B) x 100 =	**100**

*A Dominance Test result of > 50 % is a Hydrophytic Vegetation Indicator

Wetland 1 Water Quality and Wetland Hydrology Indicators			
Parameter	Measurement	Parameter	Measurement
Water Temperature (°C)	13.1	Total Dissolved Solids (mg/L)	63.5
Dissolved Oxygen (mg/L)	-	pH	5.24
Conductivity (µS/cm)	85.8	Salt (ppm)	43.6
Wetland Hydrology Indicators*	Water quality was sampled from standing water within the soil plot. Small pockets of standing water along southwest corner of wetland. Primary indicators: Surface water present, high water table, saturation, algal mats. Secondary indicators: none.		

*Requires minimum 1 Primary Indicator (P) and/or 2 Secondary Indicators for confirmed presence

Wetland 1 Soil Profile Description and Hydric Soil Indicators						
Depth (cm)	Matrix		Redox Features		Texture	Von Post Scale
	Color (moist)	%	Color (moist)	%		
5 – 0	-	-	-	-	LFH	-
0 - 40	-	-	-	-	Organic	**7**
Hydric Soil Indicators[1]	Hydric soil indicators: Organic Surface Layer (A2).					

[1]USACE (2018) Field Indicators of Hydric Soils adapted for use in Alberta

Wetland 1 Indicators Present (Yes ✓ / No X)	
Hydrophytic Vegetation	✓
Hydric Soil	✓
Hydrology [1 Primary Indicator (P) and/or 2 Secondary Indicators (S)]	✓
Total Wetland Indicators Present[1]	3/3

[1]Field Indicators provided through USACE (2019) Wetland Determination Form adapted for use in Alberta

Wetland 1 Characteristics and Classification					
Percent of Wetland	Class[1]	Form[1]	Type[1]		
			Water Permanence	Salinity	Acidity
90	Marsh	Graminoid	Temporary	-	-
10	Swamp	Wooded, deciduous	-	-	-
Additional Comments:	Wetland feature is classified as a temporary graminoid marsh (M-G-II) dominant wetland with a deciduous wooded swamp (S-Wd) sub-form within the Alberta Wetland Classification System (AWCS)[1].				

[1]Government of Alberta 2015 - Alberta Wetland Classification System

Area Structure Plan Development

WETLAND 1 RESULTS

NE16-65-11-W4M Lac La Biche County	Project No. 21-08

Wetland 1, facing west across wetland area from the eastern boundary.

Wetland 1, facing northwest across wetland area from the eastern boundary.

Wetland 1, facing south across wetland area from the northern boundary.

Wetland 1, facing east across the upland area adjacent to the eastern wetland boundary.

Wetland 1, wetland soil plot (54.626711°, -111.598352°).

Wetland 1, upland soil plot (54.626712°, -111.598197°).

Wetland 2 Vegetation Summary							
Common Name	Scientific Name	Provincial Status[1]	Federal Status[2,3]		Indicator Status[4]	Dominant Species (✓)	Absolute Cover
		ACIMS[1]	SARA[2]	COSEWIC[3]			
Tree Stratum – 10m x 10m plot							
White Birch	*Betula papyrifera*	Native (S5/G5)	Not Listed	Not Listed	FAC	✓	40
Basket Willow	*Salix petiolaris*	Native (S5/G5)	Not Listed	Not Listed	OBL		5
						Total Tree Stratum Cover =	**~ 45 %**
Sapling/Shrub Stratum – 1m x 1m plot							
Basket Willow	*Salix petiolaris*	Native (S5/G5)	Not Listed	Not Listed	OBL	✓	30
						Total Sapling/Shrub Stratum Cover =	**~ 30 %**
Herb Stratum – 1m x 1m plot							
Beaked Sedge	*Carex rostrata*	Native (S4/G5)	Not Listed	Not Listed	OBL	✓	60
Bulrush species	*Schoenoplectus* sp.	-	-	-	OBL	✓	35
Canada Thistle	*Cirsium arvense*	Noxious (SNA/G5)	Not Listed	Not Listed	FAC		<1
Common Scouring-rush	*Equisetum hyemale*	Native (S5/G5)	Not Listed	Not Listed	FACW		<1
Marsh Willowherb	*Epilobium palustre*	Native (S4/G5)	Not Listed	Not Listed	OBL		<1
Large Leaved Avens	*Geum macrophyllum*	Native (S5/G5)	Not Listed	Not Listed	FAC		<1
Tall Buttercup	*Ranunculus acris*	Noxious (SNA/G5)	Not Listed	Not Listed	FAC		<1
						Total Herb Stratum Cover =	**~ 95 %**
						Bare Ground within (underneath) Herb Stratum Cover =	**~ 20 %**

[1]ACIMS 2022 – Subnational Rank (S) S1 Extremely rare, S2 Very rare provincially, S3 Rare to uncommon provincially, S4 Common and apparently secure provincially. S5 Very common and demonstrably secure provincially. SNA Not applicable. Global Rank (G) ranging from critically imperiled (G1) to demonstrably secure (G5), GNR Unranked
[2]Government of Canada 2011 – *Species at Risk Act* (SARA)
[3]Government of Canada 2022 – Committee on the Status of Endangered Species in Canada (COSEWIC)
[4]Lichvar, R.W., D.L. Banks, W.N. Kirchner, and N.C. Melvin 2016 – USACE National Wetland Plant List

Wetland 2 Hydrophytic Vegetation Dominance Test			
Number of Dominant Species that are OBL, FACW or FAC		Total Number of Dominant Species	
OBL Species =	3	4	
FACW Species =	0		
FAC Species =	1		
Total (A) =	**4**	**Total (B) =**	**1**
		Prevalence Index (A/B) x 100 =	**100**

*A Dominance Test result of > 50 % is a Hydrophytic Vegetation Indicator

Wetland 2 Soil Profile Description and Hydric Soil Indicators						
Depth (cm)	Matrix		Redox Features		Texture	Von Post Scale
	Color (moist)	%	Color (moist)	%		
0 - 5	10YR 2/1	100	-	-	Clay Loam	-
5 - 35	10yR 5/2	80	5YR 8/2	20	Silty Clay	
Hydric Soil Indicators[1]	Hydric soil indicators: Depleted Dark Matrix (F3).					

[1]USACE (2018) Field Indicators of Hydric Soils adapted for use in Alberta

Wetland 2 Indicators Present (Yes ✓ / No X)	
Hydrophytic Vegetation	✓
Hydric Soil	✓
Hydrology [1 Primary Indicator (P) and/or 2 Secondary Indicators (S)]	✓
Total Wetland Indicators Present[1]	3/3

[1]Field Indicators provided through USACE (2019) Wetland Determination Form adapted for use in Alberta

Wetland 2 Water Quality and Wetland Hydrology Indicators			
Parameter	Measurement	Parameter	Measurement
Water Temperature (°C)	-	Total Dissolved Solids (mg/L)	-
Dissolved Oxygen (mg/L)	-	pH	-
Conductivity (µS/cm)	-	Salt (ppm)	-
Wetland Hydrology Indicators*	Wetland did not have standing and/or pooled water at time of assessment. Primary indicators: Water stained leaves, oxidized rhizospheres along the living roots, presence of reduce iron. Secondary indicators: none.		

*Requires minimum 1 Primary Indicator (P) and/or 2 Secondary Indicators for confirmed presence

Wetland 2 Characteristics and Classification					
Percent of Wetland	Class[1]	Form[1]	Type[1]		
			Water Permanence	Salinity	Acidity
60	Swamp	Wooded, deciduous	-	-	-
40	Marsh	Graminoid	-	-	-
Additional Comments:	Wetland feature is classified as a deciduous wooded swamp (S-Wd) dominant wetland with a graminoid marsh (M-G) sub-form within the Alberta Wetland Classification System (AWCS)[1].				

[1]Government of Alberta 2015 - Alberta Wetland Classification System

ENVIRO MAK Inc.

Area Structure Plan Development

WETLAND 1 RESULTS

NE16-65-11-W4M Lac La Biche County	Project No. 21-08


Wetland 2, facing north across wetland area.


Wetland 2, facing east across wetland area.


Wetland 2, facing north across wetland area.

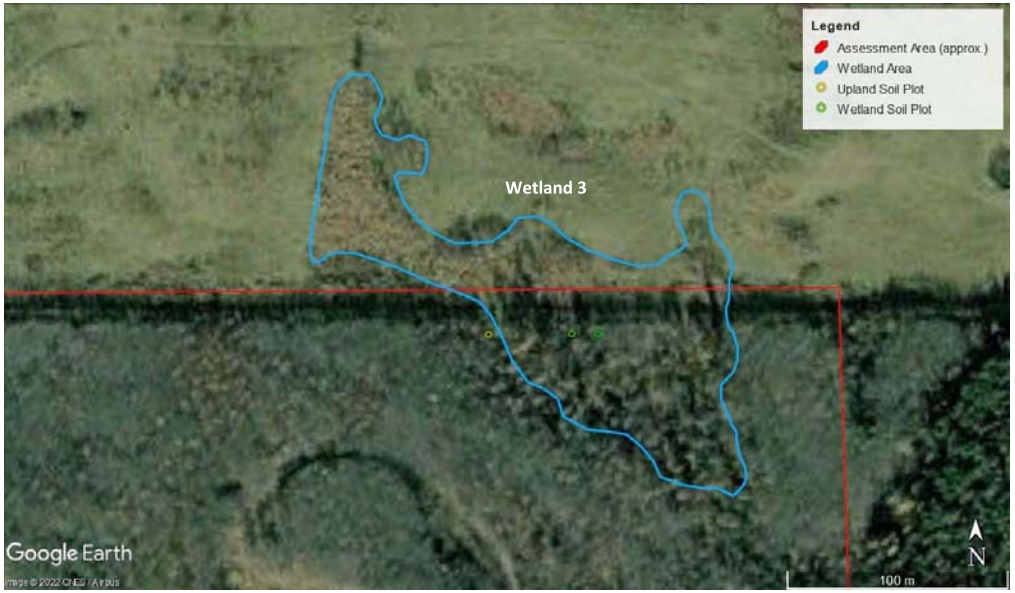

Wetland 2, facing east across wetland area.


Wetland 2, wetland soil plot (54.628241°, -111.596237°).


Wetland 2, upland soil plot (54.628223°, -111.596268°).

Wetland 3 Vegetation Summary							
Common Name	Scientific Name	Provincial Status[1]	Federal Status[2,3]		Indicator Status[4]	Dominant Species (✓)	Absolute Cover
		ACIMS[1]	SARA[2]	COSEWIC[3]			
Tree Stratum – 10m x 10m plot							
White Birch	*Betula papyrifera*	Native (S5/G5)	Not Listed	Not Listed	FAC	✓	20
Alder species	*Alnus* sp.	-	-	-	FACW		10
						Total Tree Stratum Cover =	**~ 30 %**
Sapling/Shrub Stratum – 1m x 1m plot							
Wild Red Raspberry	*Rubus idaeus*	Native (S5/G5)	Not Listed	Not Listed	FACU	✓	10
						Total Sapling/Shrub Stratum Cover =	**~ 10 %**
Herb Stratum – 1m x 1m plot							
Reed Canary Grass	*Phalaris arundinacea*	Native (S5/G5)	Not Listed	Not Listed	FACW	✓	20
Hemp-nettle	*Galeopsis tetrahit*	Exotic (SNA/G5)	Not Listed	Not Listed	FACU	✓	15
Ostrich Fern	*Matteuccia struthiopteris*	Native (S4/G5)	Not Listed	Not Listed	FACW	✓	10
Coltsfoot	*Petasites frigidus*	Native (S5/G5)	Not Listed	Not Listed	FACW	✓	10
Northern Bedstraw	*Galium boreale*	Native (S5/G5)	Not Listed	Not Listed	FACU		5
Carex species	*Carex* sp.	-	Not Listed	Not Listed	-		5
Tall Lungwort	*Mertensia paniculata*	Native (S5/G5)	Not Listed	Not Listed	FAC		< 1
						Total Herb Stratum Cover =	**~ 65 %**
						Bare Ground within (underneath) Herb Stratum Cover =	**~ 30 %**

[1]ACIMS 2021 – Subnational Rank (S) S1 Extremely rare, S2 Very rare provincially, S3 Rare to uncommon provincially, S4 Common and apparently secure provincially. S5 Very common and demonstrably secure provincially. SNA Not applicable. Global Rank (G) ranging from critically imperiled (G1) to demonstrably secure (G5), GNR Unranked
[2]Government of Canada 2011 – *Species at Risk Act* (SARA)
[3]Government of Canada 2021 – Committee on the Status of Endangered Species in Canada (COSEWIC)
[4]Lichvar, R.W., D.L. Banks, W.N. Kirchner, and N.C. Melvin 2016 – USACE National Wetland Plant List



Wetland 3 Hydrophytic Vegetation Dominance Test			
Number of Dominant Species that are OBL, FACW or FAC		Total Number of Dominant Species	
OBL Species =	0	6	
FACW Species =	3		
FAC Species =	1		
Total (A) =	**4**	**Total (B) =**	**6**
		Prevalence Index (A/B) x 100* =	**66**

*A Dominance Test result of > 50 % is a Hydrophytic Vegetation Indicator

Wetland 3 Soil Profile Description and Hydric Soil Indicators						
Depth (cm)	Matrix		Redox Features		Texture	Von Post Scale
	Color (moist)	%	Color (moist)	%		
0 - 45	-	-	-	-	Organic	**7**
Hydric Soil Indicators[1]	Hydric soil indicators: Organic Soil (A1). Von Post > 5 indicates mineral wetland soil (unable to be classified as a bog or fen wetland).					

[1]USACE (2018) Field Indicators of Hydric Soils adapted for use in Alberta

Wetland 3 Indicators Present (Yes ✓ / No X)	
Hydrophytic Vegetation	✓
Hydric Soil	✓
Hydrology [1 Primary Indicator (P) and/or 2 Secondary Indicators (S)]	✓
Total Wetland Indicators Present [1]	3/3

[1]Field Indicators provided through USACE (2019) Wetland Determination Form adapted for use in Alberta

Wetland 3 Water Quality and Wetland Hydrology Indicators			
Parameter	Measurement	Parameter	Measurement
Water Temperature (°C)	-	Total Dissolved Solids (mg/L)	-
Dissolved Oxygen (mg/L)	-	pH	-
Conductivity (µS/cm)	-	Salt (ppm)	-
Wetland Hydrology Indicators*	Wetland did not have standing and/or open water at time of assessment. Primary indicators: Surface water present, high water table, saturation, algal mats. Secondary indicators: none.		

*Requires minimum 1 Primary Indicator (P) and/or 2 Secondary Indicators

Wetland 3 Characteristics and Classification					
Percent of Wetland	Class[1]	Form[1]	Type[1]		
			Water Permanence	Salinity	Acidity
70	Swamp	Wooded, deciduous	-	-	-
30	Marsh	Graminoid	-	-	-
Additional Comments:	Wetland feature is classified as a deciduous wooded swamp (S-Wd) dominant wetland with a graminoid marsh (M-G-II) wetland sub-form within the Alberta Wetland Classification System (AWCS)[1].				

[1]Government of Alberta 2015 - Alberta Wetland Classification System

Area Structure Plan Development

WETLAND 1 RESULTS

NE16-65-11-W4M Lac La Biche County	Project No. 21-08


Wetland 3, facing across wetland area.


Wetland 3, facing across wetland area.


Wetland 3, facing across wetland area.


Wetland 3, facing across wetland area.


Wetland 3, facing northeast across wetland area extending north past assessment area.


Wetland 3, facing north across wetland area extending north past assessment area.


Wetland 3, upland soil plot (54.631149°, -111.600601°).


Wetland 3, upland soil plot (54.631146°, -111.601190°).

Upland area. Understory dominated by Beaked Hazelnut (*Corylus cornuta*).

Cleared cutline/trail within southern portion of the assessment area.

Cleared cutline/trail within northern portion of the assessment area.

Cleared, open area within southern portion of the assessment area.

Cleared, open area within northern portion of the assessment area.

Observation tower within cleared, open area in northern portion of the assessment area.

Structure/building within cleared, open area in southern portion of the assessment area.

Various garbage/debris adjacent to the structure/building in southern portion of the assessment area.

Large wood/slash pile adjacent to the cleared cutlines/trails within the northern portion of the assessment area.

Small ground den/burrow within upland forested area.

Ungulate bed within upland graminoid area, adjacent to the building/structure.

	Area Structure Plan Development
PHOTOGRAPH LOG	
NE16-65-11-W4M **Lac La Biche County**	**Project No.** **21-08**

Select Engineering Consultants Ltd.
Suite 100, 17413 – 107 Avenue NW, Edmonton AB T5S 1E5
T: 780 651 5777 F: 780 651 5757 selecteng.ca

December 15, 2022 File No.: 342-22001.3.2

Re: Lakewood Neighbourhood
Lac La Biche County
Stormwater Management Plan – 1st submission

1.0 Introduction

On behalf of Armand Menard we are pleased to provide this Stormwater Management Plan (SWMP) letter report for the development of a country residential site within Lac La Biche County, Alberta. The proposed development is located in NE ¼ Section 16 Township 65 Range 11 West of the 4th meridian, west of Range Road 113 and north of Township Road 652.

The purpose of this letter report is to develop an adequate stormwater management scheme addressing the site drainage in accordance with Lac La Biche County General Municipal Servicing Standards and Alberta Environment Stormwater Management Guidelines.

Figure 1 illustrates the study area and location plan of the site.

2.0 Land Use and Site Topography

Lakewood Neighbourhood is comprised of approximately 24.34 ha of country residential zoned land and has been historically utilized for recreational purposes.

Lakewood subdivision topography generally has a high elevation of 644.5 m on the southeast location of the site from where drains northwest, towards the existing downstream drainage course within the area, ultimately towards Lake No. 5 located northwest of the study area. The maximum grade differential over the site is approximately 24.0 m. Elevations range from 644.50m in the south east to 620.50m in the north west plan area.

Figure 2 illustrates the land use and site topography within the study area.

3.0 Existing Wetlands

A Wetland Assessment & Impact report was completed by Enviromak Inc. in August 2022, identifying three wetlands within the study area, identified as Wetland #1, #2 and #3.

The existing wetland boundaries within the Lakewood subdivision as determined by Enviromak Inc. are illustrated in **Figure 2.**

Wetland #1 is located in the north side of the development, wetland #2 is located in the east side area and wetland #3 is located in the south west side of the proposed development. As described in the ASP report, Wetland #1 and #3 will be retained within the property and incorporated into environmental reserve. The area within Wetland #2 is approximately 0.0065 ha in size and is located in the eastern portion of the study area. This wetland is proposed to be removed and water act compensation paid through Alberta Environment.

A Wetland Assessment and Impact Report will be prepared and submitted to Alberta Environment for approval to remove Wetland #2. No impacts to this wetland are permitted until Alberta Environment approvals are in place.

4.0 Existing Drainage - Pre-development vs. Post-development Flow Rate

The natural overland drainage of the site is generally in two directions: north east and north west, ultimately draining towards Elinor Lake via Lake No. 5 located approximately 7.0 Km north west site of the development. The downstream drainage area is comprised of natural wooded vegetation helping to reduce the streamflow velocity and the risk of possible drainage channel erosion resulting from runoff volumes and peak flows.

Figure 4 illustrates the preliminary grading design of the site.

The proposed lots within the Lakewood Neighbourhood will be graded to maintain the natural topography of the existing land. A large precent of the existing wooded vegetation within each lot will be maintained. This will help to prevent erosion and floodplain within each lot. Country residential developments in Lac La Biche consist of larger sized lots with a minimum of 0.625 ha of developable area. These types of developments result with a land to building pocket ratio similar to the examples shown in the following table:

Table 1.0: Proposed Building Pocket vs Total Lot Area

Lot Area (Ha/ac)	House Pocket (sq.m/sq.ft)	Outbuilding Pocket (sq.m/sq.ft)	Resultant Ratio (Land/Building)	Building Pocket Percentage (%)
0.625 / 1.5 (Avg Home)	232 / 2,500	232 / 2,500	17.96 : 1	5.6
0.625 / 1.5 (Larger Home)	464 / 5,000	464 / 5,000	6.7 : 1	14.9

The above table indicates that this style of development retains an overall runoff coefficient that includes between 6% and 15% impervious area (building roofs) and the remaining pervious area between 85% to 94%. Impervious areas include harder, smoother surfaces that shed water more readily and quicker than pervious areas that include naturally vegetated surfaces which accept infiltration and offer more surface flow resistance. In summary, the building pockets predicted for this development will have little impact on the water shed properties as compared to the 100% permeable pre-development site condition.

Figure 3 illustrates the pre-development drainage basin area versus post-development drainage basin area and is summarized in the following table:

Table 2.0: Permanent Wetlands: Pre-development vs. Post-development catchment area

Permanent Wetland	Catchment Area, Ha	
	Pre-development	Post-development
# 1	2.38	1.95
# 3	11.50	11.28

The above table shows that the difference of the drainage basin area from the pre-development to post-development area to the two wetlands is insignificant.

The total pervious area vs. impervious area is estimated based on the above criteria and is summarized below:

Table 3.0: Estimated Pervious vs Impervious Area

Total Area, Ha	Pervious Area, Ha		Impervious Area, Ha	
	Small lots	Large lots	Small lots	Large lots
24.34	1.36	3.62	22.98	20.72

5.0 Design Criteria

The Stormwater Management Plan for this site was developed in conformance with the Alberta Environment Standards and Guidelines for Municipal Waterworks, Wastewater and Storm Drainage System and Lac La Biche County Standard design. The major design criteria used for the hydraulic calculations within the proposed development are listed below:

- Land Use: country residential
- Total Area = 24.34 Ha
- The development will be graded to direct the major overland flows to the existing downstream drainages
- The storm infrastructure will be sized to provide adequate capacity to convey storm flows generated by 1:100 year storm event using The Rational Method; the total area is significantly lower than 65 Ha
- Pre-development Runoff coefficient, c = 0.20

- Post-development Runoff coefficient, c = (0.9 x Impervious area) + (0.15 x Pervious area) / Total Area

The calculated post-development runoff coefficient is summarized below:

Table 4.0: Estimated Post-development Runoff coefficient

Total Area, Ha	Runoff coefficient, c	
	Small lots	Large Lots
24.34	0.19	0.26
Estimated runoff coefficient	**0.23**	

6.0 Proposed Stormwater Drainage System – Hydraulic Assessment

The natural site conditions offer grassy rolling hills and vegetated pockets including two existing wetland to the west that will be preserved within a registered Environmental Reserve lot. The proposed improvements of the site will define three water shed basins, the south west drainage basin draining to the Wetland #1, the south east drainage basin draining to Wetland #3 and a north west drainage basin draining towards the natural downstream drainage courses to the north west. All three drainage basins, ultimately flows to Elinor Lake via Lake No.5..

The drainage concept for this development utilizes overland drainage routing across the site with no minor (piped) storm sewer system. This site drainage design removes the requirement for maintenance and replacement costs of burry infrastructure required for minor storm pipe system. Surface sloping is estimated to be between 0.8% to 4.2%, dependent on the detailed engineering design.

The proposed subdivision will be graded to maintain its natural look. However, segments of the proposed road, including the diches on each site, will have steeper slopes, therefore high velocities possible to cause ground erosion. Where excessive velocities are to be encountered, erosion and sedimentation control methods are to be

applied. The erosion and sedimentation control requirements for the proposed ditches and drainage channels within the Lakewood subdivision will be determined at detailed design stage.

The pre-development vs. post-development flows were calculated for each drainage basin using the rational method. The following is a storm flow assessment based on each drainage basin.

6.1 Wetland #1 - South west Drainage Basin

The proposed lots located within the south west water shed area, are design to maintain its existing topography and will have no impact on the drainage area contributing to the existing Wetland #1, and will be graded to slope front to back The pre-development vs. post-development flows are summarized in the following table:

Table 5.0: Wetland #1 - Storm Flow Assessment

Description	HWL m	Pre-development catchment area			Post-development catchment area		
		Area Ha	c	Flow m3/s	Area Ha	c	Flow m3/s
Wetland #1	657.0	2.38	0.20	**0.108**	1.95	0.23	**0.102**

The above table shows that there is 6% flow decrease from pre-development to post-development conditions due to reduced post-development catchment area. This percent is considered insignificant, and it won't have a negative impact to the existing downstream drainage with appropriate erosion and sedimentation control measures in place.

6.2 Wetland #3 - North west Drainage Basin

The majority of the lots located north of the proposed road drains towards the existing Wetland #3. As illustrated in **Figure 3**, the pre-development and post development drainage basin are very similar. The post-development drainage area is decreased by approximately 1.7% from the pre-development area. The stormwater generated by a 1:100 year storm event will convey flows eastward, ultimately draining towards Lake No 5 located north west of the development. The pre-development vs. post-development flows were calculated for each drainage basin using the rational method. The basin within wetland #3 is summarized in the following table:

Table 6.0: Wetland #3 - Storm Flow Assessment

Description	HWL m	Pre-development			Post-development		
		Area Ha	c	Flow m3/s	Area Ha	c	Flow m3/s
Wetland #3	631.5	11.50	0.20	**0.521**	11.28	0.23	**0.588**

The above table shows that there is approximately 12% flow increase from pre-development to post-development condition. This percent is considered insignificant, and it won't have a negative impact to the existing downstream drainage with appropriate erosion and sedimentation control measures in place.

6.3 Northwest Drainage Basin

This drainage basin will be maintained in its natural state and will continue to drain towards the existing downstream westward drainage, following the natural overland drainage within the area.
The lots located on the south side of the proposed road are draining front to back towards the proposed emergency access road located along the back of the lots.

Table 7.0: Northwest Drainage Basin - Storm Flow Assessment

Description	Pre-development			Post-development		
	Area Ha	c	Flow m3/s	Area Ha	c	Flow m3/s
Northwest Drainage Basin	11.11	0.20	**0.503**	10.46	0.23	**0.545**

The above table shows that there is approximately 8% flow increase from pre-development to post-development condition. This percent is considered insignificant, and it won't have a negative impact to the existing downstream drainage with appropriate erosion and sedimentation control measures in place.

The storm flow calculation details for the three drainage basins are attached in **Appendix A**.

7.0 Water Quality

The primary purpose of a stormwater management facilities is to collect the runoff generated by developments and to provide water quality enhancement. Alberta Environment required that a minimum of 85% of sediments with a particle size of 75 um or greater be removed from the storm runoff.

Stormwater quality enhancement within Lakewood Neighbourhood can be provided by preserving and enhancing existing wetlands natural conditions. The ditches alongside the proposed roads convey stormwater runoff and provide a natural method to remove debris and pollutants before discharging to the existing downstream drainage.

Based on this stormwater drainage assessment it can be concluded that the proposed Lakewood country residential development won't have a negative impact to the existing downstream drainage.

If you have any questions or require further information, please contact Steve Brittain at 780-651-5780 or Floarea Zerfass at 780-651-5758.

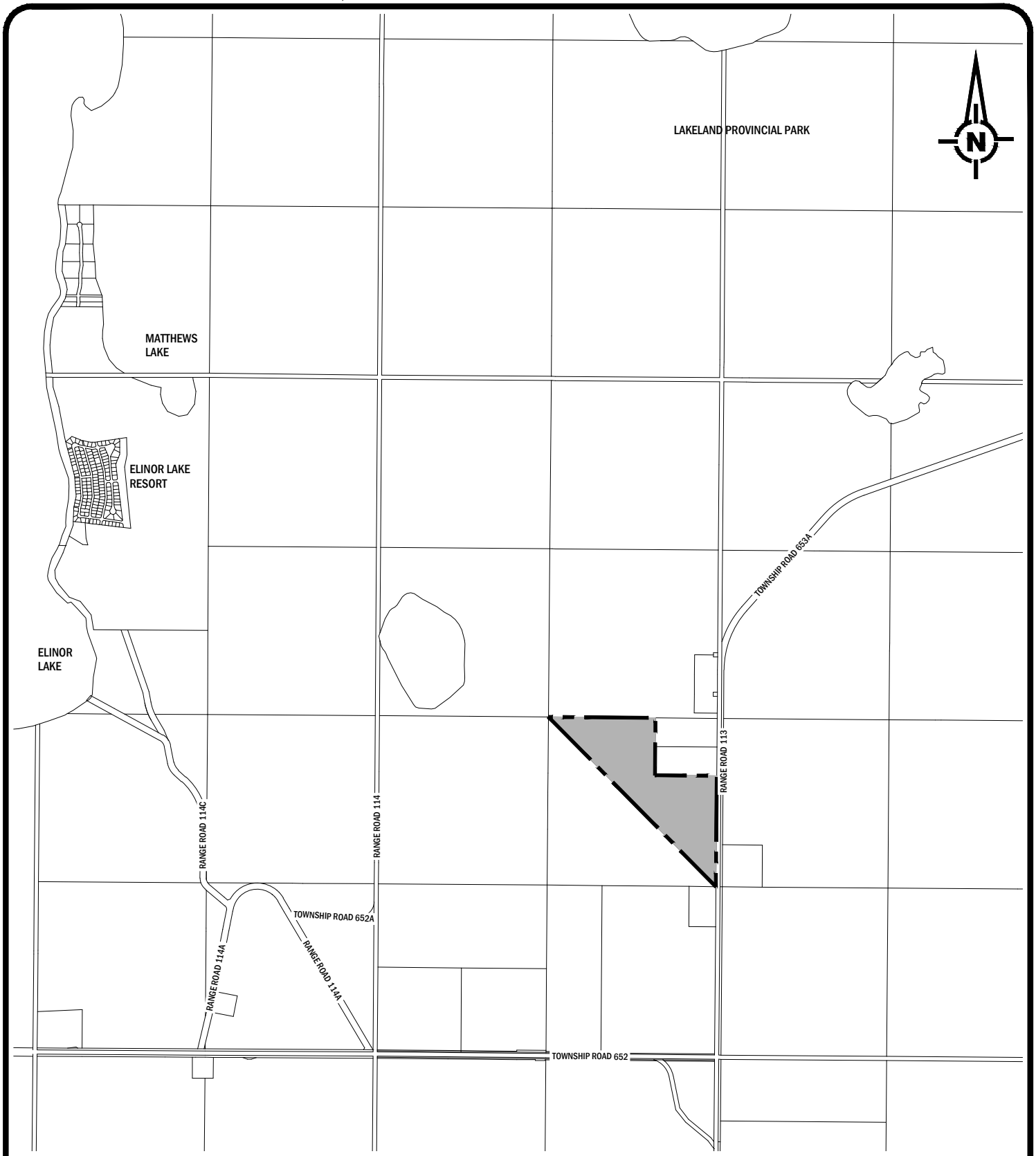
Sincerely,

Select Engineering Consultants

Floarea Zerfass, P.Eng.
Project Manager
fzerfass@selecteng.ca

cc: Steve Brittain, Select Engineering Consultants Ltd. (sbrittain@selecteng.ca)

SAVED BY: JGALLARDO PLOT DATE: December 15, 2022



LEGEND

STUDY AREA BOUNDARY

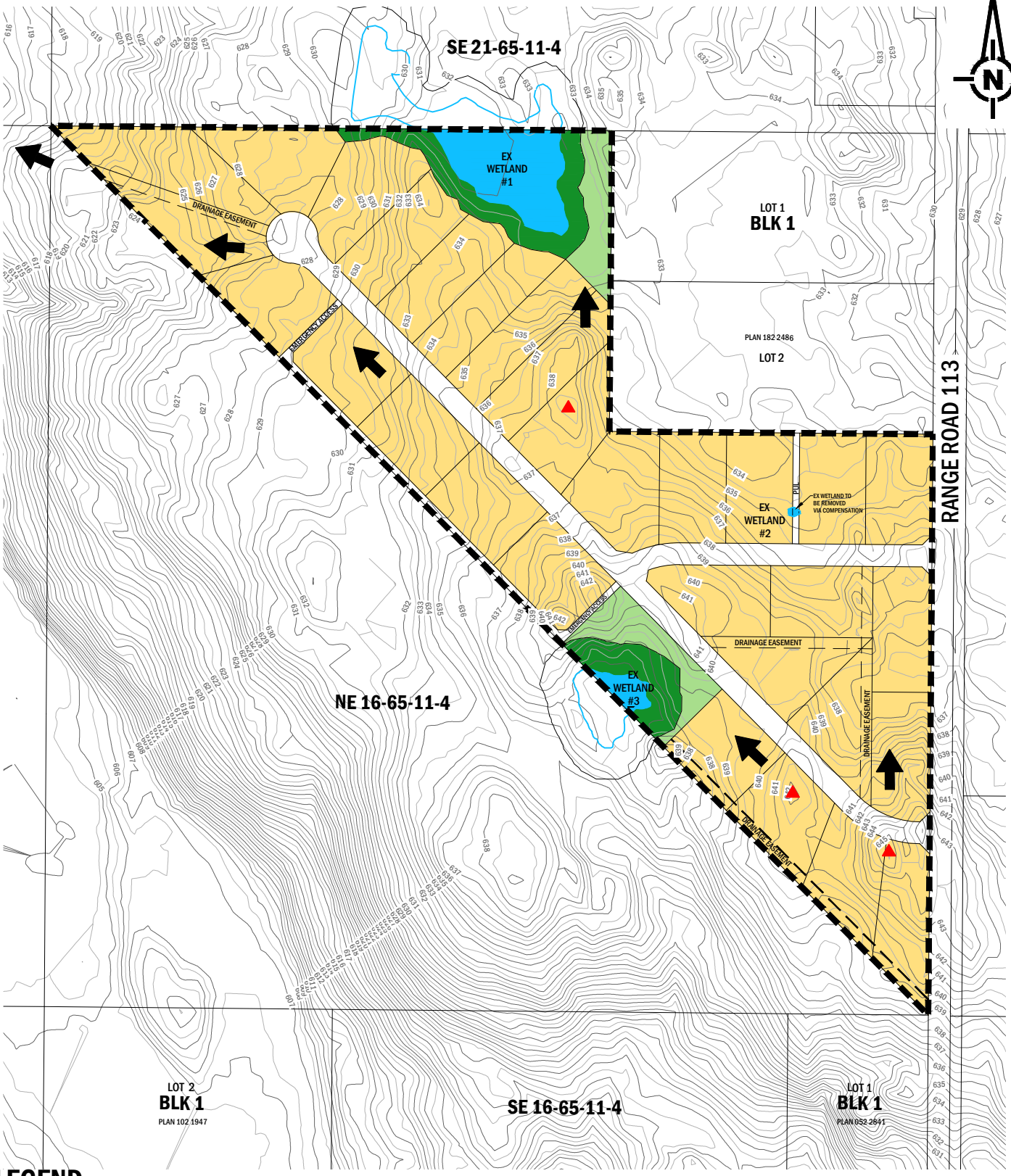
Lakewood Neighbourhood
Lac La Biche County
Stormwater Management Plan
Study Area and Location Plan

0 250 500 750 m

SCALE 1:25 000

FIGURE 1

FILENAME: 342-21001-F1.0.DWG SOURCE: W:\0342-ARMAND MENARD\0342-21001-LAC LA BICHE COUNTY RECREATIONAL LOTS\3.0 DESIGN PROCESS\3.3 ACAD\3.3.3 WORKING DRAWINGS\2022 FIGURES\STORMWATER MANAGEMENT PLAN



LEGEND

- STUDY AREA BOUNDARY
- EASEMENT
- LOW DENSITY RESIDENTIAL
- PARK
- ENVIRONMENTAL RESERVE
- EXISTING LIDAR CONTOURS
- HIGH POINT
- DIRECTION OF MAJOR DRAINAGE

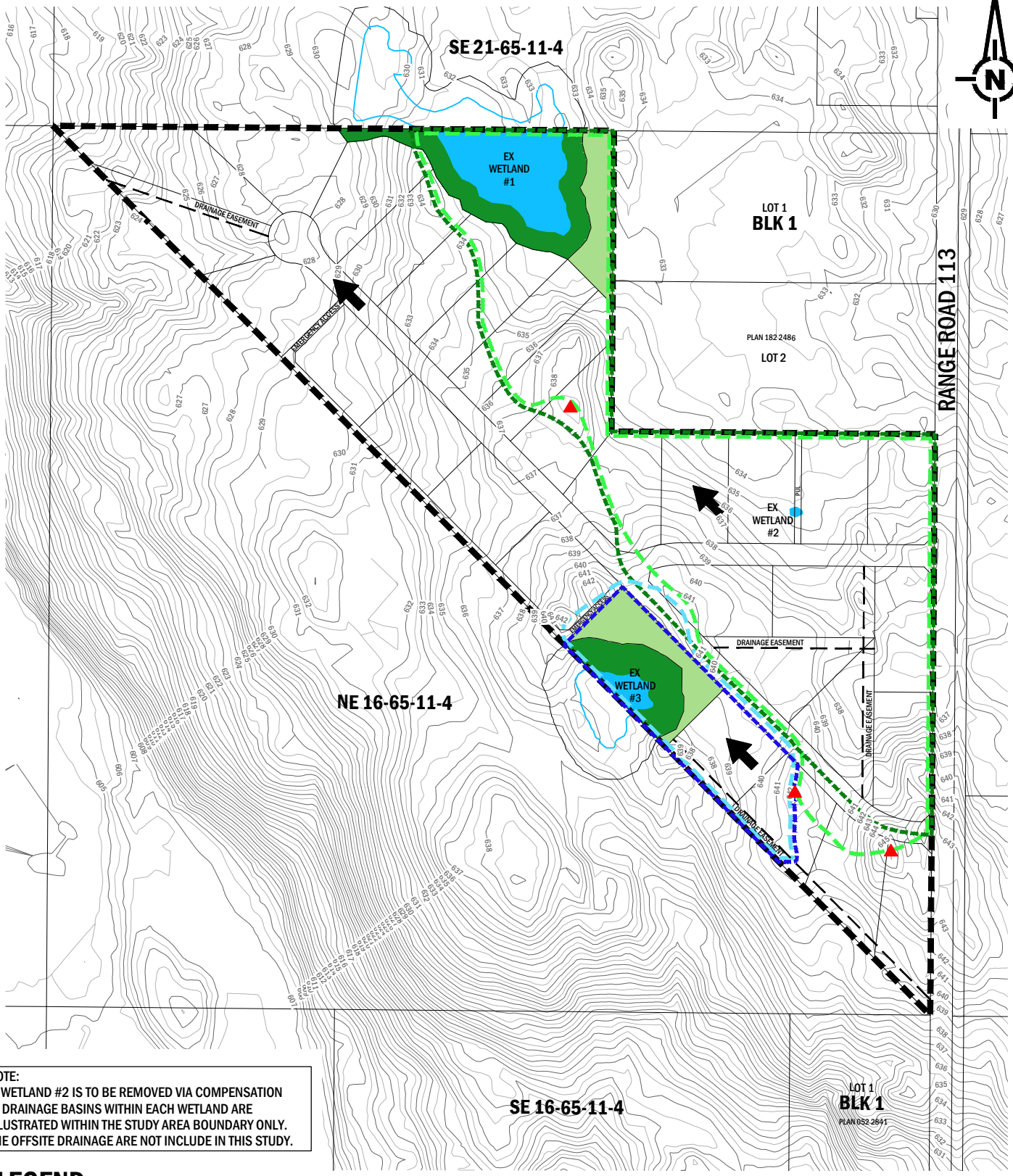
0 50 100 150 m

SCALE 1:5000

Lakewood Neighbourhood
Lac La Biche County
Stormwater Management Plan
Land Use and Site Topography

FIGURE 2

FILENAME: 342-21001-F2.0.DWG SOURCE: W:\0342-ARMAND MENARD\0342-21001-LAC LA BICHE COUNTY RECREATIONAL LOTS\3.0 DESIGN PROCESS\3.3 ACAD\3.3.3 WORKING DRAWINGS\2022 FIGURES\STORMWATER MANAGEMENT PLAN



NOTE:
1) WETLAND #2 IS TO BE REMOVED VIA COMPENSATION
2) DRAINAGE BASINS WITHIN EACH WETLAND ARE ILLUSTRATED WITHIN THE STUDY AREA BOUNDARY ONLY. THE OFFSITE DRAINAGE ARE NOT INCLUDE IN THIS STUDY.

LEGEND

STUDY AREA BOUNDARY
WETLAND #1 PRE-DEVELOPMENT DRAINAGE BASIN
WETLAND #1 POST-DEVELOPMENT DRAINAGE BASIN
WETLAND #3 PRE-DEVELOPMENT DRAINAGE BASIN
WETLAND #3 POST-DEVELOPMENT DRAINAGE BASIN
EXISTING LIDAR CONTOURS
HIGH POINT
DIRECTION OF MAJOR DRAINAGE

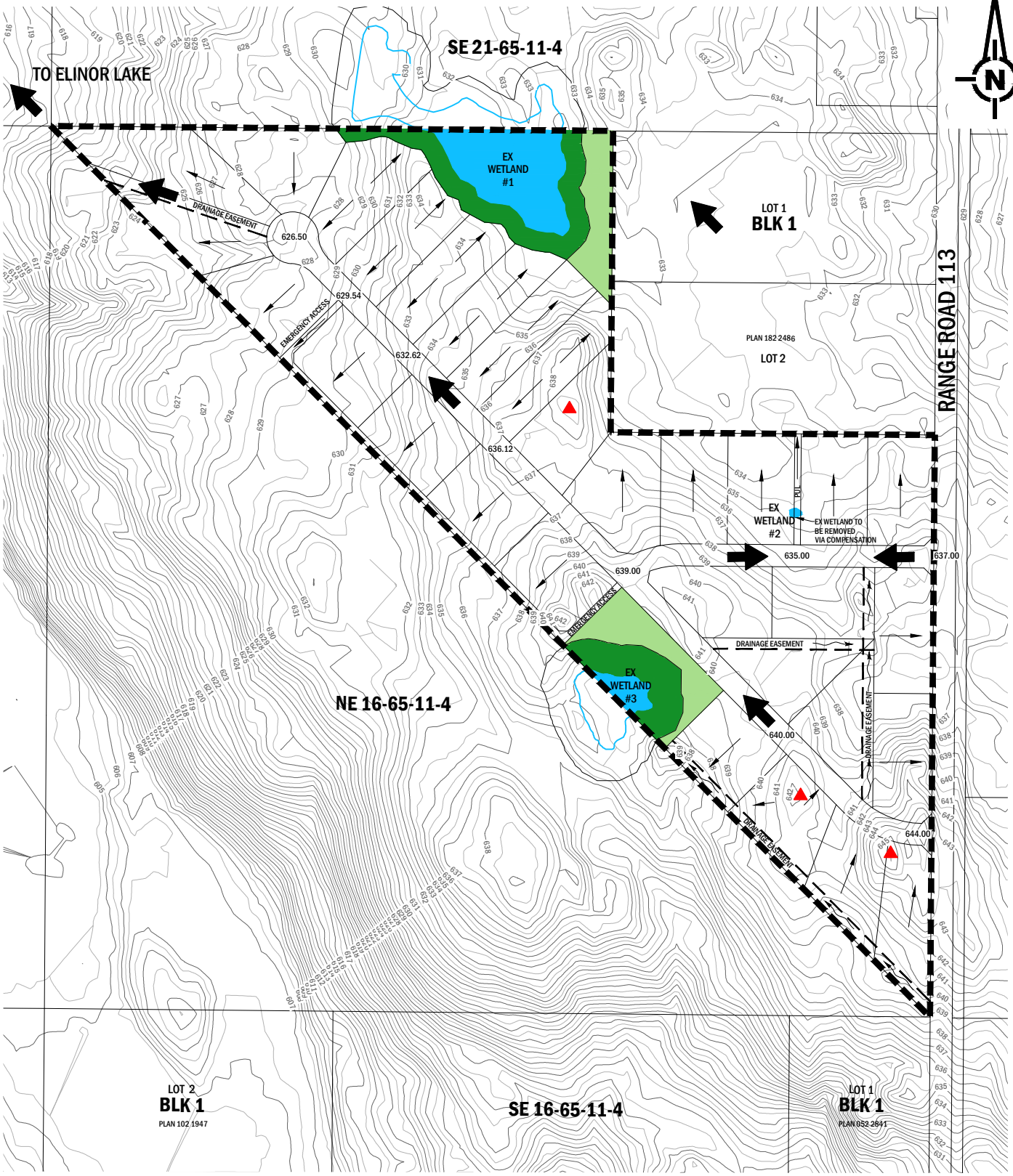
0 50 100 150 m

SCALE 1:5000

Lakewood Neighbourhood
Lac La Biche County
Stormwater Management Plan
Pre-Development vs. Post-Development Drainage Basins

FIGURE 3

FILENAME: 342-21001-F3.0.DWG SOURCE: W:\0342-ARMAND MENARD\0342-21001-LAC LA BICHE COUNTY RECREATIONAL LOTS\3.0 DESIGN PROCESS\3.3 ACAD\3.3.3 WORKING DRAWINGS\2022 FIGURES\STORMWATER MANAGEMENT PLAN



LEGEND

- STUDY AREA BOUNDARY
- EASEMENT
- EXISTING LIDAR CONTOURS
- PROPOSED GRADES
- HIGH POINT
- DIRECTION OF MAJOR DRAINAGE

0 50 100 150 m

SCALE 1:5000

Lakewood Neighbourhood
Lac La Biche County
Stormwater Management Plan
Preliminary Grading Plan

FIGURE 4

FILENAME: 342-21001-F4.0.DWG SOURCE: W:\0342-ARMAND MENARD\0342-21001-LAC LA BICHE COUNTY RECREATIONAL LOTS\3.0 DESIGN PROCESS\3.3 ACAD\3.3.3 WORKING DRAWINGS\2022 FIGURES\STORMWATER MANAGEMENT PLAN

Select Engineering Consultants Ltd.

Storm Sewer Design Calculations

Project:
Client:
Date: November 28, 2022

Design Variables

		Design Storm (IDF) City of Edmonton
Manning's Coeffic	**0.15** floodplain, trees	[1:100 yr]
Initial Tc =	**30.00** [min]	a **1290.08**
		b **-0.75**
		c **9.73**

Runoff Coefficient	
Pre-development	**0.20**
Post-development	**0.23**

Wetland #1 - Storm Event: 1:100 yr

Sewer Direction and Alignment			Rational Method Parameters							Flow
LOCATION	UP	DN	AREA Ha.	C	C * A	ACCUM C * A	Tc min	INTEN mm/hr	DESIGN Q cms	REQUIRED Q cms
pre-development	1	2	2.38	0.20	0.48	0.48	30.00	81.52	0.108	0.108
post-development	1	2	1.95	0.23	0.45	0.45	30.00	81.52	0.102	0.102

Wetland #3 - Storm Event: 1:100 yr

Sewer Direction and Alignment			Rational Method Parameters							Flow
LOCATION	UP	DN	AREA Ha.	C	C * A	ACCUM C * A	Tc min	INTEN mm/hr	DESIGN Q cms	REQUIRED Q cms
pre-development	1	2	11.50	0.20	2.30	2.30	30.00	81.52	0.521	0.521
post-development	1	2	11.28	0.23	2.59	2.59	30.00	81.52	0.588	0.588

Northwest - Storm Event: 1:100 yr

Sewer Direction and Alignment			Rational Method Parameters							Flow
LOCATION	UP	DN	AREA Ha.	C	C * A	ACCUM C * A	Tc min	INTEN mm/hr	DESIGN Q cms	REQUIRED Q cms
pre-development	1	2	11.11	0.20	2.22	2.22	30.00	81.52	0.503	0.503
post-development	1	2	10.46	0.23	2.41	2.41	30.00	81.52	0.545	0.545

July 5, 2023
03-23-0040

Eric Sehn
Select Engineering Consultants
Suite 100, 17413 – 107 Avenue NW
Edmonton, AB T5S 1E5

VIA E-MAIL: esehn@selecteng.ca

Dear Mr. Sehn:

Re: **Lakewood Area Structure Plan**
Trip Generation V2

INTRODUCTION

Select Engineering Consultants (Select) is preparing the Lakewood Area Structure Plan (ASP) for the development of 30 country residential/seasonal recreational lots in Lac La Biche County, AB. The ASP is located west of Rge Rd 113, north of Twp Rd 652 as shown in **Exhibit 1**. The site is currently zoned AG – Agricultural and is proposed to be rezoned DC – Direct Control. Access to the ASP is proposed via two all-directional accesses to Rge Rd 113.

As part of the ASP process, a Transportation Impact Assessment (TIA) may be required. The site is not anticipated to contribute significant traffic to Rge Rd 113; therefore, the following trip generation assessment has been prepared to provide Lac La Biche County with an understanding of the traffic volumes to determine if further study is required.

SITE TRAFFIC CHARACTERISTICS

Trip generation rates from the Institute of Transportation Engineers' (ITE) Trip Generation Manual, 11th Edition, were reviewed to estimate the magnitude of trips generated by the proposed ASP. As the lands are intended to be used as country residential/seasonal recreational lots, both Land Use Code (LUC) 260 – Recreational Homes and LUC 210 – Single-Family Detached Housing were reviewed as outlined in **Table 1**.

Exhibit 1: Site Location and Concept Plan

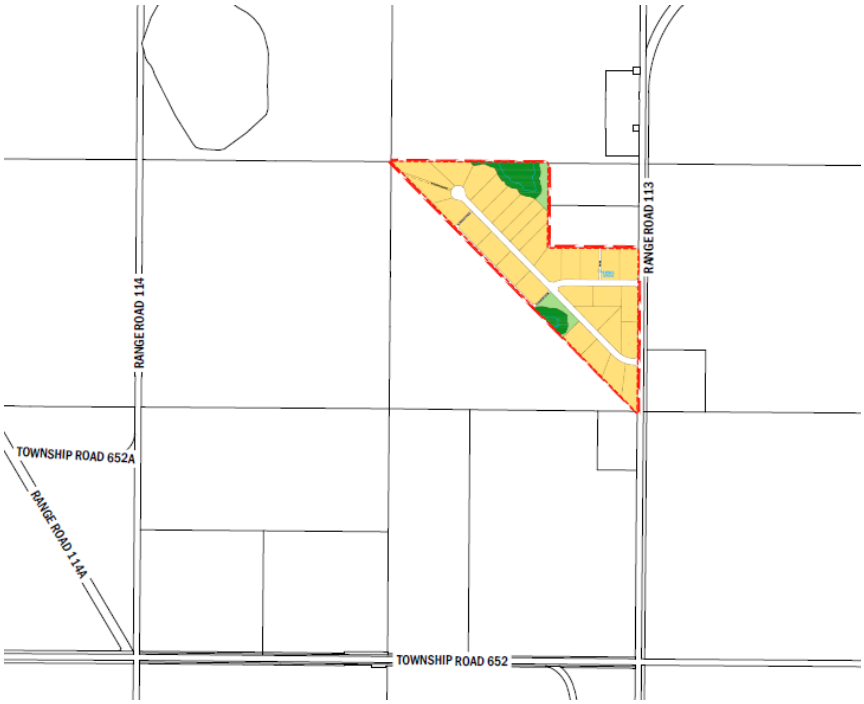


Table 1: Trip Generation Rates

LAND USE	TRIP RATES		
	AM Peak Hour	PM Peak Hour	Daily
Recreational Homes (ITE LUC 260)	0.22 trips/du 55% in/45% out	0.29 trips/du 46% in/54% out	3.55 trips/du 50% in/50% out
Single-Family Detached Housing (ITE LUC 210)	0.70 trips/du 25% in/75% out	0.94 trips/du 63% in/37% out	9.43 trips/du 50% in/50% out

Table 2 summarizes the projected two-way AM peak hour, PM peak hour, and daily vehicle trips for the proposed development. As shown in Table 2, the proposed development is projected to generate between 7 to 21 two-way gross trips during the AM peak hour, 9 to 28 two-way gross trips during the PM peak hour, and 106 to 282 two-way gross trips on a daily basis.

Table 2: Trip Generation Estimates

LAND USE	DENSITY	TRIPS					
		AM PEAK HOUR		PM PEAK HOUR		DAILY	
		In	Out	In	Out	In	Out
Recreational Homes	30 units	4	3	4	5	53	53
		7		9		106	
Single-Family Detached Housing	30 units	5	16	18	10	141	141
		21		28		282	

The addition of less than 30 two-way trips during peak hours is not anticipated to unduly impact operations along Rge Rd 113.

Rge Rd 113 is a two-lane County roadway with an approximate 9.0m gravel surface width and a speed limit of 80 km/h. Existing traffic volumes along Rge Rd 113 are unknown; however, existing volumes are anticipated to be low and the addition of 106 to 282 vpd is not anticipated to result in the need for additional surface width. It is also noted that the County does not have a threshold for paving roadways, and the 9.0m gravel collector road from the County's General Municipal Servicing Standards is appropriate for daily traffic volumes greater than 200 vpd.

CONCLUSION

Based on the above information, a comprehensive TIA is not anticipated to be warranted to support the ASP. The magnitude of traffic projected to be generated by the proposed ASP is not anticipated to unduly impact operations along Rge Rd 113.

Please contact the undersigned at 578-416-0910 or jwillis@bunteng.com if you have any questions or comments, or if you require additional study.

Yours truly,
Bunt & Associates

Janelle Willis, P.Eng.
Principal

Revision History

DATE	VERSION	DESCRIPTION OF CHANGES
June 28, 2023	01	First version
July 5, 2023	02	Updated to change proposed zoning from CR to DC

This electronic document includes a certified digital signature and represents the original document retained on file. Any printed versions of this report are considered copies and can be confirmed by referring to the original electronic document.

This document entitled "Lakewood ASP Trip Generation" was prepared by Bunt & Associates for the benefit of Select Engineering Consultants in support of an Area Structure Plan. The analysis and conclusions/recommendations in the report reflect Bunt & Associates' best professional judgment based on the knowledge and information available to Bunt & Associates at the time of preparation.

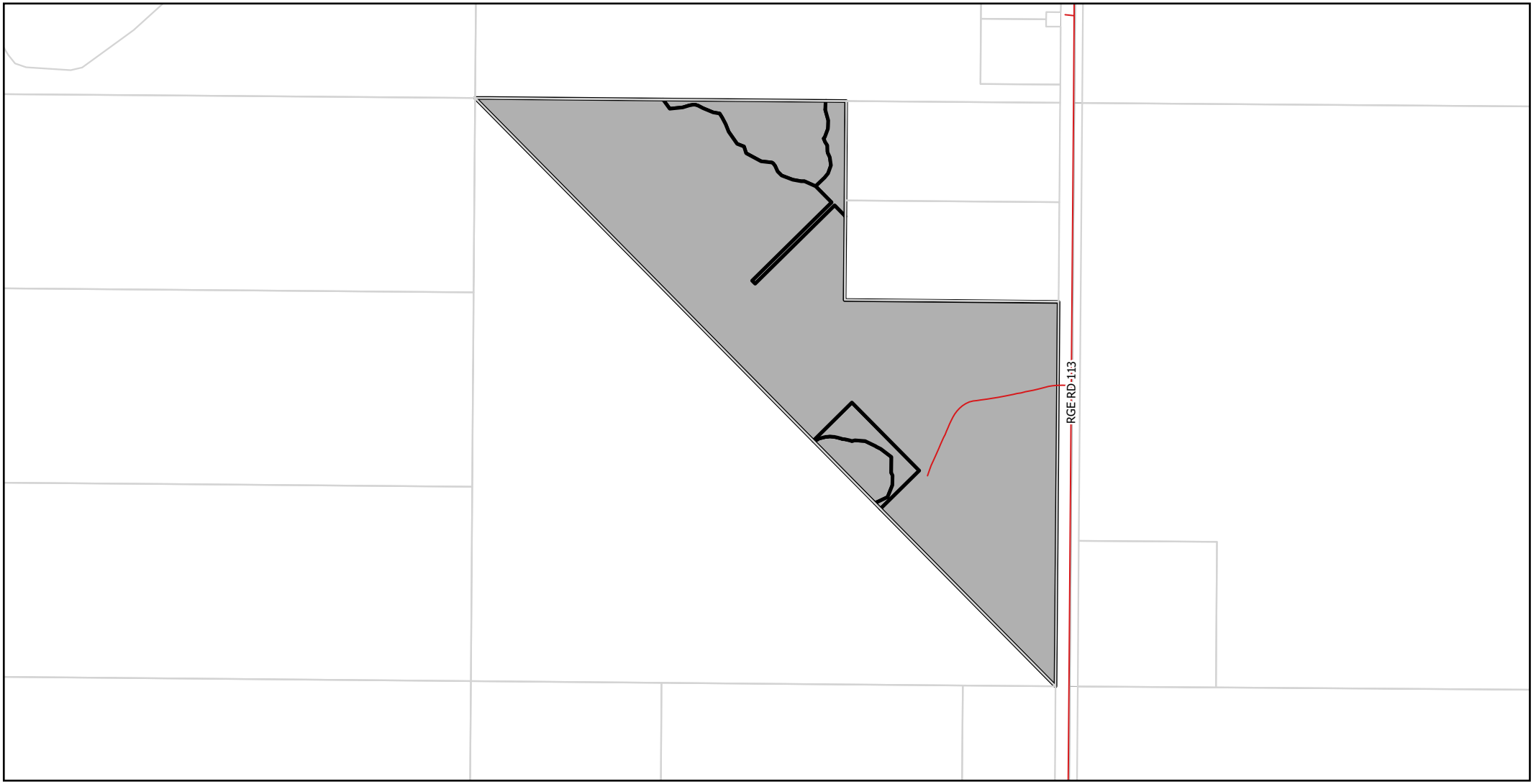
Lac La Biche County, including employees, members of Council, and Regulatory Board members shall be entitled to rely on this report for the specific purpose for which it was prepared. Lac La Biche County may also provide copies of the report to external governmental bodies having jurisdiction related to the project for which it was prepared.

Any use made of this report by a third party beyond those specifically noted here, or any reliance on or decisions based on it by any such third party, are the responsibility of such third parties. Bunt & Associates accepts no responsibility for damages, if any, suffered by such third parties as a result of decisions made or actions based on this report.

Lac La Biche County
welcoming by nature.

Schedule 'A'
Bylaw 24-002
NE 16-65-11-W4M

N



Proposed ASP

0 150 300 450 600 750 m

Bylaw 24-002

Map Produced: January 8, 2024

Projection: UTM12 NAD83

Base Map compiled from the Provincial Title Mapping Digital Base.
Spatial Data Warehouse Ltd., November 2022.