

PROPOSED BAY D'ESPOIR TO WESTERN AVALON TRANSMISSION LINE (TL 267)

**Additional Project Description to Support the
Environmental Assessment Registration (July 2015)
Registration 1803**

**Submitted by:
Newfoundland and Labrador Hydro**

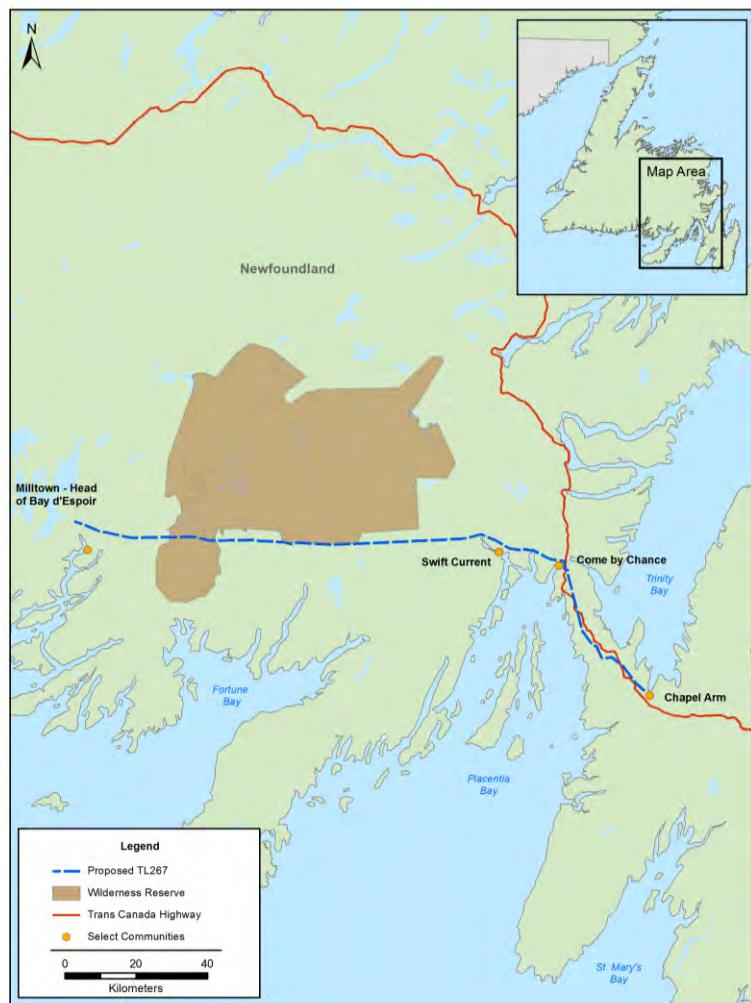
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1.0 INTRODUCTION

PROJECT NAME: *Proposed Bay d'Espoir to Western Avalon Transmission Line (TL 267)*

The proposed development project that is the subject of the *Environmental Assessment (EA) Registration* (Registration 1803) submitted in July 2015 includes the construction and operation of a new 230 kilovolt (kV) transmission line that will be approximately 188 km long and connect the existing Bay d'Espoir and Western Avalon terminal stations (hereinafter also referred to as the "Project" or "TL 267"). The proposed TL 267 will parallel existing transmission line infrastructure (TL 202 and TL 206) from Bay d'Espoir to Come By Chance and further parallels TL 203 (and eventually, the existing TL 237) from Come By Chance to the Western Avalon substation in Chapel Arm (Figure 1.1). Along with the planned development of TL 267 itself, upgrades to existing infrastructure at the Bay d'Espoir and Western Avalon terminal stations will also be undertaken as part of this Project.

Figure 1.1 The Proposed Bay d'Espoir To Western Avalon Transmission Line (TL 267)



2.0 ADDITIONAL PROJECT DESCRIPTION

Newfoundland and Labrador Hydro (Hydro) submitted an *EA Registration* for the proposed Bay d'Espoir to Western Avalon transmission line (TL 267) in July, 2015. Since that time, Hydro has continued with its detailed engineering, field assessments and analysis with consideration of technical, environmental and socioeconomic factors. As a result of this ongoing work, and detailed design, Project components have been more clearly defined.

The following sections provide a more detailed description of some of the Project's key components (e.g., camps, access trails, quarries/borrow pits), based on ongoing engineering studies and reflects the current stage of Project planning and design that were not known at the time of the submission of the *EA Registration* in July, 2015. As described above, the Project is the subject of ongoing planning and engineering design, and as with any development project it will continue to be refined and optimized as its planning and eventual implementation phases move forward.

2.1 Camps

As stated in the *EA Registration Document*, "the construction work force will be housed primarily in existing and available accommodations in communities near the western and eastern ends of the proposed transmission line, with construction personnel being transported to and from the work sites each day. Given the location and overall extent of the transmission line, at least one temporary construction camp will be required along the right of way. This facility would have the capacity to house approximately 150-200 workers, will occupy an area approximately 120 m by 120 m in size, and will be comprised of bunkhouses, a kitchen, a dining hall and a recreation area, as well as being equipped with a first aid station, communications system, water supply, sewage systems and a fuel supply. Any such camp(s) will not be located within the Bay du Nord Wilderness Reserve, and would be established and operated in compliance with regulations and approvals, including with regard to its location, design and associated water and sewer systems."

As of the date of this submission of *Additional Project Description* (January 2016) two preliminary locations have been identified for temporary camps for the construction work force. These camps have been strategically located outside the Bay du Nord Wilderness Reserve as committed in the *EA Registration*, and along existing access roads. The locations of two preliminary camps are identified on p. 8 and p. 39 of Appendix A. Again, note that these locations have been identified by Hydro at this current stage of detailed engineering and design and is subject to change based on further analysis.

2.2 Access Strategies

Approximately 13 km section of the proposed TL 267 right of way (out of its total length of 188 km) will be located within the Bay du Nord Wilderness Reserve. The proposed paralleling of the existing transmission lines through this region is considered to be the preferred option for the Project for technical, economic and environmental reasons. Section 21(2) of the *WER Act* states that the Lieutenant-Governor in Council may decrease the area of a Reserve, and sections 15 to 18 outline the process to be followed. In May 2015, Hydro made a submission to the Minister of Environment and Conservation to begin the required review process under the *WER Act* to amend the current Bay du Nord Wilderness Reserve boundary to remove the proposed TL 267

40 m wide right of way from the Reserve. Hydro recognizes that this amendment is required before the construction of the Project in this area can be initiated.

There are two potential access strategies that can be used for the construction of TL 267. The preferred strategy requires a second application under Section 21(2) of the *WER Act*. To use the existing access within the Reserve, or to carry out upgrades to the existing trails that are not for the maintenance of the existing lines (i.e., TL 202/206), Hydro is required to request the removal of these access trails from the Reserve as the *Wilderness and Ecological Reserves Act* as the *Wilderness Reserve Regulations* prohibit the upgrade and/or use of the trails, that are not solely for the purpose of maintaining the existing transmission lines (i.e., TL 202/206). Specifically, the *Wilderness Reserve Regulations, 1997 (65/97)*, state:

7. (1) Within a reserve a person shall not

- (a) pollute or obstruct a stream or other body of water or dispose of any garbage;
- (b) build or erect or cause to have built or erected a structure;
- (c) destroy, damage, remove, disturb or handle the home, den or nest of wildlife;
- (d) destroy, damage, remove, disturb or handle an egg of any wild bird;
- (e) be in possession of a firearm unless the firearm is securely wrapped and tied;
- (f) destroy, damage or remove wildlife, fossil material and any natural object;
- (g) destroy, damage or remove a sign, or other government property;
- (h) remove sand, stone or gravel;
- (i) **use, operate or be in possession of a motor car, motor truck, four-wheel drive vehicle registered or required to be registered under the Highway Traffic Act, except upon existing roads within the Avalon Wilderness Reserve;**
- (j) **use, operate or be in possession of an off-road vehicle;**
- (k) operate a commercial establishment or commercial enterprise within a reserve, except guiding, touring and outfitting;
- (l) display, post or broadcast an advertisement; or
- (m) operate or be in possession of an outboard motor.

And,

25. Notwithstanding paragraph 7(1)(j), Newfoundland Power and Newfoundland and Labrador Hydro are permitted to use all-terrain vehicles and snowmobiles as approved in writing by the management agency within a wilderness reserve on the company's existing access routes as

defined by the managing agency, solely for the purpose of inspecting or maintaining the company's existing facilities and structures which are within the reserve.

Section 7(l), (i), and (j) prohibit vehicle operations in the Reserve, and section 25 provides an exception for Hydro to use off-road vehicles for maintenance of the existing lines only.

The preferred approach is discussed in more detail in Section 2.2.1.

If the second application under Section 21(2) for the request for the removal of the access trails from the Reserve is unsuccessful, Hydro will use an alternative construction strategy. This strategy will consist of all access being located within the 40 m wide right-of-way for the 13 km section of TL 267 to be removed from the Reserve. Appendix B identifies the access trails along the 13 km section to be removed from the Reserve and the section located adjacent to the Reserve boundary to be used for the alternative strategy. This approach is discussed in more detail in Section 2.2.2.

2.2.1 Preferred Approach - Access Trails

A key requirement for Project construction will be ensuring adequate access to the area for the transportation and distribution of personnel, equipment and materials to the work sites. As each transmission tower structure will require construction and installation activity involving heavy equipment, some degree of access is required to each work location. There are existing access trails along the entire transmission line route, including west of Piper's Hole (approximately five kilometers west of Swift Current), which are in place for the ongoing maintenance of the existing Hydro assets. The proposed route for TL 267 avoids the creation of new access to currently remote areas by paralleling existing linear developments, as well as minimizing the Project's overall environmental footprint by being the shortest and most direct route, which, in turn also reduces construction and maintenance costs. Appendix A illustrates the location of the proposed access trails for the preferred approach for the construction of TL 267. In addition, Hydro also maintains a number of access trails and approved fording sites as part of its on-going operation of the existing transmission lines through this region. Along the proposed transmission line route west of Piper's Hole, access becomes limited to these trails which are currently in place for the maintenance of the existing transmission lines.

Existing highways, access roads and trails will be used to transport construction equipment and materials to select staging and storage sites along the transmission line route, from which these materials will eventually be transported along the existing and newly cleared transmission line right of way to individual work sites. This will involve the required upgrading of some existing access roads and trails in the areas, as well as the establishment of one or more access trails along (and within) the right of way (although in certain areas it may be necessary to route around waterbodies or other difficult terrain).

The movement of equipment and materials along these trails will also require watercourse crossings at various locations, through fording (new and existing), and temporary culvert or bridge installation, depending upon local site conditions, environmental characteristics and sensitivities and other technical, regulatory and economic considerations. All access approaches, routes and any associated watercourse crossings will be selected, designed, constructed and maintained in accordance with good industry practices and in compliance with all applicable legislation and regulations. In keeping with corporate policy and practice and regulatory

requirements, each watercourse crossing will be evaluated and applicable permits acquired and complied with prior to and during construction. The type of stream crossing required along the access trails for TL 267 has been identified and these are presented in Appendix A. Note, that in some locations, more than one stream crossing is indicated. The project planning team and the clearing contractor may ford a stream crossing, however the construction contractor may choose to install a culvert or construct a bridge to cross the watercourse which will be used for the multiple deliveries of equipment, material and supplies, and personnel along the route. Installation of a bridge or culvert also requires a ford site to be established to complete the installation from both sides. Therefore, at this stage of project planning, both methods and locations are indicated in the map set presented in Appendix A.

Since the enactment of the provincial *ATV Regulations* in 1996, as a part of Hydro's maintenance initiatives, a program was established to upgrade its existing transmission line access trails. This program involves the field assessment of existing access trails to identify terrain conditions and any environmental issues that may be associated with them. Where practical and terrain conditions permit, existing access trails are relocated to better, more stable, terrain with less potential environmental sensitivities. Existing ford sites are assessed and either upgraded as ford sites or converted to culvert or bridge sites to accommodate the maintenance program. The intent is to undertake the same process for existing access trails within the existing Bay du Nord Wilderness Reserve and along the entire route of TL 267. These proposed relocations are also illustrated in Appendix A and identified as part of the proposed access trail. These trails will serve the long term maintenance of Hydro's assets within the Reserve and along the entire route. Sections of existing access trails abandoned as part of this process will no longer be used and left to re-vegetate naturally. Potential access to be considered for decommissioning are identified in Appendix A, and will be confirmed post-construction.

Access trails within the Reserve including existing trails that need to be traversed (i.e., no upgrading required), or existing trails requiring upgrading, or new trails outside of the 40 m wide right-of-way will be requested for removal under Section 21(2) of the *WER Act* following environmental assessment release.

The upgrading of the existing access will require the trails to be upgraded to a Class C resource road standard, which would be constructed within a 10 m right-of-way and will have a top width that is 5.5 – 6 m. The 10 m wide right-of-way provides sufficient area to manage slope grades and ditching for run-off where necessary. Additional access spurs may branch off to specific structure locations, but these access trails will be to a lower standard given that the use requirements will be much less. At this point of project planning without tower locations, spur trails have been preliminarily identified and are subject to change based on final tower placement. These preliminarily identified spur trails are identified in Appendix A. The extent and length of spur trails identified during final design is not expected to change materially from that proposed in Appendix A. The material required for the upgrading of access roads will be obtained from sources in the vicinity of the access road/trail.

The road standard (i.e., Class C) will be to the minimum required to complete the construction of TL 267. Based on the construction strategy, materials will be distributed using equipment that can safely manipulate mild to moderate slopes. Fill will be required where the slope does not meet the standard required for the safe and reliable movement of equipment and materials. Ditching will also be required in areas where run-off must be controlled. Again it will be completed to the minimum required to protect the asset and to allow for site water

management - minimizing environmental effects to nearby watercourses and wetlands. The subgrade for the access road will be the minimum standard to permit equipment to traverse safely and without compromising the road.

The preferred approach avoids the creation of parallel access through the Reserve by utilizing the existing access where it is practical to do so. This avoids the creation of stream crossings that are adjacent to another site, (e.g., see page 12 of Appendix B that will require an adjacent bridge to be constructed on the Bay du Nord River) if the alternative approach is implemented.

Ground access may also be supplemented by the use of helicopters for transporting construction personnel in particular areas, the specific nature and degree of which will be determined as Project planning progresses.

2.2.2 Alternative Approach – Access Trails

Under the alternative approach, all access trails will be located within the 40 m wide right-of-way within the 13 km section that will be removed from the Reserve. Along the section of the line that is located adjacent to the Reserve for 22 km, all access required for the construction of TL 267 will be located outside of the Reserve. Appendix B presents the location of access required using this alternative approach along the 13 km section to be removed from the Reserve. Appendix B also presents the access along the section of the TL 267 that is located adjacent to the Reserve boundary.

Creating access along the 40 m wide right-of-way for 13 km through the Reserve requires wetlands to be crossed (that would typically be avoided as presented in the preferred approach shown in Appendix A). Additionally, several waterbodies will require the construction of causeways, and large bridges to be installed that would be minimal if the preferred approach was permitted.

Based on a desktop analysis, the alternative approach will result in an additional 2.68 km of wetlands to be crossed (or 2.68 hectares). An additional 555 m of waterbodies will also have to be crossed. Construction methods for these crossings will use a combination of causeways with equalization culverts, and bridges depending on the crossing length. An additional 4.3 km of access trail will be created by the alternative approach by not utilizing existing trails in the Reserve.

2.3 Quarries/Borrow Pits

Construction of the line and associated structures will require materials for fill and aggregates. Existing quarries and borrow pits will be used where possible, with additional fill being obtained as required from within the new or existing rights of way. Any new quarries and borrow pits that may be required for Project construction will be identified, permitted, established and decommissioned in accordance with applicable regulatory requirements. At this stage of project planning, it is conceived that existing quarries will be utilized along the section of line between Come by Chance and Western Avalon. The remainder of the line will require small quarries and borrow pits, approximately 100 m by 100 m, every 2 to 3 km. These quarries and borrow pits will be located adjacent to the right-of-way. It is expected that approximately 60 quarry/borrow pits will be required for the construction of the line. This area to be disturbed would be approximately 60 hectares which is small in comparison to the 750 hectare footprint for the 40 m wide right of way.

2.3.1 Preferred Approach – Quarries/Borrow Pits

Within the Bay Du Nord Wilderness Reserve, five quarries have been identified (see Appendix A for proposed locations). Following environmental assessment release, Hydro will submit a subsequent application to WERAC for the removal of the areas identified to permit the establishment of quarries under Section 21(2).

2.3.2 Alternative Approach – Quarries/Borrow Pits

If the subsequent application to WERAC (described in Section 2.3.1) is unsuccessful, Hydro will establish a large quarry near the western boundary of the Reserve. The access along the 13 km long section previously within the Reserve will have to be constructed to a higher standard than the preferred approach to handle the increased traffic and the type of equipment required to build a road (i.e., equipment that is not capable of manipulating steep slopes). The road would have a 6 m wide top, and pull offs will need to be constructed approximately every 100 m to allow equipment to move in both directions. It is estimated that up to 16 rock trucks will be in operation simultaneously for approximately 3 months.

2.4 Costs

The estimated cost of constructing TL 267 using the alternative construction strategy for access trails and quarries/borrow pits is an increased cost of \$10 million over the preferred strategy.

2.5 Decommissioning

At the conclusion of construction, temporary infrastructure will be removed and restoration of sites will be conducted. A detailed decommissioning plan will be prepared for the Project at the end of construction. Below is a draft annotated table of contents.

1. Introduction – This section will describe the project and will outline the aspects of the project to be decommissioned.
2. Objectives – This section will describe the objectives of the plan and any commitments being met.
3. Timelines – This section will present the timelines for decommissioning for each of the project components.
4. Construction Infrastructure to be Decommissioned:

A) Temporary Camps

All temporary camps constructed along the ROW will be decommissioned upon completion of Project construction. All buildings will be removed and water and sewer systems decommissioned in accordance with regulatory requirements. All in-ground infrastructure will be decommissioned as per applicable provincial construction regulations and permits. Temporary camps will be graded, as appropriate, to re-establish natural drainage patterns, and topsoil will be replaced.

B) Access Roads and Bridges

As described in Section 2.2.1, access that may be considered for decommissioning is identified in Appendix A. Trails no longer required for the maintenance of TL 202/206, or for the future maintenance of TL 267 will be left to re-vegetate naturally. Key infrastructure such as TL

202/206 and TL 267 requires permanent access for reliability of the system, and for the safety of Hydro's maintenance staff that conduct inspections and perform maintenance on these lines via ground access. Trails to be decommissioned will be confirmed post-construction and can be added back to the Reserve.

C) Borrow Pits and Quarries

Borrow pits and quarries excavated along the ROW will be rehabilitated as work is completed in that area. Rehabilitation will include the replacement of unused excavated material, grading to a stable slope, grading to re-establish natural drainage patterns, replacement of topsoil, and installation of erosion control structures, as appropriate.

D) Temporary Lay Down Areas

All surface infrastructure will be removed from lay down areas. All in-ground infrastructure will be decommissioned as per applicable provincial construction regulations and permits.

5. Clean-up and Reclamation

Clean-up and reclamation will be conducted after the construction infrastructure has been decommissioned. Reclamation and clean-up will include activities such as removing refuse, grading disturbed areas and contouring disturbed slopes to a stable profile. Reclamation will include site-specific measures to promote the natural revegetation of disturbed areas. Disturbed areas will be stabilized, as necessary, to prevent soil erosion.

The decommissioning plan will also include any conditions of EA release.

3.0 ENVIRONMENTAL CONSIDERATIONS AND PLANNED MITIGATION

The *EA Registration Document* presented an environmental effects analysis for the proposed Project, including each of its associated components and activities. The analysis focused upon, and was organized according to, the following themes:

- 1) *Atmospheric Environment*;
- 2) *Terrestrial Environment*;
- 3) *Aquatic Environment*; and
- 4) *Socioeconomic Environment*

Below is a comparison of the preferred construction approach versus the alternative approach by theme.

3.1 Atmospheric Environment

Key mitigation measures that will be implemented to help avoid or reduce any potential effect of Project construction on the atmospheric environment are presented in Section 5.1 of the *EA Registration*. No additional mitigation is proposed for the alternative construction strategy. Table 5.1 presents a summary of the potential environmental effects of the Project on the atmospheric environment for either access construction strategy.

Table 3.1 Environmental Effects Summary: Atmospheric Environment

Environmental Component	Project Phase / Potential Interaction			Key Considerations and Environmental Mitigation
	Construction	Operations	Issues / Interactions	
Air Quality / GHG Emissions	•		<ul style="list-style-type: none">Construction works (noise, dust)Equipment use (vehicles, fuel consumption, exhausts)Possible accidental event (fire, others)	<ul style="list-style-type: none">Localized and short-term construction activity.Project engineering design in accordance with applicable guidelines and standards.Project location within relatively remote areas.Standard construction and operational practices.Regular inspection and maintenance of equipment.Accidental event prevention and response plans and procedures.
Noise Levels	•			

The proposed Project is not likely to result in significant adverse environmental effects on any aspect of the atmospheric environment regardless of construction strategy selected. The effects for the preferred approach and the alternative approach are similar.

Any Project-related air or noise emissions (particularly during construction activities) will be negligible and occur within a small area over a relatively short time period, and will decrease quickly with distance from the source. Most Project components and activities will be located in a remote area with a low level of past and current industrial activity, and its air and noise emissions are therefore not likely to interact or overlap with any others in the region.

The Project is therefore not likely to result in significant, adverse cumulative environmental effects to the atmospheric environment in combination with other projects or activities that have been or will be carried out regardless of construction strategy selected.

3.2 Terrestrial Environment

Key mitigation measures that will be implemented to help avoid or reduce any potential effect of Project construction on the terrestrial environment are presented in Section 5.2.1 of the *EA Registration*. No additional mitigation is proposed for the alternative construction strategy. Table 5.2 presents a summary of the potential environmental effects of the Project on the terrestrial environment for either access construction strategy.

Table 3.2 Environmental Effects Assessment Summary: Terrestrial Environment

Environmental Component	Project Phase / Potential Interaction			Key Considerations and Environmental Mitigation
	Construction	Operations	Issues / Interactions	
Vegetation	•		<ul style="list-style-type: none">• Clearing and excavation• Possible fuel or chemical spills• Vegetation management	<ul style="list-style-type: none">• The alternative construction strategy will not avoid wetlands wherever possible. There will be approximately 2.68 km of access (or 2.68 ha.) created within wetlands using the alternative access strategy that would be avoided using the preferred approach.• The alternative construction strategy will create an additional 4.3 km of additional trail as a result of not utilizing existing trails within the Reserve. .• Project location adjacent to existing transmission line developments.• Localized and clearly delineated work areas• Conduct of nest searches in advance of vegetation clearing during the breeding season.• Establish suitable buffer zones around any identified active nests.• Compliance with applicable regulations and permits.• No harvesting or harassment of wildlife by Project personnel.• Waste and other materials management (facilities and procedures).• Accidental event prevention and response.
Soils and Landforms	•			
Wildlife (Mammals and Avifauna)	•	•	<ul style="list-style-type: none">• Habitat loss / alteration (clearing)• Noise, human presence, vehicle and equipment use, other disturbances during construction• Long term presence of Project infrastructure	

The proposed Project is not likely to result in significant adverse environmental effects on the terrestrial environment regardless of construction strategy selected. The effects for the preferred approach and the alternative approach are similar. As stated in Table 3.2, the alternative approach will result in 2.68 hectares of wetlands to be filled in for access and construction of 4.3 km of new access compared to the preferred approach. The accessibility of the area is similar with both approaches.

The proposed Project is not likely to result in significant adverse cumulative environmental effects on any aspect of the terrestrial environment in combination with other projects and activities that have been or will be carried out regardless of construction access strategy selected.

3.3 Aquatic Environment

Some of key mitigation measures identified for the preferred construction strategy (presented in Section 5.3.1 of the *EA Registration*) will not be applied under the alternative approach. As the watercourse crossing will have to be located within the 40 m wide right-of-way within the Reserve, one of these mitigations will no longer apply, as follows:

- Existing and approved fording sites and access trails will be used where available. During watercourse fording activities, crossings will be limited to a single location and will cross at right angles to the waterbody where possible, with the number of individual crossings minimized to reduce disturbance;

A summary of potential environmental interactions, identified mitigation measures, and the residual environmental effects of the Project on the aquatic environment is provided in Table 5.3 for both construction strategies with notes included where differences in effects between the two construction strategies exist.

Table 3.3 Environmental Effects Assessment Summary: Aquatic Environment

Environmental Component	Project Phase / Potential Interaction			Key Considerations and Environmental Mitigation
	Construction	Operations	Issues / Interactions	
Surface Water (Quantity and Quality)	•	•	<ul style="list-style-type: none"> • Watercourse crossings and other in / near water work • Vegetation clearing • Drainage / sedimentation • Water use during construction (concrete, camp) • Vegetation management / herbicide use • Potential accidental spills 	<ul style="list-style-type: none"> • Compliance with relevant environmental legislation, regulations and permits. • Erosion, sediment and dust control measures. • Use of existing access routes and trails wherever possible for the preferred approach only. • An additional 555 m of watercourse crossings will be constructed along the 13 km section within the Reserve. These crossings will use a combination of bridges and causeways. Several of the watercourse crossings to be constructed under the alternative approach will be located adjacent to an existing watercourse crossing that was constructed for TL 202/206.
Fish and Fish Habitat	•	•	<ul style="list-style-type: none"> • Watercourse crossings and other in / near water work • Vegetation clearing • Drainage / sedimentation • Vegetation management / herbicide use • Potential accidental spills 	<ul style="list-style-type: none"> • Field investigations of select watercourse crossing sites as part of Project permitting. • Implementation of Environmental Protection Plan(s) and procedures. • Implementation of waste management and fuel use / storage plans and procedures. • Project location adjacent to existing transmission line developments. • No harvesting by Project personnel. • Accidental event prevention and response.

The proposed Project is not likely to result in significant adverse environmental effects on the aquatic environment regardless of construction access strategy selected. The effects for the preferred approach and the alternative approach are similar. As stated in Table 3.3, the effects associated with the alternative approach will result in an additional 555 m of watercourse crossings including the infilling of some bodies.

The Project is not likely to result in or contribute to significant, adverse cumulative environmental effects on the aquatic environment in combination with other projects or activities that have been or will be carried out regardless of construction access strategy selected.

3.4 Socioeconomic Environment

The socioeconomic environment includes relevant components of the Project's human and cultural setting, such as historic and heritage resources, land and resource use (commercial, municipal, recreational), protected areas, communities and economy.

A summary of potential environmental interactions, identified mitigation measures, and the residual environmental effects of the Project on the socioeconomic environment is provided in Table 5.4.

Table 3.4 Environmental Effects Assessment Summary: Socioeconomic Environment

Environmental Component	Project Phase / Potential Interaction			Key Considerations and Environmental Mitigation
	Construction	Operations	Issues / Interactions	
Historic Resources	•		• Any new ground disturbance	<ul style="list-style-type: none"> Small, localized and clearly delineated work areas. No known (and low potential for) historic resources in the area. Pre-construction archaeological surveys in identified high potential areas along the planned right of way. Standard precautionary and reporting procedures.
Land and Resource Use	•	•	• Potential direct interaction with current uses and other disturbances (noise, dust, visibility, access, etc)	<ul style="list-style-type: none"> Project location adjacent to existing linear developments. Localized and short-term construction activity. On-going notification and consultation processes. Accidental event prevention and response.
Protected and Special Areas	•	•	• Potential direct interaction with these areas and/or other disturbances (noise, dust, visibility, access, etc)	<ul style="list-style-type: none"> Initiation and completion of the required review process under the <i>WER Act</i> to amend the current Bay du Nord Wilderness Reserve boundary to remove this section of the proposed TL 267 right of way from the Reserve.

Environmental Component	Project Phase / Potential Interaction			Key Considerations and Environmental Mitigation
	Construction	Operations	Issues / Interactions	
Communities, including: Human Health and Well-Being Services and Infrastructure	•	•	<ul style="list-style-type: none"> Potential implications of Project-related activities and emissions for human health and well-being in local communities or elsewhere Potential Project use of, and demands for, local services and infrastructure 	<ul style="list-style-type: none"> Project location adjacent to existing linear developments. Timing and scale of Project activities. Localized, routine and short-term construction activity. Distance from and low potential for interaction with community and residents. Work site access restrictions and associated communications. Accidental event prevention and response. No new operational employees. On-going notification and consultation processes. Approvals for waste disposal. Project design to meet or exceed applicable standards (EMF etc.)
Economy, Employment and Business	•	•	<ul style="list-style-type: none"> Employment and business opportunities 	<ul style="list-style-type: none"> Positive effects (direct and indirect). Alternative approach will cost an additional \$10 million (approximately).

The proposed Project is not likely to result in significant adverse environmental effects on any aspect of the socioeconomic environment regardless of construction access strategy selected. The effects for the preferred approach and the alternative approach are similar. As stated in Table 3.4, the alternative approach will cost an additional \$10 million to electricity customers.

The Project is not likely to result in significant, adverse cumulative environmental effects on the socioeconomic environment in combination with other projects that have been or will be carried out regardless of construction access strategy selected.

4.0 ENVIRONMENTAL MONITORING AND FOLLOW-UP

As committed to in the *EA Registration*, Hydro will complete a number of environmental field investigations related to particular environmental components and issues. Two of the field investigations were completed in the fall of 2015:

- 1) *Listed / Rare Plant Surveys*
- 2) *Historic and Heritage Resources Surveys*

4.1 Lichen Surveys

As presented in the *EA Registration Document* (July 2015), two listed plant species were identified to occur within five kilometres of the proposed TL 267 centreline – the Boreal Felt Lichen (*Erioderma pedicellatum*) and the Blue Felt Lichen (*Degelia plumbea*). Species-specific modeling was completed using the known habitat requirements of Boreal Felt Lichen and Blue Felt Lichen in order to identify target survey areas within suitable habitat crossed by the proposed transmission line from Bay d'Espoir to Come By Chance.

Results of the habitat modelling were used to identify high potential polygons within the 40 m wide right-of-way for which to conduct field surveys. Upon discussions with Newfoundland and Labrador Department of Environment and Conservation - Wildlife Division it was agreed to also include all softwood forests within the 40 m right-of-way as a medium potential habitat to be further assessed in the field. If deemed to provide suitable habitat, these medium potential areas would also be surveyed.

In November 2015, Amec FW conducted surveys with the objectives to conduct field surveys within the proposed right-of-way to identify Boreal Felt Lichen, Graceful Felt Lichen and Blue Felt Lichen individuals that may occur within the proposed Project footprint. (Note, Graceful Felt Lichen (*Erioderma mollissimum*) has not been recorded within five kilometres of the project study area, however since the habitat requirements of this species is very similar to Boreal Felt Lichen, this species was also included in the field surveys.)

Key tasks associated with the survey included:

- locate listed lichen individuals within the Project footprint; and
- record data from each listed lichen location including marking location with Global Positioning System (GPS) and flagging location in the field.

A total of 113 ha of forest habitat were identified as either medium or high potential to contain listed lichens. The 2015 field surveys resulted in locating a total of 242 individual thalli of Boreal Felt Lichen on 80 trees with the 40 m wide right-of-way. No Blue Felt Lichen or Graceful Felt Lichen individuals were recorded during the 2015 surveys. The majority of Boreal Felt Lichen individuals were recorded within Balsam Fir forests on Balsam Fir trees; however, one location did report a Boreal Felt Lichen on a Black Spruce tree. Appendix C includes the full report prepared by Amec FW which includes the locations of all Boreal Felt Lichen located during the surveys. Mitigation for these occurrences will include transplantation as agreed upon with Wildlife Division. Additionally, on-site environmental monitors will be trained to identify and relocate Boreal Felt Lichen if additional occurrences were found in the field.

4.2 Historic and Heritage Resources Surveys

During the fall of 2015, Gerald Penney Associates Limited (GPA) assessed 37 previously-identified Areas of Interest (AOIs) along, or proximate to the right-of-way for TL 267 over 12 field days. Test-pitting was concentrated on the 40 m-wide right-of-way, a contextual survey area 500 m either side of the centerline was also assessed, with a view to identifying and foot-surveying natural features suggestive of human site advantage. This 1000 m-wide corridor is referred to below as the Archaeological Potential Mapping (APM) corridor. GPA's survey team found seven groups of features and/or spot finds within the APM corridor. Six were in AOIs

previously identified as High potential. One cluster of features (AOI-12, Western Pond Lookout) was in an area previously identified as Medium potential. All seven AOIs or portions thereof may be considered for registration as archaeological or ethnographic sites by the Provincial Archaeology Office (PAO), and as such should continue to be regarded as High potential. With one exception (AOI-33, Coffins Brook) all features and spot finds were more than 100 m distant from the proposed TL 267 centreline. Hence, construction impact should be limited, although routes and methods for access road construction have yet to be determined to November 2015.

A summary report was provided to the PAO in December 2015, which included proposed mitigation to avoid any disturbance to registered sites. These sites have been added to environmental constraint mapping for TL 267 including buffers around each of the sites to avoid interaction during construction.

5.0 SUMMARY AND CONCLUSION

The Project will be planned, designed and implemented to avoid or reduce potential adverse environmental effects and to optimize benefits. Given the nature, scale and characteristics of the proposed Project, including its location immediately adjacent to existing linear developments on the Island of Newfoundland, it is not likely to have significant environmental issues or effects associated with it. It will be constructed and operated in accordance with Hydro's environmental policies, plans and practices to help ensure that it is undertaken in a safe and environmentally-responsible manner.

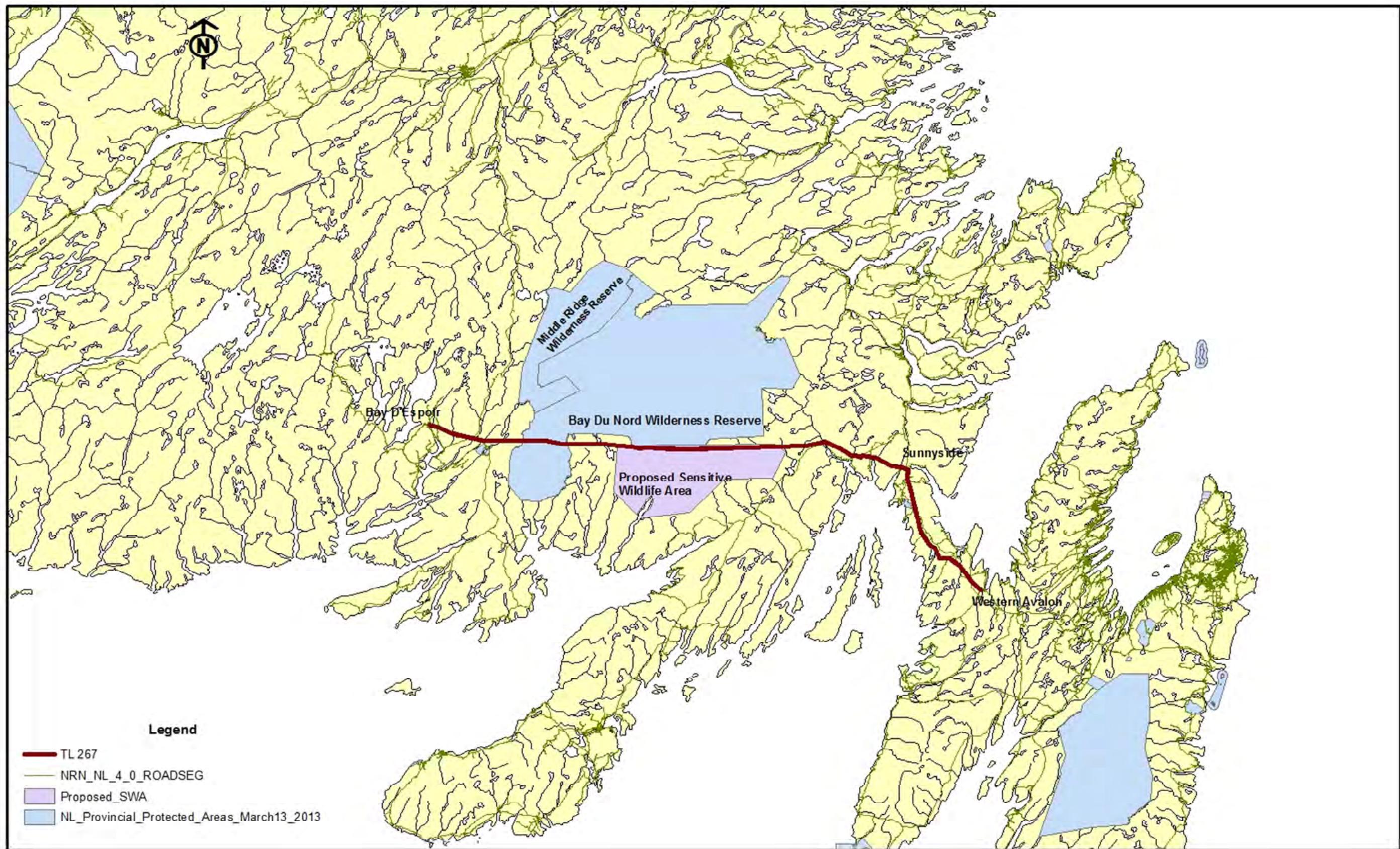
Overall, based on the environmental effects described in Section 3, the effects of the preferred approach and the alternative approach are similar. However, the alternative approach is not the preferred construction method, given the increased adverse environmental effects and increased cost to electricity customers. However the effects of the alternative are not significant and Hydro has concluded that both construction strategies would be environmentally acceptable. The residual environmental effects of the Project are the same regardless of the access construction approach selected.

The Project will make a strong contribution to local and provincial economies as a result of the employment and business activity that it will create during its construction phase, as well as over the long-term by helping to ensure a continued secure and reliable electricity supply in the region.

6.0 PROJECT DOCUMENTS

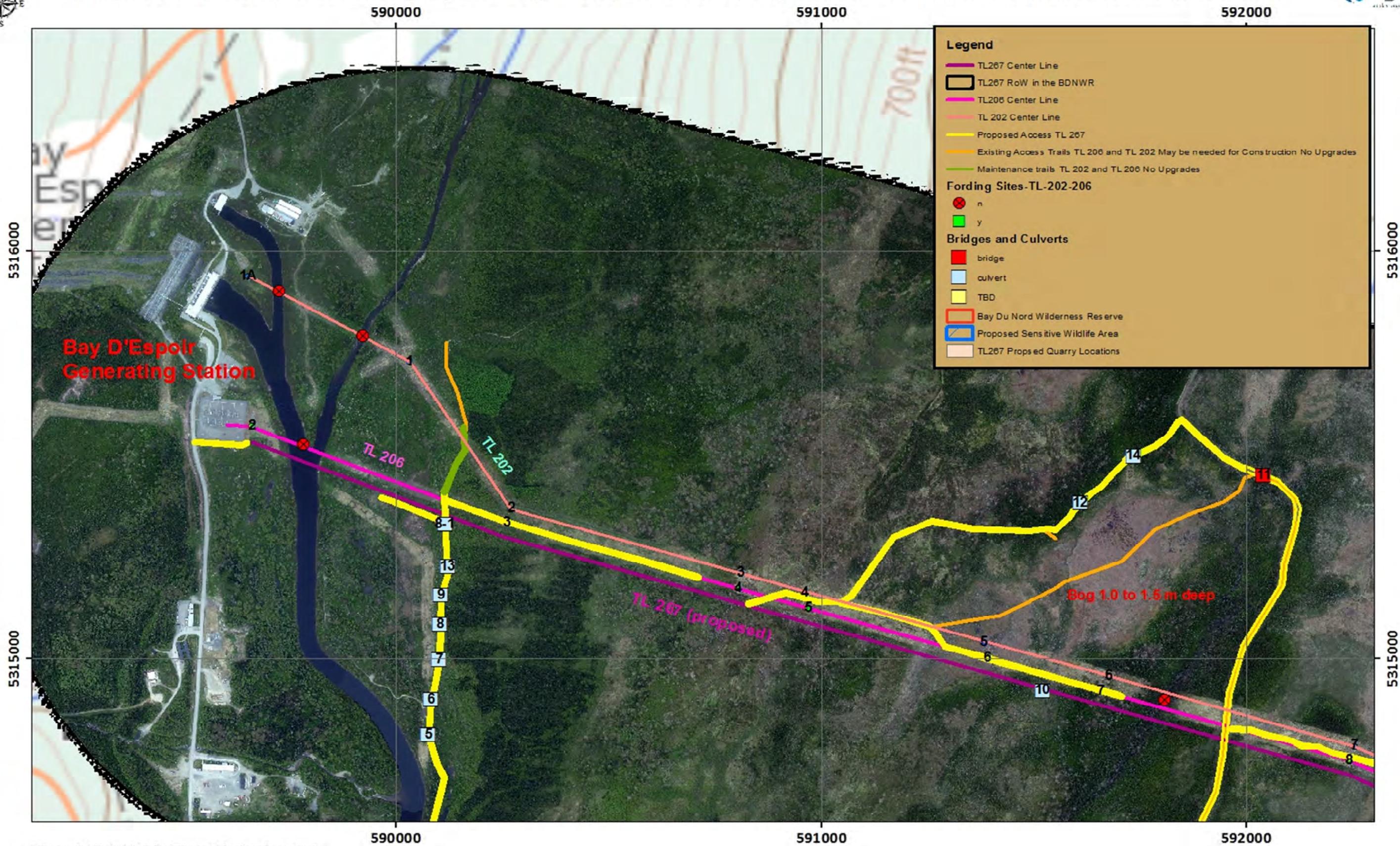
Apart from the EA Registration document submitted in July 2015, no other EA-related documents have been produced by Hydro in relation to this Project.

Appendix A – Map Set of TL 267 – Preferred Approach





Proposed Transmission Line (TL) 267 Bay D'Espoir Generating Station to Western Avalon Terminal Station



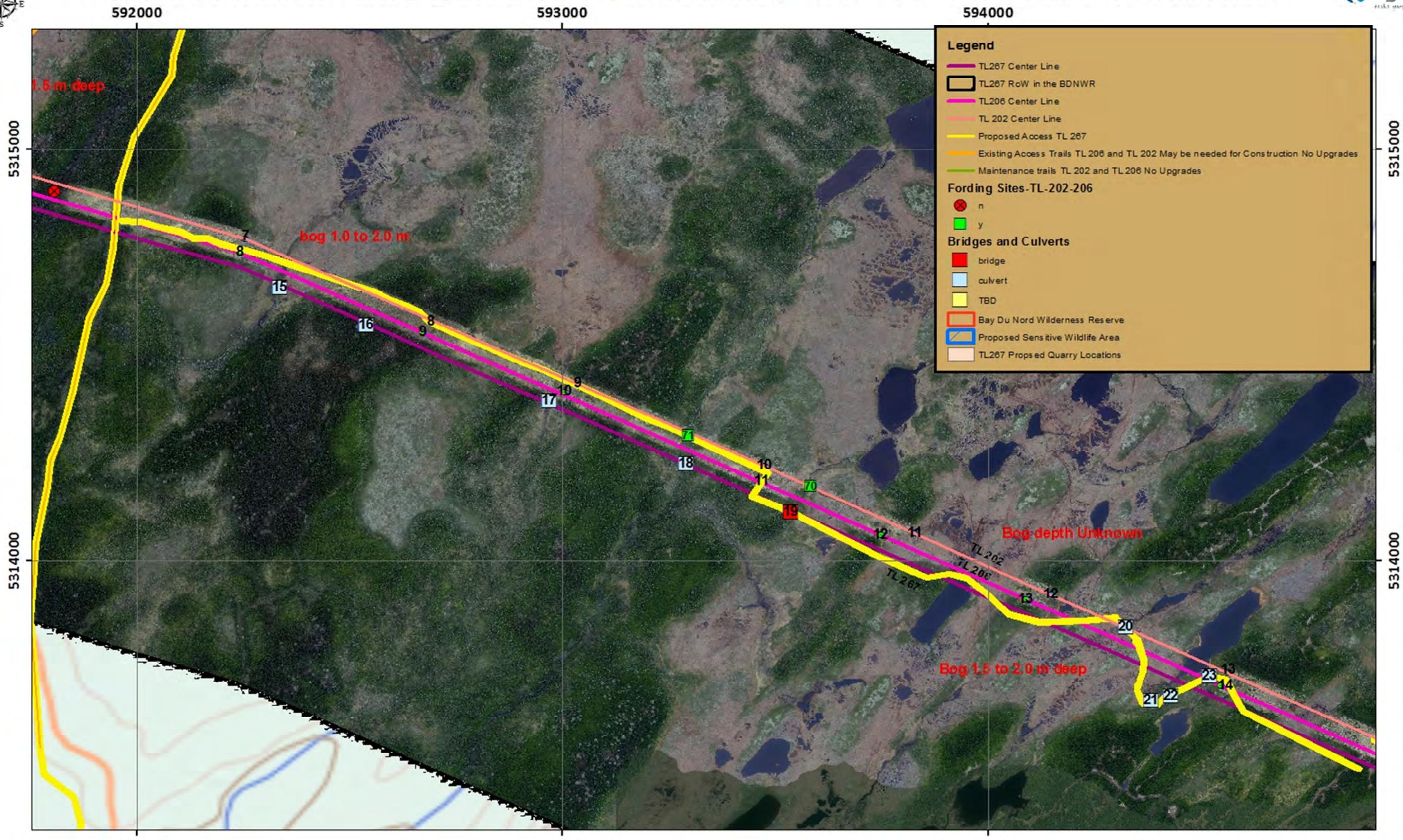
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UTM Zone 21 NAD 83

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Proposed Transmission Line (TL) 267 Bay D'Espoir Generating Station to Western Avalon Terminal Station



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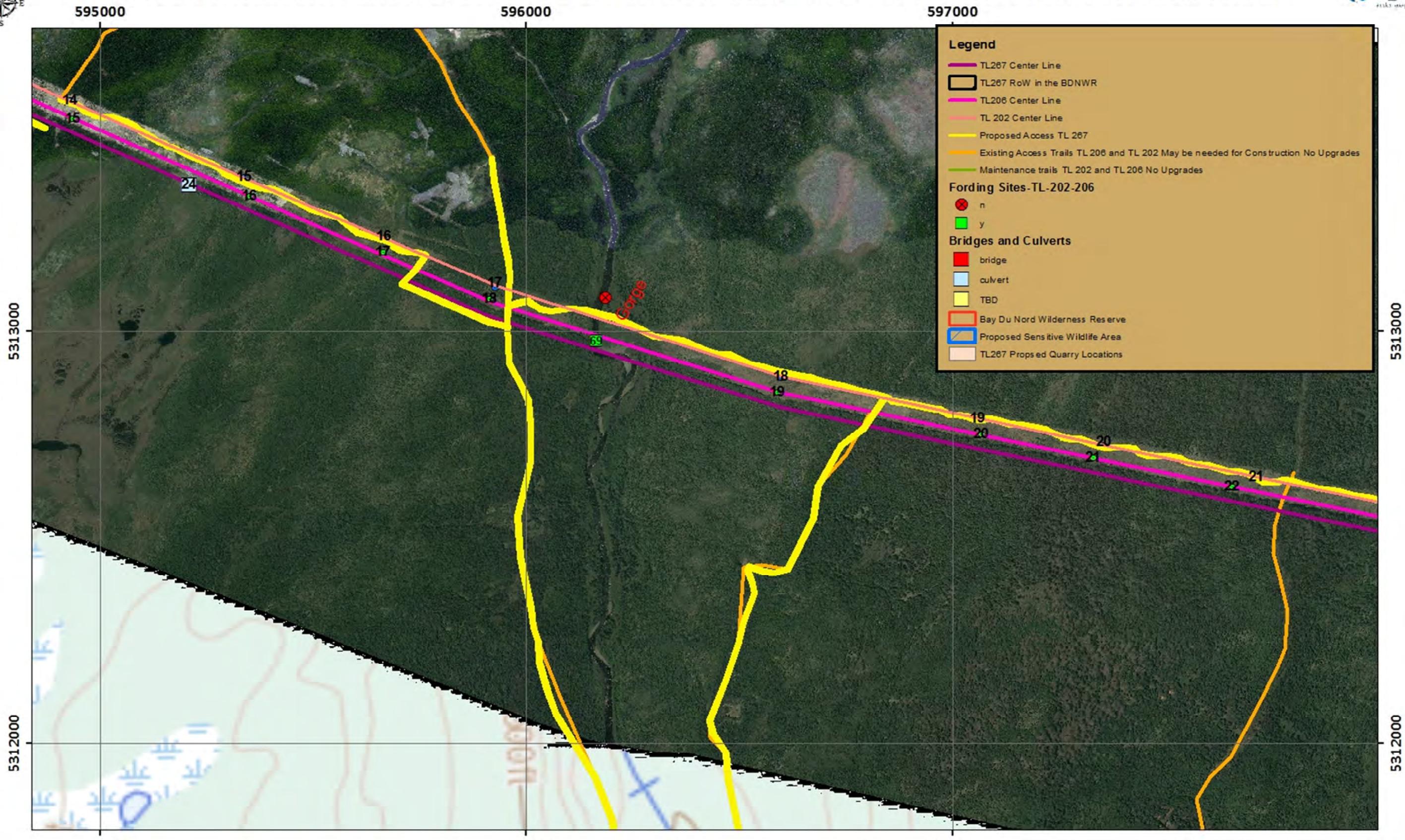
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Proposed Transmission Line (TL) 267 Bay D'Espoir Generating Station to Western Avalon Terminal Station



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Proposed Transmission Line (TL) 267 Bay D'Espoir Generating Station to Western Avalon Terminal Station



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Legend

- TL267 Center Line
- TL267 RoW in the BDNWR
- TL208 Center Line
- TL 202 Center Line
- Proposed Access TL 267
- Existing Access Trails TL 200 and TL 202 May be needed for Construction No Upgrades
- Maintenance trails TL 202 and TL 206 No Upgrades

Fording Sites-TL-202-206



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Bridges and Culverts



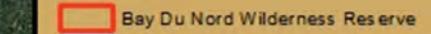
bridge



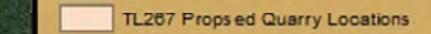
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TBD



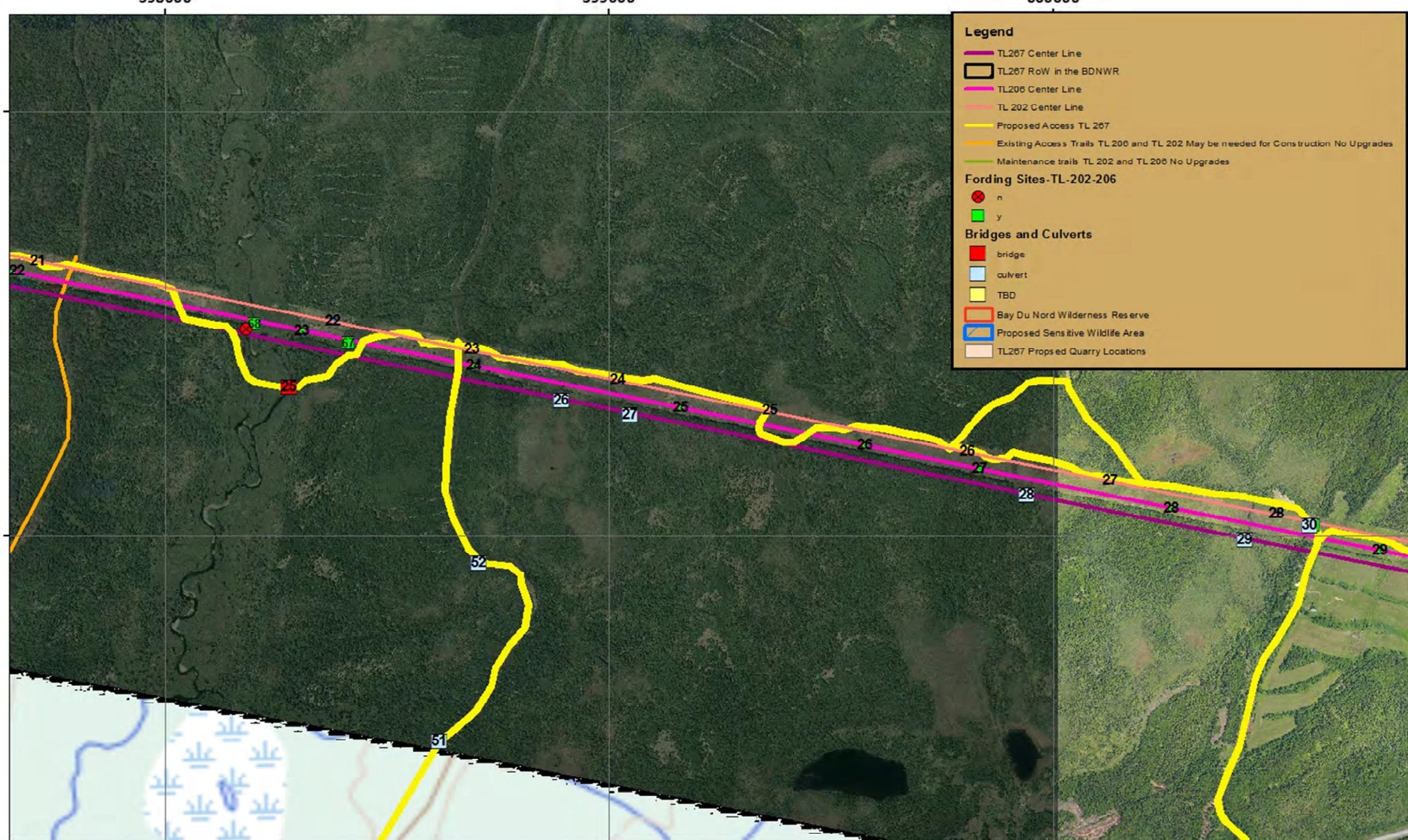
Bay Du Nord Wilderness Reserve



Proposed Sensitive Wildlife Area



TL267 Proposed Quarry Locations



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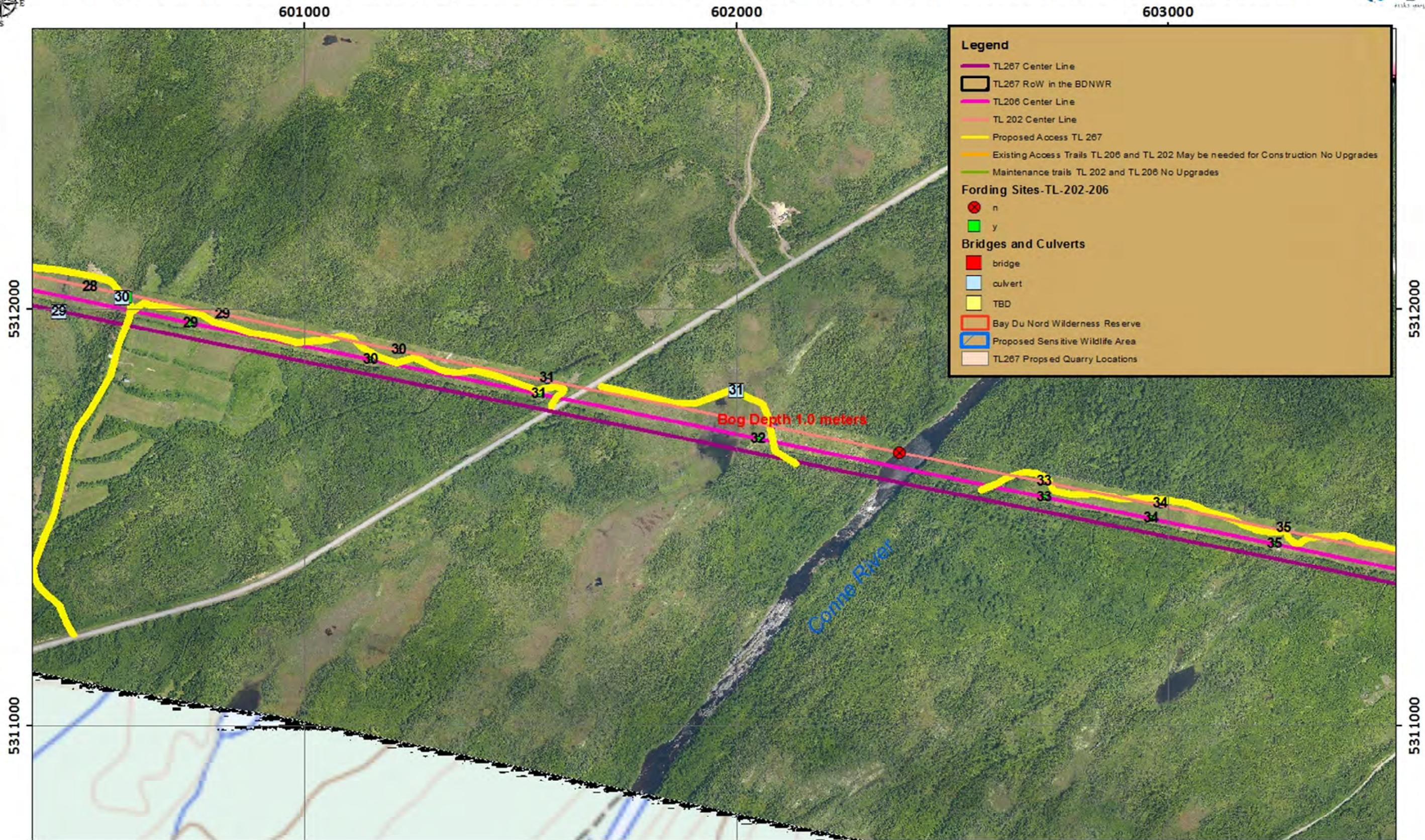
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Proposed Transmission Line (TL) 267 Bay D'Espoir Generating Station to Western Avalon Terminal Station



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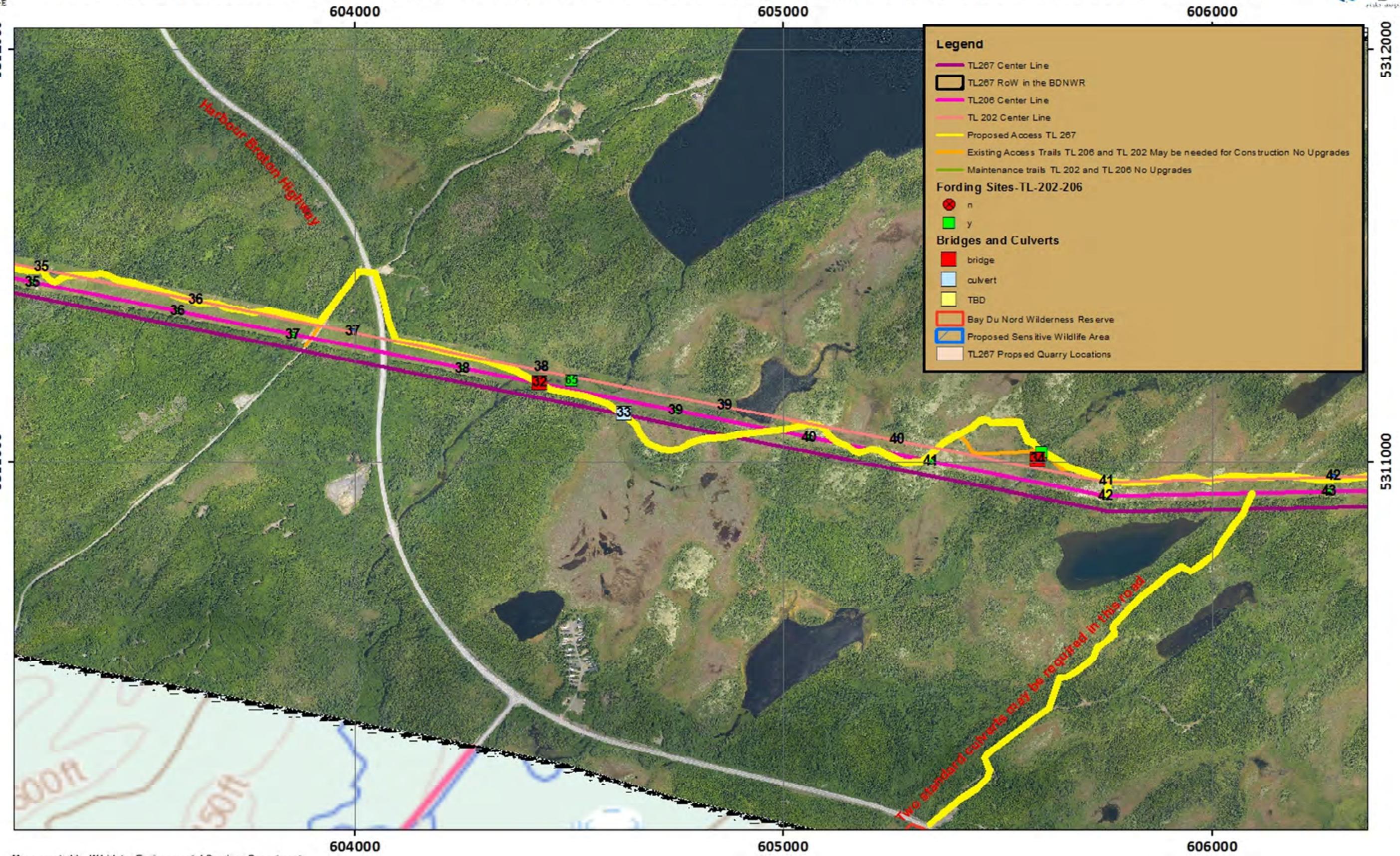
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Proposed Transmission Line (TL) 267 Bay D'Espoir Generating Station to Western Avalon Terminal Station



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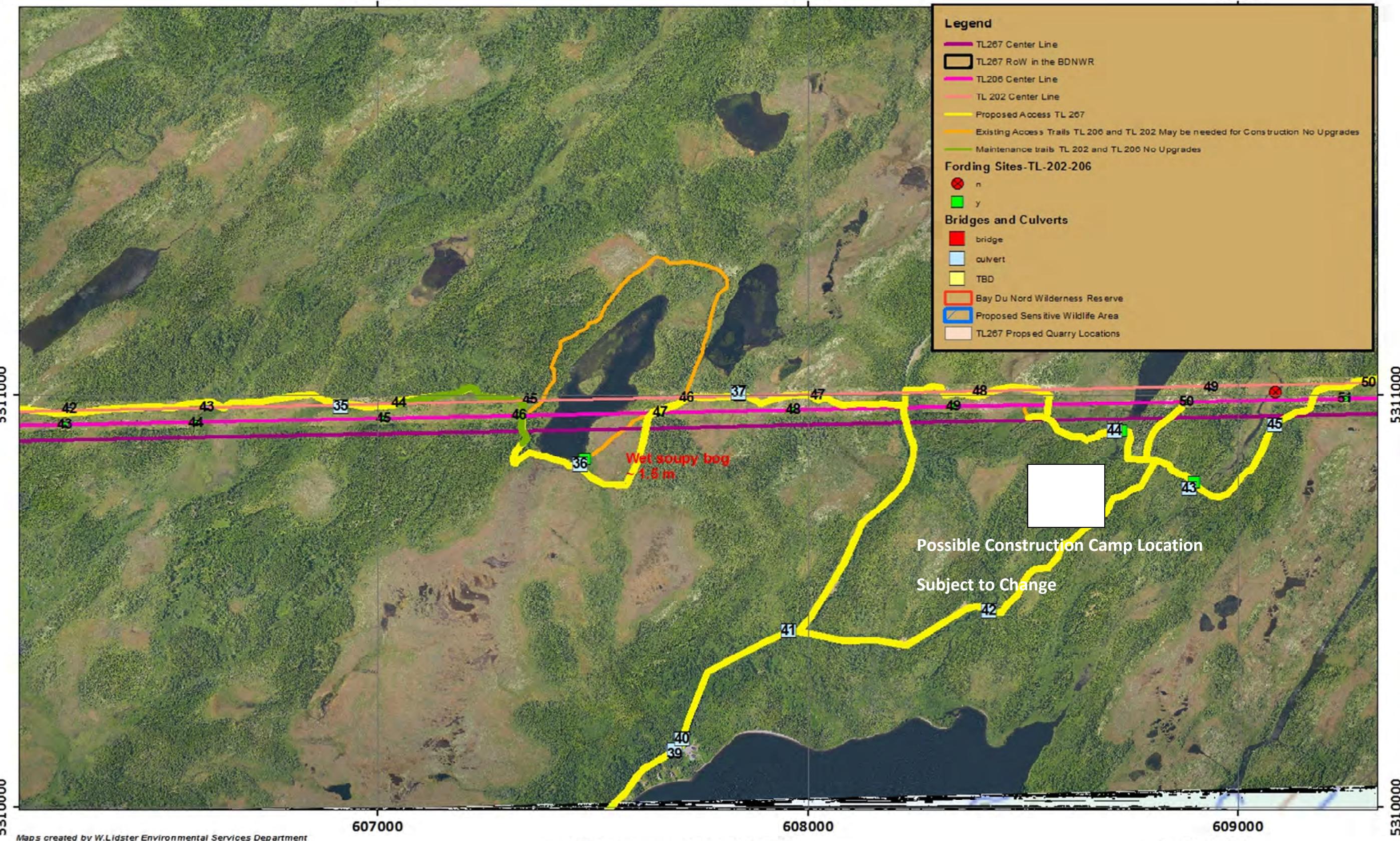
Proposed Transmission Line (TL) 267 Bay D'Espoir Generating Station to Western Avalon Terminal Station



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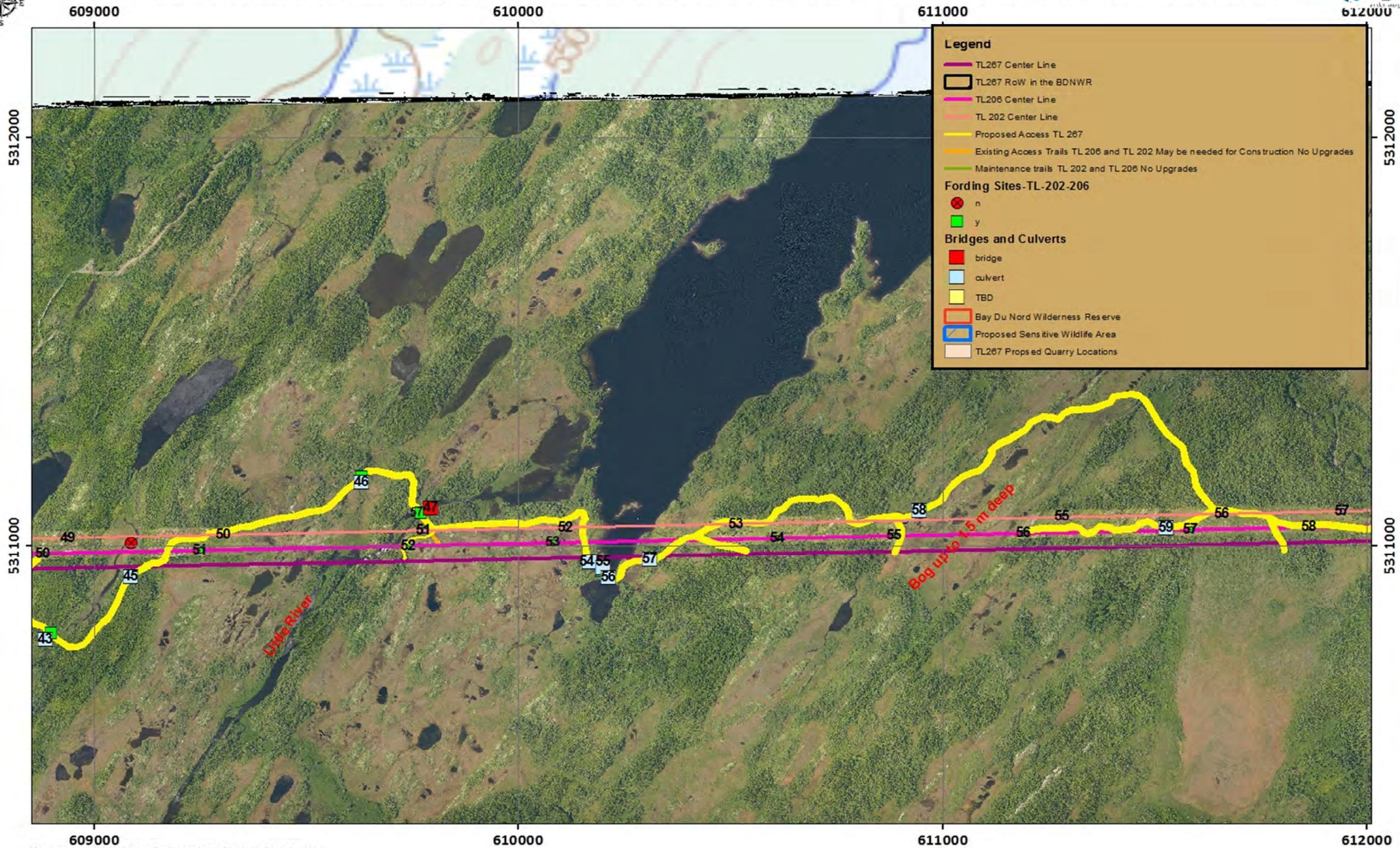
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Proposed Transmission Line (TL) 267 Bay D'Espoir Generating Station to Western Avalon Terminal Station

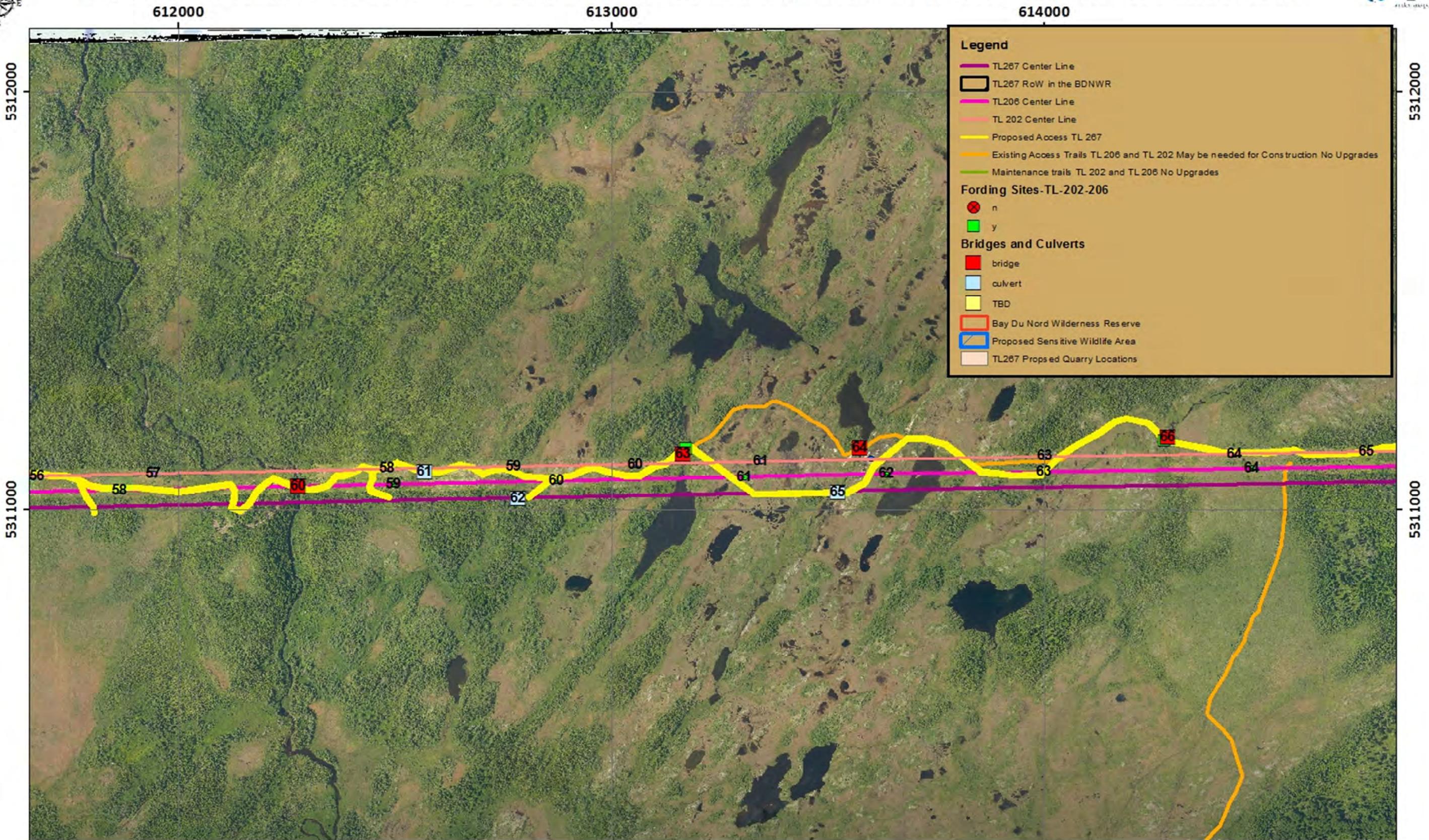


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Proposed Transmission Line (TL) 267 Bay D'Espoir Generating Station to Western Avalon Terminal Station



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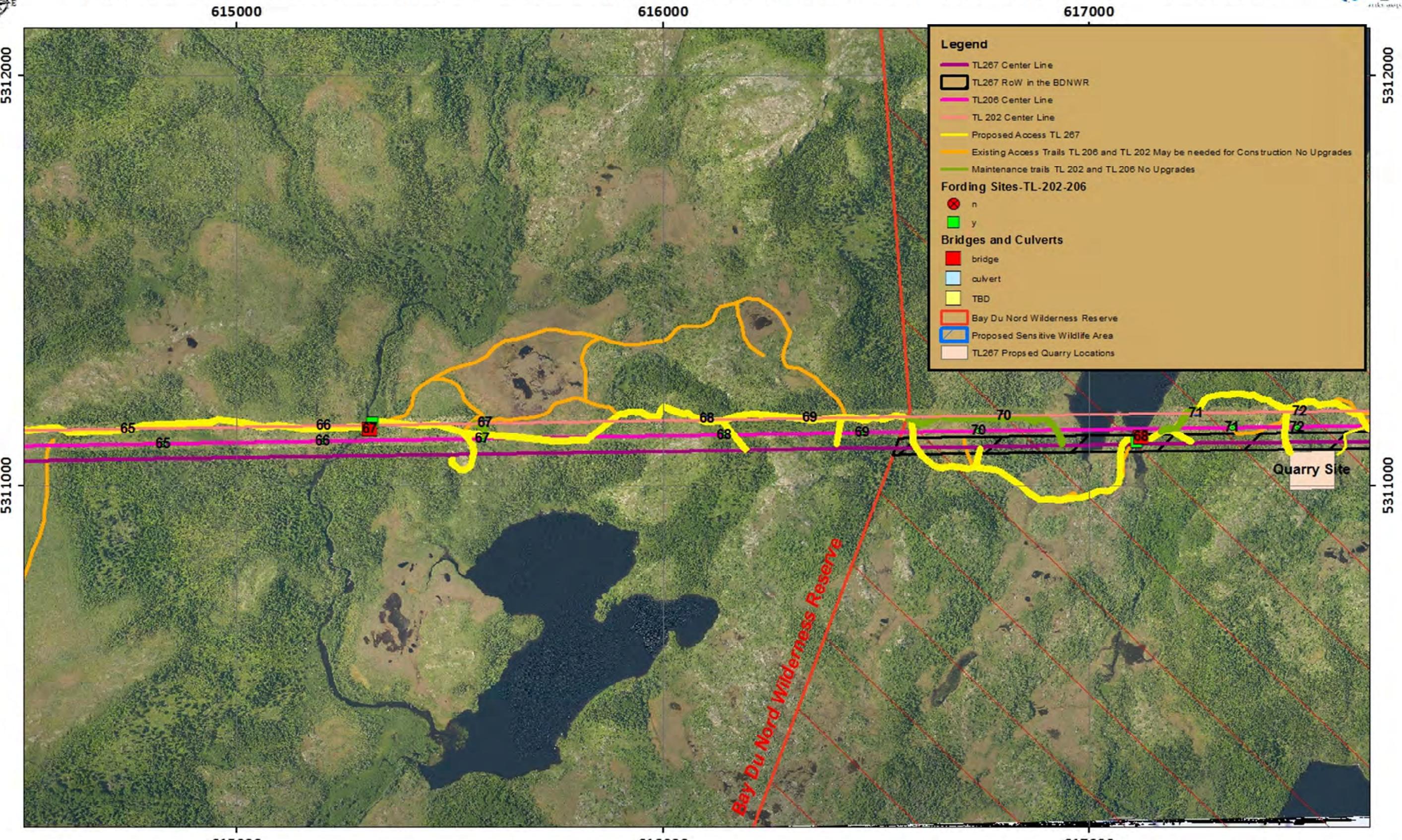
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Proposed Transmission Line (TL) 267 Bay D'Espoir Generating Station to Western Avalon Terminal Station



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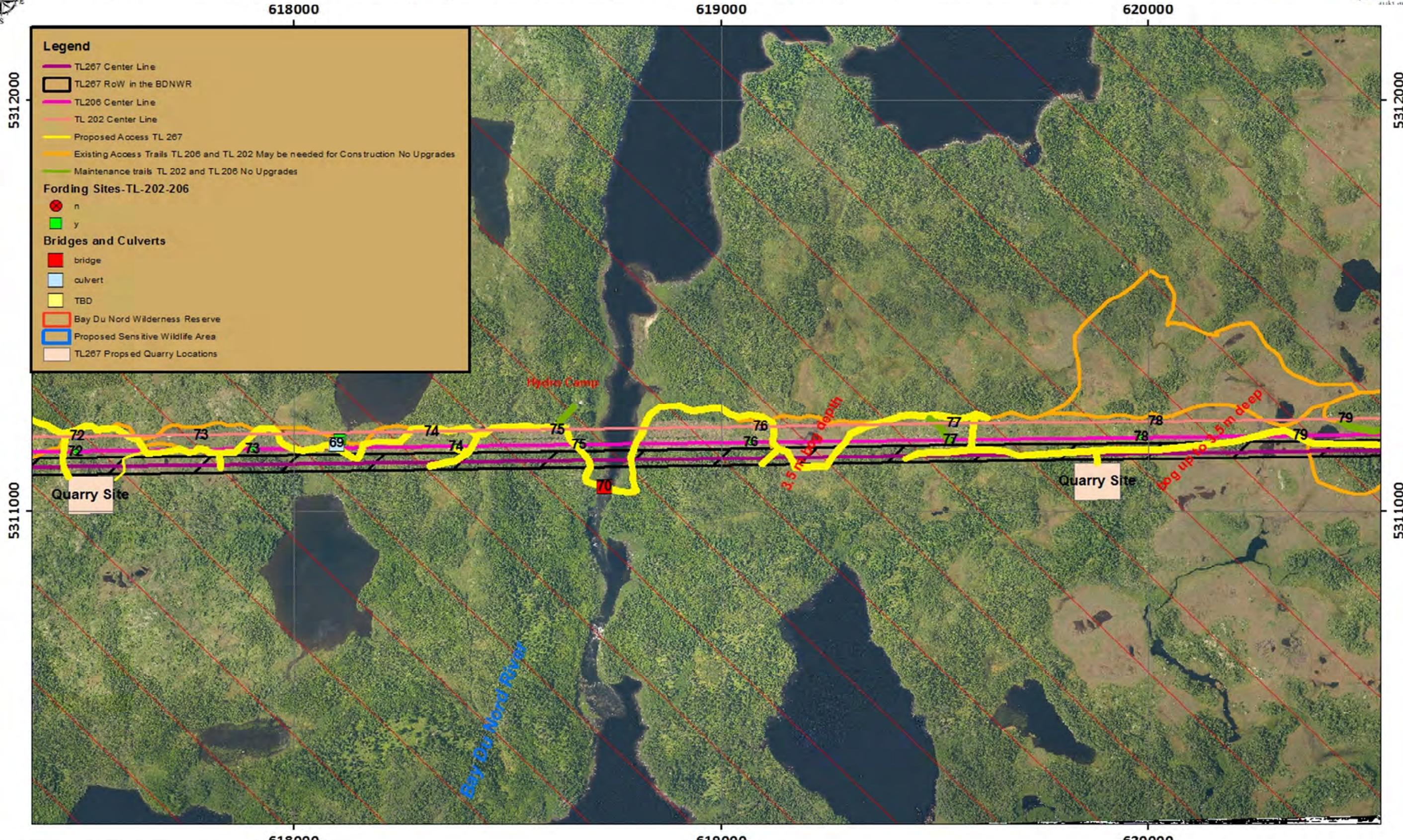
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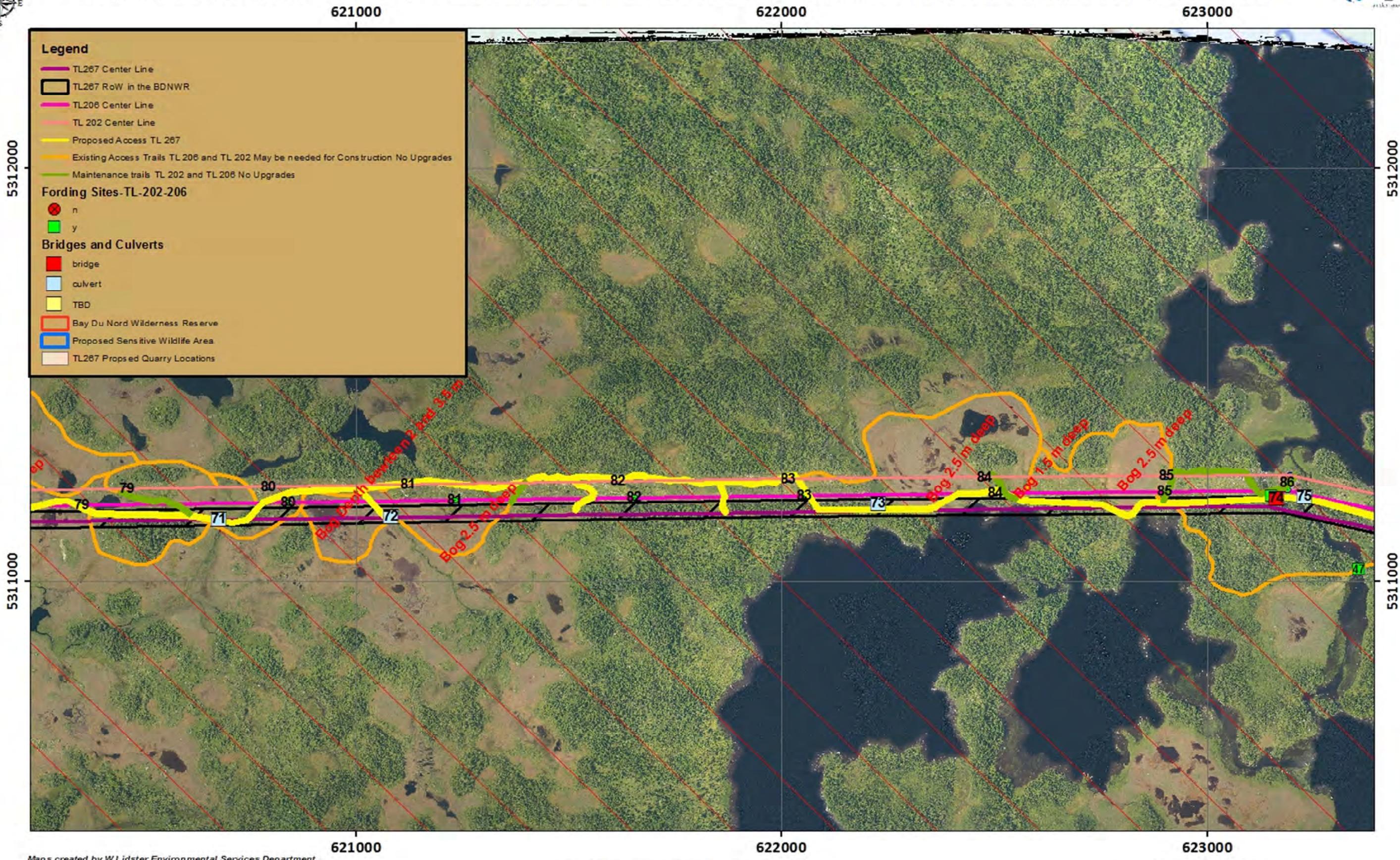


Proposed Transmission Line (TL) 267 Bay D'Espoir Generating Station to Western Avalon Terminal Station





Proposed Transmission Line (TL) 267 Bay D'Espoir Generating Station to Western Avalon Terminal Station



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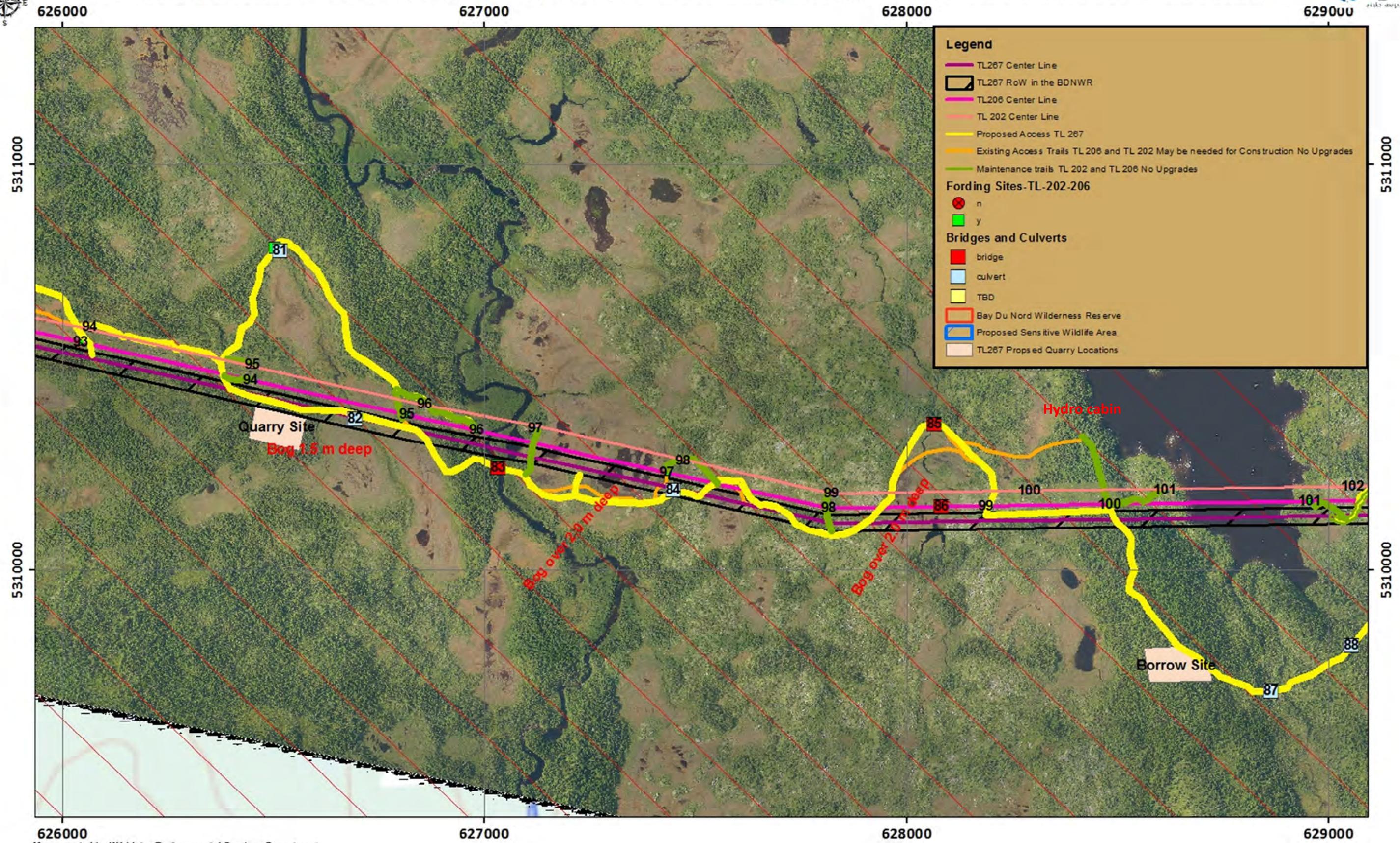


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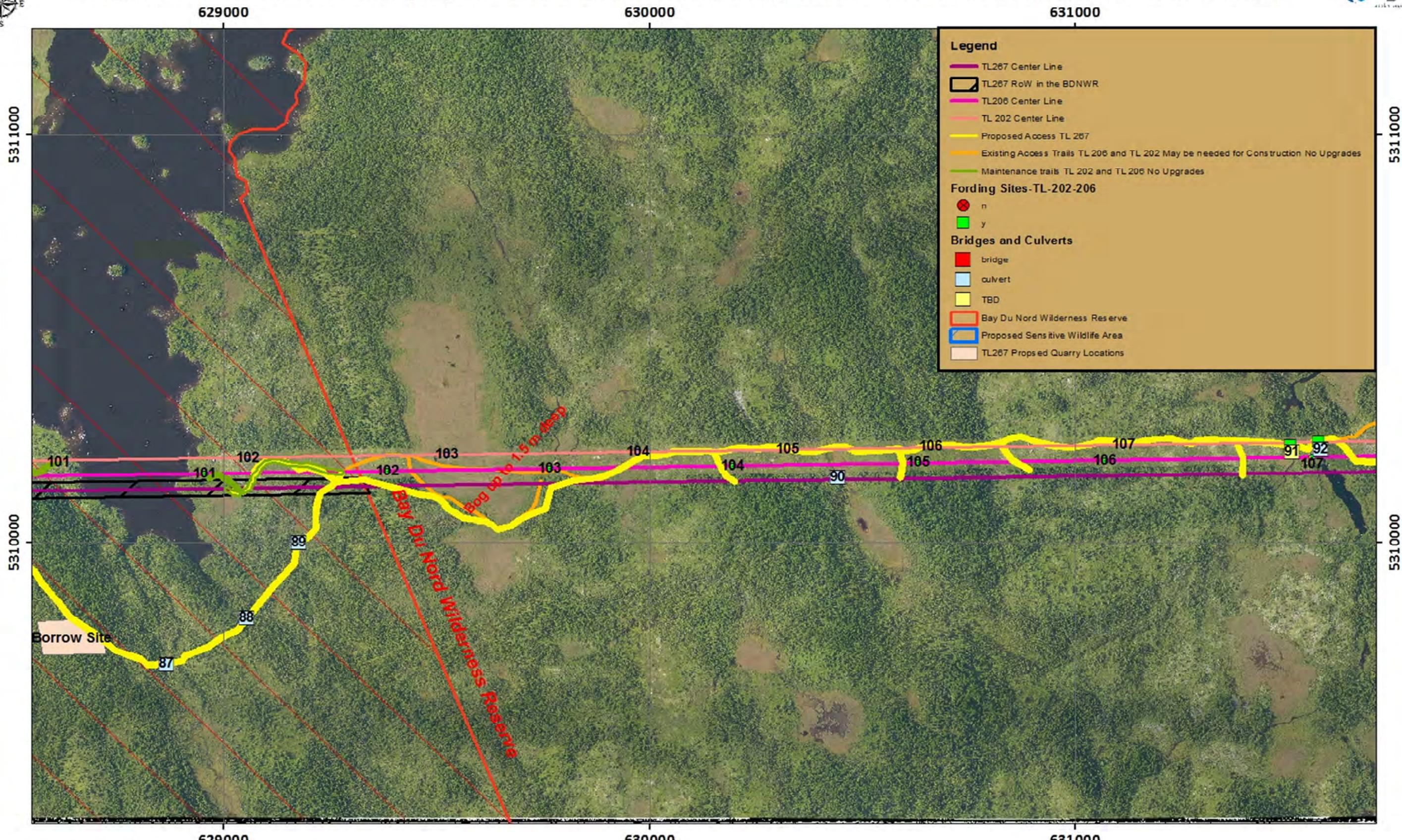
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Proposed Transmission Line (TL) 267 Bay D'Espoir Generating Station to Western Avalon Terminal Station



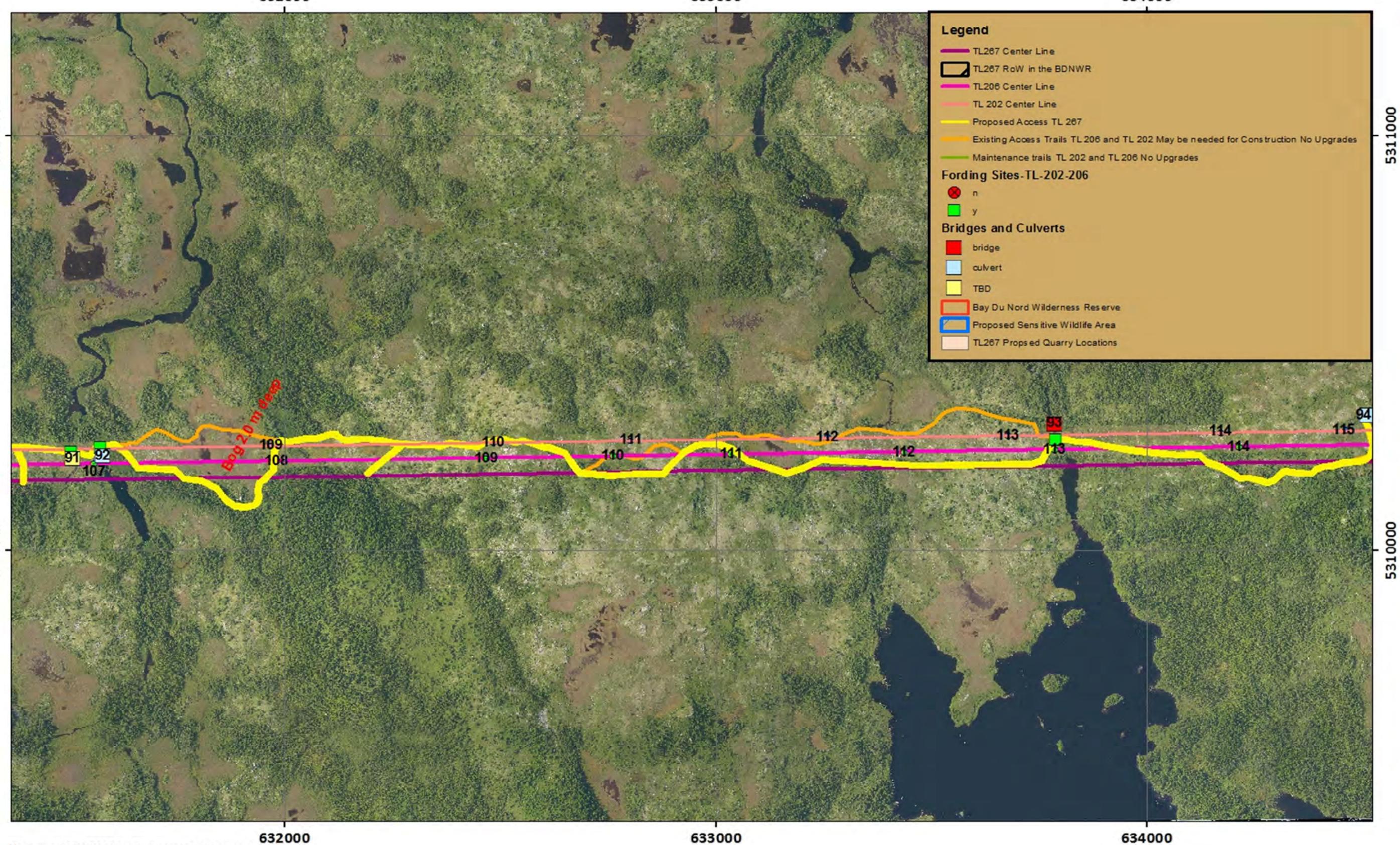
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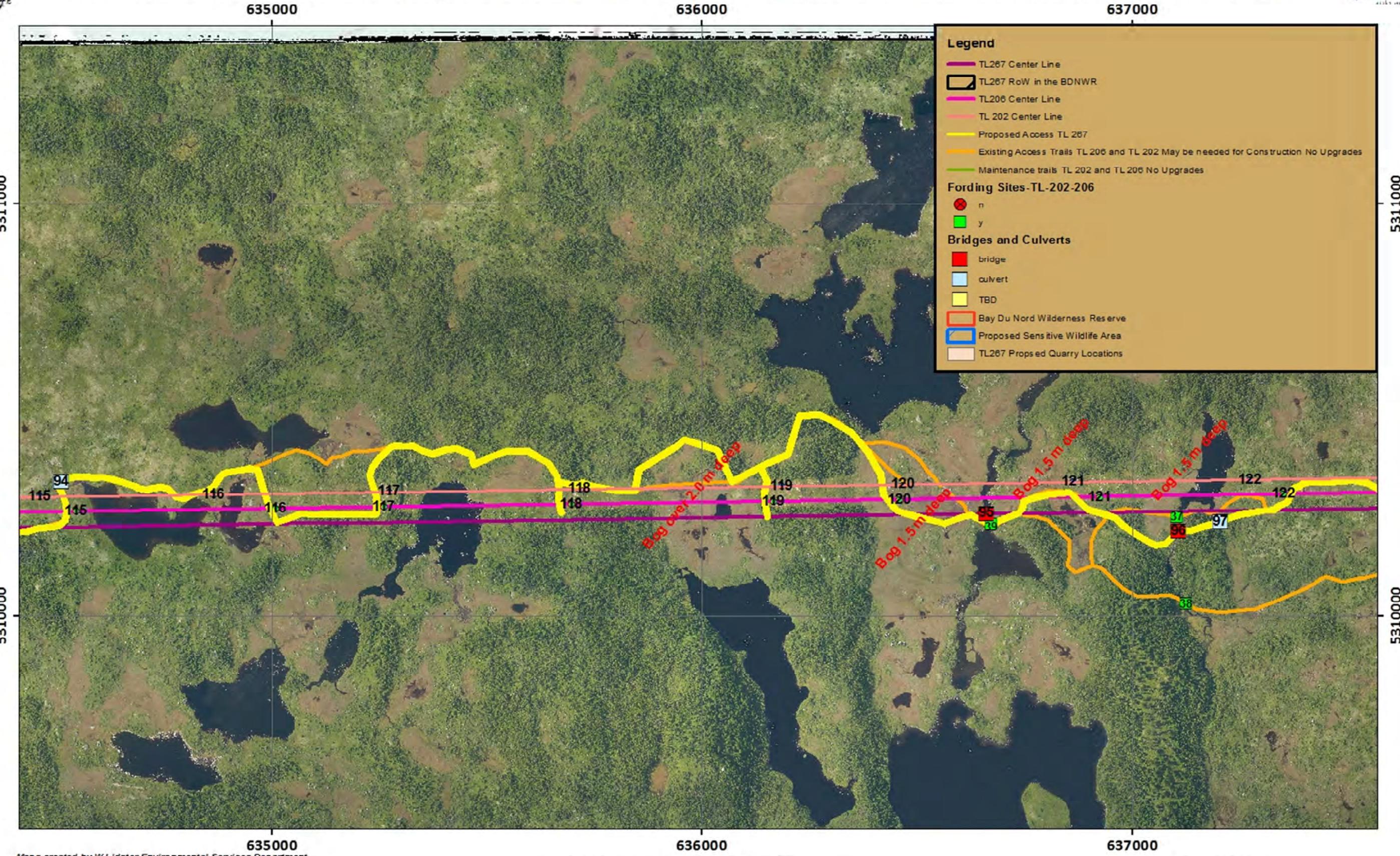


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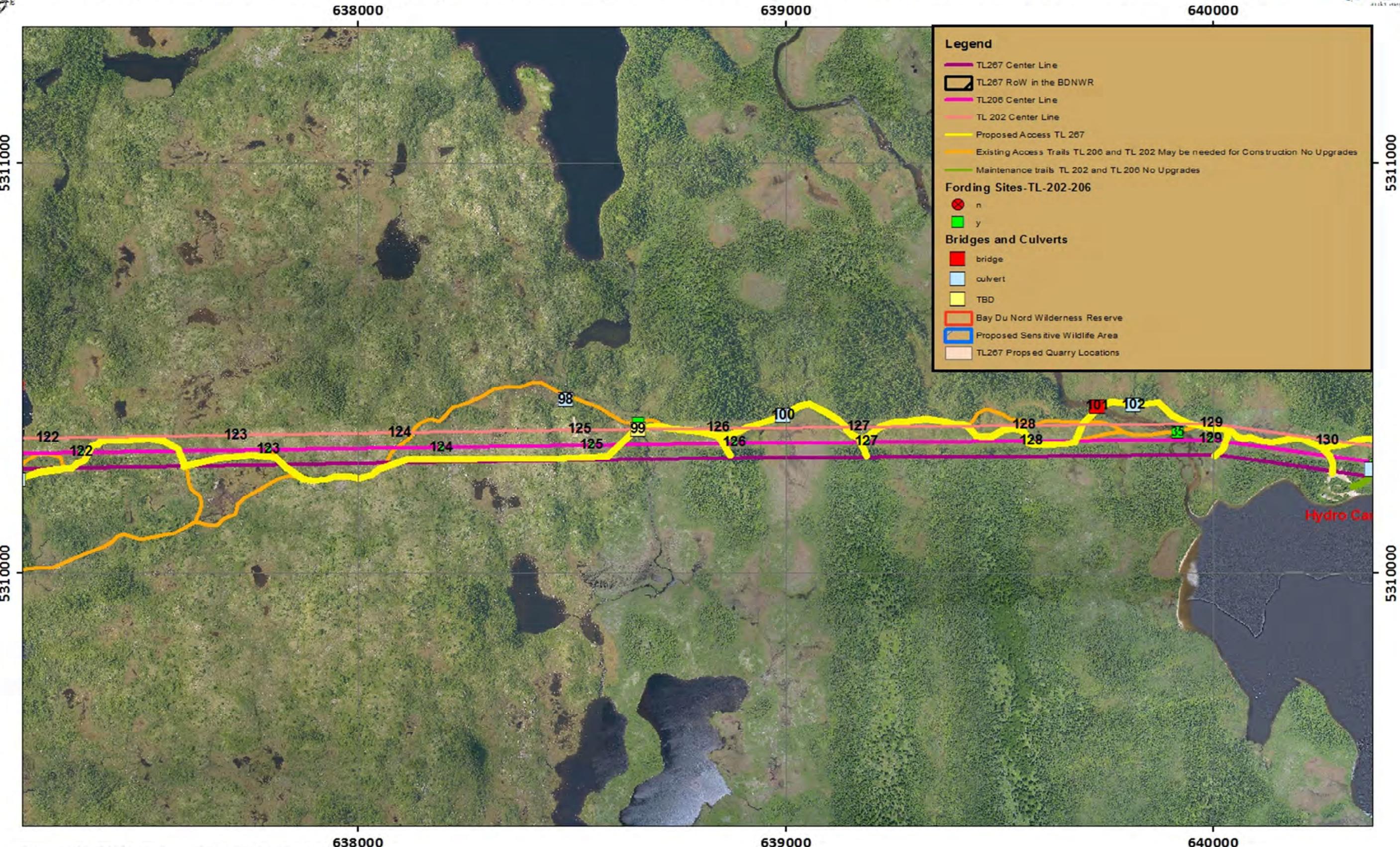


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Proposed Transmission Line (TL) 267 Bay D'Espoir Generating Station to Western Avalon Terminal Station



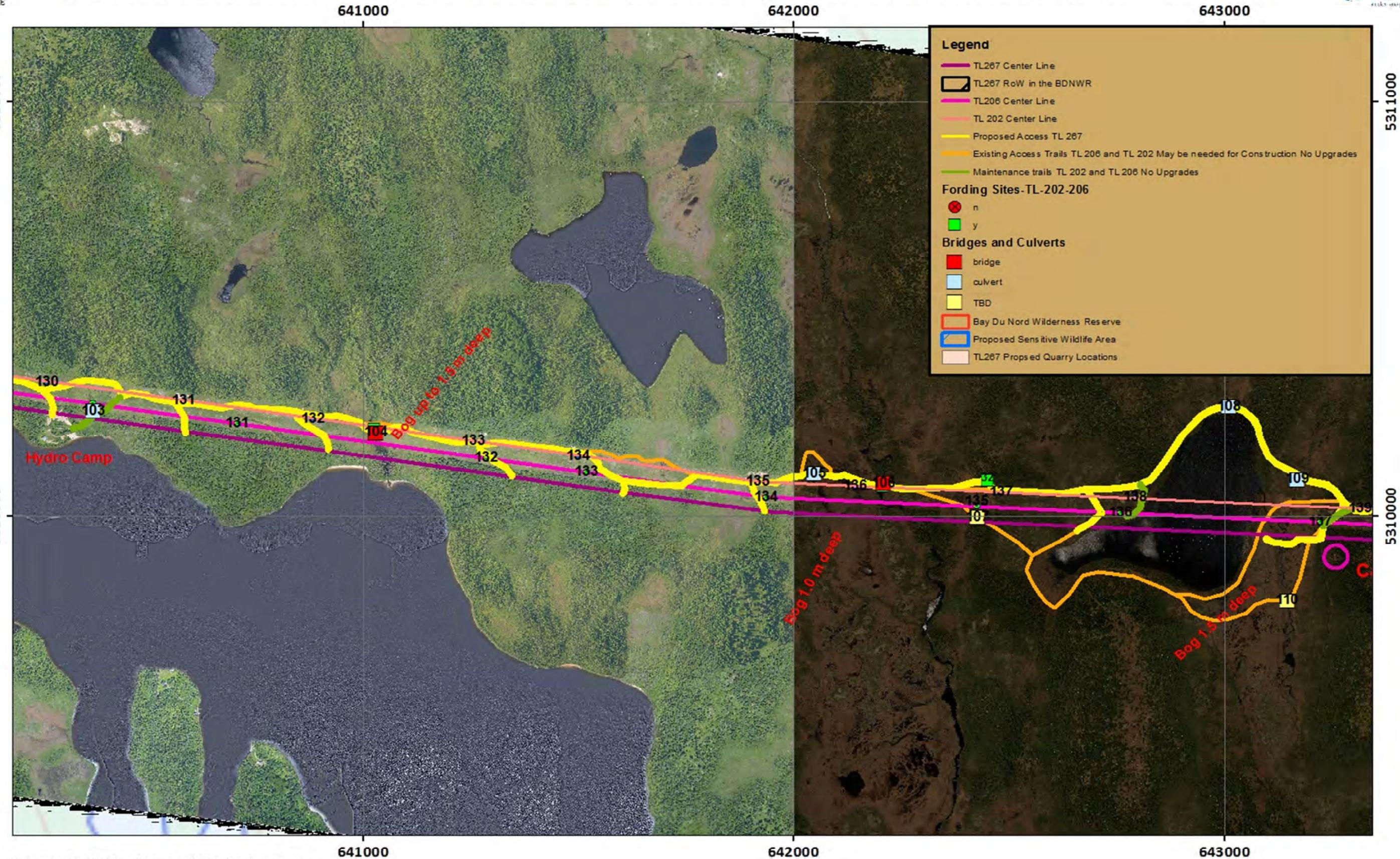
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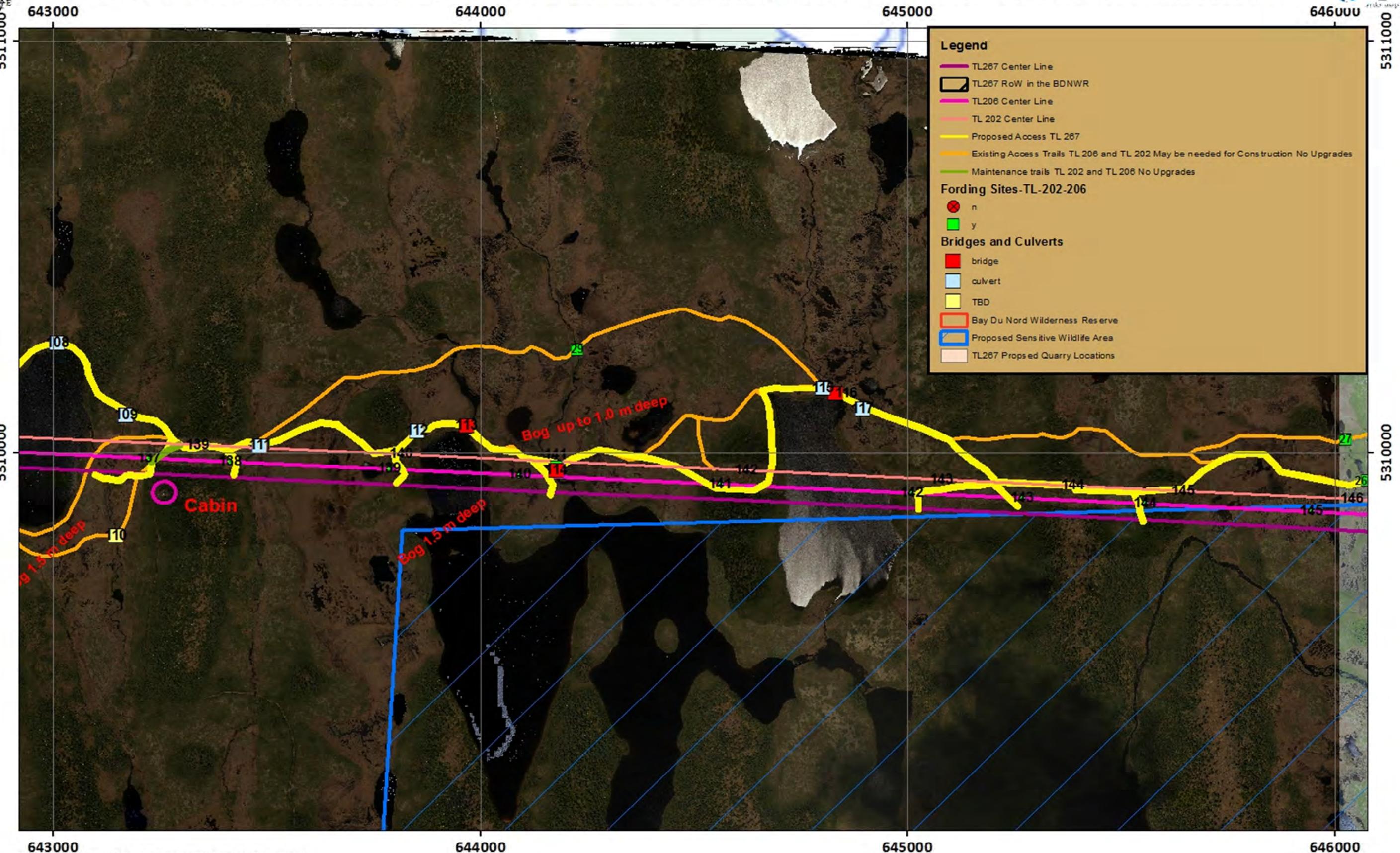
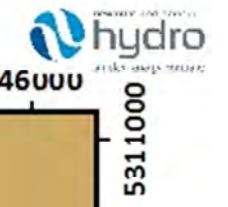
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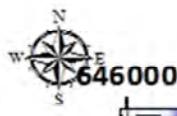
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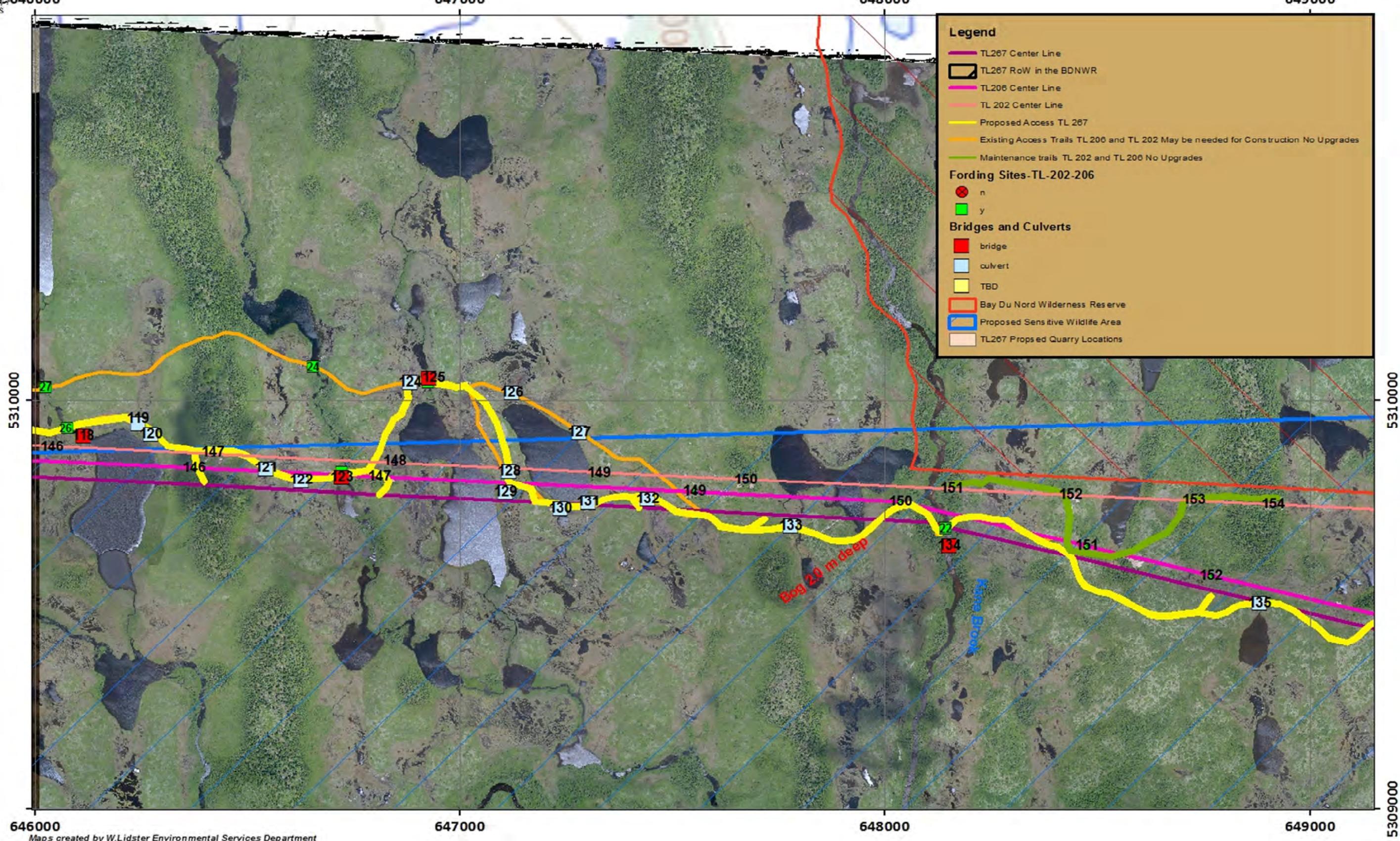
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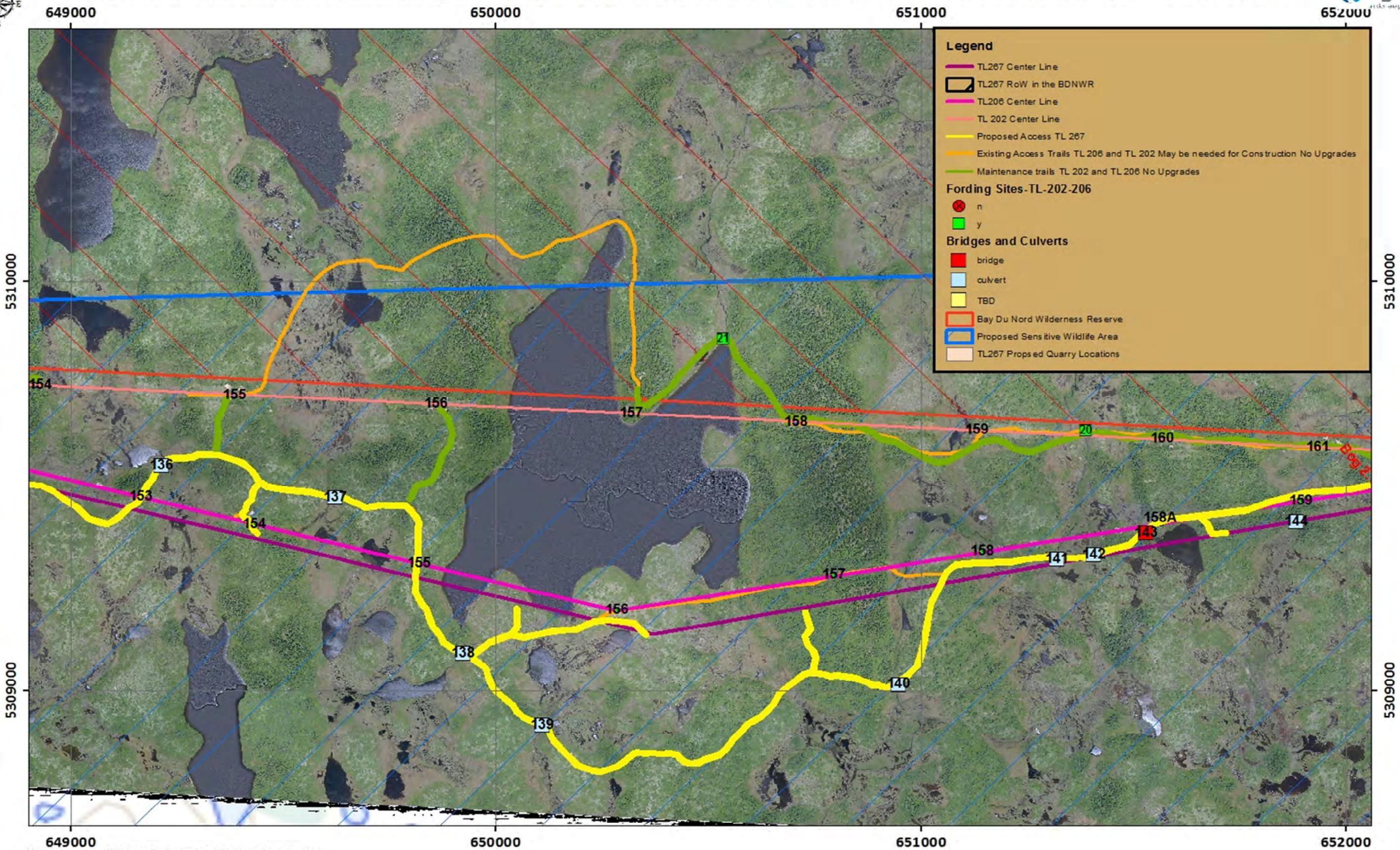
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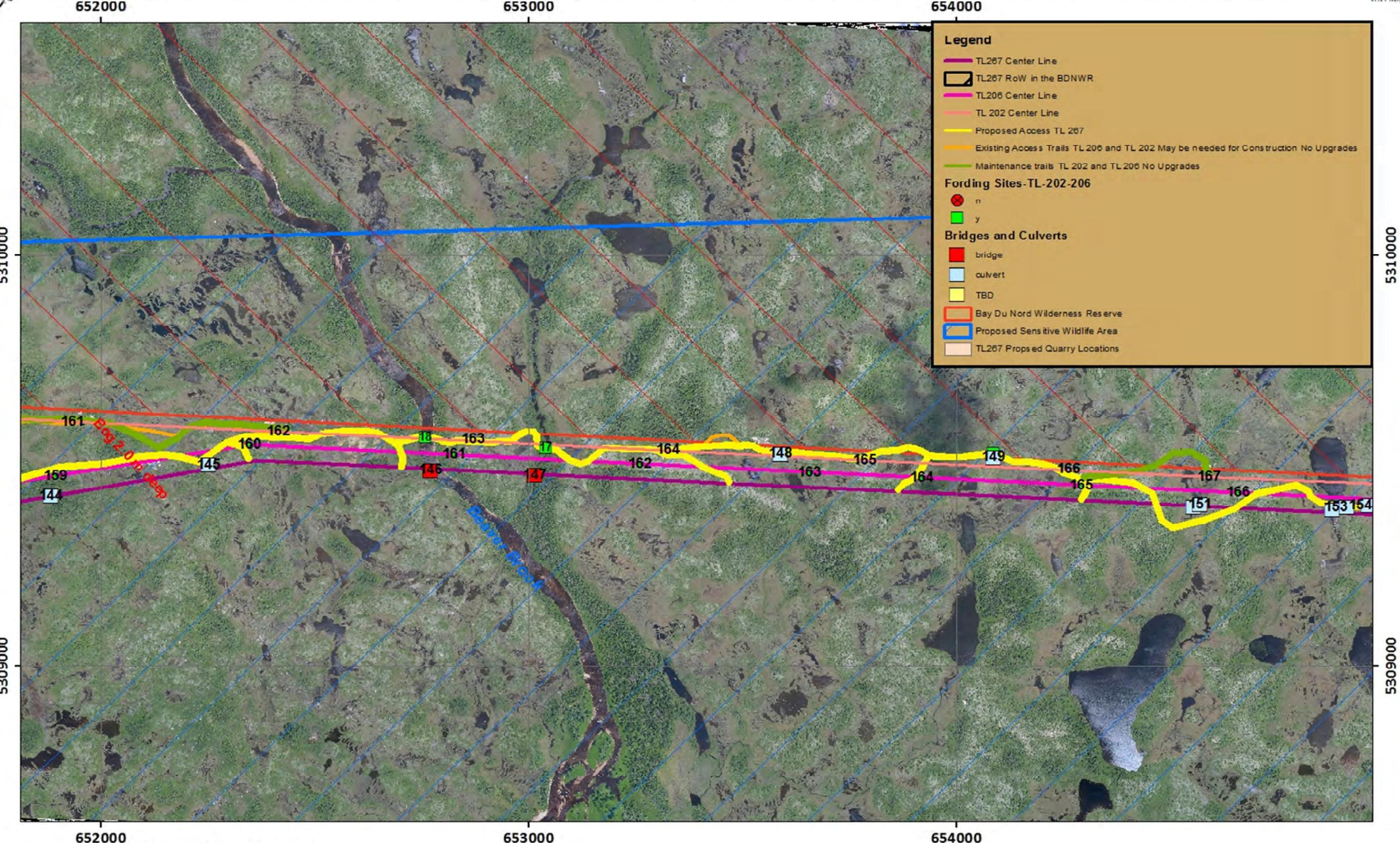
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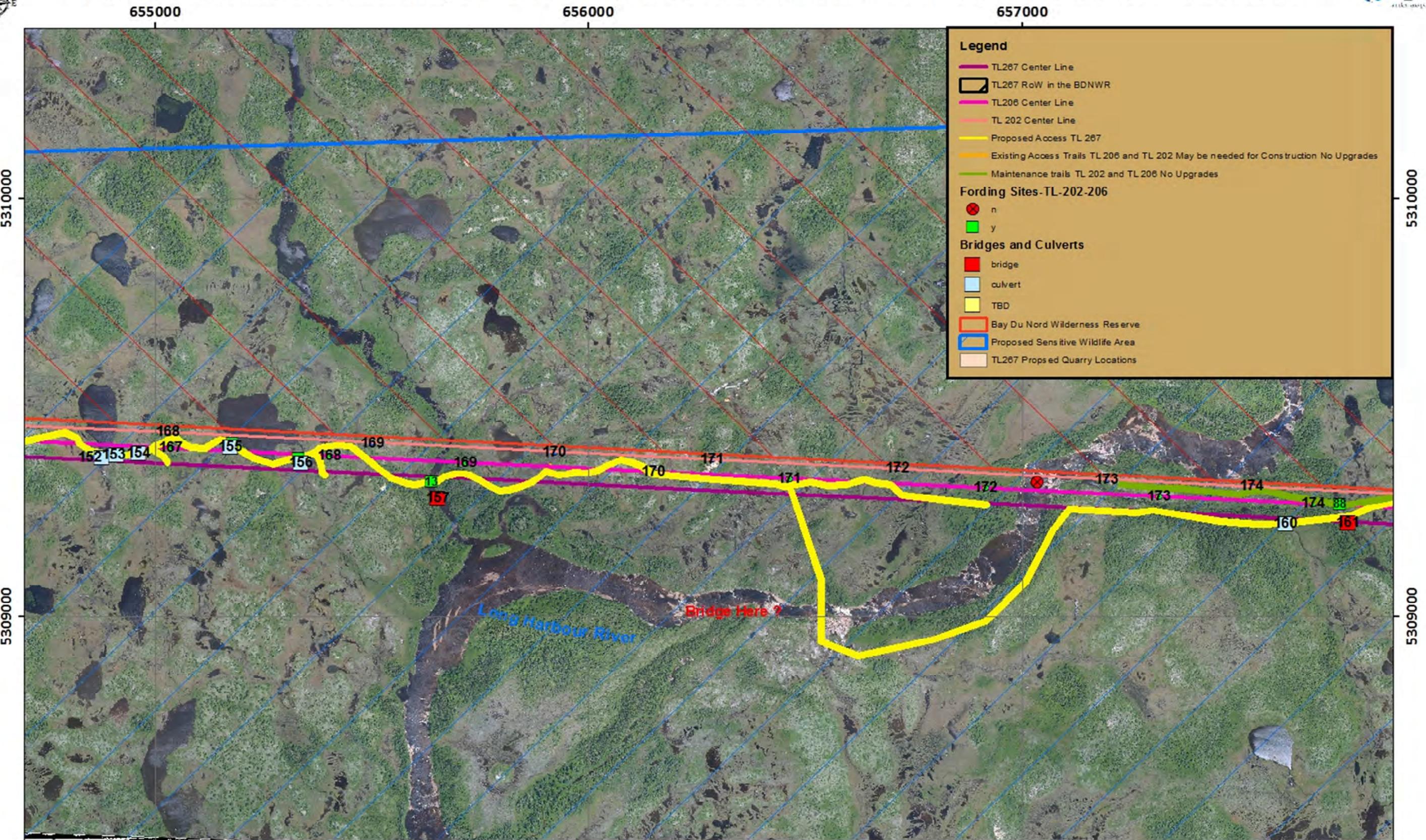
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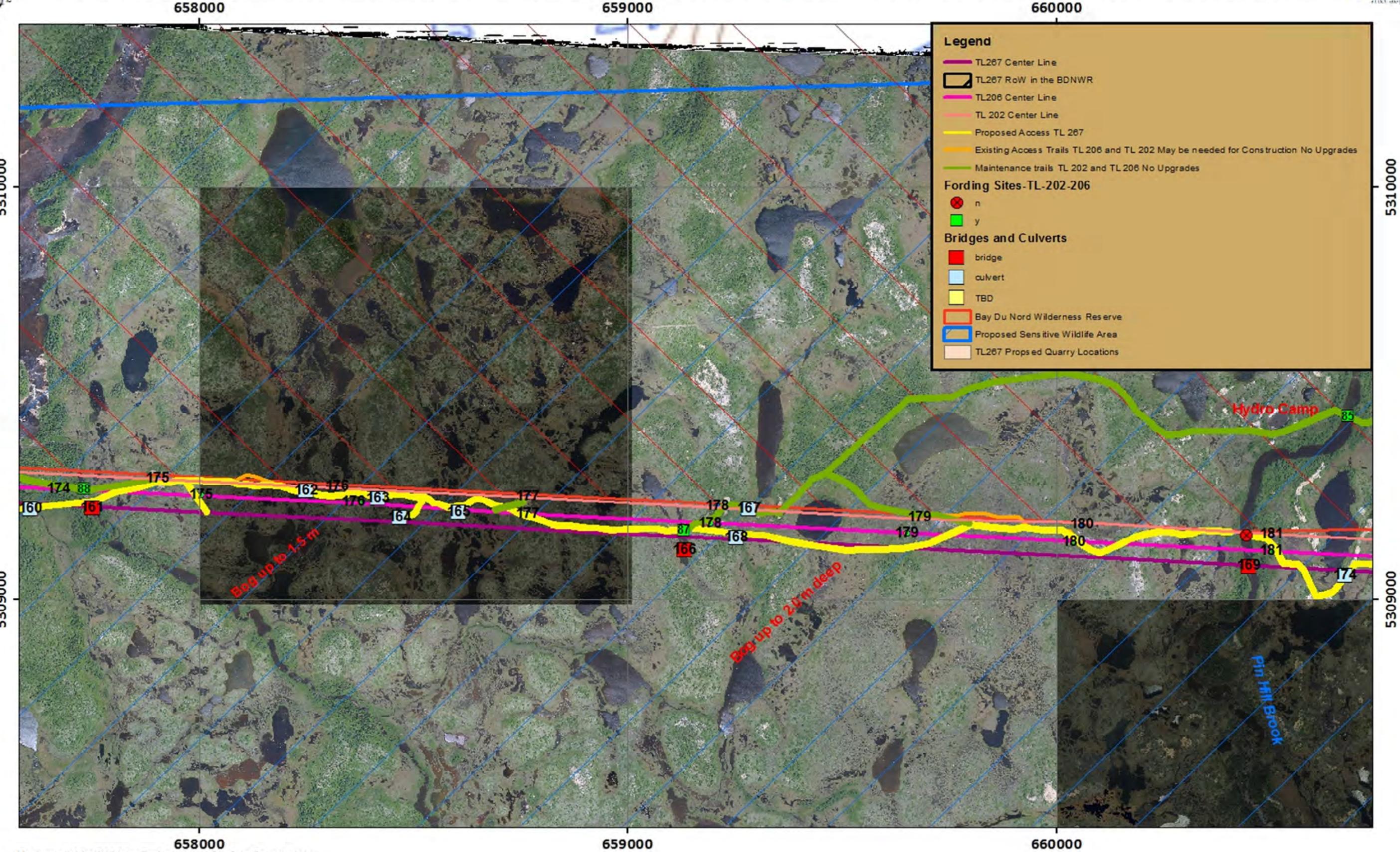


Proposed Transmission Line (TL) 267 Bay D'Espoir Generating Station to Western Avalon Terminal Station





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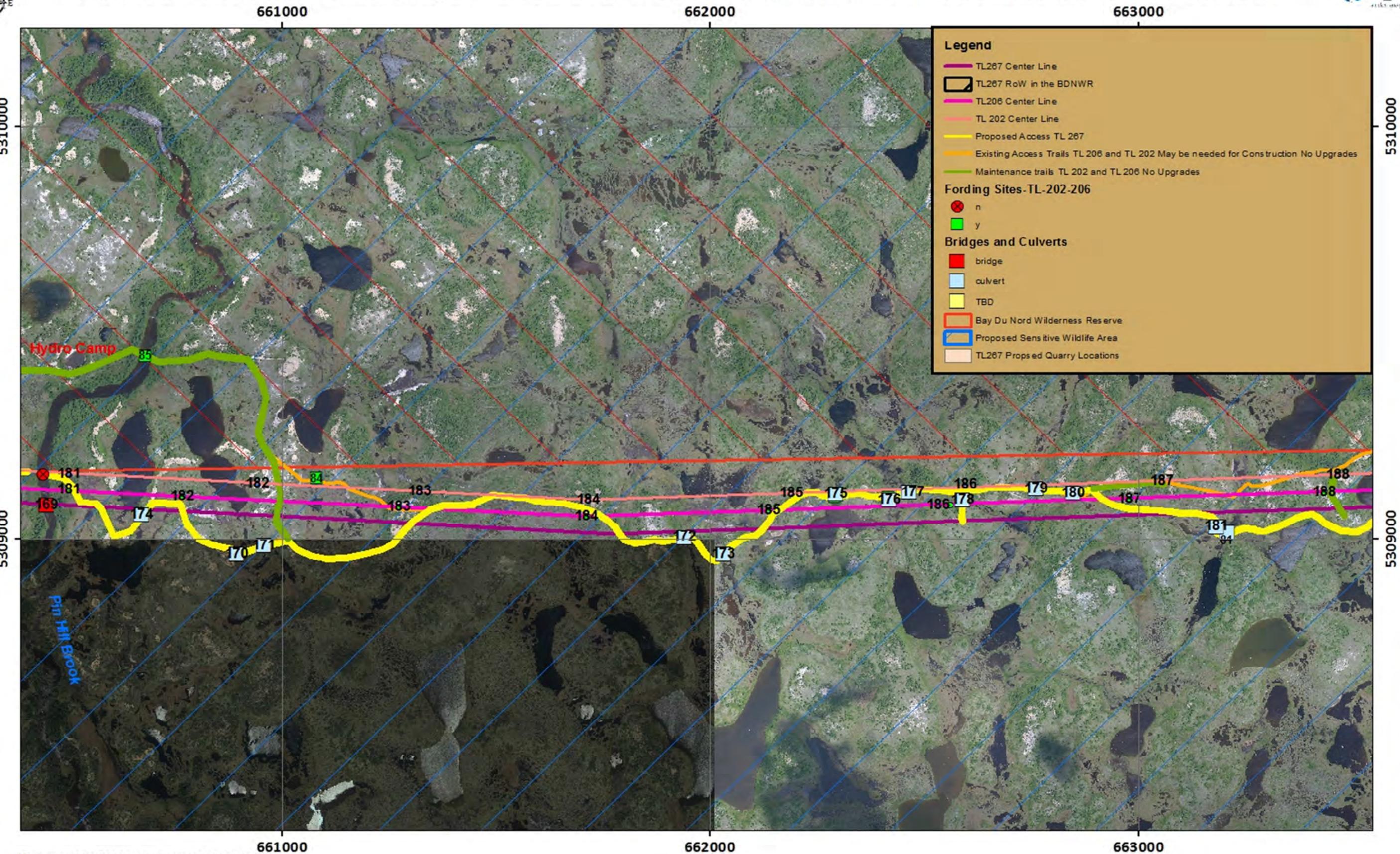


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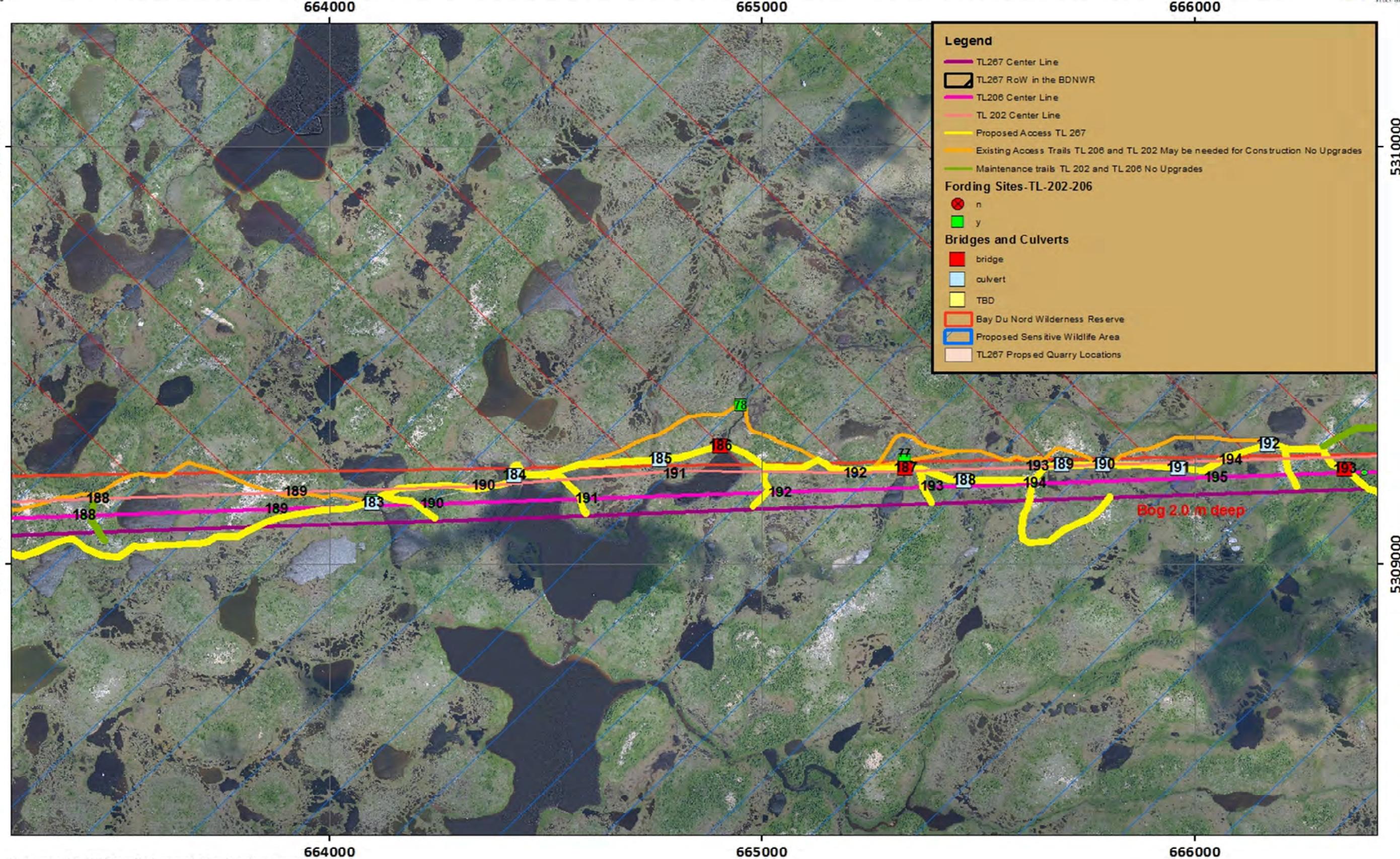
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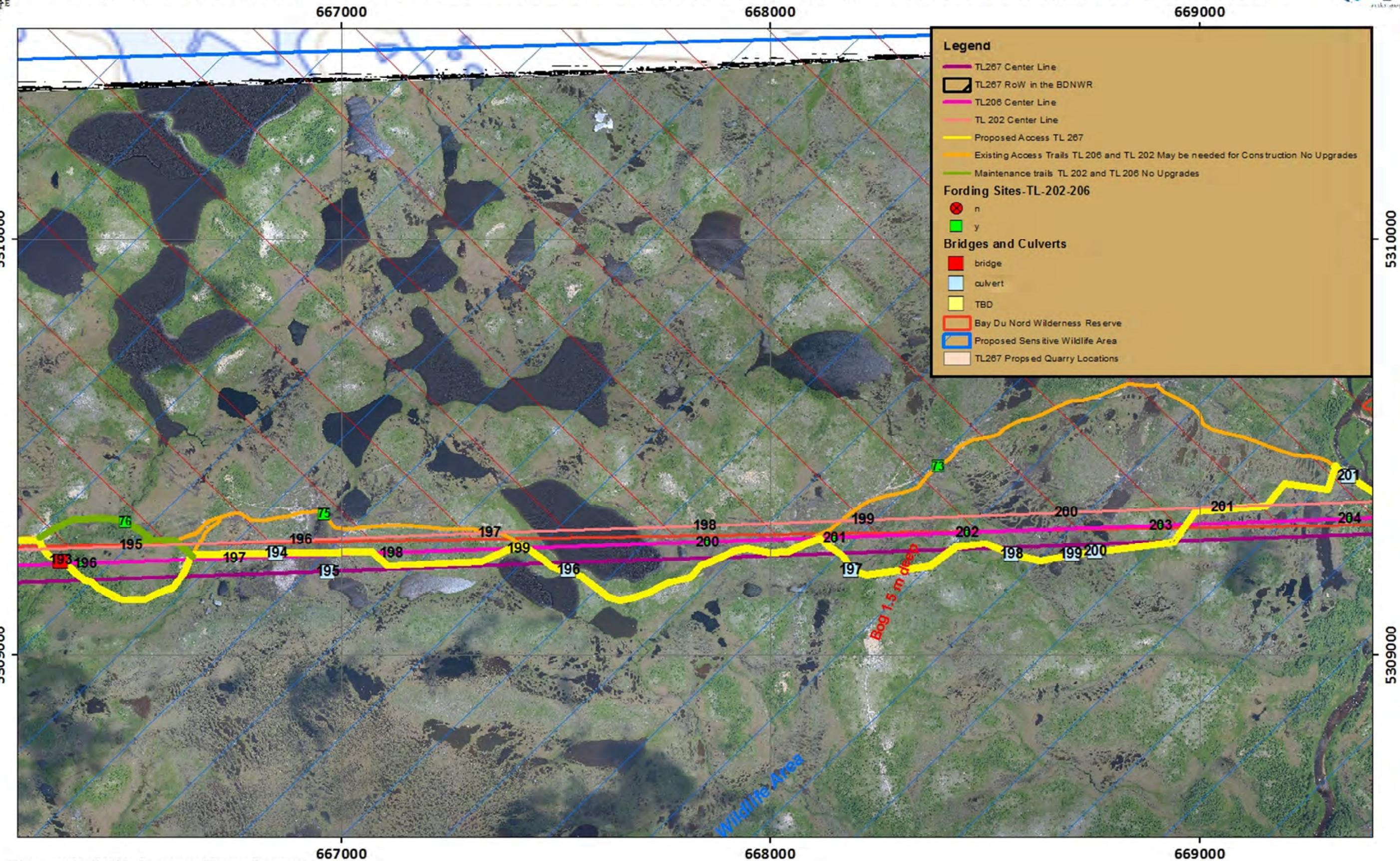
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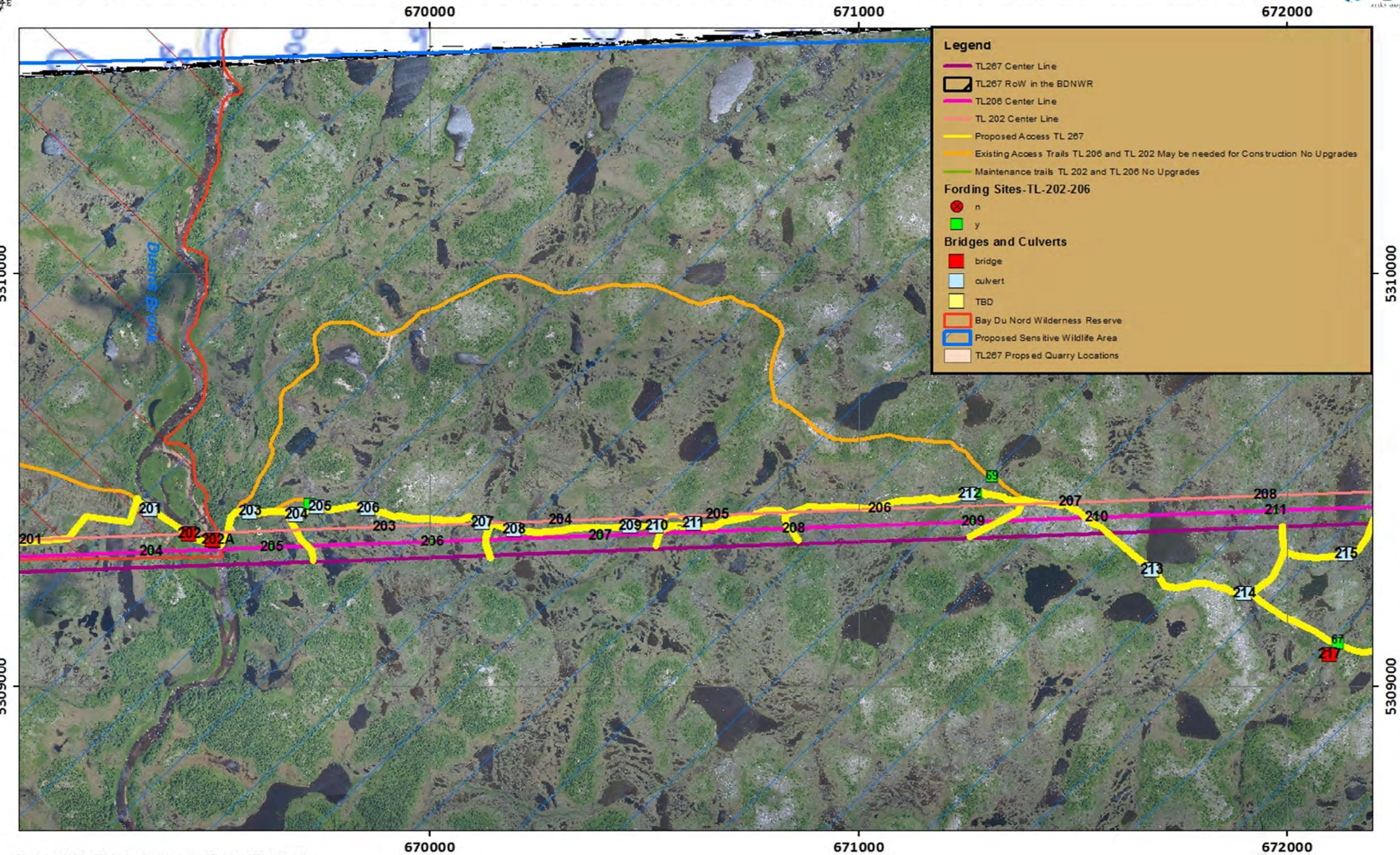
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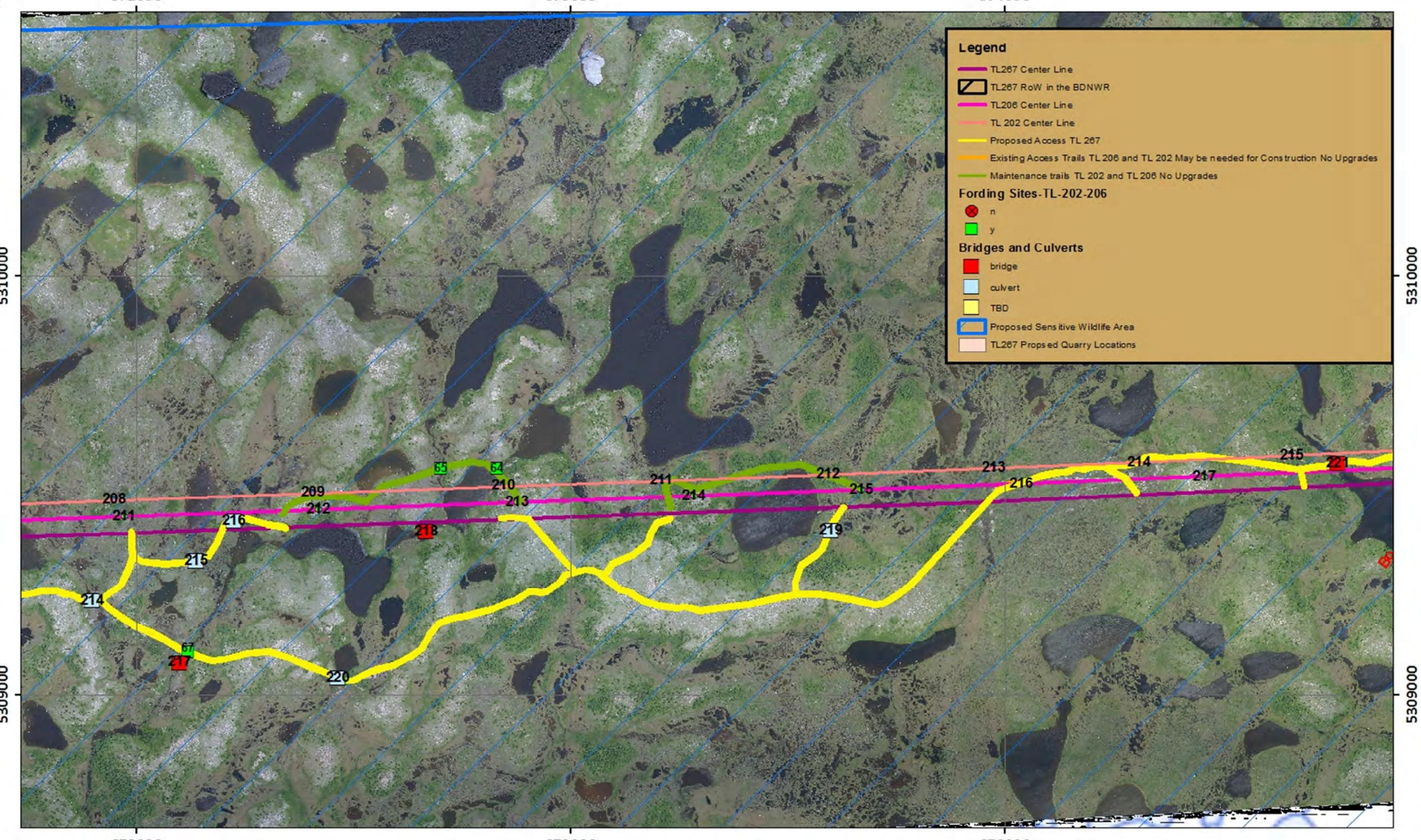
Proposed Transmission Line (TL) 267 Bay D'Espoir Generating Station to Western Avalon Terminal Station



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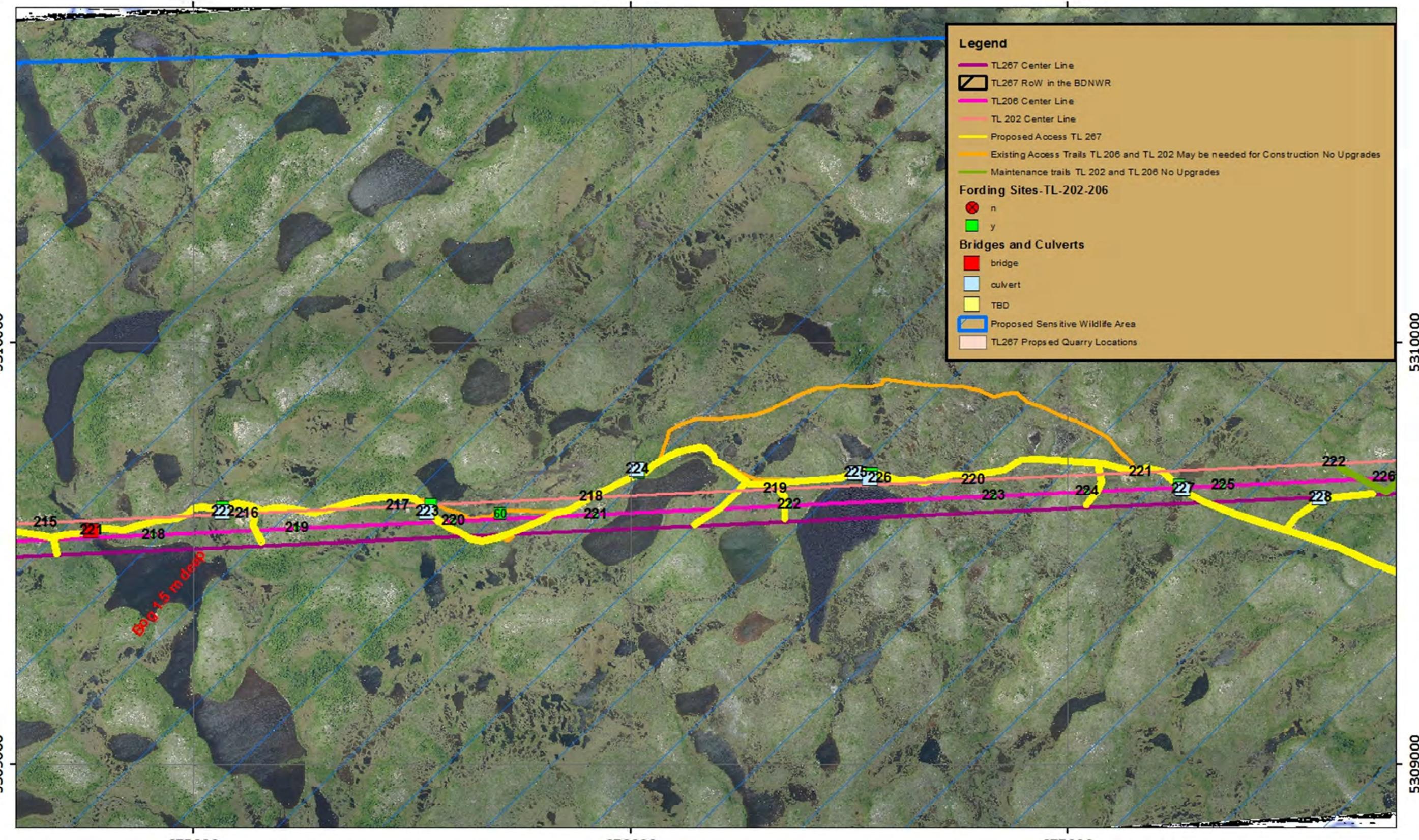


Proposed Transmission Line (TL) 267 Bay D'Espoir Generating Station to Western Avalon Terminal Station



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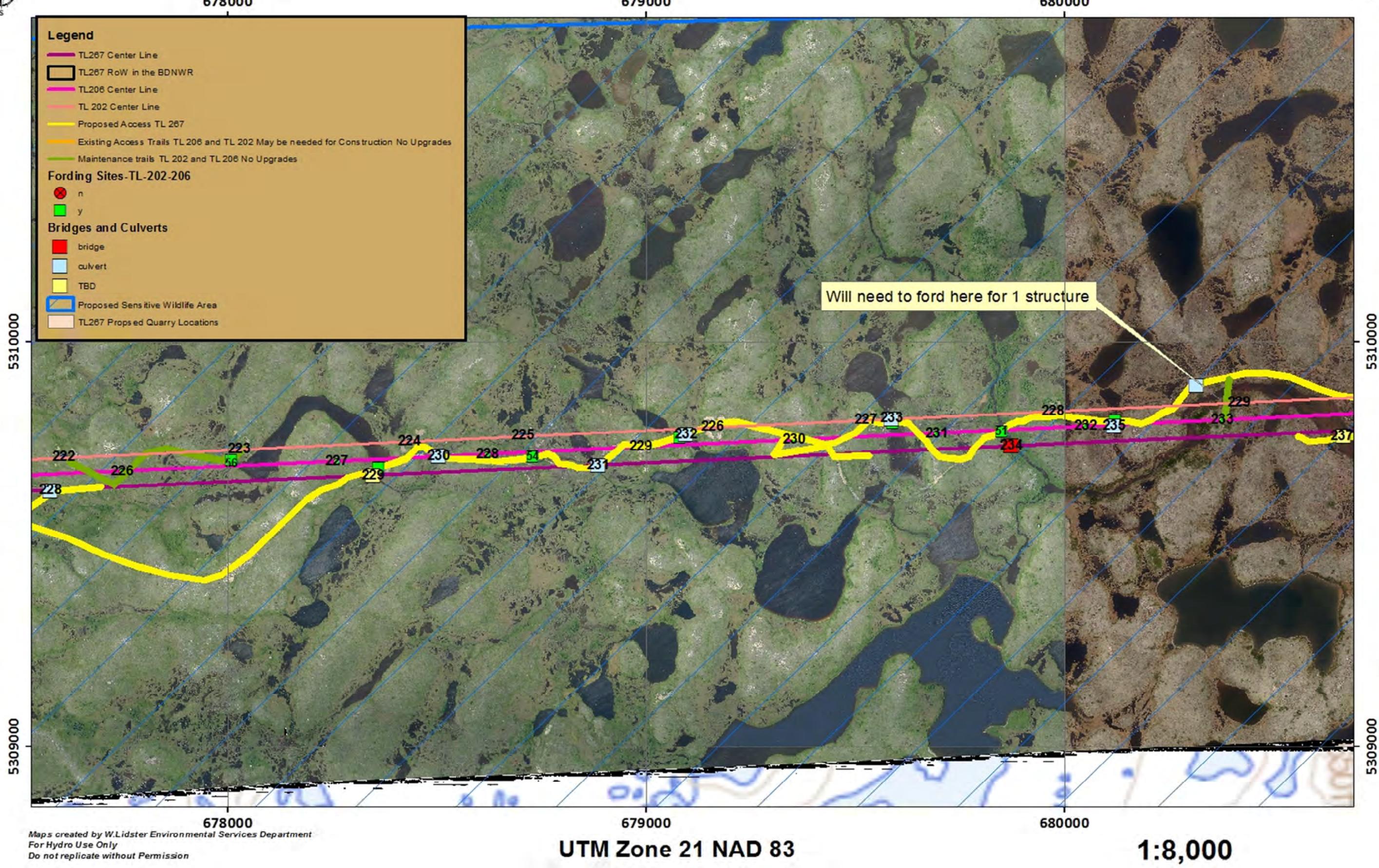
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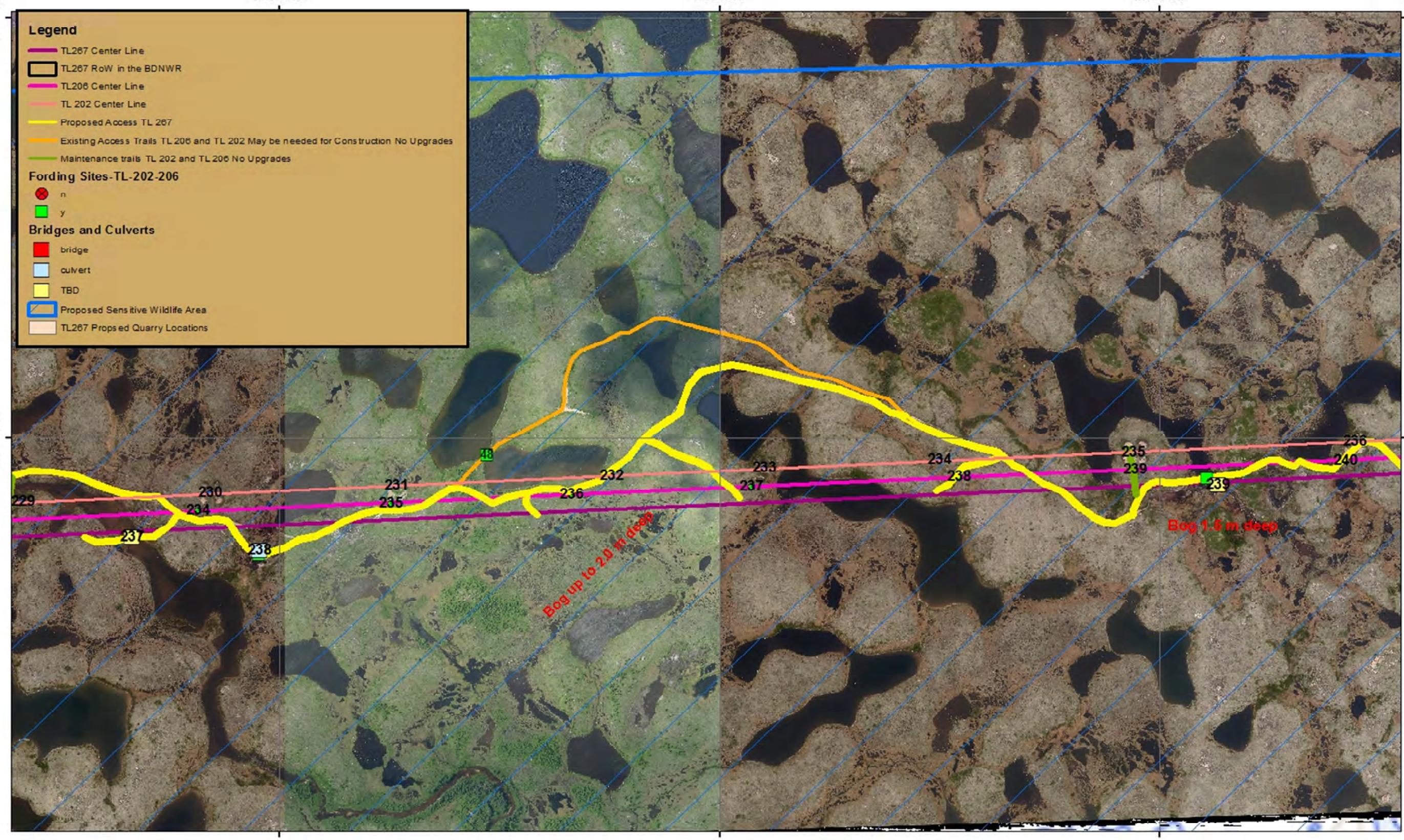
Proposed Transmission Line (TL) 267 Bay D'Espoir Generating Station to Western Avalon Terminal Station



Proposed Transmission Line (TL) 267 Bay D'Espoir Generating Station to Western Avalon Terminal Station



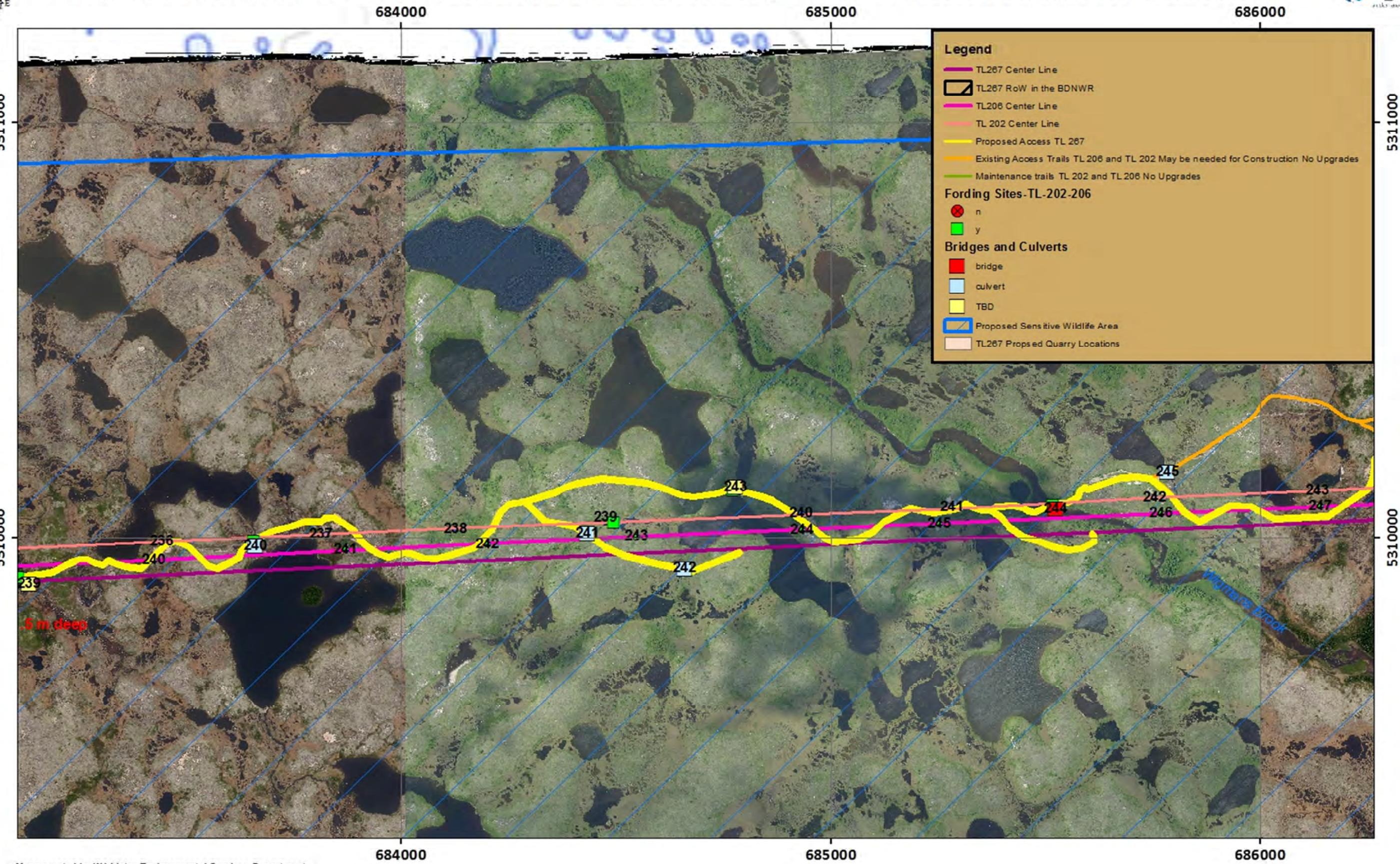
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Proposed Transmission Line (TL) 267 Bay D'Espoir Generating Station to Western Avalon Terminal Station



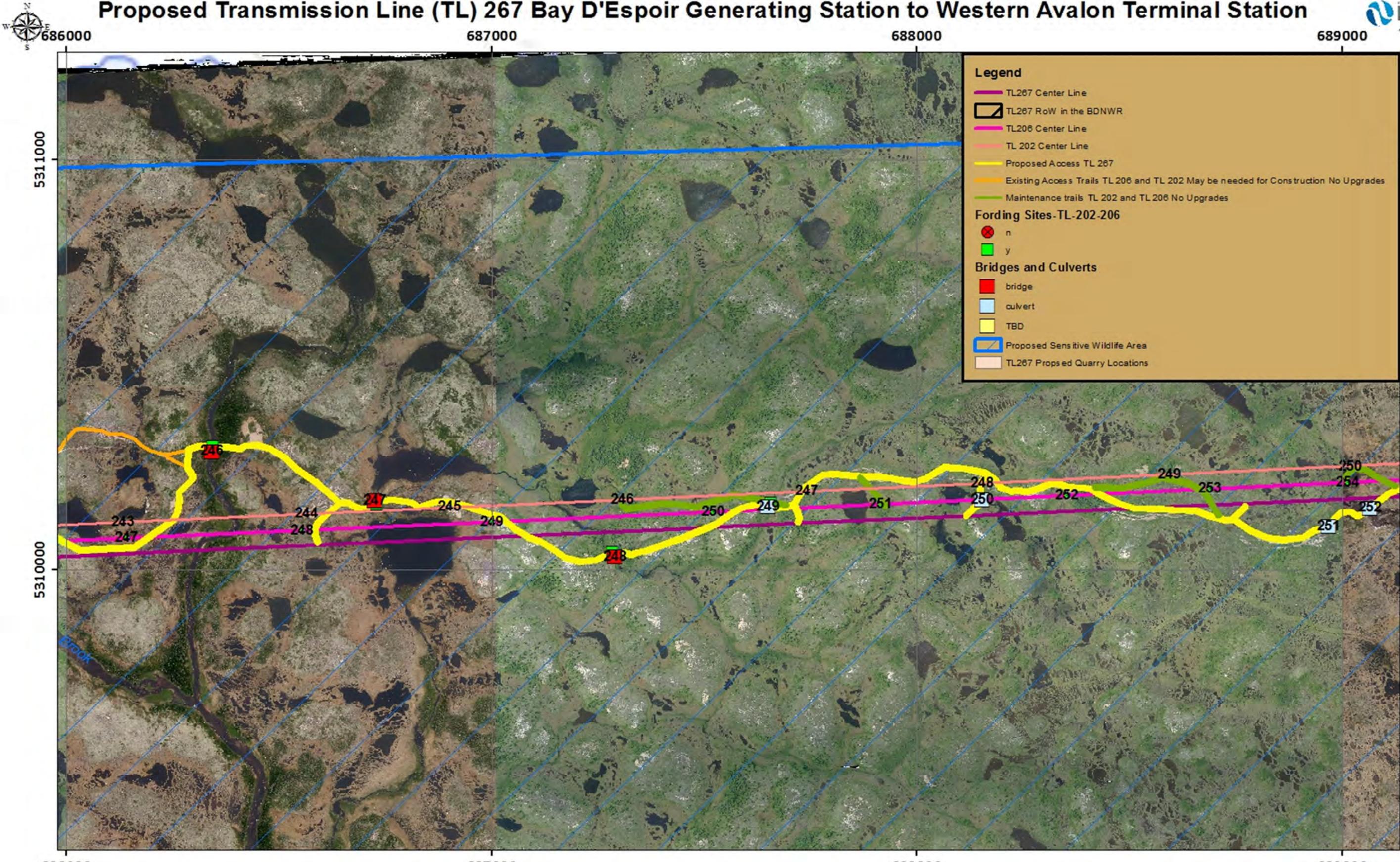
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Proposed Transmission Line (TL) 267 Bay D'Espoir Generating Station to Western Avalon Terminal Station



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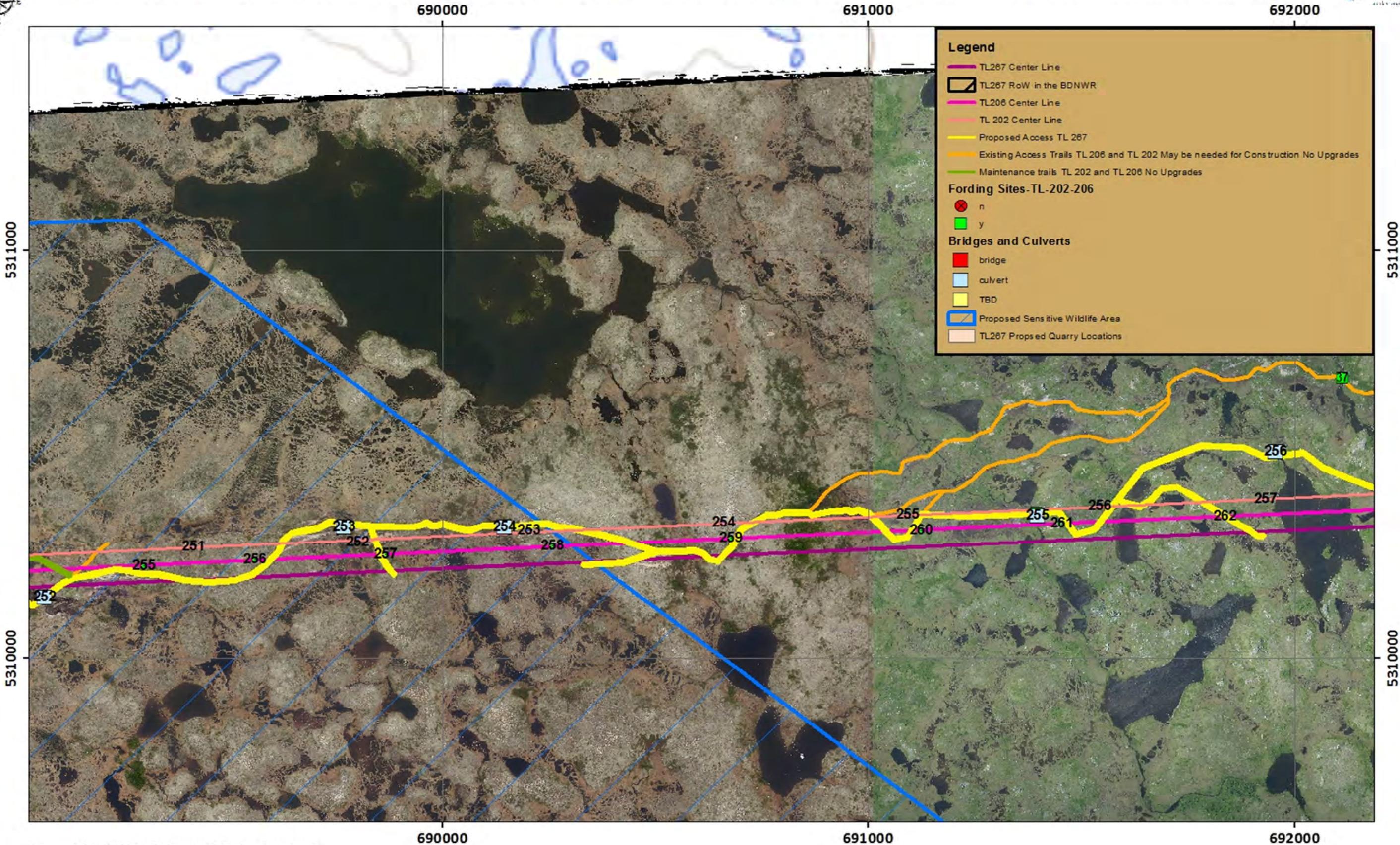
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Proposed Transmission Line (TL) 267 Bay D'Espoir Generating Station to Western Avalon Terminal Station



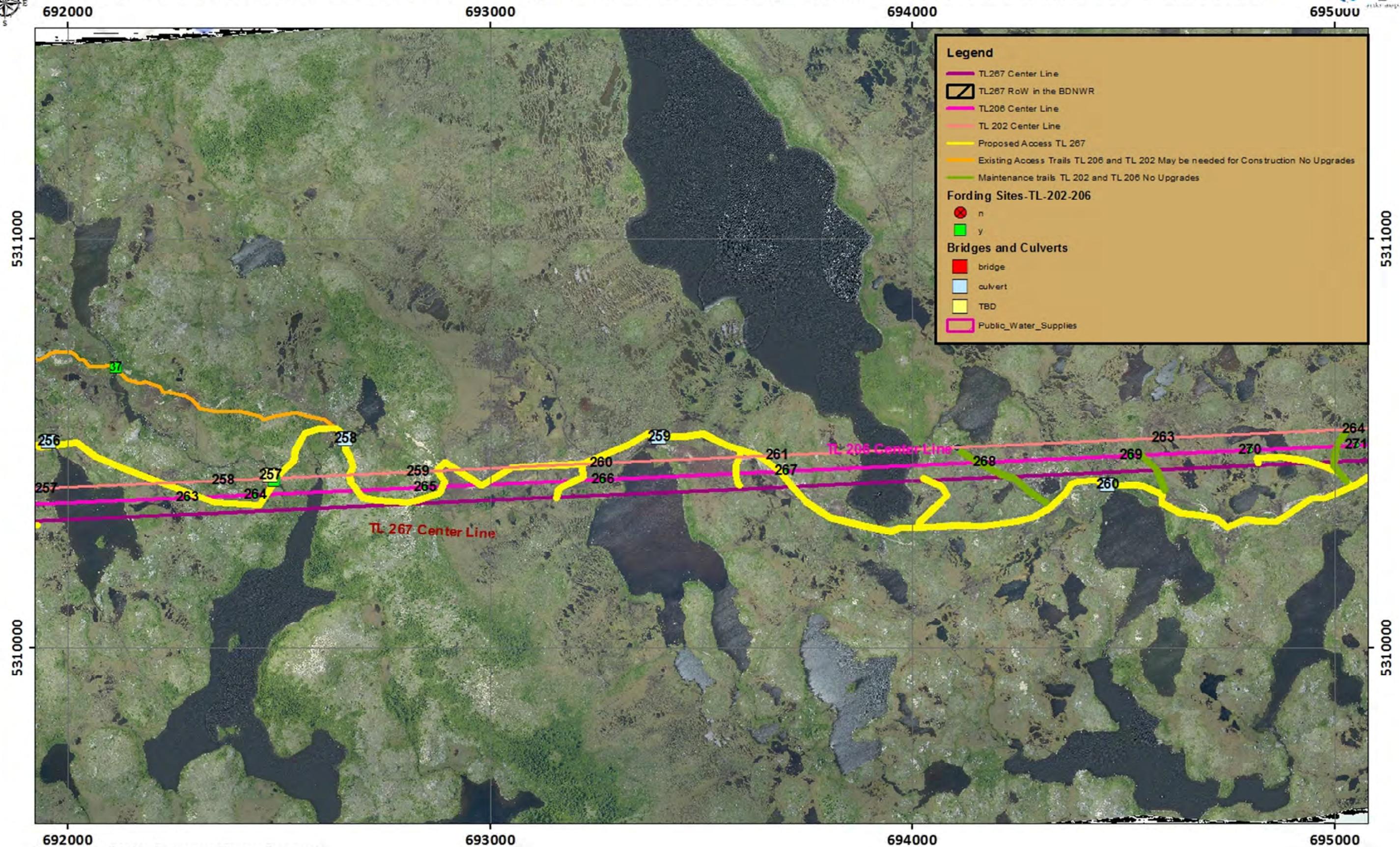
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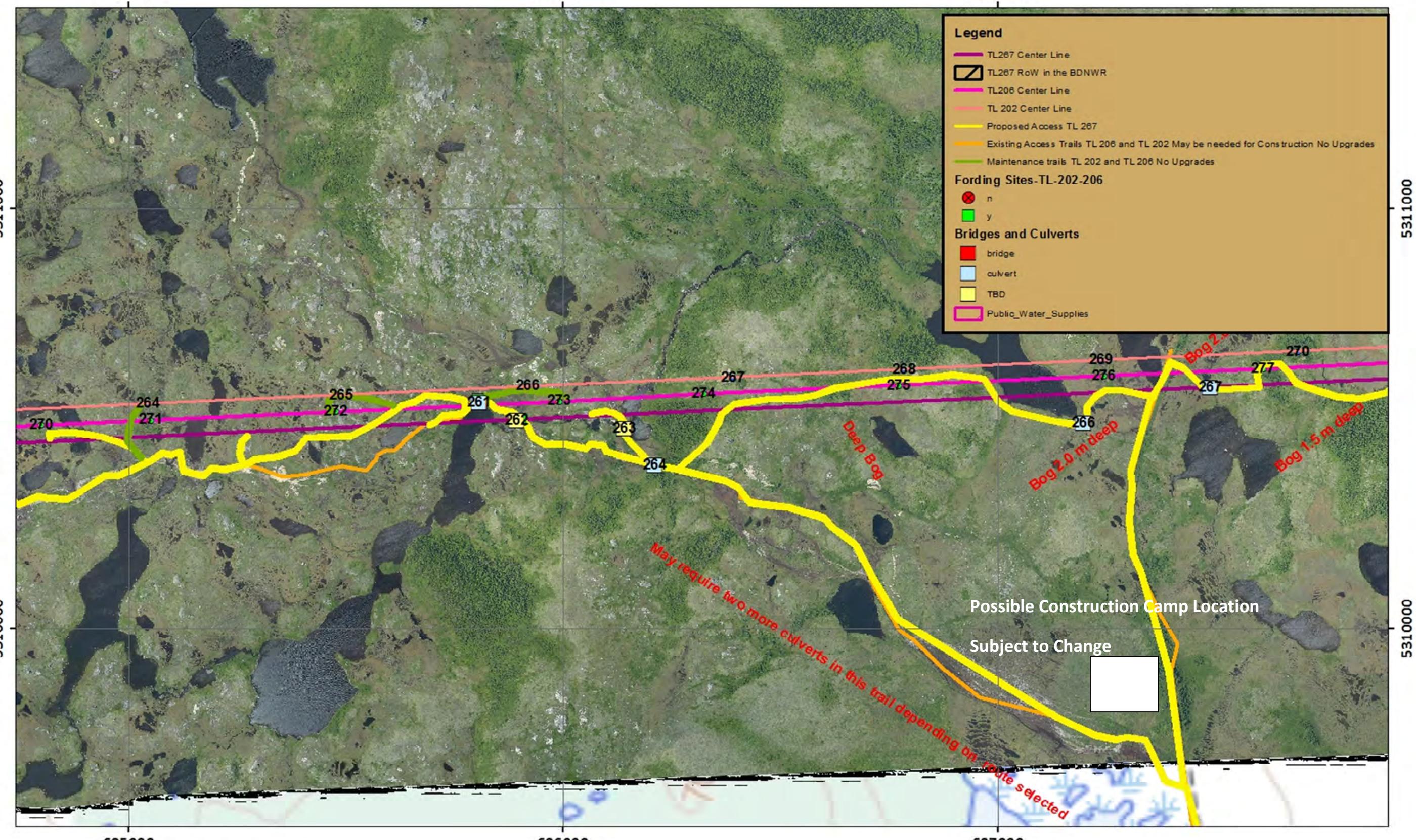
Proposed Transmission Line (TL) 267 Bay D'Espoir Generating Station to Western Avalon Terminal Station



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Proposed Transmission Line (TL) 267 Bay D'Espoir Generating Station to Western Avalon Terminal Station



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UTM Zone 21 NAD 83

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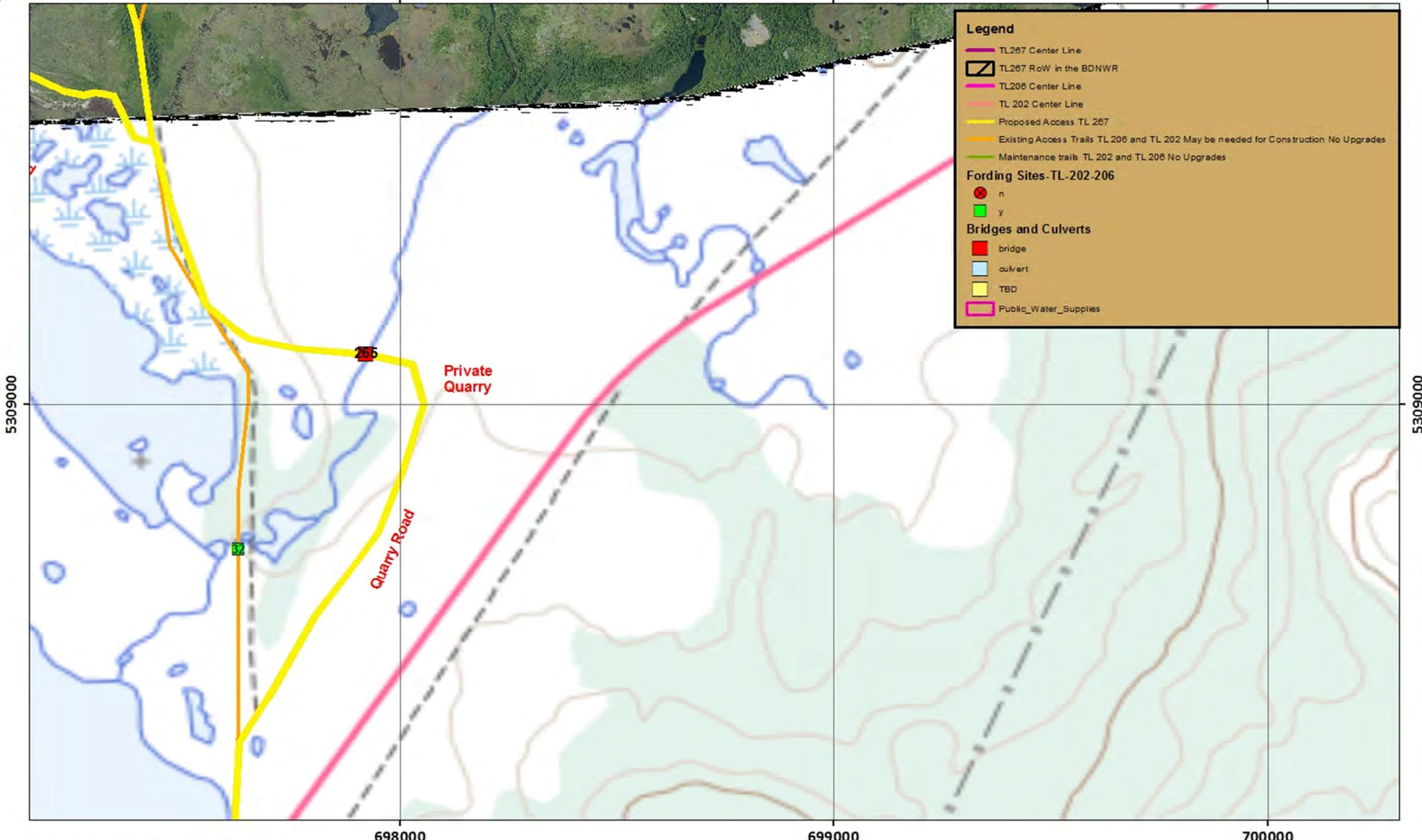
Proposed Transmission Line (TL) 267 Bay D'Espoir Generating Station to Western Avalon Terminal Station



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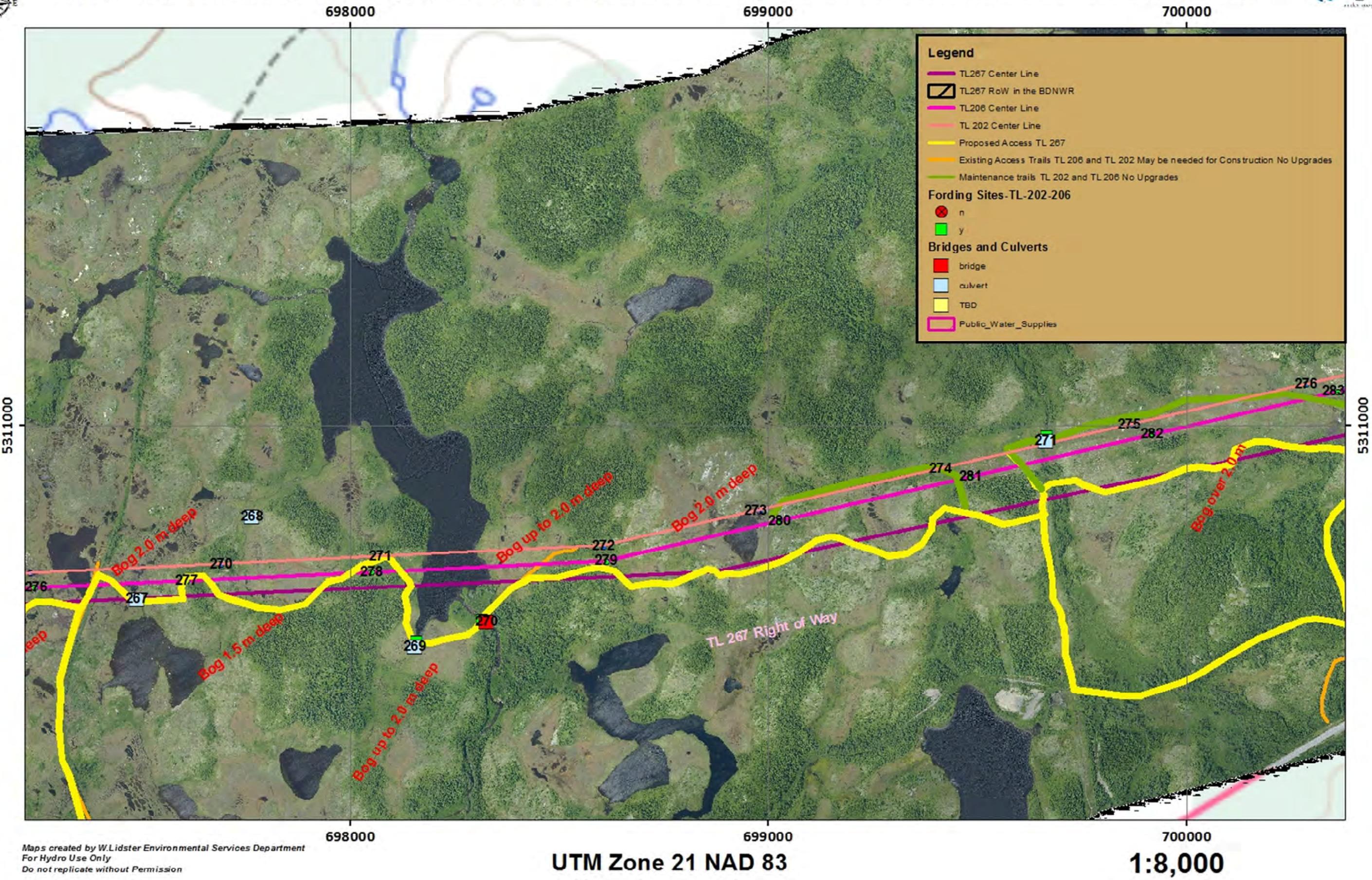
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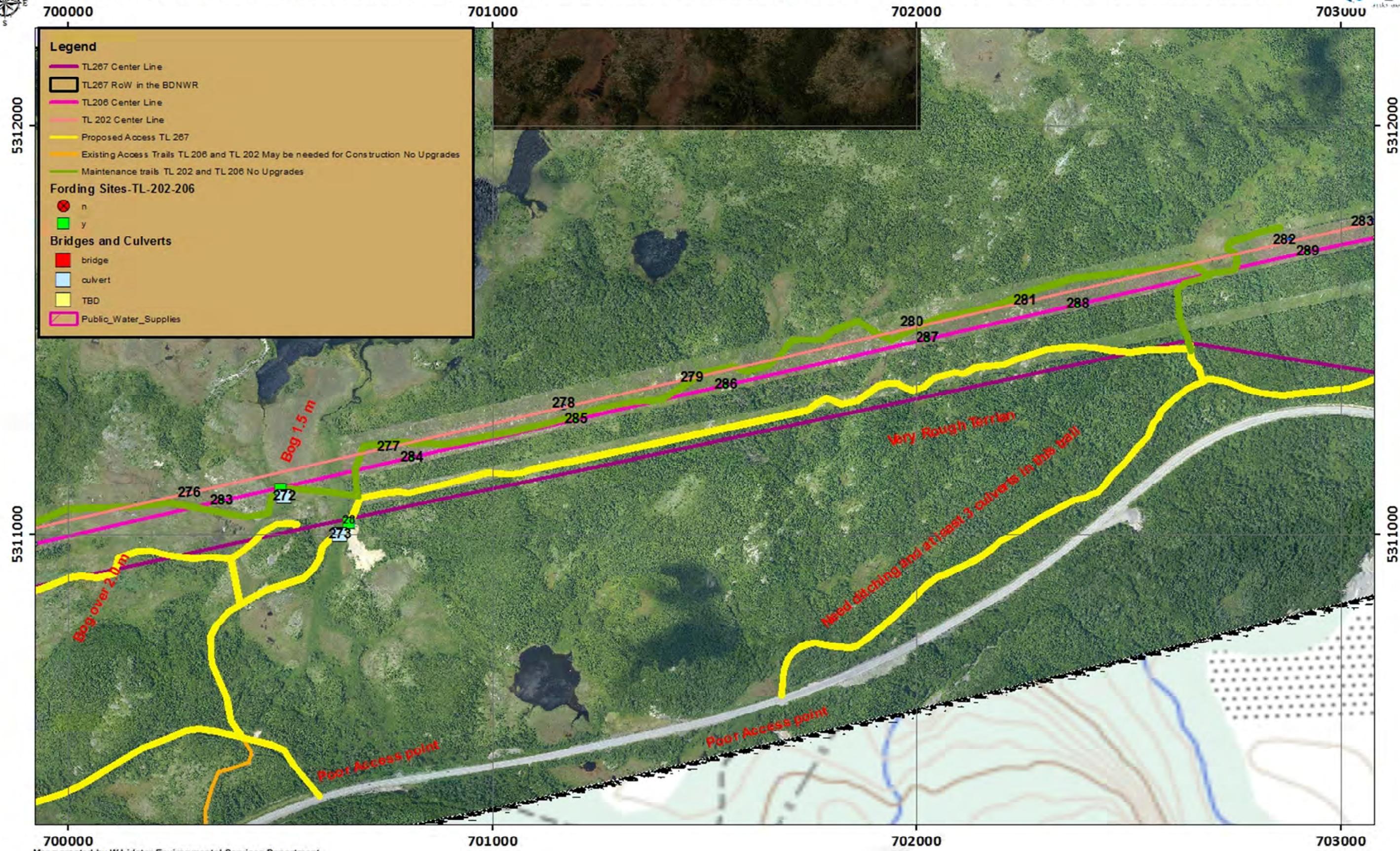


Proposed Transmission Line (TL) 267 Bay D'Espoir Generating Station to Western Avalon Terminal Station





Proposed Transmission Line (TL) 267 Bay D'Espoir Generating Station to Western Avalon Terminal Station



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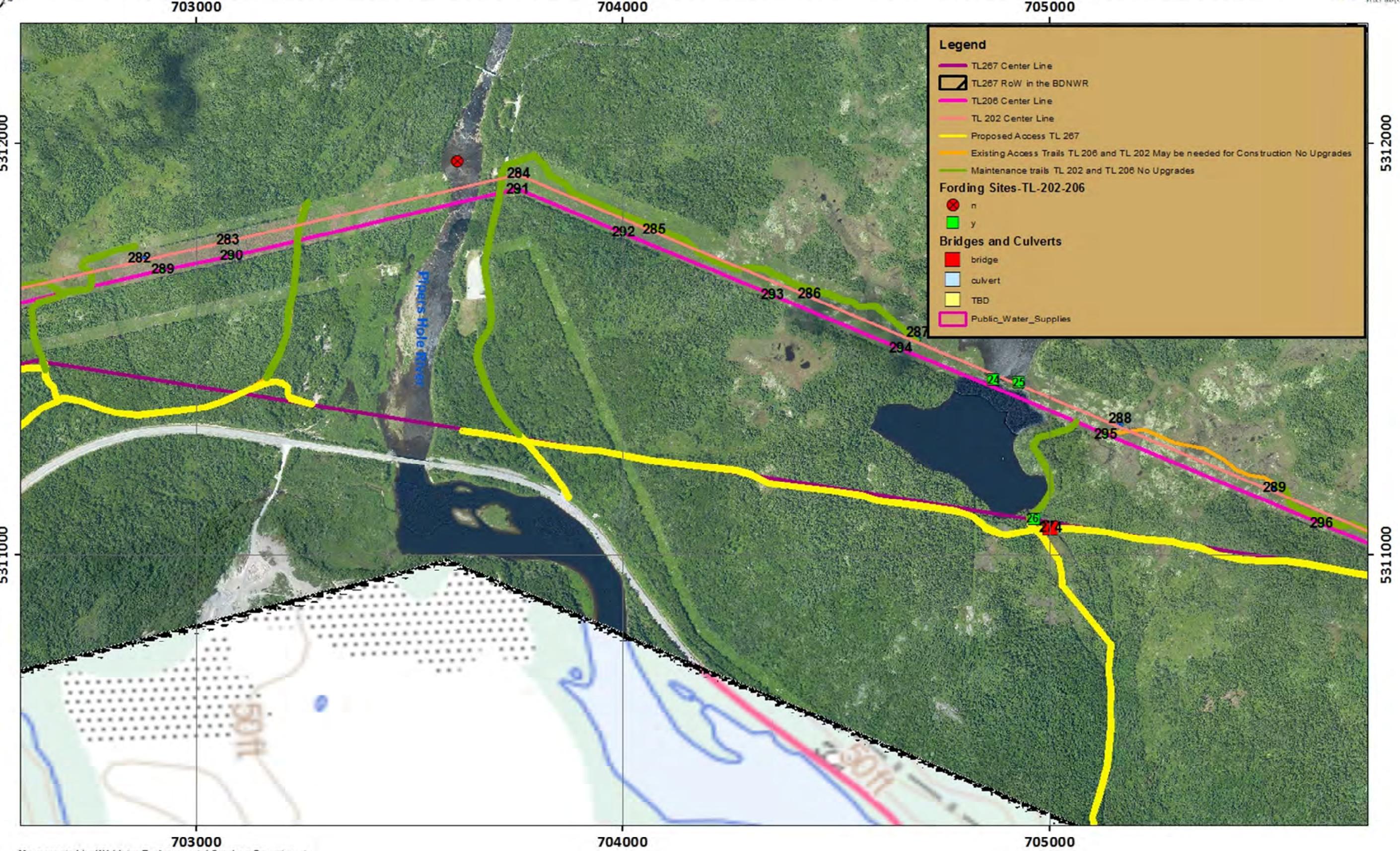
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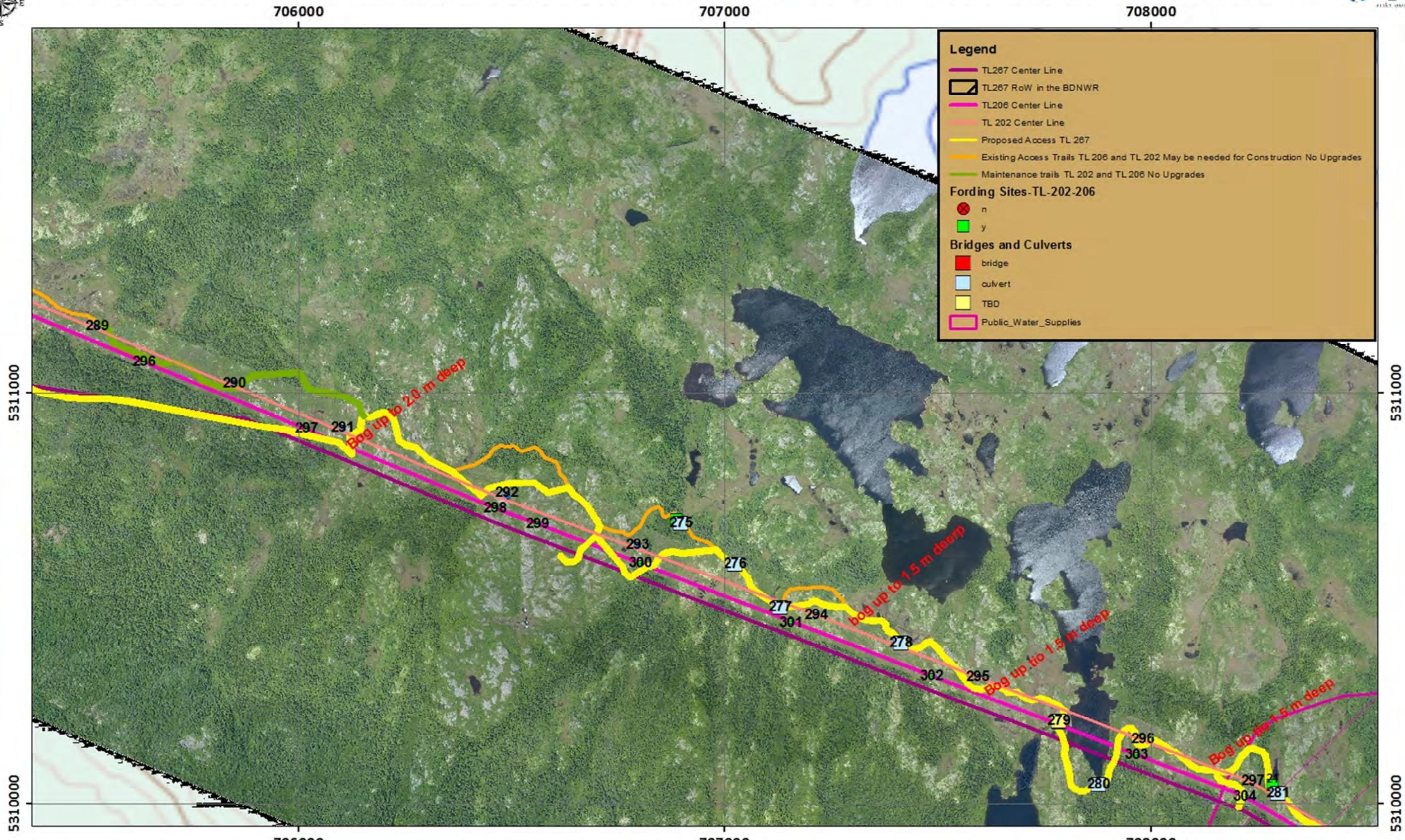
Proposed Transmission Line (TL) 267 Bay D'Espoir Generating Station to Western Avalon Terminal Station



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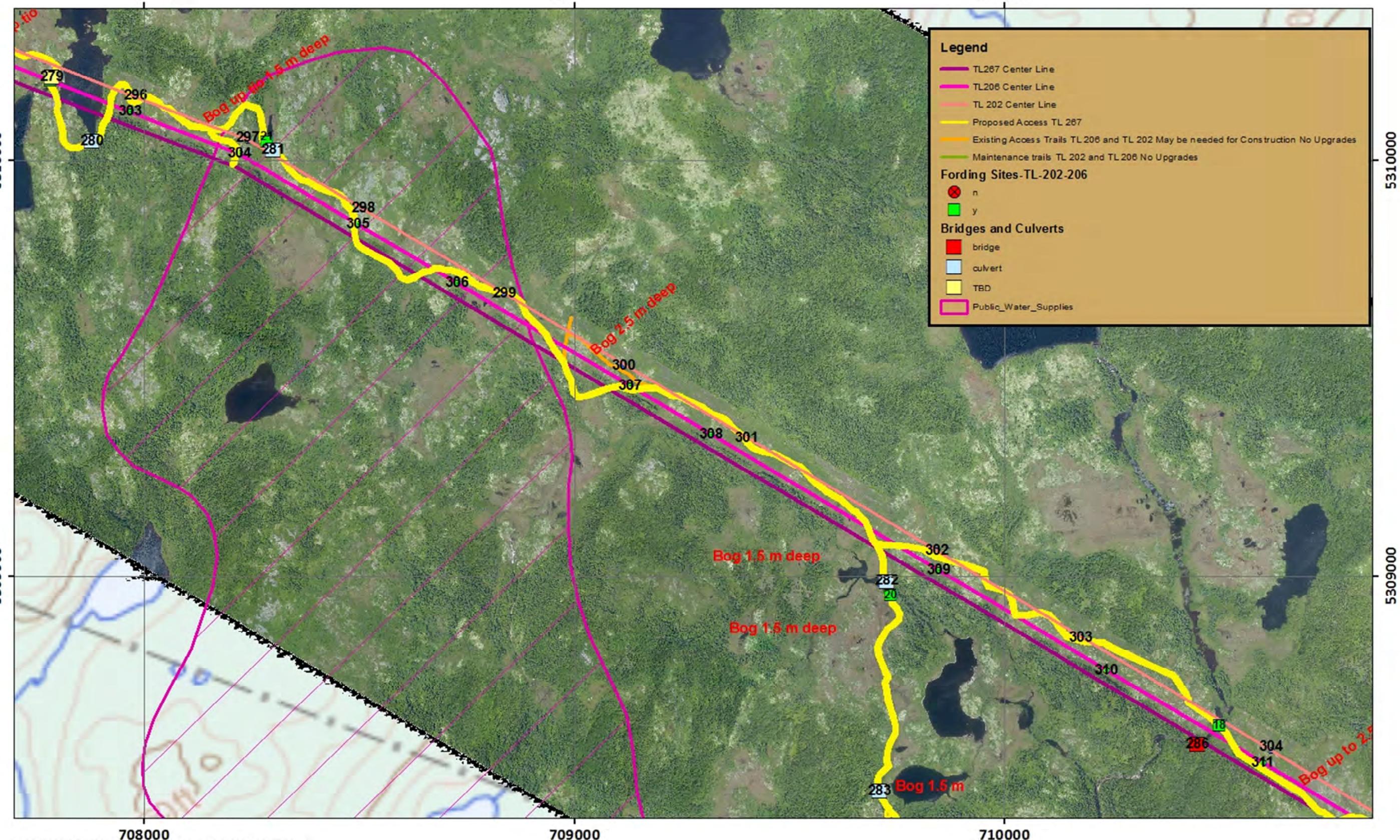
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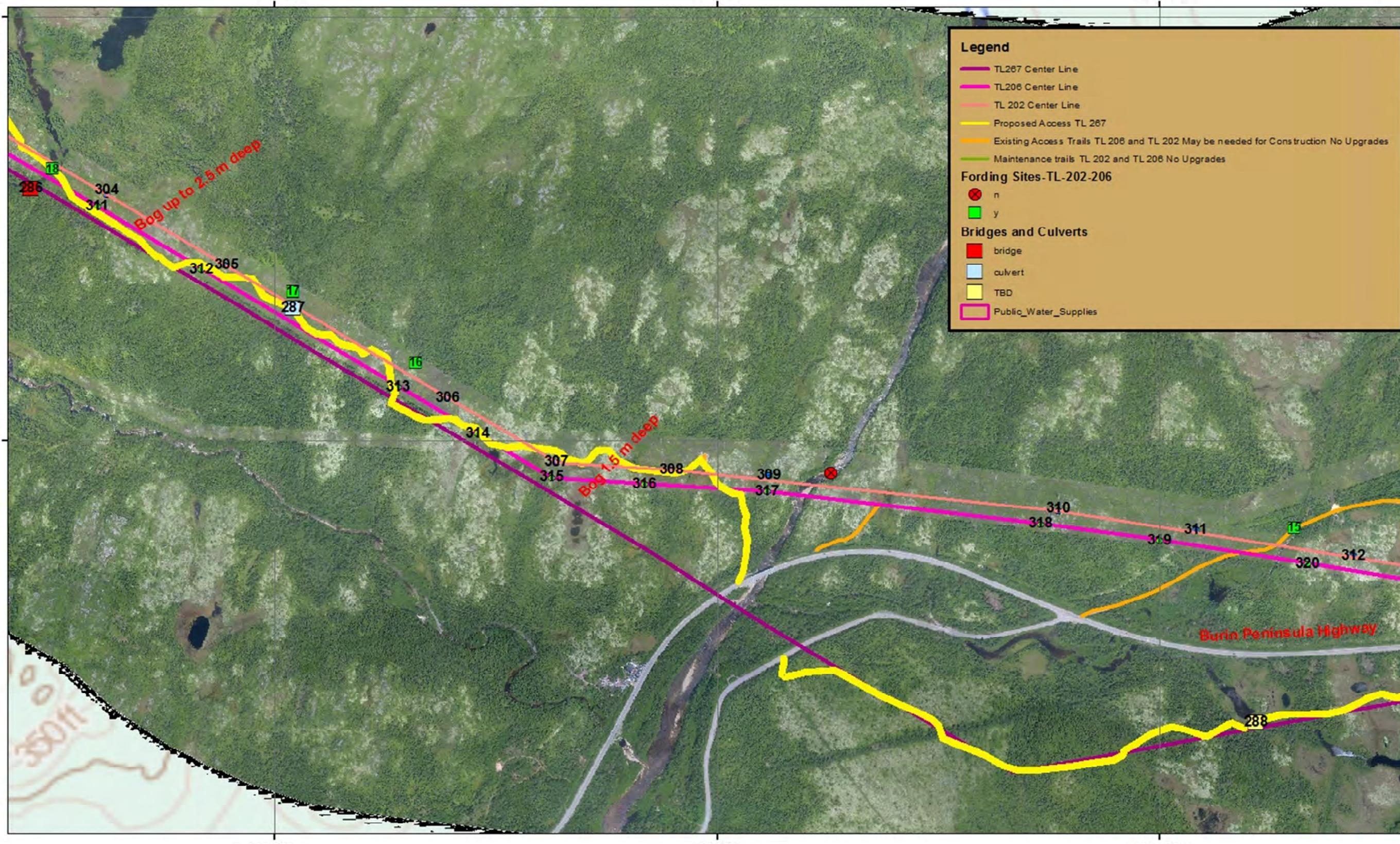
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Proposed Transmission Line (TL) 267 Bay D'Espoir Generating Station to Western Avalon Terminal Station



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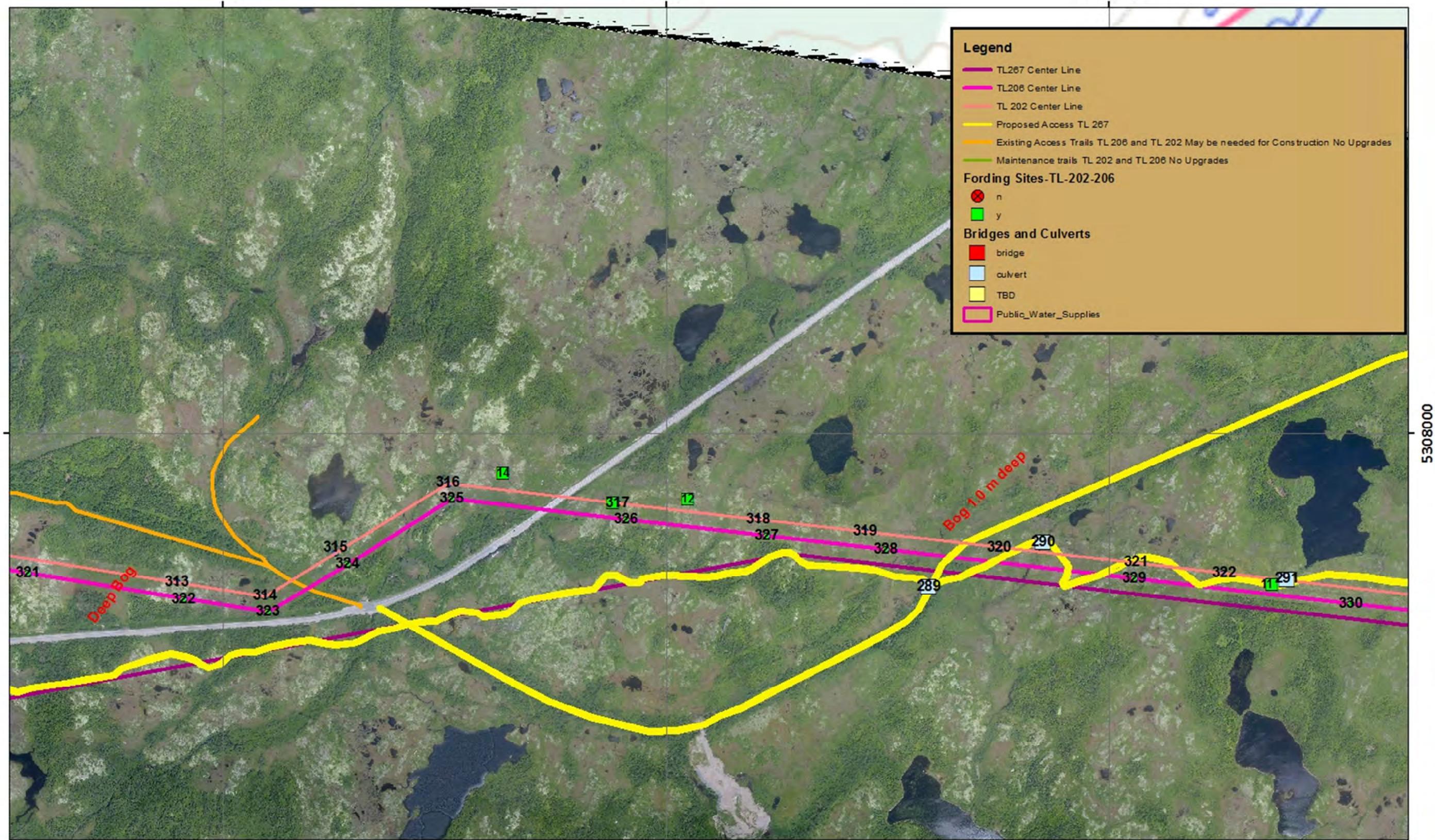


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Proposed Transmission Line (TL) 267 Bay D'Espoir Generating Station to Western Avalon Terminal Station



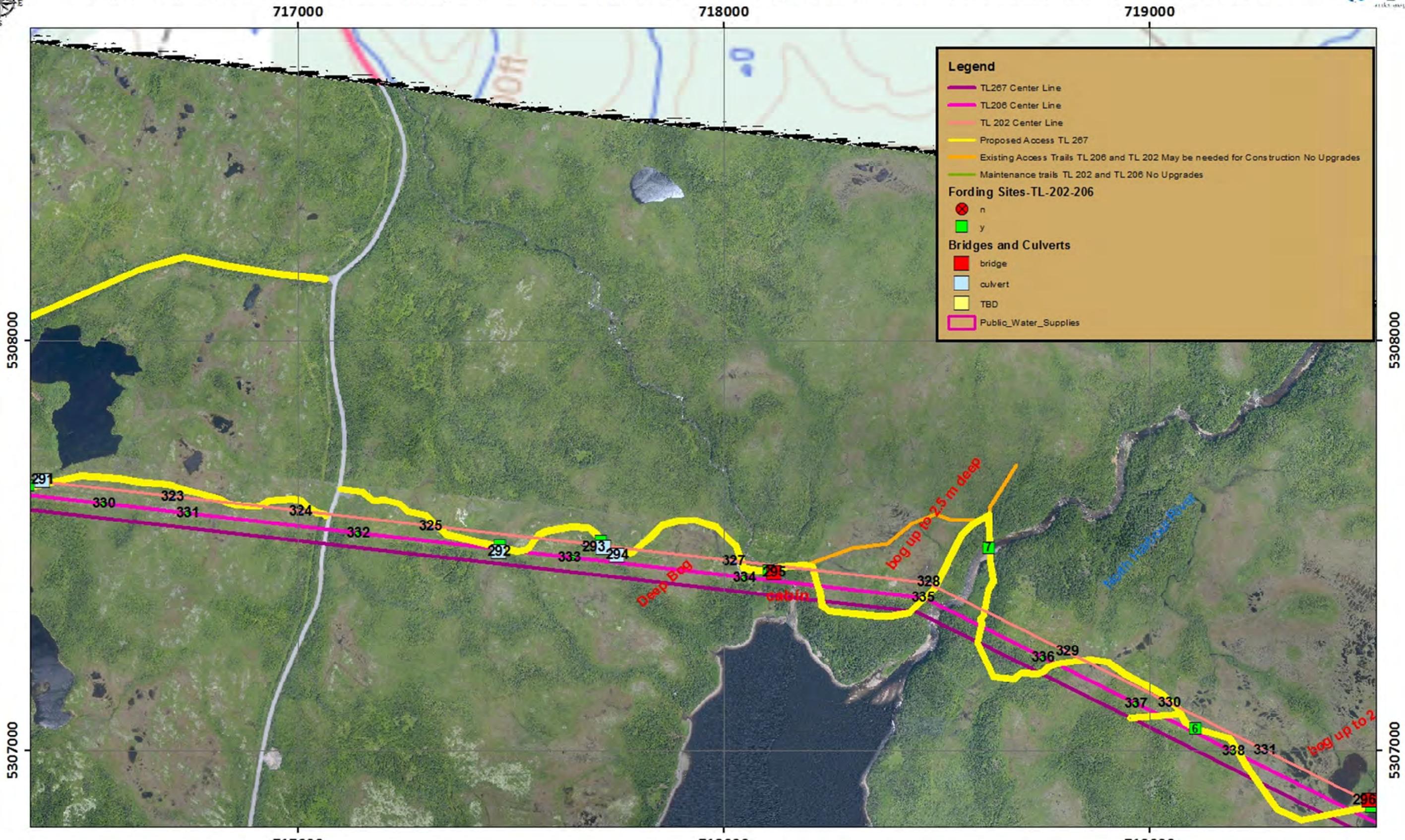
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Proposed Transmission Line (TL) 267 Bay D'Espoir Generating Station to Western Avalon Terminal Station



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Proposed Transmission Line (TL) 267 Bay D'Espoir Generating Station to Western Avalon Terminal Station



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Legend

- TL267 Center Line
- TL206 Center Line
- TL 202 Center Line
- Proposed Access TL 267
- Existing Access Trails TL 206 and TL 202 May be needed for Construction No Upgrades
- Maintenance trails TL 202 and TL 206 No Upgrades

Fording Sites-TL-202-206



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Bridges and Culverts



bridge

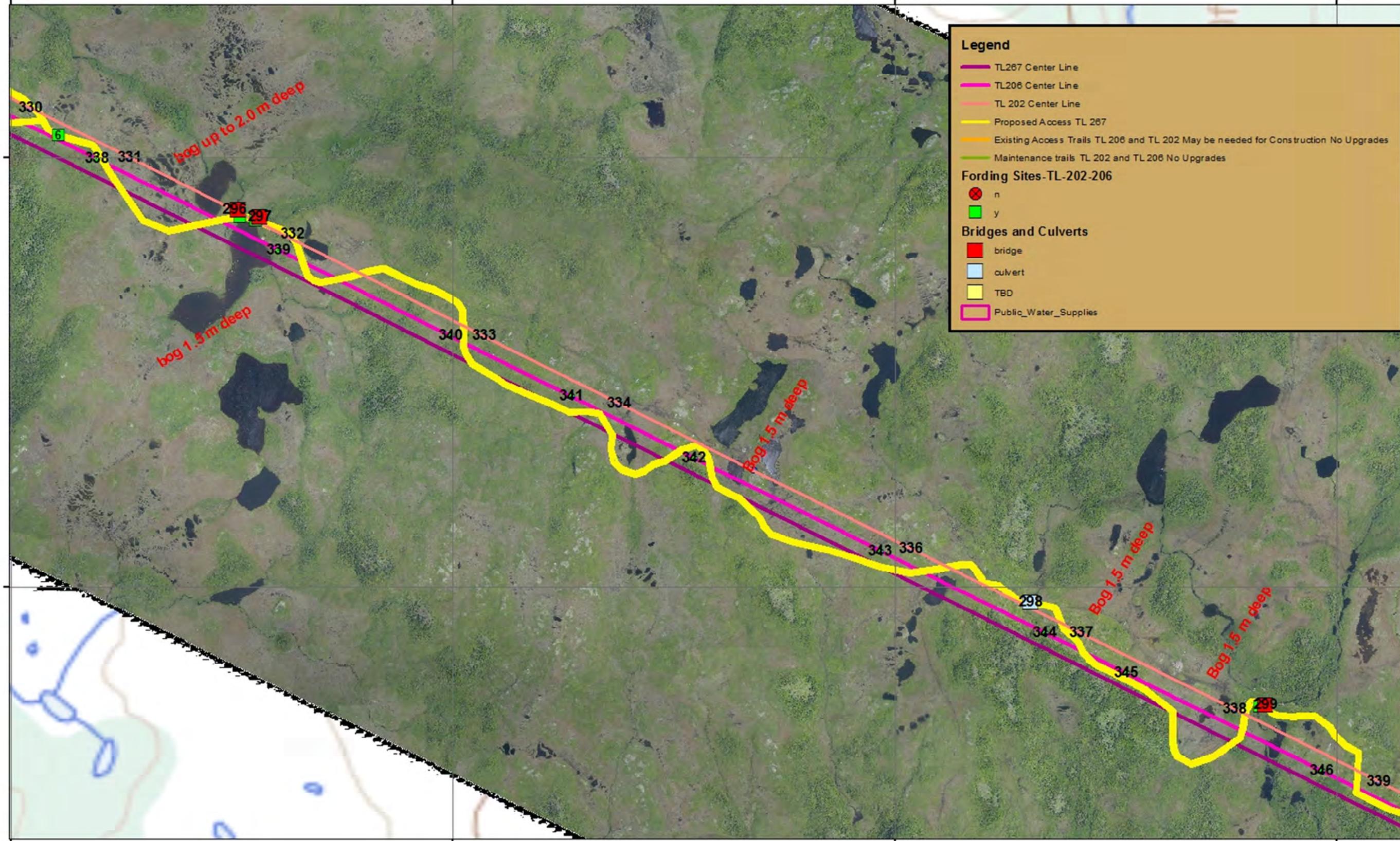


culvert



TBD

Public_Water_Supplies



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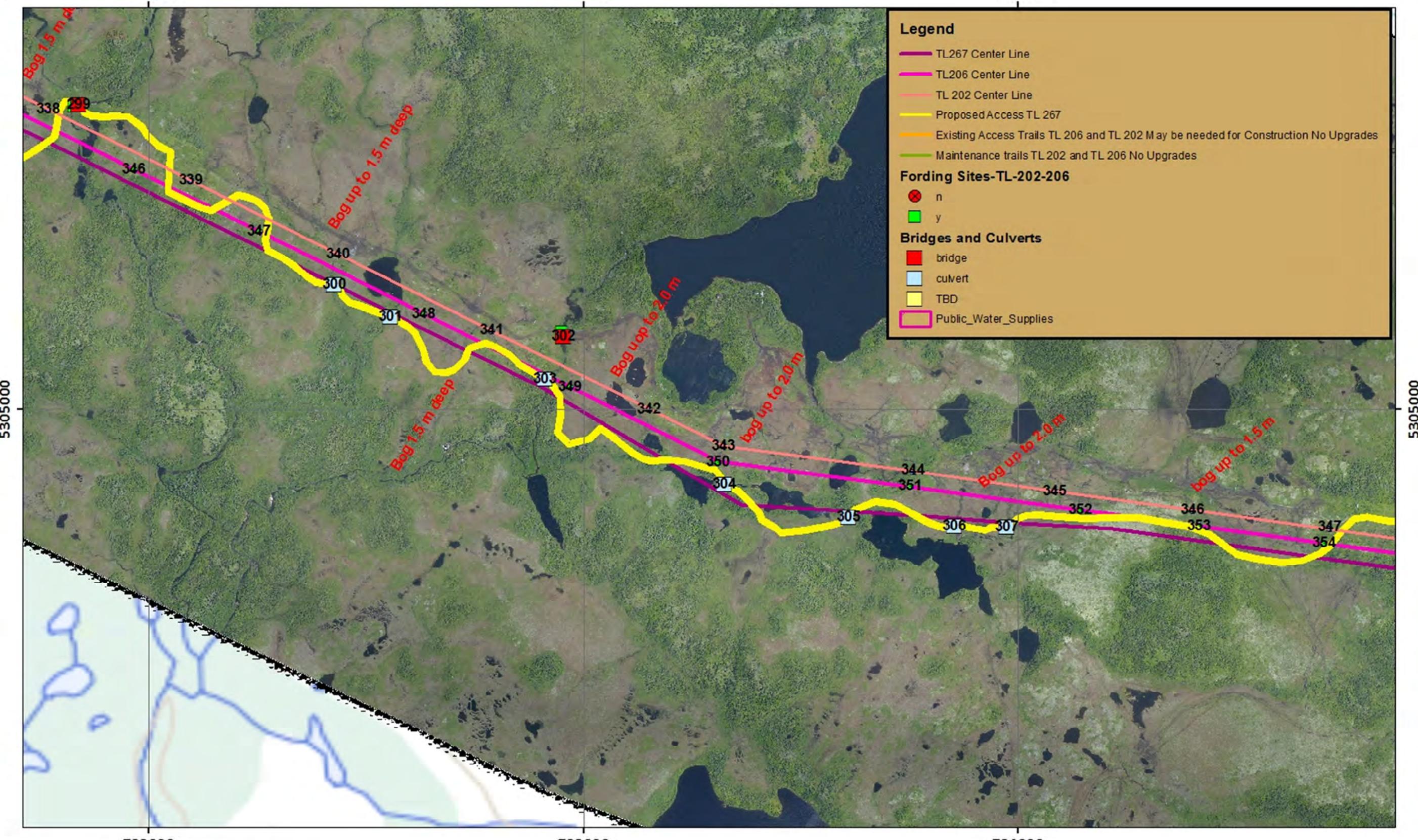
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Proposed Transmission Line (TL) 267 Bay D'Espoir Generating Station to Western Avalon Terminal Station



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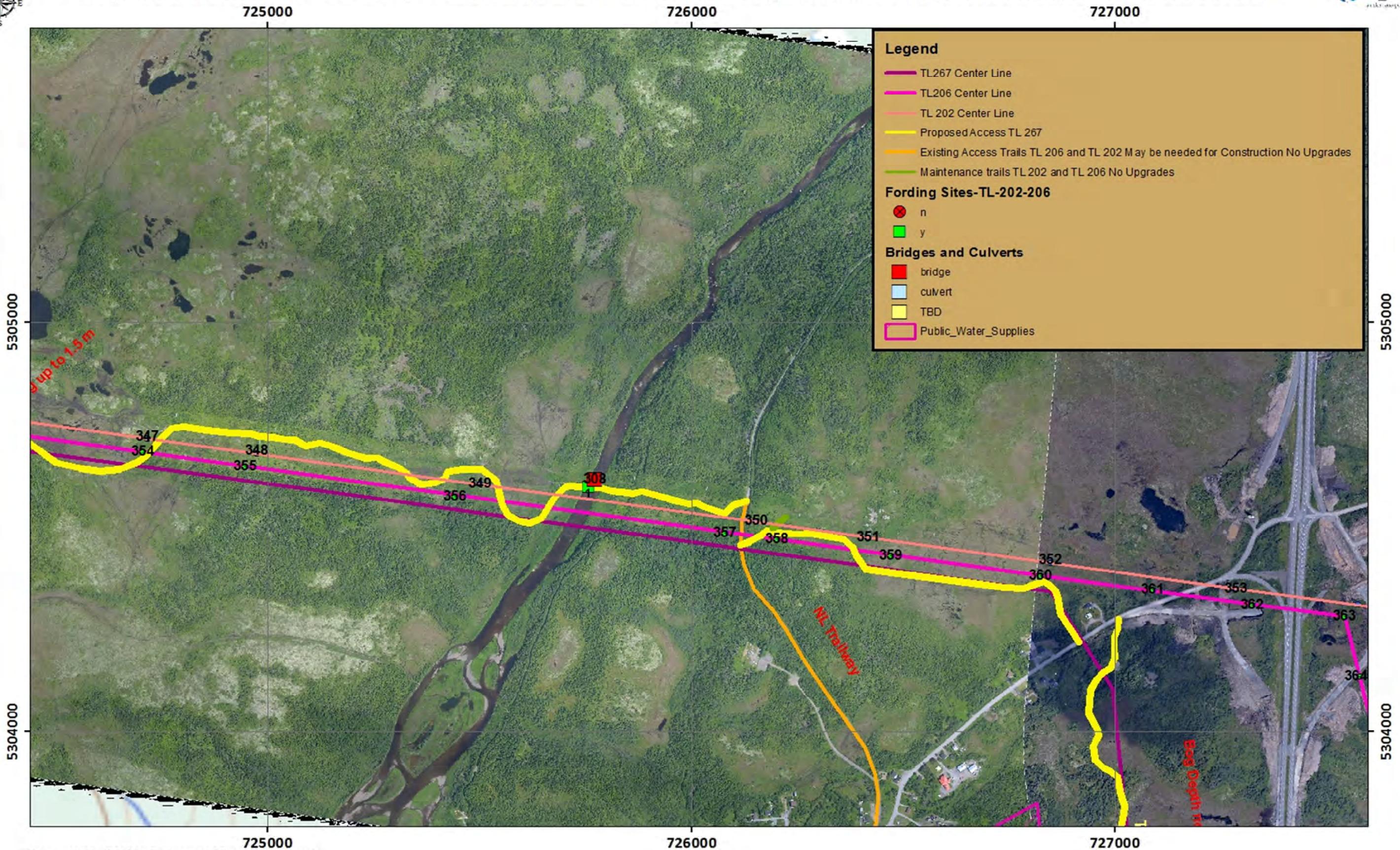
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Proposed Transmission Line (TL) 267 Bay D'Espoir Generating Station to Western Avalon Terminal Station



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Proposed Transmission Line (TL) 267 Bay D'Espoir Generating Station to Western Avalon Terminal Station



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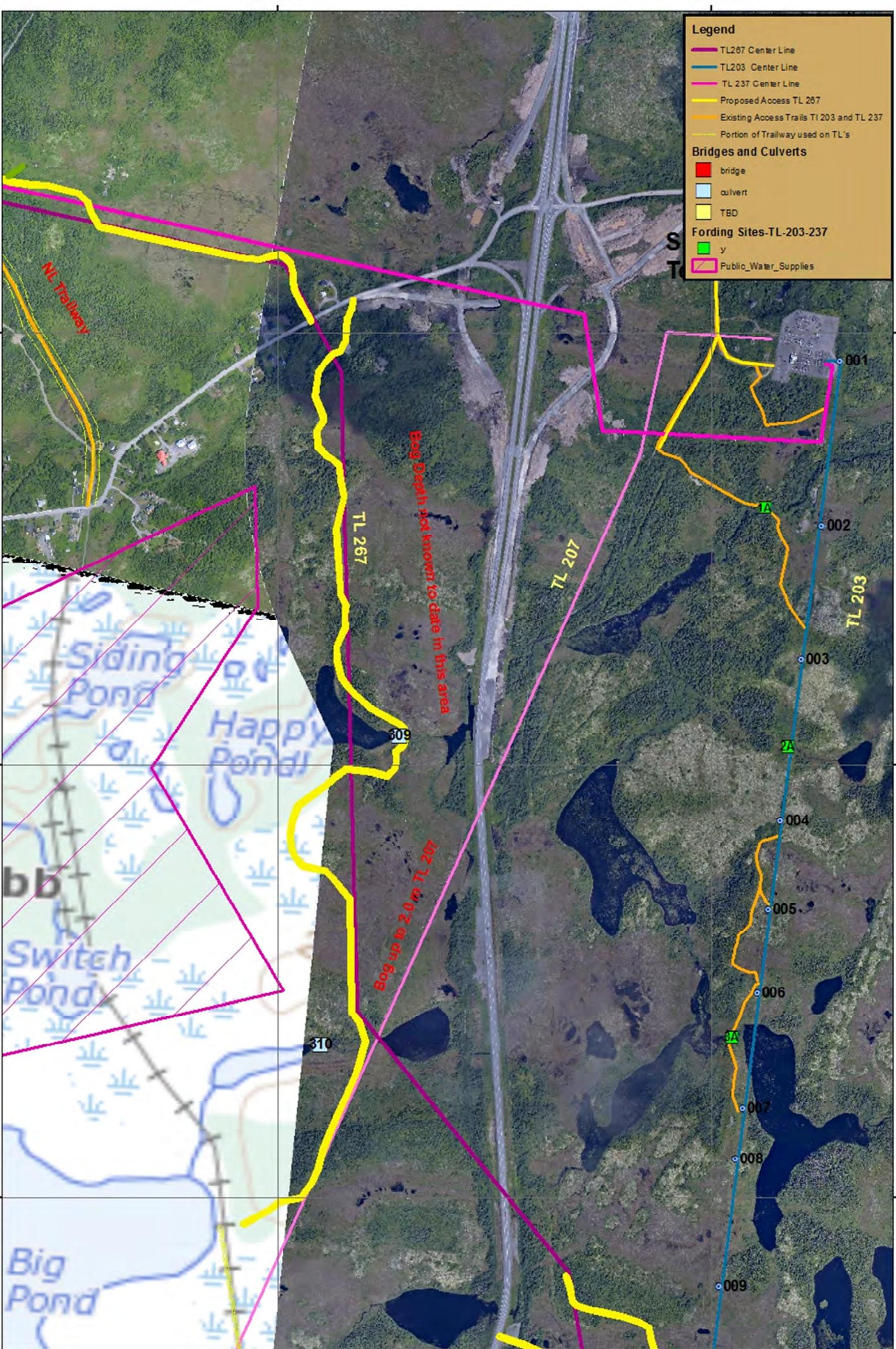
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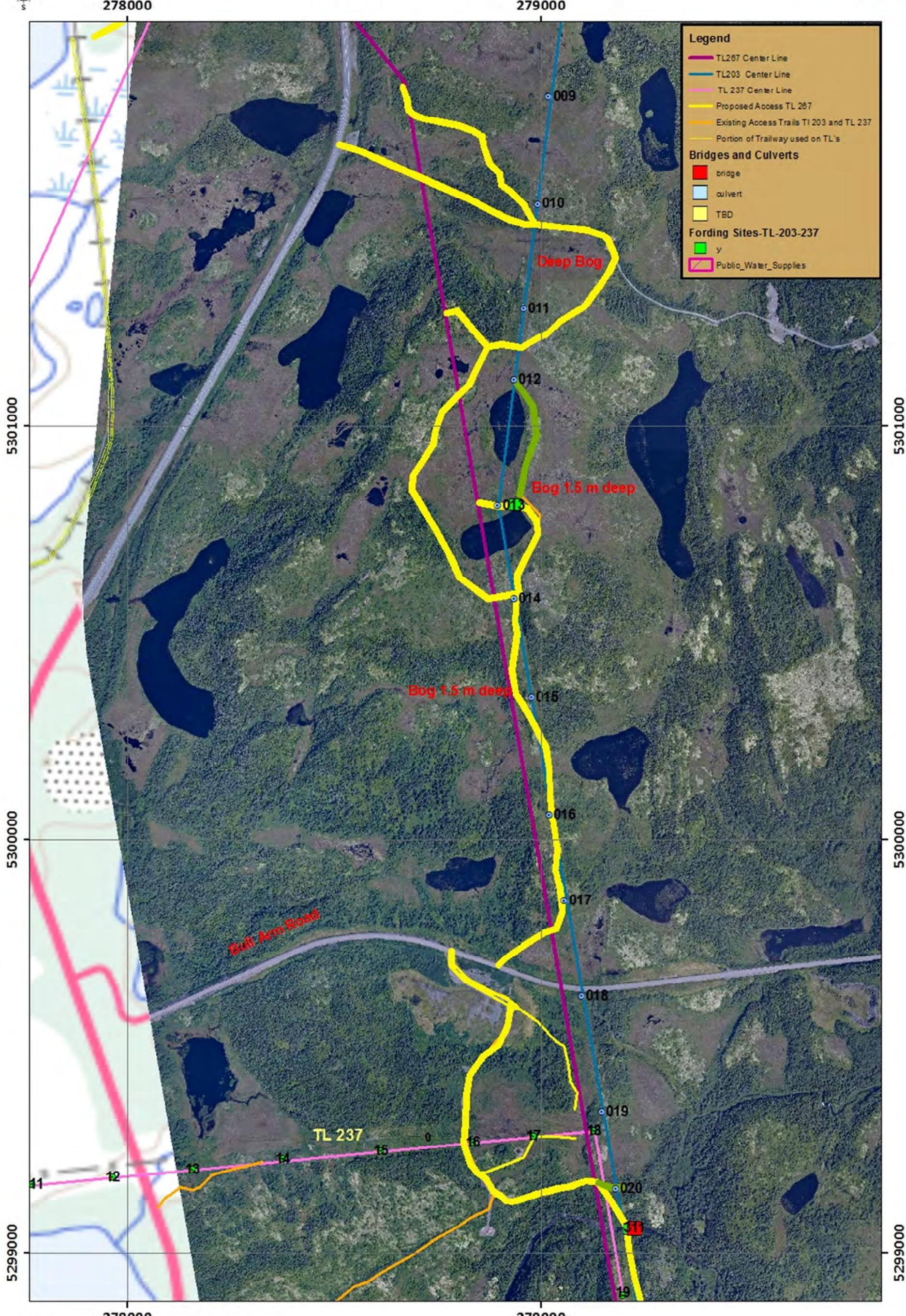
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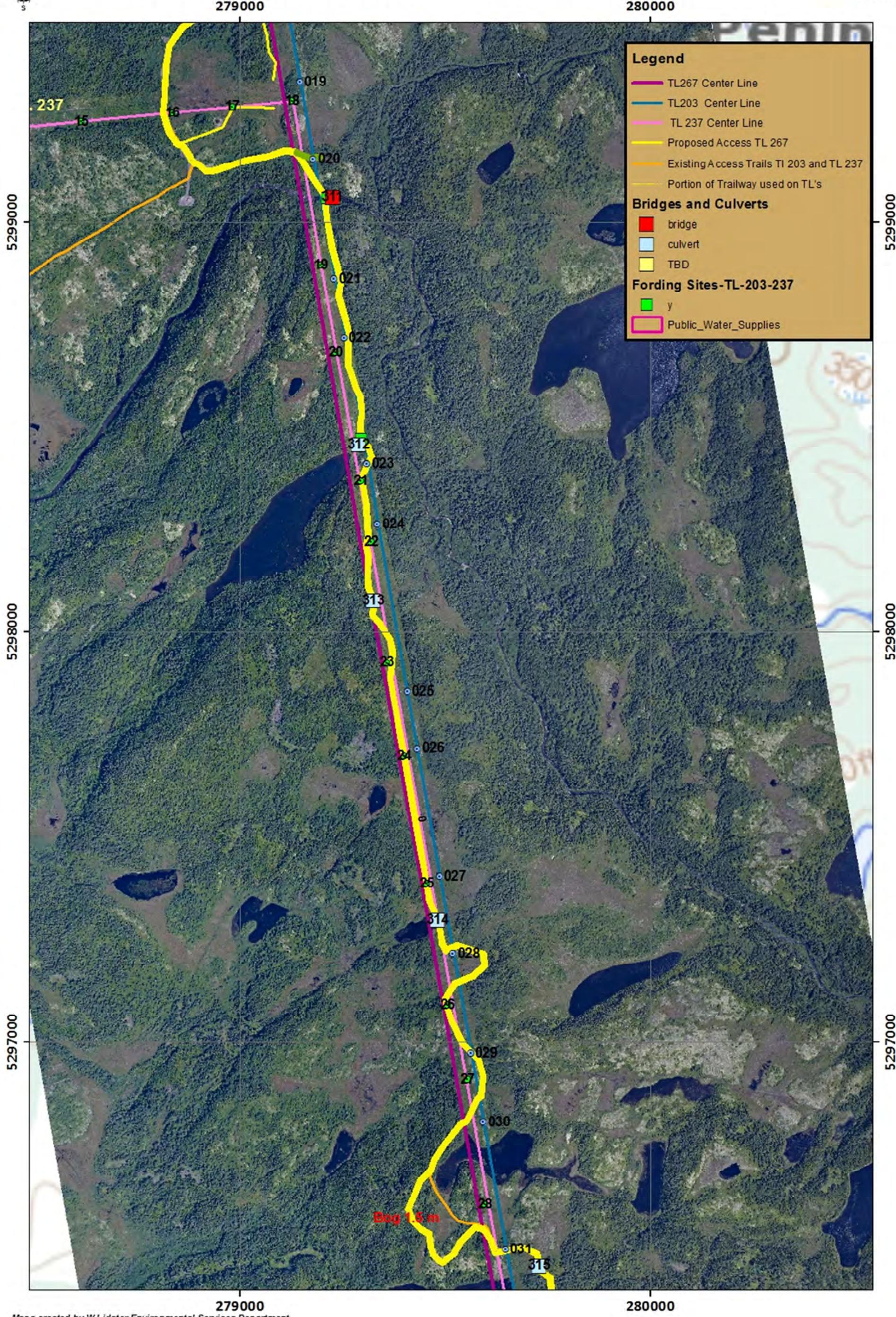
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Proposed Transmission Line (TL) 267 Bay D'Espoir Generating Station to Western Avalon Terminal Station



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Proposed Transmission Line (TL) 267 Bay D'Espoir Generating Station to Western Avalon Terminal Station



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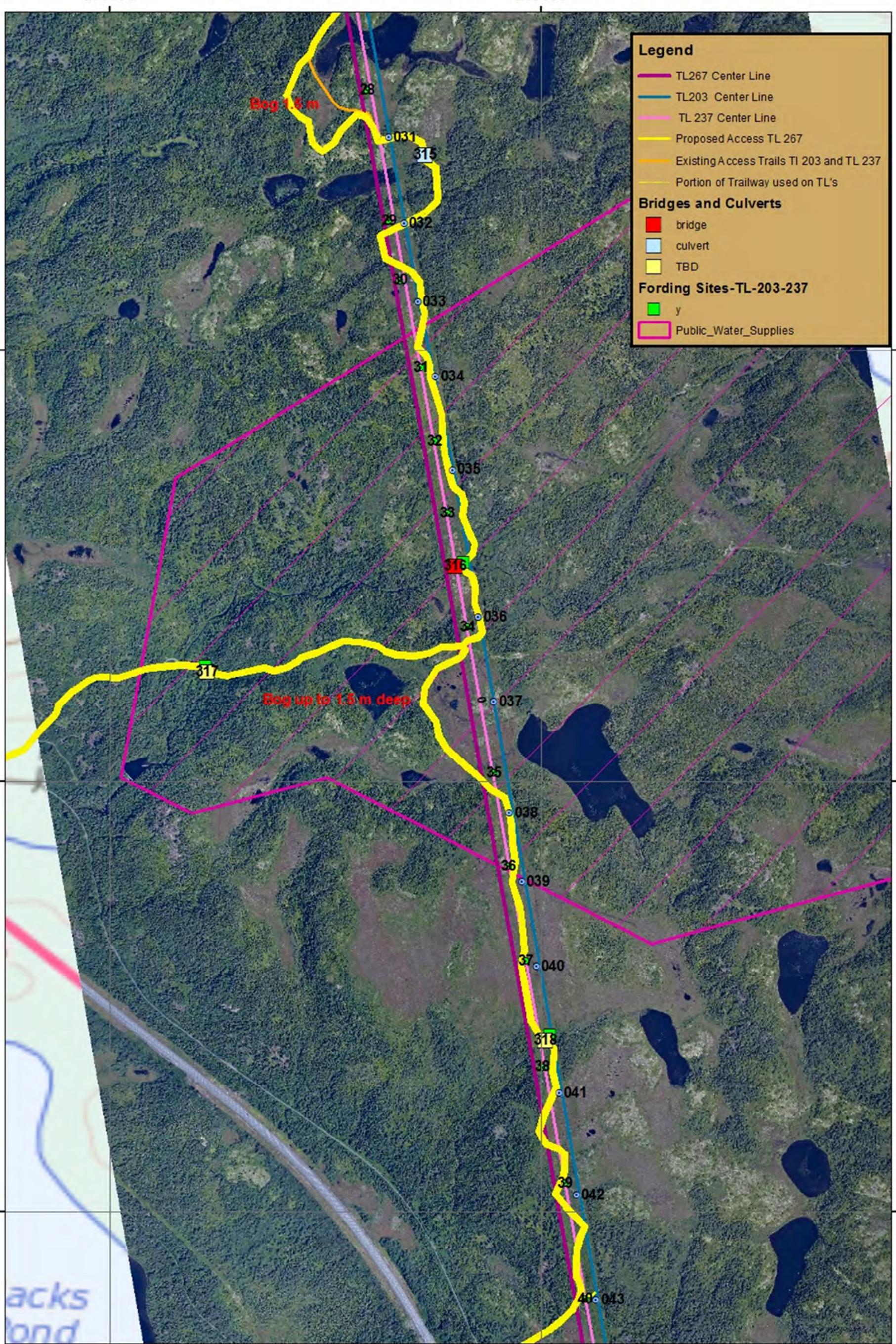
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- TL203 Center Line
- TL 237 Center Line
- Proposed Access TL 267
- Existing Access Trails TL 203 and TL 237
- Portion of Trailway used on TL's

Bridges and Culverts

- bridge
- culvert
- TBD

Fording Sites-TL-203-237

- y
- Public_Water_Supplies

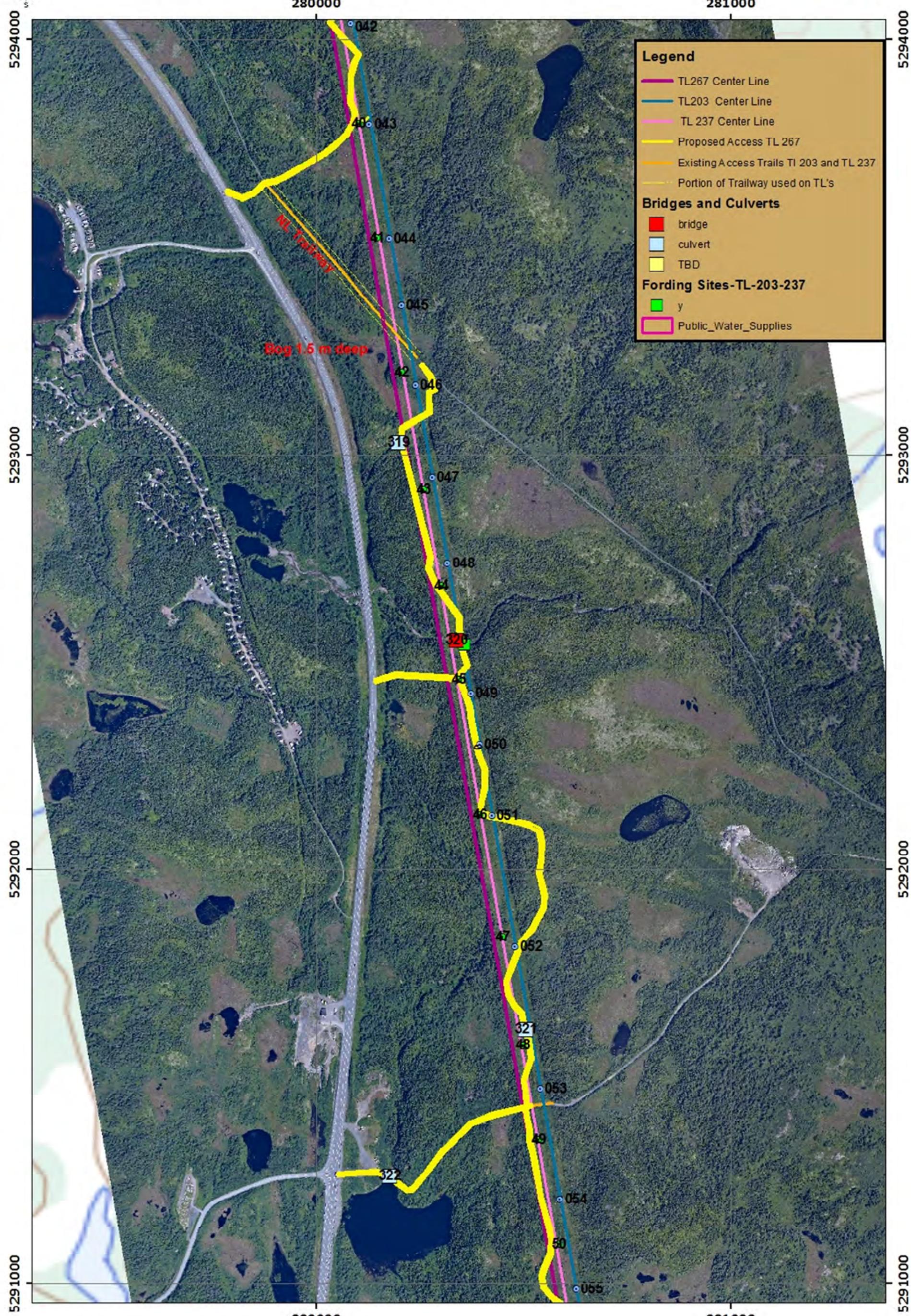


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Proposed Transmission Line (TL) 267 Bay D'Espoir Generating Station to Western Avalon Terminal Station

hydro
POWERING LIVES



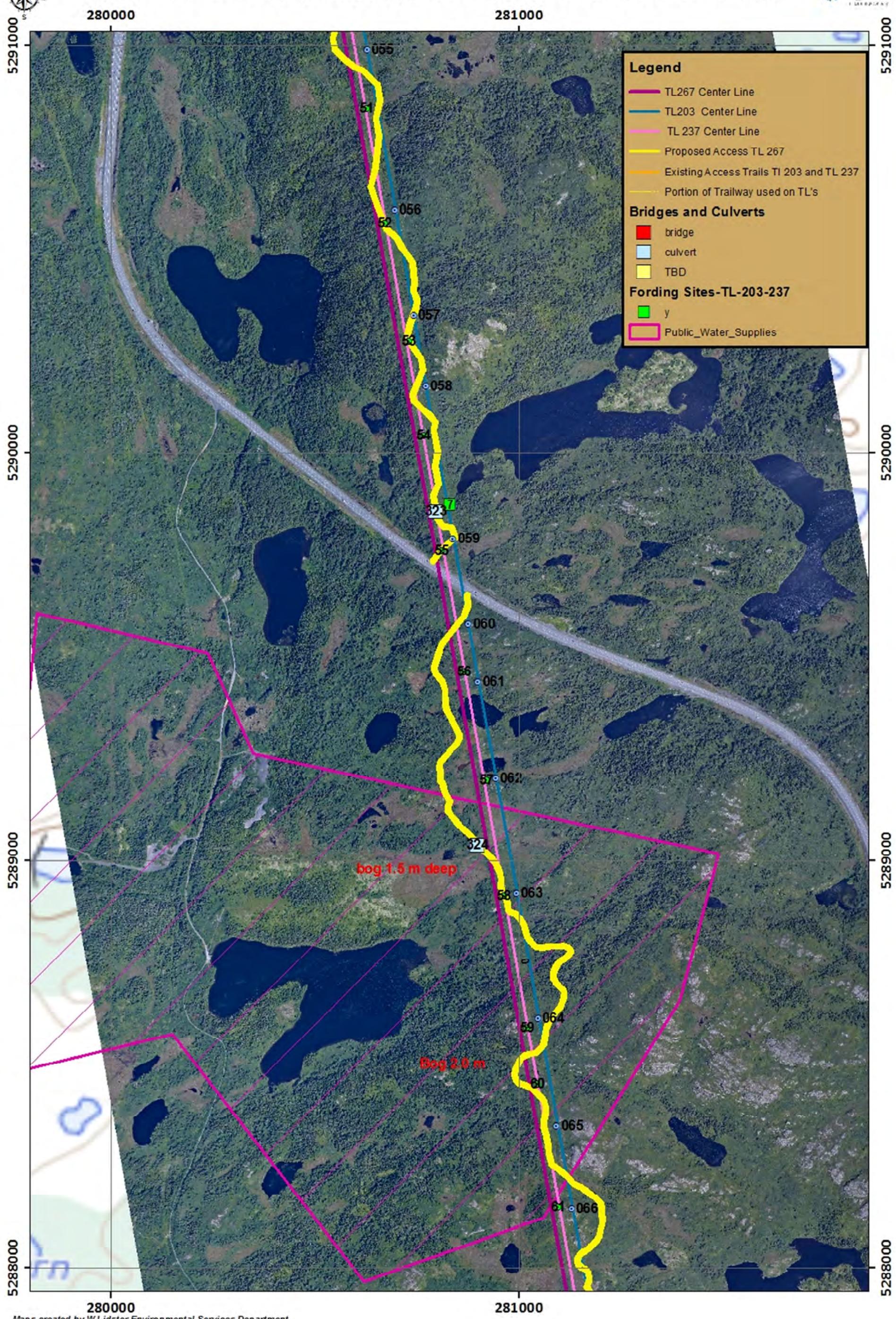
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Proposed Transmission Line (TL) 267 Bay D'Espoir Generating Station to Western Avalon Terminal Station



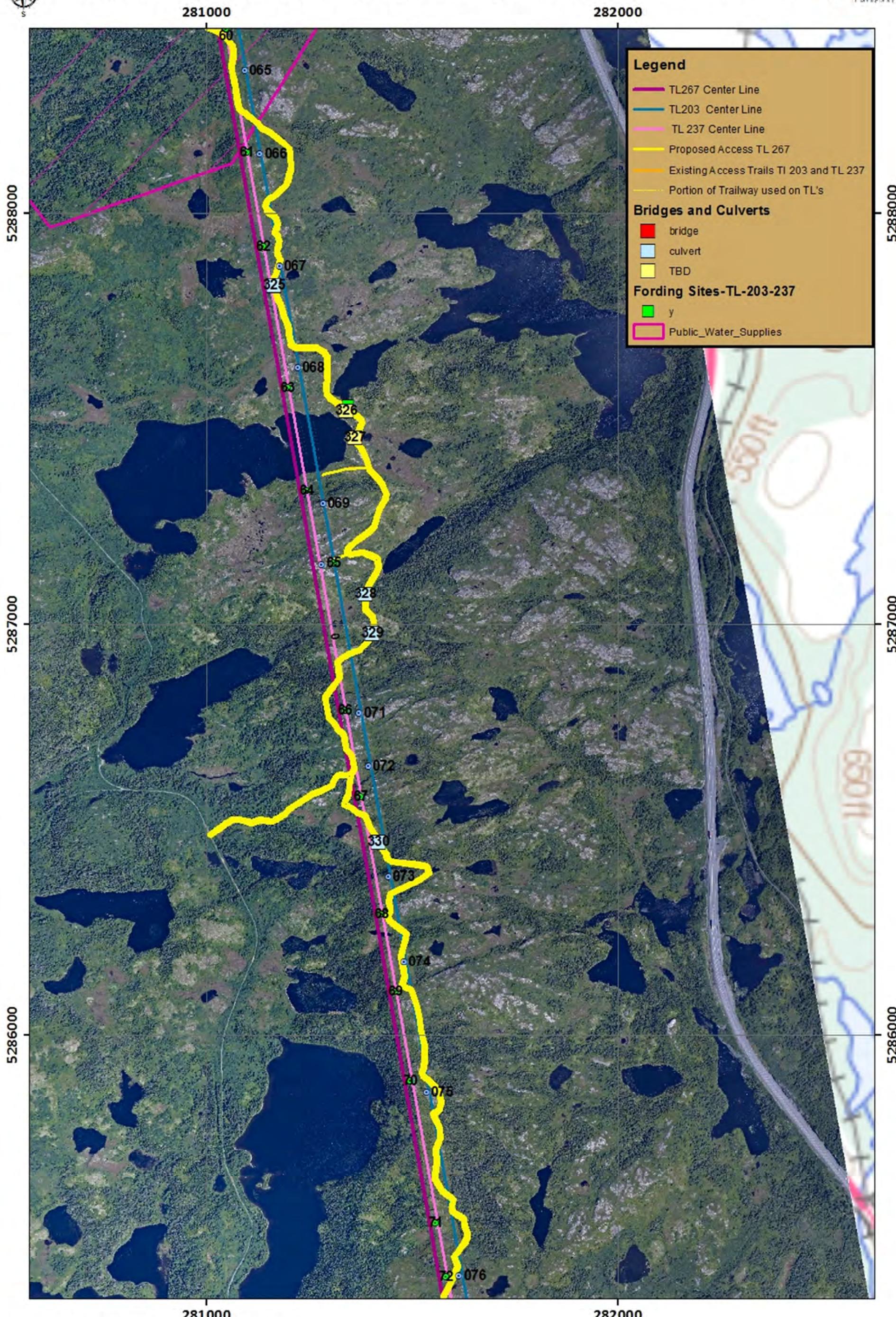
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Proposed Transmission Line (TL) 267 Bay D'Espoir Generating Station to Western Avalon Terminal Station



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Proposed Transmission Line (TL) 267 Bay D'Espoir Generating Station to Western Avalon Terminal Station



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Legend

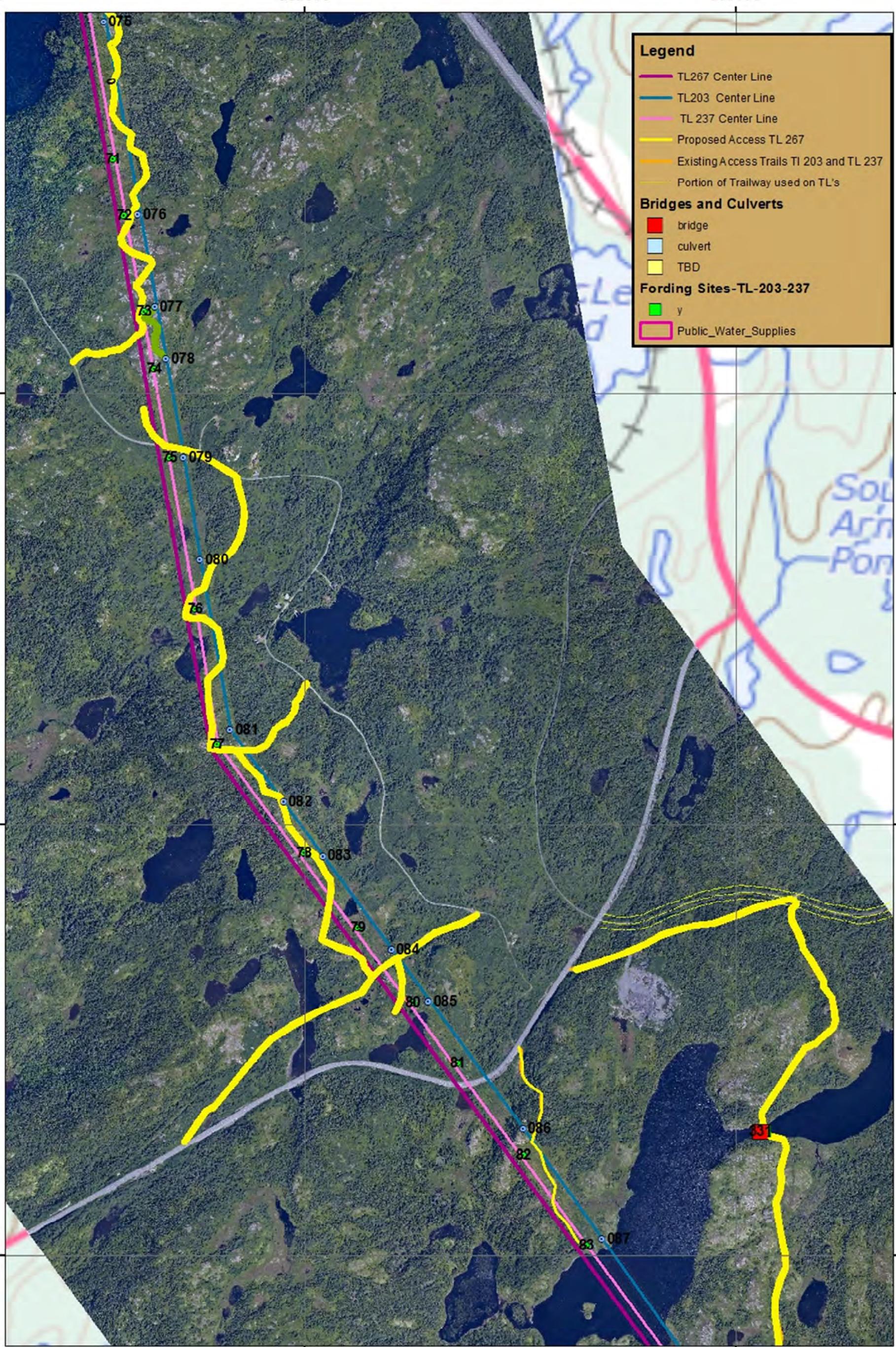
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- Existing Access Trails TL 203 and TL 237
- Portion of Trailway used on TL's

Bridges and Culverts

- bridge
- culvert
- TBD

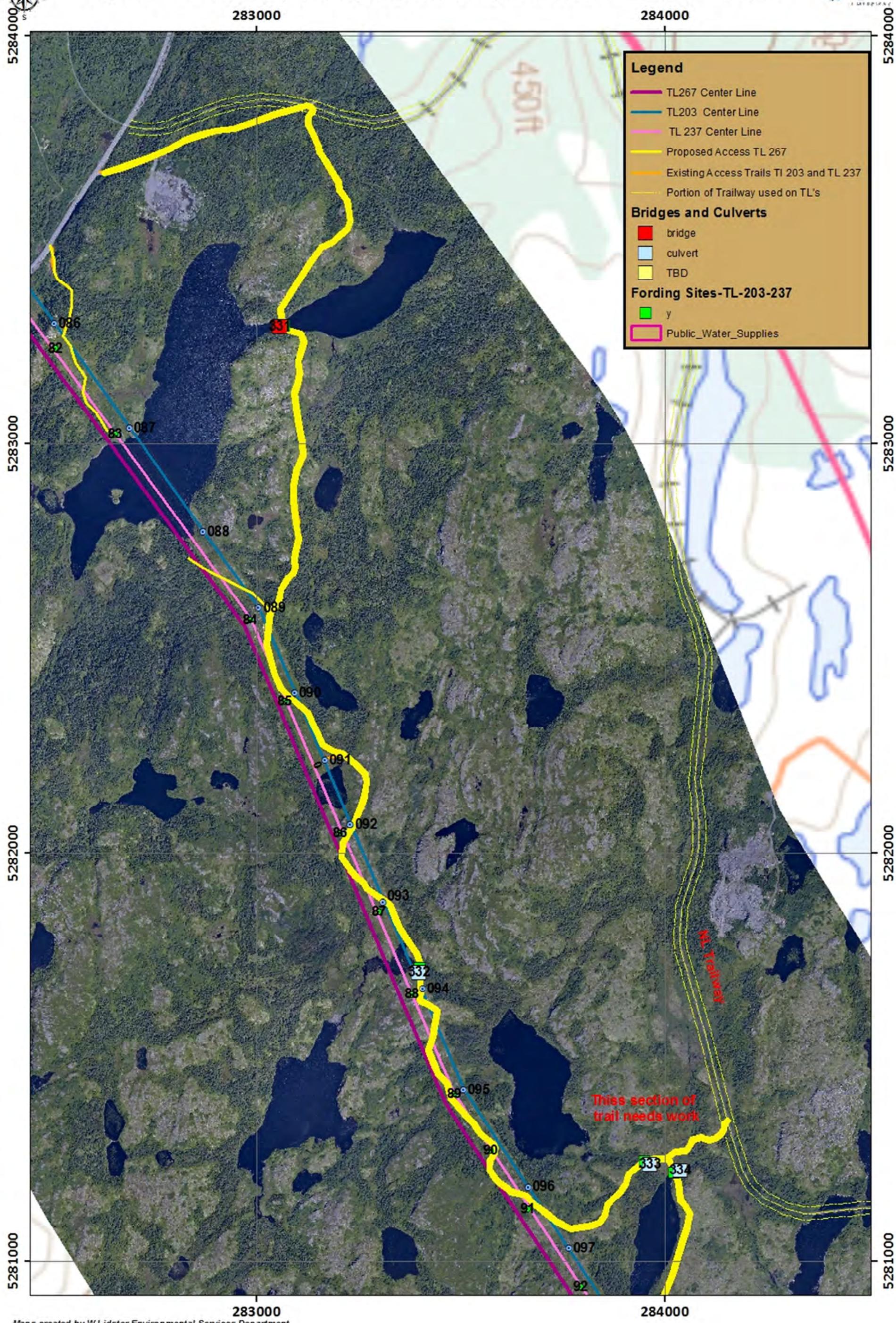
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- Public_Water_Supplies





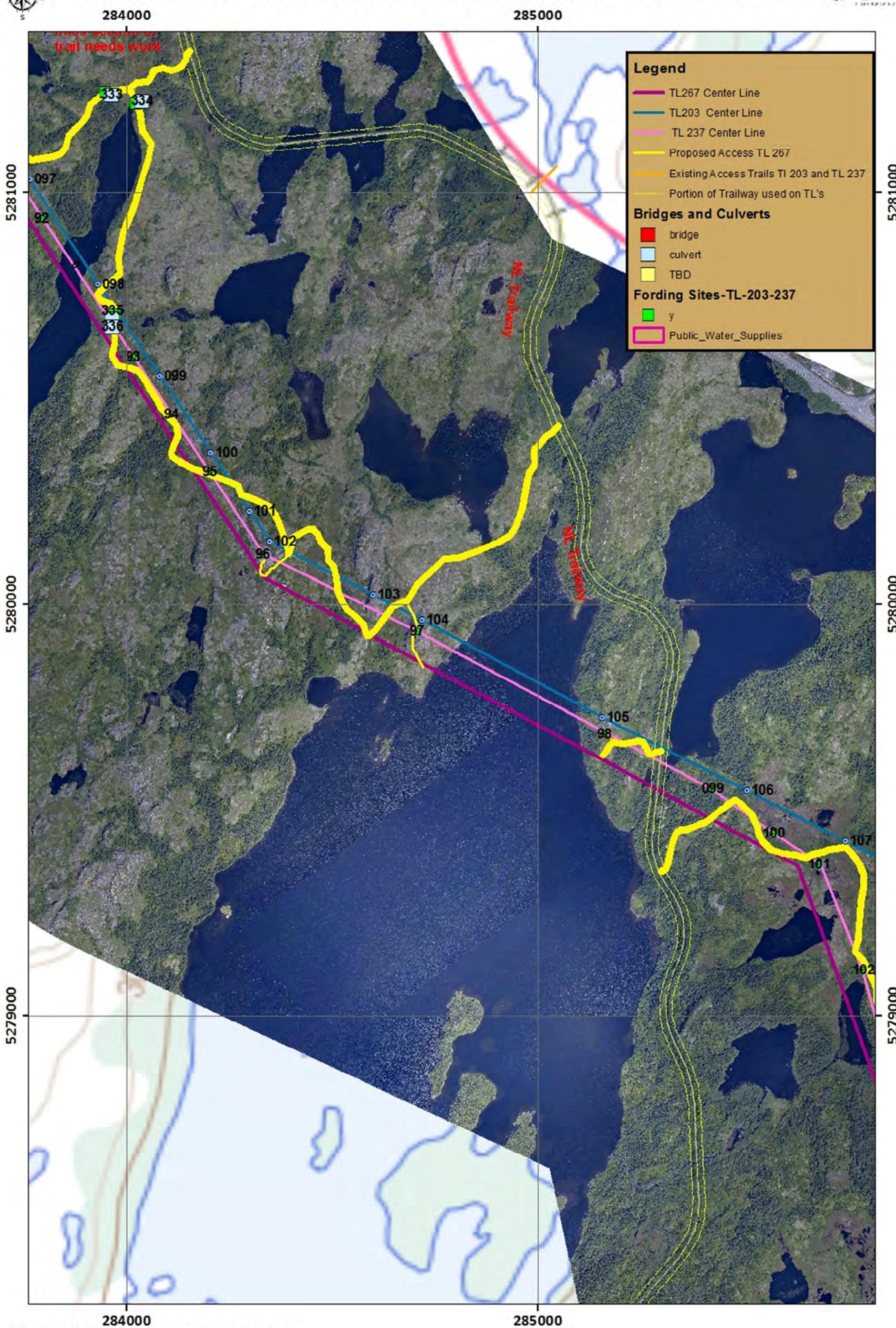
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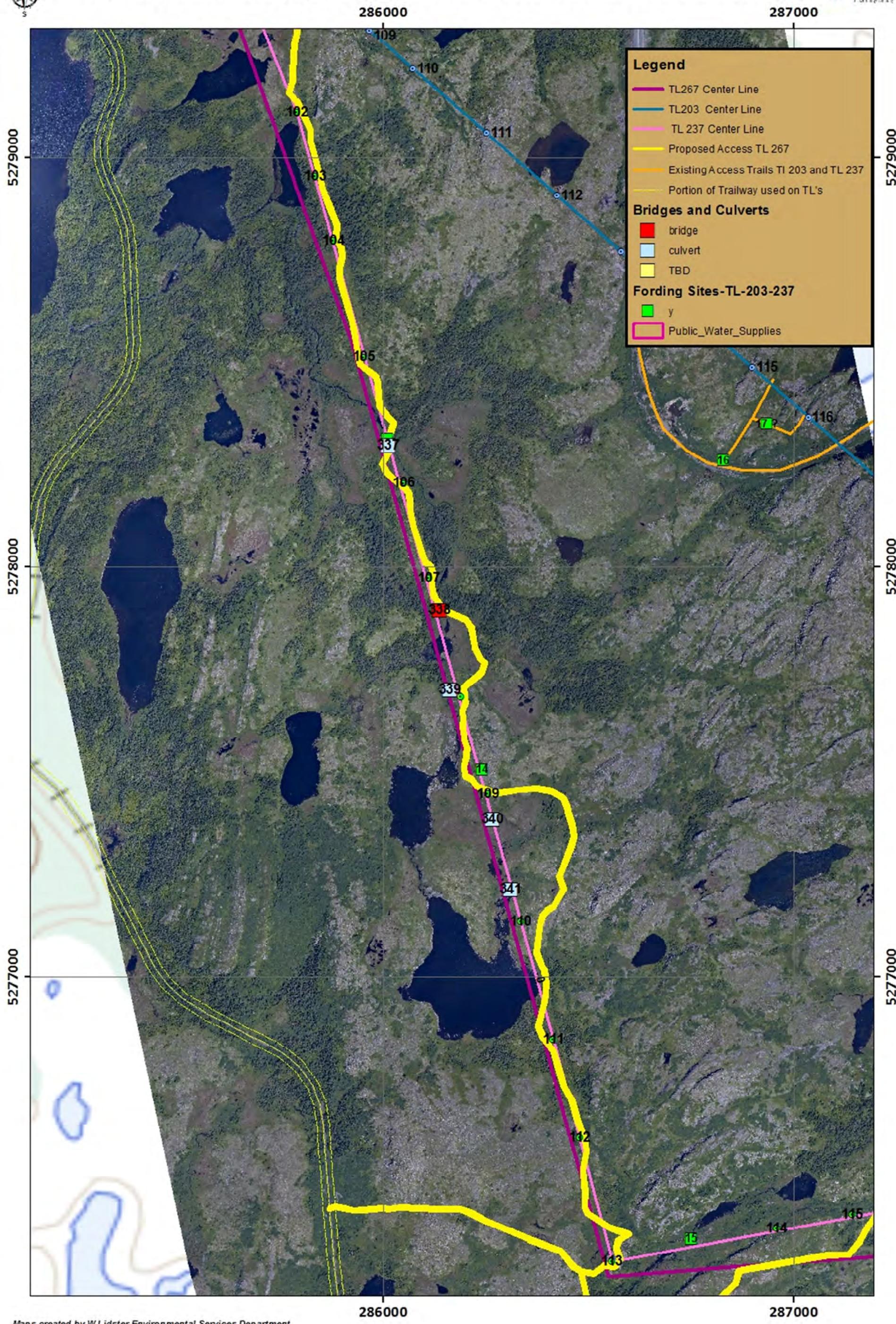
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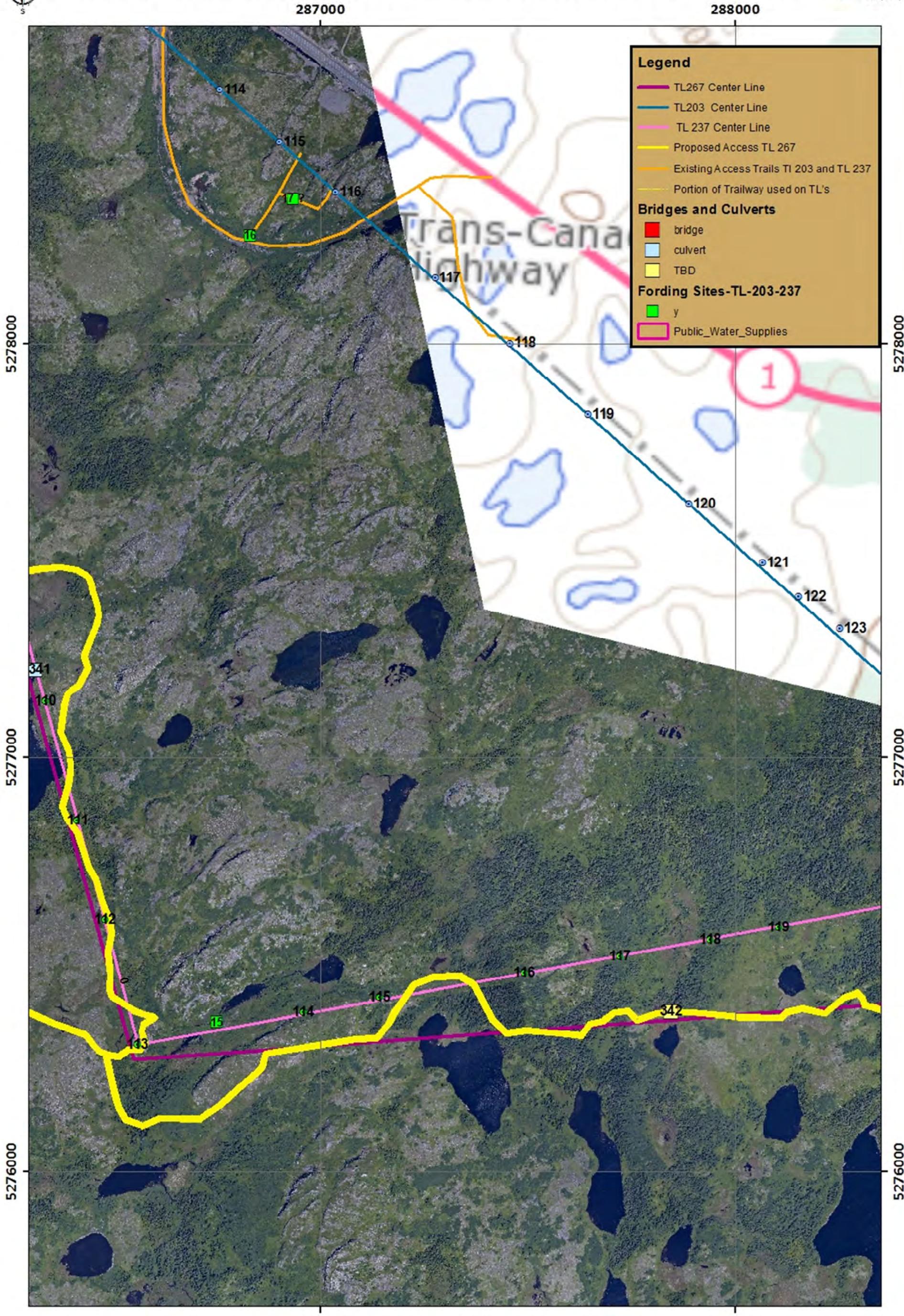
Proposed Transmission Line (TL) 267 Bay D'Espoir Generating Station to Western Avalon Terminal Station



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Proposed Transmission Line (TL) 267 Bay D'Espoir Generating Station to Western Avalon Terminal Station



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UTM Zone 22 NAD 83

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Proposed Transmission Line (TL) 267 Bay D'Espoir Generating Station to Western Avalon Terminal Station



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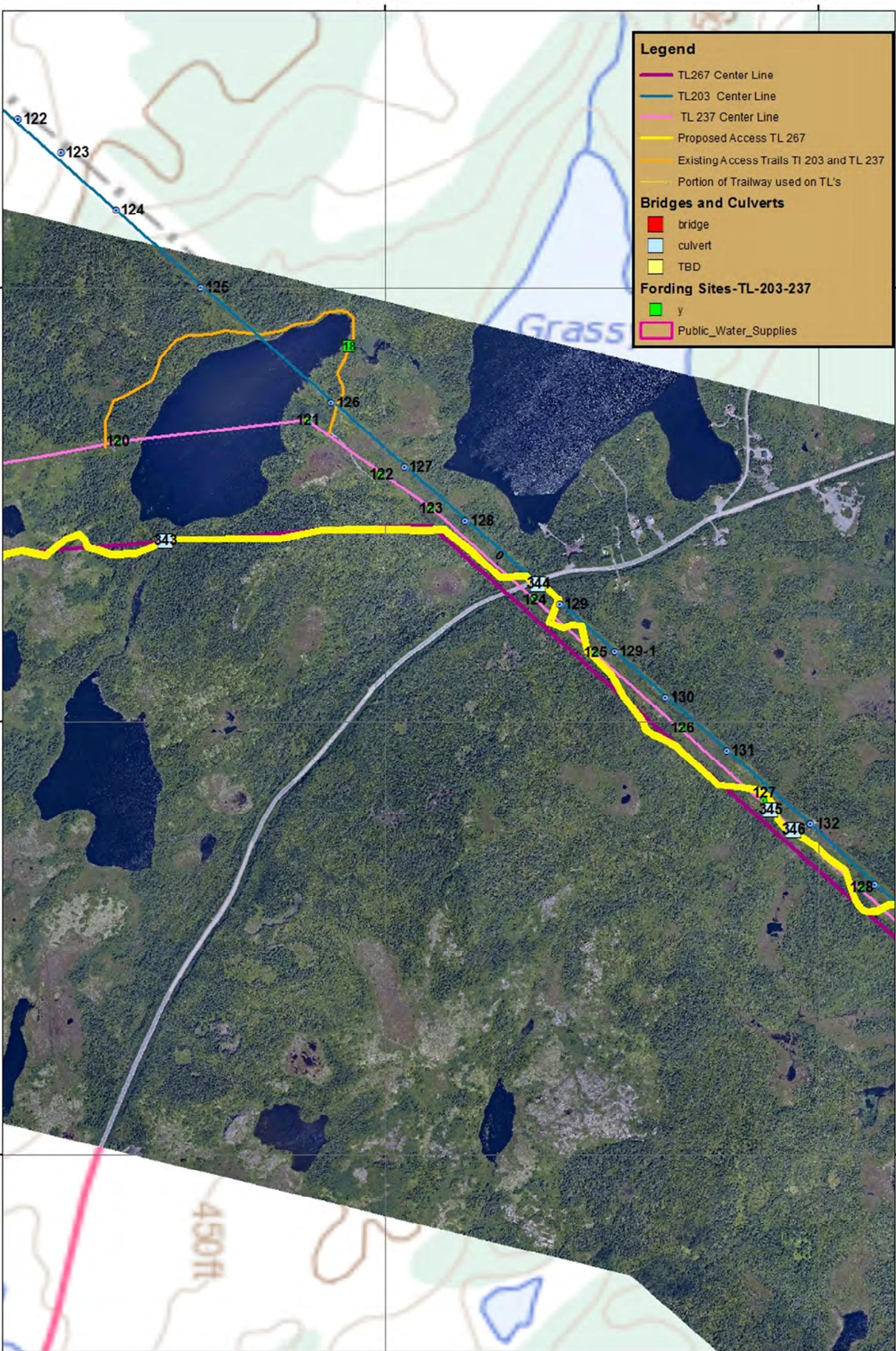
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UTM Zone 22 NAD 83

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Proposed Transmission Line (TL) 267 Bay D'Espoir Generating Station to Western Avalon Terminal Station



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UTM Zone 22 NAD 83

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* Based on NL Hydro's current stage of detailed engineering and design (January 2016) - subject to change based on further analysis

Legend

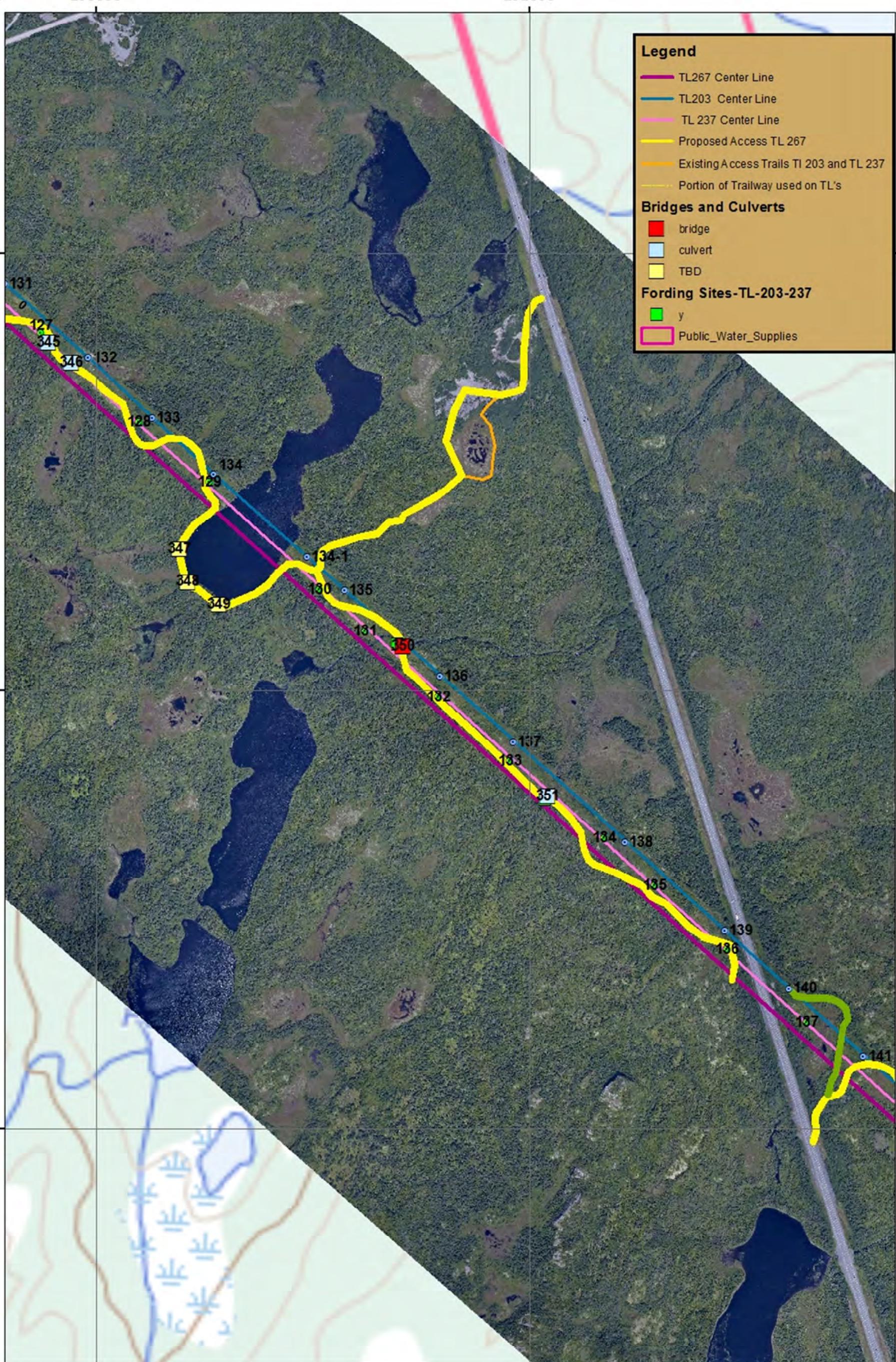
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- TL203 Center Line
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Bridges and Culverts

- bridge
- culvert
- TBD

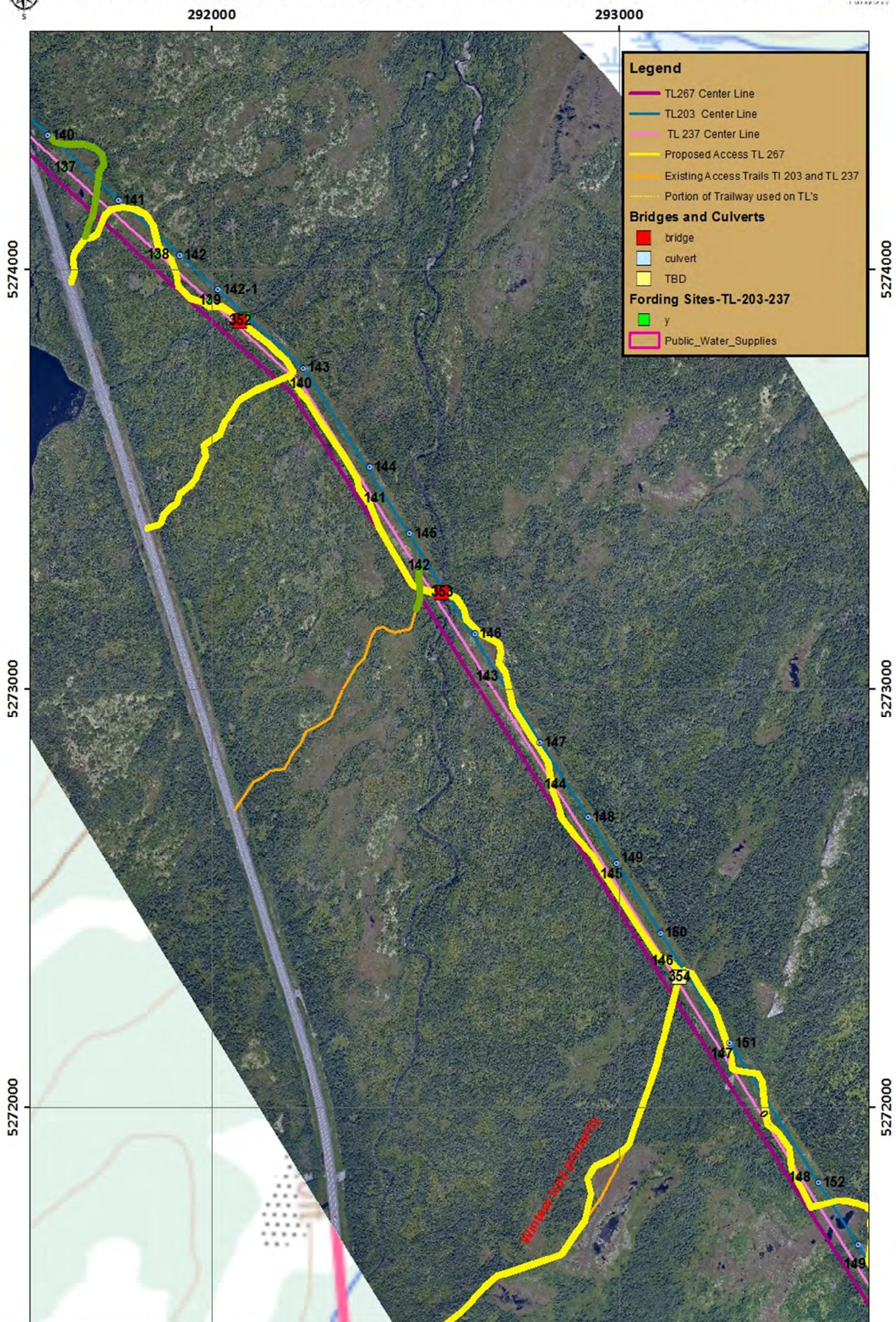
Fording Sites-TL-203-237

- y
- Public_Water_Supplies





Proposed Transmission Line (TL) 267 Bay D'Espoir Generating Station to Western Avalon Terminal Station



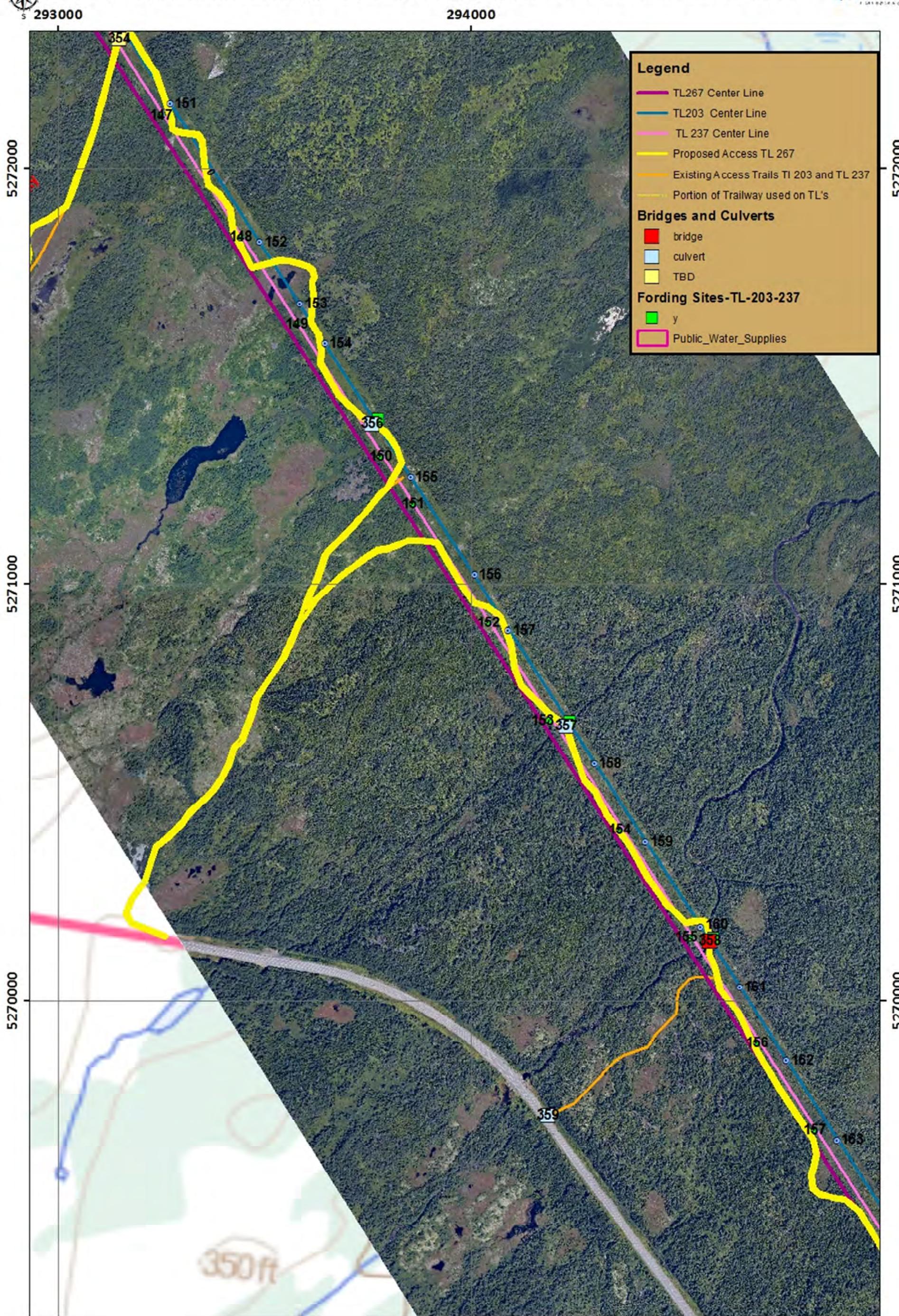
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UTM Zone 22 NAD 83

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Proposed Transmission Line (TL) 267 Bay D'Espoir Generating Station to Western Avalon Terminal Station



293000

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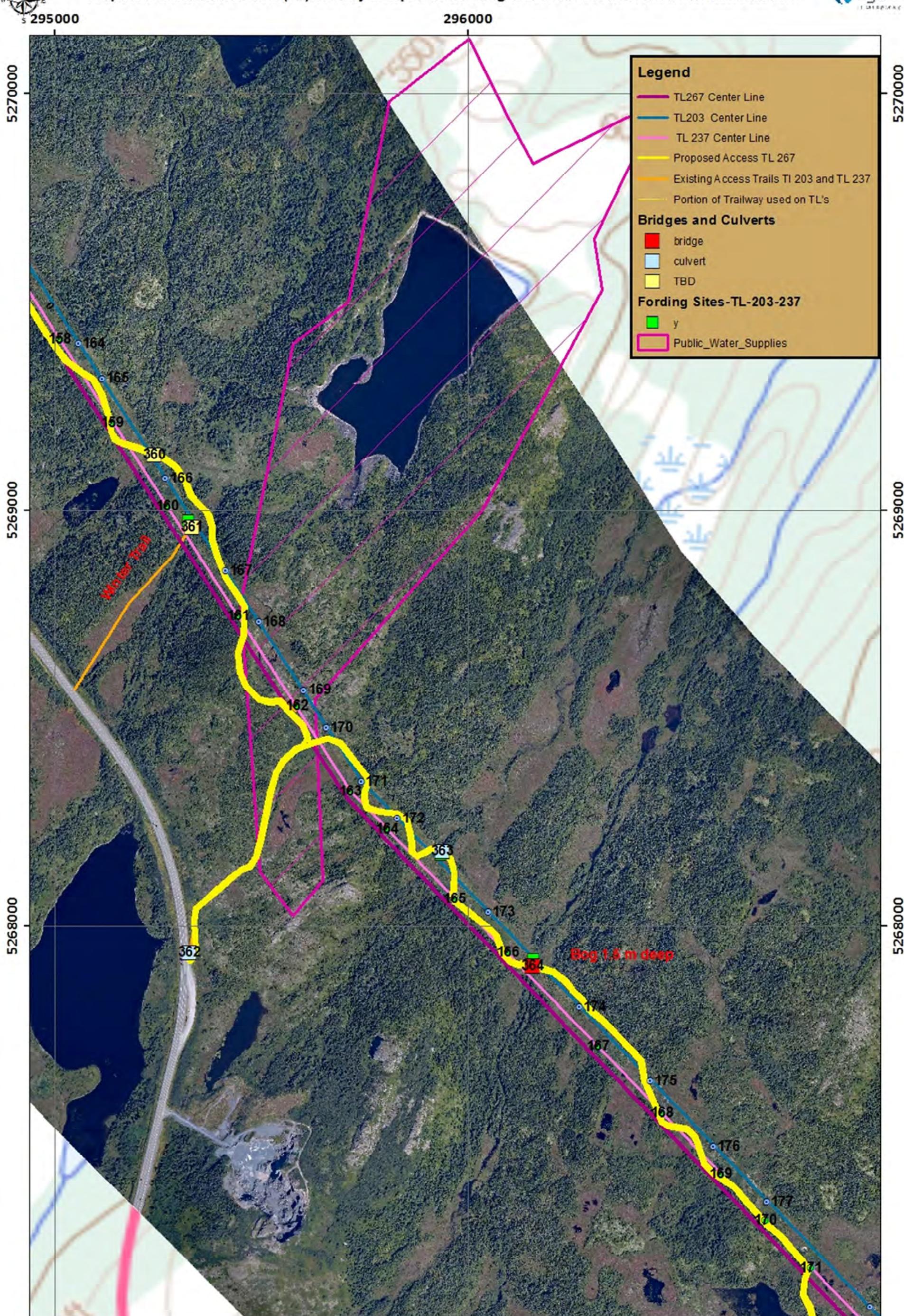
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Proposed Transmission Line (TL) 267 Bay D'Espoir Generating Station to Western Avalon Terminal Station



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UTM Zone 22 NAD 83

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Proposed Transmission Line (TL) 267 Bay D'Espoir Generating Station to Western Avalon Terminal Station



297000

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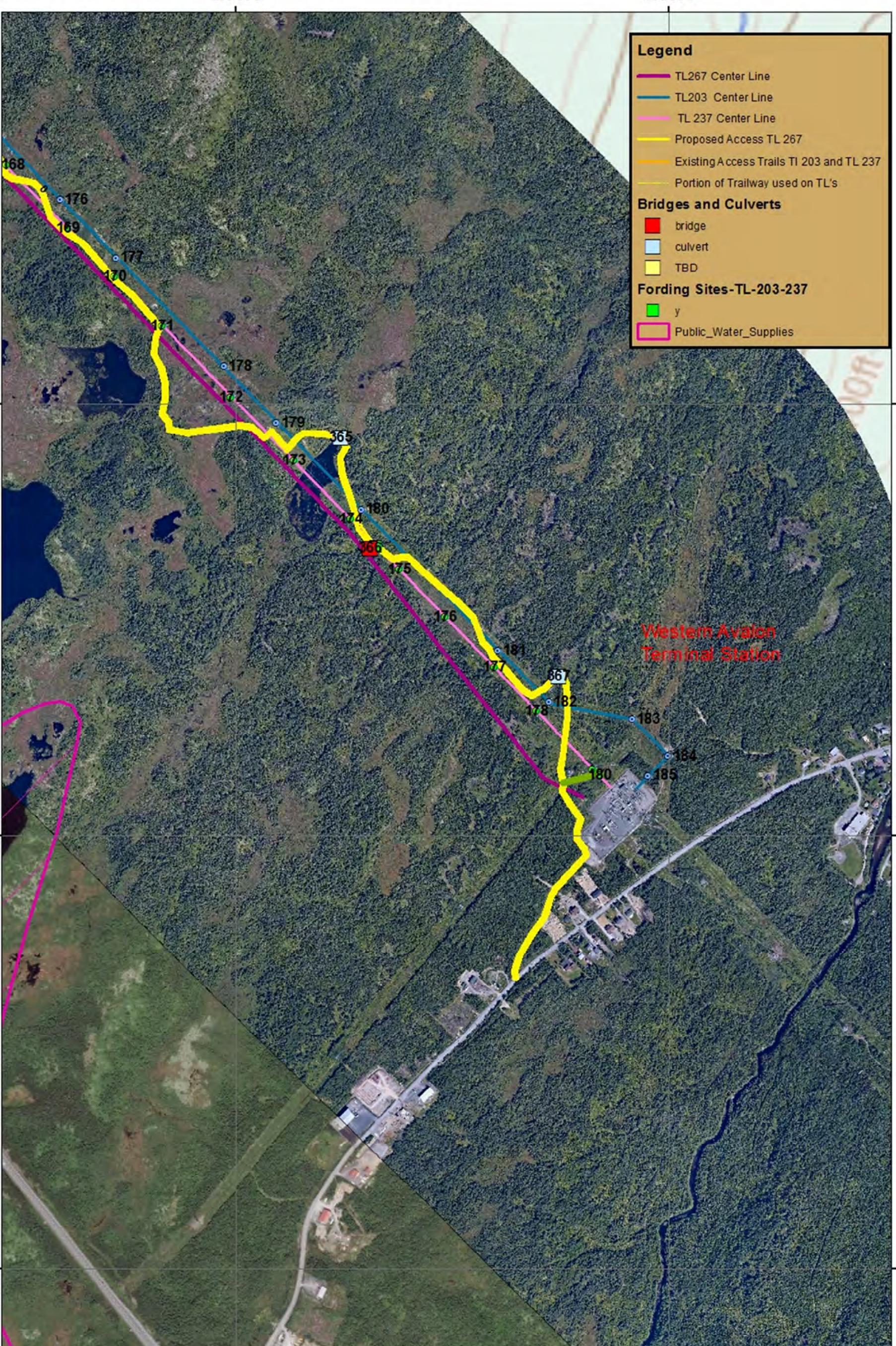
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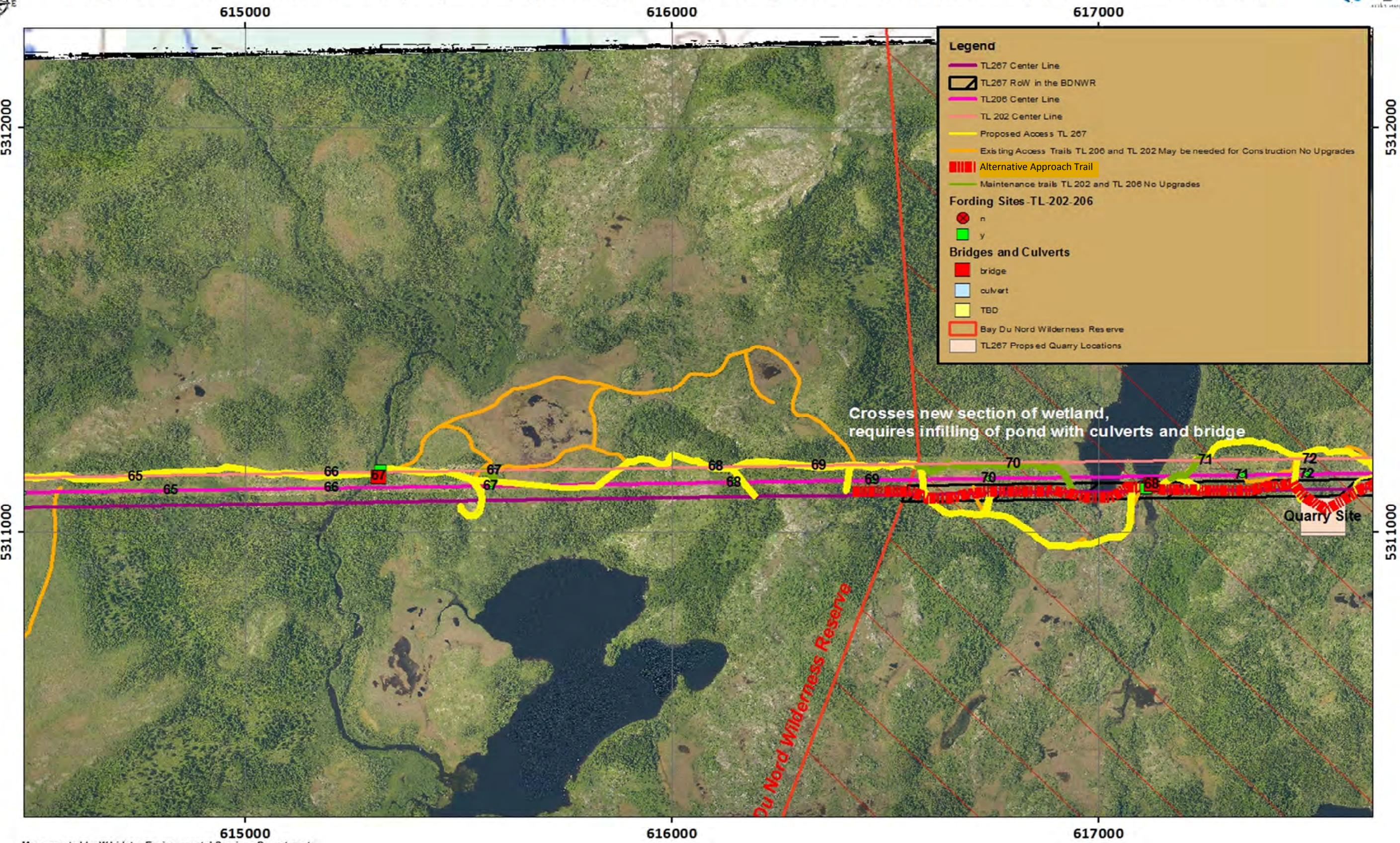
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Appendix B – Map Set of TL 267 – Alternative Approach



Proposed Transmission Line (TL) 267 Bay D'Espoir Generating Station to Western Avalon Terminal Station



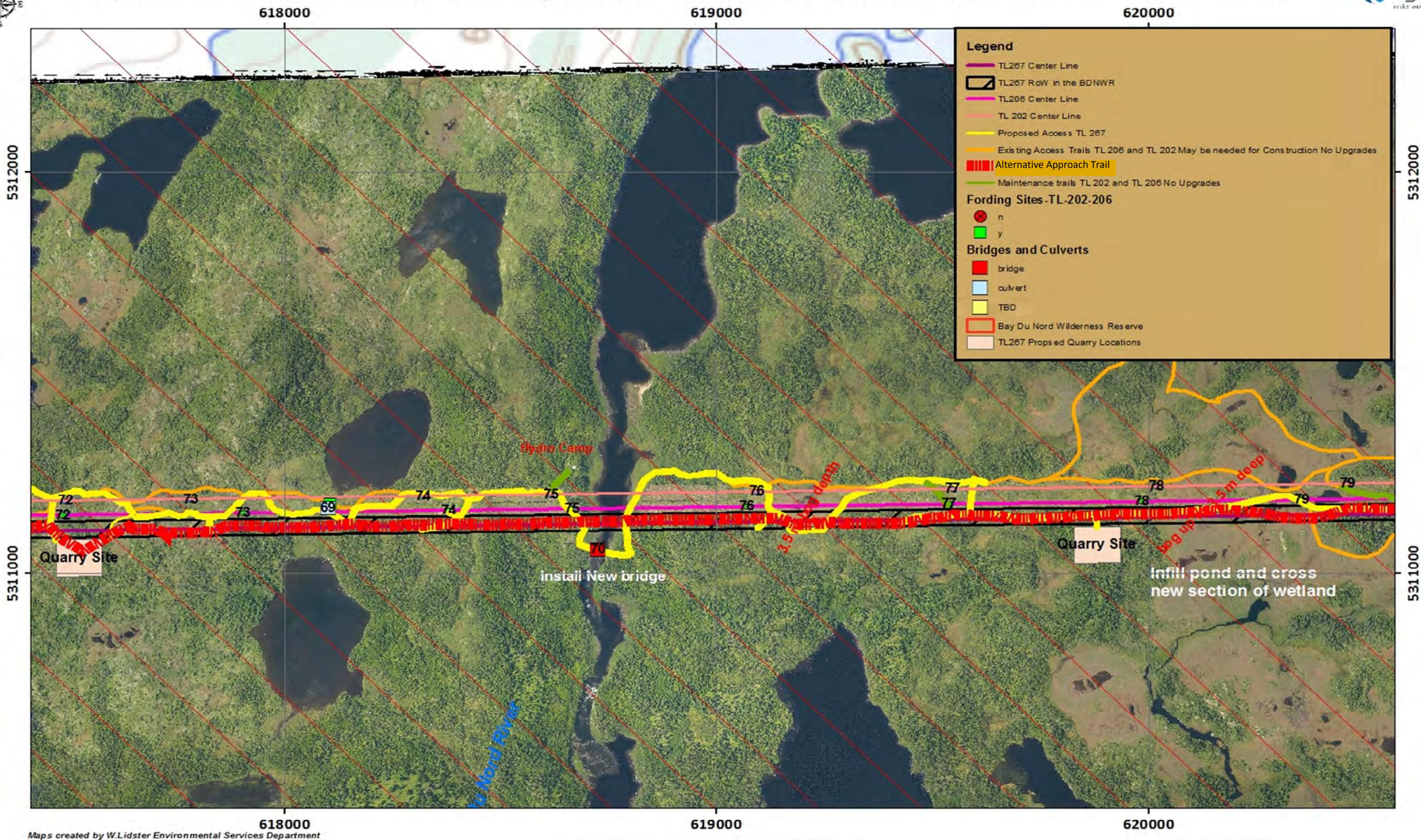
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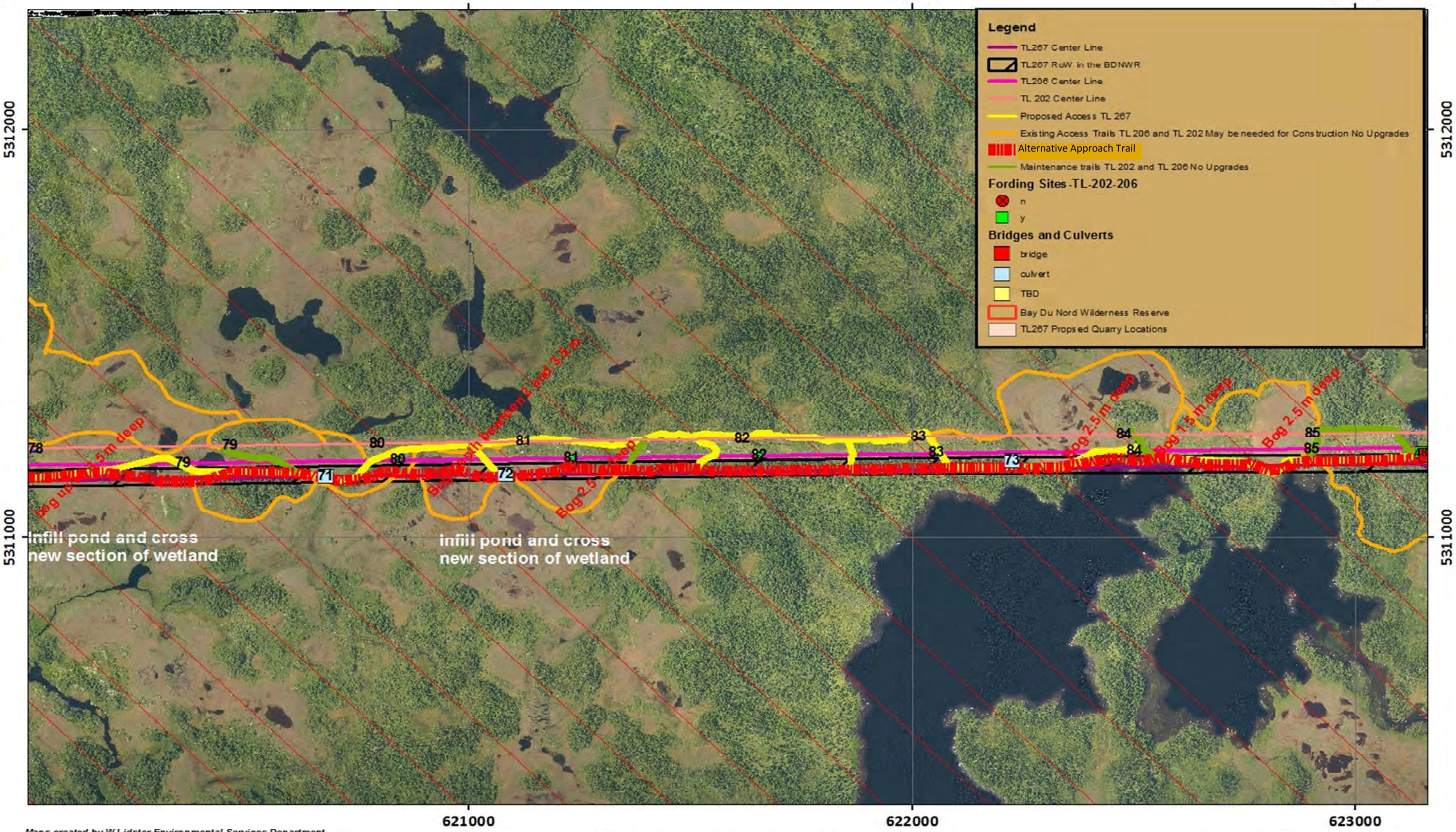


Proposed Transmission Line (TL) 267 Bay D'Espoir Generating Station to Western Avalon Terminal Station



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Proposed Transmission Line (TL) 267 Bay D'Espoir Generating Station to Western Avalon Terminal Station



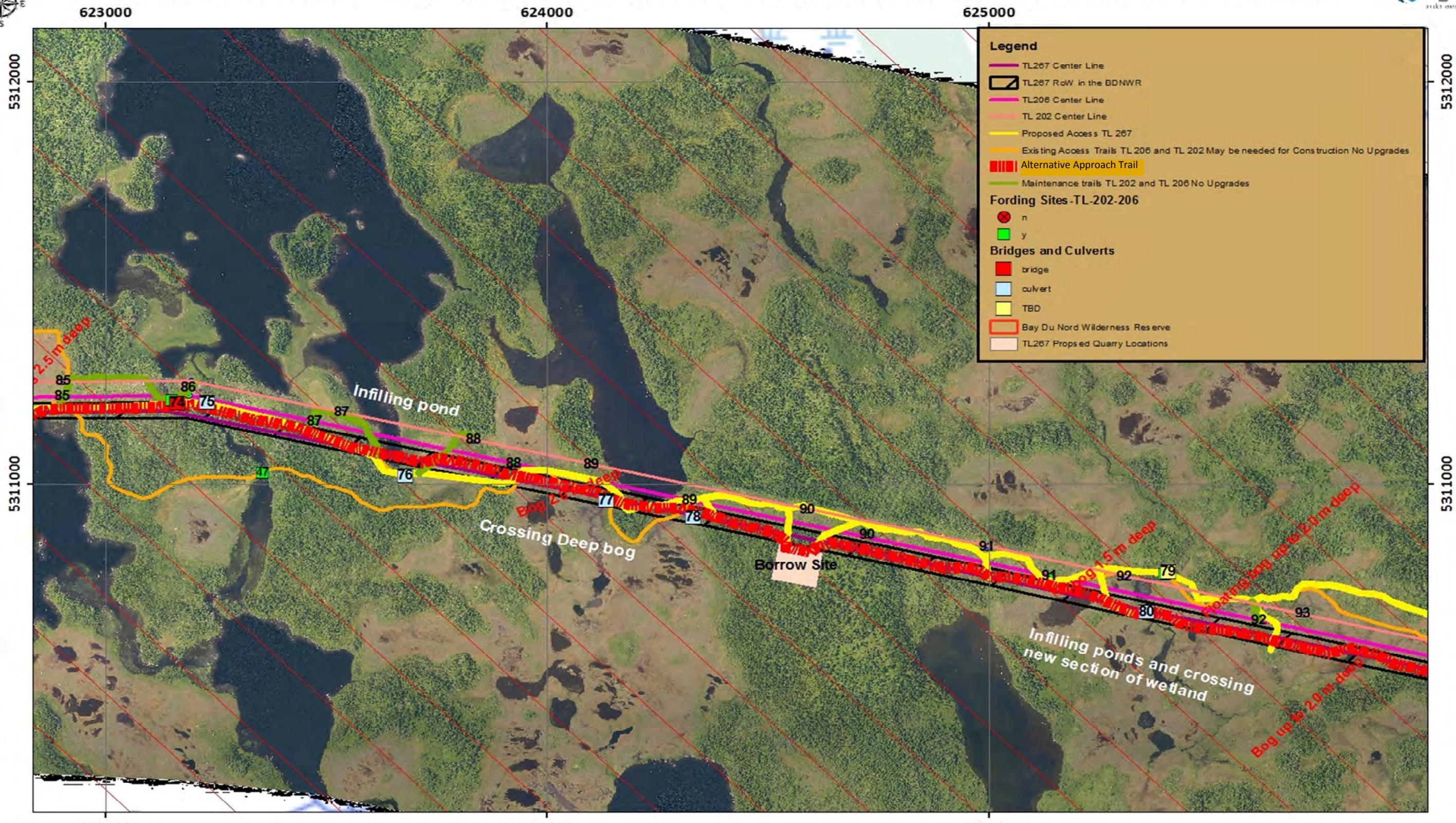
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Proposed Transmission Line (TL) 267 Bay D'Espoir Generating Station to Western Avalon Terminal Station



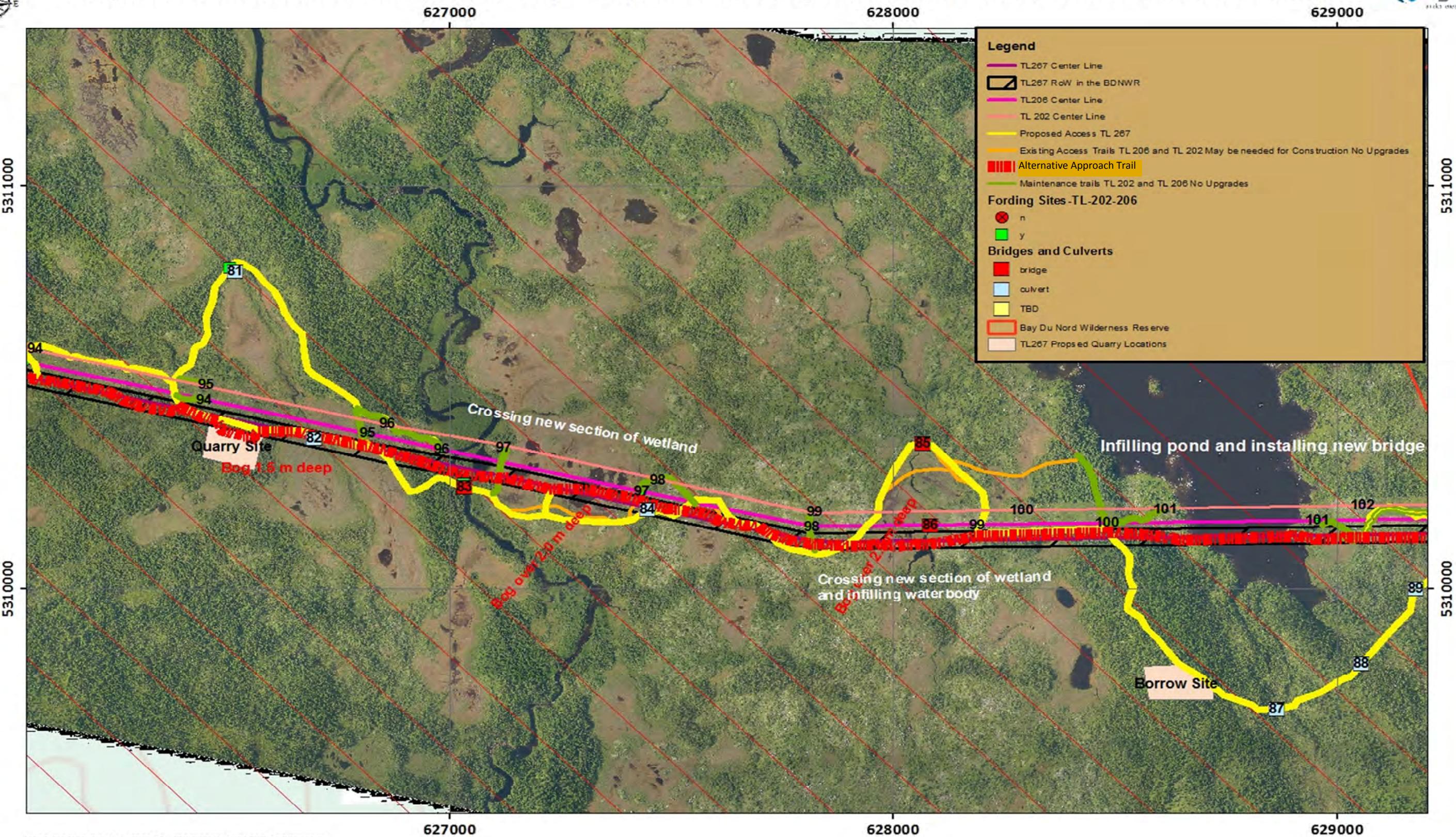
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Proposed Transmission Line (TL) 267 Bay D'Espoir Generating Station to Western Avalon Terminal Station



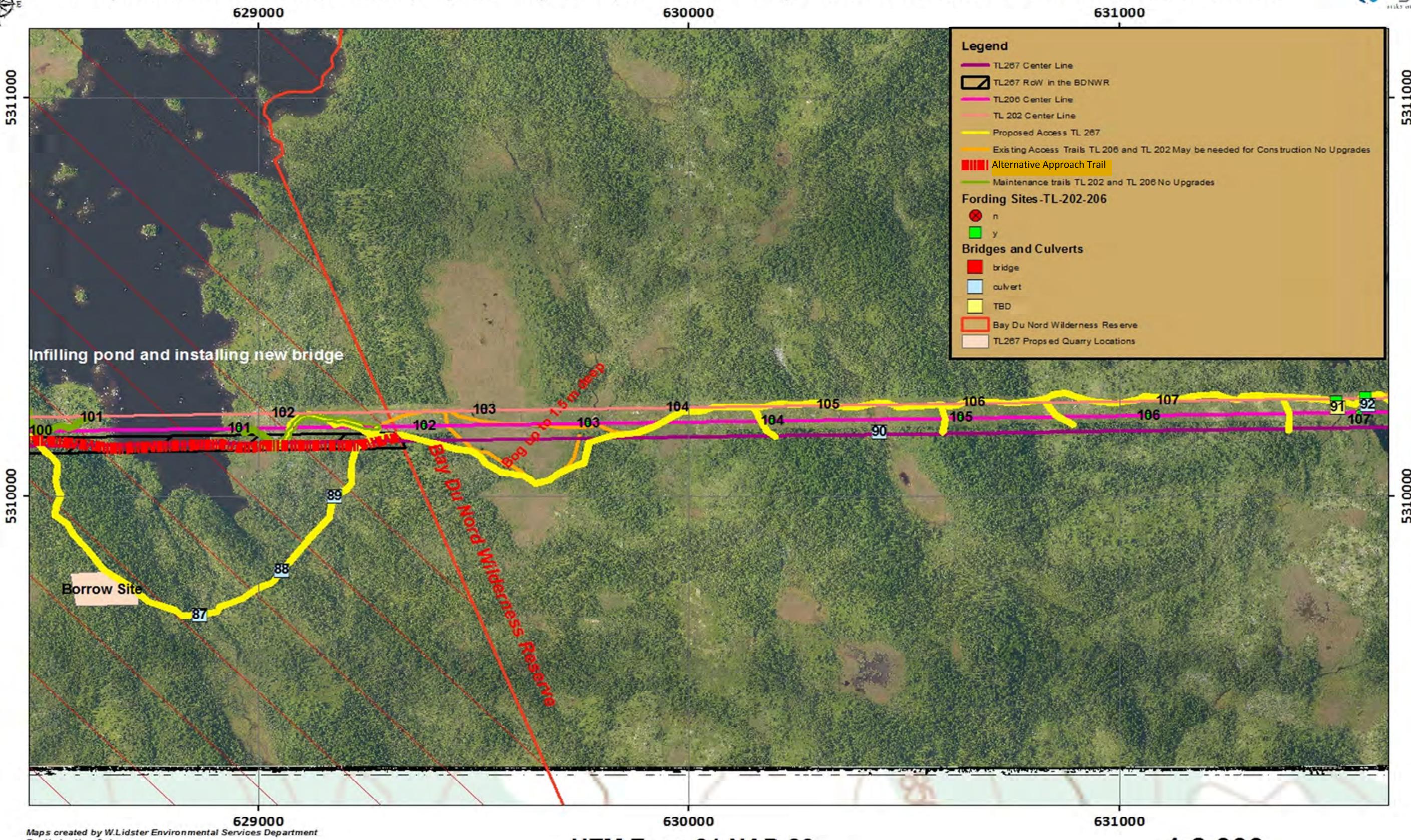
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UTM Zone 21 NAD 83

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Proposed Transmission Line (TL) 267 Bay D'Espoir Generating Station to Western Avalon Terminal Station

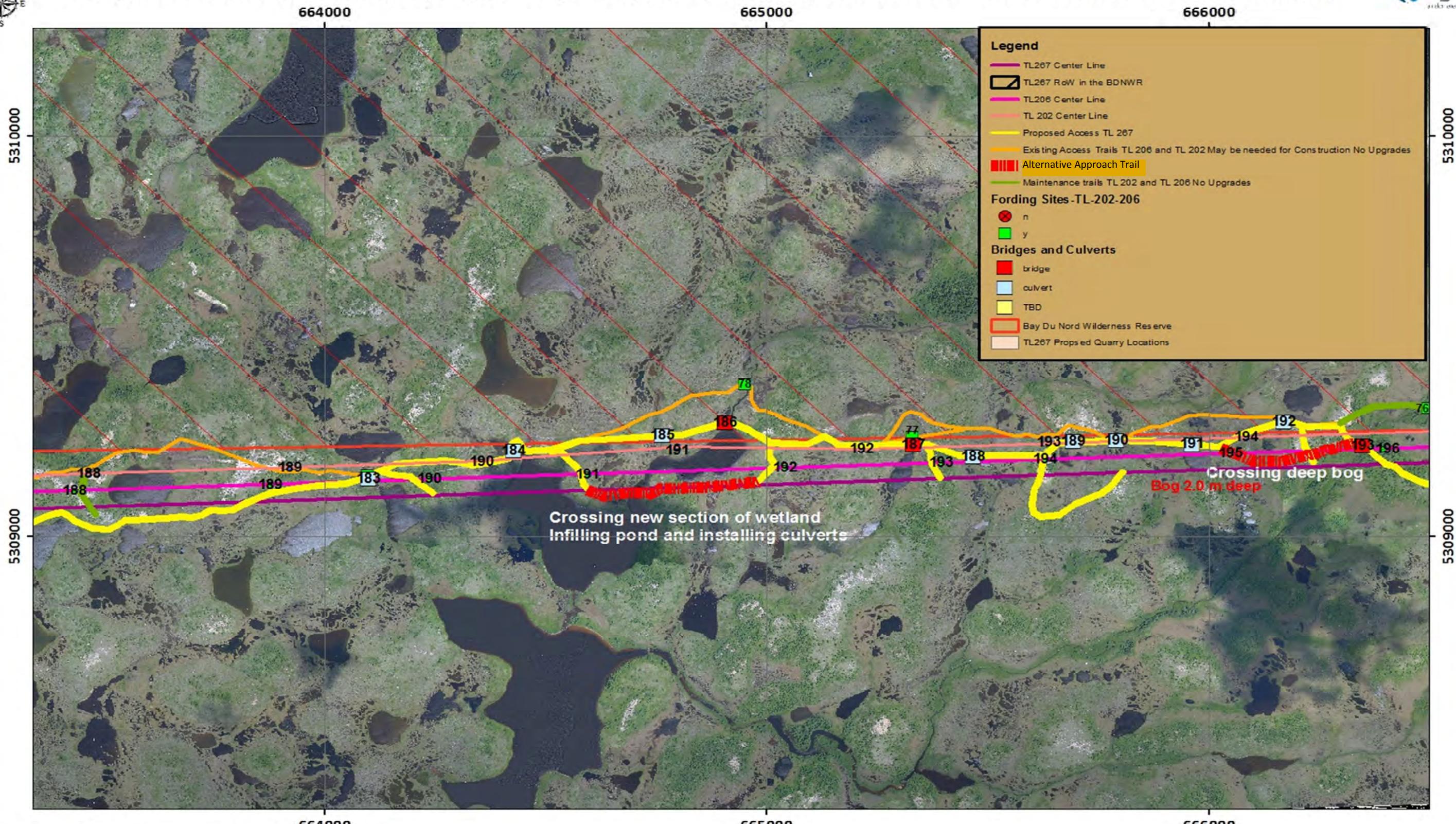


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UTM Zone 21 NAD 83



Proposed Transmission Line (TL) 267 Bay D'Espoir Generating Station to Western Avalon Terminal Station



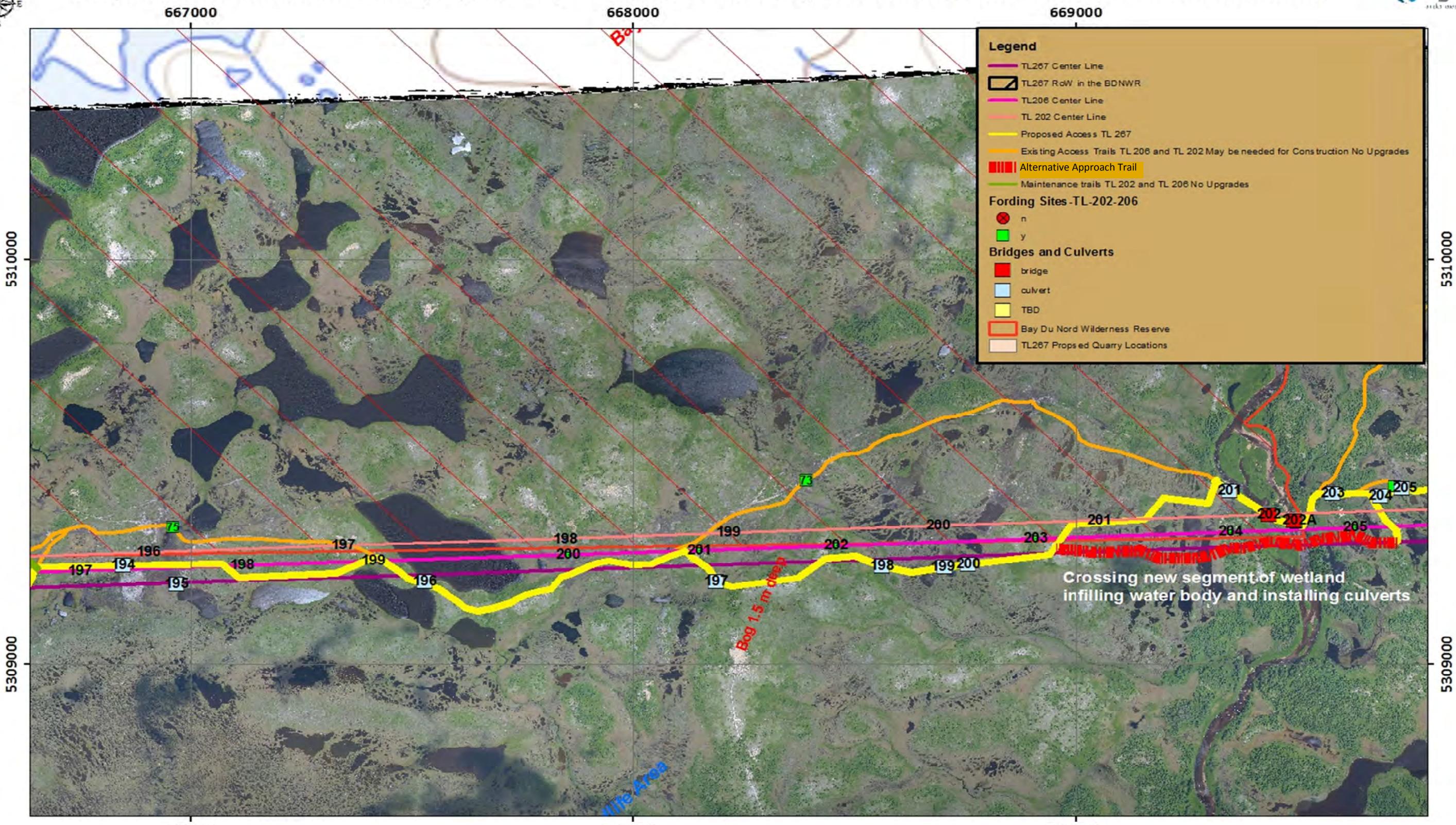
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Proposed Transmission Line (TL) 267 Bay D'Espoir Generating Station to Western Avalon Terminal Station



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Appendix C – Lichen Report



**LICHEN SURVEYS ALONG TL267
PROJECT AREA ROW**

FINAL REPORT

Submitted to:

Nalcor Energy
St. John's, Newfoundland

Submitted by:

**Amec Foster Wheeler Environment & Infrastructure,
a Division of Amec Foster Wheeler Americas Limited**
St. John's, Newfoundland

January 2016

TF15104175

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Appendix C	Scientific Research Permits

1.0 BACKGROUND AND OBJECTIVES

Newfoundland and Labrador Hydro (Hydro) is proposing to construct and operate a new 230 kilovolt (kV) transmission line (TL 267, or the Project) in south-central and eastern Newfoundland that will connect the existing Bay d'Espoir and Western Avalon Terminal Stations. The new transmission line will be approximately 188 kilometres (km) in length, and will run parallel to existing transmission lines in the region.

The development of the proposed TL 267 will involve the clearing and control of vegetation along the proposed transmission line right of way (ROW) and other ground disturbance which, given the linear nature and geographic extent of the Project, will cross through a variety of vegetation communities and habitats. As a result, a Study was completed as part of Project development to summarize the known and potential occurrence of listed (legally protected) plant species in or near the proposed Project Area (40 metres (m) wide ROW) and a surrounding Study Area (1 km wide), as well as any other plant species which are considered to be rare (regionally uncommon).

Two listed plant species have been identified to occur within five kilometres of the proposed TL 267 centreline – the Boreal Felt Lichen (*Erioderma pedicellatum*) and the Blue Felt Lichen (*Degelia plumbea*). Species-specific modeling was completed using the known habitat requirements of Boreal Felt Lichen and Blue Felt Lichen in order to identify target survey areas within suitable habitat crossed by the proposed transmission line from Bay d'Espoir to Come By Chance. It should be noted that Graceful Felt Lichen (*Erioderma mollissimum*) has not been recorded within five kilometres of the project study area, however since the habitat requirements of this species is very similar to Boreal Felt Lichen, this species was also included in the field surveys.

The objectives of this Study were to conduct field surveys within the proposed ROW in order to identify Boreal Felt Lichen, Graceful Felt Lichen and Blue Felt Lichen individuals that may occur within the proposed Project footprint. Key tasks associated with this Study included:

- locate listed lichen individuals within the Project footprint; and
- record data from each listed lichen location including marking location with Global Positioning System (GPS) and flagging location in the field.

2.0 STUDY METHODS

2.1 Target Species Background

2.1.1 Boreal Felt Lichen

Boreal Felt Lichen is an epiphytic species which grows on the trunks and branches of coniferous trees (NLDEC 2015). This species usually prefers Balsam Fir (*Abies balsamea*) trees but has also been recorded on other tree species such as Black Spruce (*Picea mariana*) and Trembling Aspen (*Populus tremuloides*). It is typically found in moist coniferous forests, close to the coast where the local topography provides suitable microclimate such as near the base of northern slopes and at the edges of wetlands. In Newfoundland this species is concentrated in two major areas including the central Avalon Peninsula and Bay d'Espoir (NLDEC 2015). Boreal Felt Lichen is listed and protected under the *Newfoundland and Labrador Endangered Species Act* (NLESA) as vulnerable and by the federal *Species at Risk Act* (SARA) as special concern (Government of Canada 2015).

2.1.2 Graceful Felt Lichen

Graceful Felt Lichen is found in similar habitat as Boreal Felt Lichen consisting of cool humid coniferous forests, close to the coast. On the Island of Newfoundland, this species primarily occurs on the trunks of Balsam Fir trees but has been found on Red Maple (*Acer rubrum*), and Yellow Birch (*Betula alleghaniensis*) in Nova Scotia (Government of Canada 2015). Graceful Felt Lichen is listed by SARA as endangered. Graceful Felt Lichen has been designated as endangered under NLESA.

2.1.3 Blue Felt Lichen

Blue Felt Lichen is also found on the branches and trunks of trees; however, this species tends to prefer hardwood species such as Yellow Birch (*Betula alleghaniensis*). In Newfoundland it also has been recorded growing on Trembling Aspen, rocks and some non-native tree species, although to a much lesser extent (NLDEC 2015). The preferred habitat for Blue Felt Lichen is mature hardwood stands and with the majority of recordings in Newfoundland occurring in the Bay d'Espoir area, central Avalon Peninsula, Terra Nova National Park and southwest Newfoundland. Blue Felt Lichen is listed by the NLESA as vulnerable and is not currently listed by SARA.

2.2 Study Area Selection

Habitat modeling was conducted in order to focus field surveys in areas that provide suitable habitat for Boreal Felt Lichen and Blue Felt Lichen. Habitat modeling for the two listed lichen species in the Study Area was carried out using information on:

1. the known occurrences of these plants within the Study Area and Regional Area; and
2. known habitat requirements for specific plant species.

As a result, two plant habitat potential models were developed for the Project.

Atlantic Canada Conservation Data Centre (ACCDC) provided a database of the known occurrences of listed and rare plant species within the overall Regional Area (ACCDC 2015). The first model was created using these known occurrences within this area, and is based on the premise that as the number of known occurrences within a particular area increases, the likelihood of encountering another such plant within that particular area also increases.

The categories and associated criteria for this “occurrence based” plant habitat model were identified as:

- Low Potential Greater than 500 m from a known listed / rare plant occurrence.
- Moderate Potential 250 - 500 m from a known listed / rare plant occurrence.
- High Potential 0 - 250 m from a known listed / rare plant occurrence.

Due to the relatively limited number of plant surveys that have been conducted in parts of the Study Area and the resulting limited number of known listed / rare plant occurrences, particular habitat requirements that are important for select plant species were also considered and evaluated as part of this Study. Specifically, the known habitat requirements for Boreal Felt Lichen and Blue Felt Lichen, listed species that are known to occur in the Study Area and regional area respectively, were considered and used to create a “species specific model”.

The categories and associated criteria for the species specific model were identified as:

- Boreal Felt Lichen Habitat: Softwood forests, within 18 km of the coastline, and within 80 m of a wetland.
- Blue Felt Lichen: Hardwood forest within proximity to known occurrences (from Bay d'Espoir Terminal Station to the eastern extent of Bay Du Nord Wilderness Reserve boundary).

Results of the habitat modelling were used to identify high potential polygons within the 40 m wide ROW for which to conduct field surveys. Upon discussions with Newfoundland Department of Environment and Conservation - Wildlife Division it was agreed to also include all softwood forests within the 40m ROW as a medium potential habitat to be further assessed in the field. If deemed to provide suitable habitat, these medium potential areas would also be surveyed.

2.3 Field Surveys

Field surveys of each identified area (high and medium potential) took place between November 7, 2015 and November 17, 2015. Surveys consisted of experienced team members conducting active searches for both lichen species in areas of identified suitable habitat within the Project Area (ROW). The areas of potential habitat are dispersed along the extent of the transmission line Study Area including within the Bay Du Nord Wilderness Reserve.

Prior to conducting field surveys, two scientific research permits were obtained from Department of Environment and Conservation. One permit was acquired from the Wildlife Division to conduct

surveys targeting Graceful Felt Lichen and the second permit was to gain access to the Bay Du Nord Wilderness Reserve from Parks and Natural Areas Division (see Appendix C).

Survey sites were accessed via helicopter which dropped crew members off at the pre-selected survey locations. Surveys within the identified habitat polygons were conducted by foot in order to visually assess the entire polygon. Each tree (trunk and branches) was examined on all sides from base to approximately 4 meters (as high as could be visually assessed by surveyors from the ground). Balsam Fir trees received higher effort than other species of tree but Black Spruce trees were also examined during the surveys. Once complete the helicopter was used to transport survey crews to the next habitat polygon.

Data recorded at each listed lichen location included the following:

- GPS location (Easting and Northing);
- tree species;
- tree breast height diameter (DBH);
- location of lichen on tree (e.g. height above ground, side of tree, branch vs trunk);
- habitat description;
- photographs;
- lichen species; and
- location flagged using pink flagging tape in the field.

2.4 Field Study Team

Field team members include Dr. Marion Sensen, Scott Burley and Derm Kenny.

The field surveys were led by Dr. Marion Sensen. Dr. Sensen is a Biologist with a specialization in Botany (Doctorate in Lichenology) and over ten years of service with Amec Foster Wheeler, Environment & Infrastructure, a Division of Amec Foster Wheeler Americas Limited (Amec Foster Wheeler). She is responsible for providing consulting services in the areas of environmental impact assessments, plant and lichen inventories, rare plant and rare lichen surveys, wetland biological and functional assessments, wetland delineation, wetland compensation planning, environmental effects monitoring, bio-monitoring, as well as permitting (watercourse and wetland alterations, *Fisheries Act*, *Navigation Protection Act* (formerly the *Navigable Waters Protection Act*)), within Nova Scotia, the Maritime Provinces and across Canada. Dr. Sensen has managed projects, designed botanical and zoological baseline studies, developed procedural guidance documents, carried out feasibility and scoping studies, and developed environmental management plans. She has experience as a research consultant and university professor.

Mr. Scott Burley, M.Sc. was a field team member with Dr. Sensen. Scott is a Vegetation Biologist with Amec Foster Wheeler, who for the past 11 years has also participated in a large number and variety of vegetation studies and associated Environmental Assessments for proposed development projects throughout Newfoundland and Labrador, Nova Scotia and other parts of Canada. This has involved various project roles including participating in field studies to gather

baseline biological inventories, community engagement and consultation, project coordination, client liaison, as well as effects analysis and mitigation planning and report preparation. Scott has been involved in many ecological research projects and has provided field support for a number of top academic botanical researchers, characterizing and mapping vegetation communities and identifying and compiling species lists. He is experienced in undertaking plant surveys in a range of terrestrial and aquatic habitats and is experienced in assessments of wetlands including carrying out wetland functional analysis and wetland delineations. Scott has completed similar studies for other projects throughout Newfoundland and Labrador and elsewhere.

Mr. Dermot Kenny was a field team member with Dr. Sensen and Mr. Burley. Derm is a Senior Field Technician with sixteen years' experience in terrestrial, marine, and freshwater habitat data collection. He is very experienced in field logistics and his efforts on these projects have focused on field collection, consolidation and analysis of data; literature reviews; sample collection; as well as collecting and assessing data on physical habitats within fluvial, lacustrine and marine environments.

3.0 RESULTS

A total of 113 ha of forest habitat was identified during the desktop component of the study as either high or medium potential to contain listed lichens. During field work, it was quickly realized that both the high potential polygons (marked in green on attached map package) and medium potential polygons (marked in yellow) both had the potential to provide suitable habitat for Boreal Felt Lichen and Graceful Felt Lichen and that the presence of Boreal Felt Lichen seemed to be more influenced by the dominance of mature Balsam Fir trees rather than the proximity to a wetland. It was also noted that some of the high potential polygons turned out to be dominated by Black Spruce where Boreal Felt Lichen is not known to occur.

Therefore each polygon regardless of initial potential assessment was re-evaluated from the air prior to conducting the actual surveys on the ground. Following the visual assessment, the majority of polygons (89 ha) did appear to provide potential habitat for Boreal Felt Lichen (i.e. presence of Balsam Fir in a relatively undisturbed, mature forest) and as such was surveyed on the ground using methods described above. The remaining 24 ha was assessed from the air as not providing suitable habitat for the two listed plant species. Polygons determined to provide unsuitable habitat for Boreal Felt Lichen consisted of:

- dense Black Spruce forest with no or very little presence of Balsam Fir;
- regenerating forest (early successional);
- highly disturbed forest;
- sparse forest dominated by Black Spruce and Larch (*Larix laricina*); or
- fragmented forest patches, offering only edge habitat.

The map package in Appendix A illustrates the distribution of polygons surveyed on the ground and polygons that were only assessed from the air.

The 2015 field surveys resulted in locating a total of 242 individual thalli of Boreal Felt Lichen on 80 trees with the Project Study Area. No Blue Felt Lichen or Graceful Felt Lichen individuals were recorded during the 2015 surveys. The majority of Boreal Felt Lichen individuals were recorded within Balsam Fir forests on Balsam Fir trees; however, one location did report a Boreal Felt Lichen on a Black Spruce tree. The map package in Appendix A depicts the locations of all Boreal Felt Lichen located during the surveys along with the associated data recorded for each location including a hyperlink to any photographs recorded at each location.



Example of Boreal Felt Lichen Thallus (Dry)



Example of Boreal Felt Lichen Thallus (wet)

All of the Boreal Felt Lichen locations were recorded in the western end of the ROW where large patches of Balsam Fir forests provide optimal habitat for this species. In many of these areas Boreal Felt Lichen thalli were recorded on only one tree; however, a few locations contained a high number of trees with Boreal Felt Lichen in a relatively small area.

Individual thalli recorded on each tree ranged from 1 to 17, the majority of which were located on the trunk of the tree; however, Boreal Felt Lichen thalli were also found on the branches of six of the 80 trees. The average size tree on which Boreal Felt Lichen was recorded was ~8.5 cm (DBH) with trees ranging in size from 2 cm (DBH) to 28 cm (DBH). The majority of thalli recorded were

found to occur between 1-2 m above ground on the north to northeast side of the tree. Appendix B provides a summary of the data recorded for each Boreal Felt Lichen location.

Habitat within which Boreal Felt Lichen individuals were encountered consisted of relatively wet conditions near the base of slopes at the edge of wetlands but also included higher elevations in more open, dryer forests. As a result of this perceived wide range in moisture tolerance, many of the medium polygons were determined to provide suitable habitat for Boreal Felt Lichen and as such received a similar level of effort in terms of field surveys as the high potential areas.



Typical Habitat where BFL were recorded (moist Balsam Fir dominated forest)



Typical Habitat where BFL were recorded (Dry, open Balsam Fir dominated forest)



The eastern end of the Study Area seemed to contain more Black Spruce dominated forests as well as disturbed forests in early successional stages which did not provide the same environmental conditions as the western end and may explain the absence of Boreal Felt Lichen from this area. The proximity of the eastern end of the Study Area to the community of Come By Chance may result in changes to air quality which may also explain the absence of this species.



Example of habitat where BFL was not recorded (Sparse Black Spruce dominated forest)

4.0 CONCLUSION

A total of 242 Boreal Felt Lichen individuals were recorded on 80 trees within the proposed 40 m ROW of TL267. All of these species were recorded on the western end of the Study Area where habitat conditions (large patches of Balsam Fir dominated forest) seemed to provide more favourable environmental conditions for Boreal Felt Lichen. No Blue Felt Lichen or Graceful Felt Lichen Species were encountered during the surveys.

5.0 REFERENCES

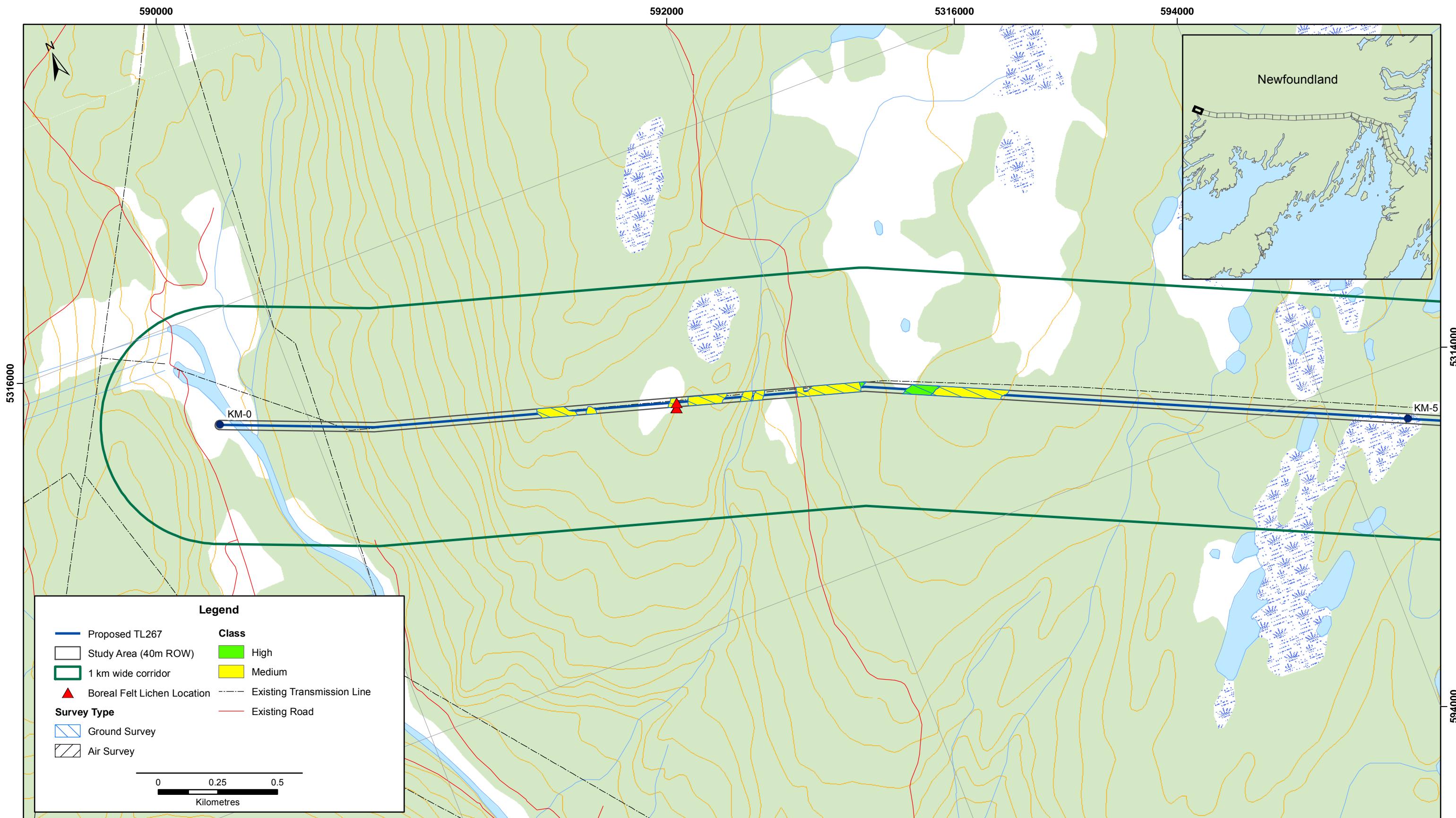
ACCDC. 2015. Search Results Data Report for Transmission Line (TL 267) Project located in South-Central and Eastern Newfoundland, October, 2015.

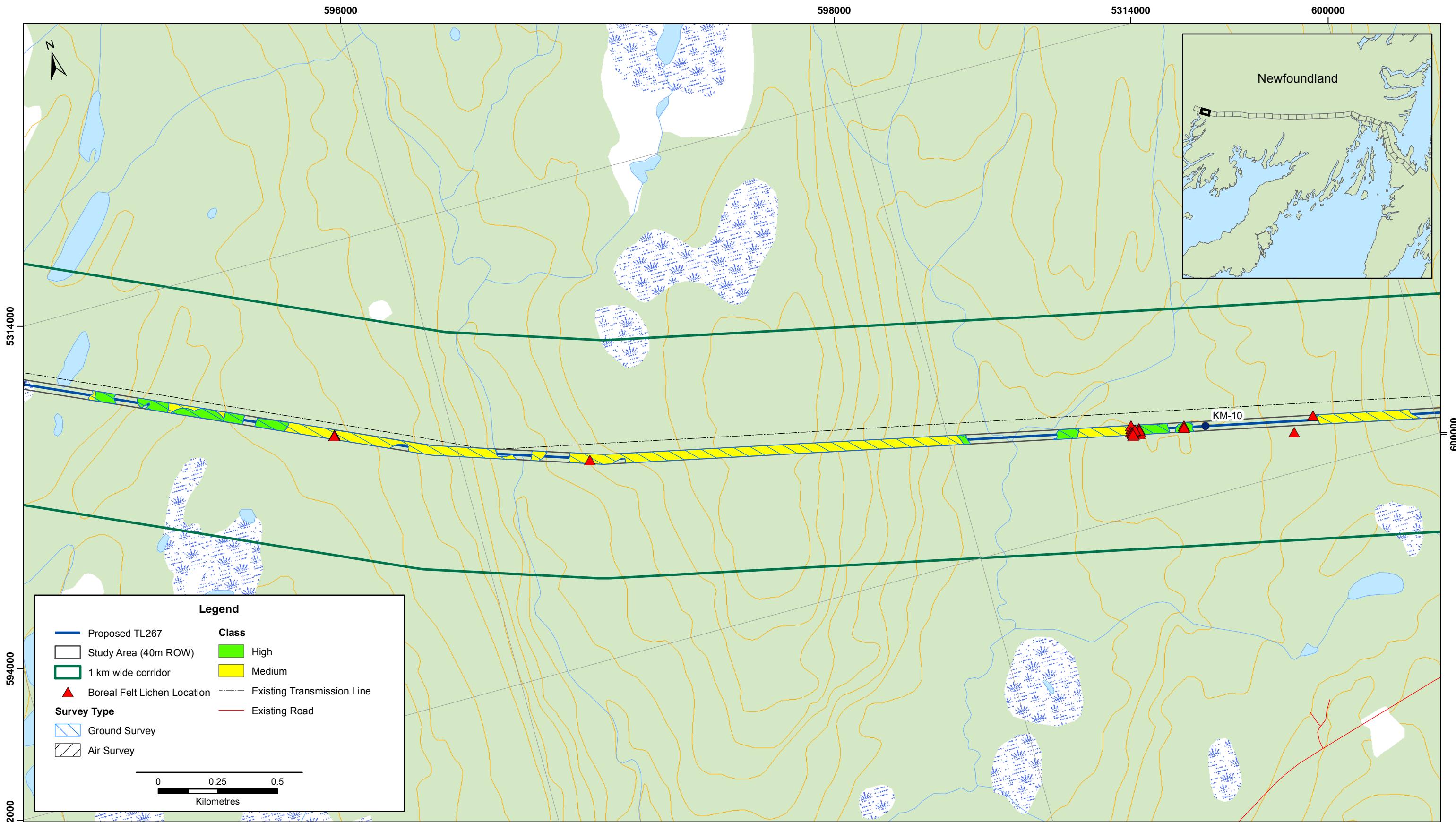
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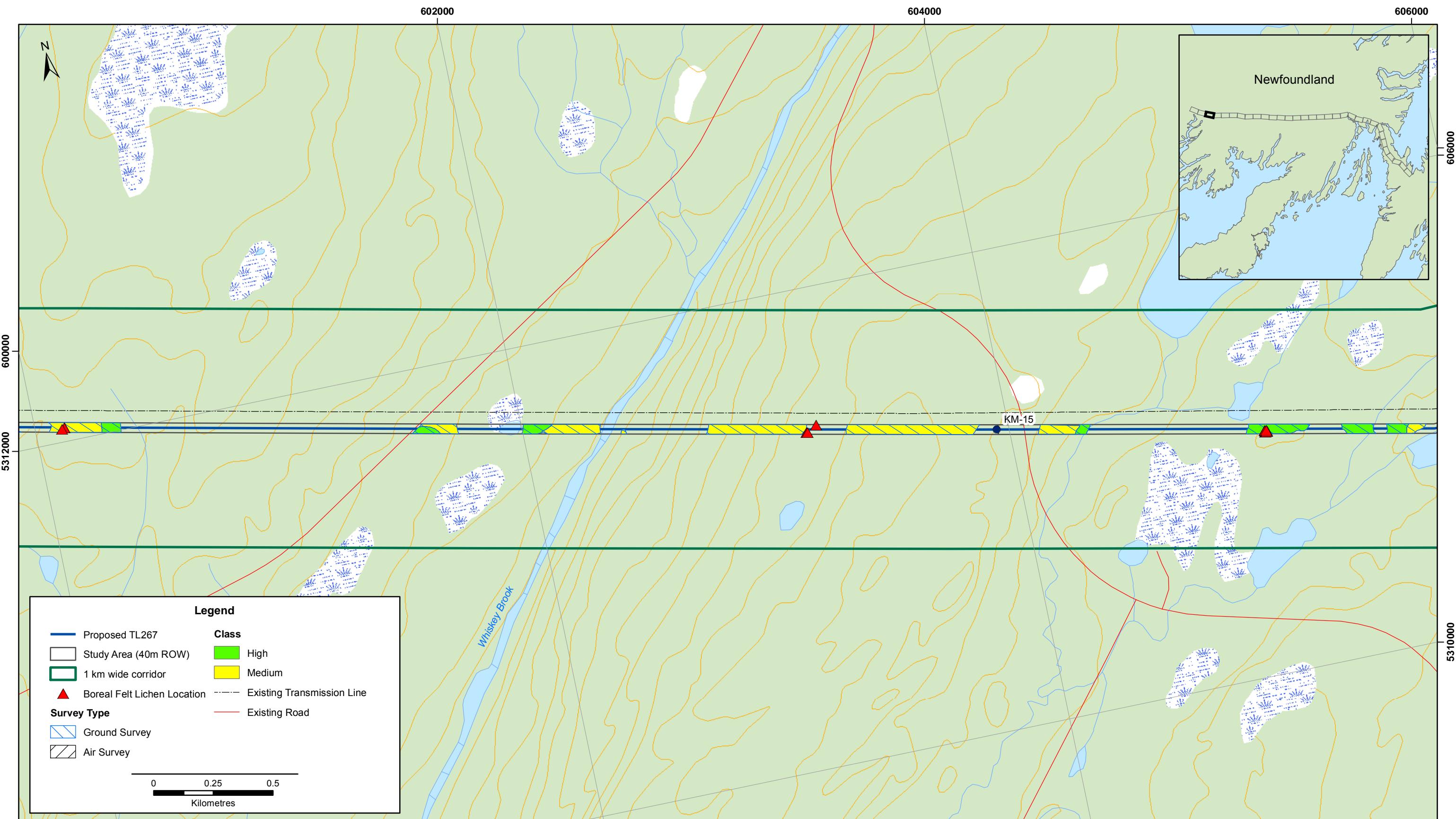
APPENDIX A
Map/Data Package





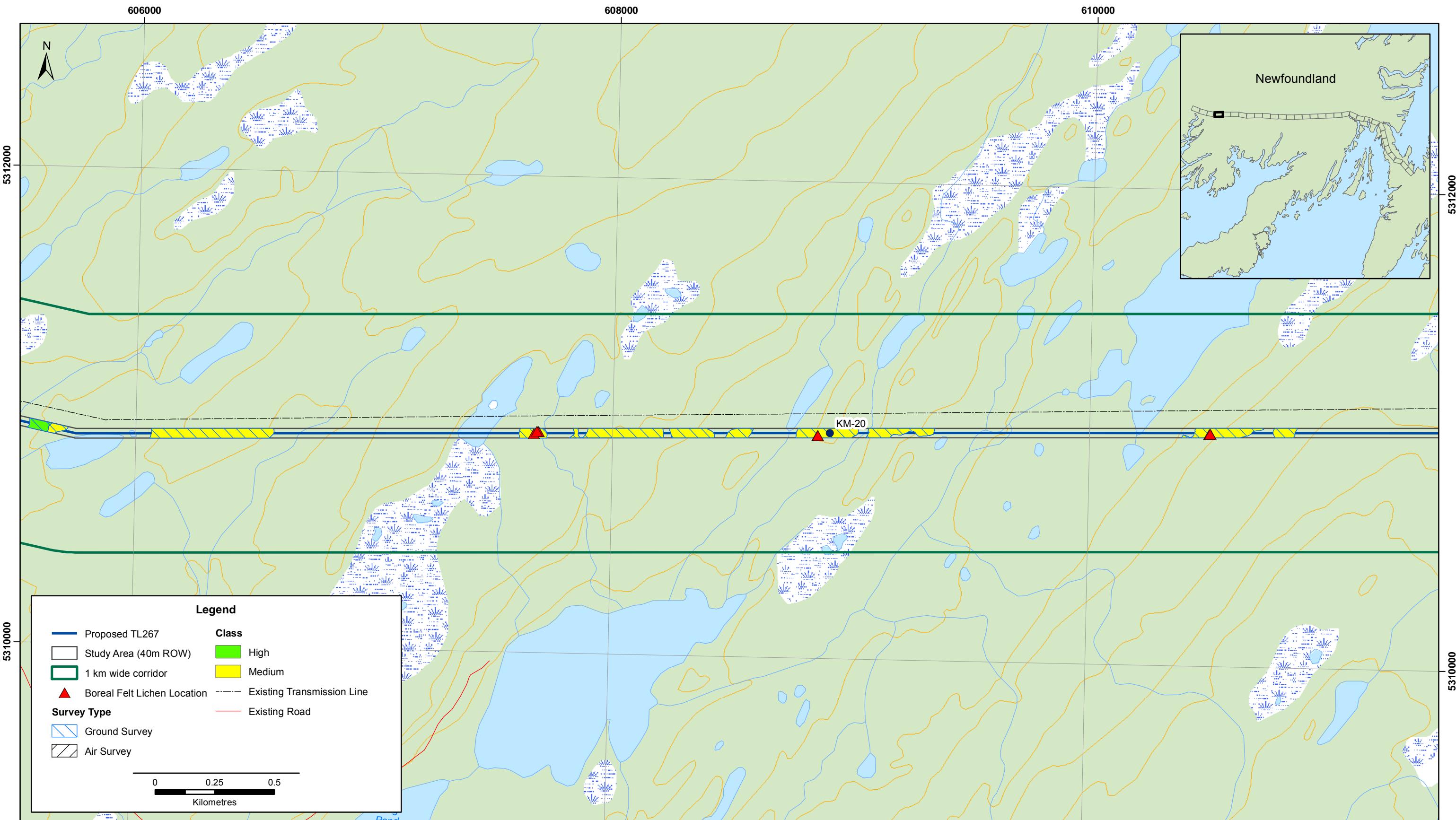
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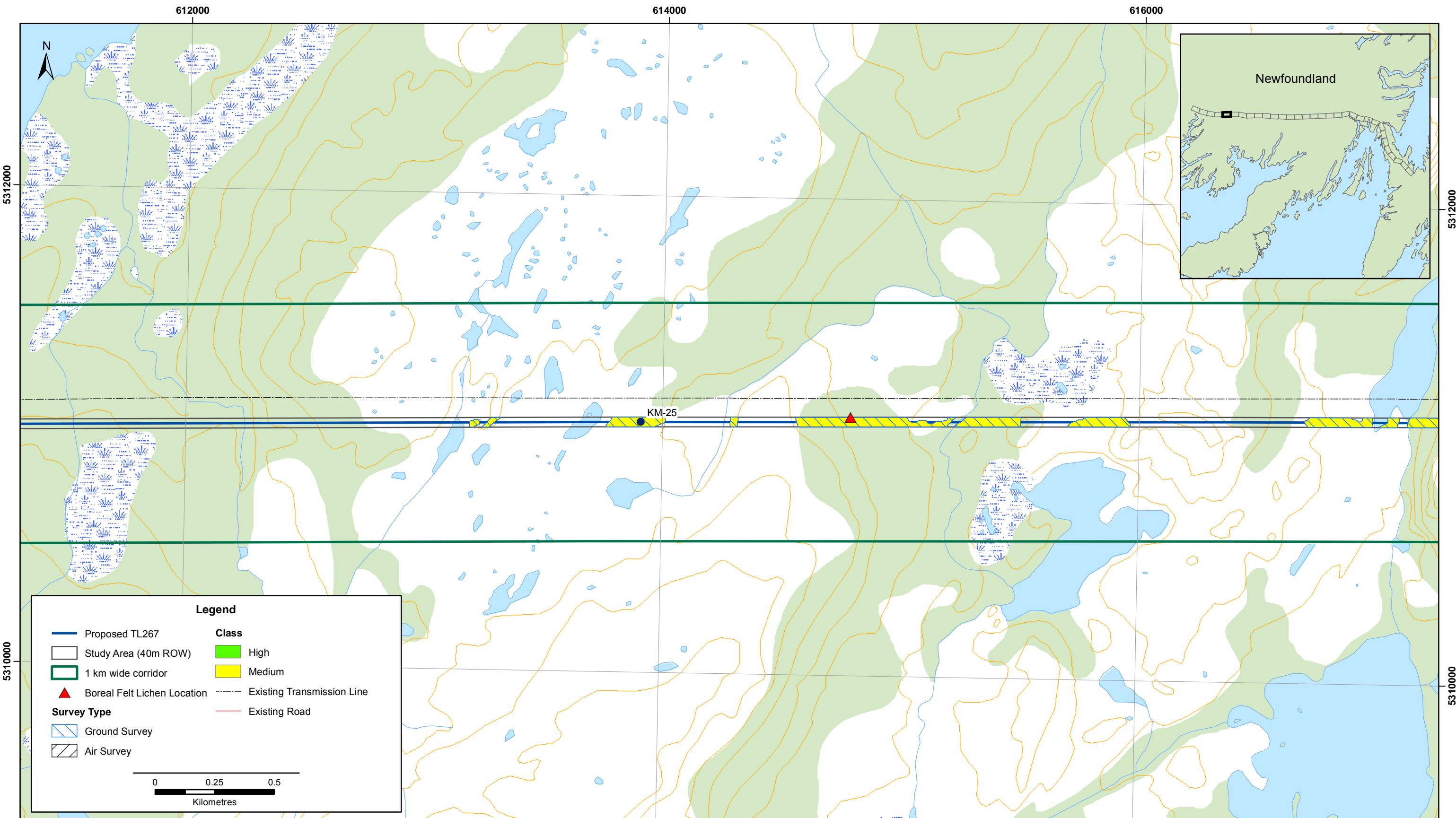
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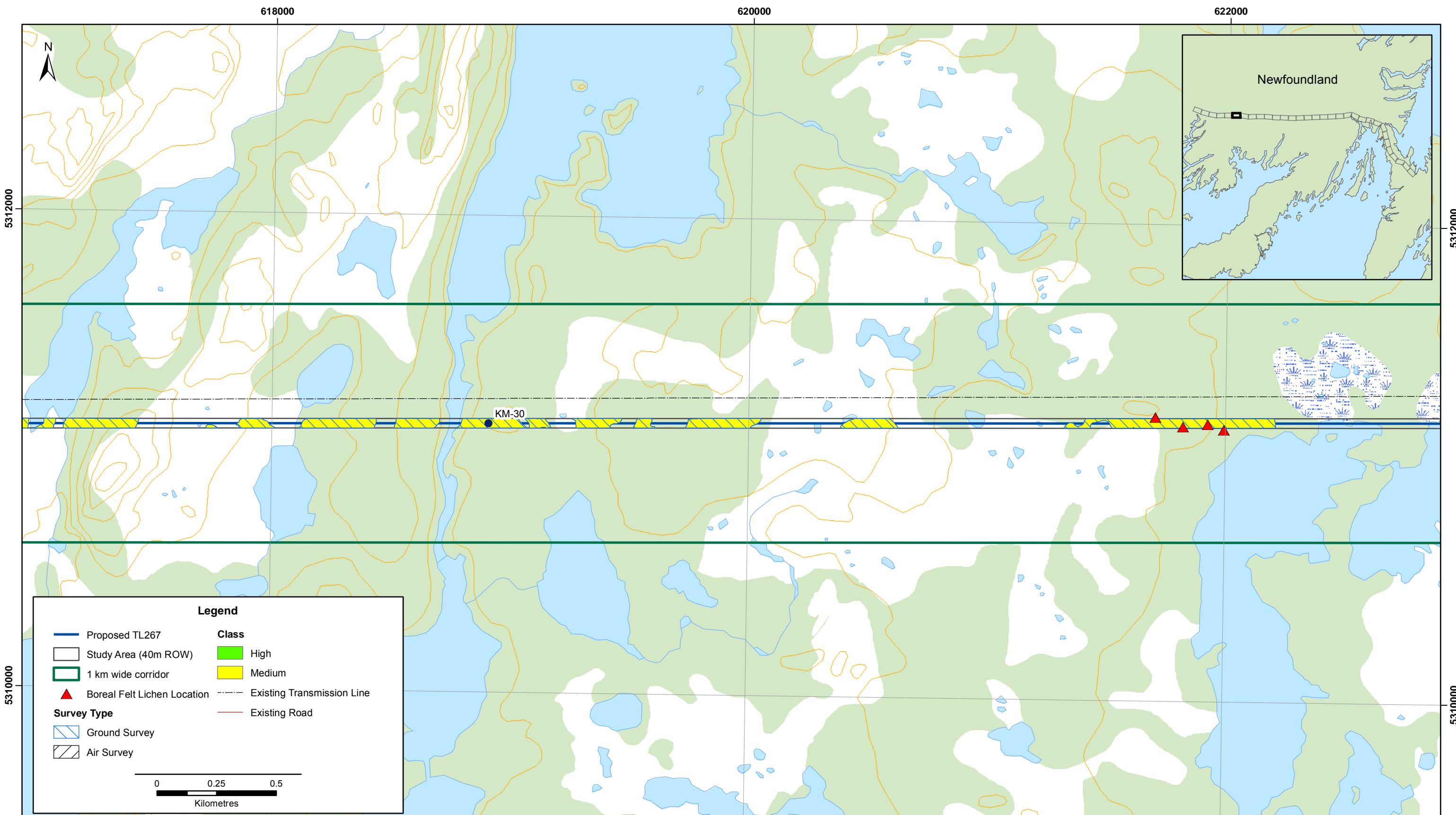


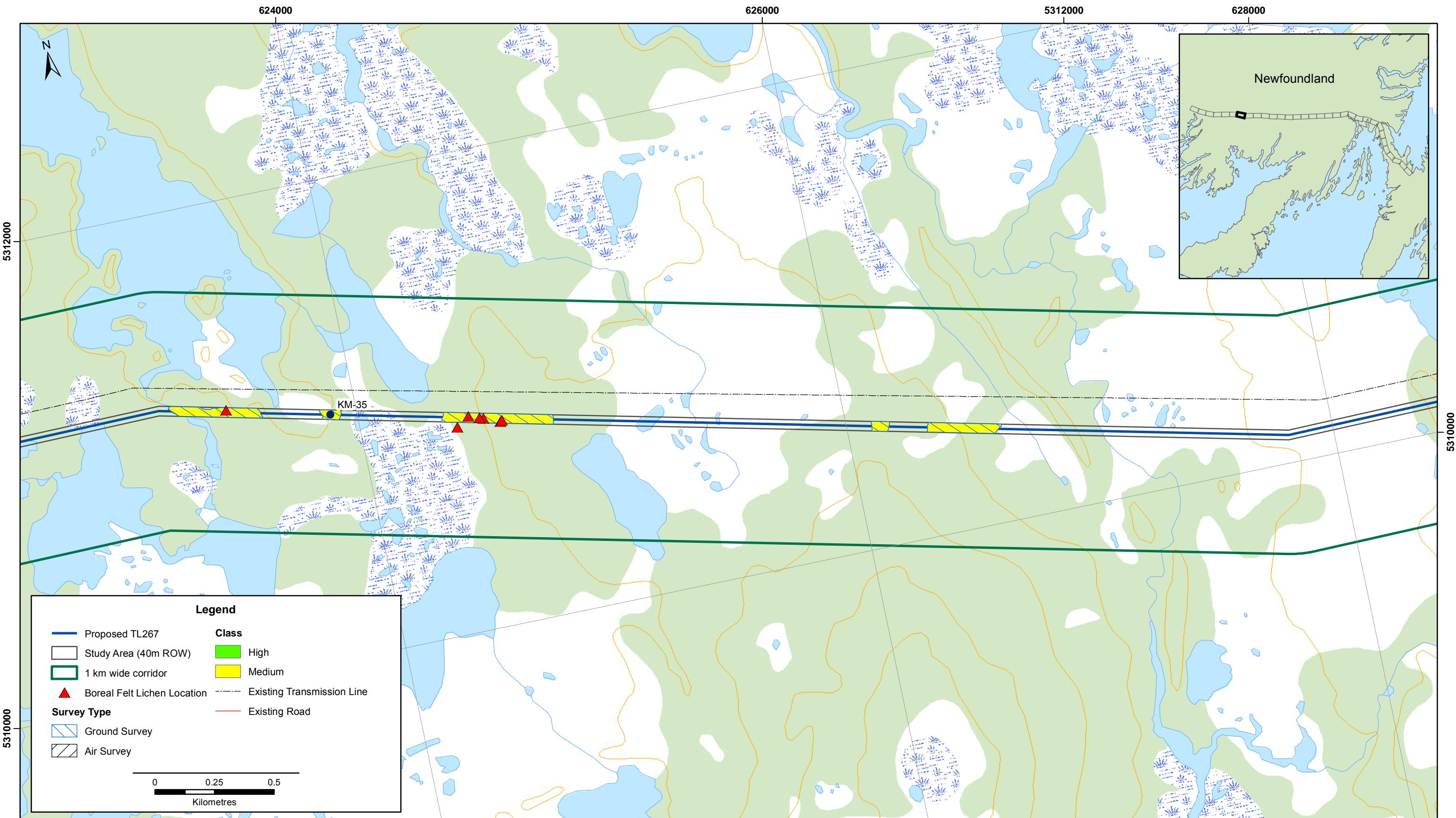
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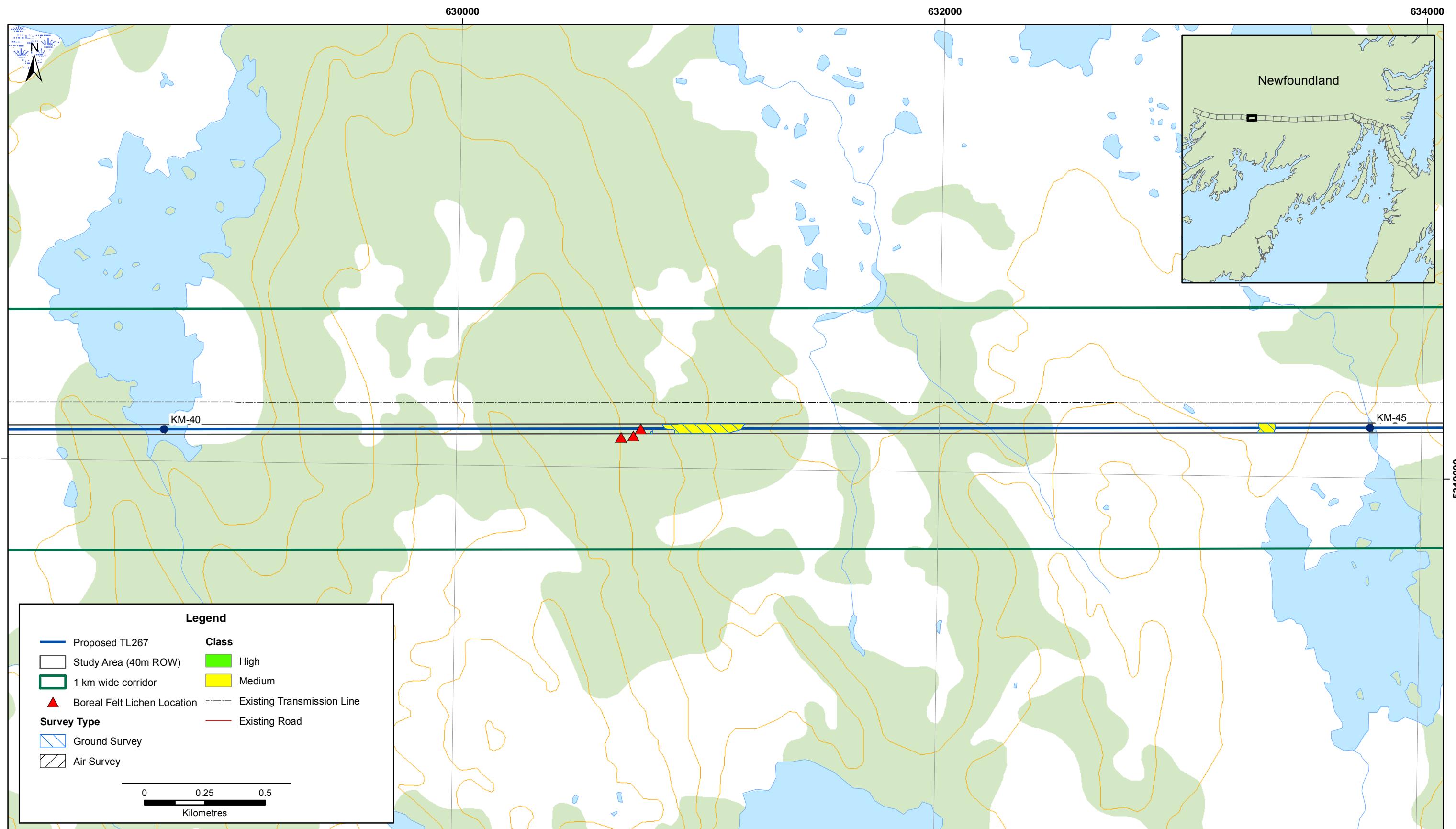
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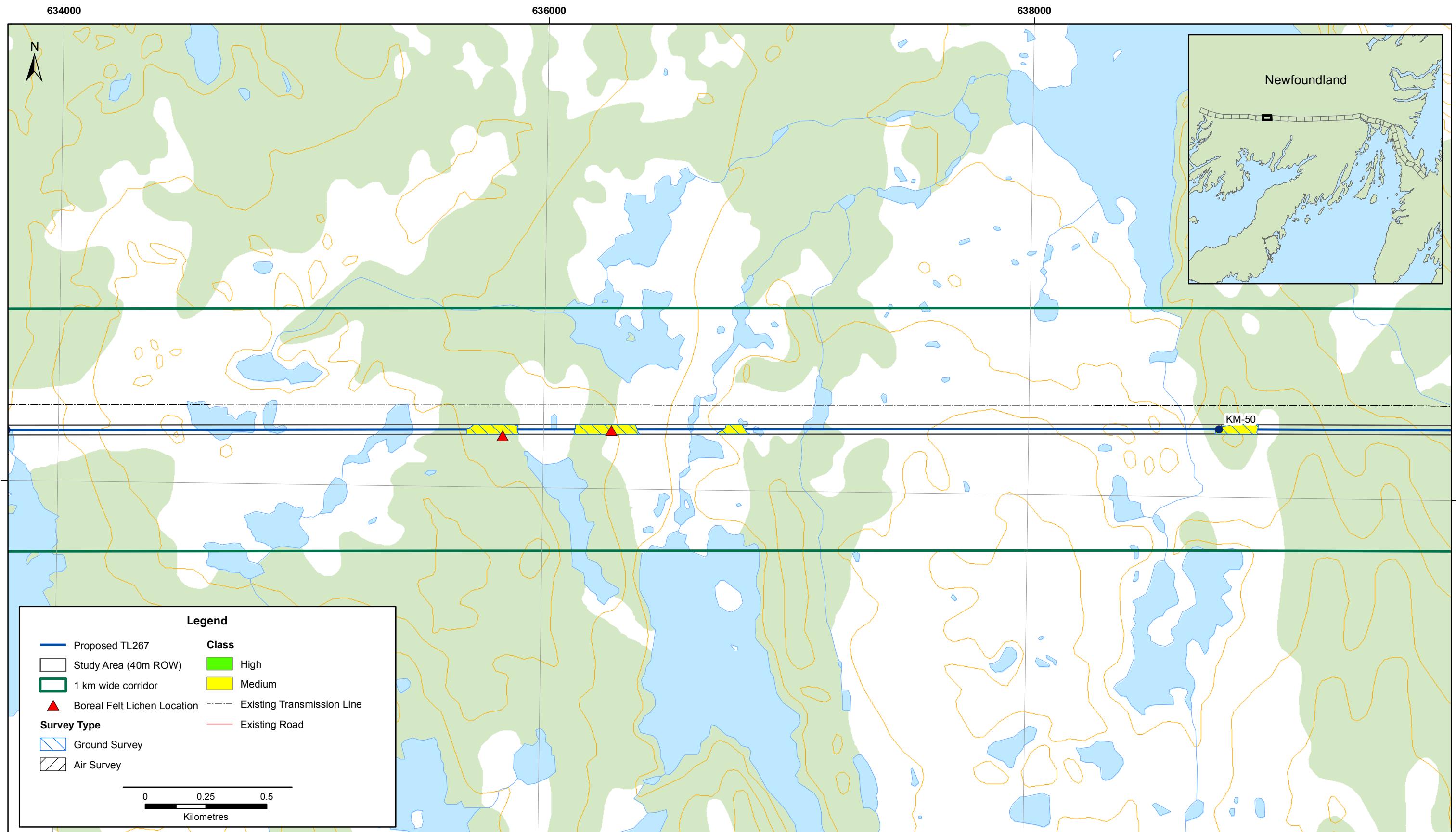






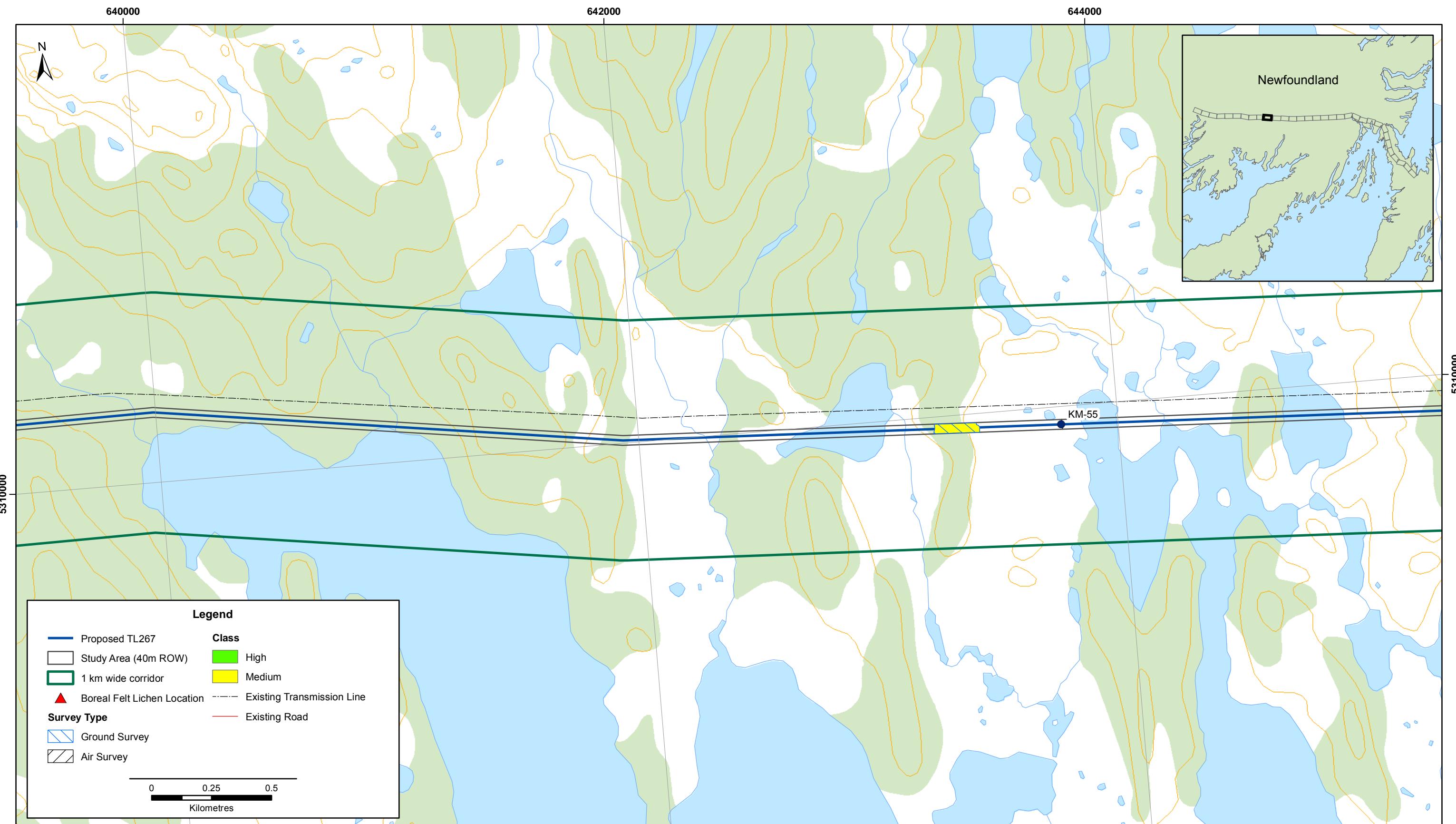


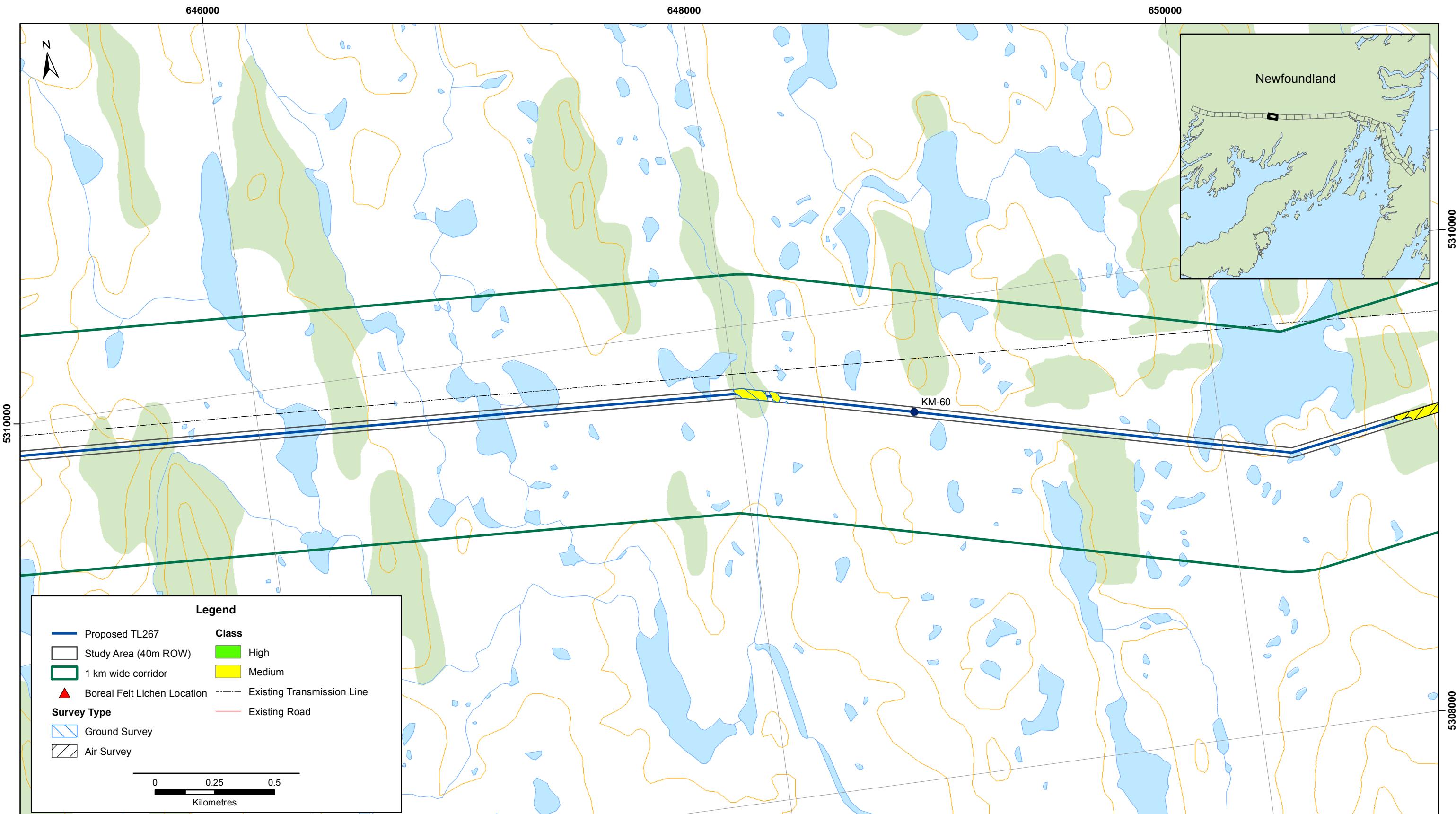


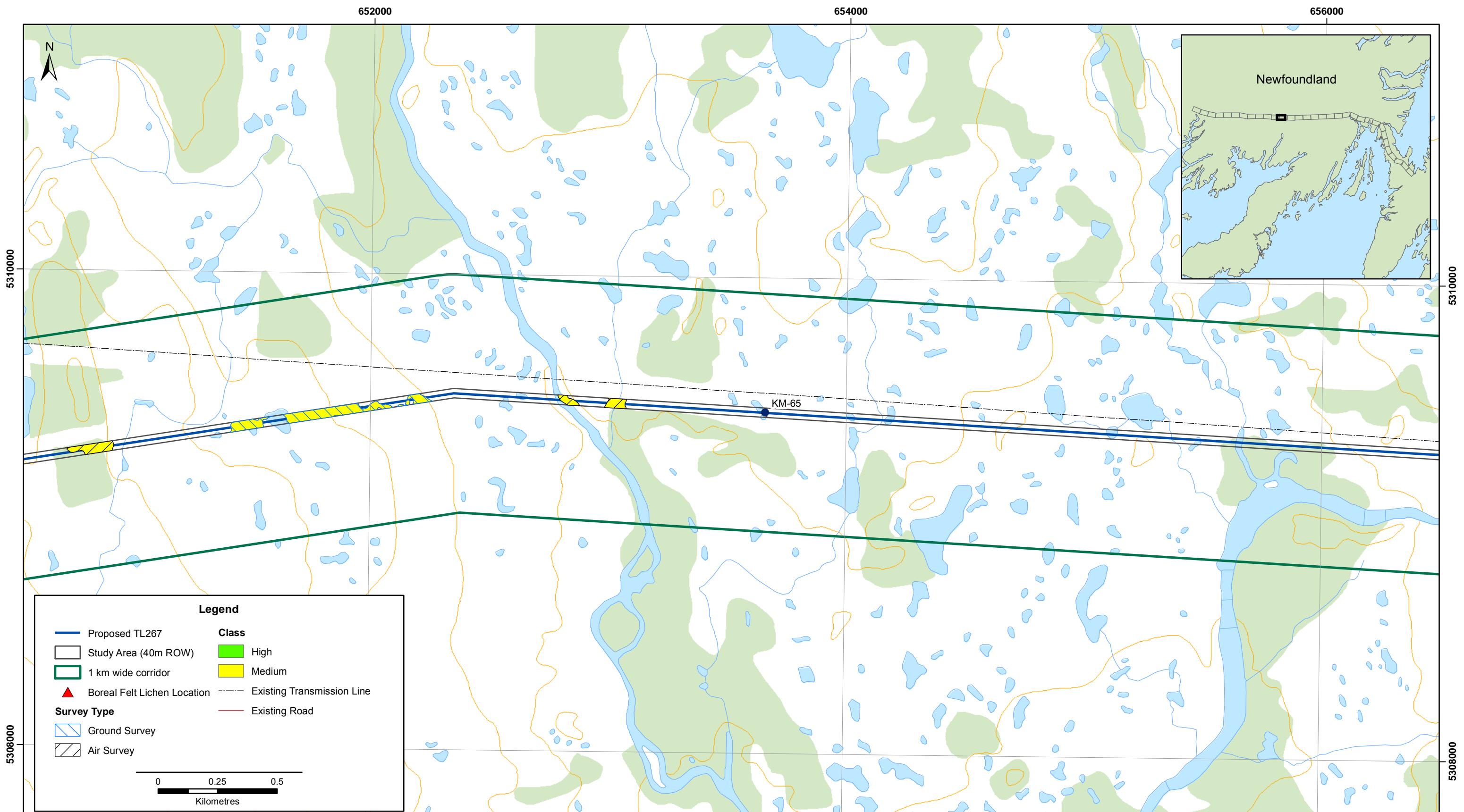


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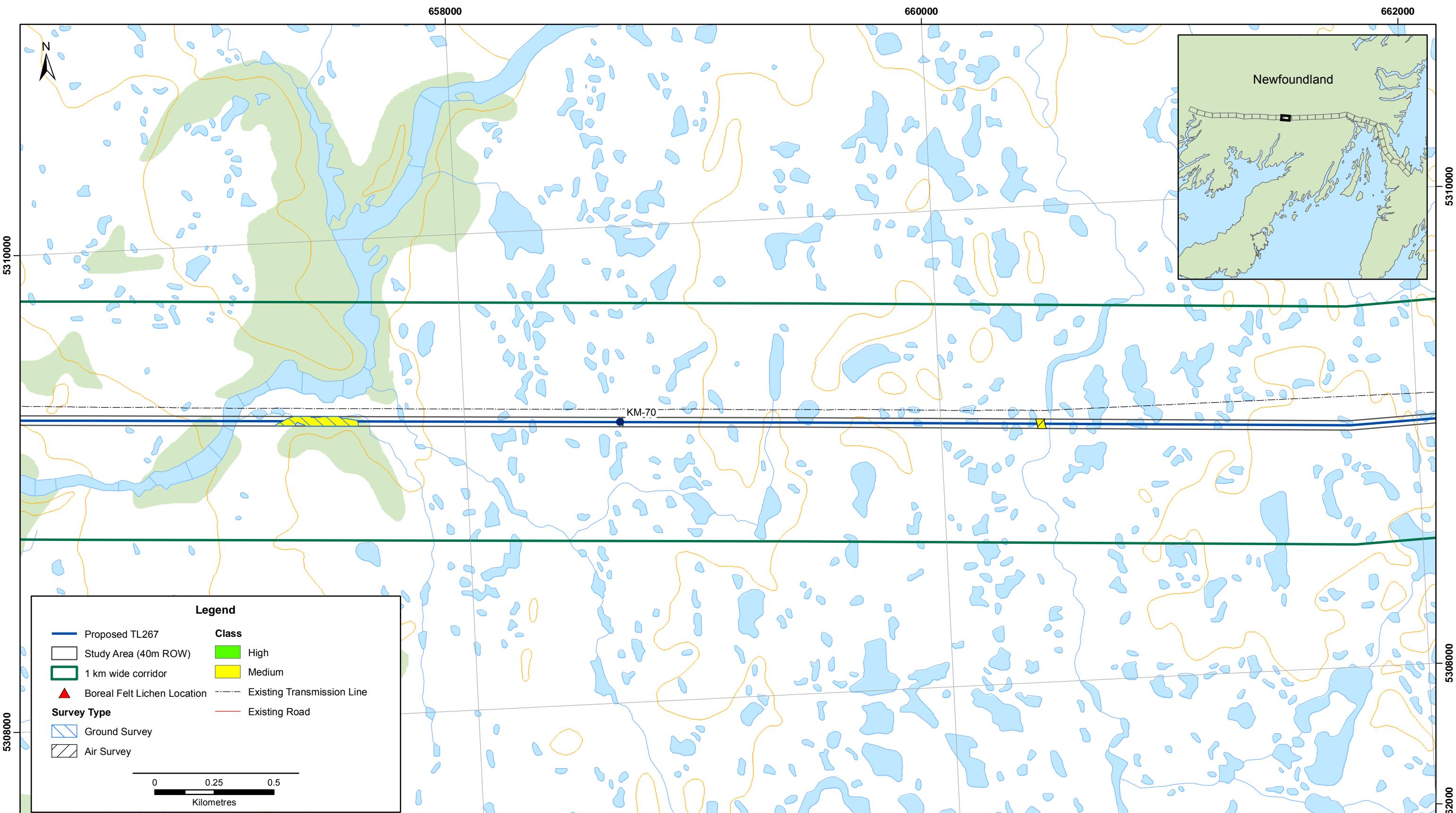


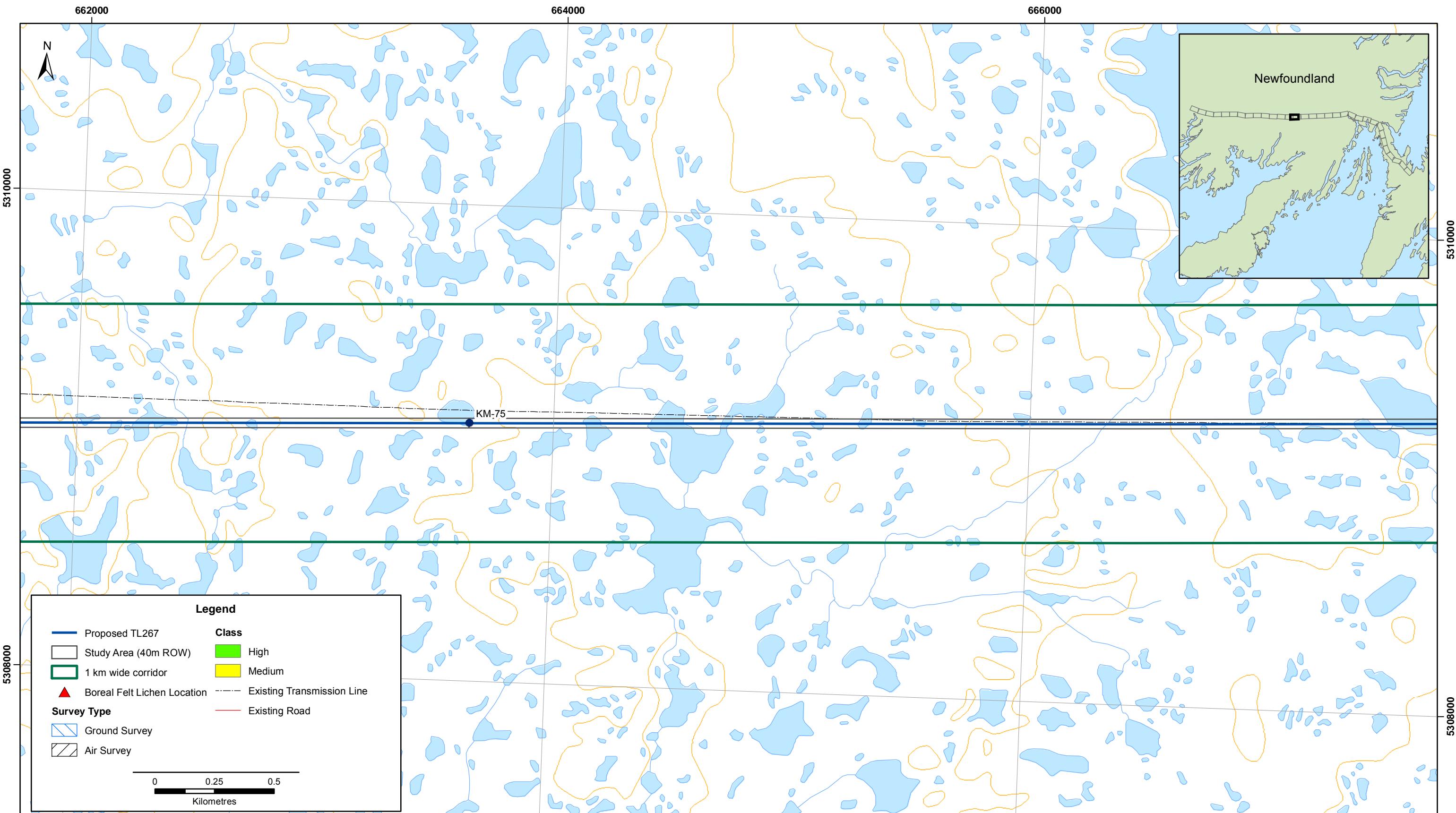


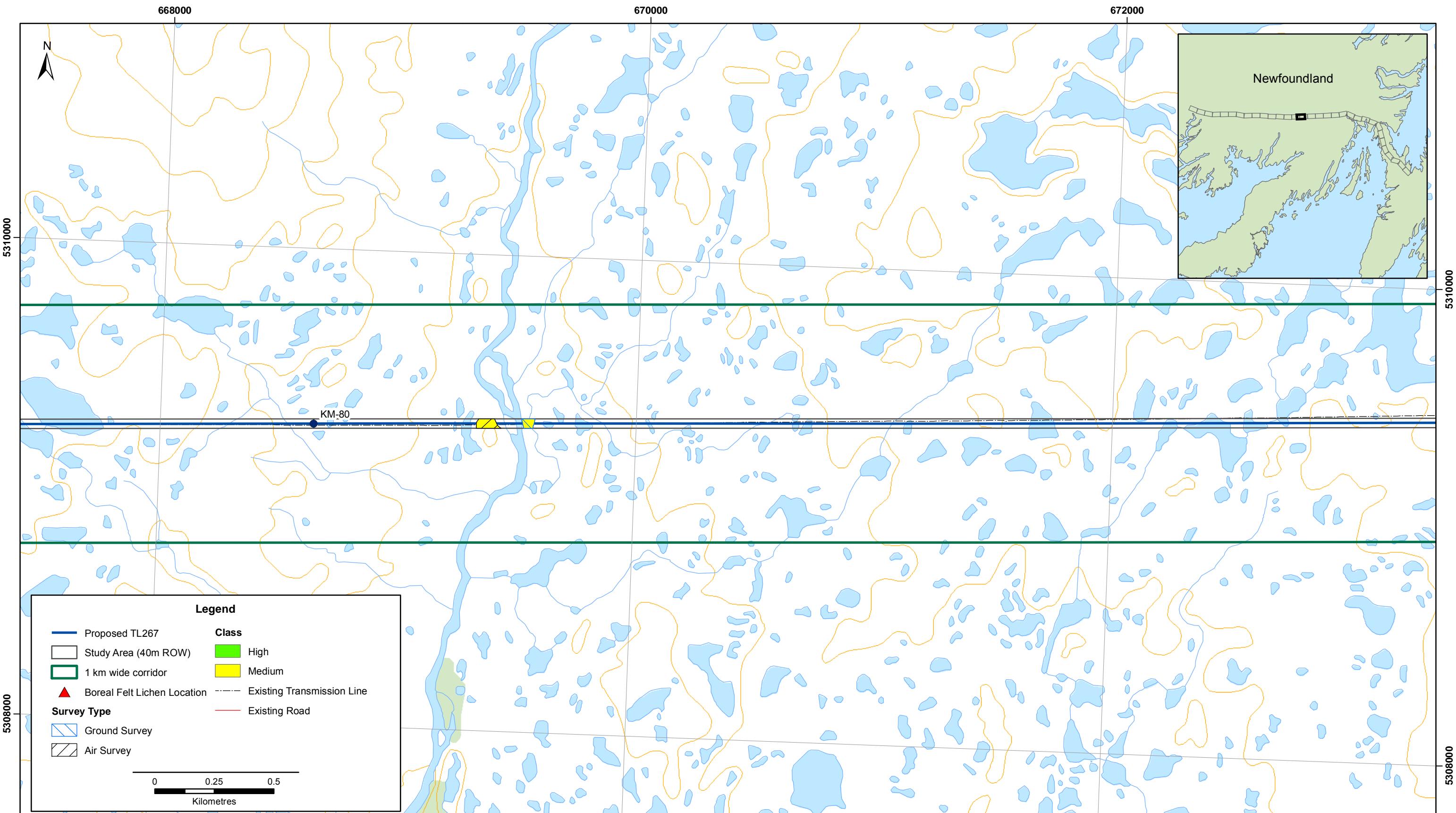


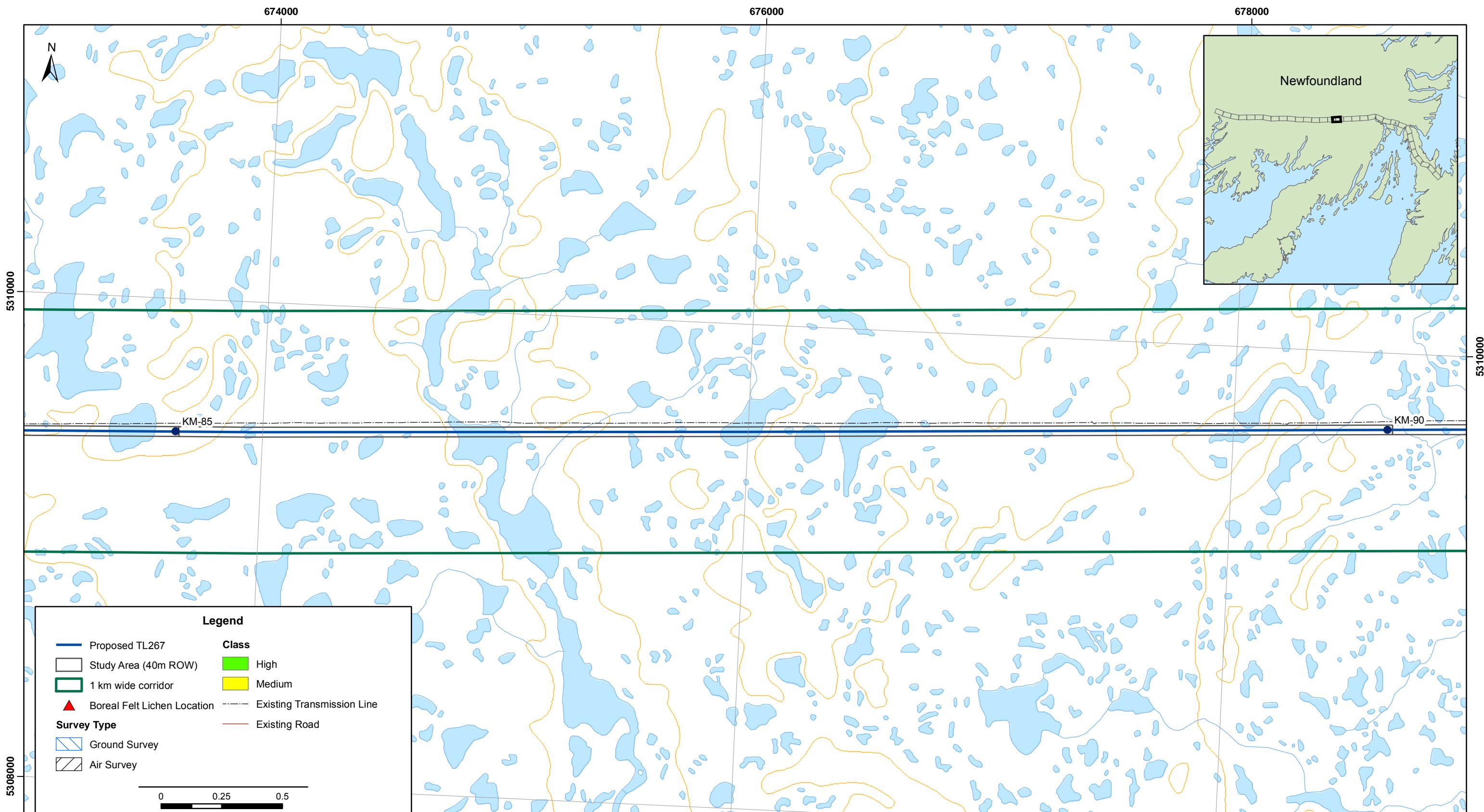
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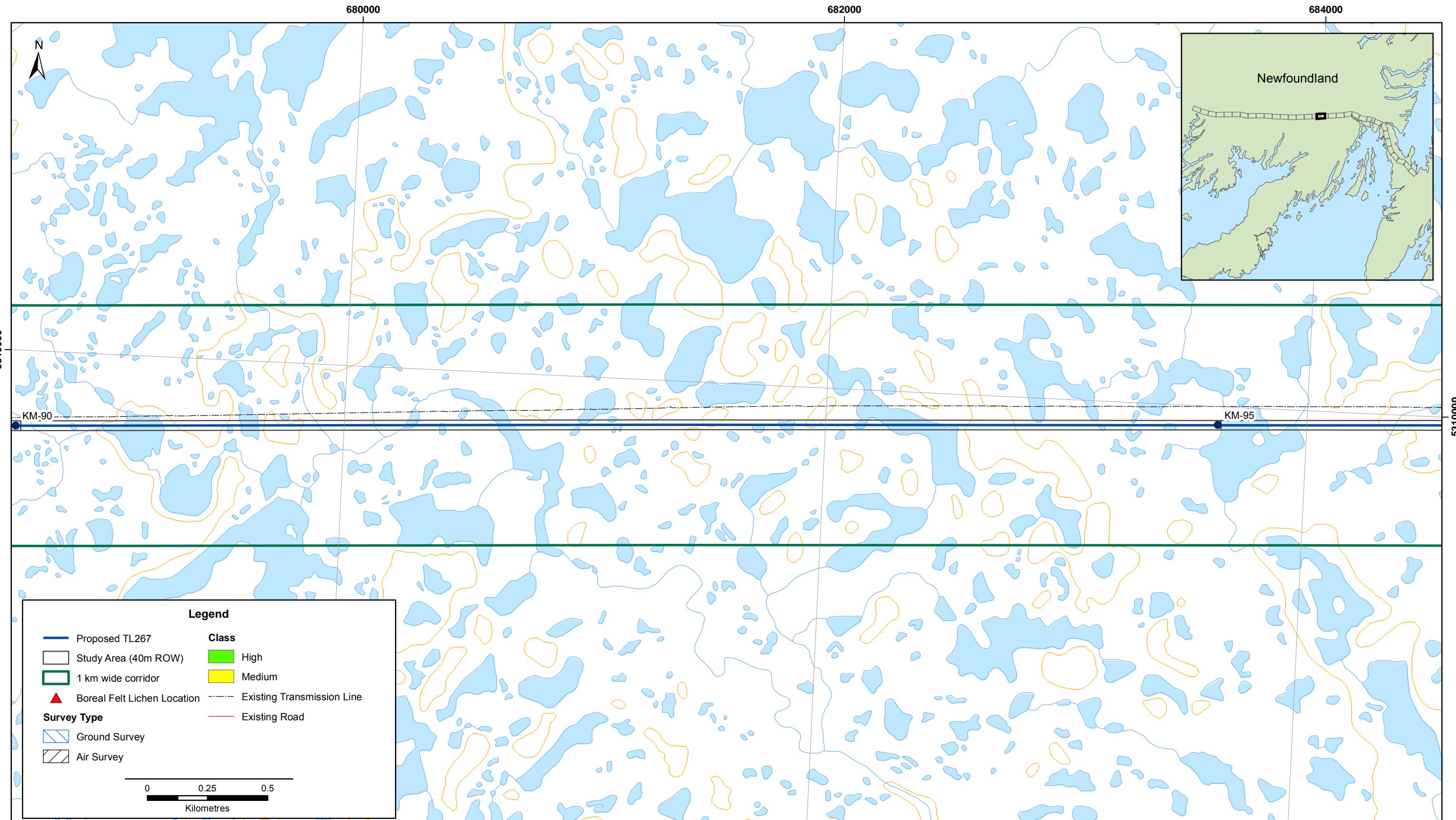
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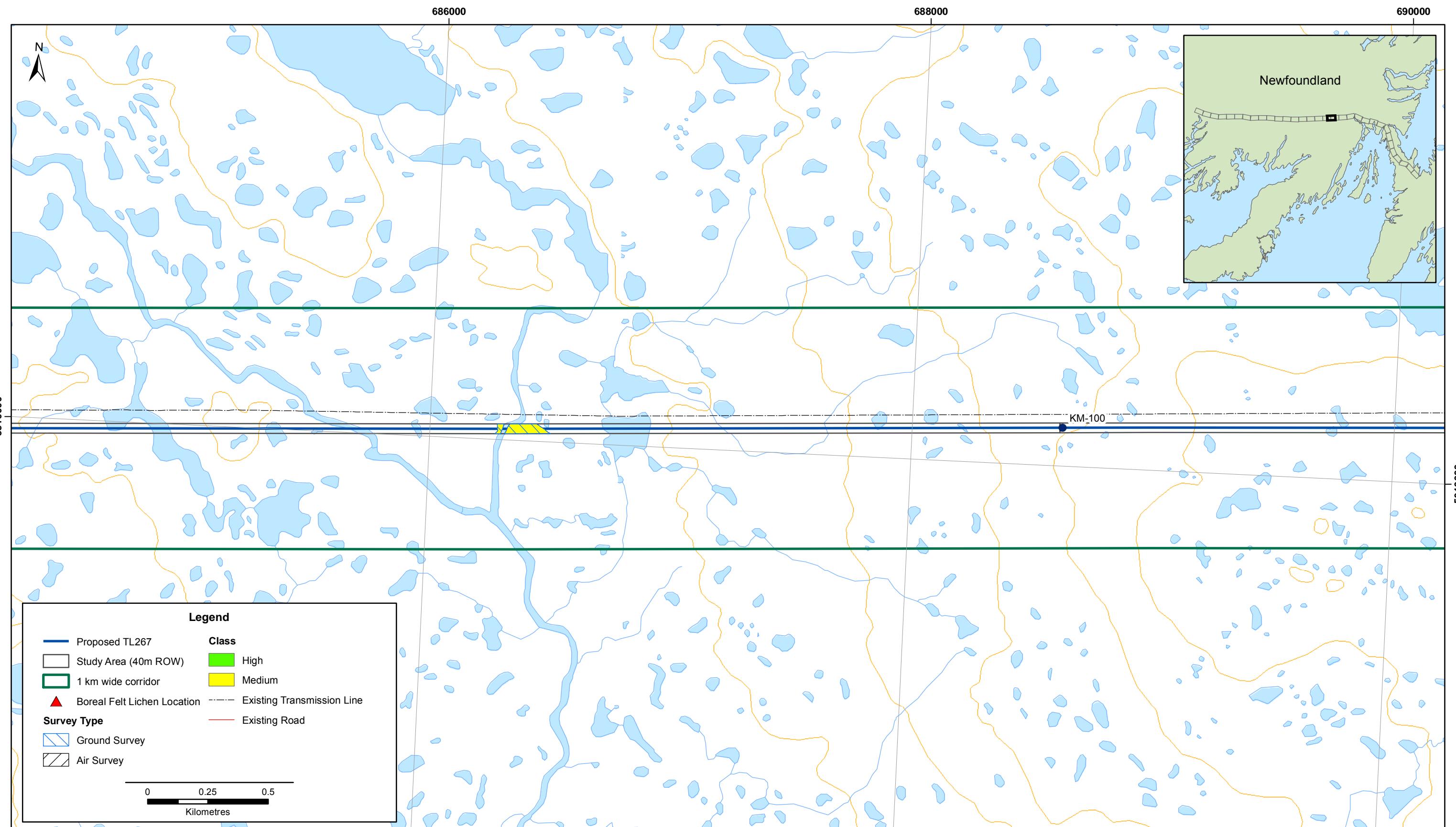






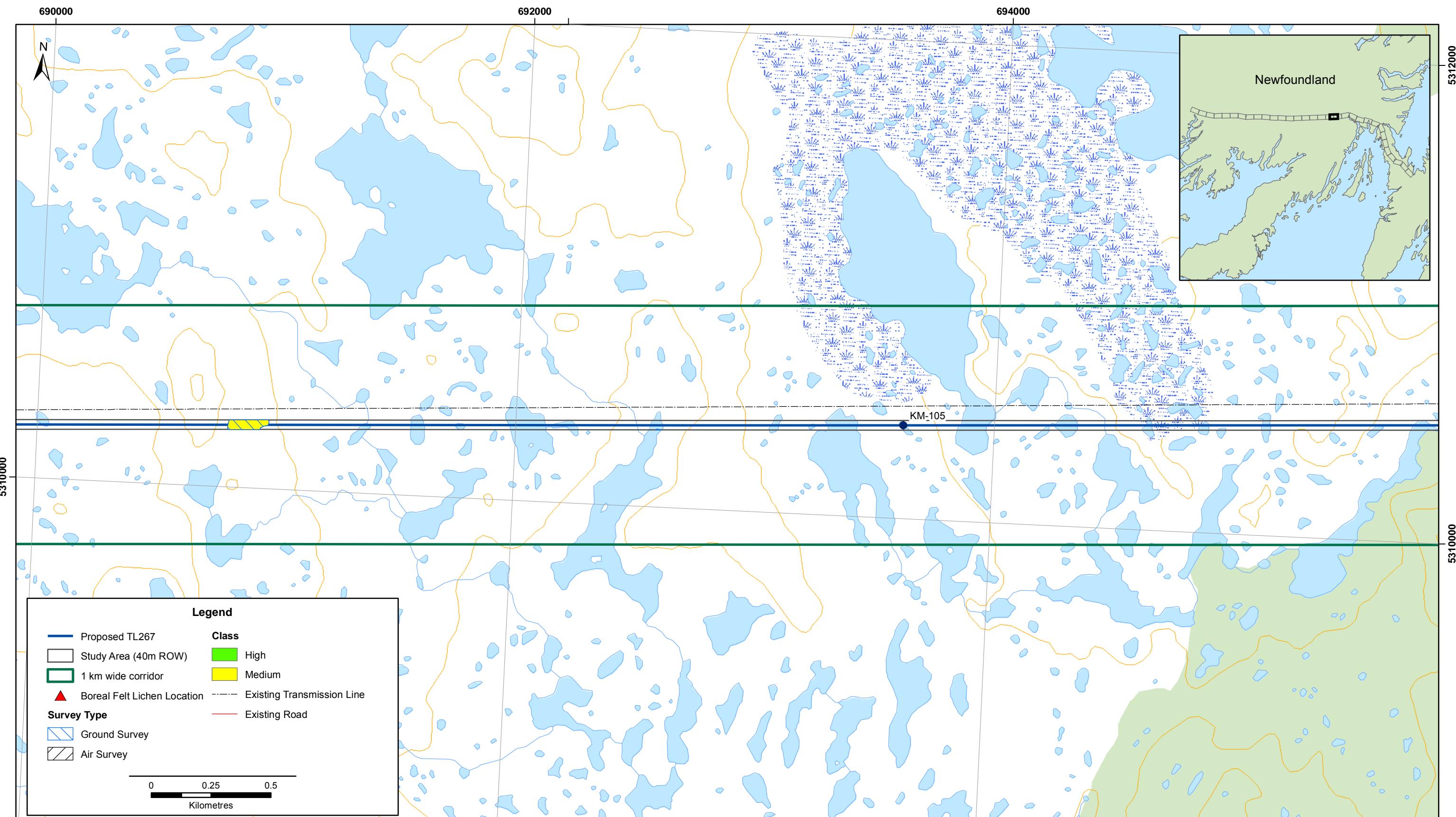


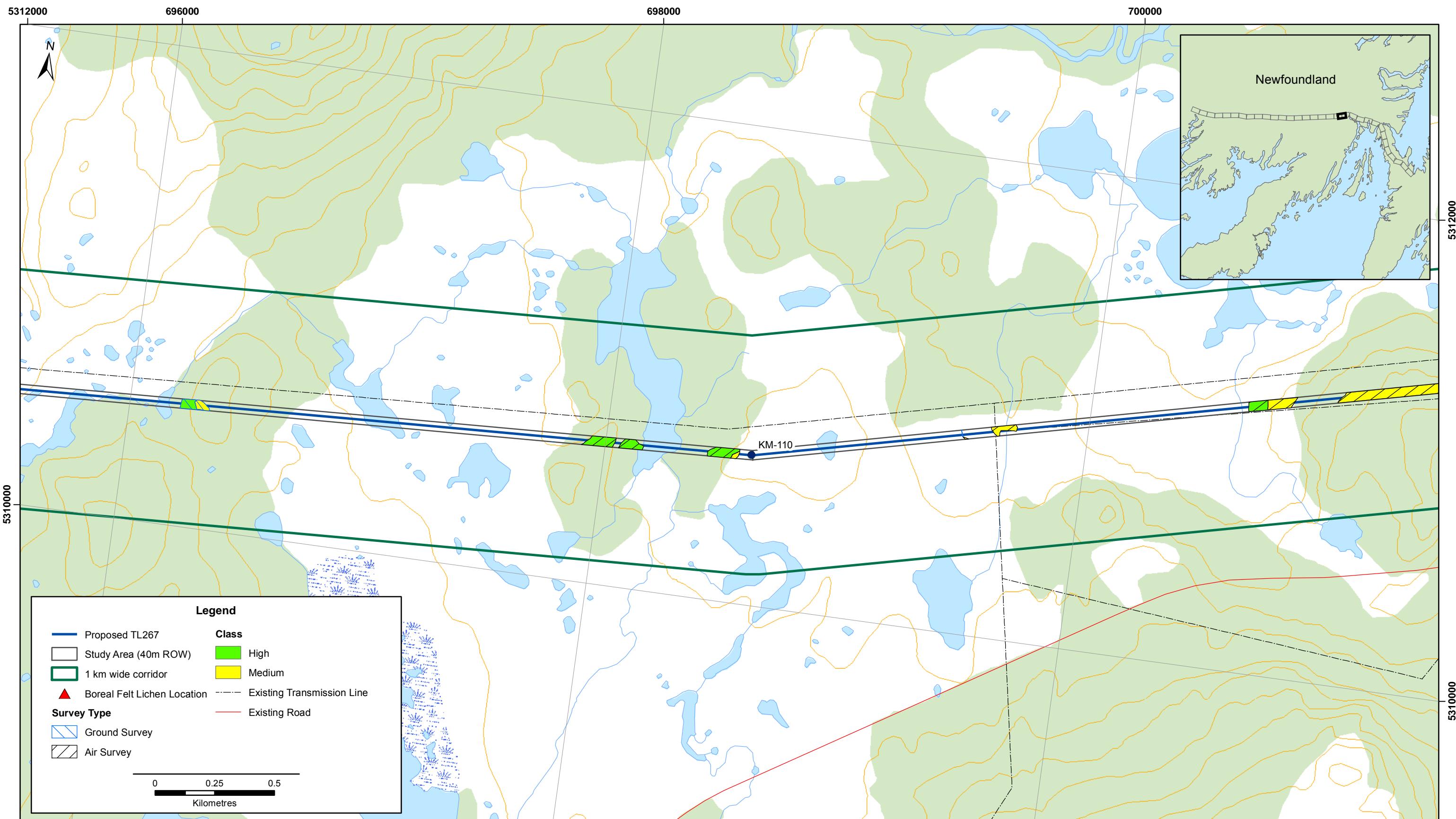


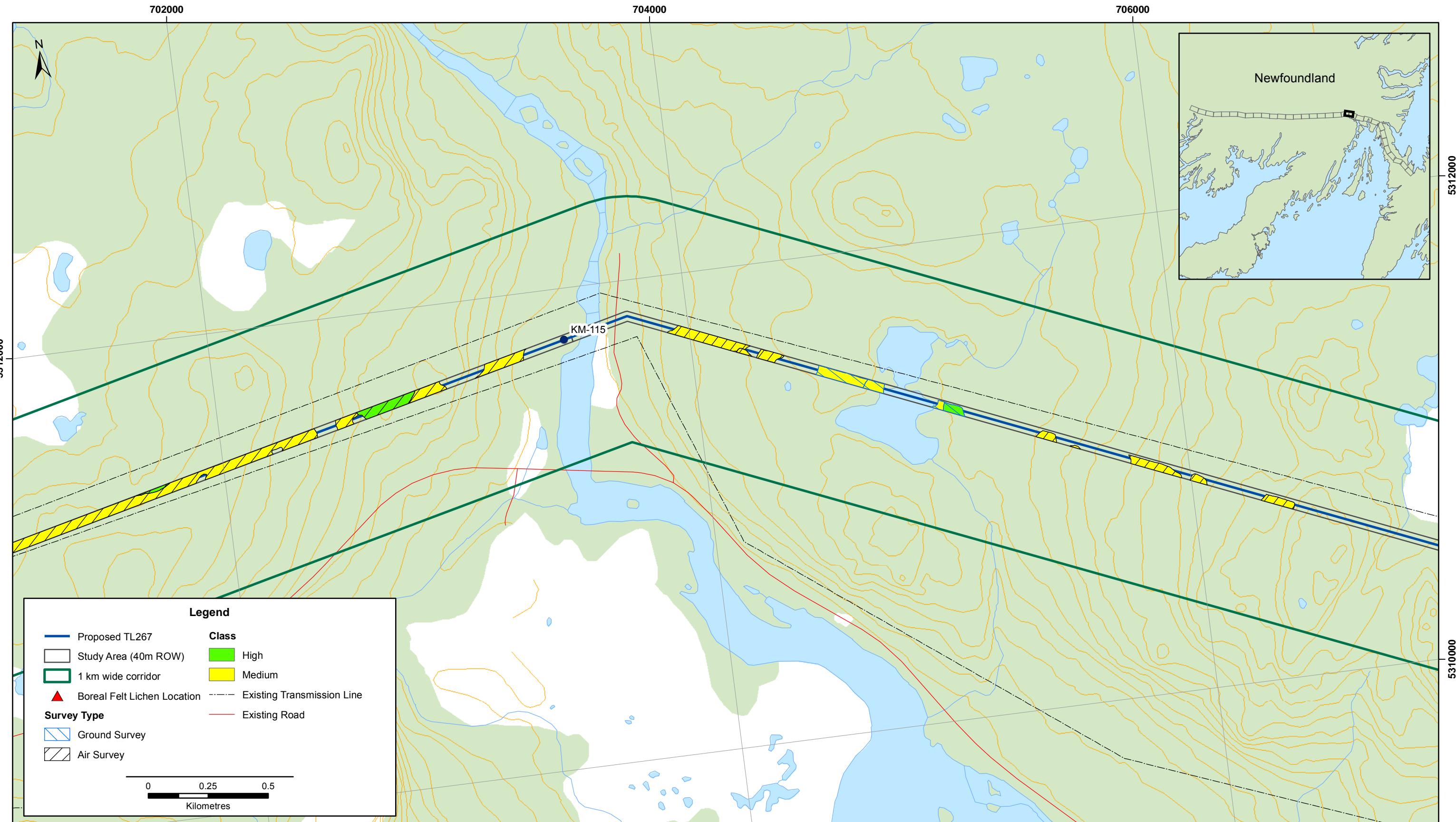


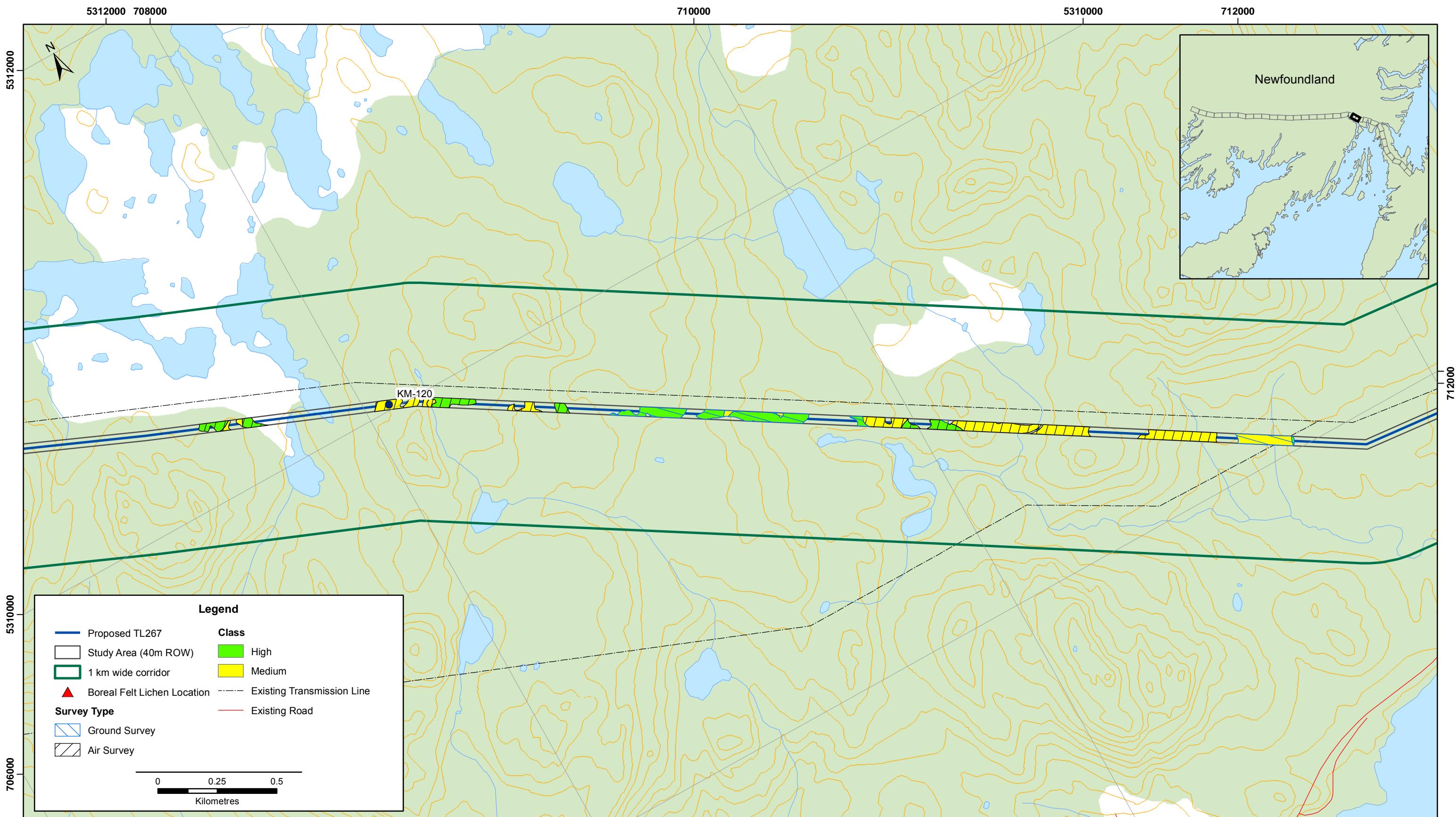
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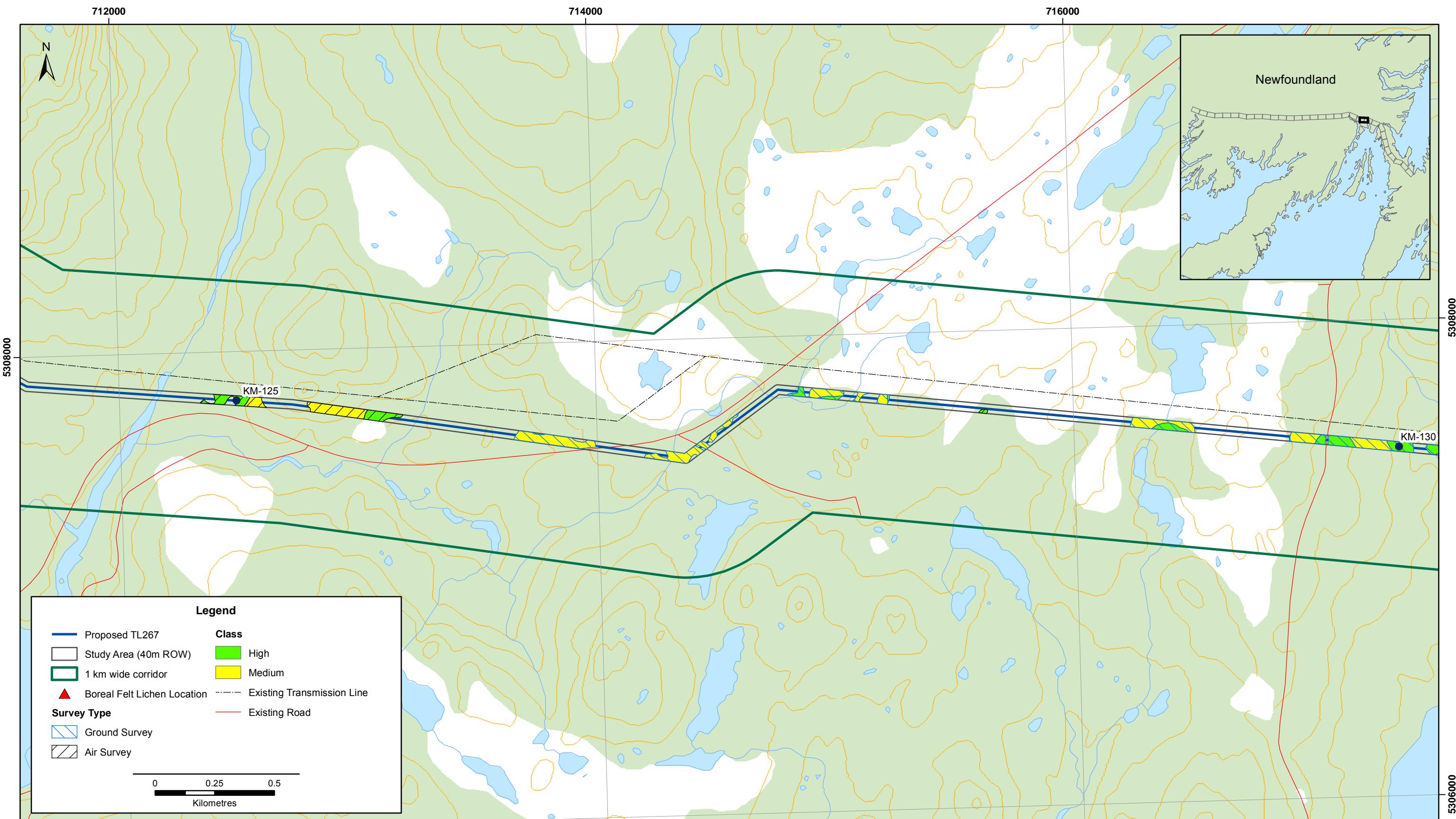
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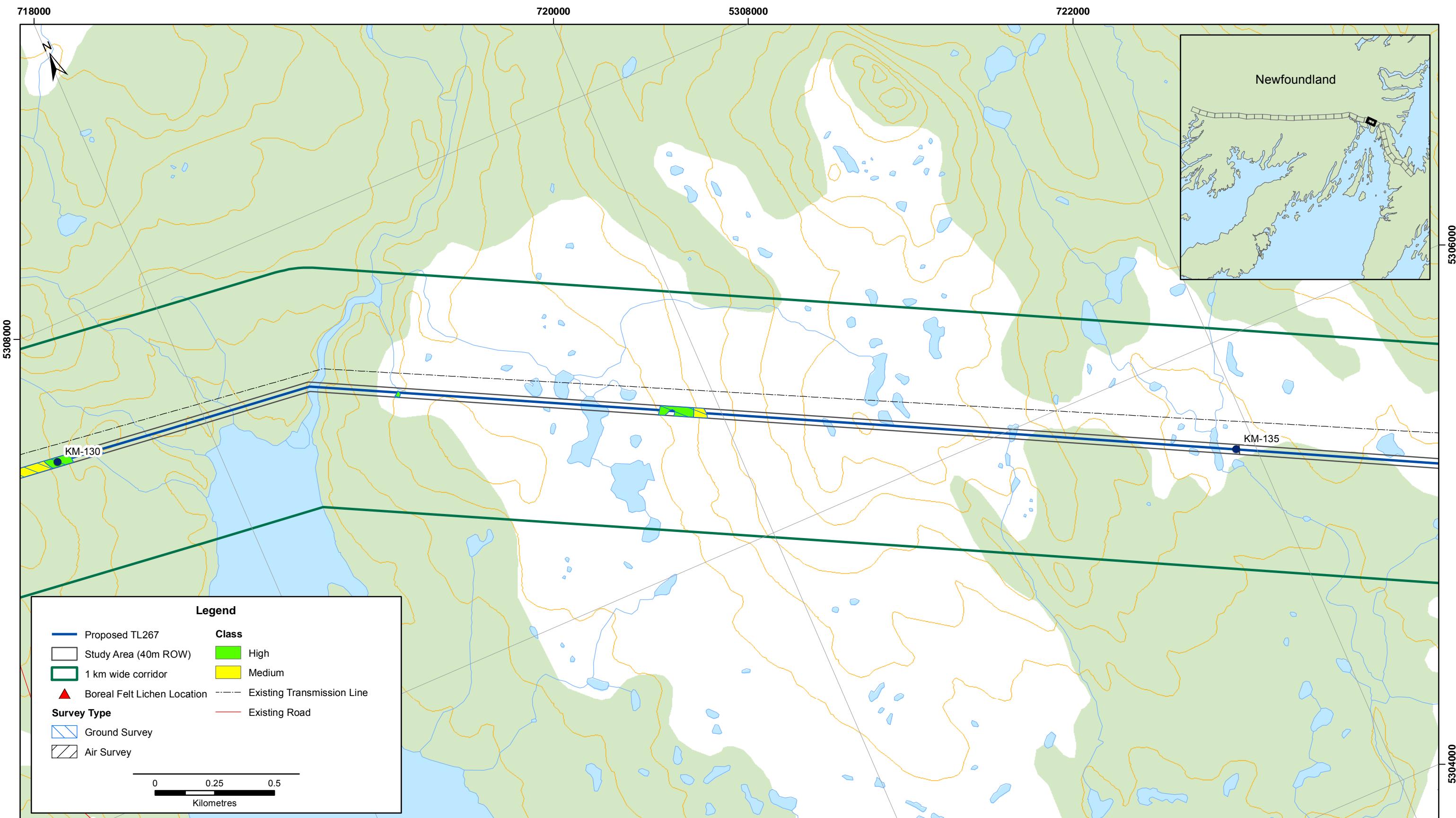


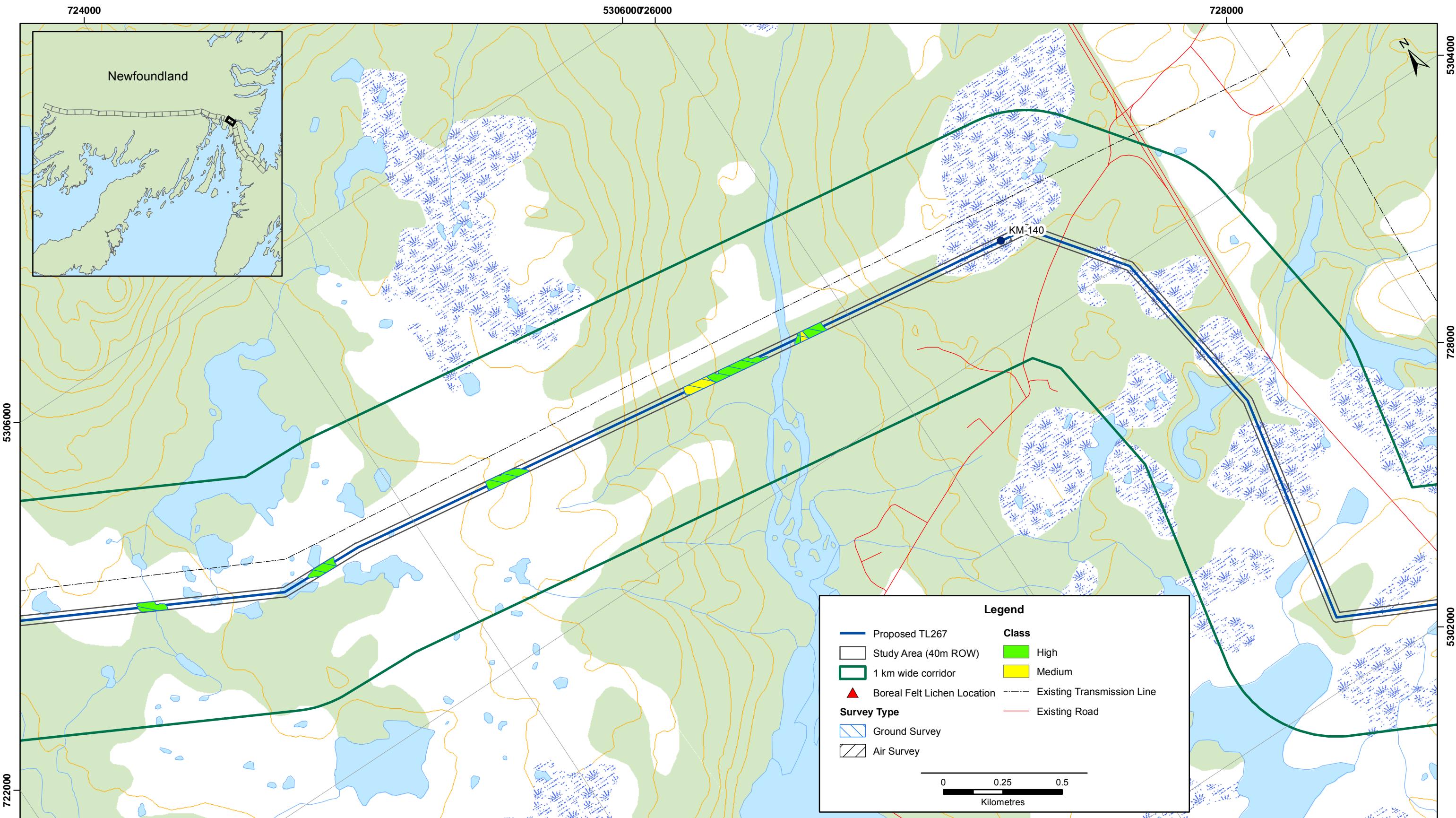


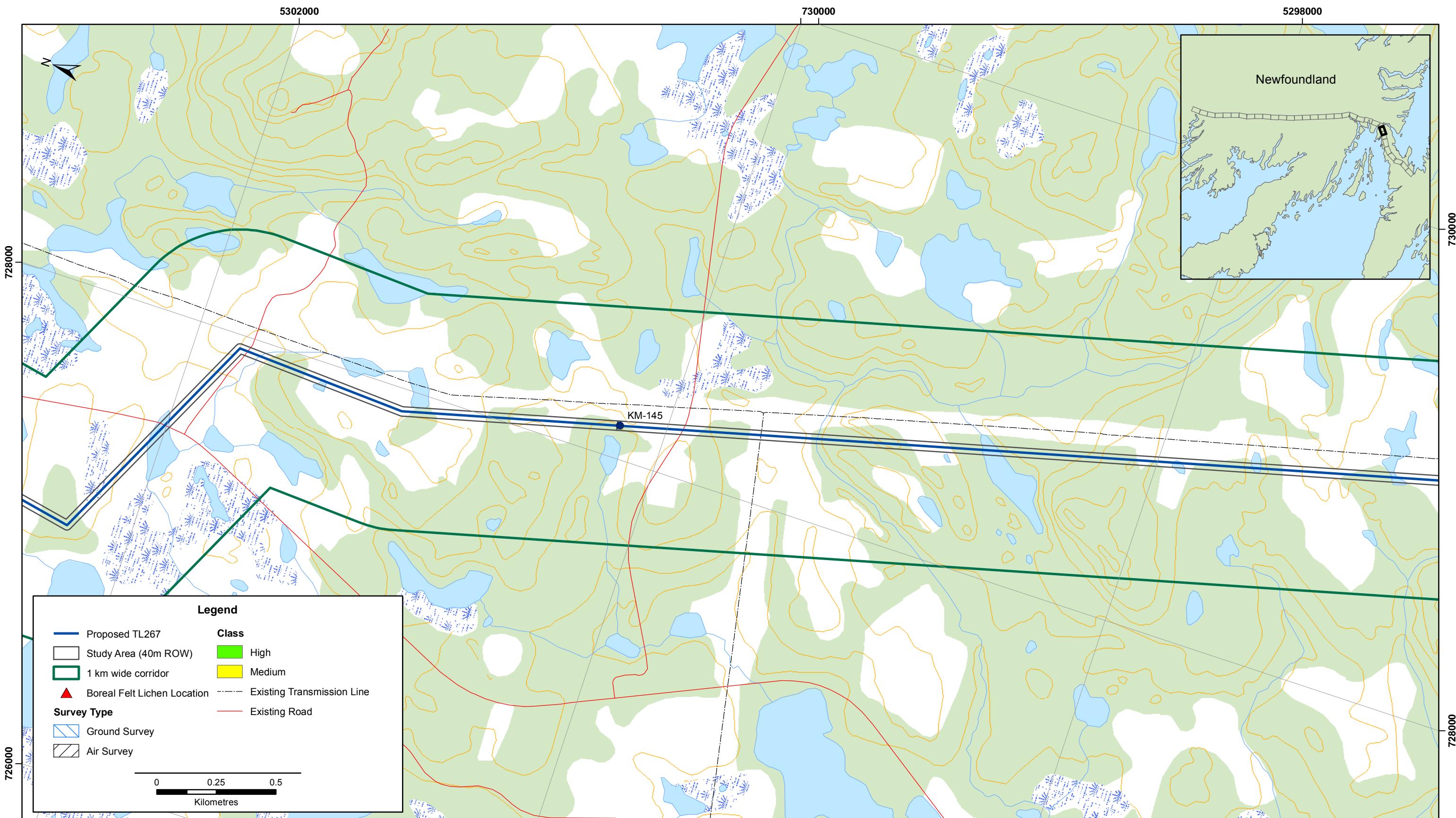


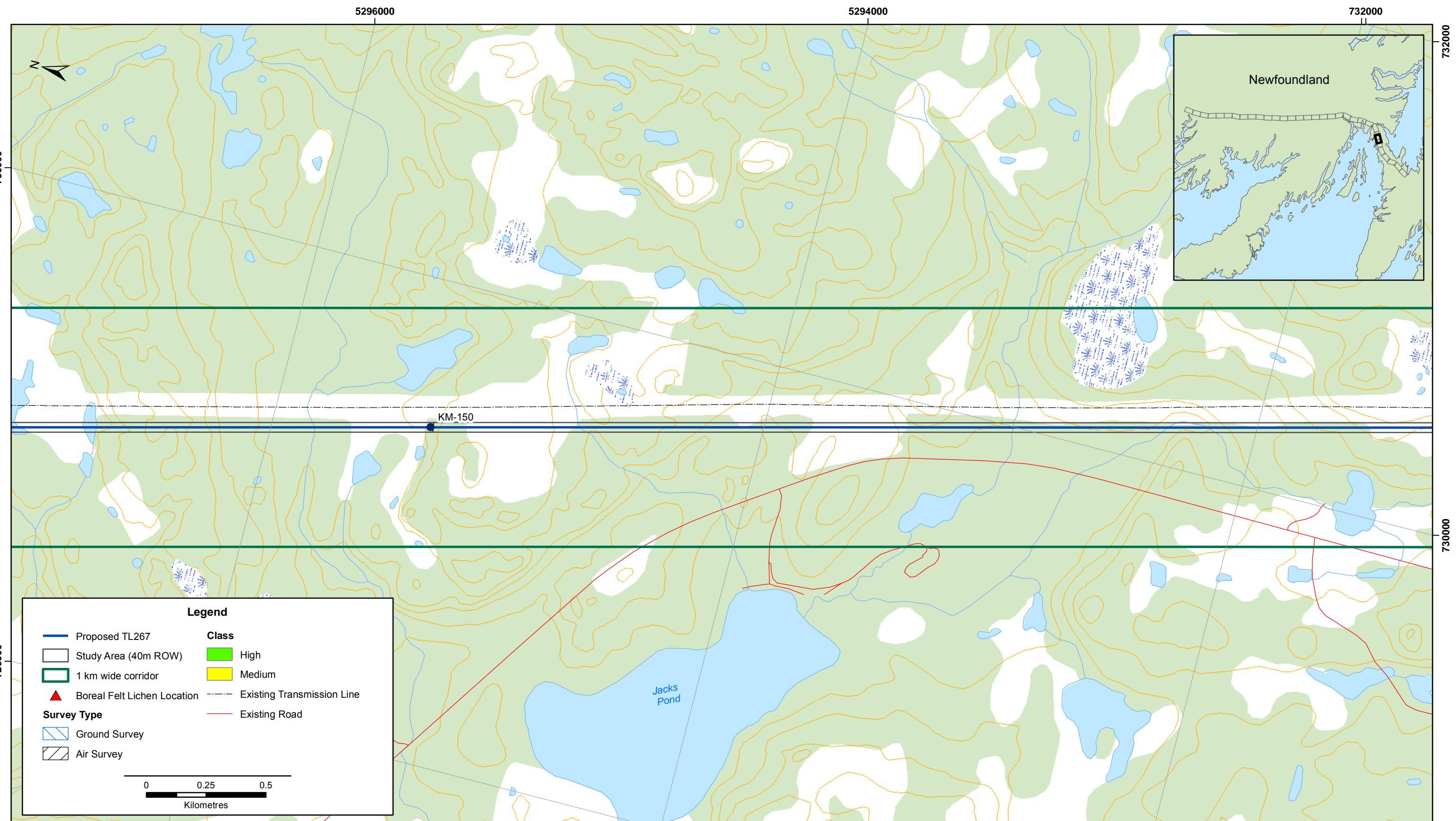


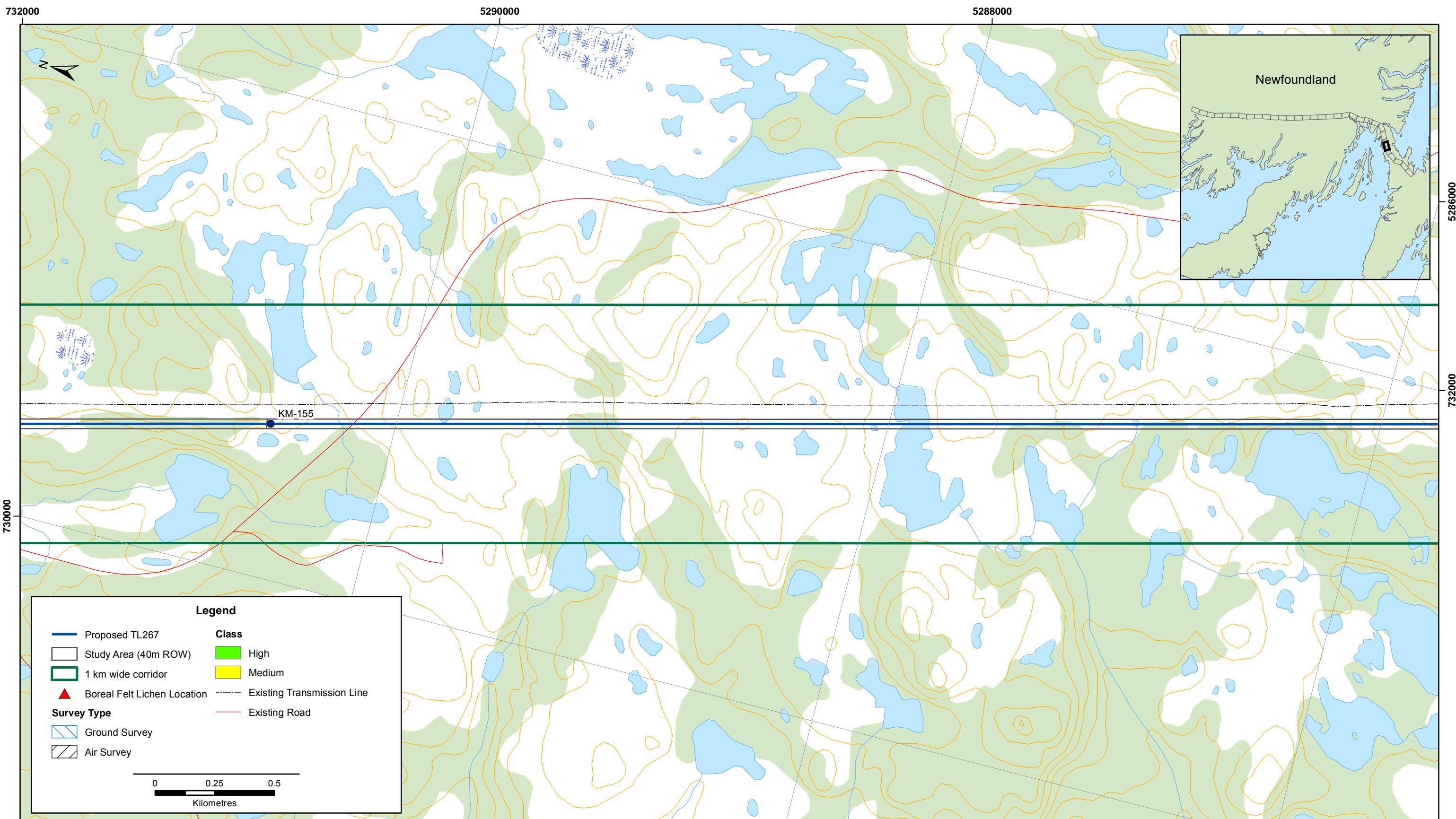


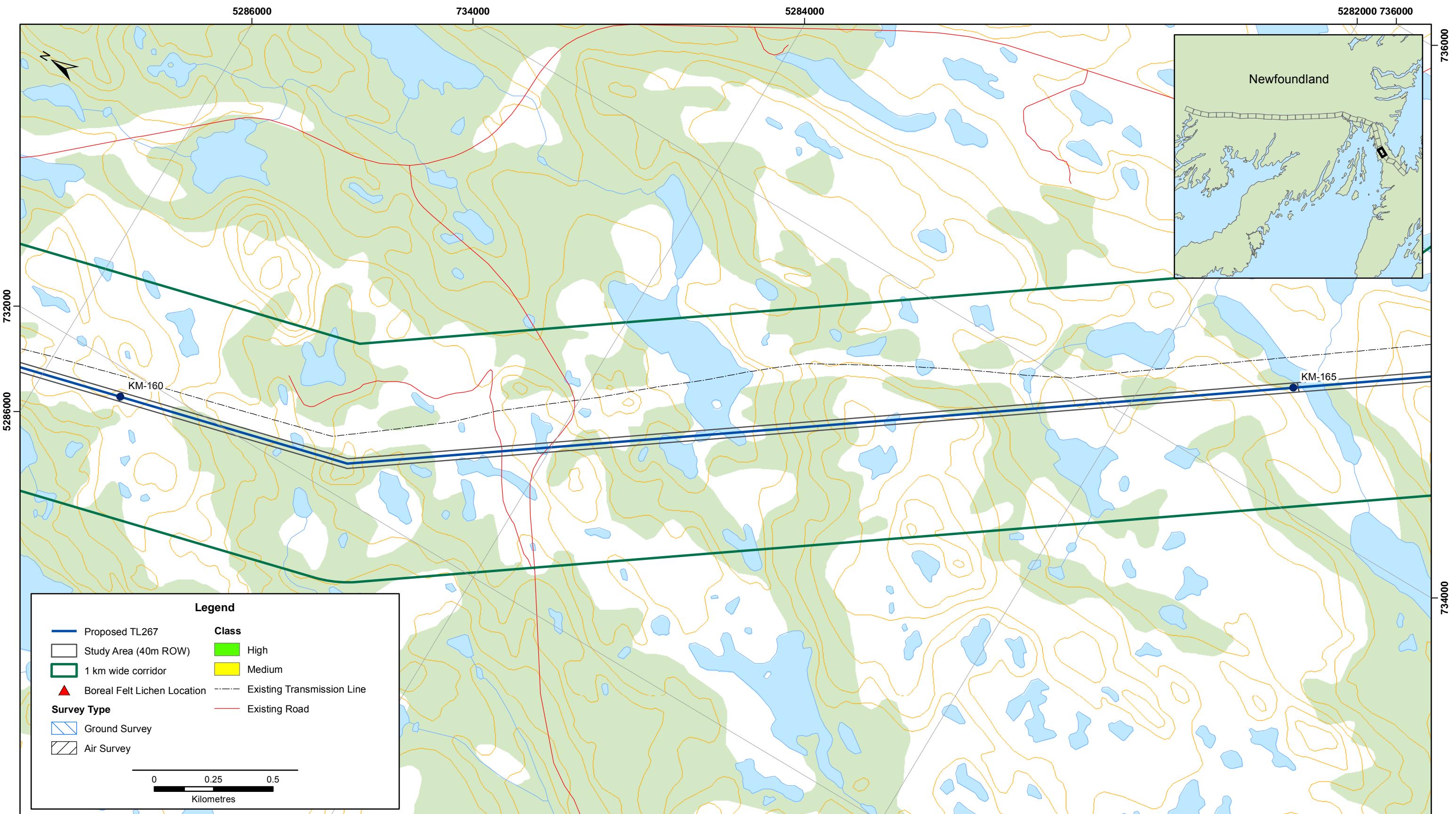


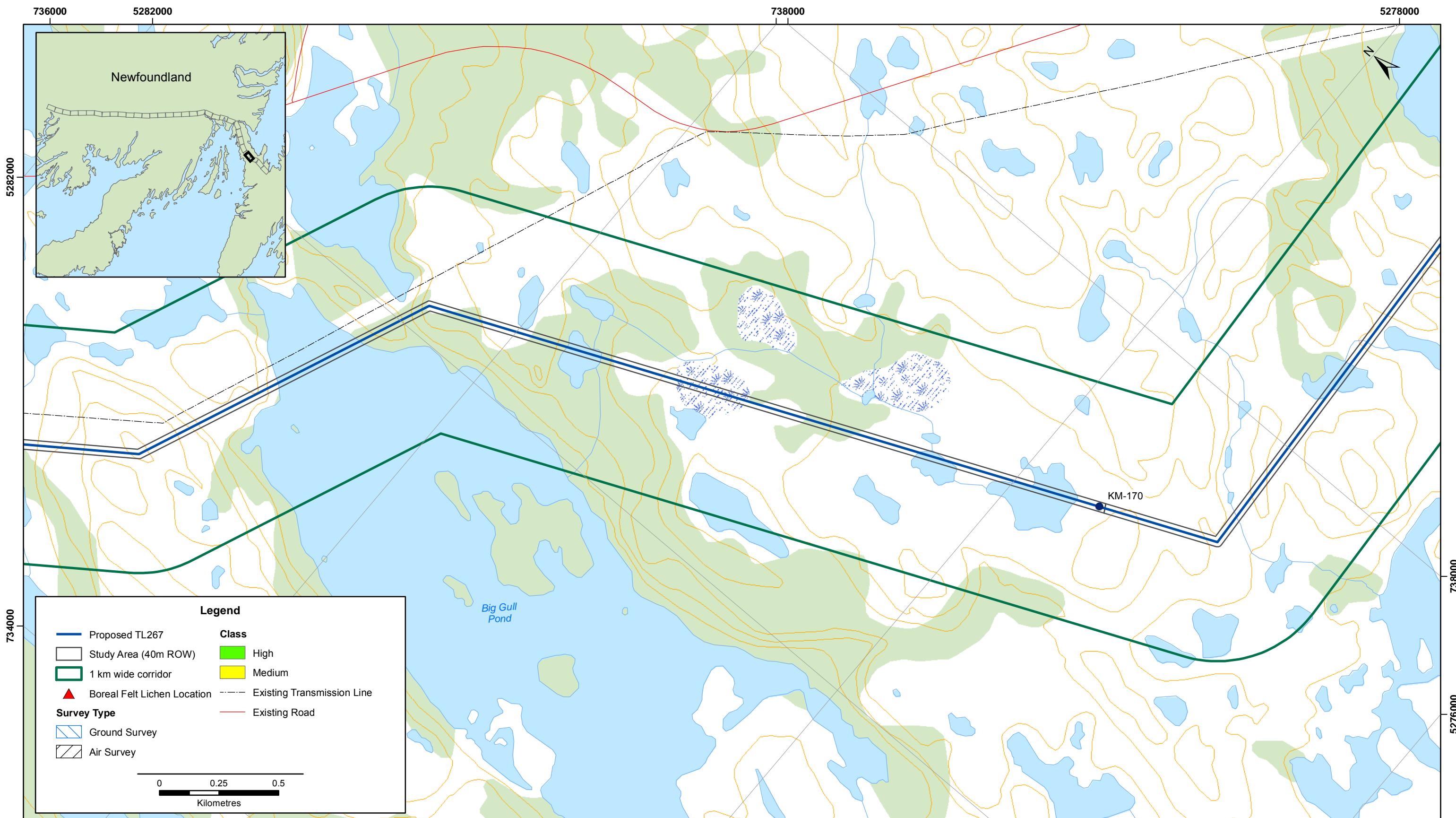


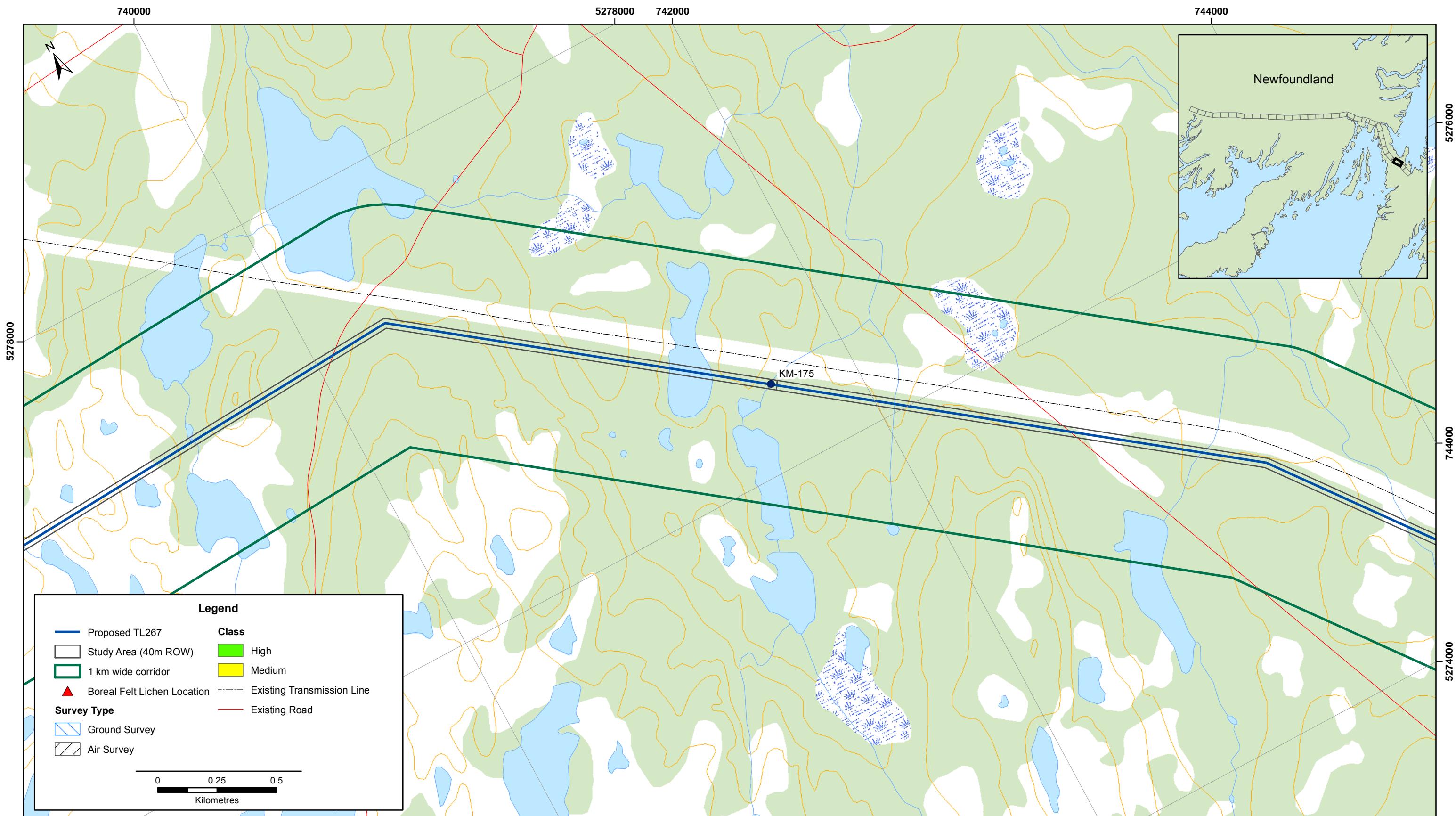


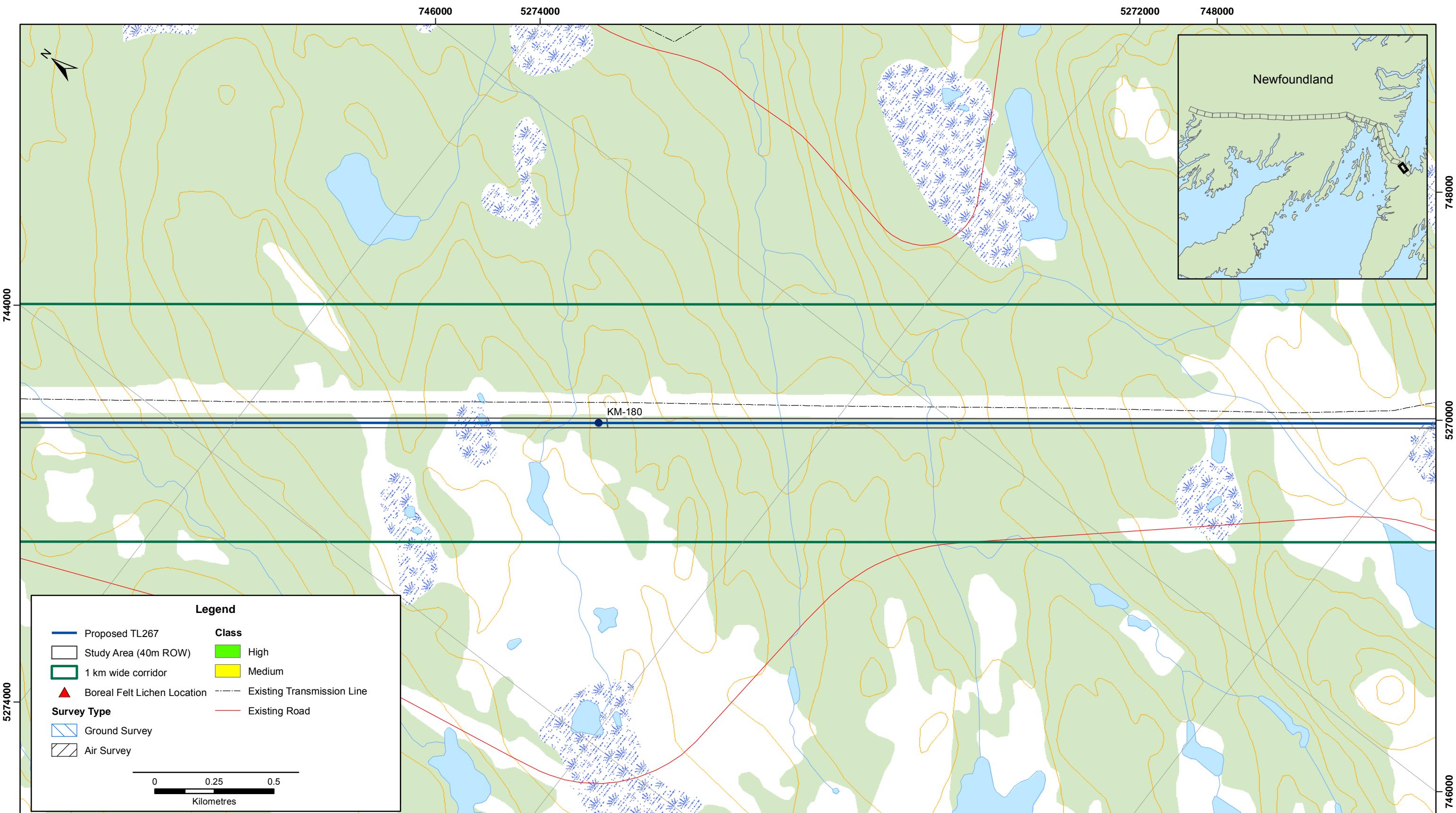


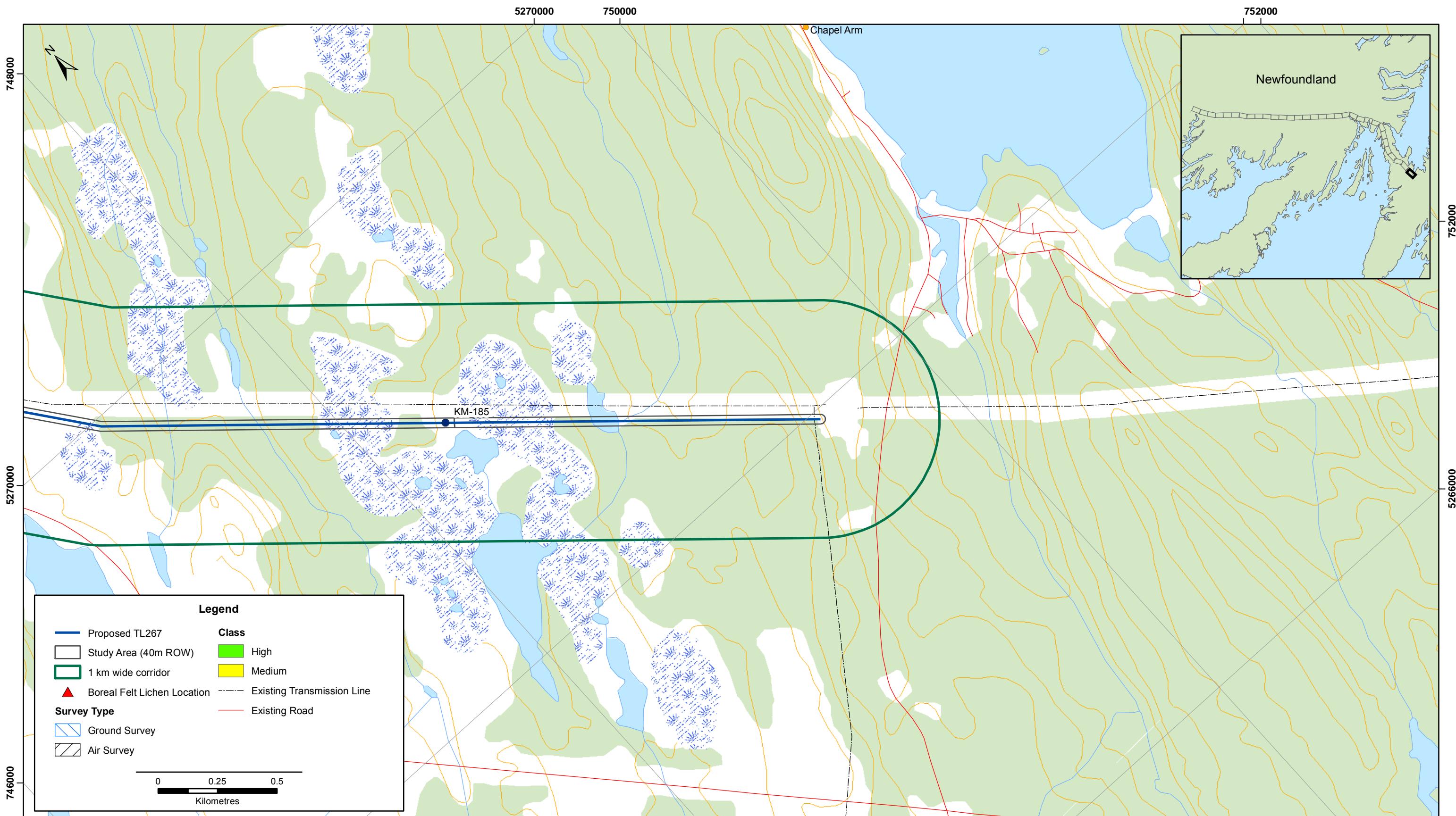














APPENDIX B
Boreal Felt Lichen Location Data Table



APPENDIX C

Scientific Research Permits



GOVERNMENT OF
NEWFOUNDLAND AND LABRADOR

Department of
Environment and Conservation
Wildlife Division

**A PERMIT TO CONDUCT RESEARCH ON SPECIMENS OF
THREATENED AND ENDANGERED SPECIES UNDER THE
*ENDANGERED SPECIES ACT OF NEWFOUNDLAND AND
LABRADOR***

Date: October 23, 2015

Endangered Species Permit Number: 2015/16-15

Issued To: Scott Burley, M.Sc.
Biologist, Environment & Infrastructure, Amec Foster Wheeler
50 Troop Ave, Unit 300, Dartmouth, NS, Canada
B3B 1Z1

Permit To: Complete lichen surveys for rare and listed species including the
endangered Graceful Felt Lichen, *Erioderma mollissimum* as permitted
under Section 18 (1) and 18 (2) of the *Endangered Species Act*.

Expiry Date: December 30, 2015

CONDITIONS:

1. Nominees also included under this permit:
Dr. Marion Sensen, Dr. Susan Squires, Dermot Kenny
2. In the event that the field team is not completely confident in the identity of a lichen species, especially in the case of *Erioderma mollissimum*, the permit holder must send high quality photos of the specimen to the Wildlife Division for ID confirmation.
3. Under no circumstances are any lichen specimens to be disturbed without discussion with the Wildlife Division. This permit does not provide authorization to transplant any lichens.
4. The permit holder may designate other individuals to perform these actions on his behalf, with suitable supervision. The permit holder is responsible for the training of any designated individuals and must ensure designated individuals follow all regulations related to this permit.

5. Names and contact information for all individuals participating in research activities must be provided to the Wildlife Division prior to start of research.
6. The permit holder must consult with the Wildlife Division in preparing for and completing this project.
7. Any amendments to the methodology for this research must be provided to the Wildlife Division prior to research being conducted. Substantial changes to the methodology may result in the permit being revoked or conditions amended.
8. The permit holder must minimize disturbance to the area and must inform the Wildlife Division immediately if any lichens are damaged during surveys.
9. No voucher specimens of listed species can be taken.
10. The permit holder must provide a report of activities carried out under this permit to the Wildlife Division by December 30, 2015. This report must include specific methodology used and a copy of the data collected as a result of this research.
11. The permit holder must provide the Wildlife Division with copies of all reports generated as a result of this research.
12. Under the discretion of the Director of Wildlife, this permit can be cancelled without notice.



 JOHN BLAKE
Director



Government of Newfoundland and Labrador
Department of Environment and Conservation

October 28, 2015

Scott Burley
Amec Foster Wheeler
50 Troop Ave
Halifax, NS
B3B 1Z1

Dear Mr. Burley:

Please find attached your scientific research permit for the work you will be conducting at Bay du Nord Wilderness Reserve this season. Please refer to the permit for associated conditions. Copies of the *Wilderness and Ecological Reserves Act* and *Wilderness Reserve Regulations* are available at www.assembly.nl.ca/legislation/sr/statutes/w09.htm

If you run into any difficulties while in the field, please do not hesitate to contact me at (709) 637-4066 or jerigraham@gov.nl.ca.

Sincerely,

A handwritten signature in black ink, appearing to read "Jeri Graham".

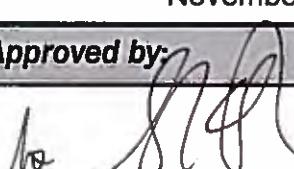
fa Jeri Graham
Manager, Natural Areas Program
Parks and Natural Areas Division

encl.



PERMIT

PARKS AND NATURAL AREAS DIVISION
DEPARTMENT OF ENVIRONMENT AND CONSERVATION

Type of Permit:	
<input checked="" type="checkbox"/> Scientific Research <input type="checkbox"/> Educational Tour <input type="checkbox"/> Seabird Reserve Access <input type="checkbox"/> Commercial Operator <input type="checkbox"/> Day Permit <input type="checkbox"/> Overnight Special Access	
Issued to:	
Scott Burley	T: (902) 480-5406
Amec Foster Wheeler	F: (902) 468-1314
50 Troop Ave, Unit 300, Dartmouth, NS B3B 1Z1	E: scott.burley@amec.com
Protected Area(s):	
Bay du Nord Wilderness Reserve	
Title of Research: (Scientific Research Only)	Research Affiliates: (Scientific Research Only)
Rare lichen field survey along the proposed new Transmission Line 267	Marion Sensen, Susan Squires, Dermot Kenny
Conditions:	
<ol style="list-style-type: none">Report any incidents immediately to the Natural Areas Manager (709-637-4066 or jerigraham@gov.nl.ca).Comply with the Wilderness and Ecological Reserves Act, Wilderness Reserve Regulations, and the Bay du Nord Wilderness Reserve Management Plan.Carry this permit with you while working in the Reserve.Lichens must not be disturbed, damaged, or removed. This permit does not provide authorization to transplant lichens of any species or to take voucher specimens.In cases where a lichen cannot be confidently identified to species, high quality photos of the specimen must be sent to the Wildlife Division for identification confirmation.	
(continued on following page)	
Date of Commencement:	Date of Expiration:
November 7, 2015	November 30, 2015
Date Approved:	Approved by:
Oct. 28/15	 Minister, Environment and Conservation



PERMIT
PARKS AND NATURAL AREAS DIVISION
DEPARTMENT OF ENVIRONMENT AND CONSERVATION

Conditions (Continued):

4. A field report is due 10 days after the field season has ended.
5. A final report is due by January 31, 2016.
6. Submit copies of any publications resulting from the study. Publications should acknowledge Parks and Natural Areas Division, Newfoundland and Labrador Department of Environment and Conservation as the managing agency for the Wilderness Reserve.
7. Submit a minimum of six photos (at a resolution of 300 dpi) of research in action that may be used for Parks and Natural Areas Division's website or promotional material. Photo credit will be given.