APPENDIX E INFORMATION REGARDING RULE 007, SECTION 6.2.1 – NID7(9)

NID7 (9) Report

Land Impact Assessment for the Central Region Transmission Reinforcement

Presented to the Alberta Electric System Operator (AESO) in Support of the AESO Need Identification Document

August 31, 2016

EXECUTIVE SUMMARY

The Alberta Electric System Operator (AESO) is contemplating transmission reinforcements in the Wainwright-Vermillion area. These potential reinforcements would be split between AltaLink and ATCO Electric service territories, including a new transmission line running from a point in AltaLink's service territory to a new substation in ATCO's service territory. The AESO has requested AltaLink and ATCO Electric prepare reports addressing the requirements of NID7 (9), of the Alberta Utilities Commission's (AUC's) Rule 007. AltaLink, in collaboration with ATCO Electric, identified study area boundaries for the purposes of carrying out this evaluation. This report addresses AltaLink's components of the AESO's technical solutions.

The three electrical options identified by the AESO have the same start and end points (in terms of AltaLink's scope), but differ in voltage level and the required compliance with AESO Rule 502.2. All three Options identified call for new transmission lines between Edgerton 899S and Hansman Lake 650S Substations, and between Nilrem 574S and a new Drury 2007S Substation in ATCO service territory, a re-termination of 749AL, and modifications to existing substations as required. The new transmission lines would be built at 138 kV as part of the AESO's Option 1; Option 1 contemplates both single circuit structures and double circuit structures with one side strung. Option 2 calls for lines between the same connection points at a 240 kV voltage. Option 2 allows for the relaxation of some elements of AESO Rule 502.2. Option 3 is the same as Option 2, but without the relaxation of AESO Rule 502.2.

The project area is located in east-central Alberta, in the vicinity of the Towns of Provost, Hardisty and Wainwright, extending north to AltaLink and ATCO Electric's service territory boundary. The land uses in the area are primarily agricultural, with some population centers in towns and villages. There are grassland and aspen forest patches throughout the region. Besides agriculture, oil and gas extraction is an important industry in the region. Land ownership is a mixture of crown and private lands.

The Canadian Forces Base (CFB) Wainwright is located within the study area. There are also several protected areas within the study area; these include the Wainwright Dunes Ecological Reserve, the Ribstone Creek Heritage Rangeland, and the Bott Lake and Wallaby Lake Provincial Recreation Areas.

The project would occur within the North Saskatchewan Planning Region. There is currently no regional plan in place for this region; however, development of the plan has begun. In the event that the regional plan is completed and comes into effect during the project, the effect of the regional plan would likely be similar between the three electrical options, given their geographic similarity.

AltaLink has not identified any features on the landscape that would preclude development of any of the three Options under consideration by the AESO. There are a number of features on the landscape where development of new transmission facilities would be expected to create higher impacts; however, these can likely be avoided or mitigated during route development. Given that the electrical Options are geographically similar, AltaLink anticipates that the impacts would be similar in terms of the elements listed in NID7 (9).

One difference between the Options under consideration by the AESO is the difference between 138 and 240 kV voltage levels. Historically, 138 kV structures are of a smaller size and a configuration that can fit in road allowances whereas 240 kV structures have not. Locating transmission lines in road allowance often represents a reduction of impacts, as this avoids interfering with existing land uses or fragmenting the landscape. Option 1 would be anticipated to have somewhat lower potential land impacts than Options 2 and 3, if Options 2 and 3 are located on property. If the transmission lines

considered in Options 2 or 3 are located in a road allowance, and have a similar structure size and right-of-way requirements to Option 1, the land impacts would be similar.

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INTRODUCTION

The AESO is responsible for the safe, reliable, and economic planning and operation of the transmission system within the province of Alberta. The AESO is contemplating reinforcements in the Wainwright-Vermillion area to mitigate transmission system constraints to serving existing and forecast loads. The AESO has requested AltaLink prepare a report on three electrical alternatives that meets the requirements of AUC Rule 007, Section 6.1, NID7 (9).

Scope

The AESO's Central Region Transmission Reinforcement (CRTR) NID Specification identifies three electrical Options that would meet the need for transmission reinforcement in the Wainwright-Vermillion area.

Option 1

Option 1 includes:

- One new 138 kV transmission line between the existing Nilrem 574S Substation and a new Drury 2007S Substation located in ATCO's service territory. AltaLink's ownership of the line would end at the ATCO-AltaLink service territory boundary;
- One new 138 kV transmission line between the existing Hansman Lake 650S and Edgerton 899S Substations; and
- A re-termination of 749AL at the new 138 kV line from Hansman Lake to Edgerton.

Option 1 also includes the options of building the new transmission line between Nilrem 574S to Drury 2007S using either single-circuit structures or double-circuit structures with only one side strung.

Option 2

Option 2 includes:

- One new 240 kV transmission line (initially energized to 138 kV) between the existing Nilrem 574S Substation and a new Drury 2007S Substation located in ATCO's service territory. AltaLink's ownership of the line would end at the ATCO-AltaLink service territory boundary;
- One new 240 kV transmission line (initially energized to 138 kV) between the existing Hansman Lake 650S and Edgerton 899S Substations; and
- A re-termination of 749AL at the new 240 kV transmission line from Hansman Lake to Edgerton.

Option 2 allows for a relaxation of ISO Rule 502.2 with respect to Sections 16, 17 and 21.

Option 3

Option 3 is the same as Option 2, except that it requires full compliance with ISO Rule 502.2.

All three Options include modifications as required to the Nilrem 574S, Hansman Lake 650S and Edgerton 899S Substations. As these modifications are at existing substation sites, minimal land impacts would be anticipated as a result of this work.

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.

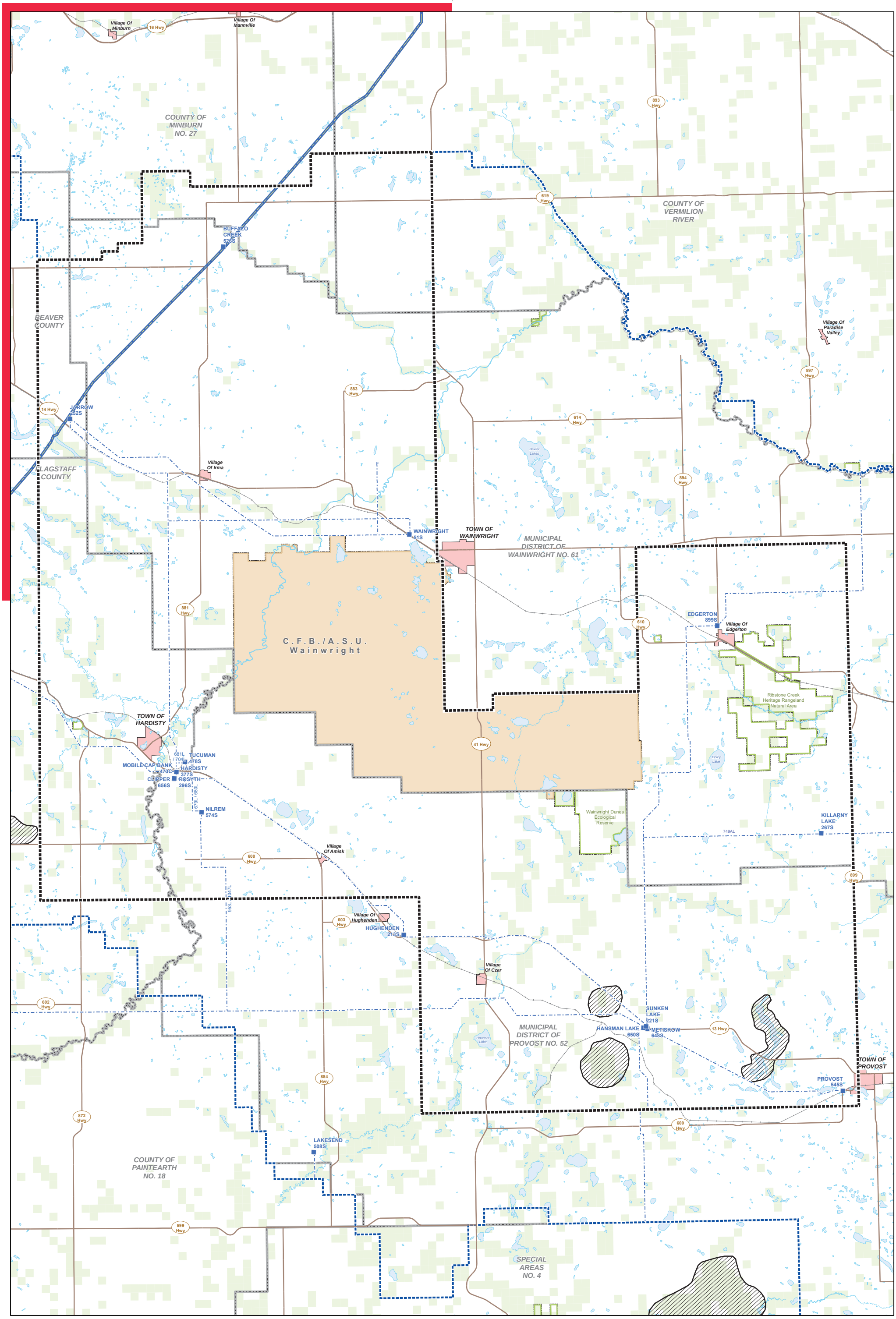
The AESO's three electrical Options for CRTR are located in east-central Alberta, and served as the basis for AltaLink's study area. The southeast corner of the study area is on the edge of the Town of Provost, and the study area extends north and west, to the northwest corner of the MD of Wainwright. The study area can be seen on Figure 1 below.

The north boundary of the study area is set on the service territory boundary between ATCO Electric and AltaLink. AltaLink's portion of the transmission line from Nilrem 574S Substation to Drury 2007S Substation would end in ATCO Electric service territory; ATCO Electric would build their own transmission line from the service territory boundary to a new Drury 2007S Substation. ATCO Electric is preparing a corresponding assessment of the factors identified in NID7 (9) specific to their scope. AltaLink and ATCO conferred on the extent of the study areas to ensure alignment, given each companies respective scope of work.

The west boundary of AltaLink's study area is set on a quarter line approximately 16 km west of the existing Nilrem 574S Substation. Nilrem 574S Substation represents the southwest connection point of the potential transmission line ending at a new Drury 2007S Substation.

The east boundary is set approximately 13 km east of the Edgerton 899S Substation on a road allowance boundary. Edgerton represents the northeast end point of the potential transmission line from Hansman Lake 650S Substation. The study area does not extend as far north as the ATCO service territory boundary in the vicinity of Edgerton 899S Substation, as there is no connection with ATCO Electric associated with this component of the three electrical Options.

The south boundary of the study area is set approximately 8.5 km south of the Hansman Lake 650S and Nilrem 574S Substations, which are the southernmost connection points included in the AESO's three Options.



LEGEND

- Existing Substation
- Existing Transmission Line
- Existing ATCO Transmission Line
- Important Bird Areas
- Study Area
- Railway
- River or Stream
- Road
- AltaLink Service Area
- Environmentally Significant Area
- Military Base
- Municipal or County Boundary
- Other Protected Area
- Urban Area
- Water Body

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DATE: 2016-08-04

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STUDY AREA SAM1

ALTALINK
A BERKSHIRE HATHAWAY ENERGY COMPANY

Figure 1
Central Region Transmission Reinforcement

STUDY AREA ASSESSMENT

AltaLink examined the study area based on the information identified in the AUC's Rule 007, NID7 (9). This report groups the features and characteristics identified in NID7 (9) into four categories: Land Ownership, Land Uses, Environmental Features, and Provincial Land Use Plans. 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.

LAND OWNERSHIP

Private and Public Lands

The study area is located in the White Area of the Province of Alberta, and as such, is composed mainly of private lands, though there are some crown lands throughout the study area. These crown lands include protected areas (as described further below), as well as untitled crown lands and fee-simple lands titled to Provincial agencies.

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).

Federal Lands

Canadian Forces Base (CFB) Wainwright is located within the project study area, and is federal land. Federal lands typically involve much longer timelines in which to obtain required lands rights, which would in turn prolong the required engagement and closure period with all stakeholders affected by a project and increase costs. There is no provincial process available to obtain access to federal lands – permission would need to be granted through the applicable federal agencies. Additionally, on past AltaLink projects, the Department of National Defence has not allowed transmission lines to be located on their lands.

First Nations Reserves and Metis Settlements

There are no First Nation Reserves or Metis Settlements within the study area.

Transportation/Utility Corridors

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

LAND USES

Agriculture

Locating transmission lines on agricultural lands can result in a number of potential impacts, both during construction and throughout operations. These potential impacts include including 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 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.

Approximately half of the study area is composed of cultivated lands, with forage lands, pasture and grassland making up the majority of the remaining area. The total cultivated area within the study area is somewhat variable depending on the dataset used. Agricultural lands are somewhat more concentrated in the northern portion of the study area, in the vicinity of Buffalo Creek Substation, though agricultural land uses occur throughout the region. There are a number of large patches of grasslands within the study area, primarily associated with CFB Wainwright and other protected areas in the study area.

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 people.

While there are residences throughout the study area outside of the urban areas, urban 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.

The Town of Hardisty and the villages of Amisk, Czar, Edgerton and Irma are located within the study area. Additionally, portions of the Towns of Provost and Wainwright are located within the study area. These urban areas are shown on Figure 1.

Industrial

There are oil and gas facilities throughout the study area. There are concentrations of oil and gas and pipeline infrastructure southeast of the Town of Hardisty (northeast of Nilrem), north of the Town of Provost, and north of the Buffalo Creek 526S Substation. 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-impacts perspective.

In addition to oil and gas infrastructure, there are other industrial developments such as sand and gravel pits within the study area; these areas are isolated features on the landscape. There is also wind power in development within the study area which will potentially have a larger footprint. Industrial developments would be considered during siting of new transmission facilities.

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 reduces the fragmentation of the landscape

and environmental features. Locating new transmission lines in road allowance may also avoid a number of impacts, as the road allowance essentially serves as a portion of the right-of-way required for the transmission line, and avoids placing structures on private lands.

There are a number of existing linear disturbances within the study area. Primary highways within the study area include 13, 14 and 41. There are several secondary highways and numerous municipal roads within the study area.

Both ATCO and AltaLink have existing transmission lines in the study area. Where new transmission lines parallel existing ones, the impact of the new line is typically incremental, in that the impacts associated with the presence of a transmission line already exist. There are also two rail lines running approximately southeast-northwest in the study area. Rail lines represent an existing linear disturbance; however, there can also be impacts on the rail line in the form of induction and electrical interference which can be significant enough to preclude long parallels.

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 a number of aerodromes located within the study area. Some of these airports have specific zoning restrictions put in place by the municipality; see Municipal Land Use Plans below for more detail. Interaction with these aerodromes can likely be avoided or mitigated during route development.

Municipal Land Use Plans

AltaLink's study area encompasses parts of six Counties (Vermillion River, Minburn, Flagstaff and Beaver) or Municipal Districts (Provost and Wainwright), all of which have Municipal Development Plans (MDPs) and Land Use Bylaws (LUBs). These documents were reviewed to identify (at a high level) potential conflicts between the electrical solutions identified by the AESO and Municipal Plans.

Beaver County

No area structure plans or area redevelopment plans were identified in the portion of Beaver County covered by the study area. Land use zoning in this area is primarily Agricultural.

County of Minburn

No area structure plans or area redevelopment plans were identified in the portion of the County of Minburn covered by the study area. Land use zoning in this area is primarily Agricultural.

Count of Vermillion River

No area structure plans or area redevelopment plans were identified in the portion of the County of Vermillion River covered by the study area. Land use zoning in this area is primarily Agricultural.

Flagstaff County

Flagstaff County's MDP identifies the area adjacent to the Battle River as environmentally sensitive, which (at least to an extent) aligns with AEP's identification of Environmentally Significant Areas (ESAs). Crossing the Battle River will be unavoidable in building a transmission line between Nilrem and Drury substations, however the impacts of this crossing can likely be minimized by site specific routing and mitigated in the construction and operation of the line.

The Flagstaff County MDP and LUB also identify the area immediately southeast of the Town of Hardisty as intended for industrial uses, with commercial uses planned along Highway 13 in the vicinity of the

town. These land uses are not necessarily incompatible with transmission facilities; there are currently a number of substations and associated transmission lines immediately southeast of Hardisty supporting the existing industrial facilities in the area. Consultation with the County and industrial or commercial owners would be important in the event that a route is identified in this area; site specific route adjustments or mitigations may be required to minimize impacts associated with new transmission facilities.

The Hardisty Airport is located west of the Town of Hardisty. Flagstaff County's LUB identifies an Airport Protection Overlay in the vicinity of the airport, which restricts the height of structures that a development permit can be issued for.

The County has identified much of the remainder of the County covered by the study area as Agricultural.

Municipal District of Provost

The LUB for the MD of Provost identifies an area for future terminal expansion in the vicinity of the Town of Hardisty; this area is adjacent to the planned industrial uses identified by Flagstaff County. The MD of Provost's MDP also identifies future urban fringe development adjacent to the Village of Czar and Town of Provost. Additionally, there are a number of small industrial and country residential areas throughout the county that would warrant consideration during route development.

The Provost Airport is located immediately southwest of the Town of Provost. The MD of Provost LUB identifies an Airport Vicinity Protection Area in the vicinity of the airport, which restricts the height of structures that a development permit can be issued for.

Municipal District of Wainwright

The MDP for Wainwright identifies a policy of encouraging orderly growth of a number of villages and towns in the MD; these include Edgerton, Irma and Wainwright which are located (at least partially) in AltaLink's study area. The Wainwright LUB identifies the areas around Irma, the Town of Wainwright and Edgerton as "Controlled Urban Development Districts". This is consistent with AltaLink's past experience that future development tends to be more likely in the vicinity of urban areas. Future development plans would be considered during route development.

There are a number of small country residential areas and industrial areas located within the study area which would require consideration during route development.

The MDP for the MD of Wainwright also notes the presence of CFB Wainwright within the MD and that this area functions somewhat like an industrial area. The MDP identifies that the MD will encourage the continued operation of CFB Wainwright.

ENVIRONMENTAL FEATURES

The study area is located mainly within the Parkland Natural Region (in the Central Parkland Natural Subregion (CPNS)), with a small portion along the southern boundary falling within the Northern Fescue Natural Subregion (NFNS) portion of the Grassland Natural Region.

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 is highly productive for crops due to the precipitation levels experienced, quality of the soil and growing season temperatures.

The NFNS is approximately 60% cultivated, and 40% native prairie. The main landforms in the portion of the NFNS within the study area are hummocky to rolling hills.

Major 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. Additionally, 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.

The project is located in the Battle River basin. The Battle River and a number of tributaries run through the study area. The Battle River is a Class C watercourse. Routing between the Nilrem 574S Substation and the new Drury 2007S Substation will require the crossing of the Battle River; identifying suitable crossing locations will be a factor considered in route development.

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 likely include some native prairie are primarily concentrated in the vicinity of CFB Wainwright, the Ribstone Creek Heritage Rangeland, the Wainwright Dunes Ecological Reserve and the area north of the Hansman Lake 650S Substation. There are smaller patches of grassland throughout the study area.

Wildlife Sensitivity Areas

There are several key wildlife areas as identified by AEP that fall within the study area. Piping plover breeding areas are associated with waterbodies located in the eastern portion of the study area, including Horseshoe Lake, Hansman Lake and Sunken Lake in the vicinity of the Hansman Lake 650S Substation. AEP has also identified two colonial nesting bird sites within the study area. These sites are known Great Blue Heron nesting sites.

Additionally, AEP’s sensitive amphibian range covers the southeastern portion of the study area, including the Hansman Lake 650S Substation. As such any transmission line routing from the Hansman Lake 650S Substation would pass through sensitive amphibian range. This range is based on a combination of species ranges, based on observations documented in provincial databases.

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 developed Wildlife Sensitivity Mapping Data Sets 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 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 Resource Act. HRV values of 3-5 indicate the presence (or believed presence) of a historical resource that may or may not require avoidance.

There are no areas designated as “HRV 1” within the study area. There are two LSDs identified as “HRV 2” within the study area. One of these sites is in the Village of Amisk, and the other is in the Village of Czar.

Natural Areas/Heritage Rangelands

The Ribstone Creek Heritage Rangeland is located in the eastern portion of the study area, southeast of the Village of Edgerton. Heritage Rangelands are areas set aside to protect sensitive or scenic public land or natural features from disturbance and to maintain them for conservation, recreation and educational purposes. The Ribstone Creek Heritage Rangeland represents a diverse area of sand plains and dunes, fens and wetlands. The area preserves habitat for numerous breeding birds and includes sharp-tailed grouse dancing grounds.

There is also a Protective Notation (PNT) in place on a quarter section of crown land west of the Village of Edgerton on the north side of Highway 610. This quarter section has some development restrictions, as the area has been identified as having potential as a natural area; however it has not (at time of writing) been designated as a natural area through an Order-in-Council.

Ecological Reserves

The Wainwright Dunes Ecological Reserve is located in the eastern portion of the study area, south of C.F.B. Wainwright. Ecological Reserves are public land set aside for preservation for ecological purposes; these are areas that are suitable for research or study, are a representative example of an ecosystem, contain rare or endangered plants or animals or rare biological and physical features.

The Wainwright Dunes is part of a large and varied area of sand dune, outwash and moraine, and contains a number of rare plant species.

Provincial Recreation Areas

There are two areas (Bott Lake and Wallaby Lake) that have PNTs registered by Alberta Parks as having potential as Provincial Recreation Areas (PRA). These areas will have some associated land use restrictions, but have not (at time of writing) been designated as a PRA through an Order-in-Council. Bott Lake is located approximately 5 km west of the Town of Hardisty and is bisected by Highway 13. Wallaby Lake is located immediately west of the Wainwright Dunes Ecological Reserve.

Provincial Parks, Wildland Parks and Wilderness Areas

There are no Provincial Parks, Wildland Parks or Wilderness Areas within the study area. The Willmore Wilderness Park is not within the study area.

Environmentally Significant Areas

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 appear to be more prevalent in the vicinity of large waterbodies and watercourses such as the Battle River.

Federally Protected Areas

There are no federally protected environmental areas within the study area.

Other Environmental Features

There are four Important Bird Areas (IBAs) within or partially within the study area. One is southwest of the town of Hardisty within Flagstaff County, at the west edge of the study area. Three are located west of the Town of Provost, in the vicinity of the Hansman Lake 650S Substation. IBAs are sites that support specific groups of birds and are identified using internationally agreed upon criteria. IBAs do not carry legislative weight, but bear consideration during route development.

PROVINCIAL LAND USE PLANS

The study area is located within the North Saskatchewan Planning Region. 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. The completion date of the North Saskatchewan Regional Plan is unknown. In the event that the regional plan is completed and comes into effect during the project, the effect of the regional plan would likely be similar between the three electrical Options, given their geographic similarity.

ASSESSMENT OF ALTERNATIVES

This section assesses the three Options identified by the AESO with respect to the factors set out in NID7 (9) of the AUC's Rule 007. AltaLink has made a number of assumptions in the evaluation of these options:

- Option 1 calls for the new transmission lines to be built using 138 kV structures, as opposed to Options 2 & 3 which would be built to a 240 kV standard. Generally, 138 kV transmission lines are smaller than 240 kV lines, have narrower right-of-way requirements and often can be located in road allowances. For the purposes of this report, AltaLink assumes that the new 138 kV transmission lines required for Option 1 can be located in road allowance, whereas Options 2 & 3 could be located on property or road allowance depending upon structure type. Locating transmission lines in road allowance is not always a lower impact option. For example, there may be circumstances where due to tree removal or impact to residences road allowance does not represent a lower impact option than locating a transmission line on property; however, using 138 kV structures allows for the option of using road allowance;
- Option 1 also contemplates whether to build single-circuit structures or double-circuit structures with only one circuit strung. Building double-circuit structures with only one side strung may be a lower impact option taking into account future transmission projects; in the event that another line is required between the same points, the second side of the structures can be strung with no new land impacts beyond those related to construction. That is a reduction of impacts for a future development; however, AltaLink anticipates that the land impact between these two options would be equivalent when considering this project alone; and
- The only difference between Options 2 & 3 is the degree of compliance with AESO Rule 502.2. Based on preliminary assessment the structure types would be similar between Options 2 and 3. As such, AltaLink anticipates these two Options would have comparable land impacts. If a relaxation of portions of AESO Rule 502.2 allowed Option 2 to be constructed with structures of comparable size and right-of-way as Option 1 (i.e. that can fit within road allowances) AltaLink anticipates that the land impacts would be similar to Option 1.

While it is anticipated that a number of impacts can be avoided during route selection (for all 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.

The assessment of electrical Options in this report is based on the information available at a desktop level. AltaLink has not contacted any of the applicable government agencies regarding the project, or conducted any public consultation. Field verification and consultation with landowners and agencies will provide additional information about the project area that will influence route development. Changes in regulations, statutory plans or legislation may impact the project, but would be expected to impact all three electrical Options in a comparable fashion given their geographic similarity.

Land Ownership

Given the scattered distribution of crown lands throughout the study area, it is unlikely that any of the Options will be able to principally utilize crown lands as opposed to privately owned lands. AltaLink anticipates that the Federal lands in the study area (CFB Wainwright) can be avoided during route development. There are no First Nations, Metis or other lands that are unique from a land-ownership standpoint within the study area.

Land Uses

Given the distribution of agricultural lands throughout the project area, and the identical start and end points for the new transmission lines amongst the options, AltaLink anticipates there is potential for some agricultural impacts amongst all three Options. Building new transmission facilities can impact agricultural land uses. For example, having to navigate around transmission structures can result in decreased efficiency of farming operations. These types of impacts can often be mitigated by locating new transmission facilities on the margins of properties (along quarter line) or adjacent to existing linear disturbances. Siting the transmission line in road allowances or highway rights-of-way also avoids impacting existing land uses. This factor favours Option 1, in terms of being a lower impact option, though there are mitigations available for constructing a 240 kV transmission line.

The right-of-way width required for 138 kV transmission lines tends to be a narrower than the right-of-way required for 240 kV transmission lines, and have a smaller disturbance footprint. As a result, the impacts related to the presence of the right-of-way and construction of the structures are anticipated to be lower with 138 kV transmission lines than with 240 kV transmission lines. A transmission line with a narrower right-of-way would take away less land for development (be it industrial, residential or other). Where transmission lines are located in road allowance, the road allowance itself essentially serves as a portion of the right-of-way required for the transmission line, and there are often setbacks for other development from the boundaries of a road allowance. This also contributes to Option 1 being a lower impact alternative than Options 2 & 3.

AltaLink expects some potential for residential impacts associated with any of the three Options. Generally, urban settings represent areas of greater potential for residential impact, compared with rural areas. The Village of Edgerton is located approximately 400 m to the south of the Edgerton 899S Substation, the end-point of one of the new transmission lines. Likewise, the Town of Hardisty is located northwest of the existing Nilrem 574S Substation. The proximity of these urban areas to the end points of the potential transmission lines represent places where a greater potential for residential impact exists. Otherwise, residential impacts can likely be minimized through route selection and mitigated or compensated for in the design and construction stages.

One difference in the potential for residential impacts is that the smaller 138 kV structures assumed for Option 1 would be expected to have less visual impact than the larger structures assumed for Option 2 & 3.

Environmental Features

AltaLink anticipates that Protected Areas and discrete environmental features warranting avoidance can be avoided in route development for all three Options. However, some distributed features like grasslands, small wetlands and ESAs would likely be crossed by the new transmission lines. Due to the widespread nature of these features, crossing them may represent lower impact options than the offsetting impacts associated with avoiding them. This likelihood is greater for Options 2 and 3, given AltaLink's assumption that they would be located on property, as opposed to in road allowance.

Provincial Land Use Plans

As the North Saskatchewan Regional Plan has not been completed, it does not favor any one particular electrical Option.

CONCLUSION

The electrical alternatives contemplated by the AESO are similar geographically (they have the same start and end points) and would be expected to traverse the same landscape. As such, the land impacts of the different alternatives are anticipated to be broadly similar. No factors have been identified in this LIA that would preclude the development of any of the alternatives, and AltaLink anticipates that areas warranting avoidance (like protected areas) can be avoided by all three Options.

Locating transmission lines in road allowance often represents a reduction of impacts, as this avoids interfering with existing land uses or fragmenting the landscape. Option 1 would be anticipated to have somewhat lower potential land impacts than Options 2 and 3 if Option 2 and 3 are located on property. If the transmission lines considered in Options 2 or 3 are located in a road allowance, and have a similar structure size and right-of-way requirements to Option 1, the land impacts would be similar. AltaLink has not identified any factors that would preclude any of the Options, from a land impacts perspective.

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Central Region Transmission Reinforcement (CRTR)
AESO Project No. 1781

LAND IMPACT ASSESSMENT

(AUC *Rule 007* NID7(9) Report)

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

August 2016

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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

LIST OF ATTACHMENTS

ATTACHMENT 1 – LAND IMPACT ASSESSMENT

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1.0 INTRODUCTION AND OVERVIEW

1.1 CENTRAL REGION TRANSMISSION REINFORCEMENT PROJECT

On June 24, 2016, The Alberta Electric System Operator (AESO) directed ATCO Electric Ltd. (ATCO Electric) 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 located within ATCO Electric's service territory for the Central Region Transmission Reinforcement (CRTR) project (AESO Project No. 1781). AltaLink Management Ltd. (AML) will also complete a report for the portions of the specification that are within AML's service territory. This report is to be used by the AESO in support of a Needs Identification Document (NID) for the forthcoming CRTR project.

The AESO has directed ATCO Electric to submit this report in accordance with Section 39 of the *Electric Utilities Act*. Copies of the Direction Correspondence, along with the *Central Region Transmission Reinforcement NID7(9) Report and NID-class Cost Estimate Specification (ATCO Electric Ltd.)* are included in Attachment 4.

1.2 REQUIREMENTS OF 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 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 are to be evaluated with consideration to potential impacts on the above listed elements, within respective areas of development (study areas). The report must also identify where development of facilities would be prohibited.

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 CRTR that are within ATCO Electric's service territory. Table 1 outlines some of the key datasets used in the evaluation the alternatives.

TABLE 1: Assessment Features and Spatial Datasets

Assessment Features	Spatial Datasets
Land assessment: public and private, federal, First Nations' reserve land, and transportation utility corridor considerations	IHS EGIS Data; Historic Resource Value Listing – Government of Alberta; Digital Integrated Dispositions System – Government of Alberta 2016
Agricultural and other land use features including native grassland	VALTUS ortho imagery mosaic (2009-2014); Geobase Landcover – Government of Alberta; Grassland Vegetation Inventory
Wildlife sensitivity areas that may be assessed from AEP wildlife sensitivity maps	Hydro Polygon – Alberta Data Partnerships 2016; Canadian Wetland Classification System Merged Wetland – Alberta Environment & Parks 2014; Fish & Wildlife Management Information System – Alberta Environment & Parks 2016

Provincially-protected areas such as provincial parks, wilderness areas, ecological reserves, wildland parks, Willmore Wilderness Park, provincial recreation areas, heritage rangelands and natural areas	Geoadmin Layers – Alberta Data Partnerships 2016
Provincially-designated environmentally-significant areas where maps are available from AEP	FIERA ESA – Alberta Environment & Parks 2014
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	Geoadmin Layers – Alberta Data Partnerships 2016

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 TFO should undertake a comprehensive assessment as defined in section 7.1.1 of *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.

2.0 ALTERNATIVES DESCRIPTION

2.1 REGIONAL CONTEXT

The CRTR area is located mainly within the Central Parkland Subregion of the Parkland Natural Region of Alberta, which is characterized by landforms of undulating till plains and hummocky uplands [see Attachment 2, CRTR Regional Map Dwg. RS-CRTR-LIA-01]. This Subregion is densely populated, with productive agricultural land and conventional petroleum exploration and development occuring throughout. Strip coal mining and gravel extraction activities also occur in the region[1].

The applicable regional land use plan for the area is the North Saskatchewan Regional Plan (NSRP), which is currently in development. Phase 1 Consultation for the plan is complete and the Regional Advisory Council is preparing a Recommendation to Government Report[2]. The *Terms of Reference* for the regional plan outlines strategic directions, including the following:

- Advancing conservation and integrated management of Crown land
- Supporting and enabling stewardship and conservation on private lands
- Promoting efficient use of land by minimizing the amount of lands taken up in the built environment[3]

The NSRP also highlights the need for utility corridors, by stating the following:

- Major transportation and utility corridors offer the opportunity to consolidate critical infrastructure within pre-defined areas, thereby reducing land fragmentation and environmental impacts. There is a need for a robust, reliable and efficient utility and transportation system that will connect the region with the rest of the province and national and international markets[3].

[1] Natural Regions Committee 2006. *Natural Regions and Subregions of Alberta*. Compiled by D.J. Downing and W.W. Pettapiece. Government of Alberta. Pub. No. T/852.

[2] Alberta Environment & Parks, "North Saskatchewan Region". https://landuse.alberta.ca/regionalplans/northsaskatchewanregion/pages/default.aspx (accessed July 4, 2016)

[3] Environment and Sustainable Resource Development – Land Use Secretariat, May 2014. *Terms of Reference for Developing the North Saskatchewan Regional Plan*. Government of Alberta.

2.2 CENTRAL REGION TRANSMISSION REINFORCEMENT ALTERNATIVES

2.2.1 Alternative 1: 144kV Development

Alternative 1 consists of proposed 144kV single and double-circuit transmission lines, as well as proposed new substation development. The typical transmission line structure is assumed to be single-pole davit for the 144kV single and double-circuit lines.

TABLE 2: Alternative 1 Development Options

Connection Options	Transmission Lines	Substations
1-A/B	Single circuit or double circuit one side strung 144kV line from AltaLink service territory boundary (near Buffalo Creek 526S) to Drury 2007S	New Drury 2007S substation is to be considered in one of 3 siting options evaluated below. These options are East (2-B), West (2-A) or North (2-C) of existing Vermilion 710S substation
2-A (Drury West)	In-out connection from nearby 7L65 to Drury 2007 West option	New Drury 2007S substation located West of existing Vermilion 710S substation
	Re-terminate 7L117 to Drury 2007S West option	
	Re-terminate 7L130 to Drury 2007S West option	
	In-out connection from 7L129 to Drury 2007S West option (indicated in the specification as “a second line from Drury to Vermilion” and assumed as the second most cost effective in-out connection)	
2-B (Drury East)	In-out connection from nearby 7L130 to Drury 2007S East option	New Drury 2007S substation located East of existing Vermilion 710S substation
	Re-terminate 7L65 to Drury 2007S East option	
	Re-terminate 7L129 to Drury 2007S East option	
	In-out connection from 7L117 to Drury 2007S East option (indicated in the specification as “a second line from Drury to Vermilion” and assumed as the second most cost effective in-out connection)	
2-C (Drury North)	In-out connection from nearby 7L117 to Drury 2007S North option	New Drury 2007S substation located North of existing Vermilion 710S substation

	Re-terminate 7L65 to Drury 2007S North option	
	Re-terminate 7L129 to Drury 2007S North option	
	In-out connection from 7L130 to Drury 2007S North option (indicated in the specification as "a second line from Drury to Vermilion" and assumed as the second most cost effective in-out connection)	

It is assumed that the use of existing connections to Vermilion 710S substation is favoured over building of new transmission lines. Siting for any of the Drury Substation options will be constrained by specified connections to existing transmission lines.

All substation siting options take into account the land requirements for potential to expand and include 240kV facilities in the future.

2.2.2 Alternative 2: 240kV Development

Alternative 2 consists of proposed 240kV single-circuit and 144kV single and double-circuit transmission lines, as well as proposed new substation development. The typical transmission line structure is assumed to be H-frame for the 240kV single-circuit and single-pole davit for the 144kV single and double-circuit lines.

TABLE 3: Alternative 2 Development Options

Connection Options	Transmission Lines	Substations
2-A	Single circuit 240kV line from AltaLink service territory boundary (near Buffalo Creek 526S) to Drury 2007S	New Drury 2007S substation to be situated West of existing Vermilion, allowing sufficient property for upgrade to a 144/240kV substation
2-A (Drury West)	In-out connection from nearby 7L65 to Drury 2007S West option	New Drury 2007S substation located West of existing Vermilion 710S substation
	In-out connection from 7L129 to Drury 2007S West option	
	Re-terminate 7L117 to Drury 2007S West option	
	Re-terminate 7L130 to Drury 2007S West option	

It is assumed that the use of existing connections to Vermilion is favoured over the building of new transmission lines. Siting for the Drury 2007S Substation will be constrained by specified connections to existing transmission lines.

All substation siting options take into account the land requirements for potential to expand and include 240kV facilities in the future.

2.3 METHODOLOGY

ATCO Electric's evaluation process began with the identification of study areas [see Attachment 2, Study Areas Mosaic Map Dwg. RS-CRTR-LIA-03] that met the technical requirements of the AESO's specification and accounted for large-scale geographic, environmental, and social constraints. A sufficient geographic area was selected in order to ensure that sensitive environmental features and land constraints were identified. Four study areas were selected in order to cover the alternatives.

Geographic Information System (GIS) analysis was completed for each of the study areas, 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.

2.4 COMMON/REGIONAL FEATURES

Routing and siting for all of the alternative configurations are encompassed in an overall Project Reference Area. This is formed by the combination of all of the individual study areas. [see Attachment 2, Study Areas Mosaic Map Dwg. RS-CRTR-LIA-03] As such, all the alternative configurations consider a number common features and constraints within this broad area.

Areas of exclusion for all study areas include the Town of Vermilion and Vermilion Provincial Park. The Town of Vermilion is located in the center of the three substation location options in Alternative 1. The town is considered a major constraint to routing and siting of facilities, due to the concentration of residential development and condensed subdivision of lands. Development through the park is not in keeping with AEP's *Environmental Protection Guidelines for Transmission Lines*, where the guidelines indicate to avoid routing of transmission lines parks and recreation areas[4]. There are other viable options that allow for avoidance of the town and park, while still meeting the electrical requirements of the connections.

[4] Alberta Environment, 2011. *Environmental Protection Guidelines for Transmission Lines*. Government of Alberta.

2.4.1 Land Assessment

All of the study areas are made-up predominantly of private land, with approximately 10% crown land adjacent to major waterbodies such as Vermilion Park Lake (Vermilion River Reservoir). There are no Indian Reserve lands or Metis settlements in any of the study areas.

There are no regionally identified Transportation Utility Corridors. Local highways exist within the study areas, but often present limited opportunities for close collocation, due to imposed setbacks to transmission line development and close proximity of agricultural use.

There are areas of listed Historic Resource Value (HRV) in each of the study areas [see Attachment 3, Prov/Fed Protected Areas Mosaic Map Dwg. RS-CRTR-LIA-07]. These were examined and assessed in detail for each Study area.

2.4.2 Agriculture

There are no Provincial Grazing Reserves and no Native Prairie Vegetation Inventory features [reference AEP NPVI data] in any of the study areas. Protective Notations (PNT's), specifically for the protection of grazing lands, were present in the study areas and were examined and assessed in detail.

2.4.3 Environmental Features

The Fish and Wildlife Management Information System (FWMIS) datasets included a large regional coverage of Sharp Tailed Grouse Survey Area, which covered all of the considered study areas [see Attachment 3, Wildlife Map Dwg. RS-CRTR-LIA-05]. AEP Fish and Wildlife has indicated that Sharp Tailed Grouse populations are in decline, but have no listed management requirements. Surveys for this species meeting the guidelines set out by AEP may be required prior to development in all study areas.

There are numerous watercourses and waterbodies in the collective study areas with noted fish habitat [see Attachment 3, Wetlands & Waterbodies Map Dwg. RS-CRTR-LIA-06]. As all study areas include fish-bearing watercourses, it should be considered that any significant water crossings may require mitigations suitable for the protection of fish habitat. It is also noted that Vermilion Park Pond, a component of the Vermilion River system, is listed for Fish Culture Stocking, including Rainbow Trout, Northern Pike, Spottail Shiner, Yellow Perch and Walleye.

The only other feature found in the FWMIS datasets is a Colonial Nesting Birds layer feature for Great Blue Heron outside of the study areas, to the south, near the confluence of Buffalo Creek and Battle River.

Vermilion Provincial Park is the only provincial park identified across study areas and is considered a constraint to routing and siting of facilities. There are no other features associated with provincially-protected wilderness areas, ecological reserves, wildland parks, heritage rangelands or natural areas in any of the study areas.

There is coverage of the provincial Environmentally Significant Areas sensitivity ranking for all of the study area, with areas ranked as Environmentally Significant in each [see Attachment 3, Environmentally Significant Areas Map Dwg. RS-CRTR-LIA-04]. These were examined and assessed for each study area.

There are no federal parks or wilderness areas in the study areas and the federal order on Greater Sage-Grouse does not apply to this area.

2.4.4 Regional Land Use Plan Considerations

The applicable regional land use plan currently in development is the North Saskatchewan Regional Plan. The stated strategic directions for the regional plan development include integrated management and stewardship of crown and private land, with the intention of minimizing new built infrastructure. The focus for electrical transmission development in the regional plan is on agglomeration of utilities and transportation infrastructure to reduce land fragmentation and environmental impact of development. These considerations are applicable to each alternative in a broad sense, as they support the criteria used for routing and siting of transmission facilities.

2.5 NILREM ROUTING STUDY AREA

Routing for all of the alternative configurations will require either a 144kV or 240kV new line connection from the Drury 2007S substation vicinity to the AltaLink service territory boundary (near Buffalo Creek 526S), with the ultimate intention of connecting to the existing Nilrem 574S AltaLink substation. [see Attachment 2, Study Areas Mosaic Map Dwg. RS-CRTR-LIA-03] As such, all the alternative configurations consider a common Nilrem Routing Study Area, with greater focus on extents of the overall study area.

The Nilrem Routing Study Area encompasses a large area, approximately 56,651 km^2 in the Counties of Vermilion River and Minburn.

2.5.1 Land Assessment

Throughout the Nilrem Routing Study Area, the predominant land use is agricultural, with scattered rural residential associated with major roadways and some concentrated residential settlements. The northeastern portion contains a significant concentration of oil and gas infrastructure, including wells and pipelines [see Attachment 3, Pipelines & Wells Map Dwg. RS-CRTR-LIA-08].

HRV ratings are generally associated with the major river systems and watercourses, with areas of HRV 4 and 5 bisecting the Study Area along the Grizzly Bear Coulee and East Lake [see Attachment 3, Prov/Fed Protected Areas Mosaic Map Dwg. RS-CRTR-LIA-07]. Routing for the Nilrem connection will need to pass though this area.

2.5.2 Agriculture

Agriculture in the study area is primarily cultivated crop, making up more than 50% of the land base. Pasture lands make up approximately 30% of the land base, with less than 5% of the area treed. Pasture is concentrated in the southeastern extent, where scattered wetlands and small waterbodies are prevalent.

There is a minor component of Protective Notations (PNT's) associated mainly with protection of lakeshores and sensitive slopes and topography. These PNT's generally restrict agricultural development to grazing only or no agriculture use.

2.5.3 Environmental Features

The southeastern half of the Nilrem Routing Study Area contains a significant density of wetlands and waterbodies [see Attachment 3, Wetlands & Waterbodies Map Dwg. RS-CRTR-LIA-06]. This will pose a challenge to routing, as the common linear developments in the area tend to follow municipal roadways and quarter section lines. Smaller wetlands may be spanned while larger wetlands may require multiple deflections in order to avoid wet ground incapable of supporting structures. In cases where structures can and will be placed within wetlands, appropriate permitting will need to be obtained.

Vermilion Provincial Park is the only provincial park identified in the Nilrem Routing Study Area, located in the most northern extent. The Park poses a routing constraint to routing of the Nilrem connection to the Drury North option in Alternative 1, where the site is considered to the north of the park.

There is coverage of the provincial Environmentally Significant Areas sensitivity ranking for the entire study area, with several quarter sections classified as Environmentally Significant throughout [see Attachment 3, Environmentally Significant Areas Map Dwg. RS-CRTR-LIA-04]. These classified significant quarter sections are concentrated along the Grizzly Bear Coulee and East Lake, as well as most other watercourses and wetland areas. Routing will need to give focused consideration to best crossing locations to minimize new disturbance. Areas of least environmental significance are correlated to dry areas where cultivated crop is prevalent, as well as areas of intensive oil and gas infrastructure development.

2.6 ALTERNATIVE 1A – DRURY WEST

The Drury West Study Area encompasses an area of approximately 7,138 km^2 in the County of Vermilion River. [see Attachment 2, Study Areas Mosaic Map Dwg. RS-CRTR-LIA-03] The study area incorporates an area to the southwest of the Town of Vermilion, between existing transmission lines 7L65 and 7L129, where siting locations for the Drury West substation option would be considered. Additional area required for routing form the substation vicinity to the existing lines incorporates area to the northwest of the Town of Vermilion. Routing to the north will need to be directed West around Vermilion Provincial Park.

The study area extent considers that the most viable routing solution will be to double-circuit the connections from Drury 2007S substation to existing 7L117 and 7L130, with the 7L130 connection re-utilizing a portion of 7L117 to the northeast of Vermilion 710S Substation [see Attachment 2, Single Line Diagrams Dwg. RS-CRTR-LIA-02a]. Routing for the single circuit or double circuit one side strung 144kV line from the substation vicinity to the AltaLink service territory boundary (near Buffalo Creek 526S) considers the common Nilrem Routing Study Area, with focus on the western extent of the area.

2.6.1 Land Assessment

Throughout the study area, the predominant land use is agricultural, with scattered rural residential development associated with major roadways. The southeastern portion contains a concentration of oil and gas infrastructure, including wells and pipelines [see Attachment 3, Pipelines & Wells Map Dwg. RS-CRTR-LIA-08].

HRV ratings are associated with the Vermilion River system, with areas of HRV 4 and 5 crossing the northern portion of the study area [see Attachment 3, Prov/Fed Protected Areas Mosaic Map Dwg. RS-CRTR-LIA-07]. Routing will need to pass through this HRV area for the connections to 7L117 and 7L130.

2.6.2 Agriculture

Agriculture in the study area is primarily cultivated crop, making up nearly 50% of the land base. Pasture lands make up approximately 25% of the land base, with less than 2% of the area treed. Pasture is common throughout the study area, with some concentration in proximity to the water systems. There are no Protective Notations in the study area.

2.6.3 Environmental Features

The study area contains a comparatively minor proportion of wetlands and waterbodies, generally contained to major water systems and mostly in the southeastern extent or

associated with the Vermilion River system in the north [see Attachment 3, Wetlands & Waterbodies Map Dwg. RS-CRTR-LIA-06]. Routing of line connections to the north will need to be directed West around Vermilion Provincial Park. In cases where structures can and will be placed within wetlands, appropriate permitting will need to be in place.

Vermilion Provincial Park is the only provincial park identified in the study area and is considered a constraint to routing and siting of facilities. The park is located in the northern extent of the study area.

There is coverage of the provincial Environmentally Significant Areas sensitivity ranking for the entire study area, with several quarter sections classified as Environmentally Significant [see Attachment 3, Environmentally Significant Areas Map Dwg. RS-CRTR-LIA-04]. These classified significant quarter sections are concentrated along the Vermilion River system, as well as in the far northern and far southern extent. Areas of least environmental significance are generally south of Highway 16 where cultivated crop is prevalent.

2.7 ALTERNATIVE 1B – DRURY EAST

The Drury East Study Area encompasses an area of approximately 6,621 km^2 in the County of Vermilion River. [see Attachment 2, Study Areas Mosaic Map Dwg. RS-CRTR-LIA-03] The study area incorporates areas surrounding the Town of Vermilion, incorporating a greater extent to the east, where siting locations for the Drury East substation option would be considered [see Attachment 2, Single Line Diagrams Dwg. RS-CRTR-LIA-02b]. Additional area required for routing form the general substation vicinity to the stated transmission line connections along the existing lines incorporates area to the north, west and east of Vermilion. Routing from the east location will need to be directed around the Town of Vermilion, due to residence and subdivision density, and around Vermilion Provincial Park.

The study area extent considers that the most viable routing solution will be to double-circuit the connections from Drury substation to existing 7L117 and 7L130, with the 7L117 connection re-utilizing a portion of 7L130 to the northeast of Vermilion 710S Substation. Routing for the single circuit or double circuit one side strung 144kV line from the substation vicinity to the AltaLink service territory boundary (near Buffalo Creek 526S) considers the common Nilrem Routing Study Area, with focus on the eastern extent of the area.

2.7.1 Land Assessment

Throughout the study area, the predominant land use is agricultural, with scattered rural residential associated with major roadways and significant development within the Town

of Vermilion. The southeastern and eastern areas contain a concentration of oil and gas infrastructure, including wells and pipelines [see Attachment 3, Pipelines & Wells Map Dwg. RS-CRTR-LIA-08]. Established infrastructure associated with Highways 16 and 41, along with development in close proximity, will need to be considered in routing.

Historic Resource Value ratings are associated with the Vermilion River system, with areas of HRV 4 and 5 crossing the northern portion of the study area [see Attachment 3, Prov/Fed Protected Areas Mosaic Map Dwg. RS-CRTR-LIA-07]. Routing will need to pass through this HRV area for the connections to existing 7L117.

2.7.2 Agriculture

Agriculture in the study area is primarily cultivated crop, making up approximately 40% of the land base. Pasture lands make up approximately 25% of the land base, with less than 2% of the area treed. A significant portion or approximately 20% of the study area is taken up by the Town of Vermilion, where agricultural activity is minimal. There are no Protective Notations in the study area.

2.7.3 Environmental Features

The study area contains a moderate proportion of wetlands and waterbodies, mostly associated with the Vermilion River system in the north, but also scattered throughout the southern extent [see Attachment 3, Wetlands & Waterbodies Map Dwg. RS-CRTR-LIA-06]. Wetlands will be a consideration in both routing and the siting of the substation. In cases where structures can and will be placed within wetlands, appropriate permitting will need to be in place.

Vermilion Provincial Park is the only provincial park identified in the study area and is considered a constraint to routing and siting of facilities. The park is located in the northern extent of the study area.

There is coverage of the provincial Environmentally Significant Areas sensitivity ranking for the entire study area, with several quarter sections classified as Environmentally Significant [see Attachment 3, Environmentally Significant Areas Map Dwg. RS-CRTR-LIA-04]. These classified significant quarter sections are concentrated along the Vermilion River system, as well as in the southeastern extent. Areas of least environmental significance are generally south of Highway 16 and either side of Highway 41, where cultivated crop and industrial activity is prevalent.

2.8 ALTERNATIVE 1C – DRURY NORTH

The Drury North Study Area encompasses an area of approximately 6,693 km^2 in the County of Vermilion River. [see Attachment 2, Study Areas Mosaic Map Dwg. RS-CRTR-LIA-03] The study area incorporates areas to the north of the Town of Vermilion, where siting locations for the Drury North substation option would be considered [see Attachment 2, Single Line Diagrams Dwg. RS-CRTR-LIA-02c]. Additional area required for routing form the substation vicinity to the existing lines incorporates area to the north and west of the Town of Vermilion. Routing from the north location will need to be directed around Vermilion Provincial Park.

The study area extent considers that an acceptable routing solution will be to double-circuit the connections from Drury substation to existing 7L117 and 7L130, with the 7L130 connection re-utilizing a portion of 7L117 to the northeast of the Vermilion 710S Substation. Routing for the single circuit or double circuit one side strung 144kV line from the substation vicinity to the AltaLink service territory boundary (near Buffalo Creek 526S) considers the common Nilrem Routing Study Area, with focus on the western extent of the area.

2.8.1 Land Assessment

Throughout the study area, the land use is agricultural, with scattered rural residential associated with major roadways and significant development within the Town of Vermilion. The northeastern and extreme southwestern areas contain oil and gas infrastructure, including wells and pipelines [see Attachment 3, Pipelines & Wells Map Dwg. RS-CRTR-LIA-08]. Established infrastructure associated with Highways 16 and 41, along with development in close proximity, will need to be considered in routing.

Historic Resource Value ratings are associated with the Vermilion River system, with areas of HRV 4 and 5 crossing the northern portion of the study area [see Attachment 3, Prov/Fed Protected Areas Mosaic Map Dwg. RS-CRTR-LIA-07]. Routing will need to pass through this HRV area for the connections to existing 7L65, 7L129 and 7L130.

2.8.2 Agriculture

Agriculture in the study area is nearly evenly distributed with cultivated crop and pasture lands, making up approximately 30% and 25% of the land base, respectively. Less than 5% of the study area treed and a portion or approximately 10% of the study area is taken up by the Town of Vermilion, where agricultural activity is minimal. There are no Protective Notations in the study area.

2.8.3 Environmental Features

The study area contains a moderate proportion of wetlands and waterbodies, mostly associated with the Vermilion River system in the north, but also scattered throughout the northern extent [see Attachment 3, Wetlands & Waterbodies Map Dwg. RS-CRTR-LIA-06]. Wetlands will be a consideration in both routing and the siting of the substation. In cases where structures can and will be placed within wetlands, appropriate permitting would need to be obtained.

Vermilion Provincial Park is the only provincial park identified in the study area and is considered a constraint to routing and siting of facilities. The park is located in the southern extent of the study area.

There is coverage of the provincial Environmentally Significant Areas sensitivity ranking for the entire study area, with several quarter sections classified as Environmentally Significant [see Attachment 3, Environmentally Significant Areas Map Dwg. RS-CRTR-LIA-04]. These classified significant quarter sections are concentrated along the Vermilion River system, as well as around prevalent waterbodies in the northern extent of the study area. Areas of least environmental significance are located to the immediate east of existing 7L117 and in the eastern and southwestern extents, where cultivated crop and industrial activity is prevalent.

2.9 ALTERNATIVE 2

Alternative 2 considers the same study area for the siting of the Drury West option and associated routing, as well as the study area for the Nilrem connection routing. Routing from this substation siting option would concentrate on the western portion of the Nilrem Routing Study Area.

It is assumed that both the 144kV single-circuit and double-circuit line connections throughout both alternatives would be strung on single-pole davit structures. As such, the routing considerations and impacts of both options are effectively the same.

The 240kV single-circuit connection to Nilrem 574S substation considered in Alternative 2 is assumed to be strung on H-frame structures. While this does not change the interpretation of the environmental and land use elements laid out in AUC *Rule 007*, Section 6.1, NID7(9), it does increase the potential for impacts.

All of the constraints identified and discussed in the Nilrem Routing Study Area and Alternative 1A – Drury West description sections (2.5 and 2.6) should be considered for Alternative 2.

3.0 ASSESSMENT OF CONSTRAINTS

The two proposed alternatives described in the specification both present constraints to the development of facilities within ATCO Electric's Service Territory. The following tables outline the constraints and risks associated with the proposed CRTR alternatives.

TABLE 4: Alternative 1 – Constraints and Risks

Connection Option	Constraints	Risks
1-A/B (Nilrem connection) Single circuit or double circuit one side strung 144kV line from AltaLink service territory boundary (near Buffalo Creek 526S) to Drury 2007S	Avoidance of the Town of Vermilion and Vermilion Provincial Park for Nilrem connection routing.	Routing around of the Town and Park may limit routing avoidance options, requiring the TFO to mitigate or offset direct impacts to intersected features.
	High proportion of cultivated crop land.	Potential for moderate impacts to agriculture, due to minor line structure footprint.
	Lightly scattered Protective Notations (PNT's), generally associated with sensitive soils and topography or restrictions to cultivation.	Minimal potential for impact to PNT's, given their nature.
	Moderate proportion of scattered wetlands and waterbodies, generally more prevalent in the eastern extent than in the western extent.	Potential for impacts to wetlands and waterbodies, considering siting requirements of listed substation options.
	Provincial Environmentally Significant Areas (ESA) associated with the Vermilion River system, the Grizzly Bear Coulee and East lake and various watercourses.	Moderate risk of new disturbance to significant areas, reduced with consideration to best crossing locations.
	Unavoidable Historic Resource Value areas for 7L117/7L130 and Nilrem connection routing.	Potential impact to Historic Resource Value features.

2-A (Drury West) In-out connection from nearby 7L65 to Drury 2007S West option	Avoidance of the Town of Vermilion and Vermilion Provincial Park for 7L117/7L130 connection routing.	Routing around of the Town and Park may limit routing avoidance options, requiring the TFO to mitigate or offset direct impacts to intersected features.
	High proportion of cultivated crop land.	Potential for moderate impacts to agriculture, due to minor line structure footprint.
	Lowest proportion of scattered wetlands and waterbodies. Associated Nilrem routing concentrated on western extent, where wetlands and waterbodies are less prevalent.	Lowest potential for impacts to wetlands and waterbodies.
	Provincial Environmentally Significant Areas (ESA) associated mainly with the Vermilion River system and Vermilion Provincial Park.	Reduced risk of new disturbance to significant areas, considering avoidance of Vermilion Provincial Park.
	Unavoidable Historic Resource Value areas for 7L117, 7L130 and Nilrem connection routing.	Potential impact to Historic Resource Value features.
2-B (Drury East) In-out connection from nearby 7L130 to Drury 2007S East option	Avoidance of the Town of Vermilion and Vermilion Provincial Park for all existing line interconnections.	Routing around of the Town and Park may limit routing avoidance options, requiring the TFO to mitigate or offset direct impacts to intersected features.
	High proportion of cultivated crop land.	Potential for moderate impacts to agriculture, due to minor line structure footprint.

	Moderate proportion of scattered wetlands and waterbodies. Associated Nilrem routing concentrated on eastern extent, where wetlands and waterbodies are more prevalent.	Highest potential for impacts to wetlands and waterbodies, considering siting requirements and Nilrem connection routing.
	Provincial Environmentally Significant Areas (ESA) associated mainly with the Vermilion River system.	Moderate risk of new disturbance to significant areas, considering new line routing requirement across Vermilion River for 7L117.
	Unavoidable Historic Resource Value areas for 7L117 and Nilrem connection routing.	Potential impact to Historic Resource Value features.
2-C (Drury North) In-out connection from nearby 7L117 to Drury 2007S North option	Avoidance of the Town of Vermilion and Vermilion Provincial Park, for all existing line interconnections, including Nilrem connection routing.	Routing around of the Town and Park may limit routing avoidance options. Greatest risk of requiring the TFO to mitigate or offset direct impacts to intersected features.
	Moderate proportion of cultivated crop land.	Lowest potential for impacts to agriculture, considering minor line structure footprint and lower proportion of cultivated crop land in area.
	Moderate proportion of scattered wetlands and waterbodies. Associated Nilrem routing concentrated on western extent, where wetlands and waterbodies are less prevalent.	Potential for impacts to wetlands and waterbodies, considering siting requirements of listed substation options.

	Provincial Environmentally Significant Areas (ESA) associated with the Vermilion River system and waterbodies in the northern extent.	Moderate risk of new disturbance to significant areas, considering siting options near existing 7L117 and new line routing requirement across Vermilion River for 7L130.
	Unavoidable Historic Resource Value areas for routing of all existing line interconnections, in addition to two constraint areas on Nilrem routing.	Greatest risk related to impact to Historic Resource Value features.

TABLE 5: Alternative 2 – Constraints and Risks

Connection Option	Constraints	Risks
P2-A Single circuit 240kV line from AltaLink service territory boundary (near Buffalo Creek 526S) to Drury 2007S	Avoidance of the Town of Vermilion and Vermilion Provincial Park for Nilrem connection routing.	Routing around of the Town and Park may limit routing avoidance options, requiring the TFO to mitigate or offset direct impacts to intersected features.
	High proportion of cultivated crop land.	Potential for increased impacts to agriculture, due to greater H-frame line structure footprint.
	Lightly scattered Protective Notations (PNT's), generally associated with sensitive soils and topography or restrictions to cultivation.	Minimal potential for impact to PNT's, given their nature.
	Moderate proportion of scattered wetlands and waterbodies, generally more prevalent in the eastern extent than in the western extent.	Potential for impacts to wetlands and waterbodies, considering siting requirements of listed substation options.
	Provincial Environmentally Significant Areas (ESA) associated with the Vermilion River system, the Grizzly Bear Coulee and East lake and various watercourses.	Moderate risk of new disturbance to significant areas, reduced with consideration to best crossing locations.
	Unavoidable Historic Resource Value areas for 7L117/7L130 and Nilrem connection routing.	Potential impact to Historic Resource Value features.
2-A (Drury West) In-out connection from nearby 7L65 to Drury 2007S West option	Avoidance of the Town of Vermilion and Vermilion Provincial Park for 7L117/7L130 connection routing.	Routing around of the Town and Park may limit routing avoidance options, requiring the TFO to mitigate or offset direct impacts to intersected features.

(repeat of above subsection)	High proportion of cultivated crop land.	Potential for moderate impacts to agriculture, due to line structure footprint.
	Lowest proportion of scattered wetlands and waterbodies. Associated Nilrem routing concentrated on western extent, where wetlands and waterbodies are less prevalent.	Lowest potential for impacts to wetlands and waterbodies.
	Provincial Environmentally Significant Areas (ESA) associated mainly with the Vermilion River system and Vermilion Provincial Park.	Minimized new disturbance to significant areas, considering avoidance of Vermilion Provincial Park.
	Unavoidable Historic Resource Value areas for 7L117, 7L130 and Nilrem connection routing.	Potential impact to Historic Resource Value features.

4.0 COMPARISON OF ALTERNATIVES

4.1 COMMON FEATURES

Both Alternatives 1 and 2, along with all three variants of Alternative 1, share a number of common constraint features and risks at a study area level. All options are constrained in some way by the Town of Vermilion and Vermilion Provincial Park, but routing around these is feasible, with opportunities for avoidance. The study areas cover mostly private land, with scattered residential developments, meaning that private land and residential impacts are chiefly attributable to line length. All of the options considered have opportunities for avoidance of major residential impacts, given the avoidance of concentrated residential developments and town sites. There are no Indian lands or Metis settlements in the study areas.

Oil and gas infrastructure is scattered throughout all study areas. Given the deep sub-surface nature of oil and gas development in the region, these developments are not susceptible to localized sterilization. Transmission facilities can occupy adjacent lands to these developments. It is therefore unlikely that any routing options will have a great impact on oil and gas infrastructure.

Fisheries and wildlife features and habitat are not significantly more prevalent in any of the study areas considered. As the region is heavily developed for agriculture, there are very few treed areas in the area.

Both of the alternatives presented in the specification have the potential to meet the requirements of the NSRP. All study areas evaluated include existing connected developments that will allow for detailed routing and siting with a focus on integration and minimized disturbance from developments. Neither of the alternatives presents a significantly better potential for integration.

4.2 LAND IMPACTS & POTENTIAL MITIGATION MEASURES

The Alternative 1 and 2 – Drury West options are found to have the lowest potential for interaction with wetlands and waterbodies, associated with the western extent of the Nilrem Routing Study Area. They also have a reduced risk of new disturbance to Environmentally Significant Areas.

The Alternative 1 – Drury East option has the highest potential for interaction to wetlands and waterbodies, given the proximity of features in the substation siting area, as well as the western extent of the Nilrem Routing Study Area.

The Alternative 1 – Drury North option requires the greatest amount of routing length, as well as significant routing around and to the north of Vermilion Provincial Park, which

poses constraints to avoidance of sensitive features. This option has the lowest potential for impacts to agriculture, due to the lower proportion of cultivated crop land. It has the highest risk related to impact to HRV features, given the proximity to listed HRV areas.

The 240kV Nilrem connection considered in Alternative 2 has a greater potential for impact to agricultural land use, given the increased footprint of the 240kV typical H-frame structures over the 144kV typical single-pole davit structures. The typical H-frame structure will also limit routing options where a single-pole structure has the advantage of narrower right-of-way and physical structure footprint.

The Alternative 1 substation site options all generally share a similar requirement for new 144kV transmission line routing to connect the proposed Drury Substation to existing lines 7L65, 7L117, 7L129 and 7L130. The difference in line routing requirement comes from the length of connection associated with the Nilrem connection routing. As such, the Alternative 1 – Drury West option will result in the least amount of new transmission line routing, given its closer proximity to a southwest end point of the Nilrem connection routing.

5.0 RECOMMENDATIONS

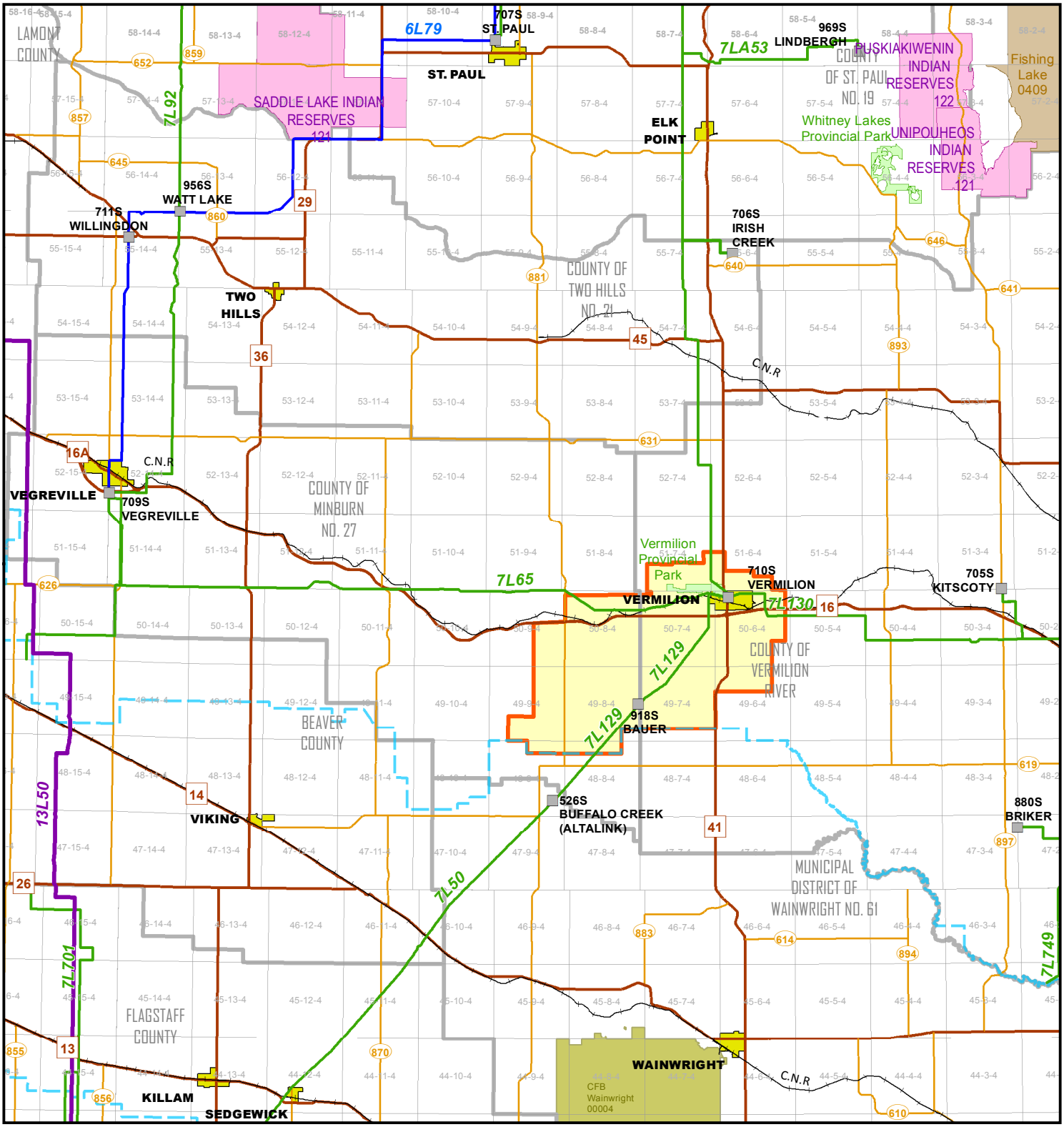
Both Alternatives 1 and 2, as well as all substation site options are found to be feasible from a land impacts perspective. Based on the criteria for evaluation laid out in AUC *Rule 007* NID7(9), the Drury West option of Alternative 1 is found to be of least potential impact due to:

- Least required length of new transmission line
- Lowest potential for impact to wetlands and waterbodies
- Greatest avoidance of Environmentally Significant Areas

Alternative 2, considering the Drury West substation siting option and 240kV Nilrem connection, would have only a marginal increase in impacts over Alternative 1 Drury West option and should also be considered viable.

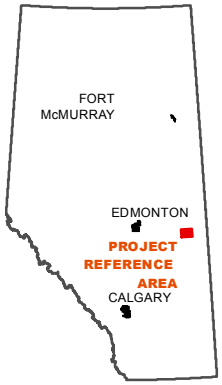
ATTACHMENT 2 - REFERENCE MAPS

CRTR Regional Map (DWG.NO. RS - CRTR - LIA – 01)
Alternative Single Line Diagrams (DWG.NO. RS - CRTR - LIA - 02a-c)
Study Areas Mosaic Map (DWG.NO. RS - CRTR - LIA – 03)



LEGEND

- Project Reference Area
- Existing Substation
- Existing 500 kV Transmission Line
- Existing 144 kV Transmission Line
- Existing 72 kV Transmission Line
- TFO Boundary
- County / Municipal District Boundary



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Central Region Transmission Reinforcement
Land Impact Assessment

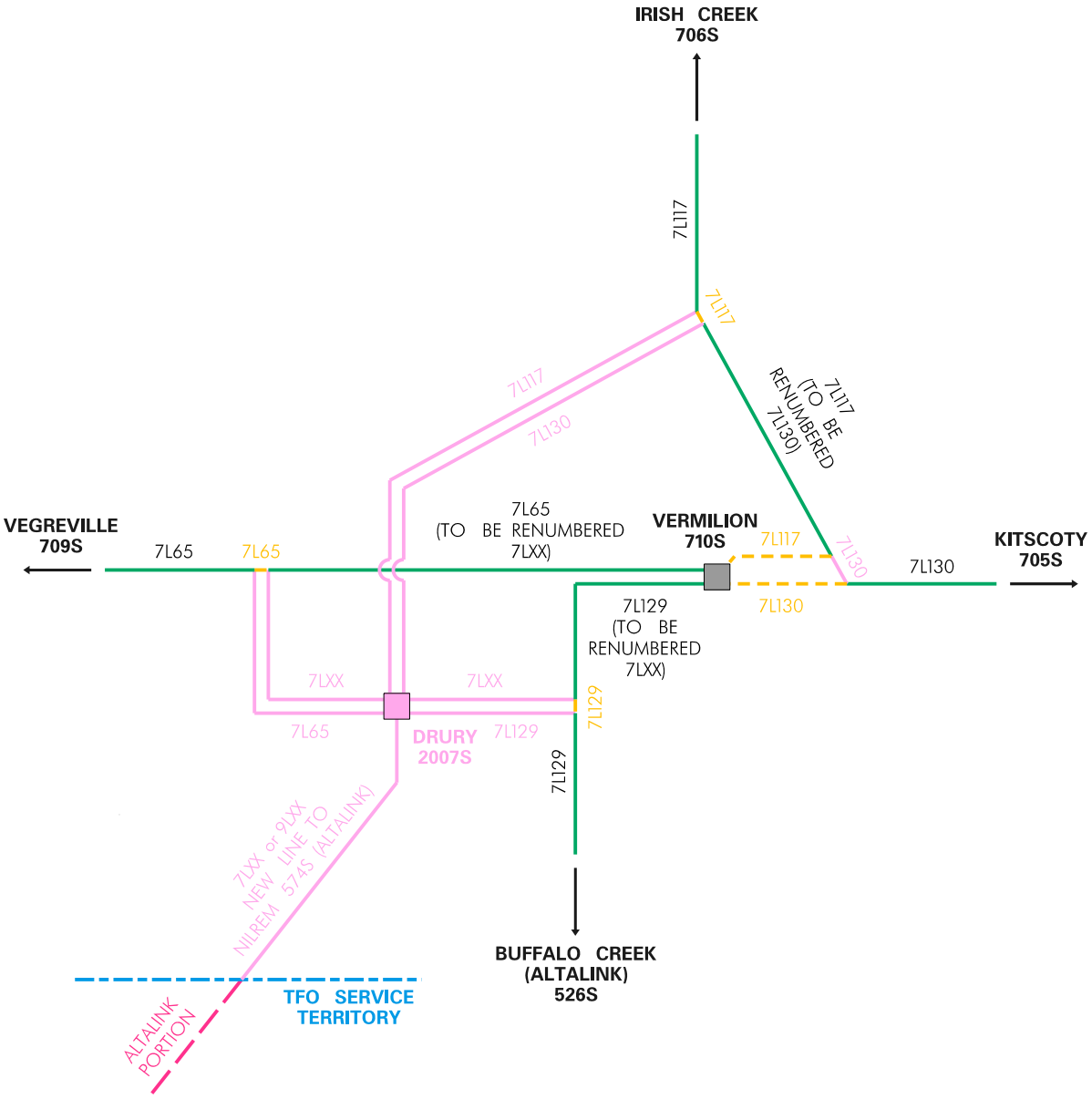
REGIONAL MAP

CREDITS

ProjectReference Area: ATCO July 2016, Electrical System: ATCO 2016, Base Data: Alberta Data Partnerships 2016, Imagery: Valtus Services 2016

Cartography By: JG | Approved By: TM | August 2016 | DWG.NO. RS - CRTR - LIA - 01

DRURY 2007S OPTION "WEST"



LEGEND

- Future 144 or 240 kV Circuit
- Existing 144 kV Circuit
- Circuit To Be Removed
- Future 144/240 kV Substation
- Eixsitng 144 kV Substation

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Central Region Transmission
Reinforcement
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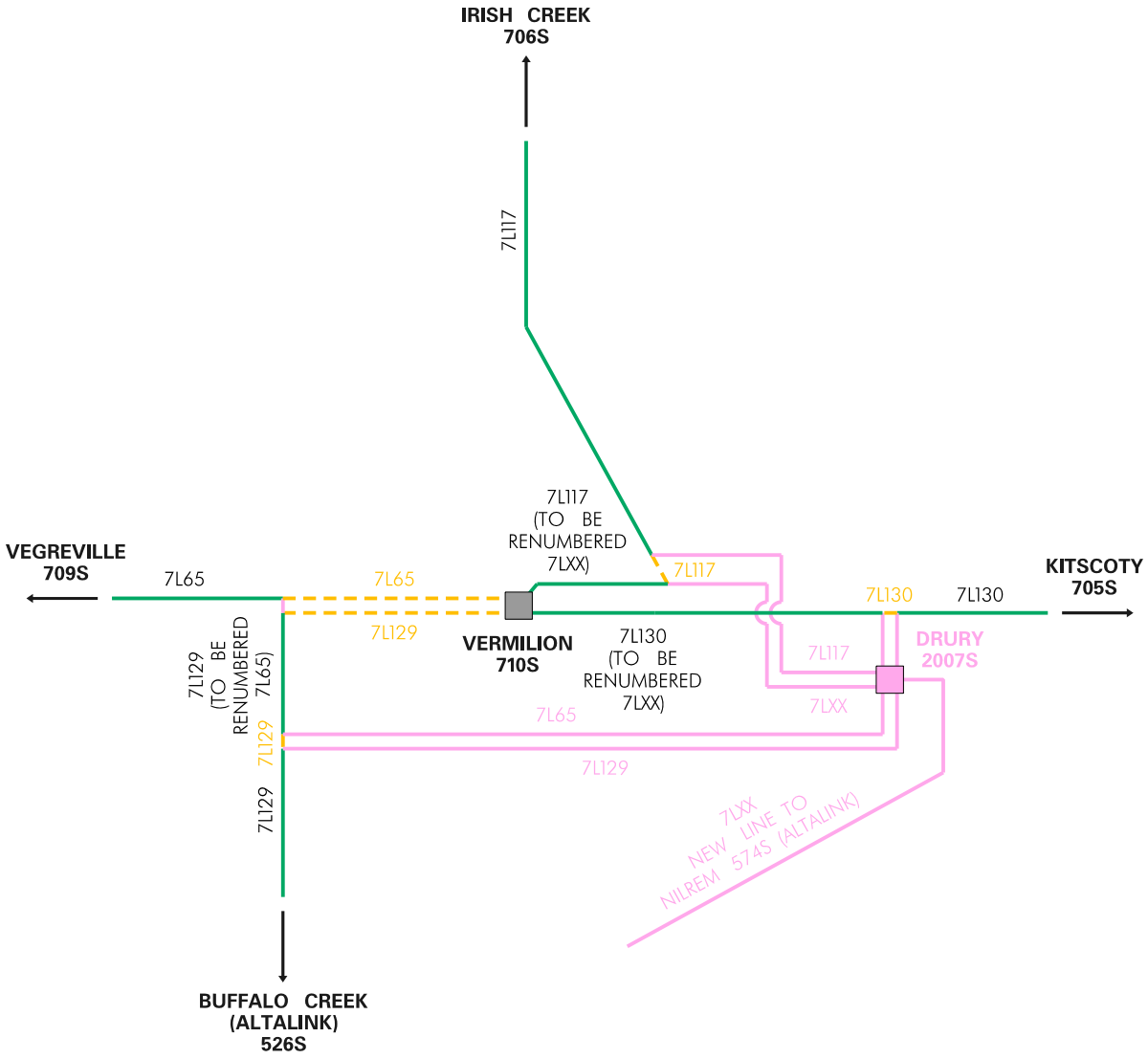
DRURY 2007S OPTION "WEST"
SINGLE LINE DIAGRAM

Drawn by: TF | Approved by: TM | August 2016 | DWG.NO. RS – CRTR – LIA – 02a

DRURY 2007S OPTION "EAST"



LEGEND

- Future 144 kV Circuit
- Existing 144 kV Circuit
- Circuit To Be Removed
- Future 144/240 kV Substation
- Eixsitng 144 kV Substation

ATCO Electric

Central Region Transmission
Reinforcement
Land Impact Assessment

DRURY 2007S OPTION "EAST"
SINGLE LINE DIAGRAM

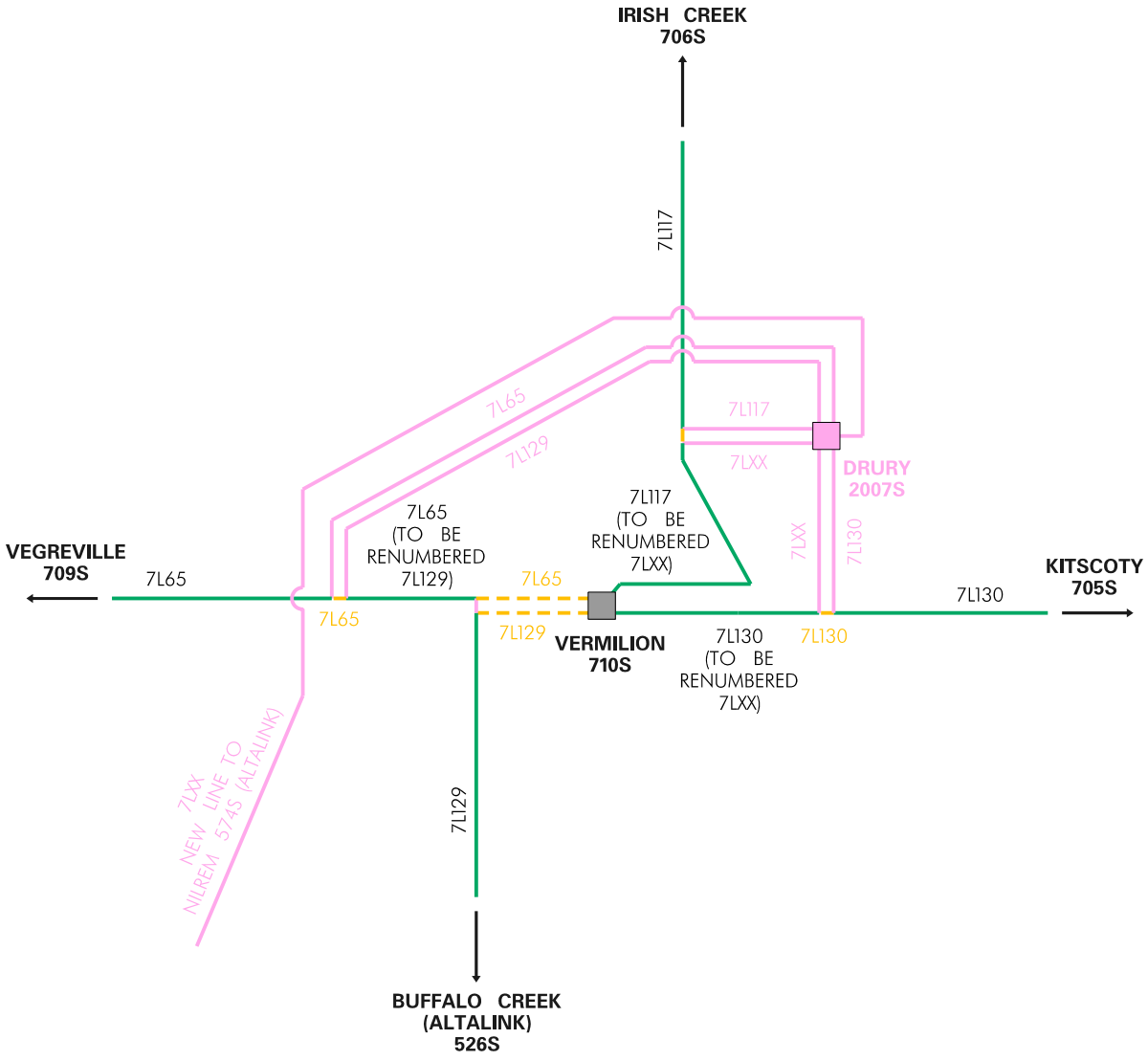
Drawn by: TF

Approved by: TM

August 2016

DWG.NO. RS – CRTR – LIA – 02b

DRURY 2007S OPTION "NORTH"



LEGEND

- Future 144 kV Circuit
- Existing 144 kV Circuit
- Circuit To Be Removed
- Future 144/240 kV Substation
- Eixsitng 144 kV Substation

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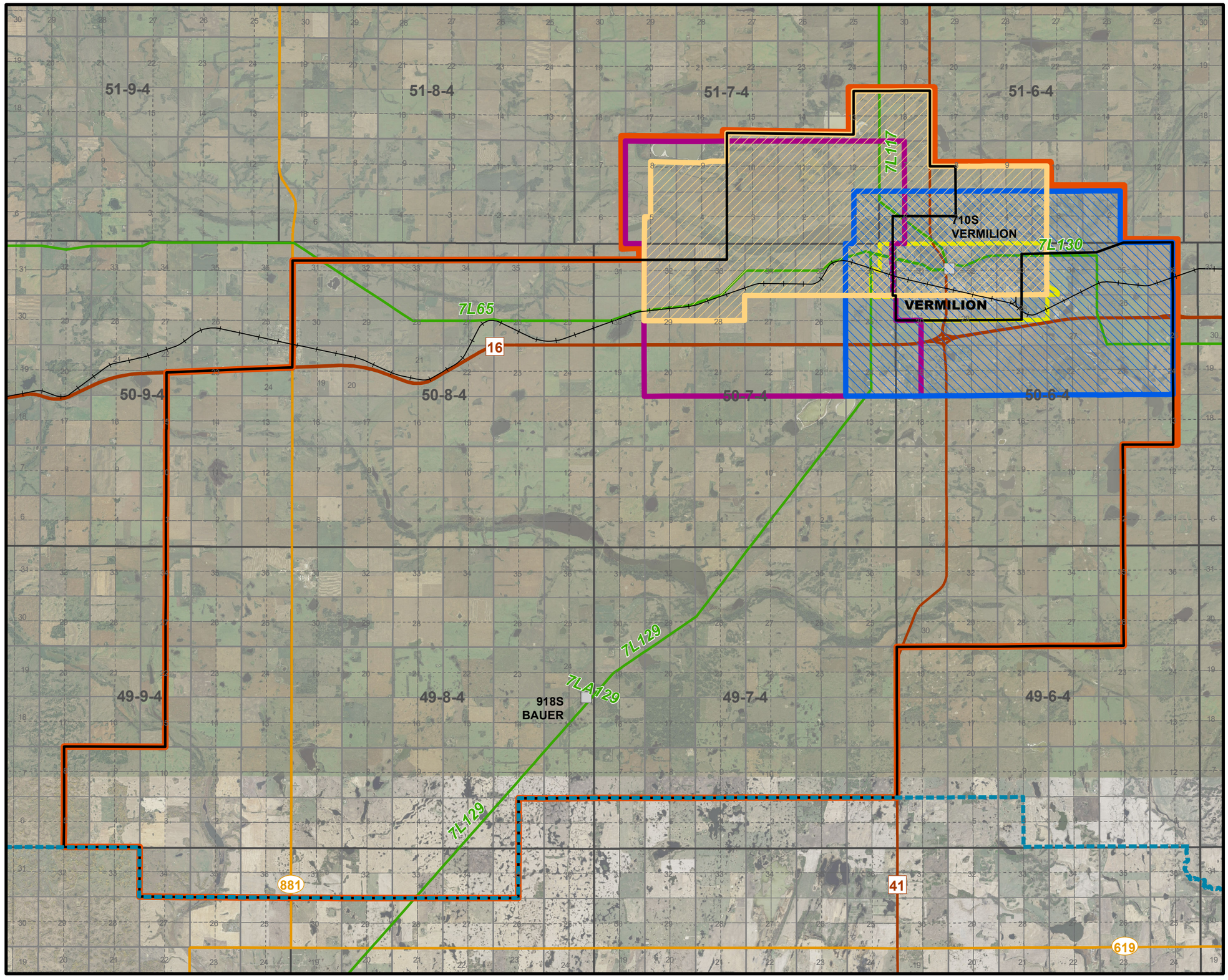
Central Region Transmission
Reinforcement
Land Impact Assessment

DRURY 2007S OPTION "NORTH"
SINGLE LINE DIAGRAM

Drawn by: TF | Approved by: TM | August 2016 | DWG.NO. RS – CRTR – LIA – 02c



LEGEND

- Project Reference Area
- TFO Service Territory
- Existing Substation
- Existing 144 kV Transmission Line
- Existing 72 kV Transmission Line
- Railway
- Primary Highway
- Secondary Highway

Study Areas

- CRTR Nilrem Routing Study Area
- CRTR Drury North Study Area
- CRTR Drury East Study Area
- CRTR Drury West Study Area

CREDITS

Project Reference Area: ATCO July 2016, Electrical System: ATCO 2016, Base Data: Alberta Data Partnerships 2016, Imagery: Valtus Services 2016, Study Areas: ATCO July 2016

N W E S

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

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Land Impact Assessment

STUDY AREAS
MOSAIC MAP

1:120,000

DWG.NO. RS - CRTR - LIA - 03

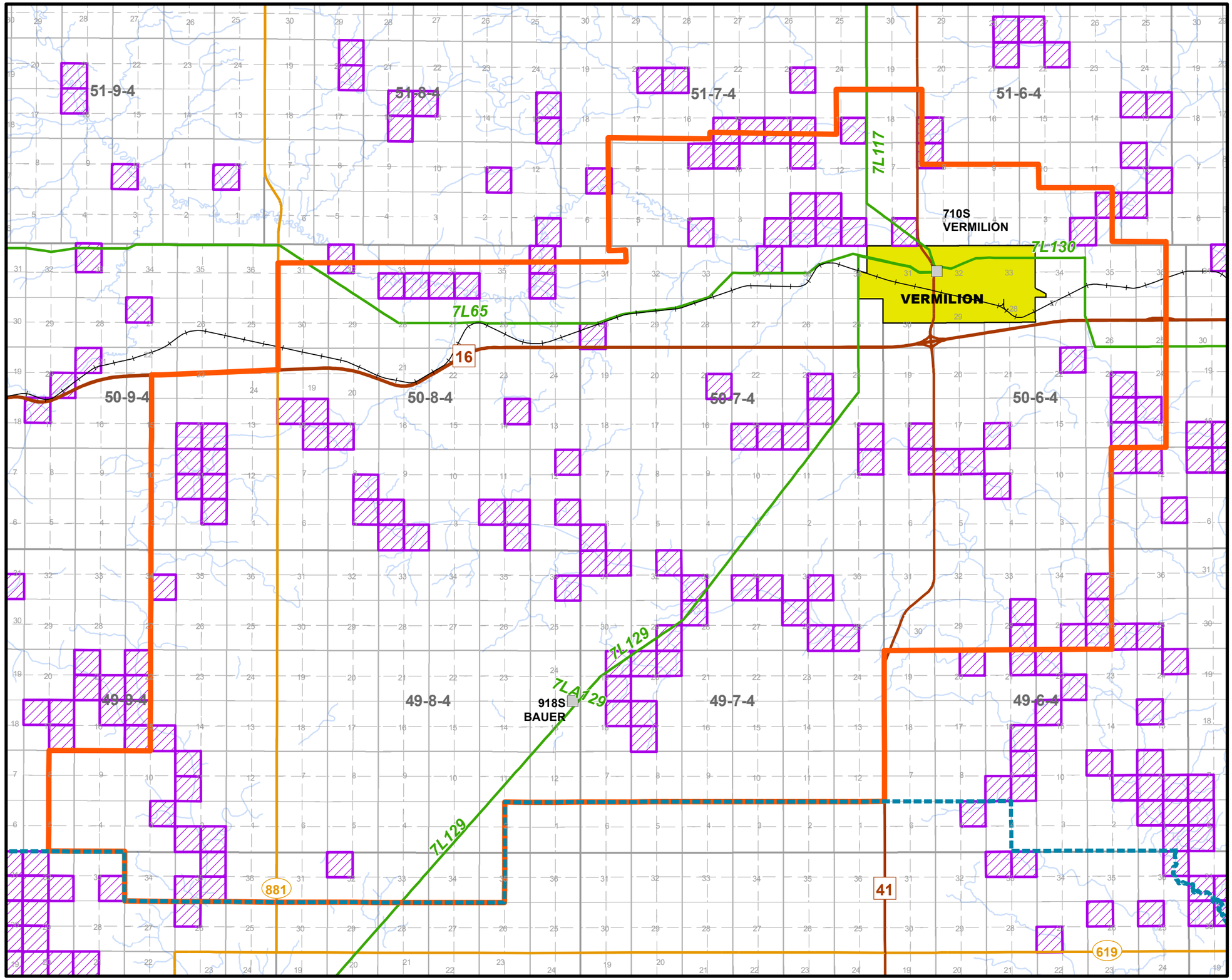
Cartography By: JG

Approved By: TM

August 2016

ATTACHMENT 3 - STUDY AREA CONSTRAINT MAPS

Environmentally Significant Areas Map (DWG.NO. RS - CRTR - LIA – 04)
Wildlife Map (DWG.NO. RS - CRTR - LIA – 05)
Wetlands & Waterbodies Map (DWG.NO. RS - CRTR - LIA – 06)
Prov/Fed Protected Areas Mosaic Map (DWG.NO. RS - CRTR - LIA – 07)
Pipelines & Wells Map (DWG.NO. RS - CRTR - LIA – 08)
Roads & Residences Map (DWG.NO. RS - CRTR - LIA – 09)



LEGEND

- Project Reference Area
- TFO Service Territory
- Existing Substation
- Existing 144 kV Transmission Line
- Existing 72 kV Transmission Line
- Railway
- Primary Highway
- Secondary Highway

ESA

- Environmentally Significant Areas (>0.189)

CREDITS

Project Reference Area: ATCO 2016, Electrical System: ATCO 2016, Base Data: Alberta Data Partnerships 2016, Imagery: Valtus Services 2016, ESA: GOA 2014

N W E S

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

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ENVIRONMENTALLY SIGNIFICANT AREAS MAP

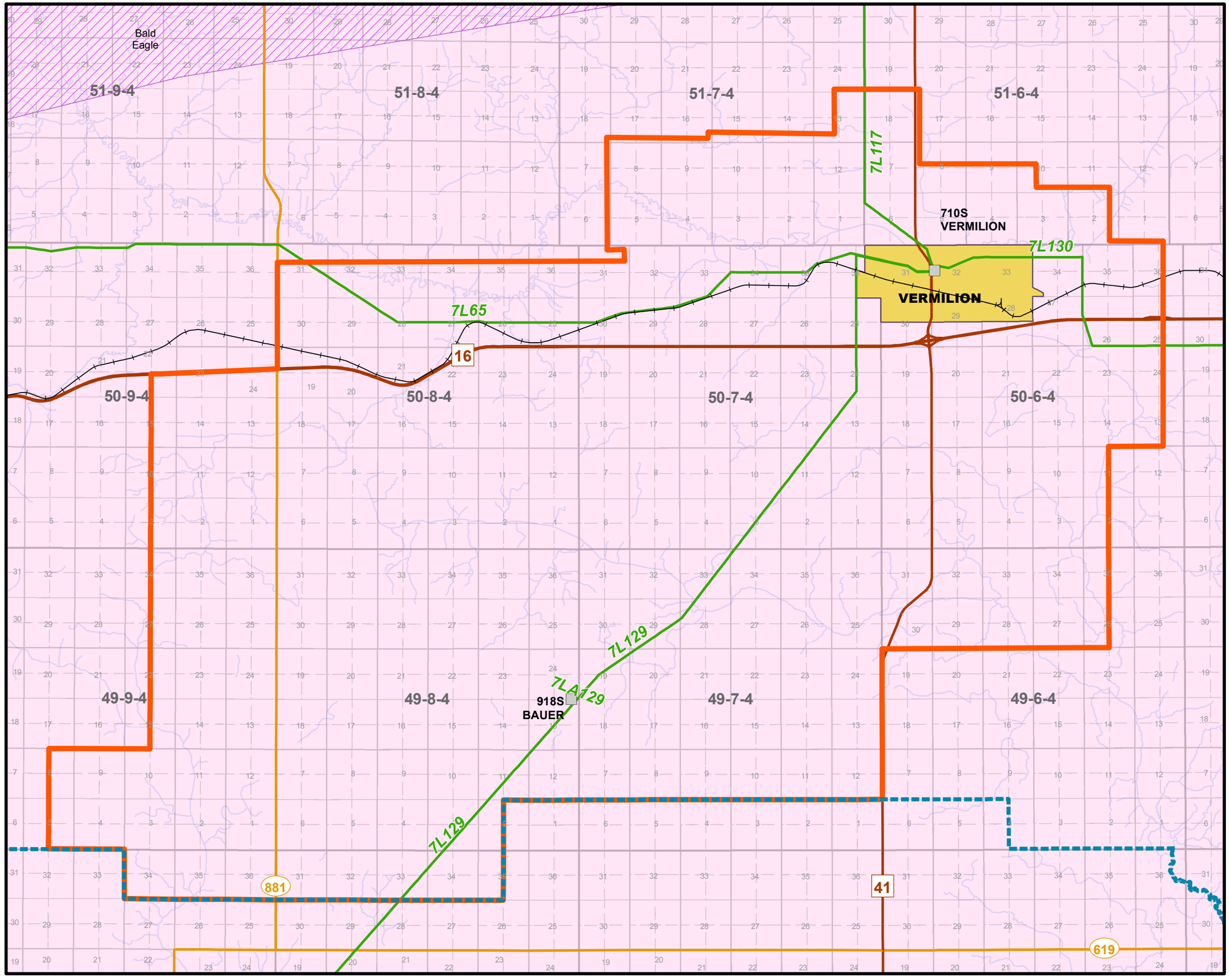
1:120,000

DWG.NO. RS - CRTR - LIA - 04

Cartography By: JG

Approved By: TM

August 2016



LEGEND

- Project Reference Area
- TFO Service Territory
- Existing Substation
- Existing 144 kV Transmission Line
- Existing 72 kV Transmission Line
- Railway
- Primary Highway
- Secondary Highway

Wildlife

- Range Sensitive Raptor
- Habitat Sharp Tailed Grouse

CREDITS

Project Reference Area: ATCO 2016, Electrical System: ATCO 2016, Base Data: Alberta Data Partnerships 2016, Imagery: Valtus Services 2016, Wildlife: FWMIS (GOA) 2016

N W E S

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

ATCO Electric

Central Region Transmission Reinforcement Land Impact Assessment

WILDLIFE MAP

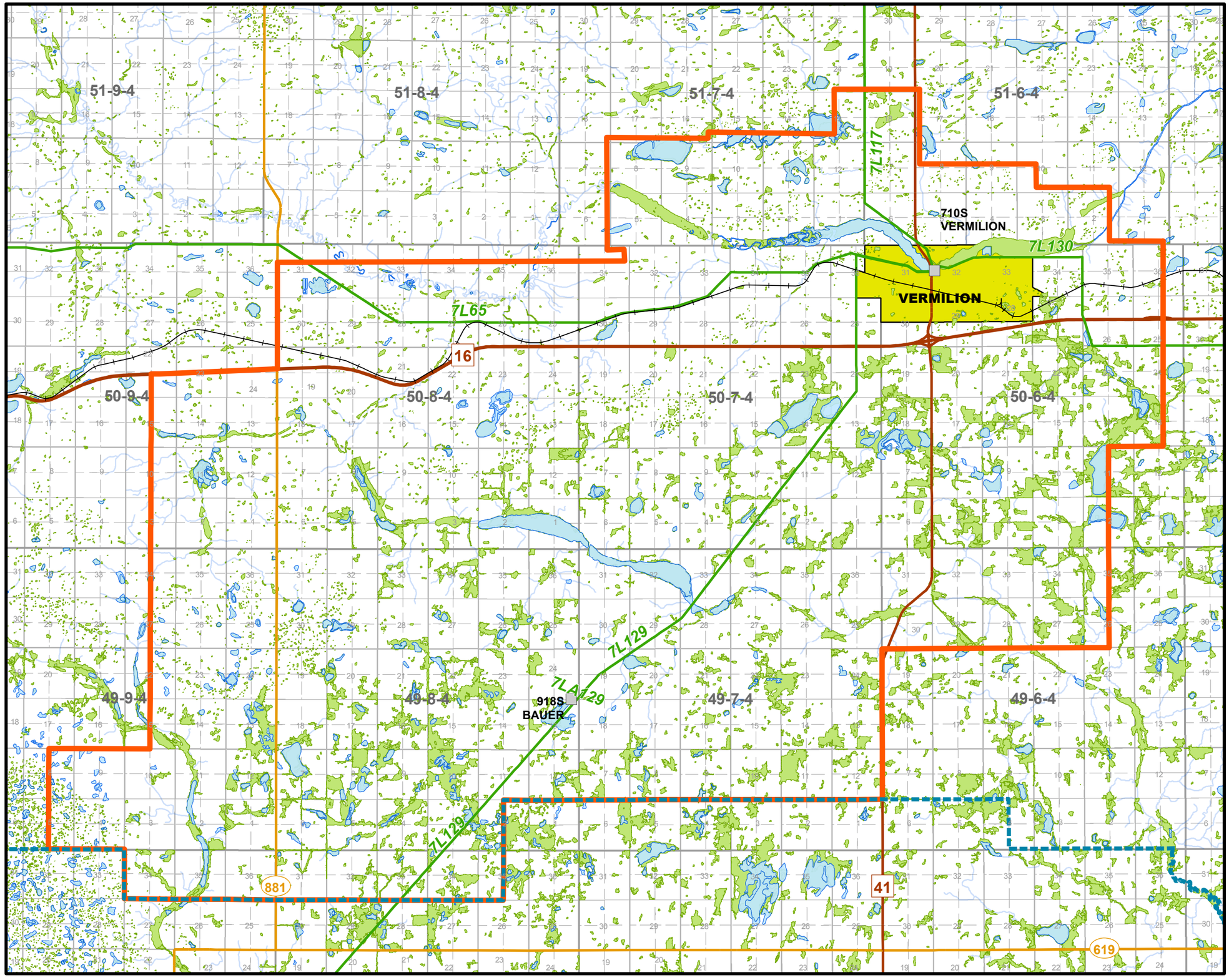
1:120,000

DWG.NO. RS - CRTR - LIA - 05

Cartography By: JG

Approved By: TM

August 2016



LEGEND

- Project Reference Area
- TFO Service Territory
- Existing Substation
- Existing 144 kV Transmission Line
- Existing 72 kV Transmission Line
- Railway
- Primary Highway
- Secondary Highway

Wetlands & Waterbodies

- Waterbodies
- Wetlands (CWCS)

CREDITS

Project Reference Area: ATCO 2016, Electrical System: ATCO 2016, Base Data: Alberta Data Partnerships 2016, Imagery: Valtus Services 2016, Wetlands: CWCS (GOA) 2014

N W E S

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

ATCO Electric

Central Region Transmission Reinforcement
Land Impact Assessment

WETLANDS & WATERBODIES MAP

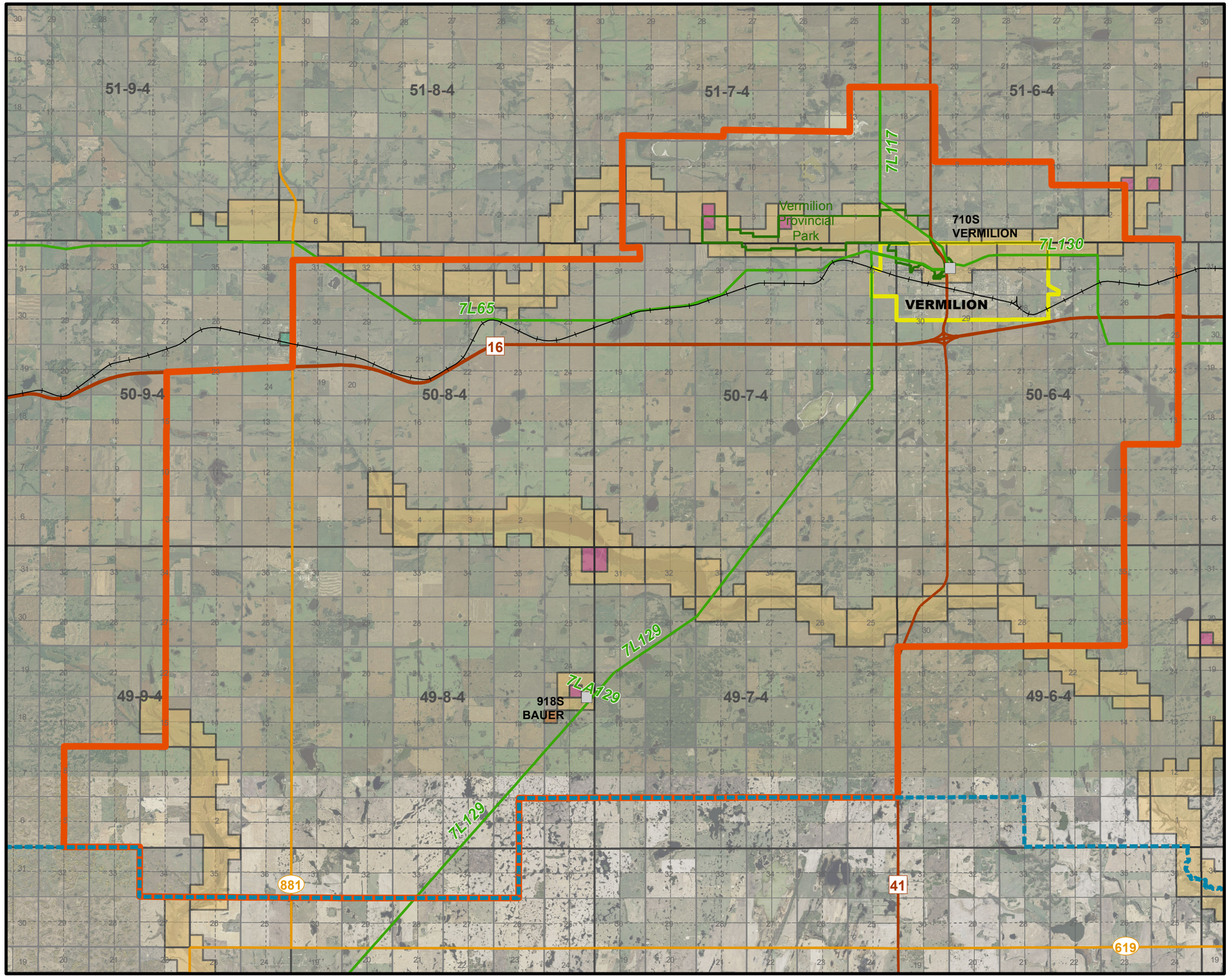
1:120,000

DWG.NO. RS - CRTR - LIA - 06

Cartography By: JG

Approved By: TM

August 2016



LEGEND

- Project Reference Area
- TFO Service Territory
- Existing Substation
- Existing 144 kV Transmission Line
- Existing 72 kV Transmission Line
- Railway
- Primary Highway
- Secondary Highway

Provincial & Federal Protected Areas

- Provincial Park

Historic Resources Listing

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

CREDITS

Project Reference Area: ATCO July 2016, Electrical System: ATCO 2016, Base Data: Alberta Data Partnerships 2016, Imagery: Valtus Services 2016, Provincial & Federal Protected Areas: Alberta Data Partnerships 2016, Historic Resource Listing: GOA 2015

Features considered include: provincial parks, wilderness areas, ecological reserves, wildland parks, provincial recreation areas, heritage rangelands, natural areas, national parks, and federal special orders

N W E S

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

ATCO Electric

Central Region Transmission Reinforcement Land Impact Assessment

PROVINCIAL & FEDERAL PROTECTED AREAS

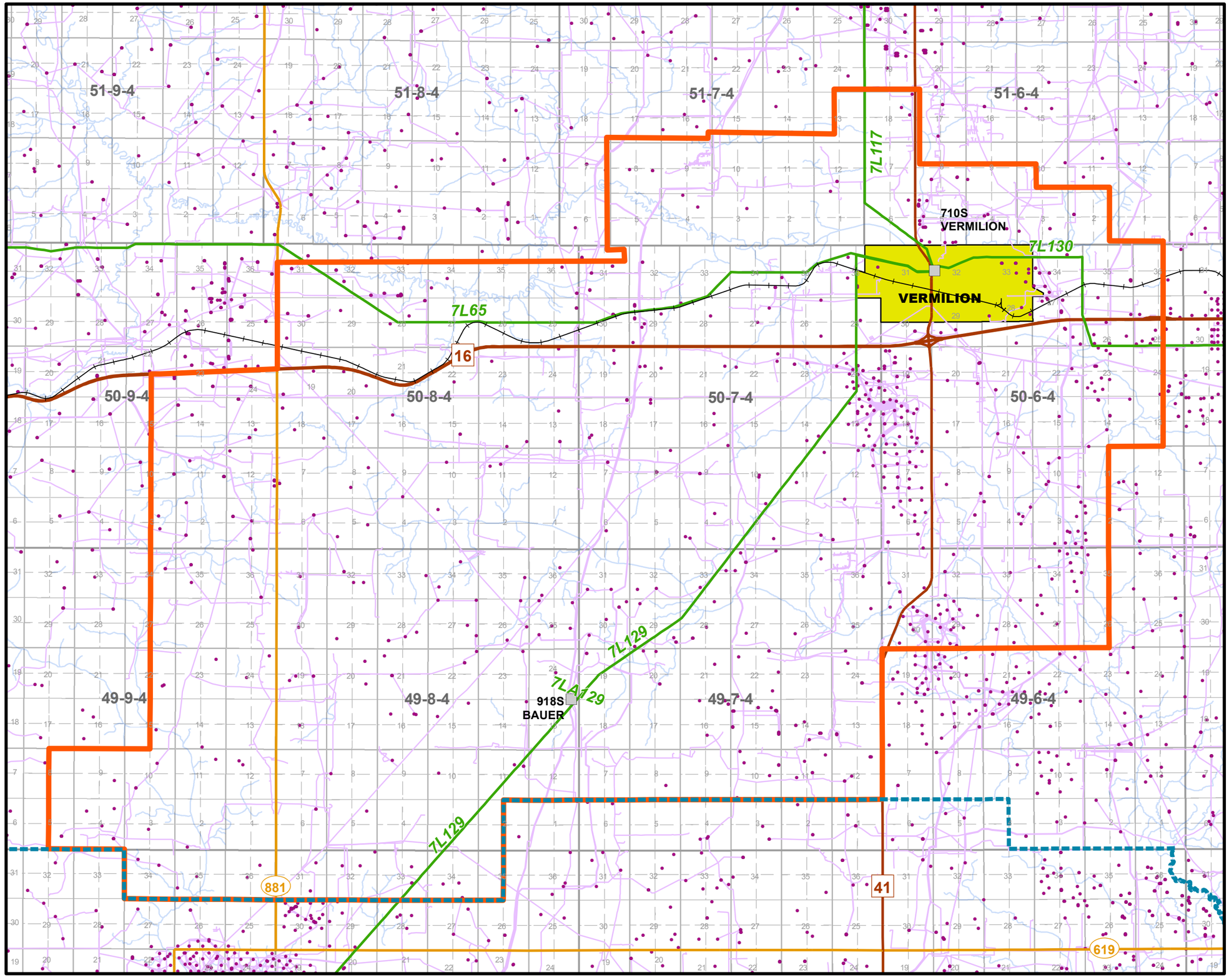
1:120,000

DWG.NO. RS - CRTR - LIA - 07

Cartography By: JG

Approved By: TM

August 2016



LEGEND

- Project Reference Area
- TFO Service Territory
- Existing Substation
- Existing 144 kV Transmission Line
- Existing 72 kV Transmission Line
- Railway
- Primary Highway
- Secondary Highway

Pipelines & Wells

- Wells
- Pipelines

CREDITS

Project Reference Area: ATCO 2016, Electrical System: ATCO 2016, Base Data: Alberta Data Partnerships 2016, Imagery: Valtus Services 2016, Pipelines & Wells: IHS 2016

N W E S

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

ATCO Electric

Central Region Transmission Reinforcement
Land Impact Assessment

PIPELINES & WELLS MAP

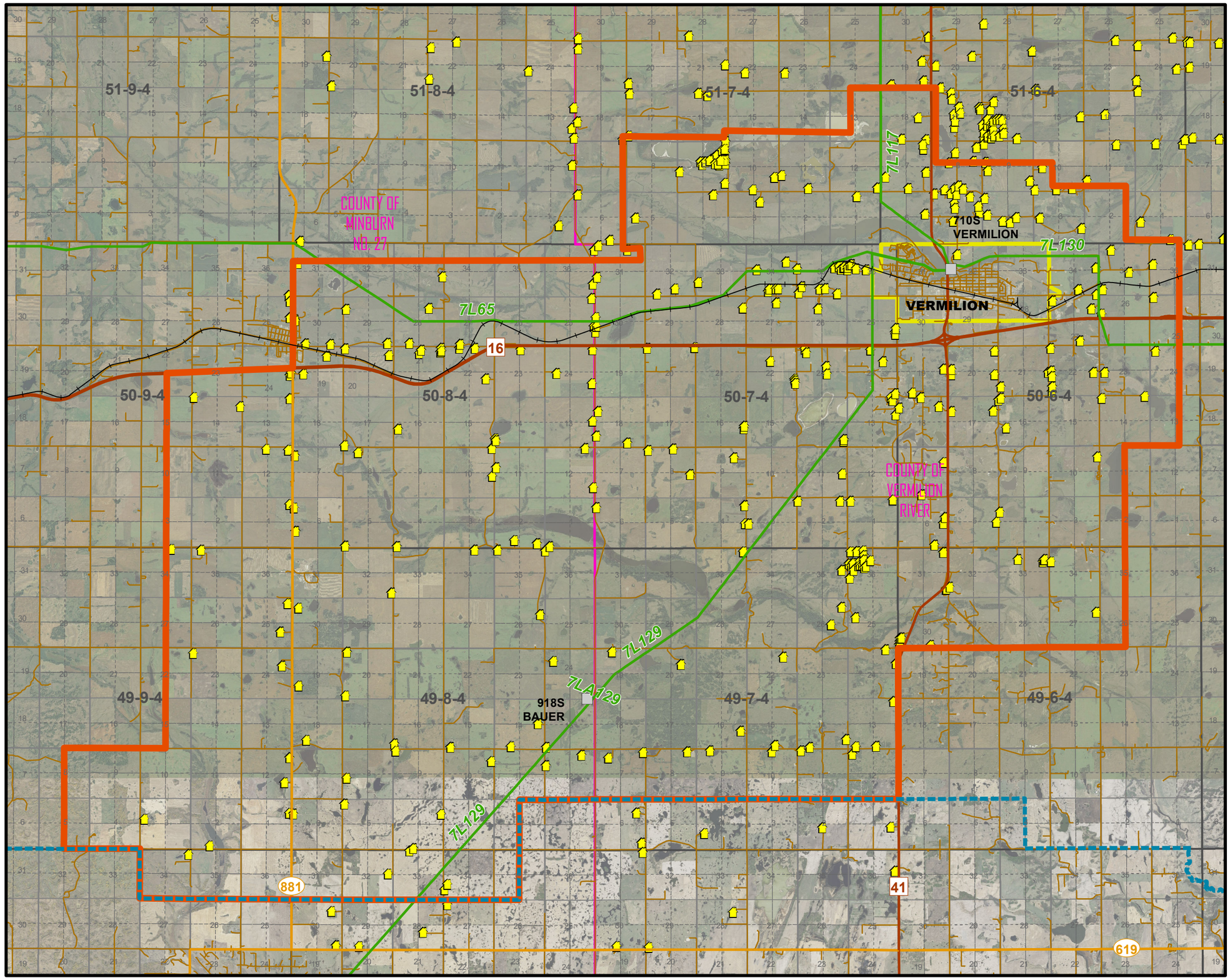
1:120,000

DWG.NO. RS - CRTR - LIA - 08

Cartography By: JG

Approved By: TM

August 2016



LEGEND

- Project Reference Area
- TFO Service Territory
- Existing Substation
- Existing 144 kV Transmission Line
- Existing 72 kV Transmission Line
- Railway
- County / Municipal District Boundary
- Primary Highway
- Secondary Highway

Roads & Residences

- Residences
- Other Roads

CREDITS

Project Reference Area: ATCO July 2016, Electrical System: ATCO 2016, Base Data: Alberta Data Partnerships 2016, Imagery: Valtus Services 2016, Residences: ATCO (Plotted from Imagery 2009 - 2012)

N W E S

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

ATCO Electric

Central Region Transmission Reinforcement
Land Impact Assessment

ROADS & RESIDENCES MOSAIC MAP

1:120,000

DWG.NO. RS - CRTR - LIA - 09

Cartography By: JG

Approved By: TM

August 2016