

775998 Alberta Ltd.
11111 – 110 Street
Box 2661
Fairview, AB

June 15 2017
File No: B-0241-16

Attention: Greg Alexander

Re: NE-27-83-23, W5M in the Municipal District of Peace No. 135
Biophysical Impact Assessment Letter

1.0 INTRODUCTION

Basin Environmental Ltd. (Basin) was retained by Greg Alexander to conduct a Biophysical Impact Assessment (BIA) on a section of land (the Property) within the Municipal District of Peace No. 135, Alberta. The Property is located within the northeast quarter of Section 27 Township 83 Range 23, and West of the Fifth Meridian (NE-27-83-23, W5M). The Property is located along Highway 2, approximately 11 kilometers (km) west of the town of Peace River, and approximately 3.2 km northwest of the locality of Roma Junction.

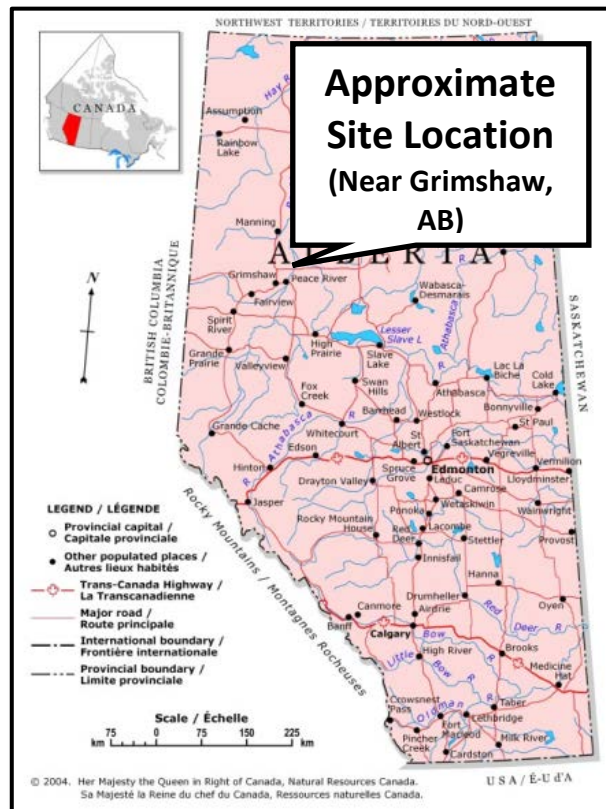
The Property is intended as a residential sub-division, and the landowner intends to develop the property in two phases. The lots comprising Phase 1, which is in the southeast corner of the property (Lots 2, 3 and 4) is approximately 11.29 hectares (ha) of land, and has already begun development. The lots comprising Phase 2, is approximately 37.39 ha (Appendix A).

The BIA was conducted in advance of the proposed development / land use changes as per the Municipal District of Peace No. 135 requirements. Figure 1 shows the location of the Property in relation to the surrounding areas.

The purpose of a BIA was to assess environmental conditions and document potential environmental impacts that development may have on the environment. The objectives of the BIA were to:

- characterize the biophysical resources on the proposed Property and surrounding areas;
- evaluate environmental significance of biophysical resources;
- assess the impact of the proposed land use changes and development; and,
- provide mitigation measures to minimize impact to the environment during development.

The BIA involved a desktop review and reconnaissance survey of the Property. The desktop review involved a collection of data from multiple sources, including government and academic databases, publications and site reports.



Notes:

- Airphoto, Abadata Maps 2017
- Study area boundary is approximate



Tuesday, June 06, 2017

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2.0 LEGISLATION

Environmental legislation related to proposed developments in Canada is based on the jurisdiction that the development is located. Basin recommends that any approvals, licenses, and permits that are necessary are secured prior to commencing applicable construction activities and that all notifications related to the approvals, licenses, and permits are provided as required. The following sections detail the Federal, Provincial and Municipal environmental legislation as it pertains to the Project activities.

2.1 FEDERAL

Relevant federal legislation includes the Fisheries Act, the Species At Risk Act and the Migratory Birds Convention Act.

FISHERIES ACT

The *Fisheries Act* is administered by the Fisheries and Oceans Canada (DFO) and has provisions aimed at protection of fish and fish habitat from serious harm. The *Fisheries Act* applies to all projects that have a potential to cause serious harm to fish and fish habitat that are part of or support a commercial, recreational or aboriginal fishery.

SPECIES AT RISK ACT

The *Species at Risk Act* (SARA) is federal legislation intended to protect sensitive species. Species included under Schedule 1 are established by the Federal Cabinet and are based on recommendations by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and consultation with government, Aboriginal peoples, stakeholders and the Canadian public. SARA applies to federal lands; however, it may also apply to other lands when provincial protection is deemed inadequate by the Federal Minister of the Environment.

MIGRATORY BIRDS CONVENTION ACT

The *Migratory Birds Convention Act* and the Migratory Birds Regulation provide protection and preservation for migratory birds and migratory bird habitat. The Act and Regulations apply to:

- migratory game birds including ducks, geese, swan, cranes, shore birds and pigeon;
- migratory insectivorous birds, including chickadees, cuckoos, hummingbirds, robins, swallows, and woodpeckers; and,
- migratory non-game birds, including gulls, herons, loons and puffins.

2.2 PROVINCIAL

Provincial legislation includes the *Historic Resources Act*, *Water Act*, *Weed Control Act* and the *Wildlife Act*.

HISTORIC RESOURCES ACT

The *Historic Resource Act* allows for the protection of historic resources such as archaeological resources, palaeontological resources, historic sites or structures and Aboriginal traditional use site(s) considered as historic resources under *The Historic Resources Act*. *Historic Resources Act* clearance is required for a variety of development activities, and requirements are outlined in the Land Use Bulletins that are outlined by the Alberta Culture and Tourism Department. Based on the land use bulletins, *Historic Resource Act* approval is required for “...residential, country residential and industrial subdivisions and related planning exercises (e.g., Area Structure Plans, Area Redevelopment Plans, Annexation Plans) encompassing more than 10 ha”.

The Project will require *Historic Resources Act* approval prior to development. The Listing of Historical Resources, updated in the spring of 2017, indicated that there are no known Historic Resource Values within the Project footprint (Alberta Culture and Tourism 2017).

WATER ACT

The *Water Act* supports and promotes the conservation and management of water in Alberta. Pursuant to Section 36 of the *Water Act*, activities that may impact waterbodies, regardless of ownership, and the aquatic environment, require an approval unless otherwise authorized by the *Water Act*. In the *Water Act*, ‘activity’ is broadly defined to include the following actions: placing construction works within a water body; erosion protection; draining a waterbody; removing or disturbing ground and/or vegetation within the bed and shore that results in altering the flow, level, direction and/or location of a water; and channel realignment.

WEED CONTROL ACT

The *Weed Control Act* and *Weed Control Regulation* designate weeds as noxious weeds or prohibited noxious weeds. Noxious weeds are those that pose the risk of major financial impacts if they are not controlled. Prohibited Noxious weeds are usually found in very few regions of Alberta and usually low populations are present at any one location. They are designated prohibited noxious to prevent their establishment. Where found, “Destruction” of the prohibited noxious weeds is required.

WILDLIFE ACT

The *Wildlife Act* and the *Wildlife Regulation* are the main bodies of provincial legislation providing protection to wildlife, including endangered species and their habitat. The *Wildlife Act* provides

protection to the following: bird nests; animal dens; beaver dams; and upland game and migratory birds, as defined under the federal *Migratory Bird Convention Act*. Schedule 6 of the *Wildlife Regulation* lists endangered species within Alberta. If the proposed development is anticipated to disturb or destroy habitat of wildlife species listed under the Act, potential regulatory requirements may need to be met depending on jurisdiction and land ownership.

2.3 MUNICIPAL

The Municipal District of Peace No. 135 also has a land use by-law which dictates requirements for land use changes. The Municipal District of Peace No. 135 Land Use Bylaw No. 1/2012 is intended to encourage, regulate and control the development of land within the district. Part 3 of the bylaw outlines the rules, permits and procedures for development, including the need for environmental impact assessments. Section 4.8 discusses development near waterbodies and watercourses, including minimum setback requirements for buildings/structures to reduce impacts to waterbodies caused by developments (Table 1).

TABLE 1 BUILDING SETBACKS AS OUTLINED IN LAND USE BYLAW NO 1/2012

Depth of Coulee, Ravine or Valley	Minimum Building or Structure Setback
Less than 7.6 m	As required by the Development Officer
Greater than 7.6 m but less than 15.2 m	22.8 m
Greater than 15.2 m but less than 30.5 m	45.7 m
Greater than 30.5 m	60.1 m

Source: Municipal District of Peace No. 135 Land Use Bylaw No. 1/2012

3.0 ENVIRONMENTAL SETTING

The Project is located within the White Area of Alberta on private lands as administered by Alberta Environment and Parks (AEP) Lands and Forests Department, and within the Municipal District of Peace No. 135. The following sections discuss the general Environmental Setting of the Project, including general regional characteristics of the Project area.

3.1 GENERAL

The Property is located on the border of the Dry Mixedwood Natural Subregion and the Peace River Parkland Natural Subregion of Alberta, and therefore has characteristics of both. A general description of these subregions was taken from the Alberta Tourism Parks and Recreation and Natural Regions Committee (NRC) website (NRC 2006).

The Peace River Parkland Natural Subregion exists within three isolated pockets within the Peace River catchment area and is the smallest natural subregion in Alberta. The Peace River Parkland Subregion is characterized by gently rolling plains, steep, grassy and forested slopes with slumping river valley slopes. Uplands primarily consist of aspen stands and grasslands, with low-lying wetlands consisting of cattail marshes, willow-sedge shrublands or treed fens. Soils within the upland plains consist primarily of Solonetzic intergrades of Dark Gray and Black Chernozems. Solonetzic soils (mainly Solods), Dark Gray Luvisols and Orthic Gray Luvisols are also commonly found within soils in the upland plains (NRC 2006).

The Dry Mixedwood Natural Subregion is a major subregion within the Boreal Forest Natural Region in Alberta. Level to undulating till or lacustrine plains and hummocky uplands are the dominant landforms. Aspen forests and cultivated landscapes are typical, with fens commonly occurring in low-lying areas. The Dry Mixedwood Natural subregion soils consist of mainly Orthic Gray Luvisols, under moderately well drained aspen forests. Wetlands occupy approximately 15 percent of the Dry Mixedwood Natural Subregion (NRC 2006).

3.2 LAND USE

Approximately 80% of the Property is currently undeveloped forested land consisting primarily of mature stands of mixed Poplar, Spruce and Willow. There is one stormwater pond/dugout located along the northern boundary of the property, and a small permanent watercourse located in the southwest corner of the property flowing from northwest to southeast. A gas co-op pipeline runs through the northern portion of the property and along the eastern boundary. An overhead power line runs along the north side of Highway 2, entering the Property in the northwest corner, and terminating in Lot 1. A waterline also runs through the northern portion of the property.

Highway 2 is located along the northern boundary of the Property while a Government Road Allowance (medium grade gravel) is located along the eastern boundary. Minimum development was noted in the immediate vicinity of the property. Agricultural land was noted to the east and south of the Property, and minimum clearing on other adjacent properties. A site sketch of the Property is included as Figure 1 and site photographs can be found in Appendix B.

Historical aerial photographs taken of the Property between 1952 and 2016 were examined to determine changes in land use on the Property and adjacent properties (Table 2). Copies of the historical aerial photographs are found in the wetland report (Basin 2017, in prep.).

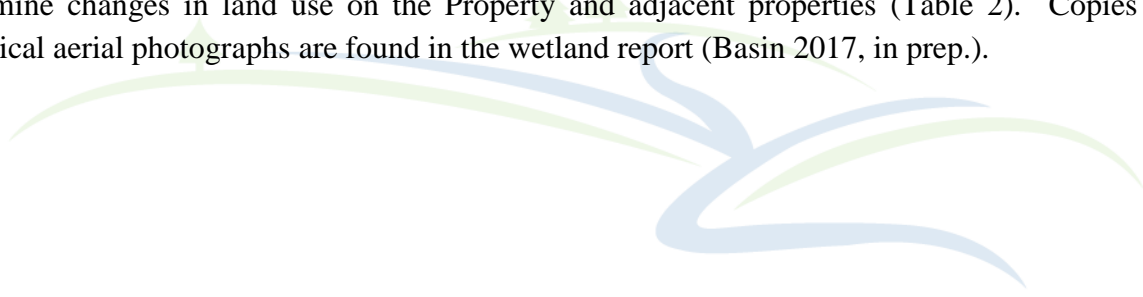
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TABLE 2 HISTORICAL AERIAL PHOTOGRAPH REVIEW

Year	Description
2016 ¹	The majority of the Property consists of a heavily treed lot. Some clearing exists in the North section, and an open water pond/storm water pond is located along the northern boundary of the property. A building/dwelling is located south of the storm water pond. A road development is visible in 9-27-83-23, W5M, running east-west. A potential watercourse is visible in the southwest section of the property, running from the northwest to southeast through 10-27-83-23, W5M. Highway 2 is located on the northern boundary of the property, running east-west and a gravel road is located along the eastern boundary, running north-south. The lot to the east of the property is mostly cleared, while the lot the west remains mostly undeveloped. Cultivated fields are present east and south of the Property. North of the Property, across Highway 2, some clearing has occurred north of the property; however, appears to be mostly undeveloped. Residential development can be noted to the northeast of the Property.
2015 ²	The road development in 9-27-83-23, W5M is not present. In the north section of the property, an existing co-op (low pressure) gas line run east to west from 16-27-83-23 to 15-27-83-23, W5M. An additional co-op gas line runs from the southeast corner into the property at 9-27-83-23, W5M to the north to 16-27-83-23, W5M and then runs west through the property through 15-27-83-23, W5M.
2011, 2006 ³	There are no significant changes from 2015 photograph.
2002 ³	There is slightly more woody vegetation in the northeast boundary than there is in 2006
1999, 1997, 1994, 1990 ²	There are no significant changes from the 2002 photograph.
1979 ³	The lot to the northeast of the property has much less development than the 1990 photograph; however, there have been no significant changes to the property from the 1990 photograph.
1974 ³	Several small buildings located on the northwest section of the property is visible that was not visible in the 1979 photograph.
1969 ³	Only east sections of the property visible on photograph. No major changes from the 1974 photograph.
1952 ³	With the exception of minor clearing along the north border, property was largely undeveloped. The stormwater pond/dugout area was not present, and no buildings located on the property.

Sources: 1 Google Earth 2017

2 ABADATA 2017

3 Airphoto Database

3.3 CLIMATE

Climate data was collected from Environment and Climate Change Canada in February 2017. Climatic data was compiled, for the 27 year period, 1981 to 2007, from the Peace River A

Meteorological Station, located within the town of Peace River (Government of Canada 2017a). A summary of compiled data is presented in Table 3.

TABLE 3 A SUMMARY OF CLIMATE DATA FROM PEACE RIVER A METEOROLOGICAL STATION

	Monthly Average Daily Temperature (°C)			Monthly Average Daily Precipitation (mm)		
	Mean	Min	Max	Mean	Min	Max
Winter (January to March)	-10.8	-14.9	-5.6	17.0	14.2	21.6
Spring (April to June)	9.4	3.8	14.3	41.6	18.1	66.4
Summer (July to September)	13.6	9.6	16.3	49.3	39.2	63.4
Fall (October to December)	-5.9	-12.7	2.8	20.9	17.4	23.5

Mean average monthly temperatures were highest during the summer months (July to September), and lowest in winter (January to March). Similarly, highest average monthly precipitation was experienced in summer months (July to September), and lowest during the winter (January to March); however, peak precipitation was typically experienced in June.

3.4 TOPOGRAPHY AND HYDROLOGY

The Peace River Parkland Natural subregion near the Property is characterized by the steep, south-facing slopes of the Peace River Valley.

The Property is located entirely within the Peace River Basin. The Peace River flows north to the Slave River, which eventually feeds the Arctic Ocean. Cardinal Lake is located approximately 10 km west of the Property. The Peace River is located approximately 14 km east of the Property.

3.5 GEOLOGY AND HYDROGEOLOGY

Within the Peace River Parkland Natural subregion, geological characteristics vary based on topography. Cretaceous marine shales underlie the plains north of the Peace River. Non-marine sandstones, mudstones and shales underlie areas in the Peace River Valley. Surficial materials on the plains are predominantly weakly saline, weakly calcareous, fine textured glaciolacustrine sediments. Valley materials include variably textured colluvium on the slopes with alluvial deposits on the valley floor (NRC 2006).

The bedrock formations of the Dry Mixedwood Natural subregion contain mainly Upper Cretaceous sandstones and shales in the south and shales and siltstones in the north. Fine textured glaciolacustrine and “lacustro-till” materials are predominant surficial materials making up for about 75% of the total area; however, glaciofluvial and eolian sands, organic deposits, and very little glacial till are also present (NRC 2006).

Groundwater well data was collected from the Alberta Environment Groundwater Information System (Alberta Government 2017a). Two domestic groundwater wells are located within the Property boundaries. At least one well had a static water depth of approximately 10 m, and was drilled to a depth of approximately 60 m. Several domestic water wells and a spring are located on the adjacent property to the west (NW-27-83-23, W5M), and had static water depths of approximately 1.5 to 3.5 m (Alberta Government 2017a).

4.0 METHODS

The following section outlines the methods used in gathering data for the BIA, including desktop and the reconnaissance survey.

4.1 SOILS

A desktop assessment was conducted to determine soil types within the Property using the Agricultural Region of Alberta Soil Inventory Database (AGRASID) Soils Information Viewer (Alberta Agriculture and Forestry 2017).

During the site reconnaissance, a soil survey was completed by Darcy O’Brien, B.Sc, RPF of Basin on September 29, 2016. To determine the soil characteristics in various settings, a 130 m x 130 m grid was established based on landscape elements (e.g., land use, slope, aspect, and drainage). For the Property, seven soil investigation locations were selected.

All soil investigation locations were excavated to the parent materials (C horizon). At each soil investigation location, site characteristics were recorded, including: surficial (parent) geological type; slope gradient, aspect, and position; drainage; land use; and vegetation.

Exposed soil profiles were described and logged according to the Canadian System of Soil Classification (Soil Classification Working Group 1998) and the Canada Soil Information System techniques in describing field soil characteristics (Expert Committee on Soil Survey 1982). Documented soil profile characteristics included: horizon types; horizon depths; soil texture; structure and consistency; Munsell soil colour (X-Rite 2000); presence of mottles, including appropriate mottle descriptors; and other pertinent horizon or parent material features as required to aid in soil classification and/or descriptors.

4.2 VEGETATION

A vegetation survey was conducted by Darcy O'Brien, B.Sc, RPF of Basin Environmental Ltd. on September 29, 2016. Plots were established alongside of the soils plots based on a 130m x 130m grid pattern. As such, seven vegetation plot locations were selected.

At each detailed vegetation plot, site characteristics were recorded which included: slope percentage, aspect, and position; landform type; percent cover of each layer (tree primary and secondary canopy, tall shrub, short shrub, forb, bryophyte and lichen); and a comprehensive list of species in all layers.

In addition to the plots, non-native and invasive plant species observations were recorded. A search for rare plants was conducted at every plot and between plots.

Alberta Parks, through the Alberta Conservation Information Management System (ACIMS) collects, continually updates, analyzes and disseminates information about the location, condition, status, and trends of selected tracked elements, including species and plant communities in a central database. The ACIMS database was consulted during the study to determine if rare plant or ecological communities exist within the Project footprint (Alberta Parks 2017).

4.3 WATERBODIES AND WETLANDS

During the site inspection, the Project area was inspected for potential waterbodies, including watercourses and wetlands.

A wetland is an ecosite dominated by hydrophytic vegetation where soils are water-saturated for a sufficient length of time such that excess water and resulting low soil oxygen levels are principal determinants of vegetation and soil development (MacKenzie and Moran 2004).

The Alberta Wetland Classification System (AWCS) has recently been developed for use and application across the province. This system recognizes five classes of wetlands including: bogs, fens, marshes, shallow open water and swamps (Alberta Environment and Sustainable Resource Development [AESRD], 2015a). The AWCS system was used to classify the wetlands within the study area.

4.4 WILDLIFE

A desktop review was conducted to determine if the Property has the potential to contain sensitive wildlife habitat or Species at Risk. The following websites and databases were consulted for relevant information:

- Alberta Biomonitoring Institute (Alberta Monitoring Institute 2017);
- Fisheries and Wildlife Information Management Tool (AEP 2017)
- GeoDiscover Alberta (Alberta Government 2017b);

- Landscape Analysis Tool (AEP and Alberta Energy Regulator [AER] 2017)
- Important Bird Areas (Important Bird Areas [IBA] 2017);
- Migratory bird sanctuaries (Environment and Climate Change Canada [ECCC] 2017a);
- National wildlife areas (ECCC 2017b);
- Species At Risk Public Registry (Government of Canada 2017b);
- Western hemisphere shorebird reserves (Western Hemisphere Shorebird Reserve Network 2009); and
- World Biosphere Reserves or Ramsar Wetlands (United Nations Educational Scientific and Cultural Organization 2017).

During the site reconnaissance, a wildlife survey was completed on September 29, 2016 by Darcy O'Brien, BSc. RPF of Basin. The survey was conducted when the temperature was above 0°C, and the precipitation and wind were minimal. A standard point count method was used along line transects in the different habitat types throughout the Property. Each line transect was walked in a steady, quiet manner at approximately 2 km/hr, and all wildlife heard or seen were recorded within 200 m on either side of the transect.

5.0 RESULTS

The following section outlines the results of the BIA, including the desktop review and the reconnaissance survey. Photos taken during the reconnaissance survey are presented in Appendix B.

5.1 SOILS

The AGRASID database (Alberta Agriculture and Forestry 2017) was utilized to search the area of the proposed development for relevant soils information. The Property is located within two soil polygons: 24081 and 24083. A description of the soil characteristics from AGRASID are presented in Table 4.



TABLE 4 DESCRIPTION OF SOIL CHARACTERISTICS WITHIN THE PROPERTY

Polygon #	Name	Landform	Description (Soil Code)
24081	BEBY2/III	Inclined Plain – Low Relief (Mid slope)	Gleyed Dark Gray Luvisol on fine textured (clay, silty clay and sandy clay) on fine textured (Clay) till (BEZ).
24081	BEBY2/III	Inclined Plain – Low Relief (Upper slope)	Dark Gray Luvisol on moderately fine textured (sand clay loam, clay loam and silty clay loam) on a gravelly and stony medium textured till (BYN).
24081	BEBY2/III	Inclined Plain – Low Relief (Lower slope)	Undifferentiated Orthic Humic Gleysol (ZGW).
24083	BEHZ9/III	Inclined Plain – Low Relief (Mid Slope)	Gleyed Dark Gray Luvisol on fine textured (clay, silty clay and sandy clay) on fine textured (clay) till (BEZ).
24083	BEHZ9/III	Inclined Plain – Low Relief (Mid Slope)	Gleyed Dark Luvisol on fine textured (clay, silty clay and sandy clay) on fine textured (clay) till (HZM).
24083	BEHZ9/III	Inclined Plain – Low Relief (Upper Slope)	Dark Gray Luvisol on moderately fine textured (sand clay, clay loam and silty clay loam) on gravelly and stony medium textured till (BYN).
24083	BEHZ9/III	Inclined Plain – Low Relief (Lower Slope)	Orthic Luvic Gleysol on very fine textured (heavy clay) water laid sediments (WNK).

The soil field assessment of the Project consisted of completing seven assessment points all within forested areas. The topsoil depths varied from 8 to 14 cm. Refer to Table 5 for a complete list of soils information, and Appendix C– Soil/Vegetation Plot Map.



TABLE 5 RESULTS OF SOIL SURVEYS

Plot #	Location / GPS	Drainage	Notes	Horizon (Depth), Texture, Color
1	Treed Lot Lat: 56.23051 Long: 117.54337	Southwest	Mottles and gleying noted. Small gravel present in upper 1 cm.	LFH (0-12 cm) Ae (12-24 cm), Coarse Sand, Light Grey Bn (24-56 cm), Coarse Sand, Grey/Brown Cg (>56 cm), Sandy Clay Loam – Sandy Clay, Grey/Brown
2	Treed Lot Lat: 56.22943 Long: 117.54333	Southwest	Small gravel present in upper 10 cm.	LFH (0-12cm) Ae, (12-28cm) Clay Loam, Medium Brown B, (28-52cm) Silty Clay Loam, Medium Brown C, Clay Loam – Clay, Grey Brown
3	Treed Lot N 55.22684 W 117.53972	Southwest	-	LFH (0-14 cm) Ae (14-22 cm), Loam, Dark Brown Ah (22-35 cm), Loam – Clay Loam, Black B (35-62 cm), Loamy Sand – Sand, Medium Brown Cgm (> 62 cm), Loamy Sand – Sandy Clay Loam, Medium Brown
4	Treed Lot N 56.22855 W 117.53865	Southwest	-	LFH (0-8 cm) Ae (8-14 cm), Clay, Dark Brown Ba (14-34 cm), Loamy Sand, Medium Brown Cg (> 34 cm), Sandy Clay Loam – Clay, Dark Brown
5	Treed Lot N 56.22983 W 117.53819	Southwest	Mottles and gleying noted. Small gravel present to 30 cm.	LFH (0-8cm) Ae (8-15cm) Clay Loam, Dark Brown B (15-42cm) Sandy Clay Loam, Grey Brown C (>42cm) Clay Loam Clay, Medium Brown
6	Treed Lot N 56.22977 W 117.53592	Southwest	-	LFH (0-8cm) Ae (8-16cm) Loamy Clay Loam, Dark Brown B (16-29cm) Clay Loam, Dark Brown C (>29cm) Clay Loam – Clay – Dark Brown
7	Treed Lot N 56.22963 W 117.53362	Southwest	Mottles and gleying noted. Small gravel present in upper 1 cm.	LFH (0-8cm) Ae (8-17cm) - Sandy Clay, Dark Brown B (17-39cm) – Sand, Medium Brown C (>20cm) Sandy Clay Loam – Clay, Grey Brown



5.2 VEGETATION

Table 6 outlines the results of the vegetation surveys. Refer to Appendix C for the Soil/Vegetation Plot Map.

TABLE 6 VEGETATION SPECIES FOUND ON THE PROPERTY

Vegetation within the Property		Plot						
		1	2	3	4	5	6	7
River alder	<i>Alnus tenuifolia</i>		x	x				
Vetch	<i>Astragalus spp.</i>	x						
Marsh Reed Grass	<i>Calamagrostis canadensis</i>	x	x	x	x	x	x	x
Fireweed	<i>Chamerion angustifolium</i>					x		
Lily-of-the-Valley	<i>Convallaria majalis</i>			x				
Bunchberry	<i>Cornus canadensis</i>	x	x	x	x	x	x	x
Red-osier Dogwood	<i>Cornus stolonifera</i>	x	x	x			x	x
Wild Strawberry	<i>Fragaria virginiana</i>	x	x		x	x		
Northern bedstraw	<i>Galium boreale</i>	x			x			
Sweet-Scented Bedstraw	<i>Galium triflorum</i>			x				
Wintergreen	<i>Gaultheria Procumbens</i>	x						
Hairy Wild Rye	<i>Elymus innovatus</i>	x	x	x		x	x	x
Twinflower	<i>Linnaea borealis</i>	x		x		x	x	x
Alfalfa	<i>Medicago sativa</i>				x			
Tall Lungwort	<i>Mertensia Paniculata</i>		x					
Bishops Cap	<i>Mitella diphylla</i>			x				
Creamy Peavine	<i>Lathyrus ochroleucus</i>	x				x	x	x
Palmate-leaved Coltsfoot	<i>Petasites palmatus</i>	x	x		x			
White spruce	<i>Picea glauca</i>	x				x	x	x
Trembling Aspen	<i>Populus tremuloides</i>	x	x		x	x	x	x
Balsam Poplar	<i>Populus balsamifera</i>	x	x	x		x	x	x
Poplar	<i>Populus spp.</i>		x			x		
Purple Aster	<i>Symphyotrichum patens</i>	x				x		
Prickly Rose	<i>Rosa acicularis</i>	x	x	x	x	x	x	x
Dewberry	<i>Rubus spp.</i>					x	x	x
Wild Raspberry	<i>Rubus idaeus</i>		x		x			
Willow	<i>Salix spp.</i>	x	x	x	x	x	x	x
Buffalo Berry	<i>Shepherdia spp.</i>	x			x	x	x	x
Snowberry	<i>Symphoricarpos albus</i>	x		x			x	x
Common Tansy*	<i>Tanacetum vulgare</i>				x			
Common Dandelion	<i>Taraxacum officinale</i>	x					x	x
Low Bush Cranberry	<i>Viburnum edule</i>	x	x	x				

Notes: * Designated noxious weed as per the Weed Control Act.

RARE PLANTS AND ECOLOGICAL COMMUNITIES

A search of rare plant and rare plant occurrences was conducted for Section 27, Township 83, Range 23, West of the 5th Meridian within the ACIMS database (Alberta Parks 2017). There were no occurrences for elements on the tracking lists in the vicinity of the search area and no rare plants were noted during the field assessment.

WEEDS AND INVASIVE PLANTS

Noxious weeds, as defined by the *Weed Control Regulation*, are common species that can be found throughout the Province, and as such are very difficult to eliminate. They can cause significant economic losses, but are so biologically suited to Alberta that they cannot be eradicated.

In addition, disturbance-caused species (e.g., dandelion) are well adapted to an environment of continual stress, where they have a competitive advantage over native species. Disturbance-caused species have more value than invasive plants, but are usually shallow-rooted and less productive; having limited value for bank-binding and erosion-prevention; and inhibit the preferred plants (Fitch and Ambrose 2003).

Since the Property has limited disturbance, only one noxious weed was identified during the vegetation survey (i.e., common tansy). Dandelions, which are considered disturbance-caused species, were also present.

5.3 WATERBODIES AND WETLANDS

During the site reconnaissance, a small permanent watercourse was discovered in the southwest corner of the property. The watercourse is considered a Class D watercourse with no Restricted Activity Period according to the Code of Practice Peace River Management Area Map (Alberta Environment 2006). Fish sampling was not conducted at this watercourse, as it is considered to have limited potential to contain fish habitat due to shallow conditions, and limited connectivity to downstream habitats.

Three Seasonal Marshes were identified within the northeast corner of the Property (see Appendix A). A wetland assessment was conducted and a wetland impact assessment is being developed, and will be reported under a separate cover (Basin 2017, in prep.). Refer to the wetland report for details of wetlands impacted by the proposed development.

5.4 WILDLIFE

During the site visit on September 29, 2016, several wildlife species were observed. In addition, the Fish and Wildlife Management Information System (FWMIS) was searched to determine which

species were present within a one, two and five kilometer radius of the Property (AEP 2017a). The results of the field and desktop review are presented in Table 7.

TABLE 7 WILDLIFE SPECIES DOCUMENTED IN OR NEAR THE PROPERTY

Common Name	Species Name	Property	1 km	2 km	5 km
White-tailed Deer	<i>Odocoileus virginianus</i>	x	-	-	-
Black-capped Chickadee	<i>Poecile atricapillus</i>	x	-	-	-
Ruffed Grouse	<i>Bonasa umbellus</i>	x	-	-	-
American Crow	<i>Corvus brachyrhynchos</i>	x	-	-	-
Song Sparrow	<i>Melospiza melodia</i>	x	-	-	-
Red Squirrel	<i>Tamiasciurus hudsonicus</i>	x	-	-	-
Great Gray Owl	<i>Strix nebulosa</i>	-	-	-	x
American Kestrel	<i>Falco sparverius</i>	-	-	-	x

During the desktop study, it was noted that the Property contains none of the following:

- Environmentally Significant Areas (Alberta Government 2017b);
- Important Bird Areas (IBA 2017);
- Key Wildlife or Biodiversity Zones (AEP and AER 2017);
- Migratory bird sanctuaries (Environment and Climate Change Canada [ECCC] 2017a);
- National wildlife areas (ECCC 2017b);
- Western hemisphere shorebird reserves (Western Hemisphere Shorebird Reserve Network 2009); and
- World Biosphere Reserves or Ramsar Wetlands (United Nations Educational Scientific and Cultural Organization 2017).

Within the general area of the Property, sensitive environmental features were identified; however, none of these sites occur within the Property boundaries. An Environmentally Significant Area is present immediately southwest of the Property. In addition, Cardinal Lake and Peace River contain Environmentally Significant Areas (Alberta Government 2017b). The Peace River valley near the Property is considered a Key Wildlife and Biodiversity zone (AEP and AER 2017). In addition, Cardinal Lake is an Important Bird Area (IBA 2017).

SPECIES AT RISK

Information collected from the desktop review determined that there might be the potential for species at risk to occur in the Property and surrounding area. Table 8 outlines species at risk whose ranges overlap with the Property. No species at risk were identified during the site reconnaissance.

The Endangered Species Conservation Committee (ESCC) reviews the status of general wildlife species in Alberta and provides advice to the provincial Minister for providing legal protection for Species At Risk. The ESCC rates wildlife species as Secure, Sensitive, May Be At Risk or At Risk (Fish and Wildlife Division 2008). Sensitive species are those that are not considered endangered; however, require additional management or conservation strategies to prevent them from becoming at risk. May Be At Risk are those species that have been assessed by the ESCC and has been recommended a listing under the *Wildlife Act*; however, is not considered to be in immediate risk (Fish and Wildlife Division 2008).

In addition to those species listed in Table 8, several species ranges overlap the Project area that are considered Sensitive or May Be At Risk within Alberta; however, have not been listed by the provincial *Wildlife Act*, and have no federal listing (i.e., COSEWIC or SARA).

Sensitive species whose ranges overlap the Project Area, and therefore have potential to occur include: Northern Goshawk (*Accipiter gentilis*), Sandhill Crane (*Antigone canadensis*), Golden Eagle (*Aquila chrysaetos*), Upland Sandpiper (*Bartramia longicauda*), American Bittern (*Botaurus lentiginosus*), Broad-winged Hawk (*Buteo platypterus*), Brown Creeper (*Certhia americana*), Black Tern (*Chlidonias niger*), Pileated Woodpecker (*Dryocopus pileatus*), Alder Flycatcher (*Empidonax alnorum*), Least Flycatcher (*Empidonax minimus*), American Kestrel (*Falco sparverius*), Common Yellowthroat (*Geothlypis trichas*), Bald Eagle (*Haliaeetus leucocephalus*), Baltimore Oriole (*Icterus galbula*), Osprey (*Pandion haliaetus*), Black-backed Woodpecker (*Picoides arcticus*), Western Tanager (*Piranga ludoviciana*), Pied-billed Grebe (*Podilymbus podiceps*), Sora (*Porzana carolina*), Eastern Phoebe (*Sayornis phoebe*), Great Gray Owl (*Strix nebulosa*), and Eastern Kingbird (*Tyrannus tyrannus*) (AEP 2017a, Alberta Biomonitoring Institute 2017, Hoar et al. 2010). In addition, the range of the Western Wood Pewee (*Contopus sordidulus*) overlaps with the Project Area (Alberta Biomonitoring Institute 2017, Hoar et al. 2017) and is rated as May Be At Risk (AEP 2017b).

Great Gray Owl and American Kestrel, both sensitive species, were detected within a 5 km radius of the Property and have the potential to occur (AEP 2017a).

A decorative graphic at the bottom of the page consists of stylized, flowing lines in shades of blue and green, resembling a river or a landscape feature, with three small green trees at the top.

TABLE 8 SPECIES AT RISK THAT HAVE THE POTENTIAL TO OCCUR WITHIN THE PROJECT AREA

Common Name	Species Name	Wildlife Act ¹	General Status of Wild Species Status ²	COSEWIC Status ³	SARA Schedule 1 Status ³
Western Grebe ^{4,5}	<i>Aechmophorus occidentalis</i>	Threatened	At Risk	Special Concern	-
Short-eared Owl ⁵	<i>Asio flammeus</i>	-	May Be At Risk	Special Concern	Special Concern
Common Nighthawk ⁵	<i>Chordeiles minor</i>	-	Sensitive	Threatened	Threatened
Olive-sided Flycatcher ^{4,5}	<i>Contopus cooperi</i>	-	May Be At Risk	Threatened	Threatened
Trumpeter Swan ^{5,6}	<i>Cygnus buccinator</i>	Special Concern	Sensitive	Not at Risk	-
Cape May Warbler ^{4,5}	<i>Dendroica tigrina</i>	Recommended Special	Sensitive	-	-
Black-throated Green Warbler ^{5,6}	<i>Dendroica virens</i>	Special Concern	Sensitive	-	-
Rusty Blackbird ^{4,5}	<i>Euphagus carolinus</i>	-	Sensitive	Special Concern	Special Concern
Peregrine Falcon ^{5,6}	<i>Falco peregrinus</i>	Threatened	At Risk	-	-
Barn Swallow ^{4,5}	<i>Hirundo rustica</i>	-	Sensitive	Threatened	-
White-winged Scoter ^{5,6}	<i>Melanitta fusca</i>	Special Concern	Sensitive	-	-
Horned Grebe ⁵	<i>Podiceps auritus</i>	-	Sensitive	Endangered	Endangered
Bank Swallow ^{4,5}	<i>Riparia riparia</i>	-	Sensitive	Threatened	-
Barred Owl ^{5,6}	<i>Strix varia</i>	Special Concern	Sensitive	-	-
Canada Warbler ^{4,5}	<i>Wilsonia canadensis</i>	-	At Risk	Threatened	Threatened

Sources: 1 Wildlife Act 1994

2 AEP 2017b

3 Government of Canada 2017b

4 Alberta Biomonitoring Institute 2017

5 Hoar et al. 2010

6 AESRD 2015b



6.0 POTENTIAL ENVIRONMENTAL EFFECTS AND RECOMMENDED MITIGATION MEASURES

6.1 SOIL

Potential environmental impacts to the soil of the Property include:

- Increases in erosion potential and sedimentation; and
- Loss of soil quality.

Excavation and grading is particularly common for the development of sub-divisions. Construction increases erosion potential by removing the vegetative cover, changing drainage patterns and exposing soils that can be readily transported by wind or water. Erosion potential due to water is particularly high during the early spring snow melt (before the vegetation re-germinates) and during periods of high rain precipitation (June to August).

Construction activities using heavy equipment have the potential to create soil compaction and impede native drainage patterns. Soil compaction is an issue for water penetration, nutrient availability and root penetration in the re-establishment of vegetation. It can also impede native drainage patterns by creating barriers to water penetration for drainage.

In the absence of proper soil handling methods and reclamation considerations, there would be adverse impact to the Property. Proper topsoil stripping, conservation and replacement is necessary for effective post-development reclamation to limit soil compaction, maintain soil fertility, promote timely vegetation re-establishment and maintain effective surface and subsoil drainage. Table 9 outlines recommended mitigation measures during soil stripping and construction to minimize adverse effects to soil, and limit erosion and sediment problems caused by construction.



TABLE 9 RECOMMENDED MITIGATION MEASURES FOR SOIL HANDLING

Environmental Effect	Recommended Mitigation Measures
Erosion, Sediment and Drainage Control	<ul style="list-style-type: none"> • Schedule work during dry periods, and cease construction during wet periods and high pressure rain events. • Where possible, minimize clearing or damage to vegetation and do not compact soils. Minimize construction traffic within areas to be reclaimed, particularly when soil conditions are moist. • Manage the flow of surface water in and around the construction site during construction in a manner that minimizes increased risks of erosion and sedimentation. If necessary, construct diversion ditches. Divert runoff or water that contains sediment, to a settling pond, sediment trap or through a vegetated area to minimize the addition of sediment to nearby waterbodies. • Clear vegetation on unstable or erodible banks by hand wherever possible. • Employ erosion and sediment control measures (e.g., sediment fencing and/or check dams) suitable to the site prior to construction. Inspect the erosion and sediment control measures regularly, repair or replace when required. • Stockpiles should be designed in a cigar shape, oriented parallel to prevailing winds and perpendicular to topographic slopes to minimize erosion. Stockpiles should be at least 30 m from waterbodies and wetlands. Stabilize stockpiles if necessary by applying water or an approved tackifier. If soil stockpiles are stored for more than one growing season, incorporate a fast-growing cover vegetation to further minimize erosion risks. • Consideration should be practiced to prevent ruts from heavy equipment operation that may alter surface drainage.
Loss of Soil Quality	<ul style="list-style-type: none"> • A qualified soil specialist should monitor soil stripping and reclamation. • During construction activities, topsoil and subsoil should be graded to the colour change between the A (topsoil) and B (subsoil) horizons, salvaged and stockpiled separately. • Soil salvage activities should occur under daylight conditions, and not occur during wet, windy, frozen, or adverse field conditions that will result in potential topsoil admixing, loss, compaction, or degradation. In areas where the colour change between topsoil and subsoil layers are not visually distinct, topsoil and subsoil salvage should be based on mean topsoil and subsoil thicknesses for the Property. • If being stored on-site, topsoil and subsoil must be stored separately in stockpiles at least 1 m away from each other to prevent admixing. • Prior to topsoil replacement, subsoils should be ripped to alleviate compaction. Areas with finer texture topsoil will be disked following replacement. Para-tilling following topsoil replacement will relieve any remaining subsoil compaction. Following construction, the subsoil should be contoured to be consistent with the native landscape, and topsoil or salvaged surface soil should be replaced uniformly at the mean thickness for each Property.

6.2 VEGETATION

Potential impacts related to vegetation include the following, and are described in detail in the sections below:

- Loss of vegetation and wildlife habitat;
- Introduction and spread of weedy or invasive species;
- Loss of rare plants or rare ecological communities; and
- Contamination of vegetation and wildlife.

LOSS OF VEGETATION AND WILDLIFE HABITAT

Clearing of the forest vegetation will impact wildlife, in particular, migratory bird species that use the trees and shrubs for nesting, foraging and cover habitat and ungulate species that forage on the shrubs in the summer and winter.

The removal of forested and wetland vegetation will impact water quality, nesting and foraging habitat and may result in the loss of wildlife. Forest and wetland vegetation not only provides valuable habitat for wildlife that depend on a combination of wetland and upland habitat but also plays an important role in maintaining wetland quality (Fitch and Ambrose 2003).

RARE PLANTS AND RARE ECOLOGICAL COMMUNITIES

No rare plants or rare ecological communities have been recorded on the Property, and none were observed during the assessments. Based on the current land use, it is possible that rare plants and rare ecological communities may occur within the forest habitat. Also, wetland areas (which have rich nutrient soils and wet moisture regimes) have a higher potential to support rare plants. However, based on the current available information, impacts to (potential) rare plants and rare ecological communities should be negligible.

WEEDS AND INVASIVE PLANTS

Construction of the proposed development will increase the opportunity for disturbance adapted, weedy and invasive species to spread and become established in the Property. Many of those species are very aggressive and can out-compete native species, reducing the biodiversity of adjacent native plant communities. Unmitigated, the spread of weedy species would have an adverse effect on habitat values, maintenance costs and land use.

Table 10 outlines recommended mitigation measures for vegetation clearing to minimize adverse effects caused by loss of vegetation and wildlife habitat, weeds and invasive species, and contamination of vegetation and wildlife that could be caused by construction activities.

TABLE 10 RECOMMENDED MITIGATION MEASURES FOR VEGETATION

Environmental Effect	Recommended Mitigation Measures
Loss of Vegetation and Wildlife Habitat	<ul style="list-style-type: none"> Construction procedures will be chosen and followed on the basis of creating the smallest disturbance footprint possible. Reclamation measures should follow immediately after construction, and the spread of invasive species should be controlled. Following those mitigation measures, impacts should be negligible. Disturbed areas should be re-seeded immediately after construction. Sites susceptible to erosion should be monitored until vegetation has become re-established.
Weeds and Invasive Species	<ul style="list-style-type: none"> All equipment is to arrive at the site in a clean condition, free of noxious weeds, invasive species and plant diseases. Use a disinfectant (e.g., 1-2% bleach solution) to disinfect equipment which may have come in contact with noxious weeds and/or plant diseases. Employ weed control on soil stockpiles left for long periods (sufficiently long for mature weeds to develop) to prevent additional seed deposition in topsoils. If required, herbicides and/or pesticides should be applied in accordance to the Alberta Weed Control Act, by a Certified Applicator.
Contamination of Vegetation and Wildlife	<ul style="list-style-type: none"> Fuel, lubricants and oils (and any other chemicals required for construction) should be stored in a secure, central storage location. Re-fueling (and any other maintenance) will be prohibited within 100m of wetlands and creeks. All personnel will be familiar with spill containment and clean-up procedures. Spill kits will be carried on equipment or stored in nearby staging areas. Educate lot owners to encourage minimal use of pesticides and herbicides. Educate residents to respect riparian areas and understand wetland function, the importance of riparian vegetation, and the use of riparian habitat by wildlife. Encourage residents to leave as much native vegetation intact as possible, and to use native vegetation in landscaping.

WATERBODIES AND WETLANDS

Riparian zones maintain and improve water quality, minimize erosion and sedimentation and can lower nitrate and acidic concentrations in surface water from agricultural fields (Haycock et.al. 2001).

Potential impacts to waterbodies and wetlands from the Property include:

- Loss or degradation of wetland habitat;
- Loss of Riparian Habitat; and
- Deterioration of water quality and increase in sedimentation.

LOSS OR DEGRADATION OF WETLAND HABITAT

The potential effects resulting from a loss or deterioration of wetland habitat is a complex environmental issue, which has been determined to have a range of environmental effects, including but not limited to: loss or degradation of wetland habitat and a loss of plant and animal biological diversity; deterioration of wetland water quality; reduction in water supply and water storage; increased occurrence of algae blooms caused by nutrient overload from land adjacent to a wetland; increased sedimentation, which negatively impacts natural filtration; loss of flood plain land and flood plain protection; reduced range of recreational opportunities; loss of aesthetic values; increased abundance of weeds; loss of species and shifts in species dominance; mosquito problems; changed hydraulic regimes, such as permanent water cover in a wetland with a natural cycle of wet and dry periods; reduction in groundwater recharge, with a negative impact on potential crop production and secure water supplies for humans and livestock; and increased soil erosion (Wetlands Alberta 2017).

LOSS OF RIPARIAN HABITAT

Similar to wetlands, riparian areas have a multitude of functions, and loss of riparian habitat can have multiple environmental effects on ecosystem health of the surrounding waterbodies or wetlands. Riparian areas function to: store water and energy; filter and buffer water; trap and store sediment; recharge aquifers; reduce and dissipate energy; maintain biodiversity; and provide a role in primary productivity (Fitch and Ambrose 2003).

DETERIORATION OF WATER QUALITY AND INCREASE IN SEDIMENTATION

Construction in and around waterbodies can have a direct impact on water quality by introducing deleterious substances such as gasoline, oil, wet concrete or construction debris to waterbodies or wetlands. In addition, ground disturbance caused by construction activities can cause an increase in erosion and sedimentation, which may be transported to nearby waterbodies. Transportation of sediment and/or other deleterious substances to nearby watercourses can have an impact on fish and fish habitat.

Table 11 outlines recommended mitigation measures to minimize adverse effects to waterbodies and wetlands. The complete wetland impact assessment, including recommended mitigation is reported under a separate document.



TABLE 11 RECOMMENDED MITIGATION MEASURES FOR WATERBODIES AND WETLANDS

Environmental Effect	Recommended Mitigation Measures
Loss or Degradation of Wetland Habitat and Loss of Riparian Habitat	<ul style="list-style-type: none"> • Maintain riparian setbacks from wetlands where possible. If wetland avoidance is not possible, obtain Water Act approval using the expertise of a Qualified Wetland Science Practitioner (QWSP) including a Wetland Impact Assessment Form, a mitigation plan and applicable Wetland Restoration and Compensation. • Operate machinery on land above the high water mark of all waterbodies, and in a manner that minimizes disturbance. • Intermittent watercourses and springs shall have a setback of at least 45 metres from the top of the break. • Small Permanent watercourses shall have a setback of at least 45 metres from the top of the break. • Large Permanent watercourses shall have a setback of at least 100 metres from the top of the break.
Deterioration of Water Quality and Increase in Sedimentation	<ul style="list-style-type: none"> • Implement appropriate precautions to prevent deleterious substances (e.g., gasoline, sediment, oil, wet concrete, etc.) from entering waterbodies. Cleaning, fueling, and servicing of equipment will be conducted in an area where spills and wash water will not contaminate surface water or groundwater resources. An emergency spill kit is to be available at all times. • Store spoil and waste materials outside of waterbodies. Stabilize this material, if warranted, to minimize the potential for runoff events to transport them into nearby waterbodies. • Prevent construction materials and debris from entering watercourses/waterbodies. • Install and maintain appropriate erosion and sediment control methods to prevent sediments from disturbed areas from being transported into waterbodies. • Refueling of vehicles and equipment will be conducted a minimum of 100 m away from all waterbodies. • Inspect machinery daily and repair if deficiencies are noted

WILDLIFE

Potential impacts related to wildlife include the following, and are described in detail in the sections below:

- Wildlife Disturbance;
- Loss of wildlife habitat;
- Increased mortality to wildlife; and
- Changes in wildlife movement patterns.

WILDLIFE DISTURBANCE

Disturbance to wildlife may occur during construction due to noise and construction activity. Sensory disturbances (i.e. noise, light, and traffic) may have adverse impacts on wildlife. Sensory disturbances (i.e., noise, light, and traffic) may disrupt nesting, denning, foraging, or breeding patterns and cause wildlife to avoid areas entirely. This is particularly important during the migratory bird nesting period (i.e., May through August). Sensory disturbances will also occur when lot development is completed and increased traffic occurs in the area.

LOSS OF WILDLIFE HABITAT

Construction activities will lead to direct habitat loss, alteration, or fragmentation. Clearing vegetation, especially shrub or forest areas, will reduce the amount of wildlife habitat available. Clearing can also reduce the quality of the remaining habitat by breaking it into smaller, more isolated patches that are less useful for some wildlife species.

INCREASED MORTALITY

Once infrastructure is in place, increased road use and traffic may result in more wildlife-vehicle collisions.

CHANGES IN MOVEMENT PATTERNS

The creation of buildings, roads, and other infrastructure will create more physical barriers. Physical barriers may alter or disrupt seasonal and daily movements of wildlife.

Table 12 outlines recommended mitigation measures to minimize adverse effects to wildlife and wildlife habitat.



TABLE 12 RECOMMENDED MITIGATION MEASURES FOR WILDLIFE AND WILDLIFE HABITAT

Environmental Effect	Recommended Mitigation Measures
Wildlife Disturbance	<ul style="list-style-type: none"> • If possible, avoid construction and land clearing during the migratory bird nesting period (Late April to Late August). In the event that this is not possible, obtain the services of a Wildlife Specialist to conduct pre-construction bird survey and nest sweeps no more than seven days prior to clearing and construction. Additional mitigation may be required as determined by the Wildlife Specialist. Buffers around sensitive wildlife habitat may be established by the Wildlife Specialist. • Conduct a pre-disturbance survey to determine if nest sites, hibernacula, rookeries, leks, colonies, and other nesting or breeding areas are present prior to land disturbance. If nesting or breeding areas are discovered, abide by the appropriate restricted activity periods and setback distances from nesting or breeding areas as outlined in the Recommended Land Use Guidelines for Protection of Selected Wildlife Species and Habitat within Grassland and Parkland Natural Regions of Alberta (Alberta Government 2011). • Construction crew should not disturb nesting wildlife. • All wildlife incidents, including aggressive wildlife encounters or wildlife-car accidents should be reported to provincial regulators.
Loss of Wildlife Habitat	<ul style="list-style-type: none"> • Minimize clearing of vegetation where possible.
Increased Mortality	<ul style="list-style-type: none"> • Limit speed on roads during construction and post-construction. Post speed limit signs throughout.
Changes in Movement Patterns	<ul style="list-style-type: none"> • Limit clearing where possible, and maintain corridors of intact vegetation to allow movement of wildlife.



7.0 CLOSING

The Biophysical Impact Assessment letter was completed to document pre-disturbance environmental information within NE-27-83-23 W5M, and to provide recommendations during development of the subdivision. This report presents information available at the time of writing, as well as best management practices and provincial and federal regulations effective at the time of writing. We trust the above meets your present requirements. If you have any questions, or require additional details, please contact the undersigned.

Sincerely,

Basin Environmental Ltd.

Report Prepared by:

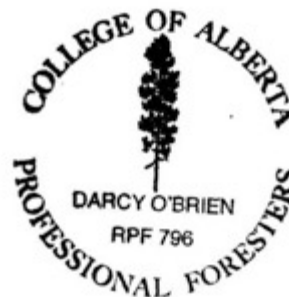


Suzanne Thompson, B.Sc., P.Biol.
Project Manager/Biologist

Reviewed by:



Darcy O'Brien, B.Sc., RPF
Principal, Senior Project Manager



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9.0 APPENDICES

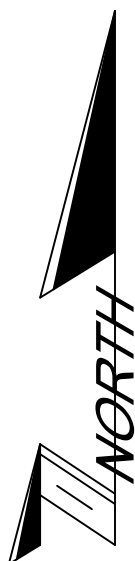
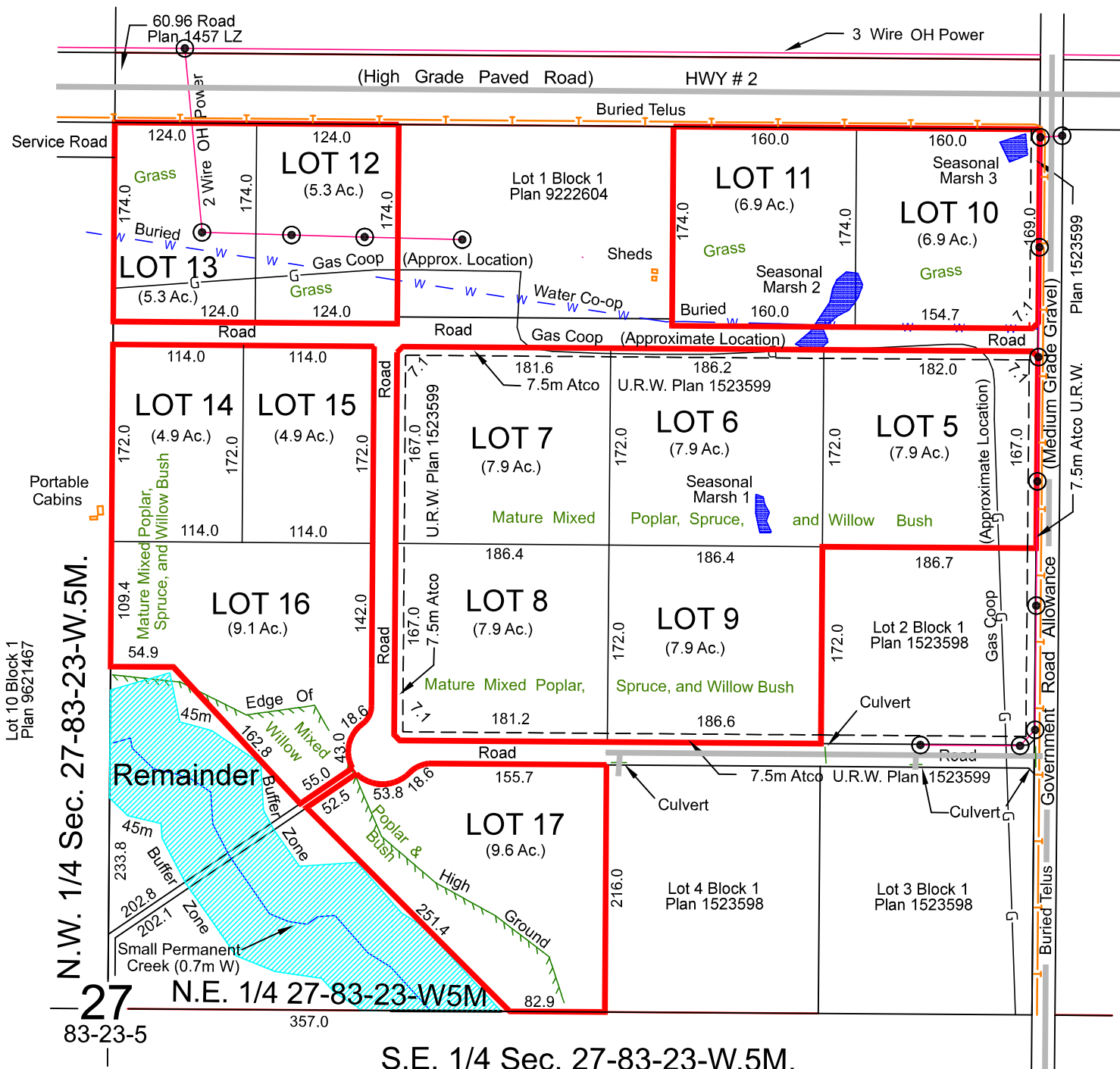


APPENDIX A

SURVEY PLANS



Tentative Plan Showing Proposed Subdivision of N.E. Sec. 27, Twp. 83, Rge. 23, W.5M. (For Phase II CR Subdivision Development) Within MD of Peace No. 135, Alberta



Scale: 1:5000



LEGEND

- Wetland Area
- Creek Buffer Area
- Phase II Lands
- Road C/L
- Overhead 2-Wire Power
- Telus Line
- Water Line (Private)
- Gas Co-op Line
- Edge High Ground
- Power Pole
- Septic Field/Discharge

**BORDERLINE
SURVEYS**

10111 - 110th Street, Box 2661
Fairview, AB. T8B 0A6
www.borderlinesurveys.com

Page: 1 of 3

Date: Oct. 14th, 2016

Drawn by: JC

Job No.: 160032

Tentative Plan Showing
Proposed Subdivision of
N.E. Sec. 27, Twp. 83, Rge. 23, W.5M.
(For Phase II CR Subdivision Development)
Within
MD of Peace No. 135, Alberta

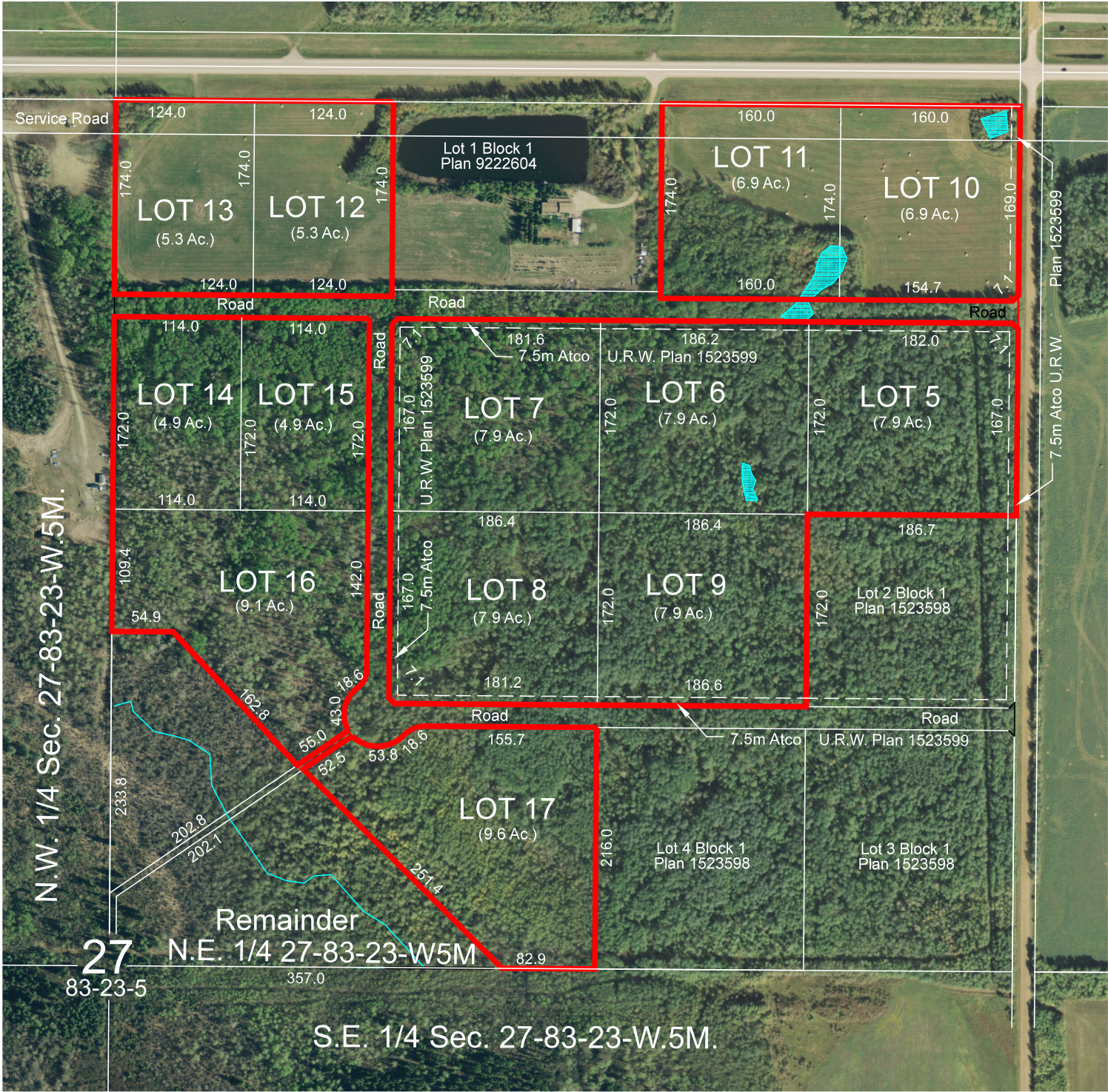


Photo Detail
Scale: 1:5000

Note:

- 1. Phase 1 Road is under construction
- 2. Atco Powerline (Plan 1523599) is under construction

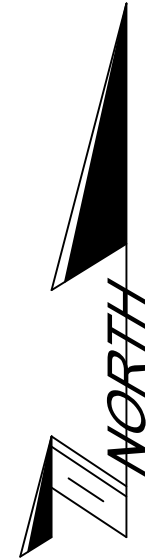


Photo Date: 2012

**BORDERLINE
SURVEYS**

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Fairview, AB. 780 - 330 - 9939
www.borderlinesurveys.com

Page: 2 of 3

Date: Oct. 14th, 2016

Drawn by: JC

Job No.: 160032

Tentative Plan Showing
Proposed Subdivision of
N.E. Sec. 27, Twp. 83, Rge. 23, W.5M.
(For Phase II CR Subdivision Development)
Within
MD of Peace No. 135, Alberta

LANDOWNER:

(Remainder) N.E. 1/4 27-83-23-W5M
775998 Alberta Ltd.
C. of T. 152 238 336 + 4

PROPOSED LOT AREA:

Lot 5:	3.212	Ha	(7.937 Ac.)
Lot 6:	3.204	Ha	(7.917 Ac.)
Lot 7:	3.206	Ha	(7.923 Ac.)
Lot 8:	3.203	Ha	(7.914 Ac.)
Lot 9:	3.208	Ha	(7.926 Ac.)
Lot 10:	2.780	Ha	(6.871 Ac.)
Lot 11:	2.784	Ha	(6.879 Ac.)
Lot 12:	2.158	Ha	(5.333 Ac.)
Lot 13:	2.158	Ha	(5.332 Ac.)
Lot 14:	1.961	Ha	(4.847 Ac.)
Lot 15:	1.962	Ha	(4.847 Ac.)
Lot 16:	3.693	Ha	(9.126 Ac.)
Lot 17:	3.886	Ha	(9.604 Ac.)
Total:	37.415	Ha	(92.456 Ac.)
Remainder Of NE 27:	5.840	Ha	(14.431 Ac.)

REGISTERED TITLE
ENCUMBERANCES

752 118 577 - U.R.W. North Peace Gas Coop
902 160 990 - U.R.W. East Grimshaw Rural Water Coop
142 216 528 - Caveat: Restrictive Covenant
152 100 849 - R/W Agreement Atco Electric Ltd.
152 238 339 - U.R.W. Atco Electric


Wetlands
Table:

Wetland	Lot Location	Area (SqM)	Wet_Area (SqM)	MR_Area (SqM)	Veg_Area (SqM)
Seasonal Marsh 3	Lot 10	380	380	380	380
Seasonal Marsh 2	Lot 10	90	90	90	90
Seasonal Marsh 2	Lot 11	830	830	830	830
Seasonal Marsh 2	Road	360	360	360	360
Seasonal Marsh 1*	Lot 6	40	40	40	40
Seasonal Marsh 1	Lot 6	250	250	250	250

*Open Water

BORDERLINE

SURVEYS



APPENDIX B

SITE PHOTOGRAPHS





Photo 1: Photograph of northeast corner of the Property (Lot 10) view west at lots 10/11



Photo 2: Photograph of southeast corner of the Property view west along road development.



Photo 3: Photograph of road development within the Property, view south at lot 4, block 1.



Photo 4: Photograph of road development within the Property, view north.



Photo 5: Photograph of east boundary of the Property, view north.



Photo 6: Photograph of southwest corner of the Property, view northeast.



Photo 7: Photograph of small permanent watercourse in southwest corner of the Property.



Photo 8: Photograph of riparian area surrounding small permanent watercourse in southwest corner of the Property.



Photo 9: Photograph from middle of the Property (Lot 7), view south.



Photo 10: Photograph of Seasonal Marsh 1 in center of the Property (Lot 6).



Photo 11. Photograph of Seasonal Marsh 2 in northeast corner of the Property (Lot 11).



Photo 12. Photograph of Seasonal Marsh 2 in northeast corner of the Property (Lot 11).



Photo 13: Photograph of Seasonal Marsh 3 in northeast corner of the Property (Lot 10).

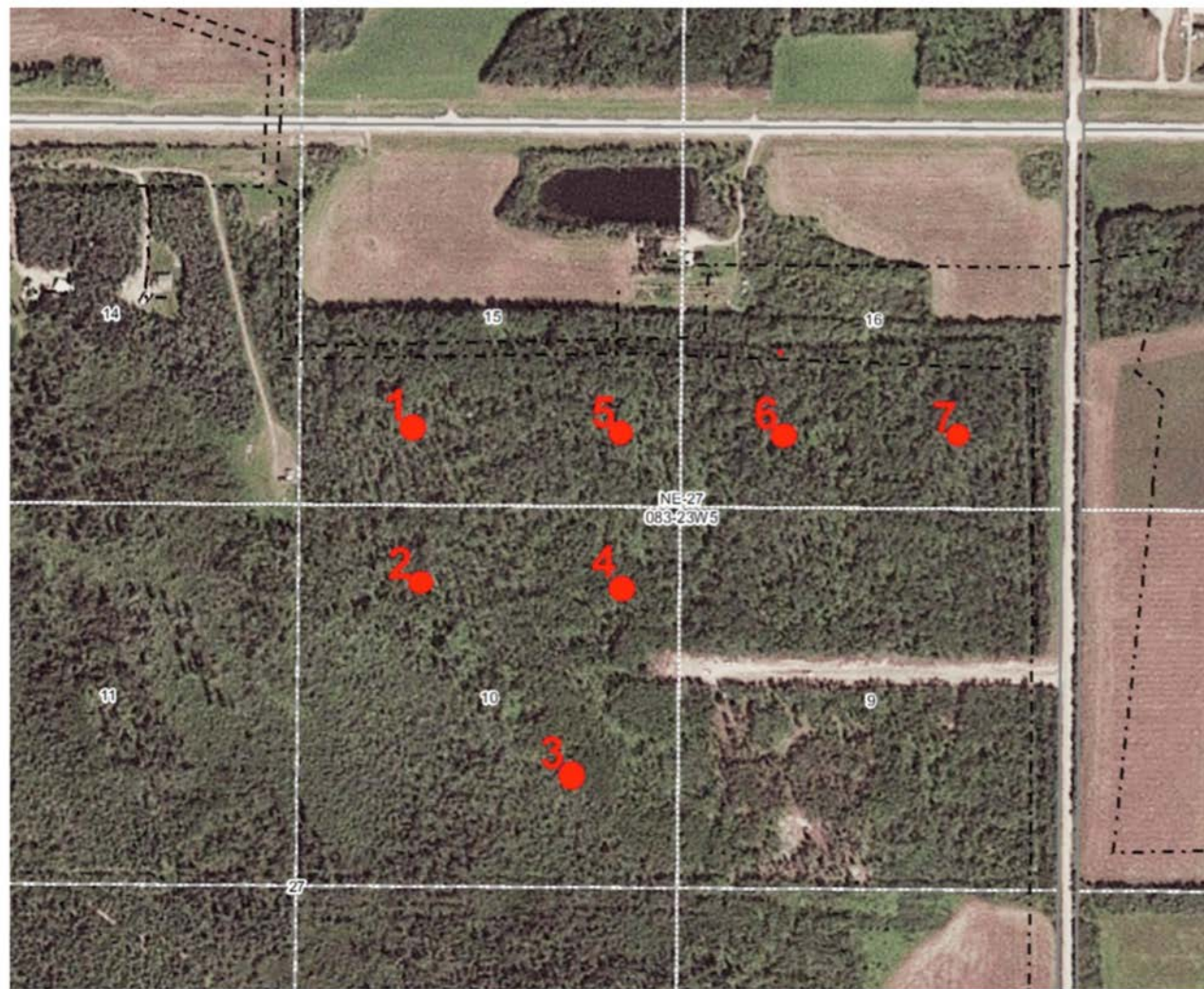


Photo 14: Photograph of soil pit in center of the Property (Lot 7).

APPENDIX C

SOIL AND VEGETATION PLOT MAP





Notes:

- Airphoto, Abadata Maps 2017
- Soil and Vegetation Plot locations are approximate



**Appendix C: Soil and
Vegetation Plots**

**Soil and Vegetation Plot
Locations
NE-27-83-23, W5M**

**Project No.
B-241-16**