APPENDIX D TFO ENVIRONMENTAL AND LAND USE EFFECTS

Attachment 1: Option 1 and Option 2 prepared by AltaLink Management Ltd.

NID7 (9) Report

Land Impact Assessment for the Central East Transfer-Out Project

Presented to the Alberta Electric System Operator (AESO) in Support of the AESO Central East Transfer-Out NID

May 3, 2018

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EXECUTIVE SUMMARY

AltaLink has been advised that the Alberta Electric System Operator (AESO) is contemplating transmission reinforcements to ensure sufficient transfer out system capacity from areas with high renewable generation potential in the Central East region (the Project). These potential reinforcements would occur in both AltaLink's and ATCO Electric's service territories. The AESO has directed AltaLink to complete a Land Impact Assessment (LIA) addressing the requirements of NID7(9) of the Alberta Utilities Commission's (AUC's) Rule 007: *Applications for Power Plants, Substations, Transmission Lines, and Industrial Systems* (AUC Rule 007). AltaLink, in collaboration with ATCO Electric, identified study area boundaries for the purposes of carrying out this evaluation. This LIA addresses components of the AESO's technical solutions (Options) within AltaLink's service territory.

In the Central East Transfer-Out Land Impact Assessment Specification, Project Number 7001, March 30, 2018 (the Specification), The AESO directed AltaLink to consider the following three options for the Project:

- Option 1: Construction of a new 240 kV transmission line between the existing ATCO Electric Tinchebray A972S and AltaLink Gaetz 87S Substations;
- Option 2: Construction of a new 240 kV transmission line between the existing ATCO Electric Tinchebray A972S and AltaLink Wolf Creek 288S Substations; and
- Option 3: Construction of a new 240 kV transmission line between the existing Tinchebray A972S Substation and a point between Wolf Creek 288S and Gaetz 87S Substations. AESO advised that Option 3 is only to be considered if Options 1 and 2 were deemed unfeasible.

Additionally, the AESO has directed that AltaLink assess the feasibility of a second 240 kV transmission line that will be constructed in the longer term time horizon as part of the three Options above.

Options 1 and 2 were determined to be feasible. As such, Option 3 has not been considered as part of this LIA.

The LIA study area is illustrated in Figure 1-1 below.

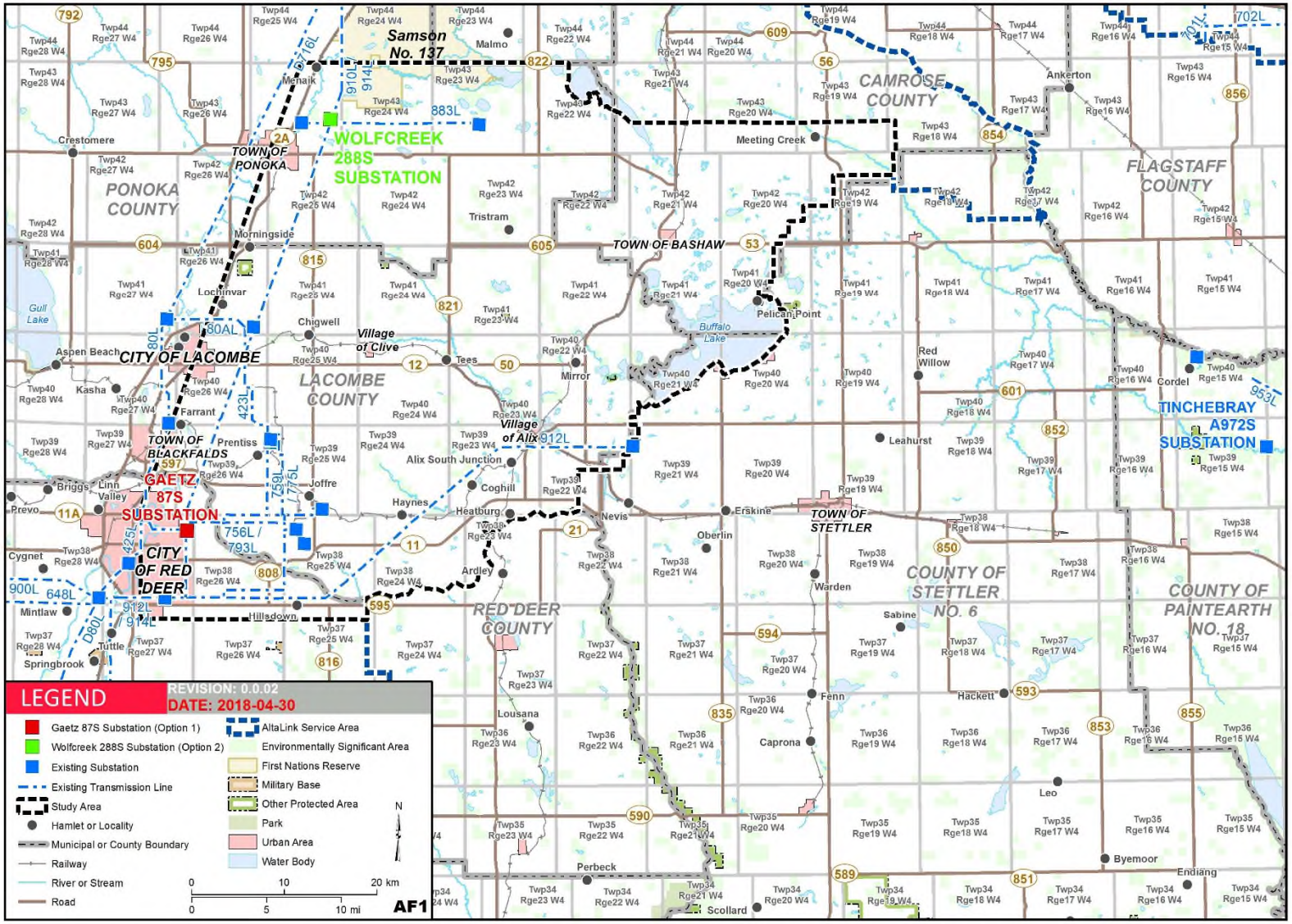
The Project area is located in central Alberta in the area east of the Highway 2 corridor. AltaLink established a study area for the purposes of considering impacts associated with the above Options. The lands within the study area are comprised mostly of cultivated lands with patches of aspen and prairie vegetation. Land ownership in the study area is primarily private, with isolated parcels of Crown land. The study area has a relatively high number of residences, with residential density being somewhat higher near urban areas, and in the vicinity of Highway 2. Buffalo Lake is located in the eastern portion of the study area and is important both as a residential and recreation area, as well as for its wildlife habitat.

AltaLink has not identified any constraining features that would preclude the development of either Option 1 or 2. Option 1 and 2 differ in the types of impacts expected. Transmission line routing associated with Option 1 would require a crossing of the Red Deer River, which would likely limit the available routes into Gaetz 87S Substation. The area south of Gaetz 87S Substation has several residential areas. Gaetz 87S Substation is also located in an area identified as a future growth area for the City of Red Deer; as such, there is some uncertainty around the impact of a second, future 240 kV transmission line into Gaetz 87S Substation. Routing associated with Option 1 is anticipated to be shorter, within AltaLink's service territory.

Transmission line routing associated with Option 2 would either bypass Buffalo Lake to the north or to the south. Routing to the north would be shorter than to the south, but would cross an area with a number of small lakes and wetlands. Routing around the south side of Buffalo Lake is anticipated to have higher residential impacts. Option 2 would terminate at Wolf Creek 288S, which has fewer high level siting constraints than Gaetz 87S, although it still has a relatively high number of residences in proximity to it as it is adjacent to the Town of Ponoka.

The AESO's LIA Specification does not indicate the type of structure the project would utilize. Due to the uncertainty at this time, this LIA conservatively contemplates that two single circuit 240 kV transmission lines would ultimately be required. However, if a double circuit structure were used, with one side strung initially it would provide lower combined impacts in the longer term, including visual, environmental and agricultural impacts compared with two single circuit 240 kV structures. This determination is based solely on a land impact perspective and does not take into account the difference in costs that might exist between the two structure configurations.

Figure 1-1: Central East Transfer-Out LIA Study Area



INTRODUCTION

The AESO is responsible for the safe, reliable, and economic planning and operation of the transmission system within the province of Alberta. AltaLink has been advised that the AESO is considering a new transmission line between the Tinchebray A972S Substation (located in ATCO Electric's service territory) and either the Gaetz 87S or Wolf Creek 288S Substation, called the Central East Transfer-Out (CETO) Project. The AESO has directed AltaLink to prepare a report comparing the feasibility and potential impact of a new transmission line terminating at either Gaetz 87S or Wolf Creek 288S Substation.

Scope

The AESO's CETO project (as outlined in the Land Impact Assessment Specification dated March 30, 2018) has identified three electrical Options that would meet the need for transfer out system capability to accommodate renewable electricity generation.

Option 1: A New 240 kV Transmission Line from Tinchebray A972S Substation to Gaetz 87S Substation

Option 1 includes:

- Construction of a 240 kV transmission line between the Tinchebray A972S and the Gaetz 87S substations;
- Consideration of a second 240 kV transmission line between the above substations to be constructed over the long term.

Option 2: A New 240 kV Transmission Line from Tinchebray A972S Substation to Wolf Creek 288S Substation

Option 2 includes:

- Construction of a 240 kV line between the Tinchebray A972S and the Wolf Creek 288S substations;
- Consideration of a second 240 kV transmission line between the above substations to be constructed over the long term.

Option 3: A 240 kV transmission Line from Tinchebray A972S Substation to a point between Wolf Creek 288S and Gaetz 87S Substations

- Construction of a 240 kV line between the Tinchebray A972S and a suitable point between the Wolf Creek 288S and Gaetz 87S substations.
- Consideration of a second 240 kV transmission line between Tinchebray A972S Substation and the above identified point to be constructed over the long term.

The AESO directed AltaLink to only consider Option 3 in the event that Options 1 and 2 were found to be not feasible. As both Options 1 and 2 are feasible, AltaLink has not included any analysis of Option 3 in this LIA.

STUDY AREA

AltaLink identified a study area for the purposes of evaluating environmental and land use effects of the potential transmission developments being considered by the AESO. It formed the spatial basis for the assessment of the features identified in NID7 (9) of the AUC's Rule 007. In establishing a study area,

AltaLink identified an area large enough to identify low impact routes to meet the technical solutions identified by the AESO.

The northern boundary of the study area is set on a township boundary located approximately 6 km north of the Wolf Creek 288S Substation. The study area boundary follows the township boundary east to Red Deer Lake. At Red Deer Lake, the study area is located on the southwest edge of the Lake. The presence of Red Deer Lake presents a natural northern boundary for the study area; given that the Tinchebray A972S Substation is located generally south and east of Wolf Creek, pursuing route options north of Red Deer Lake would be expected to increase the length of transmission line needed, without a reduction in impacts to justify the additional line length.

The east boundary of AltaLink's study area is set on the service territory boundary with ATCO. East of the service territory boundary, ATCO completed its own evaluation of transmission line route options and associated impacts.

The southern boundary of the study area is set on a blind line approximately 1.6 km south of Highway 595. Setting the boundary in this location includes both the Highway and the existing 240 kV transmission line 912L within the study area. Highway 595 and the existing 240 kV transmission line 912L are existing linear disturbances that run east-west within the study area and would provide paralleling opportunities for a new transmission line. The south boundary of the study area is located approximately 9.5 km south of the existing Gaetz 87S Substation; given that Gaetz 87S Substation is the south most connection point for the new transmission line options being considered, transmission line route options farther south would be expected to increase the length of transmission line needed, without a reduction in impacts to justify the additional line length.

The western boundary is set approximately 5 km west of the Wolf Creek 288S and Gaetz 87S Substations. The 914L/1083 transmission line runs between the two substations and as such the study area is roughly 5 km west of this existing line. Given that the Wolf Creek 288S and Gaetz 87S Substations are the western end points of the new transmission line options, transmission line routes west of the boundary would be expected to increase the length of transmission line needed, without a reduction in impacts to justify the additional line length.

Please see map SAM1 in Appendix A. SAM1 is a base map that illustrates features within the study area.

ASSESSMENT OF ALTERNATIVES

This section will discuss the characteristics of the study area and associated potential impacts of the two Options. AltaLink examined the study area based on the information identified in the AUC's Rule 007, NID7 (9).

Routing Assumptions

AltaLink's Gaetz 87S Substation is located west and slightly south of ATCO's Tinchebray A972S Substation. As such, AltaLink assumed transmission line routing for Option 1 would proceed generally east, and connect to ATCO's alignment at the service territory boundary somewhere south of Buffalo Lake. Because AltaLink's Wolf Creek 288S Substation is located west of Tinchebray A972S Substation, but also farther north, a transmission line from Wolf Creek 288S to Tinchebray A972S Substation could be routed north or south of Buffalo Lake. As such, AltaLink's analysis of Option 2 contemplates both scenarios.

Based on the end points for each Option, AltaLink determined a range of conceptual route lengths. Routes from Gaetz 87S Substation to the service territory boundary are anticipated to be approximately 50-60 km, while routes from Wolf Creek 288S Substation to the service territory boundary are anticipated to be approximately 60-70 km. AltaLink's transmission line routes for Option 1 are anticipated to be shorter than for Option 2; however, consideration of the overall line lengths would include the portion of new line located within ATCO's service territory. It may be that route options for Option 2 are shorter overall, taking into account both AltaLink and ATCO's transmission line routing.

Transmission line routes for Option 2 north of Buffalo Lake are anticipated to be shorter than routes south of Buffalo Lake.

The assessment of the two Options in this LIA is based on the information available at a desktop level. Additional field verification and consultation with landowners and agencies during the preparation of a facility application with the AUC would provide additional information about the Project area that would influence route development.

Regardless of the Option selected by the AESO for further consideration, preliminary route development for the selected Option would be completed prior to moving forward with further public consultation. While it is anticipated that a number of impacts can be avoided during route selection for both of the Options, building new transmission lines requires a balancing of impacts. As part of its staged route development process, AltaLink endeavors to identify progressively lower impact routes. Any discussion of avoidance referenced in this LIA assumes that avoidance does not result in a higher impact alternative. Avoidance of features would be in consideration of the overall impacts of a route. AltaLink first attempts to avoid impacts, but failing that would mitigate, and then compensate for impacts.

Single Circuit vs Double Circuit

The LIA Specifications identifies that in the case of both Options 1 and 2, a single 240 kV transmission line would be required, with a second 240 kV transmission line required over a longer term horizon. The LIA Specification does not indicate the type of structure the project would utilize. As such this LIA conservatively contemplates two single circuit 240 kV transmission lines would ultimately be required, given the longer term timeline for the second circuit.

If a double circuit structure were used, with one side strung initially, it may provide lower combined impacts, including visual, environmental and agricultural impacts compared with two single circuit 240

kV structures. When the second circuit is needed, both circuits would be located on the same structure and therefore the impacts from the circuits would be consolidated. Using double circuit structures would also be expected to reduce impacts associated with construction as a full mobilization would not be required to install the second circuit.

This LIA assumes that in the case of either single circuit or double circuit structures, the transmission line(s) would be located on property as opposed to road allowance. Typically, 240 kV structures are located along quarter lines or offset from other linear infrastructure as the structures are too large to be located within a highway or municipal road allowance. Following quarter lines or other land use breaks can reduce agricultural impacts as the structure footings would primarily be located on the headlands where cultivation does not occur. In the event that AltaLink were to use a structure that could fit in road allowance, it would allow for additional routing options that may mitigate impacts.

Overall, AltaLink does not anticipate that the use of single circuit structures or double circuit structures would favour one Option over the other from a land impact perspective.

Comparison of Options

This LIA groups the features and characteristics identified in NID7 (9) into four categories: Land Ownership; Land Uses; Environmental Features; and Provincial Land Use Plans. The environmental and land use effects relating to the transmission facilities considered in this LIA are described in the sections below. AltaLink considered the information specifically listed in NID7 (9), as well as other data sources pertinent to the potential for environmental and land use effects. A list of data and information sources can be found in **Appendix B**

Land Ownership

Private and Public Lands
The study area is located in the White (developed) Area of the Province of Alberta, and as such, is composed mainly of private lands, although there are some Crown lands throughout the study area.

With the exception of certain areas, the use of public land is generally viewed by landowners as a preferable location for transmission development as opposed to using private lands. Locating new facilities on Crown lands will require acquisition of a disposition from Alberta Environment and Parks (AEP). However, given the distribution of Crown lands throughout the study area, it is unlikely that either of the Options will be able to utilize Crown lands for a significant portion of the transmission line length.

Federal Lands
There are no federal lands located within the study area.

First Nations Reserves and Métis Settlements
Portions of the Samson Indian Reserve (IR) #137 and Montana IR #139 are located within the study area, northeast of the Wolf Creek 288S Substation. Any routes within the First Nations IRs would require federal government and Band Council approval. IR lands represent a finite land base that cannot be easily replaced with other lands. There is no provincial process for AltaLink to gain a right-of-entry order under surface rights legislation if it is not able to obtain an agreement with the First Nation. This is an access issue for the initial construction of a transmission facility and any future expansion or modification to it.

The boundary of the Montana IR# 139 is located approximately 2.5 km northeast of the Wolf Creek 288S Substation. There is a residential area in the southeast portion of the IR, and the number of residences in the southern portion of the IR is generally greater than on the fee simple lands south of the IR. Because of this higher density of residences and the unique processes associated with IR lands, the Montana IR #139 likely represents a higher impact location for a new transmission line compared with fee simple lands to the south.

Transportation/Utility Corridors

There are no Transportation/Utility Corridors (as identified in the Restricted Development Area Regulations) within the study area.

Land Uses

Land uses are numerous and diverse throughout the study area as discussed below.

Agriculture

Locating transmission lines on agricultural lands can result in a number of potential impacts, both during construction and throughout operation of the transmission line. These potential impacts include inconvenience and crop loss associated with construction activities, reduced efficiency of field operations, limitations on the use of irrigation systems and aerial spraying, restrictions on equipment sizes and the loss of shelterbelts. These types of impacts can typically be avoided, reduced and mitigated during the siting and design of new transmission facilities. Additionally, compensation for impacts (in the form of payment for rights-of-way and annual structure payments for example) can offset the impacts of transmission facilities.

Lands within the study area are primarily agricultural (crop or forage lands). Crop lands are found throughout the study area but are more predominant in the western portion of the study area. To the north and east, there is a greater proportion of grasslands, forage lands and treed areas. This is also true of the area south of Highway 11, in the southern portion of the study area. Lands in the study area are heavily utilized for agriculture. As such, cultivated lands will likely be encountered wherever new transmission facilities are located.

In areas where cultivation does not occur, these lands are predominantly used for foraging activities. Typically, transmission lines have limited impacts to these types of operations as grazing animals can move freely across the right-of-way and around structures.

While both Options have the potential for agricultural impacts, the southern portion of the study area has more cultivated land and, as such, Option 1 would be anticipated to have greater potential agricultural impacts.

Residential

New transmission facilities have the potential to create impacts on residential properties. These impacts can be both physical impacts to residential properties and visual (aesthetic) impacts. Direct physical impacts to residential properties include loss of developable area, relocation of outbuildings or residences, and impacts to landscaping or tree screening. Visual or aesthetic impacts can include removal of trees within the sightlines of residential properties and the presence of the line on the landscape; visual impacts are subjective and vary between stakeholders.

There are a number of urban communities including the Cities of Red Deer and Lacombe, the Towns of Ponoka, Bashaw and Blackfalds, and the Villages of Alix and Clive. There are also several hamlets and country residential areas throughout the study area. While there are residences throughout the study

area outside of the urban areas, urban areas (and urban fringe areas) represent the areas with the greatest density of residences. As such, urban areas are used as a general indication of the potential residential impact associated with the proposed alternatives during the LIA stage. Development also tends to happen more often in proximity to existing developed areas like towns or villages. Siting new transmission facilities away from existing residential density may help reduce residential impacts and avoid conflicts with planned and future development.

Residential density is higher in the vicinity of the Highway 2 corridor, where the majority of the urban areas are located. Additionally, the southern half of the study area has more residences, primarily in the vicinity of the Village of Alix, around Buffalo Lake, and near the City of Red Deer. In the north half of the study area, residential density is highest in and around the Towns of Bashaw and Ponoka.

Residential density is lowest in the center of the study area north of Highway 50, and in the area north of Buffalo Lake and east of the Town of Bashaw. Lower residential density north of Buffalo Lake is likely partly due to kettle and knob topography and the presence of numerous small lakes. Routing from Tinchebray A972S Substation to Wolf Creek 288S Substation would potentially pass through these areas of lower residential density. By contrast there are more residences in the vicinity of Gaetz 87S Substation and in the vicinity of the Village of Alix and transmission line routes for Option 1 would be more likely to pass through these areas.

Both Options 1 and Option 2 would likely have similar numbers of residences in proximity to a new transmission line, although Option 1 is anticipated to be shorter.

Industrial

There are oil and gas facilities distributed fairly evenly throughout the study area. The Nova Chemical Plant at Joffre is a hub for pipelines and is located within the study area approximately 10 km east of the City of Red Deer. Transmission facilities can have an impact on existing oil and gas infrastructure (for example AC interference that needs to be mitigated). Paralleling or sharing oil and gas infrastructure (such as access roads) can also be beneficial from a land-impact perspective.

There are several aggregate operations in the study area. These operations are primarily located in the vicinity of the Red Deer River and would more likely be a consideration for transmission line routes associated with Option 1.

Existing Linear Corridors/Transmission Lines

Paralleling existing linear disturbances can reduce potential impacts associated with new transmission lines, particularly in terms of impact to existing land uses like agricultural operations, and on environmental features like native grasslands. For example, farming around a second set of transmission structures is an incremental impact when compared with altering patterns of farming from a completely unencumbered state. Paralleling existing linear disturbances can also reduce the fragmentation of the landscape.

The end points for both options identified by the AESO within AltaLink territory are generally west of the Tinchebray A972S Substation. As such, AltaLink would expect route options to generally run east within the study area (though some north-south routing would be required).

There are several highways within the study area, including Highways 11, 12, 53, 505 and 605 which run generally east-west between the Highway 2 corridor and ATCO's service territory. Highways create a corridor through areas that could be paralleled to reduce fragmentation. Typically, highway rights-of-way can be utilized by utilities such as transmission and distribution lines and fibre optics to locate

facilities within. However, typically transmission lines at 240kV or higher cannot fit within road allowance as the structures are too large and are therefore sited adjacent to the highway rights-of-way. Alberta Transportation typically requests setback from highways ranging from approximately 30-110m depending on potential future highway expansions plans. As a result, this typically places transmission lines 240 kV and higher in mid-field positions, increasing the potential agricultural impacts.

There are three main east-west transmission lines within the study area that represent opportunities to parallel:

- The existing 240 kV transmission line 912L runs the south side of the City of Red Deer to the existing Nevis A766S Substation, located just inside ATCO service territory south of Buffalo Lake.
- The existing 138 kV transmission line 883L runs east from a connection point near Wolf Creek 288S for approximately 17 km to the Nelson Lake Substation. The existing 883L is a 138 kV transmission line and is located in road allowance, which places some spatial constraints on the ability to parallel it with a second transmission line.
- The existing double circuit 138 kV transmission line 756L/793L which runs from Gaetz 87S approximately 10 km east to the existing Joffre 533S Substation. This line runs in parallel with the existing 138 kV transmission line 756L for a portion of that length.

Within the study area, there are areas where residences or other structures have been built adjacent to the existing transmission lines; paralleling these lines may still represent low impact routing, but deflecting away from parallel or crossing the existing line may be required.

There are a number of other transmission lines in the study area that either predominantly run north-south, or east-west for a short distance. These are mainly concentrated near the Highway 2 corridor between the City of Red Deer and Ponoka.

There are more existing transmission lines located in the southern half of the study area which could potentially be paralleled by new transmission lines, which favors Option 1.

There are two rail lines that run generally east-west within the study area. One such line runs from the City of Lacombe to the Village of Alix. The second rail line runs from the area north of the City of Red Deer to the Village of Alix. There are also several spurs and lines running north south within the study area. Opportunities to parallel the rail line offer similar benefits with regards to fragmentation as well as potential to co-locate features which are typically viewed as industrial in nature.

As with pipelines, transmission lines located parallel to rail lines create induction and conduction interference effects. Interference from transmission lines on railway tracks can potentially cause voltage levels to occur on the rails that exceed personnel safety limits, disrupt communication signaling causing unsafe rail operations, and equipment damage. As a result of these effects, opportunities to parallel the railway for significant length may be limited.

Given the location of rail lines within the study area, and the extent of oil and gas development, both Options are expected to have similar levels of interactions with these facilities.

Other Land Uses

Airports and Aerodromes

Aviation activity associated with airports and aerodromes can be impacted by the presence of a transmission line. There are two registered aerodromes located within the study area: the Bashaw Airport; and the Ponoka Industrial Labrie Field. The Bashaw Airport is an aerodrome located

approximately 2 km south of, and operated by, the Town of Bashaw. The Bashaw Airport does not have specific zoning protections, however, the Camrose County Land Use Bylaw has increased development restrictions within 1,000 m of airports generally. The Bashaw Airport is located north of Buffalo Lake and, as such, would be a relevant consideration in identifying transmission line routes for Option 2.

The Ponoka Industrial (Labrie Field) aerodrome is located immediately south of, and is operated by, the Town of Ponoka. The area around the Ponoka Industrial (Labrie Field) aerodrome is identified within the Ponoka County Land Use Bylaw as a specific district within which there are restrictions on certain types of development. As the Ponoka Industrial (Labrie Field) aerodrome is located at the western boundary of the study area, approximately 8 km southwest of the Wolf Creek 288S Substation, it will likely not impact potential transmission line routes for either Option 1 or 2.

Environmental Features

The study area is located within the Parkland Natural Region (PNS) and Central Parkland Natural Subregion (CPNS) of Alberta. The CPNS landscape is composed mostly of cultivated lands with patches of aspen and prairie vegetation. The dominant landforms in the CPNS are undulating plains and hummocky uplands. The CPNS experiences adequate rainfall and has rich soils making it productive for agriculture.

Waterbodies and Wetlands

There are a number of large wetlands and waterbodies throughout the study area. There are often technical constraints associated with spanning large waterbodies and wetlands (those over 4 ha in area), and locating structures within waterbodies can create environmental impacts. Buffalo Lake is the largest waterbody in the area and used for recreational purposes. There can be visual impacts associated with transmission lines near large lakes with recreational value.

Wetlands and waterbodies can also function as bird habitat, and the presence of transmission lines may increase the risk of bird collisions. Wetlands and waterbodies are located throughout the study area, however, there is a concentration of these features in the area north of Buffalo Lake. The terrain in this area is hummocky, with small waterbodies located in the depressions between hummocks.

Buffalo Lake and Red Deer Lake create a pinch point in the north part of the study area. Transmission line routes for Option 2 north of Buffalo Lake would pass through this pinch point. There will be limited route options through the pinch point, which may result in higher local impacts.

Given the concentration of small lakes in the area north of Buffalo Lake, the number of wetlands and waterbodies in the vicinity of routes north of Buffalo Lake (i.e., those associated with Option 2) is anticipated to be significantly higher when compared to routes south of Buffalo Lake. If routes associated with Option 2 were located south of Buffalo Lake, AltaLink anticipates that these impacts would be reduced, although there would likely be other offsetting impacts.

The Red Deer River is the only major river within the study area. The Red Deer River is located in the southern portion of the study area and forms a portion of the service territory boundary between ATCO and AltaLink. The Red Deer River Valley has steep slopes in some locations, and there are protected areas along the river in several locations. Identifying a suitable crossing location will be a relevant consideration in route development. Potential routes between Gaetz 87S and Tinchebray A972S Substations will require a crossing of the Red Deer River.

Both Options 1 and 2 would require crossings of other smaller watercourses. All major rivers and waterbodies can be viewed in map SAM1 in **Appendix A**.

Native Prairie

The term "Native Prairie" refers to undisturbed, naturally occurring grassland ecosystems. Given the level of cultivation and development in Alberta, these native prairie areas are a finite land base.

Grassland areas that may include some native prairie are primarily concentrated in the area around Buffalo Lake, the Red Deer River and in the centre of the study area southeast of the Magee Lake. As this area of the province is extensively cultivated, areas of native prairie within the study area are anticipated to be limited and not favour either Option 1 or 2.

Wildlife Sensitivity Areas

There are several key wildlife areas as identified by Alberta Environment and Parks (AEP) that fall within the study area. There are several Colonial Nesting Bird sites within the study area. These are American White Pelican and Great Blue Heron sites associated with Buffalo Lake, Great Blue Heron sites in the central part of the study area, and in Lacombe County south of the Chain Lakes. Additionally, Red Deer Lake and Buffalo Lake Area are piping plover waterbodies.

AEP's Sensitive Raptor Range covers the majority of the study area, with the exception of the area northeast of Buffalo Lake. Most of the study area (except the easternmost portion) is covered by Bald Eagle Range. As such, transmission lines from either of Gaetz 87S or Wolf Creek 288S Substation to Tinchebray A972S Substation would pass through this range, and for similar lengths. The southern portion of the study area is covered by Prairie Falcon range and Option 1 would likely have some length of transmission line in this area.

The entire study area is covered by AEP's Sharp-tailed Grouse Range layer. Sharp-tailed Grouse require open spaces for displaying and areas of grass and low shrubs for nesting. AEP's Sharp-tailed Grouse Range data set was developed for the purpose of informing industry about where surveys should occur.

Protected Areas

Historic Resources

Historical Resource Sites are categorized and protected by Alberta Culture and Tourism. Sites that are designated historic resource value (HRV) "1" and "2" are viewed as the most sensitive and valuable. Areas with an HRV value of 1 are sites that have been designated as "Provincial Historic Resources", and areas with an HRV rank of 2 contain "Municipal or Registered Historic Resources" as identified under the *Historical Resources Act* (HRA). HRV values of 3-5 indicate the presence (or believed presence) of a historical resource that may or may not require avoidance.

There are four areas designated as HRV 1 in the study area. One of these sites is located along Meeting Creek in the northern portion of the study area approximately 18 km east of Red Deer Lake. Two other HRV1 sites are located in the Towns of Bashaw and Ponoka. The fourth site is located immediately south of the town of Ponoka.

There are three parcels with an HRV 2 notation in the study area, two within the City of Red Deer and one in the Hamlet of Mirror.

There are a number of HRV 3-5 throughout the study area. Many of these are located in close proximity to the rivers and waterbodies within the area.

Transmission line routes for Option 1 will likely cross more parcels with HRV notations than route for Option 2 as a result of having to cross the Red Deer River which has notations along it. The majority of these notations are HRV 4 & 5 which are the lowest level of protection for lands listed in the HRA.

Natural Areas/Heritage Rangelands
There are four Natural Areas within the study area: Gadsby Lake, Heatburg, J.J. Collett and Magee Lake.

Gadsby Lake Natural Area is a 64 hectare natural area north of Highway 50 in the centre of the study area. Heatburg is a 32 hectare Natural Area located on the north side of the Red Deer River southeast of the Village of Alix. J.J. Collett Natural Area is 257 hectares and is located northeast of the City of Lacombe. Magee Lake Natural Area is 64 hectares in size and is located in the central part of the study area west of Magee Lake.

There are no Heritage Rangelands within the study area.

Ecological Reserves
There are no Ecological Reserves identified within the study area.

Provincial Recreation Areas
There is one Provincial Recreation Area identified within the study area. The Narrows Provincial Recreation Area is a 23 ha recreation area northeast of the Village of Alix at the eastern tip of Buffalo Lake, and provides camping and day use facilities.

Provincial Parks, Wildland Parks and Wilderness Areas
There are no Provincial Parks, Wildland Parks or Wilderness Areas within the study area.

Environmentally Significant Areas (ESAs)
ESAs as defined by AEP are areas important to maintenance of biodiversity and include, for example, unique landforms and species, wildlife habitat, and large blocks of native grassland. ESAs are identified by quarter section, and the actual level of importance may vary within each quarter section, and between ESAs. ESAs are a useful planning tool, but need to be considered on a site specific basis and in combination with other information sources. Depending on the circumstances, the features on the landscape that merit an ESA may not be impacted by new transmission facilities.

ESAs are distributed throughout the study area, but are denser around the perimeter of Buffalo Lake and along the Red Deer River.

Routes associated with Option 2 are anticipated to cross slightly more ESAs than those associated with Option 1.

Federally Protected Areas
The Red Deer Migratory Bird Sanctuary (RDMBS) is located within the City of Red Deer. The RDMBS is centred on two oxbow lakes formed by an abandoned channel of the Red Deer River. Several species use this area. Migratory Bird Sanctuaries are established for the protection and conservation of migratory birds.

Due to the limited extent of provincial Natural Areas, Recreation Areas and Federally Protected Areas, it is likely that these features can be avoided by routes associated with either Option.

Visual Impacts

AltaLink recognizes the potential for visual impacts when planning transmission facilities. The determination of what may constitute a visual impact can be subjective and perspectives may vary between stakeholders as a result. AltaLink attempts to minimize visual impacts by attempting to avoid residences within 150 m of greenfield routes as visual impacts tend to decrease with distance from new

transmission lines. As such, AltaLink anticipates potential visual impacts to be greater near urban areas, or areas with a greater number of residences.

AltaLink can also reduce the potential for visual impacts by paralleling existing infrastructure like other transmission lines. By building parallel to existing infrastructure, the visual impacts are consolidated in an area where they already exist and where the impact of a new line is incremental.

Given the presence of a Provincial Recreation Area and more generally the use of Buffalo Lake recreationally by the public, AltaLink anticipates that siting new transmission lines in the vicinity of Buffalo Lake would result in greater visual impacts.

AltaLink also anticipates greater potential visual impacts associated with crossing or locating a new transmission line near the Red Deer River. Because of the topographic relief associated with the river valley, the area around the Red Deer River has scenic value.

Both Options being considered within this LIA have the potential to increase visual impacts due to presence of residences throughout the study area. However, given the lower residential density and the lack of a crossing of the Red Deer River, visual impacts are anticipated to be lower for Option 2.

Provincial Land Use Plans

The study area is located in both the Red Deer Regional Plan (RDRP) and North Saskatchewan Regional Plan (NSRP) area. The regional plan for the North Saskatchewan region has not been finalized, however terms of reference for development of the plan, and the first phase of public consultation have been completed, and the second phase of consultation is ongoing. The Red Deer regional plan has not been started. As neither the NSRP nor the RDRP are in effect, consideration of Provincial Regional Plans does not favour either Option 1 or Option 2.

Municipal Land Use Plans

AltaLink's study area covers parts of four counties: Red Deer; Lacombe; Ponoka; and Camrose. These municipalities have Municipal Development Plans (MDPs) and Land Use Bylaws (LUBs). These documents were reviewed to identify potential conflicts between the electrical solutions identified by the AESO and Municipal Plans. Additionally, a number of urban municipalities are located within the study area including the Cities of Red Deer and Lacombe, Towns of Ponoka and Bashaw and several villages. Where these municipalities have an Intermunicipal Development Plan (IDP) with an adjacent municipality those documents were reviewed as well.

Regardless of which Option is selected by the AESO, consultation with the applicable municipalities would be important to identify potential impacts and areas of concern associated with transmission line routes.

Red Deer County

The existing Gaetz 87S Substation is located within Red Deer County, and as such any new transmission line between Tinchebray A972S and Gaetz 87S would be partially located within Red Deer County. There are no area structure plans (ASP) identified in the MDP within the study area. The existing Gaetz 87S Substation falls within the area subject to the IDP between the City of Red Deer and Red Deer County.

The IDP between the City of Red Deer and Red Deer County identifies the area where Gaetz 87S Substation is located as a future growth area of the City of Red Deer. The area is currently agricultural land and the IDP states one if its long-range planning objectives as "To maintain The City's Growth Area in a relatively undeveloped state until it is annexed, in order to allow orderly urbanization to proceed."

As such, until such a time as the growth area is annexed, it is likely that land uses in the immediate vicinity of Gaetz 87S Substation will remain primarily agricultural.

While the area around the Gaetz 87S Substation is still agricultural, with the date of installation of the future second circuit in the longer term, there is the potential that by the time of installation of the second circuit, there is development in proximity to the substation. This results in some uncertainty around the impact of a future second circuit associated with Option 1.

The Red Deer County MDP also identifies a number of gravel and sand deposits and existing extraction areas, some of which are within the study area. Two gravel or sand pits are located north of, and one east of, the Gaetz 87S Substation along the Red Deer River. Aggregate operations (gravel pits, oil sands operations) involve the ongoing excavation of soils, which presents a transmission facilities siting constraint due to the cost of any future relocation of facilities. These aggregate areas would be considered in identifying transmission line routes for Option 1.

Lacombe County

Lacombe County is the largest municipal area covered by the study area, extending west from Buffalo Lake to the study area boundary. A transmission line between Tinchebray A972S and Gaetz 87S Substations would have a portion of its length located in Lacombe County. A transmission line between the Tinchebray A972S and Wolf Creek 288S Substations may also have a portion of its length located in Lacombe County.

The MDP for Lacombe County has identified a framework for future land use growth in a number of areas. The MDP has identified the area between Highway 11 and the Red Deer River as having the potential for future multi-lot residential. An existing Outline Plan and the Land Use Bylaw further identify some areas specific areas south of Highway 11 for residential development. This would be a consideration for routes associated with Option 1.

Similarly, the MDP identifies the area around Buffalo Lake as an area of residential growth. The MDP also identifies the Hamlet of Mirror (west of Buffalo Lake) as an area where they will encourage further residential growth. The Hamlet of Mirror represents a high density residential area that would be a constraint on transmission line routes for Option 2.

Portions of the City of Lacombe and Town of Blackfalds are located within the study area. These municipalities have IDPs with Lacombe County. The IDP between Lacombe County and the City of Lacombe identifies the area southeast of the City as a future urban growth area. The IDP between the County of Lacombe and Town of Blackfalds identifies the area immediately north of the Town as a long term growth area. These two municipalities are located between the Gaetz 87S and Wolf Creek 288S Substations and, as such, are likely avoidable by transmission line routes for both Options.

The County of Lacombe also has IDPs with the Villages of Clive and Alix. The Village of Clive IDP identifies two quarter sections immediately south of the Village as an area for future residential growth and one quarter section immediately east of the Village as an area for residential growth and recreation.

The Village of Alix is located approximately 10 km southwest of Buffalo Lake and 7 km north of the Red Deer River, in the eastern part of the study area. Lacombe County's IDP with the Village of Alix identifies the quarter sections west and northeast of the Village as areas of future residential growth. It also identifies areas north and east of the Village (in the vicinity of Haunted Lakes) as areas for future development of outdoor recreation facilities. The IDP also identifies the area southeast of the Village as an area where future industrial development should occur. Transmission line routes south of Buffalo

Lake may be located in the vicinity of the Village of Alix and, as such, the growth areas identified in the IDP would warrant consideration in the development of routes.

The Joffre Chemical Plant is located in Lacombe County approximately 10 km east of the Gaetz 87S Substation. The MDP identifies the area around the Joffre Chemical Plant for future industrial growth. The Joffre Chemical Plant represents an existing facility that AltaLink would avoid during identification of transmission line routes for Option 1.

Ponoka County

The Ponoka County MDP identifies maintaining agricultural land within the County as a priority. No area structure plans or area redevelopment plans were identified in the portion of Ponoka County within the study area. Land use zoning in this area is primarily agricultural, with more country residential designations in the vicinity of the Town of Ponoka. The Wolf Creek 288S Substation is located in Ponoka County and, as such, transmission line routes associated with Option 2 would be located partly within the County.

The County of Ponoka and Town of Ponoka have an Intermunicipal Development Agreement (IDA). This differs from an IDP as it is a voluntary agreement intended to guide land uses in the vicinity of the Town of Ponoka, so as to ease the transition from rural to urban land uses and not impede future growth of the Town. The existing Wolf Creek 288S Substation falls outside the area covered by the IDA, and likely far enough east that this area would not be a factor in transmission line routes associated with Option 2.

Camrose County

Camrose County is located in the north portion of the study area. A transmission line between Tinchebray A972S and Wolf Creek 288S Substations would be located partially in Camrose County if the line were built north of Buffalo Lake. There is an ASP for the Hamlet of Meeting Creek within the study area. The ASP establishes policies and guidelines related to land uses within the hamlet. The Hamlet is located in the northeastern portion of the study area, west of Highway 56.

There is an IDP between Camrose County and the Town of Bashaw. One of the goals of the IDP is to protect the area around the Town to allow for future urban growth. The IDP identifies an Urban Fringe area which will be the primary urban expansion area, and is composed of the quarter sections immediately north and south of the town, as well as one quarter section southeast of the town. Within this area, the Town and County have agreed to review new development jointly.

The Town of Bashaw, its IDP area and the Bashaw Airport are located in the pinch point created by Red Deer Lake and Buffalo Lake. The areas identified in the Bashaw IDP would warrant consideration in the identification of transmission line routes north of Buffalo Lake.

Buffalo Lake Intermunicipal Development Plan

The five municipalities bordering Buffalo Lake jointly developed the Buffalo Lake IDP. The five municipalities identified a need to protect the character and environment in the vicinity of the Lake, given its importance both for recreation and its wildlife habitat areas. Two of the five municipalities bordering the Buffalo Lake area are within AltaLink's service territory (Camrose and Lacombe Counties) while the other three are within ATCO's service territory.

The area covered by the Buffalo Lake IDP extends between approximately 800 m and 4.8 km from the shore of the lake (depending on the contour of the shoreline). The IDP identifies five growth nodes within this area, three of which are within AltaLink service territory. These areas are on the north shore, the northwestern arm (near Bashaw Bay) and on the west shore near Pelican Island. These growth

nodes include existing developed areas as well as areas planned for development in the future, including multi-lot residential areas, recreational areas and related commercial activity. The IDP identifies much of the remaining shoreline area as either "Significant Wildlife Habitat" or "Highest Priority Wildlife Habitat"; the IDP broadly aims to retain, protect and enhance these environmentally sensitive areas.

SUBSTATION SPECIFIC ASSESSMENT

This section addresses the requirement in the AESO Specification that AltaLink consider whether the two end point substations can accommodate 240 kV transmission line terminations and the availability of space for future substation expansion.

Gaetz 87S Substation Constraints and Analysis

The Gaetz 87S Substation is located on an approximately 17 acre parcel owned by AltaLink immediately east of the City of Red Deer. The existing Gaetz 87S Substation site currently has enough space for the termination of two additional 240 kV circuits without requiring a fence expansion.

As the existing Gaetz 87S Substation is located in an area identified as a "City of Red Deer Growth Area" by an IDP, there is an element of uncertainty around egress to accommodate the future second 240 kV circuit. One objective of the IDP is to maintain the City's "Growth Area" in a somewhat undeveloped state until it is annexed by the City and as such, AltaLink anticipates only limited growth in the area in the short term. However, over a longer term time horizon, if the annexation of the area by the City of Red Deer were to occur, it is possible that new development will constrain AltaLink's ability to route a second circuit to Gaetz 87S Substation.

The lands surrounding the Gaetz 87S Substation are still primarily agricultural, including within the City of Red Deer. The closest residential subdivision in the City of Red Deer is approximately 2 km southwest of the substation. In Red Deer County, to the east and south of the Gaetz 87S Substation, there are several country residential developments. The Balmoral Golf Course is located approximately 2 km south of the Gaetz 87S Substation, and there is also a tree farm/nursery south of the substation. There are also individual residences north and east of the substation. As such, while the primary land use in the area is currently residential, there are existing features that AltaLink would consider during route selection.

The Red Deer River forms a rough, upside-down "U" shape around the Gaetz 87S Substation at a distance of roughly 3-4 km. The Red Deer River is a major river, and there is significant elevation change and steep slopes associated with the river valley. Any route between Gaetz 87S and Tinchebray A972S Substations would need to cross the Red Deer River. Identifying a low impact crossing location represents a limitation on route options into the Gaetz 87S Substation. There are several protected areas along the Red Deer River within 5 km of the Gaetz 87S Substation; consultation with Alberta Environment and Parks would be required to fully assess the suitability of crossing in these areas. Additionally, the Canyon Ski Resort is located on the west side of the Red Deer River Valley approximately 2.5 km west of the Gaetz 87S Substation, adjacent to three existing transmission lines, which would present siting constraints.

Wolf Creek 288S Substation Constraints and Analysis

The existing Wolf Creek 288S Substation is located approximately 4 km northeast of the Town of Ponoka on approximately 16 acres of land owned by AltaLink. The existing Wolf Creek 288S Substation has two open 240 kV bays and, as such, currently has enough space to terminate two 240 kV transmission lines.

Due to the orientation of the substation, the egress of the existing 910L and 1083L transmission lines and presence of the existing 914L transmission line to the west of the substation, a crossing of a 240 kV transmission line in close proximity to the Wolf Creek Substation is likely required to terminate a new line to it. As such, egress into Wolf Creek 288S Substation is currently more challenging than into Gaetz 87S Substation.

There are some residential subdivisions south and east of the Wolf Creek 288S Substation which AltaLink would attempt to avoid during route development. Additionally, individual residences are located throughout the area.

There are three waterbodies greater than 4 hectares in size between 1.5 and 2.5 km south of the Wolf Creek 288S Substation. As waterbodies greater than 4 hectares typically cannot be spanned by a transmission line, these three lakes are constraints that AltaLink would attempt to avoid with routing into the Wolf Creek 288S Substation.

CONCLUSION

Based on the assessment provided within this LIA, AltaLink has determined that from a land impact perspective, both Options are viable and there were no features identified that would preclude development of either Option. As directed in the LIA Specification (dated March 30, 2018), Option 3 was not assessed as both Option 1 and 2 were identified to be feasible. In addition to a new transmission line (which is required for all three Options), Option 3 would require a new switching station with the associated impacts.

Based on the associated potential land and construction impacts, AltaLink would expect a double circuit structure to have lower overall impacts compared to a two single circuit configuration. This determination is true for both Option 1 and 2, and is based solely on a land impact perspective without taking into consideration the cost difference between the configurations as well as the uncertainty around the timing of the construction of a second circuit. Using double circuit structures with only one side initially strung would reduce the uncertainty around the impacts of a second future circuit in the vicinity of the Gaetz 87S Substation and would secure a location for the crossing of the Red Deer River by the second circuit.

Table 1 below presents a comparison of the opportunities and constraints for Options 1 and 2.

Table 1 - Opportunities and Constraints for Options 1 and 2

Option 1 - 240 kV Line from Tinchebray A972S Substation to Gaetz 87S Substation		Option 2 - 240 kV Line from Tinchebray A972S Substation to Wolf Creek 288S Substation	
Opportunities	Constraints	Opportunities	Constraints
• More opportunity to parallel existing transmission lines • Fewer ESAs • Less surface water/wetlands • Shorter (within AltaLink service territory)	• A crossing of the Red Deer River is required • More residential density • Greater potential impacts to cultivated lands • Future development associated with the City of Red Deer (uncertainty around future second circuit)	• Lower residential density • No major river crossings required • Less potential impact to cultivated lands	• More surface water/wetlands associated with routing north of Buffalo Lake • More potential for environmental impact to native vegetation and ESAs • Egress / existing transmission lines in the vicinity of Wolf Creek require engineering solutions • Longer (within AltaLink service territory)

In the case of both Options 1 and 2, impacts are anticipated to be higher in close proximity to Buffalo Lake. Buffalo Lake is important both in terms of residential and recreation opportunities and as wildlife habitat. The municipalities bordering the Lake and Alberta Environment and Parks have identified recreation value associated with the Lake and wildlife habitat warranting protection.

Both Options 1 and 2 are anticipated to have similar residential impacts. However, because of Option 1's shorter length (within AltaLink service territory), these impacts are more concentrated than for Option 2.

AltaLink has not conducted consultation on transmission line routes for Options 1 or 2. AltaLink anticipates that consultation with stakeholders in proximity to proposed routes will identify additional information on local impacts.

Transmission line routes for Option 1 are anticipated to have lower environmental impacts associated with wetlands/surface water and to cross fewer ESAs. Routes for Option 1 are anticipated to be shorter (within AltaLink's service territory) and there are more existing transmission lines for these routes to parallel than Option 2. However, Option 1 requires a crossing of the Red Deer River; AltaLink anticipates that there will be limited options in terms of suitable crossing locations, which may result in higher local impacts.

Currently, egress from the Gaetz 87S Substation is anticipated to be easier because the existing 240 kV transmission lines are consolidated on the west side of the substation. However there is uncertainty about the impact of the future 240 kV circuit terminating at Gaetz 87 Substation, given that the Substation is within an identified Growth Area for the City of Red Deer.

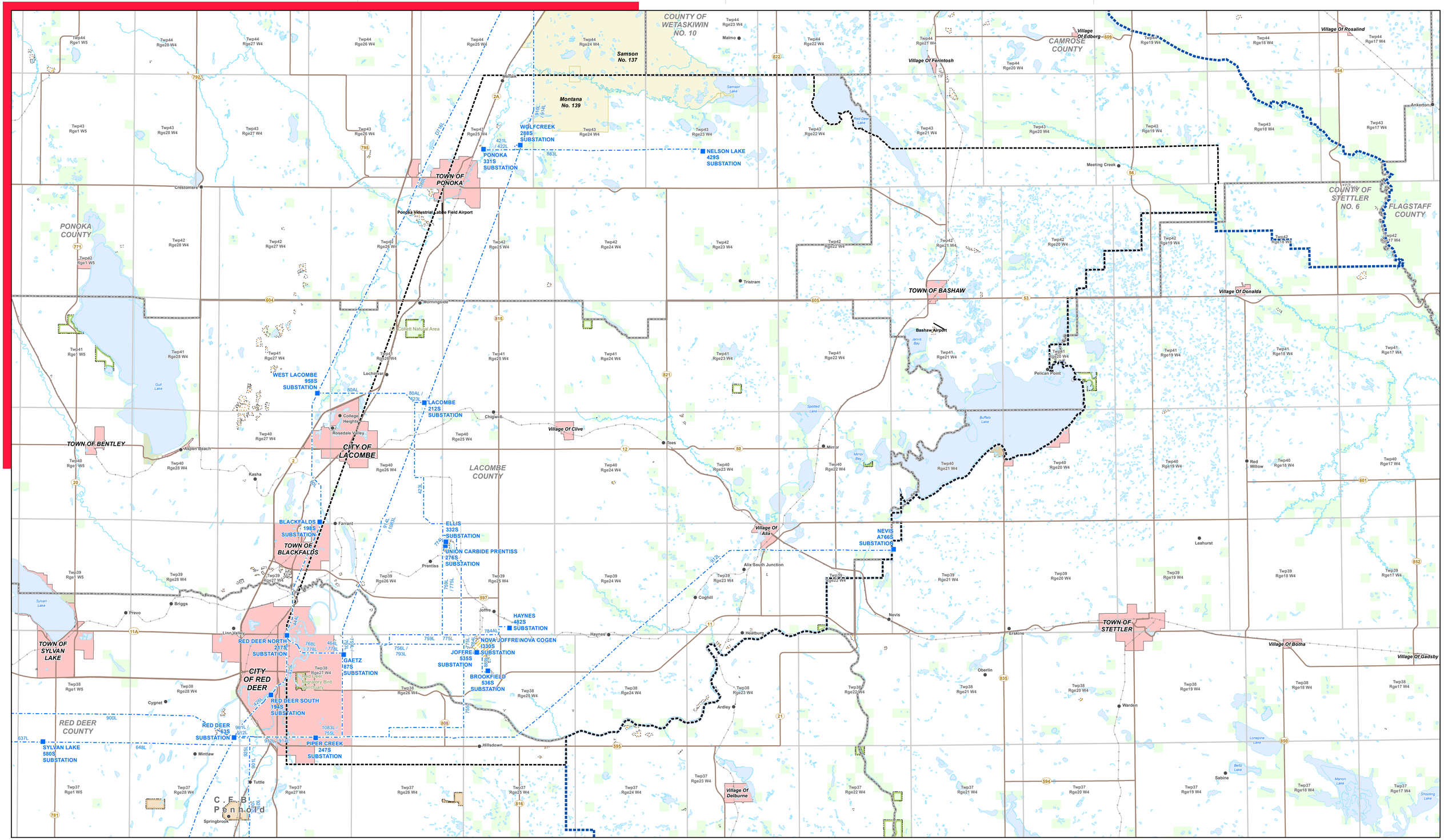
Transmission line routes for Option 2 would avoid a crossing of the Red Deer River, but would likely be located across or in proximity to more small lakes and wetlands than routes for Option 1. Option 2 would likely cross less cultivated land than Option 1, due to the hummocky terrain north of Buffalo Lake. Routing north of Buffalo Lake would also pass through a pinch point between Red Deer Lake and Buffalo Lake. The Town of Bashaw and Bashaw Airport are located between these two lakes, along with residential properties outside of the Town; as such routing options through this area are anticipated to be limited.

AltaLink considered the potential land impacts of transmission line routes for Option 2 located both north and south of Buffalo Lake. Routes located south of Buffalo Lake would be longer, and would be anticipated to have more residential impacts than routes north of Buffalo Lake. However, transmission line routes for Option 2 located south of Buffalo Lake would be expected to encounter fewer wetlands and waterbodies.

Egress from the Wolf Creek 288S Substation is likely to be more challenging than from Gaetz 87S Substation due to the configuration of the existing transmission lines. Longer outages during construction are anticipated to be required to address the termination at Wolf Creek, and a crossing of an existing 240 kV line in close proximity to the Substation is likely to be required.

While the types of impacts may differ between Option 1 and 2, the overall level of impact is likely to be similar. Based on a desktop analysis, Option 1 appears to have lower potential impacts due to its shorter line length, lower number of waterbodies and the presence of existing transmission lines to parallel within AltaLink's service territory; however, any evaluation of the overall impact of either Option would also take into account the portions of the project located within ATCO's service territory.

APPENDIX A - Study Area Maps (SAM1)



LEGEND

- Existing Substation
- Existing Transmission Line
- Study Area
- Hamlet or Locality
- Municipal or County Boundary
- Railway
- River or Stream
- Road
- Airport
- AltaLink Service Area
- Environmentally Significant Area
- First Nations Reserve
- Gravel Pit
- Oil and Gas Plant
- Military Base
- Other Protected Area
- Park
- Urban Area
- Water Body

NO: 35022711-6201
DRAWN: SG - AL
FILE NO.: XXXXXXX

REVISION: 0.00.01
AL FOLDER: Central East Transfer Out
DATE: 2018-04-26

Although there is no reason to believe that there are any errors associated with the data used to generate this product or in the product itself, users of these data are advised that errors in the data may be present.

N

0 5 10 15 20 Kilometres
0 5 10 Miles

STUDY AREA **SAM1**

ALTALINK
A BERKSHIRE HATHAWAY ENERGY COMPANY

CENTRAL EAST TRANSFER-OUT

APPENDIX B - Data Sources

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Data Sets

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From: Harmon, Michael
To: Imran Wyeen
Cc: Heffernan, Sean; Johnstone, Ian; Ehgoetz, Owen
Subject: RE: EXT - P7001 - CETO - NID7(9) repots conclusions
Date: Tuesday, February 18, 2020 8:42:59 AM

*** EXTERNAL email. Please be cautious and evaluate before you click on links, open attachments, or provide credentials.***
Hello Imran,

Confirmed, the conclusions found in the NID7(9) report submitted by AML for this project in May of 2018 are still valid and no substantive changes were made to affect the conclusions.

Thanks,
Mike.

From: Imran Wyeen [mailto:Imran.Wyeen@aeso.ca]
Sent: Thursday, February 13, 2020 1:44 PM
To: Harmon, Michael <Michael.Harmon@AltaLink.ca>; Ehgoetz, Owen <Owen.Ehgoetz@atco.com>
Subject: EXT ⚠ - P7001 - CETO - NID7(9) repots conclusions

**** Remember SAEL when reading email ****

Sender	The sender of this email is prvs=305355aeb=Imran.Wyeen@aeso.ca using a friendly name of Imran Wyeen . Are you expecting the message? Is this different from the message sender displayed above?
Attachments	Does this message contain attachments? Yes If yes, are you expecting them? image001.jpg
EXT Tag	Messages from an external sender will have **EXT** ⚠ added to the subject.
Links	Does this message contain links? Yes Check links before clicking them or removing BLOCKED in the browser.
Cybersecurity risk assessment: High	

Gentlemen,

Please confirm by return email that the conclusions found in their NID7(9) reports submitted in May 2018 still remain valid for this Application and no substantive changes were made to affect the conclusions.

Thanks you.

Regards

Imran Wyeen, P. Eng., MBA, PMP, RMP
Project Manager, Transmission System Projects,
Direct: 403-233-4688 | Cell: 403-473-6544

Alberta Electric System Operator (AESO)

Attachment 2: Option 1 and Option 2 prepared by ATCO Electric Ltd.

Central East Transfer-Out (CETO)
AESO Project No. 7001

ENVIRONMENTAL & LAND USE EFFECTS

A DESKTOP EVALUATION FOR AUC *RULE 007*

(NID7(9) Report)

Prepared for the
Alberta Electric System Operator
in Support of the
Needs Identification Document

May 2018

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NID7(9) Report Information Requirements Per AUC *Rule 007*

NID7(9) Report Information Requirements (Short Description)	
	To analyze and compare specified alternatives for "environmental and land use effects by way of a desktop evaluation within a development area defined by the ISO to identify areas where the development of transmission facilities may be prohibited, and to evaluate the effects of the options considered." Including:
a	Land assessment: public and private, federal, First Nations' reserve land, and transportation utility corridor considerations
b	Agricultural and other land use features including native grassland
c	Environmental features such as: (i) wildlife sensitivity areas that may be assessed from AEP wildlife sensitivity maps; (ii) provincially-protected areas such as provincial parks, wilderness areas, ecological reserves, wildland parks, Willmore Wilderness Park, provincial recreation areas, heritage rangelands and natural areas; (iii) provincially-designated environmentally-significant areas where maps are available from AEP; (iv) federally-protected areas such as national parks, wilderness areas and areas subject to special orders such as the Emergency Order for the Protection of Greater Sage-Grouse
d	Applicable regional land use plans adopted under the *Alberta Land Stewardship Act* and whether the proposed development meets the requirements of the plans

ENVIRONMENTAL & LAND USE EFFECTS

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1.0 INTRODUCTION AND OVERVIEW

1.1 CENTRAL EAST TRANSFER-OUT PROJECT

On April 10, 2018, the Alberta Electric System Operator (AESO) directed ATCO Electric Ltd. (ATCO) to prepare a NID7(9) Report that meets the requirements of the Alberta Utilities Commission (AUC) *Rule 007*, Section 6.1, NID7(9) for each of the specified alternatives for the Central East Transfer-out (CETO) project (AESO Project No. 7001). This report is to be used by the AESO in support of determining the preferred termination point of a new 240-kV circuit from Tinchebray 972S substation in ATCO service territory, to an undetermined substation location in Altalink service territory.

The AESO has directed ATCO to prepare this report in accordance with Section 39 of the *Electric Utilities Act*.

1.2 REQUIREMENTS OF AUC RULE 007 NID7(9)

Section 6.1, NID 7(9) of AUC *Rule 007* outlines the requirement for a review of environmental and land use effects of a project through a desktop evaluation to identify areas where the development of transmission facilities may be prohibited, and to assess the effects that the options considered may have in relation to the stated environmental and land use elements. These elements include:

(a) land assessment: public and private, federal, First Nations' reserve land, and transportation utility corridor considerations;

(b) agricultural and other land use features including native grassland;

(c) environmental features such as:

(i) wildlife sensitivity areas that may be assessed from Alberta Environment and Parks (AEP) wildlife sensitivity maps;

(ii) provincially-protected areas such as provincial parks, wilderness areas, ecological reserves, wildland parks, Willmore Wilderness Park, provincial recreation areas, heritage rangelands and natural areas;

(iii) provincially-designated environmentally-significant areas where maps are available from AEP;

(iv) federally-protected areas such as national parks, wilderness areas and areas subject to special orders such as the Emergency Order for the Protection of Greater Sage-Grouse;

(d) applicable regional land use plans adopted under the *Alberta Land Stewardship Act* and whether the proposed development meets the requirements of the plans.

The alternatives presented by the AESO in the CETO LIA Specification (Version 1, March 30, 2018) are to be evaluated with consideration to potential impacts on the above listed elements, within respective areas of development (study areas).

The effects of presented alternatives on environmental and land use elements are evaluated at a coarse scale, using readily available datasets, and are not comparable in detail until facility routing and siting, as well as design, has been undertaken for the Facility Application preparation phase. This report focuses on those aspects and considerations that can be described at a study area level.

1.3 EVALUATION METHODOLOGY

The alternatives considered in this report are limited to the components of the CETO that are located within ATCO's service territory. The key datasets used in the evaluation of this alternative are listed below.

Spatial Datasets:

- Geoadmin Layers – Alberta Data Partnerships 2018
- Pipelines & Wells Data – IHS 2018
- Historic Resource Value Listing – Government of Alberta 2017
- Digital Integrated Dispositions System – Altalis 2018
- Hydro Polygon – Alberta Data Partnerships 2018
- Canadian Wetland Classification System Merged Wetland Inventory – Alberta Environment & Parks 2018
- Fish & Wildlife Management Information System – Alberta Environment & Parks 2018
- Wildlife Key Range Layers and Piping Plover Waterbodies – Alberta Environment & Parks 2016
- Canadian Land Inventory (CLI) Soil Capability Classification for Agriculture – Agriculture and Agri-Food Canada (1998)
- Environmentally Significant Areas – Alberta Environment & Parks 2014
- VALTUS ortho imagery mosaic (2011-2015)
- Residences – ATCO (plotted from VALTUS imagery, 2012-2018)

The desktop evaluation of existing datasets does not preclude the need for detailed assessment during Facility Application preparation. Consultation with the regulatory bodies and agencies overseeing the management of the considered features should be undertaken during the detailed routing and siting phase of the Facility Application preparation phase.

1.3.1 Limitations of Assessment

The assessments and conclusions in this report with respect to the potential impacts of the proposed developments within the project study areas are subject to availability of various data sets. The study areas assessed were defined based on scope assumptions outlined in the AESO's specification. Detailed routing and siting activities within the study areas have not been completed. As part of the Facility Application process, the Transmission Facility Owner (TFO) should undertake a comprehensive assessment as defined in section 7.1.1 of AUC *Rule 007* for the proposed development. Once preliminary routing and siting activities have been undertaken and project-specific impacts are defined, options for mitigation and avoidance can be explored.

All detailed discussion and analysis that follows in this report is limited in scope to ATCO's service territory. The findings of this report must be considered in combination with Altalink's corresponding NID7(9) Report to fully understand the potential land and environmental impacts of the alternative connection options between Tinchebray 972S substation and substations within Altalink's service territory.

2.0 DESCRIPTION OF ALTERNATIVES

2.1 ALTERNATIVES

There are two main development alternatives outlined in the CETO LIA Specification as presented by the AESO, and further described in the sections below. Should the AESO determine that neither alternative is feasible, a third alternative may be considered involving an undetermined termination point to be located between Gaetz and Wolf Creek substations, within Altalink's service territory. Due to the presence of Buffalo Lake in the middle of the overall project area, ATCO is not presenting and/or evaluating a third alternative study area and as such all routing considerations for this alternative would be borne by Altalink. Either of ATCO's two alternatives described in this report may be used to support the third alternative, regardless of the termination location within Altalink's service territory. Similarly, should Altalink's proposed routing from Wolf Creek substation lead south of Buffalo Lake, the considerations outlined in this report for Option 1 would then apply within ATCO's service territory.

Stage 1 of the project involves the addition of one new circuit, as described in this report; Stage 2 considers the possibility of a second future circuit between the same two termination points. The land and environmental impact of the second circuit will be additive and not substantively different, therefore the analysis in this report will focus on the initial impact (Stage 1) only.

2.1.1 Option 1: 240-kV circuit from Tinchebray 972S substation to Gaetz 87S substation

Option 1 consists of a new 240-kV single circuit transmission line connecting Tinchebray substation to Gaetz substation. The typical transmission line structure is assumed to be either an H-frame or steel lattice tower design. Tinchebray substation will also require the addition of equipment to reliably terminate the new 240-kV circuit. An expansion of the fenced area may be required to accommodate this new equipment; however, no change to the property boundary of Tinchebray substation is anticipated. ATCO's routing will terminate at a location along the TFO service territory boundary (to be determined and agreed upon by ATCO and Altalink following detailed routing and siting during the Facility Application process).

2.1.2 Option 2: 240-kV circuit from Tinchebray 972S substation to Wolf Creek 288S substation

Option 2 consists of a new 240-kV single circuit transmission line connecting Tinchebray substation to Wolf Creek substation. The typical transmission line structure is assumed to be either an H-frame or steel lattice tower design. Tinchebray substation will also require the addition of equipment to reliably terminate the new 240-kV circuit. An expansion of the fenced area may be required to accommodate this new equipment; however, no change to the property boundary of Tinchebray substation is anticipated. ATCO's routing will terminate at a location along the TFO service territory boundary (to be determined and agreed upon by ATCO and Altalink following detailed routing and siting during the Facility Application process).

2.2 METHODOLOGY

ATCO's evaluation process began with the identification of two study areas that meet the technical requirements of the AESO's specification and account for large-scale geographic, environmental, and social constraints. A sufficient geographic area was selected to ensure that sensitive environmental features and land constraints were identified.

Geographic Information System (GIS) analysis was completed utilizing currently available data sets, to examine the environmental and land use elements laid out in AUC *Rule 007*, Section 6.1, NID7(9). The resultant mapping and metrics were assessed to determine qualitative land impacts and to identify potential constraint areas for future transmission development within each study area.

2.3 COMMON REGIONAL FEATURES

Routing for the alternatives is encompassed in the area represented by a combination of both study areas. There is a significant area of overlap between the two study areas, representing approximately 60% of each study area. As such, the alternatives consider many common features and constraints within this broad overlapping area. Analysis of

these two options will therefore yield similar results and potential impacts are also anticipated to be similar, given that only 40% of each study area does not overlap.

2.3.1 Land Assessment

Development near small residential centres (towns, hamlets, and subdivision communities) is considered a constraint to routing. In addition to residential areas, there are several watercourses and various small and large waterbodies within the area. The remainder of the combined study area consists primarily of agricultural lands.

The combined study area contains extensive private land, with isolated pockets of Crown land scattered throughout. The western extent of the combined study area contains a large contiguous area of Crown land surrounding Buffalo Lake, containing various Protective Notations.

There are no National Parks, Wildland Parks, Wilderness Areas, Ecological Reserves, Indian Reserve lands or Métis settlements in the combined study area. An area of Protective Notation—Paintearth Coulee Natural Area—occurs in the east half of the combined study area, approximately 5 km west of Tinchebray substation. The following areas are located along the periphery of the combined study area, where they are not likely to be affected by route options and will thus require no further elaboration beyond this section:

- Big Knife Provincial Park
- Rochon Sands Provincial Park
- Boss Hill Provincial Recreation Area

There are no regionally identified Transportation Utility Corridors. Local highways exist within each study area, but often present limited opportunities for close collocation due to imposed setbacks to transmission line development and proximity of residential development. However, these areas also represent some of the best opportunities for routing transmission infrastructure to minimize impacts to agricultural activities. Routing along highway plans should be considered and discussed with the appropriate agencies.

There are areas of listed Historic Resource Value (HRV) in each of the study areas. The numerical HRV ratings are defined as follows:

HRV 1: designated under the Act as a Provincial Historic Resource
HRV 2: designated under the Act as a Municipal or Registered Historic Resource
HRV 3: contains a significant historic resource that will likely require avoidance
HRV 4: contains a historic resource that may require avoidance
HRV 5: high potential to contain a historic resource

Routing into Tinchebray substation is largely unconstrained, and there is currently sufficient room within the existing substation property to accommodate expansion of the fenced area and termination of additional transmission lines.

2.3.2 Agriculture

Both study areas contain extensive private land, where land uses consist primarily of agricultural activities (cultivation and pasture). Crown agricultural dispositions, typically for grazing activities, are located sporadically throughout both study areas.

There are listings under the provincial Grassland Vegetation Inventory (GVI) dataset in the area, however they are located along the southeastern fringe of the Option 1 study area only, where they are not likely to be affected by route options and will thus require no further elaboration beyond this section.

2.3.3 Environmental Features

There are numerous watercourses and waterbodies in the combined study area with noted fish habitat[1]. As both study areas include fish-bearing watercourses, it should be considered that any water crossing may require mitigations suitable for the protection of fish habitat. Large waterbodies are generally excluded from the study areas, however there is potential to encounter small waterbodies and/or wetlands, and care should be taken to avoid or minimize routing within these areas to the extent reasonably practicable.

There are no other features associated with federally or provincially-protected wilderness areas, ecological reserves, wildland parks, heritage rangelands or natural areas in the combined study area other than those discussed in Section 2.3.1, nor any areas subject to special order.

There is coverage of the provincial Environmentally Significant Areas (ESAs) sensitivity ranking throughout the combined study area, with areas ranked as Environmentally Significant; these were assessed for each study area.

2.3.4 Regional Land Use Plan Considerations

The combined study area is predominantly within the Red Deer Regional Plan (RDRP), however a small portion of the Option 2 study area also intersects the North Saskatchewan Regional Plan (NSRP). Although the NSRP has not yet been approved and drafting of the RDRP has not yet started, it is prudent to apply similar strategies as other planning jurisdictions for the routing and siting of transmission infrastructure. The draft NSRP and the approved Lower Athabasca Regional Plan (LARP) both include strategic development directions with directives toward integrated management and stewardship of Crown and private land, with the intention of minimizing impacts of newly built infrastructure. The focus for electrical transmission development in the NSRP and LARP is on the amalgamation of utilities and transportation infrastructure to reduce land

[1] Fish and Wildlife Management Information System (FWMIS) accessed using the Fish and Wildlife Internet Mapping Tool (FWIMT), http://aep.alberta.ca/fish-wildlife/fwmis/access-fwmis-data.aspx

fragmentation and environmental impact of development[2]. These considerations are applicable to each of the CETO alternatives in a broad sense, as they support the criteria used for routing and siting of transmission facilities.

In addition to these regional planning areas, the combined study area intersects several municipalities including the Counties of Stettler, Paintearth, and Camrose. Consultation with each affected municipality, with respect to municipal development plans, area structure plans, etc., will be required for the CETO project.

2.4 OPTION 1 – EVALUATION OF TINCHEBRAY TO GAETZ

The Tinchebray to Gaetz Study Area encompasses approximately 1,143 km^2 across portions of the Counties of Stettler and Paintearth. The study area is approximately 70 km wide and extends approximately 18 km north-south. It is bounded to the west by the TFO service territory boundary, and includes area up to one mile east of Tinchebray substation to allow for flexibility in routing new transmission line terminations into the substation.

The assessment of this study area considers that an acceptable routing solution would be to follow existing roadways, quarter/section lines, property boundaries, existing 240-kV transmission line 9L20, and other field edges, to reduce potential impacts to agricultural activities. Route options from Tinchebray substation to the TFO service territory boundary for Option 1 are expected to range in length from approximately 74 km to 84 km.

2.4.1 Land Assessment

Private land in the study area covers approximately 95% of the land base, with isolated pockets of Crown land throughout. Rural residential density is mainly low due to the increased number of waterbodies and land topography in the study area's eastern extent; however, localized high density areas are prevalent in the western portion of the study area. Visual impacts typically relate to proximity to residences and tree removal; therefore, with lower residence density and minimal anticipated tree removal, visual impacts are generally expected to be minimized. Visual impacts are more likely to be realized in the higher residential density areas of the study area.

Oil and gas activity is extensive throughout the study area. High density is noted for both pipelines and well sites within the west portion of the study area, and low to moderate density throughout the rest of the study area. In the northeastern portion of the study area where oil and gas activity is less prevalent, coal mining takes its place as the

[2] Alberta Environment and Parks, Land-Use Framework, *Regional Plans*, website https://landuse.alberta.ca/RegionalPlans/LowerAthabascaRegion/Pages/default.aspx

dominant industrial activity. Active coal mines are generally located near the Battle River, to the northwest of Tinchebray substation.

Areas of historical resource potential are concentrated in the eastern extent of the study area with most of the areas having HRV 5. These areas are generally located in proximity to tributaries of Paintearth Creek, near Tinchebray substation where they cannot be entirely avoided. Appropriate permitting will need to be obtained for routing in this area, and potential features will need to be identified for avoidance or other acceptable mitigation.

2.4.2 Agriculture

Approximately 40% of the land use within the study area is cultivated cropland with CLI ratings of class 2 and 3 in the central portion of the study area. The eastern and western extents of the study area have CLI ratings of 3 to 6 and 4 to 5, respectively. Routing along field edges and other existing linear disturbance will help to minimize impacts to agricultural activity.

2.4.3 Environmental Features

Environmental considerations within the study area include an area of Protective Notation (Paintearth Coulee Natural Area) in the east half of the study area, located approximately 5 km west of Tinchebray substation. Although this area is likely avoidable, routing in this area should be discussed with AEP to determine if avoidance or other mitigation measures are required.

ESAs ranked as Environmentally Significant are located sporadically throughout the east half of the study area. Several waterbodies, creeks, and streams are located in the central and eastern sections of the study area. Wetland density increases with proximity to Buffalo Lake in the northwestern portion of the study area. Natural grasslands are anticipated to occur within the study area where the potential for habitats of Species at Risk and the existence of rare plants is increased. The entire study area is located within the Sharp-tailed Grouse and Sensitive Raptor species ranges, and Buffalo Lake is designated as a piping plover waterbody. Areas of least environmental significance are located throughout the study area and correlate to where cultivated crop and/or industrial activity are prevalent.

2.5 OPTION 2 – EVALUATION OF TINCHEBRAY TO WOLF CREEK

The Tinchebray to Wolf Creek Study Area encompasses approximately 1,118 km^2 across portions of the Counties of Stettler, Camrose, and Paintearth. The study area is approximately 53 km wide extending south to Township Road 392, west to Range Road 202, and up to one mile east of Tinchebray substation to allow for flexibility in routing new transmission line terminations into the substation. It is bounded to the north by a series of creeks (Big Knife Creek, Red Willow Creek, and Meeting Creek), and to the

northwest by the TFO service territory boundary. North of those creeks is a series of coulees, valleys, and other environmentally sensitive areas not conducive for transmission line routing.

The assessment of this study area considers that an acceptable routing solution would be to follow existing roadways, quarter/section lines, property boundaries, existing 240-kV transmission line 9L20, and other field edges, to reduce potential impacts to agricultural activities. Route options from Tinchebray substation to the TFO service territory boundary for Option 2 are expected to range in length from approximately 72 km to 80 km.

2.5.1 Land Assessment

Private land in the study area covers approximately 93% of the land base, with isolated pockets of Crown land throughout. The majority of Crown land in the study area occurs around the northeast end of Buffalo Lake. The predominant land use in the study area is agricultural.

Rural residential density is mainly low due to the increased number of small waterbodies and land topography; however, localized high density areas occur in the southwestern portion of the study area, primarily within Townships 40-19-W4M and 39-19-W4M, as well as around various hamlets and villages. Visual impacts typically relate to proximity to residences and tree removal; therefore, with lower residence density and minimal anticipated tree removal, visual impacts are generally expected to be minimized. Visual impacts are more likely to be realized in the higher residential density areas of the study area.

Oil and gas activity is extensive throughout the study area, with low to moderate density for both pipelines and well sites. In the eastern portion of the study area where oil and gas activity is less prevalent, coal mining takes its place as the dominant industrial activity. Active coal mines are generally located near the Battle River, to the northwest of Tinchebray substation.

Areas of historical resource potential are concentrated in the eastern extent of the study area in proximity to tributaries of Paintearth Creek, as well as along Red Willow Creek in the north-central portion of the study area, and to the northeast of Buffalo Lake at the western extent of the study area. Most of these areas have HRV 5, however the area around Buffalo Lake (generally within Township 41-20-W4M) contains some HRV 1, 3, and 4. Routing can avoid most of these HRV occurrences; however, HRV rated areas in the eastern extent near Tinchebray substation cannot be avoided. Appropriate permitting will need to be obtained for routing in this area, and potential features will need to be identified for avoidance or other acceptable mitigation.

2.5.2 Agriculture

Approximately 40% of the land use within the study area is cultivated cropland with CLI ratings of class 2 and 3 in the central portion of the study area. The eastern and northwestern extents of the study area have CLI ratings of 3 to 6 and 3 to 5, respectively. Routing along field edges and other existing linear disturbance will help to minimize impacts to agricultural activity.

2.5.3 Environmental Features

Environmental considerations within the study area include an area of Protective Notation (Paintearth Coulee Natural Area) in the east half of the study area, located approximately 5 km west of Tinchebray substation. Although this area is likely avoidable, routing in this area should be discussed with AEP to determine if avoidance or other mitigation measures are required.

ESAs ranked as Environmentally Significant are located throughout the study area, with the highest concentration in the eastern extent as well as in the area northeast of Buffalo Lake. Several waterbodies, creeks, and streams are located in the central and eastern sections of the study area. Wetland density increases with closer proximity to Buffalo Lake, in the northern half of the study area. Natural grasslands are anticipated to occur within the study area where the potential for habitats of Species at Risk and the existence of rare plants is increased. The entire study area is located within the Sharp-tailed Grouse range and most of the southern two-thirds of the study area is within the Sensitive Raptor range. Buffalo Lake, Rider Lake, and Rockeling Bay (the latter two areas are located immediately northeast of Buffalo Lake) are designated as piping plover waterbodies. Areas of least environmental significance are located throughout the study area and correlate to where cultivated crop and/or industrial activity are prevalent.

3.0 ASSESSMENT OF CONSTRAINTS

The options described in this section both present constraints to the development of electrical facilities within the project area. However, none of the constraints identified result in an overall preclusion of any one option—both options are viable. The following sections outline the constraints and risks associated with Options 1 and 2.

3.1 OPTION 1 – TINCHEBRAY TO GAETZ

The development will require the expansion of the Tinchebray substation. Given that ample space exists at the Tinchebray substation site, impacts related to the expansion of the substation are expected to be minor.

Agricultural activity is prevalent throughout the study area and the CLI agricultural potential classification is considered favourable for crop production in many areas.

Linear development within the study area could potentially realize agricultural impacts which may be minimized with routing along property boundaries, field edges, and along other linear disturbance (e.g. roads and powerlines) and modifying construction timing and practices.

The residential assessment indicates a mainly low density in the eastern extent of the study area; however, the presence of hamlets, villages, towns, and other areas of medium to high rural residential density is noted within the central and western portions of the study area. All hamlets, villages, and towns are avoidable, and the avoidance of higher residential density areas should be considered during the detailed routing and siting phase of the Facility Application process. The lower residential density and overall ability to avoid built-up areas will help minimize the potential for visual impacts within the study area. At the time of detailed routing, efforts should be made to mitigate impacts to residences that are unavoidable.

The study area is within both the Sharp-tailed Grouse and Sensitive Raptor ranges; although not avoidable, consideration for these species should be given and mitigation measures discussed with AEP, where applicable. The various creek and stream crossings and native grasslands within the study area should also be considered during the Facility Application through discussions with the appropriate regulator. Environmental impacts are anticipated to be minimal for linear development within the study area.

Impacts to cemeteries and HRV lands should be considered during the detailed routing phase of the project. As there is extensive oil and gas activity in the study area avoidance may not be practical; therefore, early engagement with facility owners during the detailed routing phase should be incorporated into the Facility Application process.

TABLE 1: Option 1 - Constraints and Risks

Connection Option	Constraints	Risks
Tinchebray to Gaetz • Single circuit 240-kV transmission line from Tinchebray 972S substation to Gaetz 87S substation	Unavoidable residences.	Limitations on routing opportunities. Unavoidable visual impacts.
	Moderate proportion of cultivated crop land.	Potential for moderate impacts to agriculture, due to line & structure footprint.
	Moderate proportion of wetlands and waterbodies.	Potential for impacts to wetlands and waterbodies.

	Unavoidable sensitive species ranges.	Setback requirements (dependent on species present). Construction timing limitations.
	Low proportion of Protective Notation's (PNTs).	Low risk. Routing around PNT areas may limit routing options; consult with AEP to determine if avoidance is required.
	Moderate proportion of Environmentally Significant Areas (ESA).	Moderate risk of intersecting significant areas.
	Unavoidable Historic Resource Value areas associated with Paintearth Creek.	Low risk. Possible impact to Historic Resource Value features.

3.2 OPTION 2 – TINCHEBRAY TO WOLF CREEK

The development will require the expansion of the Tinchebray substation. Given that ample space exists at the Tinchebray substation site, the impacts related to the expansion of the substation are expected to be minor.

Agricultural activity is prevalent in the central portion of the study area and the CLI agricultural potential classification is considered favourable for crop production. Linear development within the study area could potentially realize agricultural impacts which may be minimized with routing along property boundaries, field edges, and along other linear disturbance (e.g. roads and powerlines) and modifying construction timing and practices.

The residential assessment indicates a mainly low density throughout the study area. The presence of hamlets, villages, towns, and other areas of medium to high rural residential density is noted within the southwest portion of the study area. Avoidance of these higher residential density areas should be considered during the detailed routing and siting phase of the Facility Application process. The lower residential density and overall ability to avoid built-up areas will help minimize the potential for visual impacts within the study area. At the time of detailed routing, efforts should be made to mitigate impacts to residences that are unavoidable.

The area around the northeast end of Buffalo Lake contains the Boss Hill Provincial Recreation Area, in addition to multiple piping plover waterbodies; this area should be avoided if reasonably possible. The study area is also located within both the Sharp-tailed Grouse and Sensitive Raptor ranges; although not avoidable, consideration for these species should be given and mitigation measures discussed with AEP, where

applicable. The various creek and stream crossings and native grasslands within the study area should also be considered during the Facility Application through discussions with the appropriate regulator. Environmental impacts are anticipated to be minimal for linear development within the study area.

Impacts to cemeteries and HRV lands should be considered during the detailed routing phase of the project. As there is extensive oil and gas activity in the study area avoidance may not be practical; therefore, early engagement with facility owners during the detailed routing phase should be incorporated into the Facility Application process.

TABLE 2: Option 2 - Constraints and Risks

Connection Option	Constraints	Risks
Tinchebray to Wolf Creek Single circuit 240-kV transmission line from Tinchebray 972S substation to Wolf Creek 288S substation	Unavoidable residences.	Limitations on routing opportunities. Unavoidable visual impacts.
	Moderate proportion of cultivated crop land.	Potential for moderate impacts to agriculture, due to line & structure footprint.
	High proportion of wetlands and waterbodies.	Potential for impacts to wetlands and waterbodies.
	Unavoidable sensitive species ranges.	Setback requirements (dependent on species present). Construction timing limitations.
	Low proportion of Protective Notation's (PNTs).	Low risk. Routing around PNT areas may limit routing options; consult with AEP to determine if avoidance is required.
	Moderate proportion of Environmentally Significant Areas (ESA).	Moderate risk of intersecting significant areas.
	Unavoidable Historic Resource Value areas associated with Paintearth Creek.	Low risk. Possible impact to Historic Resource Value features.

4.0 COMPARISON OF ALTERNATIVES

Options 1 and 2 share several common constraint features and risks at a study area level, as they share a large area of overlap. Both are constrained in some way by rural residential development within the respective study areas; however, Option 2 has fewer residences and lower overall residential density than Option 1, particularly when considering the west half of the Option 1 study area where there is relatively high residential density and many quarter sections contain two or more residences. Higher residential density may present an increased risk of a lengthier regulatory proceeding due to the higher population potentially affected. Residential density is low in the vicinity of Tinchebray substation and is not expected to be a constraint to expansion of the substation.

Both study areas cover mostly private land, with prominent agricultural land use, which implies that impacts to private land and agricultural use are chiefly attributable to line length and the ability to route alongside other existing linear disturbances (e.g. roads, powerlines, property boundaries, etc.). Both study areas have a similar amount of cultivated land and therefore a similar overall potential impact to agricultural use. In any case, consideration will need to be given to structure placement and following existing linear disturbance, as well as to other mitigation measures that reduce impacts to agricultural use to the extent reasonably practicable.

Oil and gas infrastructure is scattered throughout both study areas, although the highest concentration of this activity is in the west half of the Option 1 study area; this area is mostly avoided by Option 2. Given the deep sub-surface nature of oil and gas development, these developments are not susceptible to localized sterilization and transmission facilities can occupy adjacent lands. Therefore, it is unlikely that any routing options will have a significant impact on oil and gas infrastructure. Option 1 has a greater density of pipelines and well sites than Option 2, and consideration will need to be given to ensure routing maintains appropriate setback distances from all oil and gas infrastructure. Oil and gas activity is relatively low in the vicinity of Tinchebray substation, and is not expected to be a constraint to expansion of the substation.

Both study areas include some degree of existing linear disturbance that may allow for detailed routing with a focus on integration and minimizing overall disturbance. Existing 240-kV transmission line 9L20 traverses east-west through both study areas; portions of this existing line may present a potential routing opportunity for either option. Both study areas also contain local roads and highways; although these features would serve as a reasonable routing opportunity to reduce impact to agricultural land, they may not be as advantageous due to the concentration of residential and other development located along them. Where following these linear features is not practicable, quarter/section lines and property boundaries should also be considered.

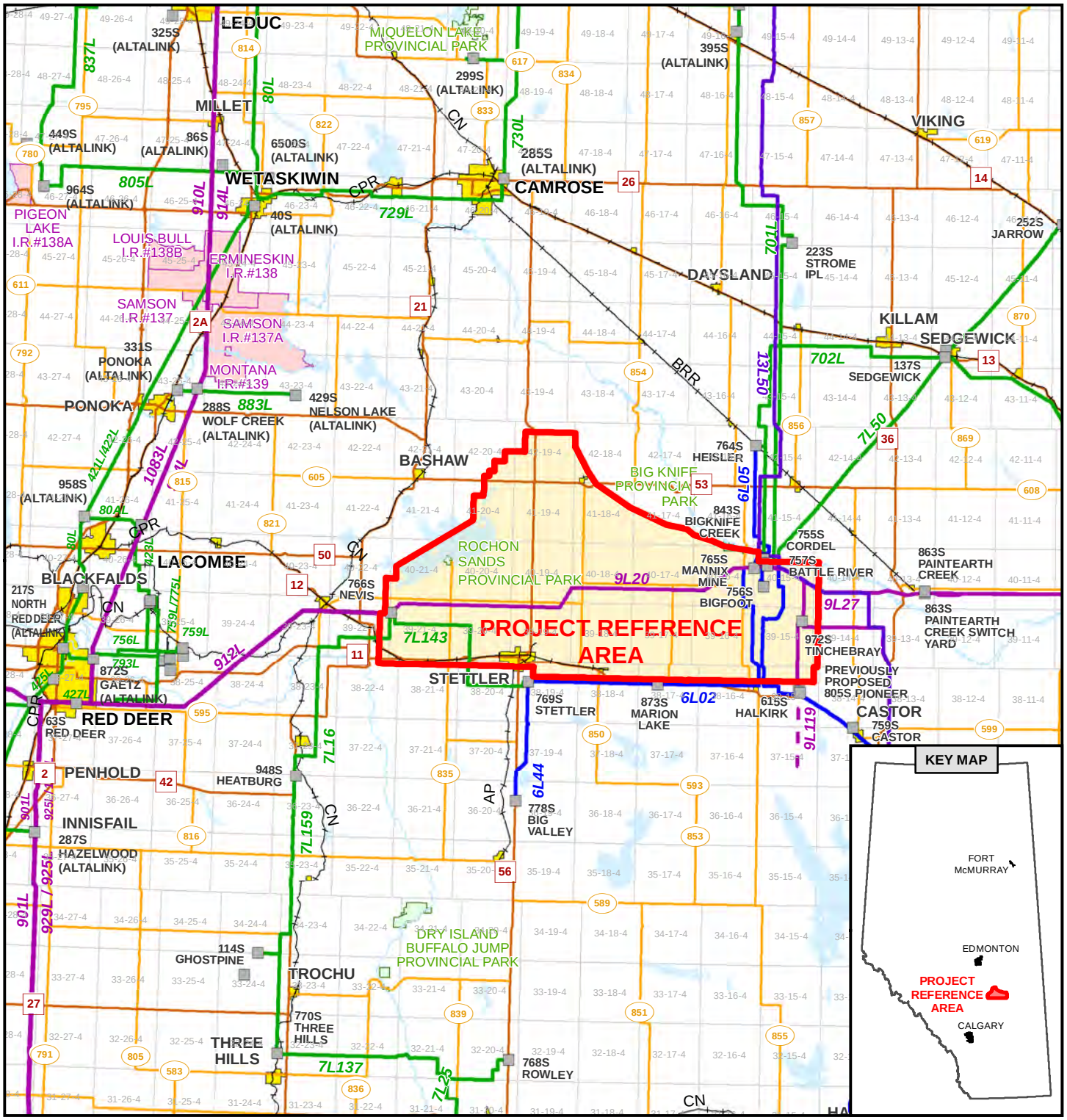
Both study areas contain ESAs and both are bounded in the west by Buffalo Lake. The highest concentration of ESAs is within the area of overlap between the study areas, so neither option is favoured in this regard. A high risk of intersecting ESA quarter sections does not necessarily mean there will be a high risk of impact, as any potential impact to wet areas or other environmental features can either be avoided through proper routing and siting, or reduced through other mitigation measures. Option 2 has an area of relatively high environmental significance immediately northeast of Buffalo Lake; this area should be avoidable through proper routing and siting. Option 2 also has more wetlands and small waterbodies than Option 1; in any case, both study areas have a relatively low amount of waterbody or wetland area when compared to other parts of the province.

Both study areas have relatively low amounts of HRV lands, and both contain an overlapping area of unavoidable HRV lands near Tinchebray substation. Option 1 has fewer HRV lands than Option 2; however, impacts to historical resources can be avoided and/or mitigated with either option.

5.0 SUMMARY

For Stage 1 of the project, both options are found to be feasible and reasonable from a land impacts perspective. Based on the criteria for evaluation laid out in AUC *Rule 007* NID7(9), Option 2 is found to be more favourable than Option 1 when considering residential density and line length (project footprint) within ATCO's service territory. Option 1 is more favourable than Option 2 when considering the potential for impacts to wetlands and small waterbodies. Both options are expected to have a similar impact on agricultural land use. In any case, impacts to residences, agriculture, and environmentally sensitive areas can be reduced through proper routing and siting and implementation of appropriate mitigation measures.

Stage 2 of the project, which requires the addition of a second 240-kV circuit from Tinchebray substation to the chosen Altalink substation, would result in a second transmission line traversing through the same study area; therefore, the environmental and land use impact of a second circuit is additive but not substantially different. To avoid additional land impact at Stage 2, Stage 1 of the project should consider construction of double-circuit structures that allow for future accommodation (stringing) of the second circuit. If double-circuit structures are not appropriate or feasible, then routing and siting for Stage 1 should consider the need for additional right-of-way width to accommodate a second adjacent line in the future, or as close as possible to the first line, to reduce overall footprint and minimize land impacts.



Project Reference Area
Existing / Previously Proposed Substation
Existing 500 kV Transmission Line
Existing 240 kV Transmission Line
Previously Proposed 240 kV Transmission Line
Existing 144 / 138 kV Transmission Line
Existing 72 kV Transmission Line

N W E S

0 10 20 Kilometres
0 6.5 13 Miles

ATCO

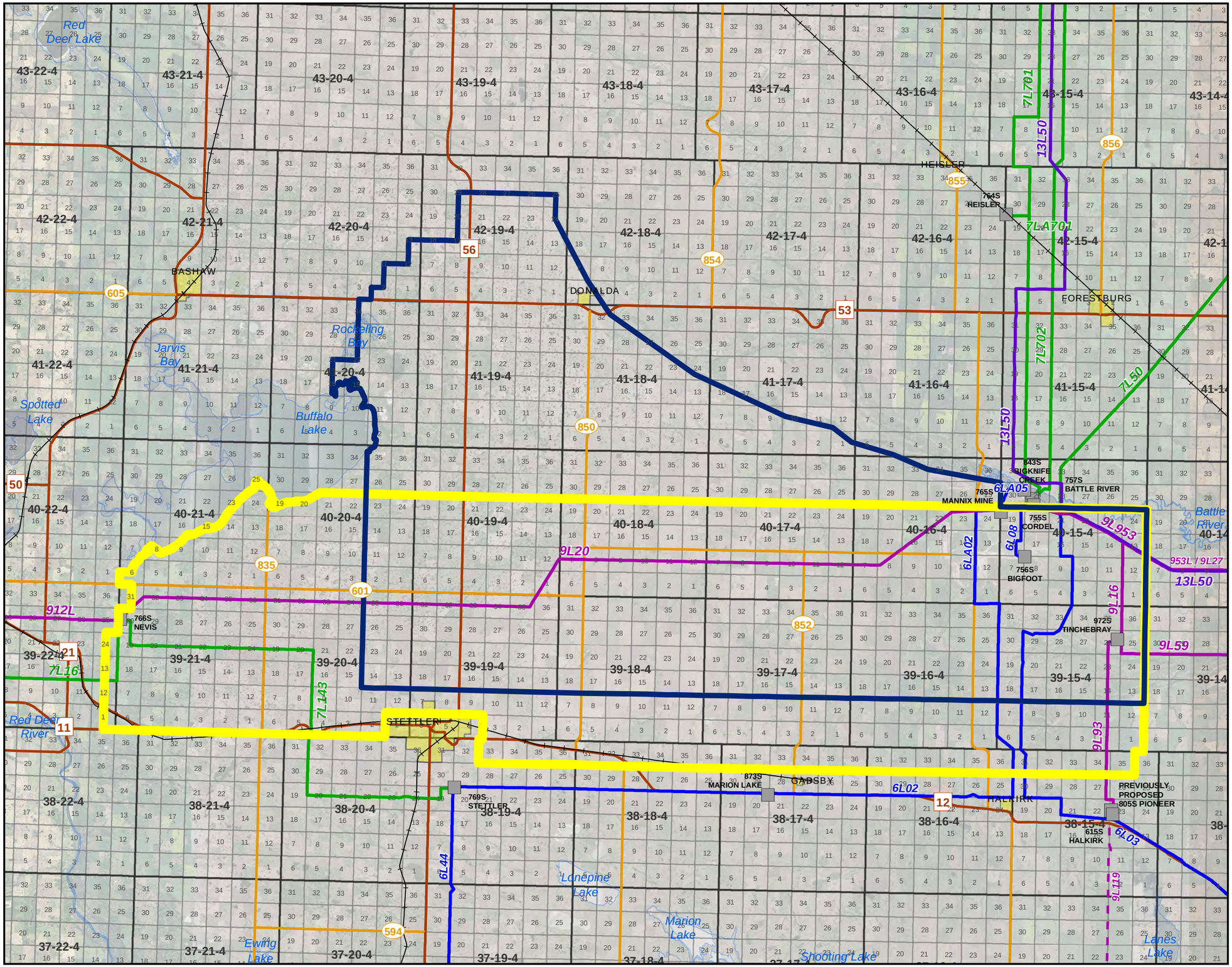
Central East Transfer - Out

REGIONAL MAP

May 2018

RS- CETO - LIA - 01

Cartography By: TO | Approved By: NJ | 1:900,000 at Letter | Projection: NAD 1983 UTM Zone 12N | File Name: CETO_LIA_Regional_Map



LEGEND

- Existing 500 kV Transmission Line
- Existing 240 kV Transmission Line
- Previously Proposed 240 kV Transmission Line
- Existing 144 kV Transmission Line
- Existing 72 kV Transmission Line
- Existing / Previously Proposed Substation
- Railway
- Primary Highway
- Secondary Highway

Study Areas

- CETO Option 1
- CETO Option 2

CREDIT NOTES
Project Reference Area: ATCO April 2018, Electrical System: ATCO 2018, Base Data: Alberta Data Partnerships 2018, Imagery: Valtus Services 2011 - 2015, Study Areas: ATCO April 2018

N W E S

NOTES:
- Noted scale is for the base features only. All other features are not to scale.

ATCO

Central East Transfer - Out Land Impact Assessment

STUDY AREA MOSAIC MAP

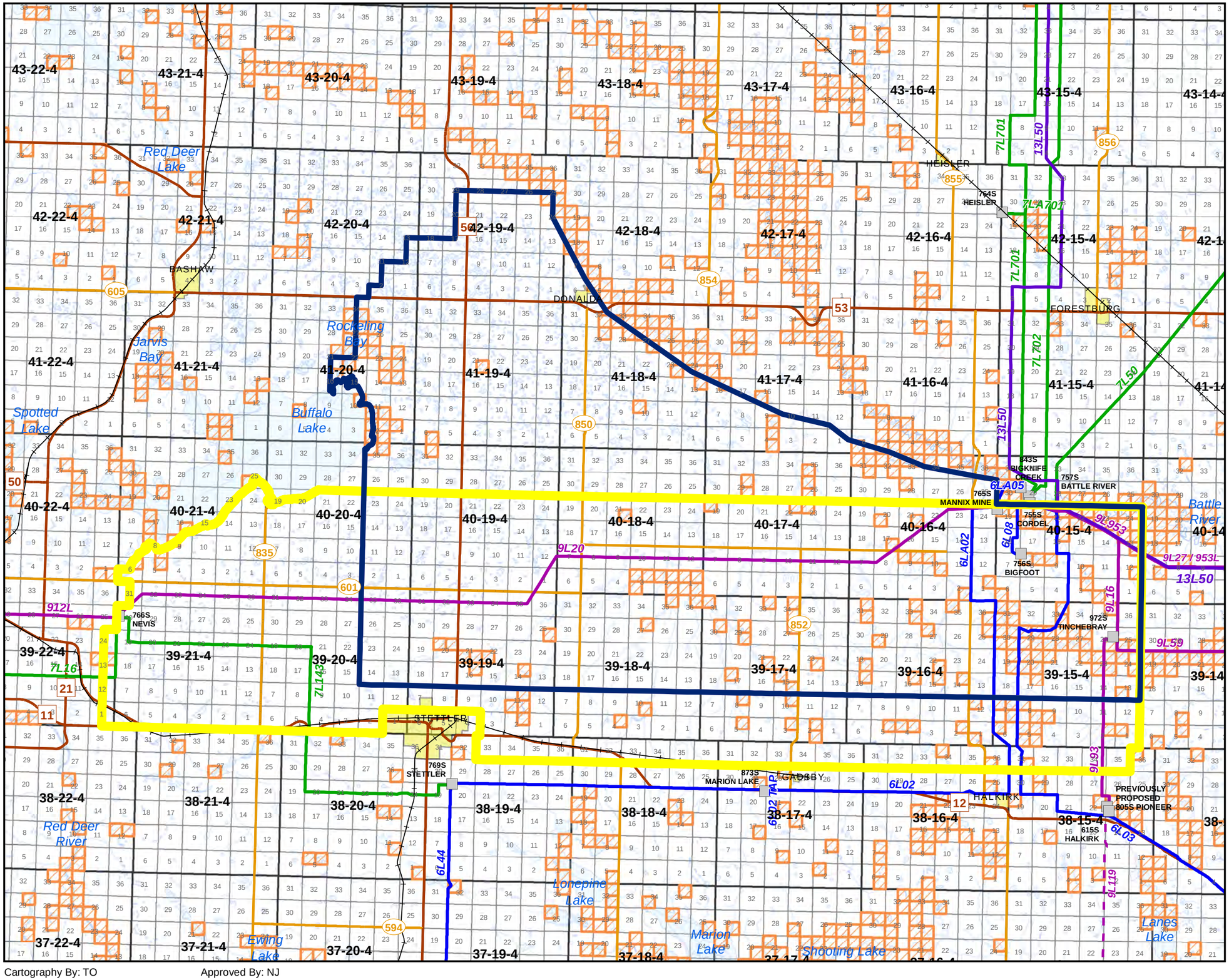
1:250,000

DWG.NO. RS - CETO - LIA - 02

Cartography By: TO

Approved By: NJ

May 2018



LEGEND

- Existing 500 kV Transmission Line
- Existing 240 kV Transmission Line
- Previously Proposed 240 kV Transmission Line
- Existing 144 kV Transmission Line
- Existing 72 kV Transmission Line
- Existing / Previously Proposed Substation
- Railway
- Primary Highway
- Secondary Highway

Study Areas

- CETO Option 1
- CETO Option 2
- Environmentally Significant Areas (>0.189)

CREDIT NOTES
Project Reference Area: ATCO April 2018, Electrical System: ATCO 2018, Base Data: Alberta Data Partnerships 2018, ESA: GOA 2014, Study Areas: ATCO April 2018

N W E S

NOTES:
- Noted scale is for the base features only. All other features are not to scale.

ATCO

Central East Transfer - Out
Land Impact Assessment

ENVIRONMENTALLY SIGNIFICANT AREAS MAP

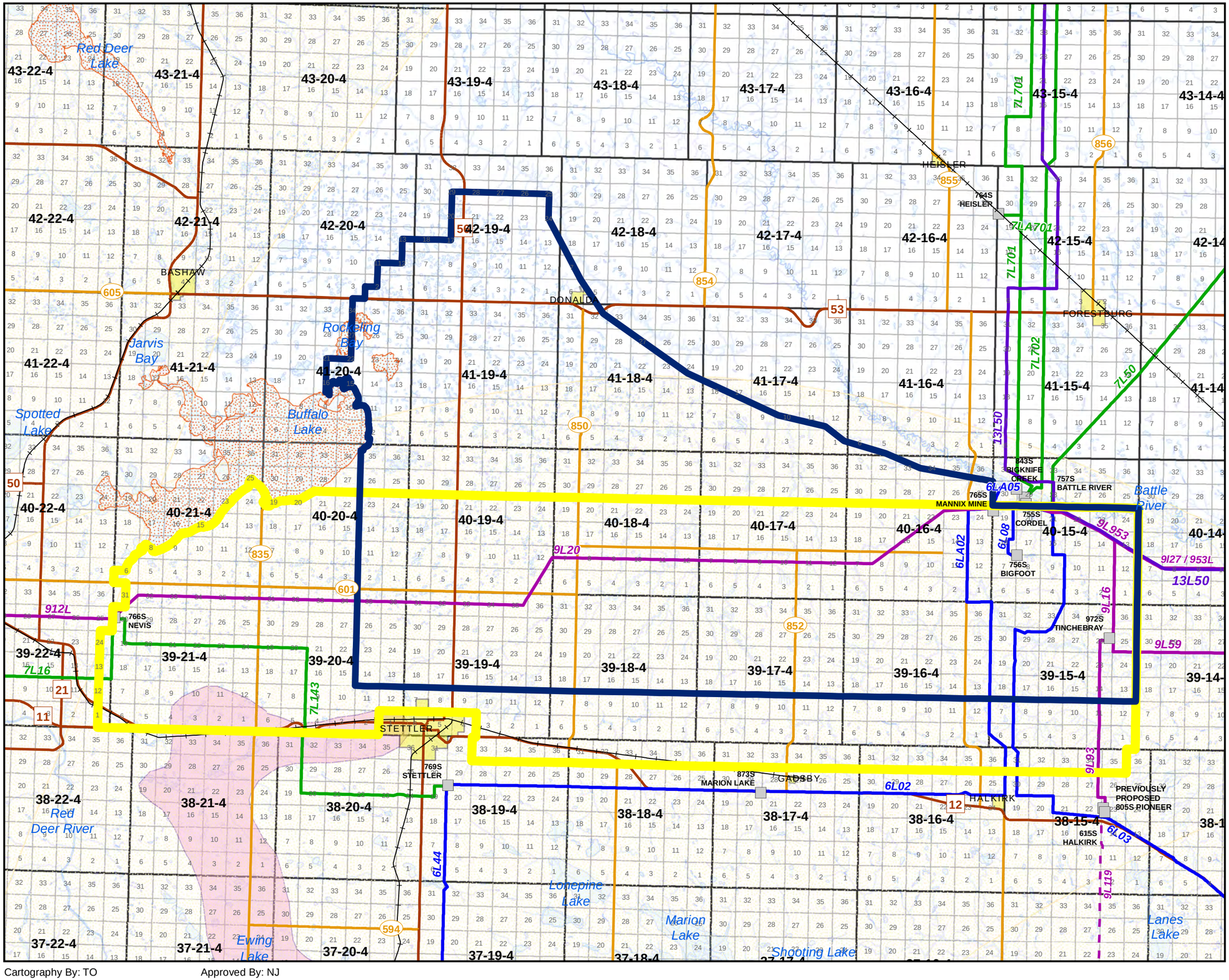
1:250,000

DWG.NO. RS - CETO - LIA - 03

Cartography By: TO

Approved By: NJ

May 2018



LEGEND

- Existing 500 kV Transmission Line
- Existing 240 kV Transmission Line
- Previously Proposed 240 kV Transmission Line
- Existing 144 kV Transmission Line
- Existing 72 kV Transmission Line
- Existing / Previously Proposed Substation
- Railway
- Primary Highway
- Secondary Highway

Study Areas

- CETO Option 1
- CETO Option 2

Wildlife

- Sensitive Raptor Range
- Piping Plover Waterbodies
- Important Bird Areas

Both Study Areas are entirely within Sharp-tailed Grouse Range

CREDIT NOTES

Project Reference Area: ATCO April 2018, Electrical System: ATCO 2018, Base Data: Alberta Data Partnerships 2018, Wildlife: AEP (GOA) April 2016, Study Areas: ATCO April 2018

N W E S

NOTES:
- Noted scale is for the base features only. All other features are not to scale.

ATCO

Central East Transfer - Out Land Impact Assessment

WILDLIFE MAP

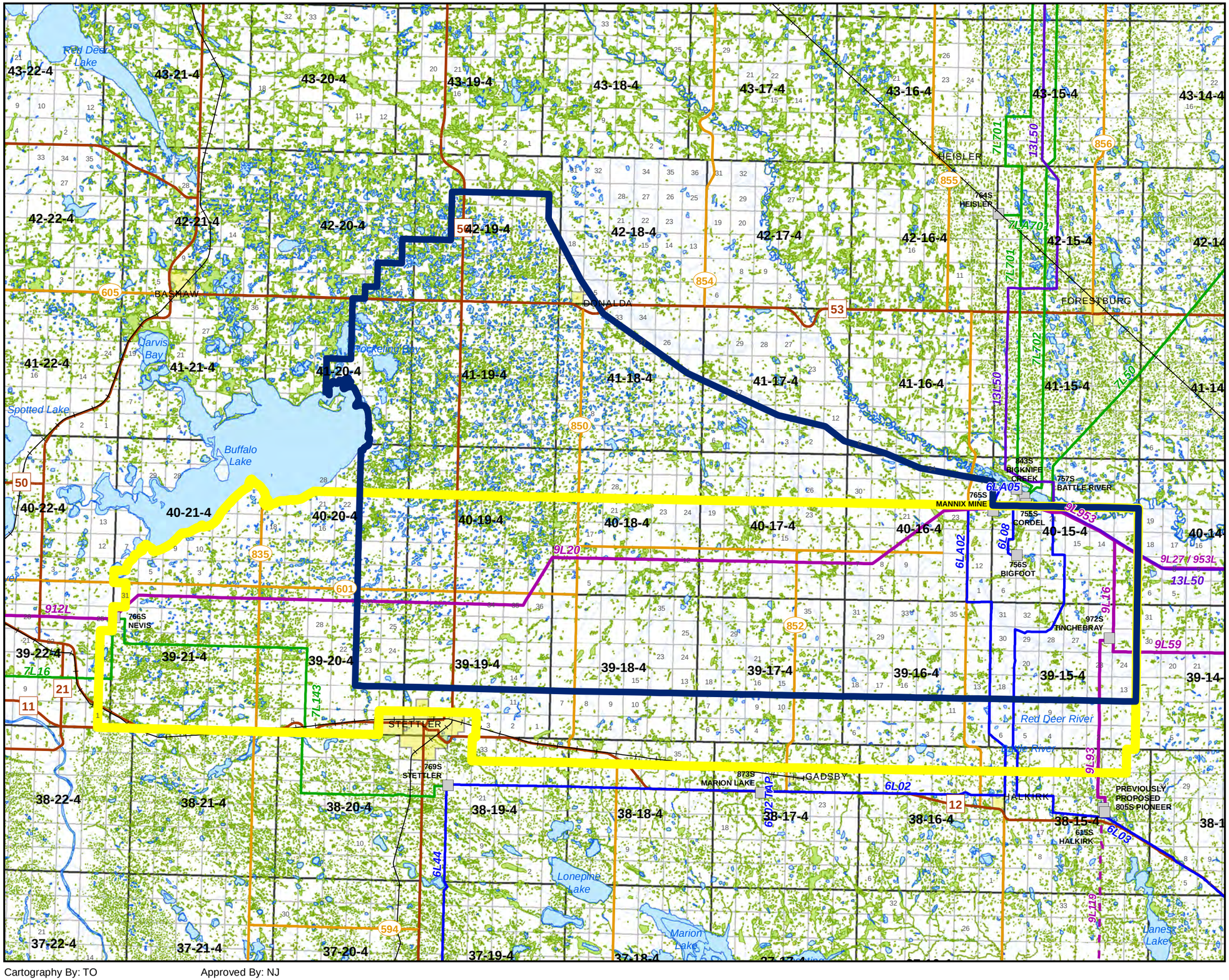
1:250,000

DWG.NO. RS - CETO - LIA - 04

Cartography By: TO

Approved By: NJ

May 2018



LEGEND

- Existing 500 kV Transmission Line
- Existing 240 kV Transmission Line
- Previously Proposed 240 kV Transmission Line
- Existing 144 kV Transmission Line
- Existing 72 kV Transmission Line
- Existing / Previously Proposed Substation
- Railway
- Primary Highway
- Secondary Highway

Study Areas

- CETO Option 1
- CETO Option 2

Wetlands & Waterbodies

- Waterbodies
- Wetlands

CREDIT NOTES
Project Reference Area: ATCO April 2018, Electrical System: ATCO 2018, Base Data: Alberta Data Partnerships 2018, Wetlands: Alberta Merged Wetland Inventory (GOA) 2015, Study Areas: ATCO April 2018

N W E S

NOTES:
- Noted scale is for the base features only. All other features are not to scale.

ATCO

Central East Transfer - Out
Land Impact Assessment

WETLAND & WATERBODIES MAP

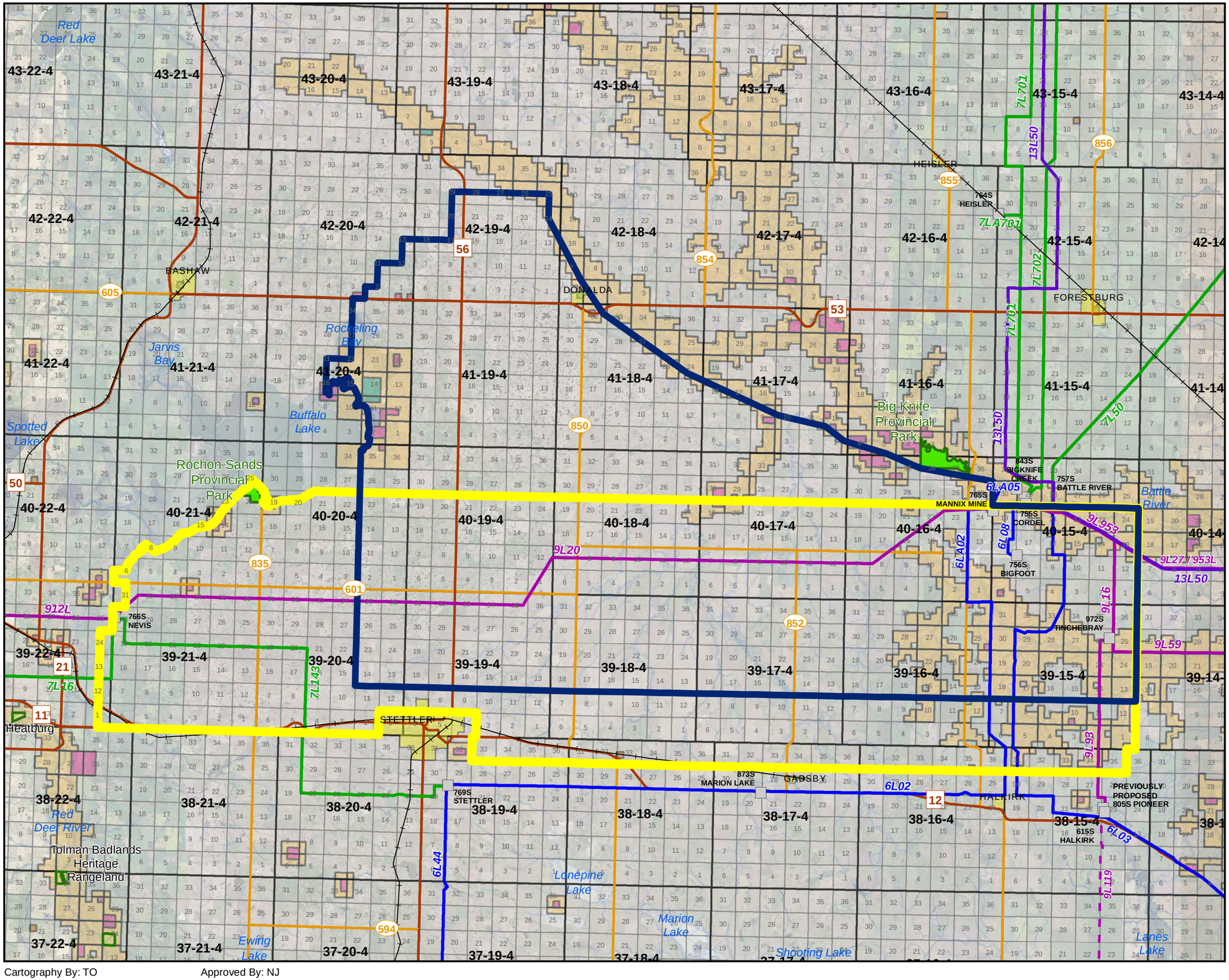
1:250,000

DWG.NO. RS - CETO - LIA - 05

Cartography By: TO

Approved By: NJ

May 2018



LEGEND

- Existing 500 kV Transmission Line
- Existing 240 kV Transmission Line
- Previously Proposed 240 kV Transmission Line
- Existing 144 kV Transmission Line
- Existing 72 kV Transmission Line
- Existing / Previously Proposed Substation
- Railway
- Primary Highway
- Secondary Highway

Study Areas

- CETO Option 1
- CETO Option 2

Provincial & Federal Protected Areas

- Provincial Park
- Natural Area

Historic Resources Listing

- HRV 1
- HRV 2
- HRV 3
- HRV 4
- HRV 5

CREDIT NOTES

Project Reference Area: ATCO April 2018, Electrical System: ATCO 2018, Base Data: Alberta Data Partnerships 2018, Provincial & Protected Areas: Alberta Data Partnership 2018, Historic Resources Listing: GOA April 2018, Imagery: Valtus Services 2011 - 2015, Study Areas: ATCO April 2018

N W E S

NOTES:
- Noted scale is for the base features only. All other features are not to scale.

ATCO

Central East Transfer - Out Land Impact Assessment

PROVINCIAL & FEDERAL PROTECTED AREAS MOSAIC MAP

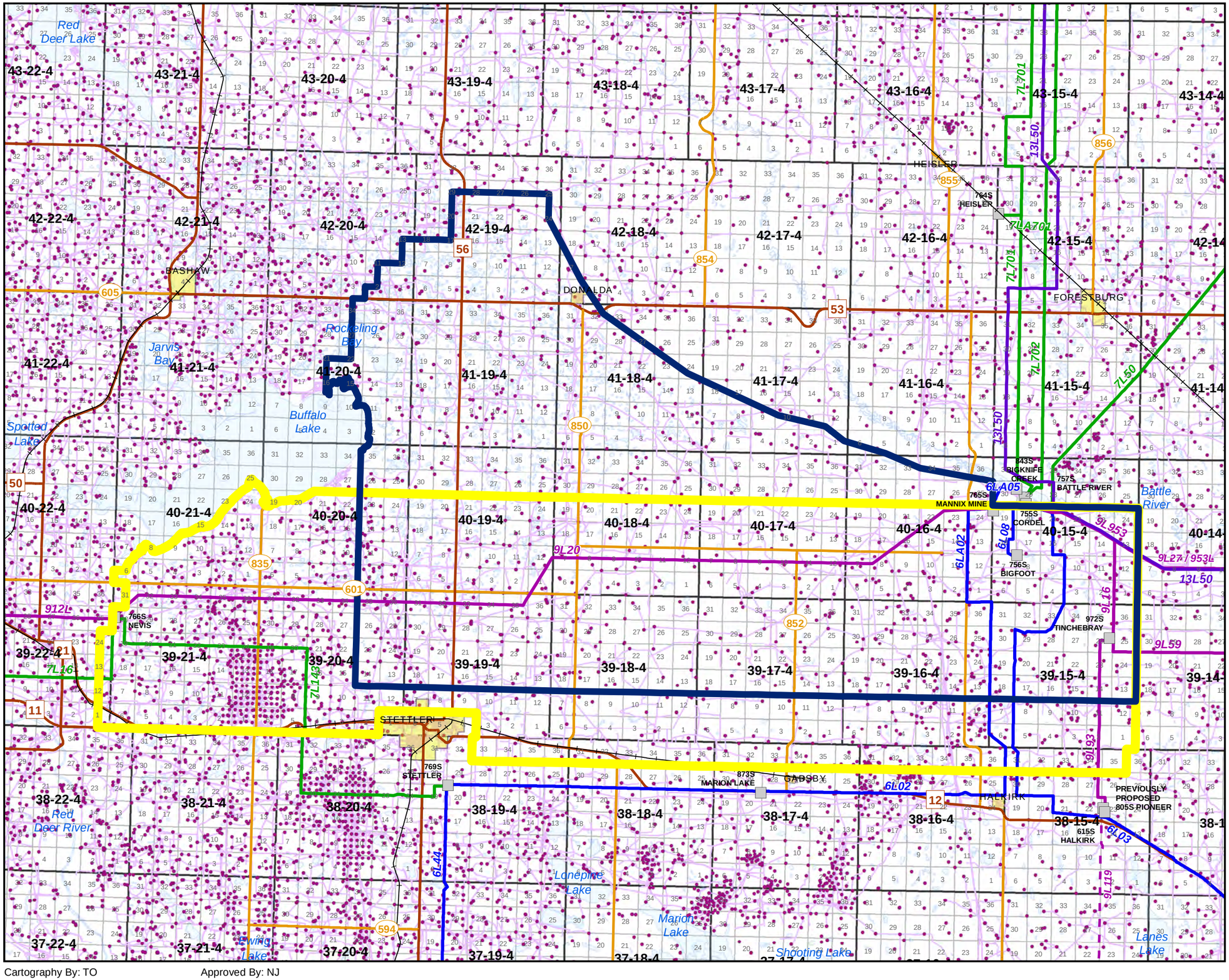
1:250,000

DWG.NO. RS - CETO - LIA - 06

Cartography By: TO

Approved By: NJ

May 2018



LEGEND

- Existing 500 kV Transmission Line
- Existing 240 kV Transmission Line
- Previously Proposed 240 kV Transmission Line
- Existing 144 kV Transmission Line
- Existing 72 kV Transmission Line
- Existing / Previously Proposed Substation
- Railway
- Primary Highway
- Secondary Highway

Study Areas

- CETO Option 1
- CETO Option 2

Pipelines & Wells

- Wells
- Pipelines

CREDIT NOTES

Project Reference Area: ATCO April 2018, Electrical System: ATCO 2018, Base Data: Alberta Data Partnerships 2018,Pipelines & Wells: IHS 2018, Study Areas: ATCO April 2018

N W E S

NOTES:
- Noted scale is for the base features only. All other features are not to scale.

ATCO

Central East Transfer - Out Land Impact Assessment

PIPELINES & WELLS MAP

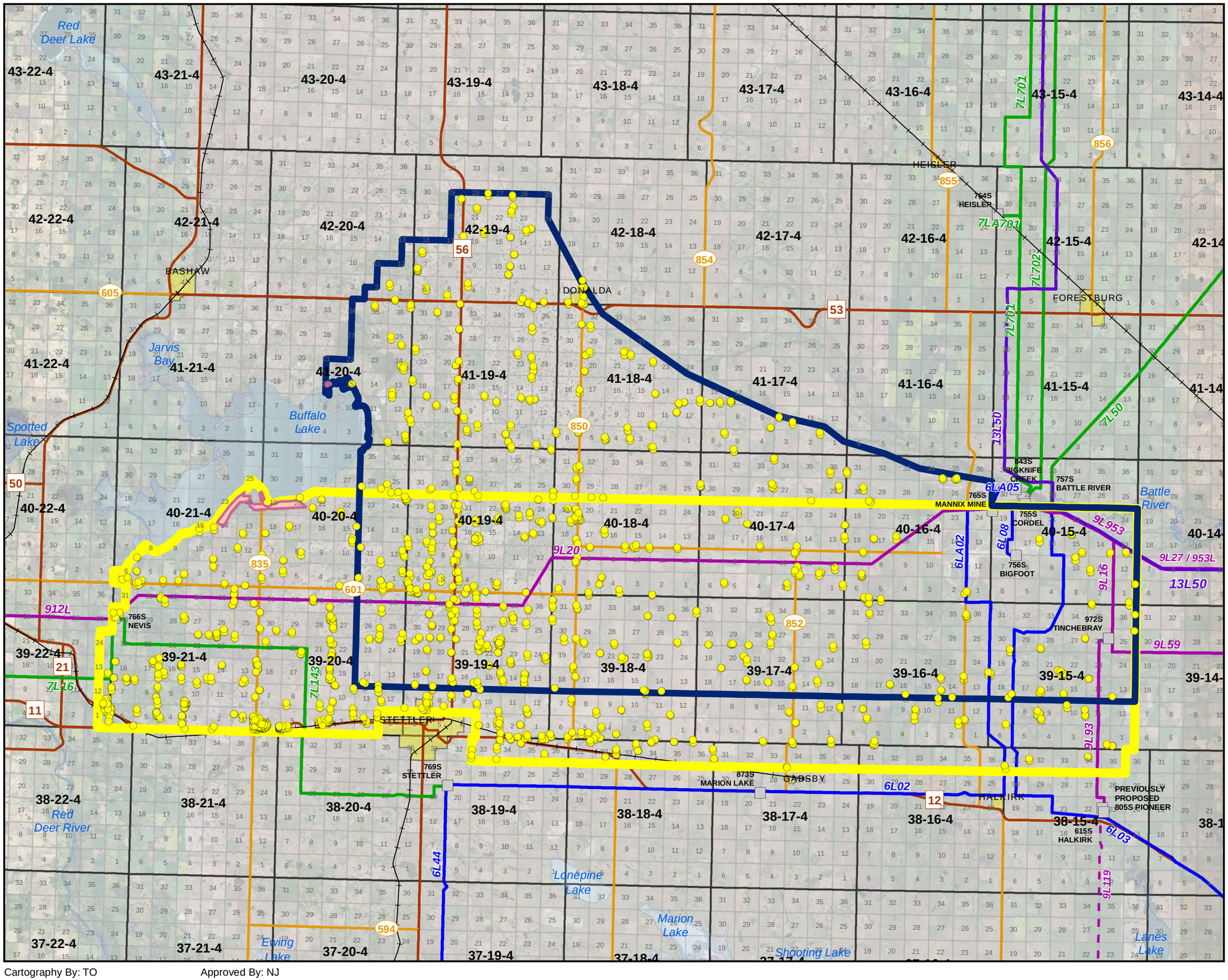
1:250,000

DWG.NO. RS - CETO - LIA - 07

Cartography By: TO

Approved By: NJ

May 2018



LEGEND

- Existing 500 kV Transmission Line
- Existing 240 kV Transmission Line
- Previously Proposed 240 kV Transmission Line
- Existing 144 kV Transmission Line
- Existing 72 kV Transmission Line
- Existing / Previously Proposed Substation
- Railway
- Primary Highway
- Secondary Highway

Study Areas

- CETO Option 1
- CETO Option 2

Roads & Residences

- Residences
- Country Residential

CREDIT NOTES

Project Reference Area: ATCO April 2018, Electrical System: ATCO 2018, Base Data: Alberta Data Partnerships 2018, Imagery: Valtus Services 2012, Study Areas: ATCO April 2018, Residences: ATCO (Plotted from imagery 2012 - 2018)

N W E S

NOTES:
- Noted scale is for the base features only. All other features are not to scale.

ATCO

Central East Transfer - Out Land Impact Assessment

ROAD & RESIDENCES MOSAIC MAP

1:250,000

DWG.NO. RS - CETO - LIA - 08

Cartography By: TO

Approved By: NJ

May 2018

March 11, 2020

Alberta Electric System Operator
2500, 330 – 5th Avenue SW
Calgary, Alberta
T2P 0L4

Attention: Imran Wyeen – Project Manager

Dear Mr. Wyeen,

Re: Environmental & Land Use Effects Evaluation Validity Central Transfer Out Transmission Project (the Project) AESO Project No.7001

ATCO Electric confirms that the conclusions detailed in the Environment and Land Use Effects desktop evaluation dated May 2018 submitted to the Alberta Electric System Operator (AESO) remain valid for the Project. ATCO Electric undertook the evaluation in accordance with the "Central East Transfer Out Project Land Impact Assessment (LIA) Specification" Version V1, dated March 30, 2018 issued by the AESO.

This evaluation can continue to be utilized by the AESO as part of its Needs Identification Document (NID) application for submission to the Alberta Utilities Commission.

Should you have any questions or concerns in this regard, please contact me directly at 403-245-9938 or at owen.ehgoetz@atco.com

Yours truly,

Owen Ehgoetz
Transmission Division
ATCO Electric

Andrada, Josie

From: Imran Wyeen <Imran.Wyeen@aeso.ca>
Sent: Thursday, February 13, 2020 1:44 PM
To: Harmon, Michael; Ehgoetz, Owen
Subject: P7001 - CETO - NID7(9) repots conclusions

Gentlemen,

Please confirm by return email that the conclusions found in their NID7(9) reports submitted in May 2018 still remain valid for this Application and no substantive changes were made to affect the conclusions.

Thanks you.
Regards

Imran Wyeen, P. Eng., MBA, PMP, RMP
Project Manager, Transmission System Projects,
Direct: 403-233-4688 | Cell: 403-473-6544

Alberta Electric System Operator (AESO)

Attachment 3: Option 1 and Option 6 prepared by ATCO Electric Ltd.

March 11, 2020

Alberta Electric System Operator
2500, 330 – 5th Avenue SW
Calgary, Alberta
T2P 0L4

Attention: Imran Wyeen – Project Manager

Dear Mr. Wyeen,

Re: In Consideration of the Aspects of AUC Rule 007, Section 6.1, NID7(9) - Land Impacts for Adding One (1) 240 kV Transmission Circuit to Cordel 755S Substation as Part of the Central East Transfer Out Transmission Project

In an email dated February 24, 2020, the Alberta Electric System Operator (AESO) requested ATCO Electric Ltd. (AET) to comment on differences in the potential land impacts associated between the following routing options:

Option A: Construct one 240kV double circuit transmission line from Tinchebray 972S to the ATCO/AltaLink service boundary.

Option B: Construct one 240kV double circuit transmission line from the ATCO/AltaLink service boundary to a common point near Cordel 755S Substation and Tinchebray 972S Substation. Construct approximately 12 km of new 240 kV single circuit transmission line from the common point to Cordel 755S Substation. Construct approximately 15 km of new 240 kV single circuit transmission line from the common point to Tinchebray 972S Substation.

The AESO requested ATCO compare and comment on the above based on ATCO's Environmental & Land Use Effects assessment[1] for the Project in support of the AESO's Needs Identification Document.

From a land impact perspective, Option B adds an additional 12km of linear line length relative to Option A. This additional line length increases the number of impacted land parcels, and will therefore have a greater land impact as the linear line distance increases construction impacts by an additional ~12 km from the common point to Cordel 755S substation – an alignment that is not impacted in Option A. This resultant addition of linear line length is compounded with the additional land impacted for construction and operation of a single circuit wood H-Frame transmission line – typically a 34m right of way. The proposed double circuit steel monopole contemplated for Option A requires a typical 24m right-of-way. The table below is a quick-reference land impact comparison between Option A and Option B, based on the increase in linear line length and the rights of way discussed above. Per the table, Option B increases the total impacted land area by more than 30% (*(Total ha for Opt A – Total ha for Opt B)/ Total ha for Opt A*).

[1] Central East Transfer-Out (CETO) AESO, Project No. 7001, Environmental & Land Use Effects, A Desktop Evaluation for AUC Rule 007 (NID7(9) Report, May 2018

	Option A	Option B - Split Circuit		
	D/C Steel Mono	D/C Steel Mono	S/C to 972S	S/C to 755S
Line Length (km)	75	60	15	12
ROW Width (m)	24	24	34	34
Sub Total Area (ha)	180	144	51	40.8
TOTAL Land Area	**180**	**235.8**		

Should you have any questions or concerns in this regard, please contact me directly at 403-245-9938 or at owen.ehgoetz@atco.com

Yours truly,

Owen Ehgoetz
Transmission Division
ATCO Electric