

Flora: Listed and Rare Plants Study

Proposed Bay d'Espoir to Western Avalon Transmission Line (TL 267)

FINAL REPORT

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IMPORTANT NOTICE

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EXECUTIVE SUMMARY

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 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. The purpose of this study is to summarize the known and potential occurrence of listed (legally protected) plant species in or near the proposed Project Area (40 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). This was undertaken through background research on the known presence, distribution and habitat preferences of such plant species and the use of an associated Ecological Land Classification (ELC) Study and associated mapping to create two habitat potential models: 1) one based on proximity of known locations for these species and 2) a species-specific habitat suitability analysis.

Two listed plant species have been identified to occur within five kilometers of the proposed TL 267 centerline – the Boreal Felt Lichen (*Erioderma pedicellatum*) and the Blue Felt Lichen (*Degelia plumbea*). Based on the available ACCDC (2015) data, there have been no reported occurrences of the protected Water Pygmyweed (*Tillaea aquatic*) in the Project Area. However, additional sources identify occurrences of this species in Placentia Bay, which is located within approximately 500 m of the TL 267 centerline.

The first habitat potential model is based on the proximity of known listed / rare species occurrences to the Project Area, and delineates areas of low (greater than 500 m), medium (250 – 500 m), and high (0 – 250 m) listed / rare plant habitat potential. Over 98 percent of the habitat within the Study Area from Bay d'Espoir to Chapel Arm was classified as being of low potential based on proximity to known occurrences. The remaining approximately two percent of the Study Area is comprised of medium and high potential areas.

Species-specific modeling was also completed using the known habitat requirements of Boreal Felt Lichen, Blue Felt Lichen and Water Pygmyweed, and was carried out using the ELC Study results for the section of the proposed transmission line from Bay d'Espoir to Come By Chance. A total of approximately 517 and 21 ha of suitable habitat for Boreal Felt Lichen were identified in the Study Area and Project Area (ROW), respectively. A total of approximately 110 and five ha of suitable habitat for Blue Felt Lichen were identified within the Study Area and ROW, respectively. The only suitable habitat for Water Pygmyweed within the Study Area is 1.3 km of shoreline near Placentia Bay. A previous regionally uncommon plant study for the section of the Study Area from Come By Chance to Chapel Arm did not identify any high or very high potential habitats for listed or rare plant species in that area.

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1.0 INTRODUCTION

Newfoundland Labrador Hydro (Hydro) owns and operates an extensive electrical generation and transmission system on the Island of Newfoundland, which includes a 613 megawatt (MW) hydroelectric generation station at Bay d'Espoir in the south-central portion of the Island, as well as several transmission lines that extend between it and other electrical infrastructure and load centres across the Island. This includes two existing transmission lines that run from that facility to Sunnyside which were constructed in the late 1960s, as well as a transmission system that extends between Sunnyside and Chapel Arm.

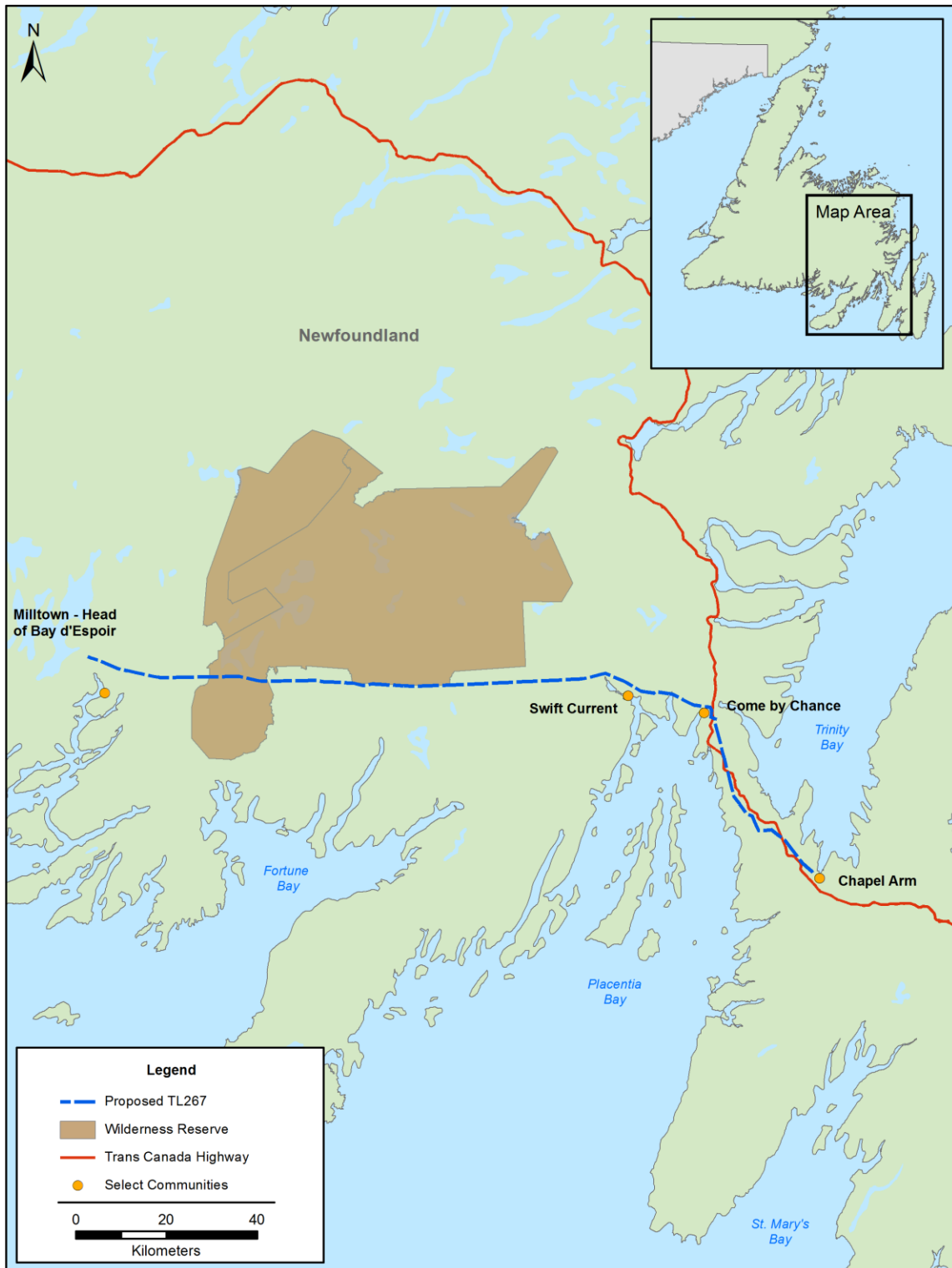
The proposed development project that is the subject of this study includes the construction and operation of a new 230 kilovolt (kV) transmission line that will be approximately 188 km long and connect the existing Bay d'Espoir and Western Avalon Terminal Stations (hereinafter also referred to as the "Project" or "TL 267"). The proposed TL 267 will parallel existing transmission line infrastructure from Bay d'Espoir to Come By Chance (TL 202 and TL 206) and further parallels TL 203 from Come By Chance to the Western Avalon substation in Chapel Arm (Figure 1.1). Upgrades to existing infrastructure at the Bay d'Espoir and Western Avalon terminal stations will also be completed as part of this Project. The existing transmission lines (TL 202, 203 and 206) were cleared and constructed within the boundaries of the easement granted to Hydro by Government at the time of their development, as will the proposed TL 267.

Given that this new transmission line and associated infrastructure will follow entirely along existing transmission lines and other infrastructure in the region, the Project is expected to have few if any environmental issues associated with it. Hydro is, however, committed to ensuring that Project construction and operations are conducted in an environmentally responsible and acceptable manner, in full compliance with associated environmental regulations and permits, as well as the company's own environmental policies, plans and standards.

The Proponent has therefore planned and completed an environmental study program in relation to the proposed Project, in order to obtain and compile information on key aspects of the existing biophysical and socioeconomic environments within and near the Project Area. The information provided through this study program is intended to support the Project's Environmental Assessment (EA) registration and review, and will be used in on-going Project planning and design, as well as in the eventual permitting and construction / mitigation planning for the Project.

This *Flora: Listed and Rare Plants Study* comprises one component of the environmental study program.

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



1.1 Study Rationale and Purpose

The development of the proposed TL 267 will involve the clearing and control of vegetation along the 40 m wide 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. The purpose of this study is to summarize the known and potential occurrence of listed (legally protected) plants species in or near the proposed Project Area, as well as any other plant species which are considered to be rare (regionally uncommon).

The specific objectives of this study were to:

- Conduct background research on the occurrences, characteristics and habitat preferences of listed and rare plants that do or may occur in the area, including obtaining, reviewing and updating relevant and current listings of these plants in Newfoundland and Labrador;
- Identify, evaluate, and map the known or likely occurrence of listed and rare vascular plants, mosses, and lichens species within the Study Area;
- Build on and utilize the Ecological Land Classification (ELC) and associated spatial imagery to perform plant habitat potential modeling, comparing the known habitat requirements for identified listed and rare species and the available habitats within the Study Area; and
- Prepare a report, including detailed maps with known and/or potential locations of listed and regionally rare vascular plants, mosses, and lichens and their habitats in and around the Project Area.

These areas are identified, mapped, and described in this report, and the resulting information can now be considered in on-going Project design and planning to proactively avoid or attempt to reduce direct interaction with these locations and/or to plan further study of these areas as required.

1.2 Regulatory and Management Framework: Listed Plants

Recognizing that the protection of species at risk is a joint responsibility of all governments of Canada, in 1996 the federal, provincial, and territorial governments signed the *National Accord for the Protection of Species at Risk*. The Accord outlines the joint designation and collaboration approaches for the protection of species at risk in Canada.

The national Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and the provincial Species Status Advisory Committee (SSAC) consist of government and non-governmental scientists who determine the status of species, subspecies, and significant populations considered to be at risk of extinction or extirpation. The evaluation processes of both committees are independent, open and transparent, and based on the best available

information on the biological status of species including scientific, community, and traditional knowledge.

Designations made by either or both COSEWIC and the SSAC can be used to list species, subspecies, and significant populations under the *Newfoundland and Labrador Endangered Species Act (NL ESA)* as being at risk and needing of protection. The *NL ESA* provides legal protection for indigenous plant and wildlife species, sub-species, and populations that are considered to be endangered, threatened or vulnerable within the province. The various at-risk designations under this legislation are as follows:

Endangered: A species that is facing imminent extirpation or extinction;

Threatened: A species that is likely to become endangered if nothing is done to reverse the factors leading to its extirpation or extinction; and

Vulnerable: A species that has characteristics which make it particularly sensitive to human activities or natural events.

Currently there are 52 plant and wildlife species, subspecies, and populations listed under the *NL ESA* and the associated *Endangered Species List Regulations (2015)*, of which 24 are listed as endangered, 13 as threatened and 15 as vulnerable. Of these listed species, 29 are vascular plants, mosses, and lichens.

The Canadian *Species at Risk Act (SARA)* provides legal protection to species at the national level to prevent extinction and extirpation, facilitate the recovery of endangered and threatened species, and promote the management of other species to prevent them from becoming further at risk in the future. There are various schedules associated with *SARA*. Species that have legal protection are listed under Schedule 1, which includes species in the following possible designations:

Extirpated: A species that no longer exists in the wild in Canada, but exists elsewhere;

Endangered: A species that is facing imminent extirpation or extinction;

Threatened: A species that is likely to become endangered if nothing is done to reverse the factors leading to its extirpation or extinction; and

Special Concern: A species that has characteristics which make it particularly sensitive to human activities or natural events.

There are currently 27 plant and wildlife species, subspecies, and populations listed under Schedule 1 of *SARA* that have occurrences in Newfoundland and Labrador. Of these 27 listings, 11 are listed as endangered, seven as threatened, and nine as vulnerable. Eight of these species are vascular plants, mosses, and lichens, and seven of the eight vascular plants, mosses, and lichens listed under Schedule 1 of *SARA* are also listed under the *NL ESA*. The

majority of flora listed under either or both of these Acts are known to occur only on the Island of Newfoundland, with many in only one or a few locations.

Once a species, subspecies, or significant population with occurrences in Newfoundland and Labrador are listed under the *NL ESA* and/or *SARA*, measures to protect and recover the listed organism are established and implemented, including the development of a Recovery Plan / Strategy, as well as associated Action Plans and Management Plans as applicable. Organisms designated as endangered must have a plan / strategy developed within one year, and for threatened or extirpated species it must be developed within two years.

These documents define conservation goals and objectives, identify critical (and recovery) habitat, and describe the research and management activities required. Critical habitat under the *NL ESA* is defined as habitat that is critical to the survival of a species and recovery habitat is defined as habitat that is necessary for the recovery of a species. Critical habitat under *SARA* is defined as habitat that is required for the species' survival or recovery.

1.3 Identification and Evaluation of Rare Plants

In addition to species that are listed and therefore protected under the provincial and/or federal legislation described above, there are also those that are considered to be rare but are not currently provided with formal, legal protection. Species may be considered rare because of a COSEWIC or SSAC designation of being at risk that has not yet resulted in legal protection, as well as through associated ratings by the Atlantic Canada Conservation Data Centre (ACDC), Nature Serve Canada, and/or under the General Status of Species in Canada. Designations of species by such organizations provide a general indication if the species is regionally uncommon, and thus, of conservation interest, but again these ranks are not synonymous with legally "listed" species and they therefore are not afforded protection under provincial and/or federal legislation.

The ACCDC is a non-profit organization that manages occurrence and distribution databases for Newfoundland and Labrador's Department of Environment and Conservation (Wildlife Division) which are a valuable source of information for rare flora in the province. The ACCDC identifies and ranks all vascular plants, bryophytes (mosses and related plants), and macrolichens known to occur in the province with consideration of the following factors: 1) population size, 2) number of occurrences, 3) geographic distribution, 4) population trend, 5) distribution trends, 6) population threat, and 7) habitat threats. Each taxon is assigned a status and S-rank, which are specific to the geographic area (Labrador and/or the Island of Newfoundland) in which they occur (ACCDC 2015).

ACCDC provincial S-ranks provide a useful and relevant indication of the relative rarity and current status of plant species in the province, and they include the following ratings (ACCDC 2015):

- S1** *Critically Imperiled:* Extreme rarity or some factor(s) such as very steep declines making it especially vulnerable to extirpation from the jurisdiction.

- S2** *Imperiled:* Rarity due to very restricted range, very few populations, steep declines, or other factors making it very vulnerable to extirpation from the jurisdiction.
- S3** *Vulnerable:* Restricted range, relatively few populations, recent and widespread declines, or other factors making it vulnerable to extirpation from the jurisdiction.
- S4** *Apparently Secure:* Uncommon in the jurisdiction but not rare; some cause for long-term concern due to declines or other factors.
- S5** *Secure:* Common, widespread, and abundant in the jurisdiction.
- SX** *Presumed Extirpated:* Species or ecosystem believed to be extirpated from the jurisdiction. Not located despite intensive searches of historical sites and other appropriate habitat, and virtually no likelihood that it will be rediscovered.
- SH** *Possibly Extirpated:* Known from only historical records. There is evidence that the species or ecosystem may no longer be present in the jurisdiction, but not enough data to state this with certainty (e.g. it has not been documented in 20-40 years despite searching).
- SU** *Unrankable:* Lack of information or substantially conflicting information about status or trends.
- SNR** *Unranked:* Conservation status not yet assessed.
- SNA** *Not Applicable:* The species or ecosystem is not a suitable target for conservation activities.

Plants that are ranked as S1, S2, and S3 are typically considered to be of conservation concern and species ranked SNR and SU are possibly of conservation concern.

A numeric range rank (e.g., S2S3 or S1S3) is used to indicate any associated range of uncertainty about the status of the species or ecosystem.

2.0 APPROACH AND METHODS

The following sections describe the general approach and methodologies that were used in the planning and completion of the Study, including the associated Study Areas, data sources, and the overall methods used to develop and present the resulting environmental information.

Again, the overall purpose of this study is to provide information on the known or potential presence of vascular plants, mosses, and lichens that are listed and protected under the *NL ESA* and/or *SARA*, as well as other rare species within the various areas of interest (see below). This was achieved through the following components and activities:

- Obtaining and reviewing relevant listings of protected and/or rare plants in Newfoundland and Labrador;
- Identifying, evaluating, and mapping the known or likely occurrence of listed (legally protected) and rare vascular plants, mosses, and lichens species within the areas of interest; and
- Using the occurrence data, ELC results and known habitat requirements for identified listed and rare species to create listed / rare plant habitat models resulting in the identification and delineation of high, medium and low potential habitats within the Study Area.

2.1 Study Area and Regional Ecological Setting

The proposed Project will include construction and operation of a new electrical transmission system along existing transmission lines and roadways in south-central and eastern Newfoundland for a total distance of approximately 188 km. In completing this study, the associated analysis has focused upon a number of geographic scales, including:

Project Area or Transmission Line Right of Way: A specific routing has been selected for the transmission line, which will involve a cleared right of way approximately 40 m wide.

Study Area: The larger (1 km wide) Study Area extends 500 m on either side of the centre line of the identified ROW for the proposed TL 267, as described above. This surrounding area is considered in order to address the potential for Project-related activities to occur outside the 40 m wide transmission line routing itself. This Study Area also corresponds with the ELC Study Area.

Regional Area: Where relevant, a larger (10 km wide) area was also established and considered that encompasses the overall regional landscape. This surrounding area is considered in order to provide relevant, regional context for the analysis, and to provide a more comprehensive and regional scale query for the ACCDC database regarding listed and rare species (as described below).

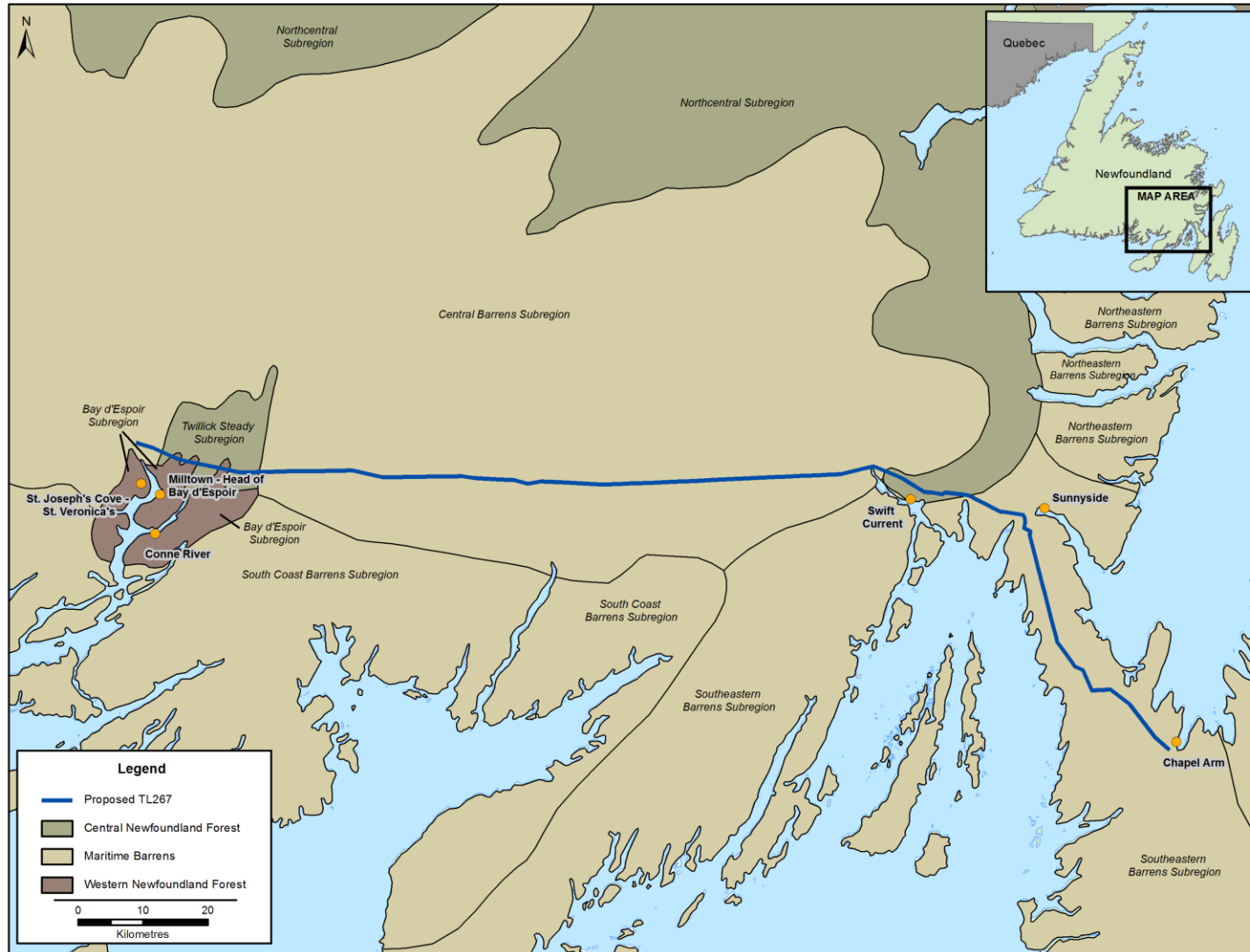
This study focuses primarily on the TL 267 as far east as where the proposed transmission line meets the existing TL 203, near Come By Chance. The remaining section of the TL 267 ROW, between Come By Chance and the Western Avalon Terminal Station near Chapel Arm, was the focus of a similar study several years ago (Stantec 2010a). For completeness and reference, the flora observations and habitat potential mapping identified within that section of the Study Area are summarized in this report. That previous study should be consulted for further details on its associated methodologies and findings.

The proposed transmission line extends through south-central and eastern portions of the Island of Newfoundland, and in doing so, will cross through a portion of the Boreal Shield Ecozone of Canada (Canada Committee on Ecological Land Classification 1989). The Boreal Shield Ecozone consists of a base of ancient bedrock covered by gravel, sand and other glacial deposits. Regional topography is comprised of broadly rolling uplands that form poorly drained depressions covered by lakes, ponds and wetlands. The climate of the Ecozone is generally continental in nature, with long cold winters, short warm summers and abundant precipitation. Cool temperatures and a short growing season along with acidic soils influence the resultant vegetation community composition, distribution and abundance. The landscape configuration consists primarily of forested cover dominated by coniferous species intermixed with hardwoods. Bogs, marshes and other wetlands comprise the remaining landscape matrix of vegetation communities (Wiken 1986).

At the provincial scale, the proposed transmission line will also pass through three of the Ecoregions that have been identified on the Island of Newfoundland, including (primarily) the large Maritime Barrens Ecoregion (79 percent of the transmission line's linear distance), along with smaller portions of the Central Newfoundland Forest Ecoregion (18 percent) and Western Newfoundland Forest Ecoregion (three percent) at its ends (Figure 2.1). Within the Maritime Barrens Ecoregion, the proposed ROW occurs primarily within the Central Barrens Subregion with a smaller portion on the Avalon Peninsula falling within the Southeastern Subregion. The section of the transmission line within the Central Newfoundland Ecoregion crosses two Subregions, Twillick Steady near Bay d'Espoir and Northcentral near the Isthmus of the Avalon Peninsula (NL DNR 2015).

The Maritime Barrens Ecoregion is characterized by cool summers with frequent fog and strong winds. Winters are relatively mild with intermittent snow cover. Consequently, this ecoregion is dominated by open heathland and peat bog interspersed with patches of stunted balsam fir (*Abies balsamea*), black spruce (*Picea mariana*) and eastern larch (*Larix laricina*). Heath plants are primarily *Kalmia angustifolia* on protected slopes and *Empetrum nigrum* or *E. easmesii* on windswept ridges and headlands (Meades 1990).

Figure 2.1 Ecoregions and Subregions in Newfoundland Crossed by the Proposed Project



The Central Newfoundland Ecoregion has a more continental climate than the Maritime Barrens area, with cooler winter and higher summer temperatures. Forest fires have historically been more frequent in this ecoregion and have led to a replacement of balsam fir-*hyloconium* forest types over many areas. However, upland areas within the Twillick Steady Subregion remain dominated by balsam fir forest. Ground cover in the Northcentral Subregion near portion of the near Goobies is primarily dwarf shrub heath (*K. angustifolia*) with interspersed stands of balsam fir and black spruce. Topography in both subregions is less than 300 m above sea level and the topography is rugged and undulating (Meades 1990).

The Western Newfoundland Forest Ecoregion (Bay d'Espoir Subregion) is characterized by a humid climate with a relatively longer frost-free period. Higher humidity reduces the prevalence of fire as a disturbance mechanism and favours the growth of *dryopteris*-balsam fir forest rather than black spruce as the dominant tree. Rich soils also support the growth of yellow birch (*Betula alleghaniensis*) in sheltered valleys of this subregion.

The proposed Project will also cross through a portion of the existing boundaries of the Bay du Nord Wilderness Reserve (2,895 km²), which encompasses a vast landscape of ponds, rivers, barrens, bogs and fens, forests, and thickets in south-central Newfoundland (Parks and Natural Areas Division 2015).

2.2 Desktop Analysis and Modeling

Background research for the study included obtaining and reviewing the various relevant lists of legally protected and/or rare plants in Newfoundland and Labrador, with a particular focus on those which may be potentially present within the Study Area and larger Regional Area. This included reviewing and compiling a species list from the following information sources:

Listed / Protected Plants

- Canadian *Species At Risk Act* – Schedule 1; and
- Newfoundland and Labrador *Endangered Species Act and Regulations*.

Rare (but not “Listed”) Plants

- COSEWIC (Committee on the Status of Endangered Wildlife in Canada);
- NGSWG (National General Status Working Group); and
- ACCDC (Atlantic Canada Conservation Data Centre).

Equipped with the ACCDC observation data and general information on the habitat preferences and ranges of the species identified in the Study and Regional Areas described above, the ELC (Amec Foster Wheeler 2015) was then used to create a model in ArcGIS to determine high, medium and low potential habitat that could occur within the Study Area. Key aspects of that approach and methodology are described further below.

2.2.1 Ecological Land Classification (ELC)

As part of the environmental study program for this Project, an ELC Study was undertaken to identify and classify vegetation communities (habitat type or “ecotypes”) within the Study Area. An ELC had already been completed for the section of transmission line from Come By Chance to the Western Avalon Terminal Station (Stantec 2010b) and was not duplicated for the purposes of this Project. The ELC Study for the proposed TL 267 from Bay d'Espoir to Come By Chance is used in conjunction with the ELC completed from Come By Chance to Chapel Arm (Stantec 2010b) to cover the entire Study Area. These ELC studies, along with aerial photographs, topographic mapping, and other data provided background information and context for the listed / rare plant habitat modeling as described below. Detailed information on the methods for, and results of, the ELC Study can be found in a separate study report, and are briefly summarized below as applicable to the current Study.

The ELC mapping utilized high resolution colour imagery, stereo (3D) imagery, and LiDAR datasets acquired by Hydro. Mapping was completed using ArcGIS and standard spatial data protocols at scales between 1:2,000 and 1:5,000. Interpreters assessed the imagery and assigned one of the defined ecological land classes based on the presence / absence of vegetation communities, tree species, moisture, slope, etc. The ELC analysis resulted in approximately 2,700 polygons being delineated, classified, and mapped for the Study Area. The ELC vegetation analysis and mapping resulted in the following 10 primary ecotypes:

Softwood Forest: Forested habitat characterized by a combined crown closure of at least or greater than 20 percent, species composition which is at least or greater than 70 percent softwood (balsam fire, black spruce), and able to produce merchantable forest of at average rotation age.

Hardwood Forest: Forested habitat characterized by a combined crown closure of at least or greater than 20 percent, species composition which is at least or greater than 70 percent hardwood (yellow birch, white birch), and able to produce merchantable forest of at average rotation age.

Mixedwood Forest: Forested habitat characterized by a combined crown closure of at least or greater than 20 percent, species composition where the dominant species is less than 70 percent hardwood or softwood, and able to produce merchantable forest of at average rotation age.

Softwood Scrub: Treed habitat characterized by a combined crown closure of at least or greater than 20 percent, species composition which is greater than 50 percent softwood, and not able to produce merchantable forest of at average rotation age due to limiting environmental factors (elevation, shallow soils, and nutrient deficiency).

Hardwood Scrub: Treed habitat characterized by a combined crown closure of at least or greater than 20 percent, species composition which is greater than 50 percent hardwood, and not able to produce merchantable forest of at average rotation age due to limiting environmental factors (such as elevation, shallow soils, and nutrient deficiency).

Herbaceous: Habitat dominated by non-woody (or herbaceous) vegetation which dies back during the fall and winter months.

Barren: Habitat characterized by a total treed crown closure of less than 20 percent, where lichens and ericaceous plants are the dominate vegetation, and substrates are dominated by bedrock and/or thin layers of soil / organic matter over bedrock.

Shrub: Habitat characterized by small to medium sized woody plants (alders, willow, mountain maple, rhodora, leatherleaf, Labrador tea).

Wetland: The wetland ecotype is comprised of six sub-ecotypes: bog, fen, swamp, marsh, shallow water, and complex (multiple wetland types represented).

Anthropogenic / Other: This category consists of eight non-vegetated subtypes including: water, exposed bedrock, transportation routes, disturbed – industrial, disturbed – residential, disturbed – farmland, disturbed – insect, and disturbed – cutover.

2.2.2 Habitat Potential Modeling

Habitat modeling for listed (protected) and rare (regionally uncommon) plant species in the Study Area was carried out using information on: 1) the known occurrences of such 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.

The ACCDC provided a database of the known occurrences of listed and rare plant species within the overall Regional Area (Appendix A). The first model was created using these known occurrences within this area (Appendix B), 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:

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

It is important to note that observational data provided by the ACCDC comes with varying degrees of accuracy for several reasons including a deliberate attempt to keep exact locations confidential. This should be considered when reviewing the model results and associated potential mapping in Appendix B. The high, medium and low categories identified are based on point observation data that could be anywhere from 10 m to 10 km in (or of unknown) accuracy and are therefore only meant to provide a rather general indication of the potential for these species to occur within the Study Area.

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". This second model also considered the known habitat and potential occurrence of Water Pygmyweed, a very tiny, amphibious listed plant species that is found on shores in Placentia Bay which at its most northern extent borders the Project Area in one location.

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

Boreal Felt Lichen Habitat: Softwood Forest ELC polygons, within 18 km of the coastline, and within 80 m of a Wetland ELC polygon.

Blue Felt Lichen: Hardwood Forest ELC polygons within proximity to known occurrences (from Bay d'Espoir Terminal Station to the eastern extent of Bay Du Nord Wilderness Reserve boundary).

Water Pygmyweed: Sandy shores of rivers and ponds with a marine influence within Placentia Bay, where the species is known to occur.

Despite scientific efforts to date, no statistically significant predictive habitat model has been developed for Boreal Felt Lichen (Wiersma and Skinner 2011). As noted above, and based on the available research, suitable habitat for Boreal Felt Lichen in the species specific model was therefore identified as the ELC softwood forests habitat type, within 18 km of the coastline (Wiersma and Skinner 2011), and within close proximity to a wetland. The distance of 80 m from a wetland was chosen because research on a similar species in Newfoundland and Labrador, the Graceful Felt Lichen or Vole Ears Lichen (*Erioderma mollissimumi*; Endangered under SARA and NL ESA) suggests that occurrences are most likely to occur within 80 m of a wetland / peatland (COSEWIC 2009). Graceful Felt Lichen is found in similar habitat as Boreal Felt Lichen on the Avalon Peninsula (SSAC 2008a), although the only known locations of both are just east of the easternmost extent of the Project (e.g. Whitbourne). While it may be possible to find Graceful Felt Lichen and/or Boreal Felt Lichen at the eastern end of this Project, the species-specific modeling exercise focused on areas as far east as Come By Chance.

Far less research has been completed on the Blue Felt Lichen and the Water Pygmyweed. The limited research to date suggests that the habitat for Blue Felt Lichen would include the Hardwood Forest ELC category within the proximity of known occurrences, which in this study have been identified in the western extent of the Project up to the Bay du Nord Wilderness Reserve boundary (COSEWIC 2010). Blue Felt Lichen does occur on the Avalon Peninsula (e.g. Whitbourne, Sir Robert Bond Park) but east of the easternmost extent of the Study Area (COSEWIC 2010). While it may be possible to find Blue Felt Lichen at the eastern end of this Project, the modeling exercise focused on areas as far east as Come By Chance. The model criteria for Water Pygmyweed included sandy shores of rivers and ponds with a marine influence (SSAC 2008b) within proximity of known occurrences in Placentia Bay.

3.0 RESULTS

The following sections provide an overview of the key results and outcomes of the Study, including the associated listed / rare plant modeling and associated mapping results for the Project Area (40 m wide ROW) and surrounding Study Area (1 km wide). The results follow a “top down” approach, where the likelihood of listed and rare species within the Study Area are described in a more general and regional context, followed by a narrowing in on particular species that are known or likely to be present in the region.

3.1 Potential Listed / Rare Species Presence

The likelihood of occurrences of listed plant species in the Study Area is summarized in Table 3.1. As discussed previously, Blue Felt Lichen and Boreal Felt Lichen have confirmed presence within the overall Regional Area based on the available ACCDC observational data. Graceful Felt or Voles Ears Lichen and Water Pygmyweed have possible occurrences due to their overall ranges and the presence of suitable habitat within the Regional Area, but there have been no reported observations of these species within the Study Area as of the time of this study.

Water Pygmyweed was investigated further using the ELC results, regardless of the lack of observations from ACCDC, since its preferred habitat occurs within the region from Bay d'Espoir to Come By Chance (Placentia Bay), which was not included in the previous Stantec (2010a) study. Habitat potential mapping for Graceful Felt Lichen along the Avalon Peninsula was included in Stantec (2010a), with high potential habitat for this species being identified in two main areas, approximately 15 km east of Chapel Arm (the terminus of TL 267). Since habitat potential analysis for listed and rare flora was completed for the section of transmission line from Come By Chance to Chapel Arm, Graceful Felt Lichen was not included in the species-specific habitat model undertaken for this study.

The ACCDC search covered a 10 km wide by approximately 188 km long (Regional Area) area surrounding the proposed transmission line. In total, the ACCDC identified 1,127 listed and rare plant observations in that area. The vast majority of these occurrences were for two listed species - the vulnerable / special concern Boreal Felt Lichen (1,097 occurrences) and the vulnerable Blue Felt Lichen (eight occurrences) (Table 3.2), as described previously.

The remaining occurrences (22) were of other rare plants, according to ACCDC designations (Table 3.2). Two of the rare plants identified each had two occurrences within the Regional Area, the remaining 18 each had one occurrence. Of the 20 species identified, two are considered rare on the global level, including a lichen, *Parmelia omphalodes* and Acadian Quillwort (*Isoetes acadensis*). These rare plants include a variety of flora types including three species of peat moss, five species of lichen, a moss, a fern, a grass, and a number of other flowering plants.

Only eight observations of listed and/or rare plant species were identified within the 1 km wide Study Area itself.

Table 3.1 Listed Plant Species (NL ESA and SARA) in Newfoundland and Likelihood of Occurrence in the Study Area

Species		Designation		Habitat ¹	Likelihood of Occurrence in Study Area
Common Name	Scientific Name	NL ESA	SARA		
Alaska Rein Orchid	<i>Platanthera foetida</i>	Endangered	-	Open areas of damp to dry, moss dominated, coniferous forests	Unlikely (Known locations are in Western NF)
Barrens Willow	<i>Salix jejuna</i>	Endangered	Endangered	Limestone Barrens	Highly Unlikely (Habitat not present)
Blue Felt Lichen	<i>Degelia plumbea</i>	Vulnerable	-	On branches and trunks of yellow birch in moist sites or near the edges of streams and ponds, and more rarely on trembling aspen, white spruce, rock, and some non-native trees	Presence Confirmed (ACCDC Maps #1 and #2; Appendix A)
Bodin's Milkvetch	<i>Astragalus bodinii</i>	Threatened	-	Limestone Barrens	Highly Unlikely (Habitat not present)
Boreal Felt Lichen	<i>Erioderma pedicellatum</i>	Vulnerable	Special Concern	On branches and trunks of balsam fir or black spruce (rarely white spruce, red maple, or white birch) on north or east-facing slopes having a constant moisture supply	Presence Confirmed (ACCDC Maps #1, #2, #3, #4, #6; #7, #9; Appendix A)
Crowded Wormseed Mustard	<i>Erysimum inconspicuum</i> var. <i>coarctatum</i>	Endangered	-	Among vegetation or isolated on calcareous talus and cliffs, disturbed areas, bluffs, and meadows	Unlikely (Known location is in coastal western NF)
Cutleaf Fleabane	<i>Erigeron compositus</i>	Endangered	-	Calcareous substrates, gravel, and scree slopes	Highly Unlikely (Habitat not present)
Feathery False Solomon's Seal	<i>Maianthemum racemosum</i> subsp. <i>racemosum</i>	Endangered	-	Deciduous woodlands, such as alder thickets and shared roadsides	Unlikely (Known locations are in Western NF)
Fernald's Braya	<i>Braya fernaldii</i>	Threatened	Endangered	Limestone Barrens	Highly Unlikely (Habitat not present)

Species		Designation		Habitat ¹	Likelihood of Occurrence in Study Area
Common Name	Scientific Name	NL ESA	SARA		
Fernald's Milk-vetch	<i>Astragalus robbinsii</i> <i>var. fernaldii</i>	Vulnerable	Special Concern	Limestone Barrens	Highly Unlikely (Habitat not present)
Gmelin's Watercrowfoot	<i>Ranunculus gmelinii</i>	Endangered	-	Shallow river backwaters with a muddy bottom	Unlikely (Known locations are in Western NF)
Graceful Felt or Vole Ears Lichen	<i>Erioderma mollissimum</i>	Endangered	Endangered	On trunks of balsam fir in cool, humid coastal coniferous forests containing wetlands	Possible; found in similar locations as <i>Erioderma pedicellatum</i> on the Avalon Peninsula
Griscom's Arnica	<i>Arnica griscomii</i> <i>subsp. griscomii</i>	Endangered	(considered Threatened by COSEWIC)	Limestone substrates, including on ledges of partially shaded cliffs	Highly Unlikely (Habitat not present)
Lindley's Aster	<i>Symphyotrichum ciliolatum</i>	Endangered	-	A range of habitats, including semi-open birch/white spruce forests and Limestone Barrens	Highly Unlikely (Known locations are in Western NF on calcareous substrates).
Long's Braya	<i>Braya longii</i>	Endangered	Endangered	Limestone Barrens	Highly Unlikely (Habitat not present)
Low Northern Rockcress	<i>Neotorularia humilis</i>	Endangered	-	Limestone Barrens	Highly Unlikely (Habitat not present)
Mackenzie's Sweetvetch	<i>Hedysarum boreale</i> <i>subsp. mackenzii</i>	Endangered	-	Limestone Barrens	Highly Unlikely (Habitat not present)
Mountain Fern	<i>Thelypteris quelpaertensis</i>	Vulnerable	-	Open, rocky woods, and subalpine meadows in acid soils	Highly Unlikely (Habitat not present)
Mountain Holly Fern	<i>Polystichum scopulinum</i>	-	Threatened	Rock crevices and at base of boulders in serpentine or ultramafic substrates, usually exposed to full sun	Highly Unlikely (Habitat not present)
Northern Bog Aster	<i>Symphyotrichum boreale</i>	Endangered	-	Calcareous fens, marshes, and bogs, stream and pond margins, wet meadows, swales	Highly Unlikely (Known location is in Western NF)

Species		Designation		Habitat ¹	Likelihood of Occurrence in Study Area
Common Name	Scientific Name	NL ESA	SARA		
Oval-leaved Creeping Spearwort	<i>Ranunculus flammula</i> var. <i>ovalis</i>	Endangered	-	Limestone Barrens	Highly Unlikely (Habitat not present)
Porsild's Bryum	<i>Mielichhoferia macrocarpa</i>	Threatened	Threatened	Cliffs keep damp to wet from calcareous seepage or splash that are dry during winter freezing	Highly Unlikely (Habitat not present)
Rattlesnakeroot	<i>Prenanthes racemosa</i>	Endangered	-	Calcareous fens, marshes, and bogs, stream and pond margins, wet meadows, swales	Highly Unlikely (Known location is in Western NF)
Rock Dwelling Sedge	<i>Carex petricosa</i> var. <i>misandroides</i>	Endangered	-	Damp limestone cliffs, barrens, and slopes where gravel is mixed with fine soil and bedrock	Highly Unlikely (Known location is in coastal western NF)
Sharpleaf Aster	<i>Oclemena acuminata</i>	Threatened	-	Shaded woodland and disturbed habitats with cool, well-drained, acidic soils	Unlikely (Known location is in Western NF)
Tradescant's Aster	<i>Symphyotrichum tradescantii</i>	Threatened	-	Shoreline habitats, even those which undergo periods of complete inundation in wet years	Unlikely (Known locations are in Western NF)
Vreeland's Striped Coralroot	<i>Corallorhiza striata</i> var. <i>vreelandii</i>	Endangered	-	Semi-open, second-growth forests with calcareous soils and in abandoned roadbeds	Unlikely (Known locations are in Western NF).
Water Pygmyweed	<i>Tillaea aquatica</i>	Vulnerable	-	Sandy (very fine, grey sand) shores of rivers and ponds and margins of vernal pools with a distinct marine influence and sparse vegetation	Possible. Known occurrences are on the Avalon and Burin Peninsulas
Wooly Arnica	<i>Arnica angustifolia</i> subsp. <i>tomentosa</i>	Endangered	-	Limestone Barrens	Highly Unlikely (Habitat not present)

Source: Fernald (1950); Flora of North America (2015)

Table 3.2 Rare Plant Species Observed in the Regional Area From Bay d'Espoir to Chapel Arm

Species		ACCDC Designation	Habitat ¹
Common Name	Common Name		
Acadian Quillwort	<i>Isoetes acadiensis</i>	S1	Emergent or in shallow, slightly acid lakes, ponds, and streams
American Burred	<i>Sparganium americanum</i>	S2S3	Shores and edges of shallow neutral-to-alkaline ponds in peat bogs
Beautiful Peatmoss	<i>Sphagnum pulchrum</i>	S2	Fens, raised bogs, along edge of small muddy pools, low to moderate elevations
Blackgirdled Bulrush	<i>Scirpus atrocinctus</i>	S3S5	Mixed forests, marshes, moist meadows, ditches
Blue Felt Lichen	<i>Degelia plumbea</i>	SNR	On branches and trunks of yellow birch in moist sites or near the edges of streams and ponds, and more rarely on trembling aspen, white spruce, rock, and some non-native trees
Boreal Felt Lichen	<i>Erioderma pedicellatum</i>	S3	On branches and trunks of balsam fir or black spruce (rarely white spruce, red maple, or white birch) on north or east-facing slopes having a constant moisture supply
Dwarf Rattlesnake Plantain	<i>Goodyera repens</i>	S3S4	Mature, mossy Balsam Fir dominated forest with some White Birch present and understory dominated by Stairstep Moss; wet organic soil; filtered light
Grass-leaf or Grassy Arrowhead	<i>Sagittaria graminea</i>	S3	Margins of streams, lakes, and ponds, and tidal areas where freshwater flow backed up by saltwater tide
Lanceleaf Violet	<i>Viola lanceolata</i>	S2	Damp to inundated peaty open/unvegetated mud or in slight shade.
Leathery Grapefern	<i>Botrychium multifidum</i>	S2S3	Large path on river bank, widespread in fields
Mosquito Bulrush	<i>Scirpus hattorianus</i>	S3	Marshes, moist meadows, ditches
Purple Bladderwort	<i>Utricularia purpurea</i>	S2	Shallow ponds and slow streams with rocky and mucky bottom
Small Waterwort	<i>Elatine minima</i>	S2	Muddy shores of ponds, tidal flats, and salt marshes
Smooth Lungwort	<i>Lobaria quercizans</i>	S3S4	Bark of deciduous trees, usually maples
Virginia Wildrye or Terrell Grass	<i>Elymus virginicus</i> var. <i>virginicus</i>	S3	Thickets and shores lines just above high tide mark
lichen	<i>Pilophorus fibula</i>	S1	Large boulders in small streams above the flood level and partially under a forest canopy
lichen	<i>Lichinodium sirosiphoideum</i>	S3S4	Epiphyte on other lichens, old Balsam Fir and Black Spruce forest with feathermoss understory
lichen	<i>Fuscopannaria ahlneri</i>	S3S4	Old growth Balsam Fir and Black Spruce forest with feathermoss understory; adjacent peat bog, moist to wet
lichen	<i>Parmelia omphalodes</i>	SNR	Exposed, erratic rocks in fire-barren heath
moss	<i>Fissidens bryoides</i>	S1	Stones and rocks in shaded, moist areas, along streams, sometimes inundated, uncommonly around bases of trees

Species		ACCDC Designation	Habitat ¹
Common Name	Common Name		
peatmoss	<i>Sphagnum strictum</i>	S2	Peaty sand, pine barrens, burned-over savannas, seeps in mountainous areas inland; low to high elevations
peatmoss	<i>Sphagnum molle</i>	S1	Fens, sand dunes, savannas, pine barrens, swamps, pond margins, and ditches where periodic desiccation is common; low to high elevations

Source: Fernald (1950); Flora of North America (2015); ACCDC (2015)

3.2 Descriptions of Listed Species

Boreal Felt Lichen

Boreal Felt Lichen is a leafy, grey-blue-green epiphytic lichen that grows on the trunks and branches of trees (Figure 3.1). Typically it is found on balsam fir trees but it has also been found on black spruce, red maple, white birch, and associated with other cyanolichens (Maass and Yetman 2002; Keeping and Hanel 2006). It is often found associated with other lichen species, *Lobaria scrobiculata* and *Coccocarpia palmicola*.

The Island of Newfoundland is home to over 90 percent of the known global population of the Boreal Felt Lichen. In Newfoundland, this species grows in the sub-oceanic forest regions of the central Avalon Peninsula and Bay d'Espoir in cool, moist, sphagnum-rich sites such as partially open wetlands and forests (i.e., crown cover between 25-75 percent) adjacent to nutrient poor fens and bogs (Maass and Yetman 2002; Keeping and Hanel 2006). Boreal Felt Lichen is known to occur on northerly exposed forested slopes where cool and moist conditions prevail in self-perpetuating forest types (Keeping and Hanel 2006). No critical habitat has been identified and designated for Boreal Felt Lichen.

Figure 3.1 An Image of Boreal Felt Lichen



Source: Keeping and Hanel (2006)

Blue Felt Lichen

Blue Felt Lichen is blue-grey, leafy cyanolichen that grows most often on yellow birch in moist sites such as cool, humid woodlands (Figure 3.2; COSEWIC 2010). It more rarely grows on trembling aspen, white spruce, or rocks, although the majority of occurrences in Newfoundland and Labrador are actually found on non-native trees. Within Canada, it is known only to the Atlantic region. It is vulnerable to disturbance that reduces habitat humidity and it is sensitive to acid rain (COSEWIC 2010).

In Newfoundland, this species is known to occur in approximately 24 locations within four general areas: 1) Bay d'Espoir, 2) the central Avalon Peninsula, 3) Terra Nova National Park, and 4) southwest Newfoundland (COSEWIC 2010). This species occurs in the Study Area line at the head of Bay d'Espoir (13 percent of occurrences), in Jipujij'kuei Kuespem Park (75 percent of occurrences), and in Conne River (13 percent of occurrences) (Appendix A). No critical habitat has been identified and designated for Blue Felt Lichen.

Figure 3.2 An Image of Blue Felt Lichen



Source: COSEWIC (2010)

Water Pygmyweed

Water Pygmyweed is a very tiny, red to green colour amphibious plant species (Figure 3.3). While it is not known to occur within the Study Area, the species is found on shores in Placentia Bay which at its most northern extent borders the Study Area (Appendix C). Water Pygmyweed has been listed as Vulnerable under the *NL ESA*. Within the province it is known to occur in six populations, all of which are found on the Burin and Avalon Peninsulas.

Less research has been completed on the Water Pygmyweed than other listed plants in the province. The limited research available suggests the habitat for Water Pygmyweed is associated with sandy shores of rivers and ponds with a marine influence (SSAC 2008b) and within proximity of known occurrences in Placentia Bay.

Figure 3.3 An Image of Water Pygmyweed



Source: SSAC (2008b)

3.3 Ecological Land Classification Results

As described earlier, 10 ecotypes were identified, delineated, and mapped within the Study Area from Bay d'Espoir to Come By Chance as part of the 2015 ELC Study (Amec Foster Wheeler 2015). A total of 14,057 ha of habitat were classified in this analysis.

An ELC for the remaining section of the Study Area from Come By Chance to Chapel Arm was previously conducted by Stantec (2010b) and was, therefore, not included in the 2015 study because the modeling was already complete.

Table 3.3 provides a summary of the results of the most recent ELC study from Bay d'Espoir to Come By Chance.

Table 3.3 ELC Habitats by Area in the Project and Study Areas (Bay d’Espoir to Come By Chance)

2015 ELC Habitat Type	40 m Wide Right of Way (ha)	1 km Wide Study Area (ha)
Softwood Forest	108.66	2,509.49
Hardwood Forest	8.75	249.96
Mixedwood Forest	67.37	1,503.73
Softwood Scrub	66.10	1,527.65
Hardwood Scrub	0.74	22.21
Herbaceous	4.24	197.25
Barren	85.94	2,259.48
Shrub	37.67	895.67
Wetland	143.78	3,807.00
Anthropogenic / Other	37.37	1,085.51
Total	560.62	14,057.95

3.4 Listed / Rare Plant Modeling Results

In this study, habitat potential is predicted, in part, based on the number of listed / rare plant species that are known to utilize a particular habitat type. Table 3.4 provides a summary of the number of known listed / rare plant occurrences in the Study Area which occur in each of the above described ELC habitat classifications. As indicated, no individual habitat type has more than four occurrences and most (seven out of ten) have no known occurrences (Table 3.4).

Table 3.4 Number of Plant Occurrences in each of the ELC Habitat Classifications

2015 ELC Habitat Type	Number of Listed / Rare Plant Species Present (From ACCDC Data)
Softwood Forest	2
Hardwood Forest	0
Mixedwood Forest	2
Softwood Scrub	0
Hardwood Scrub	0
Herbaceous	0
Barren	0
Shrub	0
Wetland	4
Anthropogenic / Other	0
Total	8

A listed / rare plant habitat model was developed based on the proximity of species occurrences to delineate areas of low, medium, and high rare plant potential (Appendix B), based on species occurrence data obtained from the ACCDC (2015) for the Regional Area from Bay d’Espoir to Chapel Arm. Any location within the Study Area that was greater than 500 m away from a known listed / rare plant occurrence was classified as being of low potential, locations from 250 to 500 m from a known occurrence were classified as moderate potential and those from 0 – 250 m as high potential.

Over 98 percent of the area of / habitat within the Study Area from Bay d'Espoir to Chapel Arm was classified as low potential based on these criteria. The remaining less than two percent of the Study Area was comprised of medium (0.92 percent) and high (0.57 percent) potential habitats, with similar proportions for the Project ROW itself (Table 3.5).

Table 3.5 Area and Percentage of each Habitat Potential Classification within the Project Area (ROW) and Study Area (Bay d'Espoir to Chapel Arm)

Classification	Study Area (ha)	Study Area Percentage (%)	Project Area (ROW) (ha)	Project Area (ROW) Percentage (%)
Low	18,371.38	98.51	735.62	98.68
Medium	172.44	0.92	5.47	0.73
High	105.49	0.57	4.35	0.58
Total	18,649.31	100.00	745.44	100.00

Due to the limited listed / rare plant occurrence data within the Study Area itself (eight observations in total), additional effort was also made to evaluate and predict plant habitat potential as part of this study. Species specific modeling was completed using the known habitat requirements of Boreal Felt Lichen, Blue Felt Lichen, and Water Pygmyweed (Appendix C). This was conducted using the ELC Study results (Amec Foster Wheeler 2015) for the section of transmission line from Bay d'Espoir to Come By Chance.

As previously stated in Section 2.2 of this report, the Boreal Felt Lichen specific model included ELC habitat types with softwood characteristics within 18 km of coastline and 80 m from wetlands. This resulted in a total of approximately 517 and 21 ha of suitable habitat for Boreal Felt Lichen in the Study Area and Project Area (ROW), respectively (Table 3.6).

Blue Felt Lichen only has known occurrences from Bay d'Espoir east through the Bay du Nord Wilderness Reserve (ACCDC 2015). Hardwood ELC habitat types within proximity to known occurrences inside the Bay du Nord Wilderness Reserve were, therefore, identified as suitable habitat. This resulted in a total of approximately 110 and less than five ha of suitable habitat for Blue Felt Lichen within the Study Area and Project Area (ROW), respectively.

Water Pygmyweed requires sandy shores of rivers and ponds with a marine influence, with the only suitable habitat within the Study Area being 1.3 km of shoreline near Placentia Bay.

Table 3.6 Amount of Habitat Classified as Suitable for Identified Species of Interest in the Study Area and Project Area (ROW) (Bay d'Espoir to Come By Chance)

Species	Study Area (ha)	Study Area Percentage (%)	Project Area (ROW) (ha)	Project Area (ROW) Percentage (%)
Boreal Felt Lichen	517.27	2.77	20.73	2.78
Blue Felt Lichen	110.37	0.59	4.89	0.66
Water Pygmyweed	1.3 km of coastline (0.065 ha)	< 0.01	0	0.00

The Map Atlas provided in Appendix A presents the known listed / rare plant occurrence data from the ACCDC at the 1:60,000 scale.

Map Atlases provided in Appendices B and C then present the detailed results of the listed / rare plant habitat potential modeling at the 1:15,000 scale. The associated GIS system contains this information at a scale of 1:5,000, and can be analyzed and queried in detail as required.

3.5 Previous (2010) Study Results

As noted previously, this study focuses primarily on the proposed TL 267 as far east as where the proposed transmission line meets the existing TL 203, near Come By Chance. Stantec (2010a) conducted a regionally uncommon plant study for the then proposed Labrador-Island Transmission Link (L-ITL) which parallels a section of the proposed TL 267 from Come By Chance to Chapel Arm. The portion of the L-ITL Study Area which overlaps with that for the proposed TL 267 was not found to provide any high or very high potential for the occurrence of listed or rare plant species. The closest high potential areas to the current Study Area are located 15 km to the east, near Whitbourne, and are associated with rare lichen occurrences and suitable habitat data (See Figure 3.8 of Stantec 2010a). Boreal Felt Lichen, Graceful Felt Lichen and Blue Felt Lichen are known to occur in and near Whitbourne (Keeping and Hanel 2006; SSAC 2008a; COSEWIC 2009; COSEWIC 2010). This identified high potential area accounted for less than one percent of the total 2 km wide L-ITL Study Area for the Avalon region. The remaining portions were considered to be medium and low potential habitat.

In 2012, representatives of Nalcor Energy participated in a meeting with the Wildlife Division, Newfoundland and Labrador Department of Environment and Conservation to discuss outstanding issues related to regionally uncommon plants occurring within the L-ITL Study Area (Nalcor Energy 2012). As part of this process, the parties collectively identified pre-construction survey locations along the ROW using high-resolution aerial imagery, ACCDC data, and anecdotal information provided by the Wildlife Division regarding the distribution and habitat preferences of regionally uncommon plants along the planned transmission line (Nalcor Energy 2012). Of the 35 pre-construction survey locations identified for the proposed L-ITL, one was identified on the Avalon Peninsula from Whitbourne to Oceans Pond, covering a total of 15.1 ha. This pre-construction survey location was established in moist conifer forests with a minor birch component to look for Boreal Felt Lichen (Nalcor Energy 2012).

In 2013 and 2014, a regionally uncommon plant survey found two occurrences of Boreal Felt Lichen at a location east of Whitbourne in the vicinity of Goose Pond within the L-ITL ROW. In cooperation with the Wildlife Division, specimens were removed and transplanted to a suitable habitat within approximately 250 m of their original location (Nalcor Energy 2014).

4.0 SUMMARY AND CONCLUSION

The purpose of this study has been to summarize the known and potential occurrence of listed (legally protected) plant species in or near the proposed TL 267 Area (40 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). This was undertaken through background research on the known presence, distribution and habitat preferences of such plant species and the use of an associated ELC Study and associated mapping to create two habitat potential models: 1) one based on proximity of known locations for these species and 2) a species-specific habitat suitability analysis.

Two listed plant species have been identified to occur within five kilometers of the proposed TL 267 centerline – the Boreal Felt Lichen (*Erioderma pedicellatum*) and the Blue Felt Lichen (*Degelia plumbea*). Based on the available ACCDC (2015) data, there have been no reported occurrences of the protected Water Pygmyweed (*Tillaea aquatic*) in the Project Area. However, additional sources identify occurrences of this species in Placentia Bay, which is located within approximately 500 m of the TL 267 centerline.

The first habitat potential model presented herein is based on the proximity of known listed / rare species occurrences to the Project Area, and delineates areas of low (greater than 500 m), medium (250 – 500 m), and high (0 – 250 m) listed / rare plant habitat potential. Over 98 percent of the habitat within the Study Area from Bay d’Espoir to Chapel Arm was classified as being of low potential based on proximity to known occurrences. The remaining approximately two percent of the Study Area is comprised of medium and high potential areas.

Species-specific modeling was also completed using the known habitat requirements of Boreal Felt Lichen, Blue Felt Lichen and Water Pygmyweed, and was carried out using the ELC Study results for the section of the proposed transmission line from Bay d’Espoir to Come By Chance. A total of approximately 517 and 21 ha of suitable habitat for Boreal Felt Lichen were identified in the Study Area and Project Area (ROW), respectively. A total of approximately 110 and five ha of suitable habitat for Blue Felt Lichen were identified within the Study Area and ROW, respectively. The only suitable habitat for Water Pygmyweed within the Study Area is 1.3 km of shoreline near Placentia Bay. A previous regionally uncommon plant study for the section of the Study Area from Come By Chance to Chapel Arm did not identify any high or very high potential habitats for listed or rare plant species in that area.

These areas are identified, mapped, and described in this report, and the resulting information will be considered in on-going Project design and planning to proactively avoid or attempt to reduce direct interaction with these locations and/or to plan further study of these areas as required.

5.0 REFERENCES

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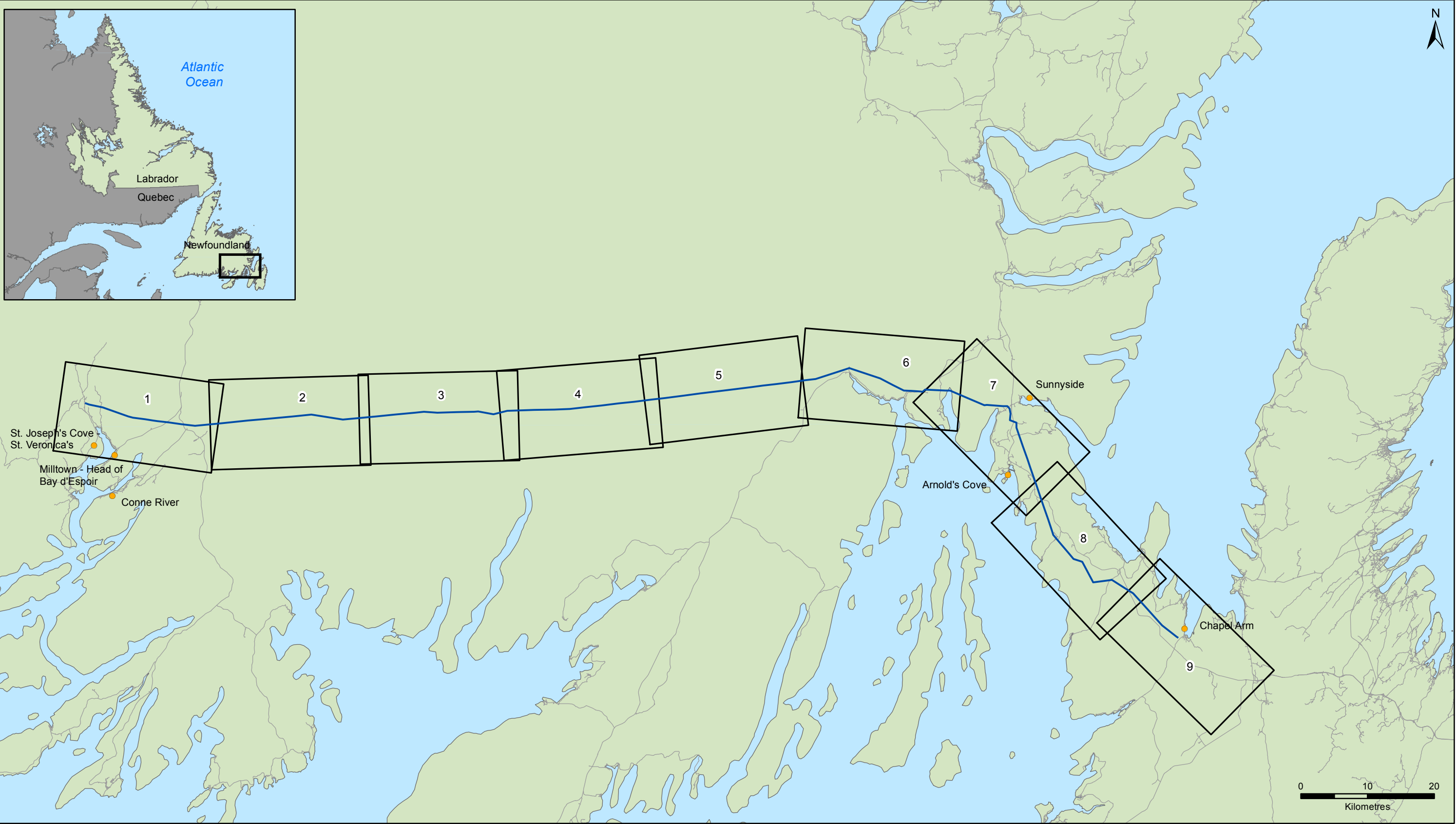
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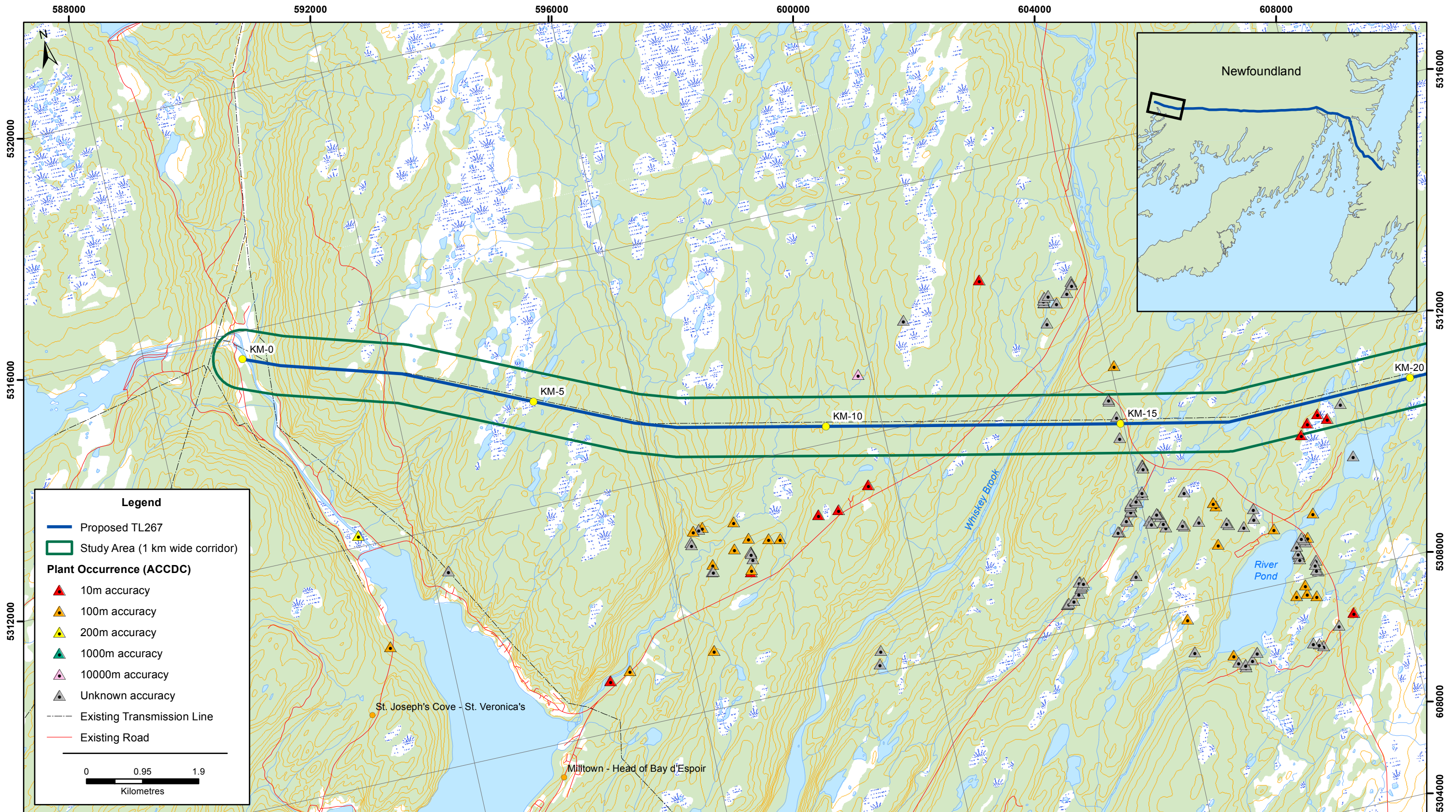
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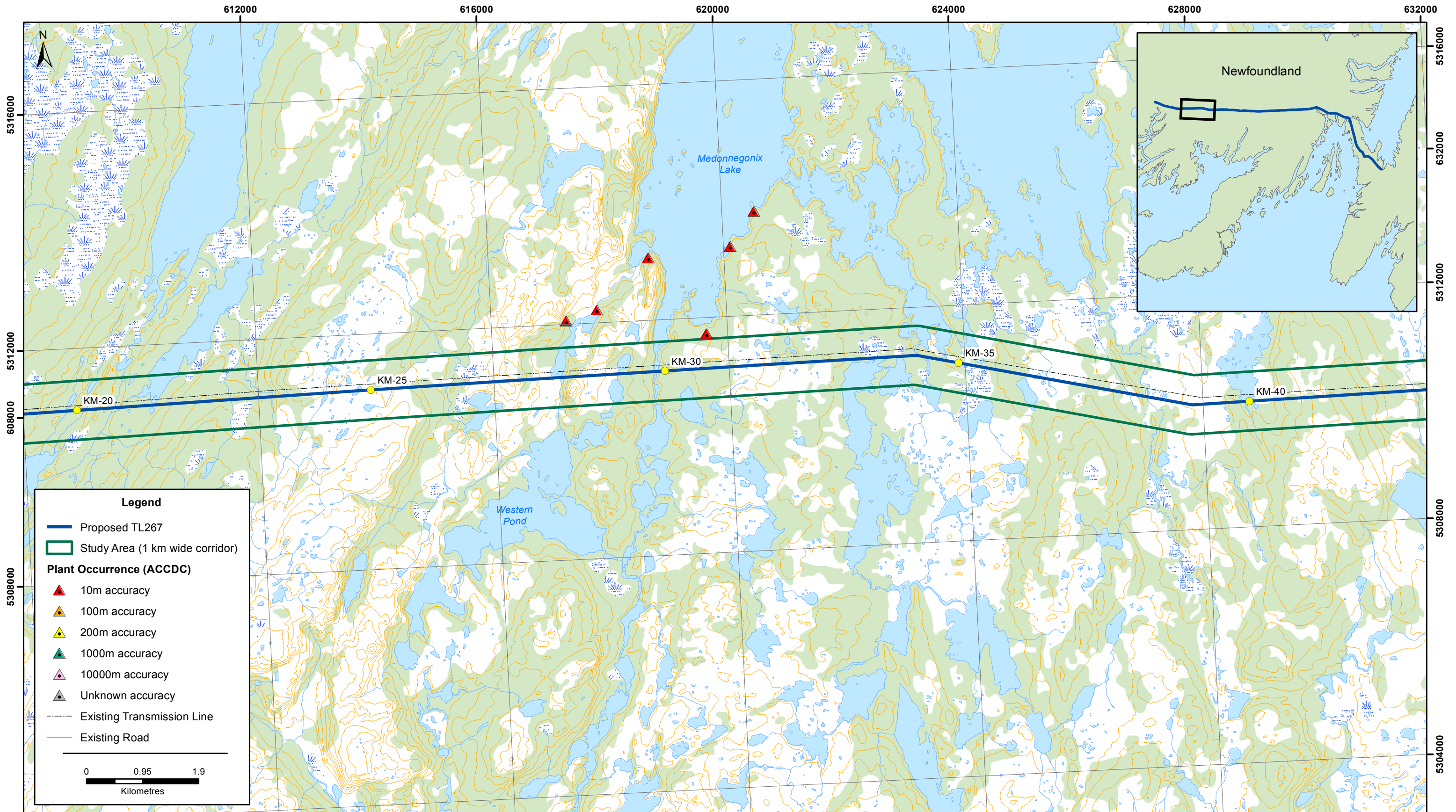
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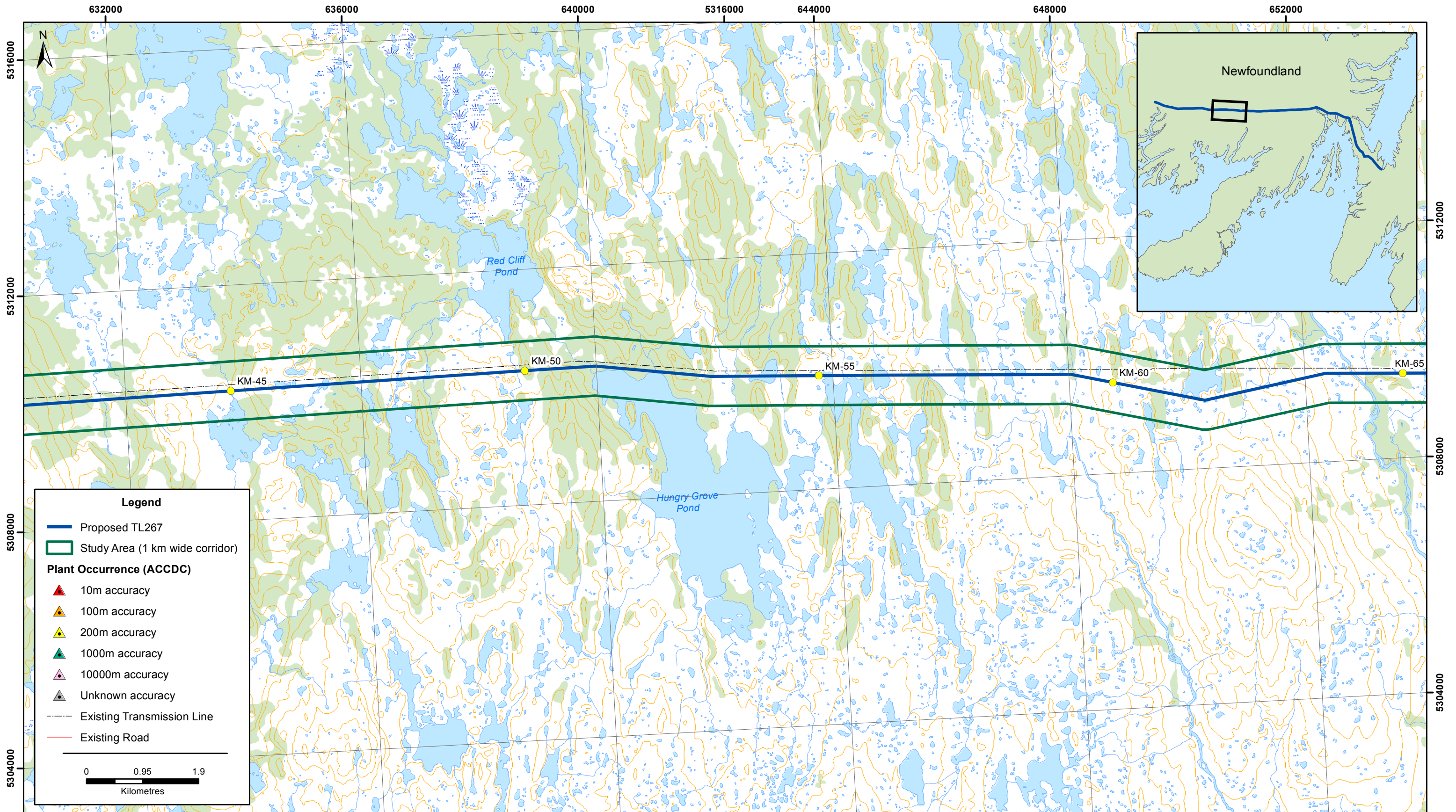
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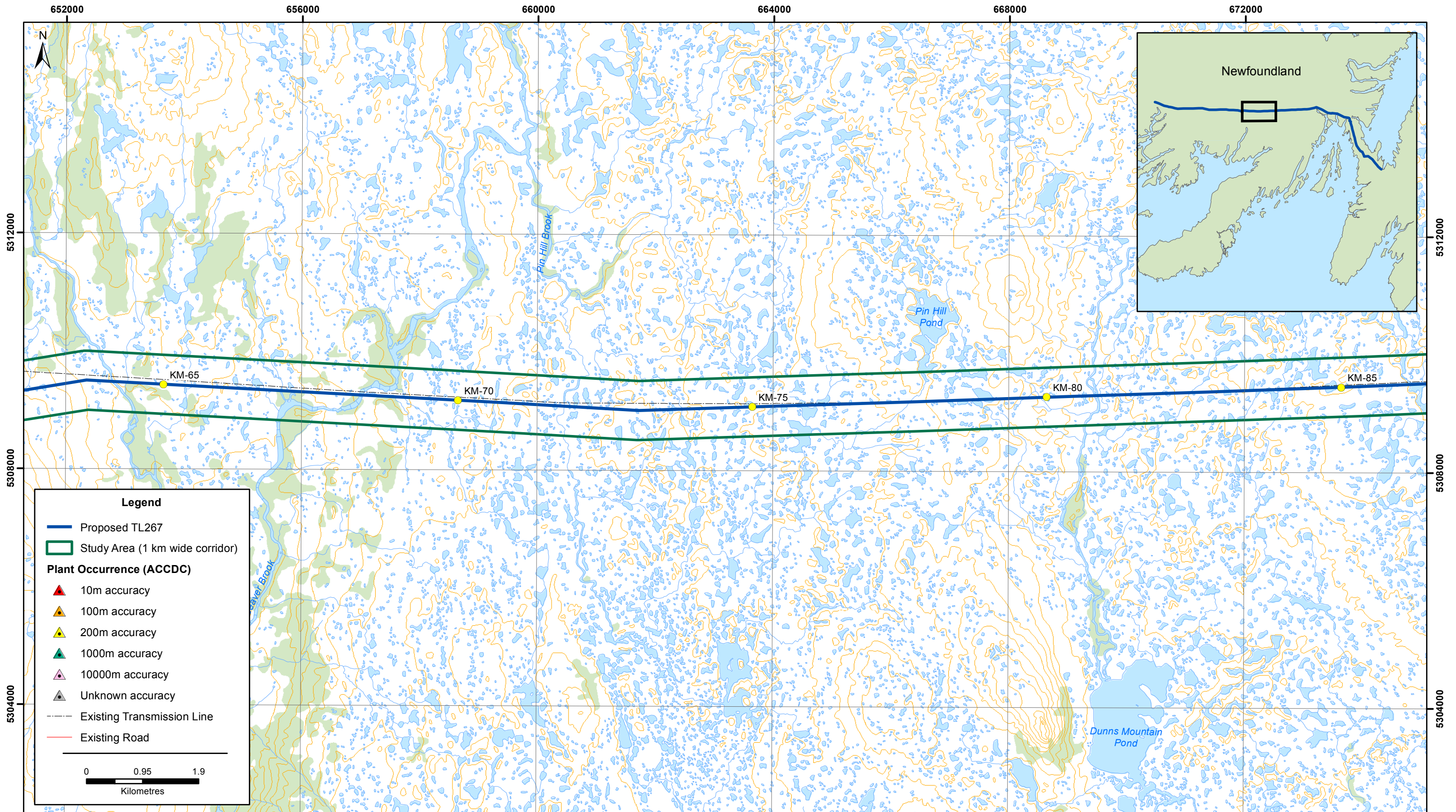
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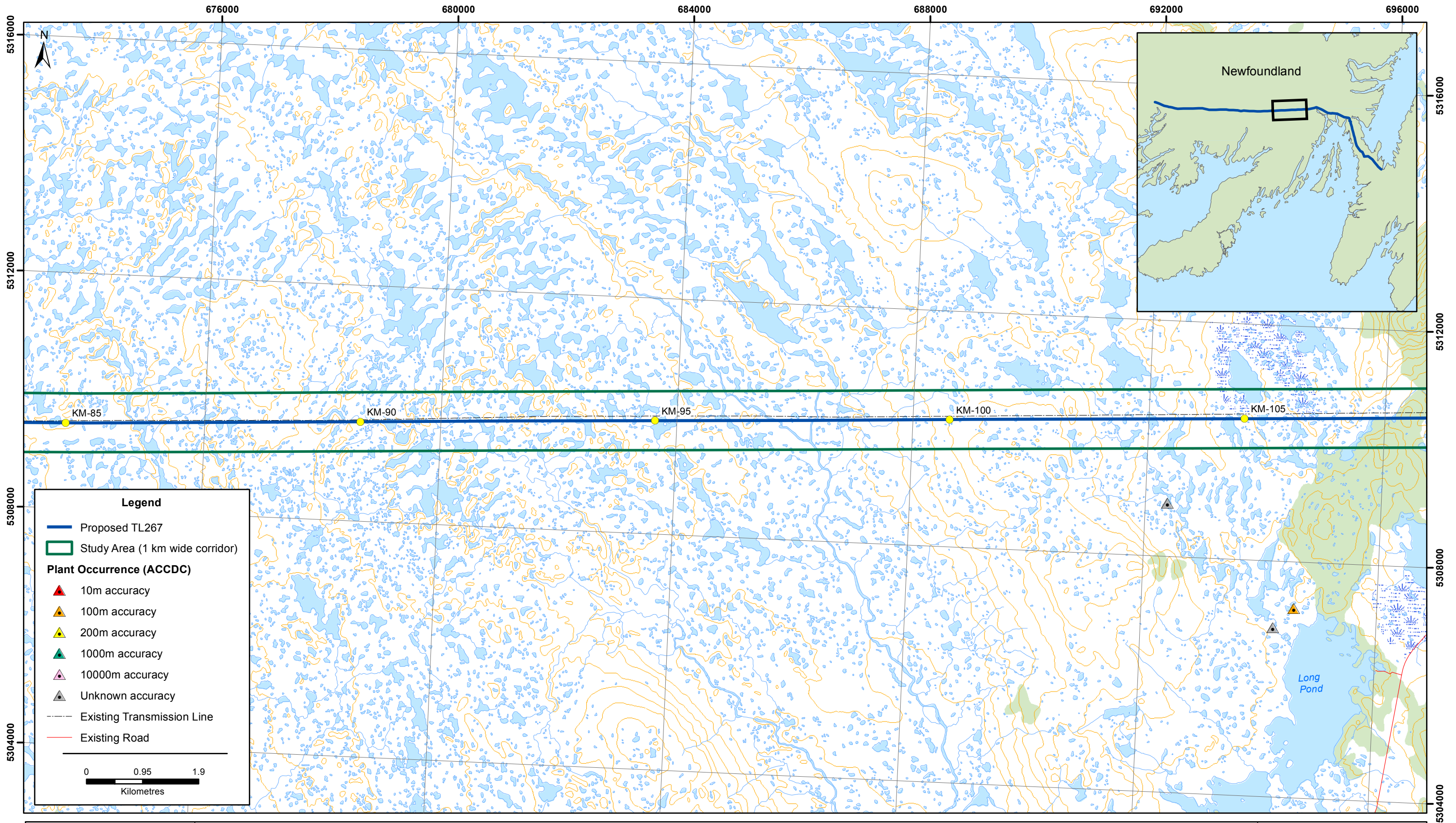


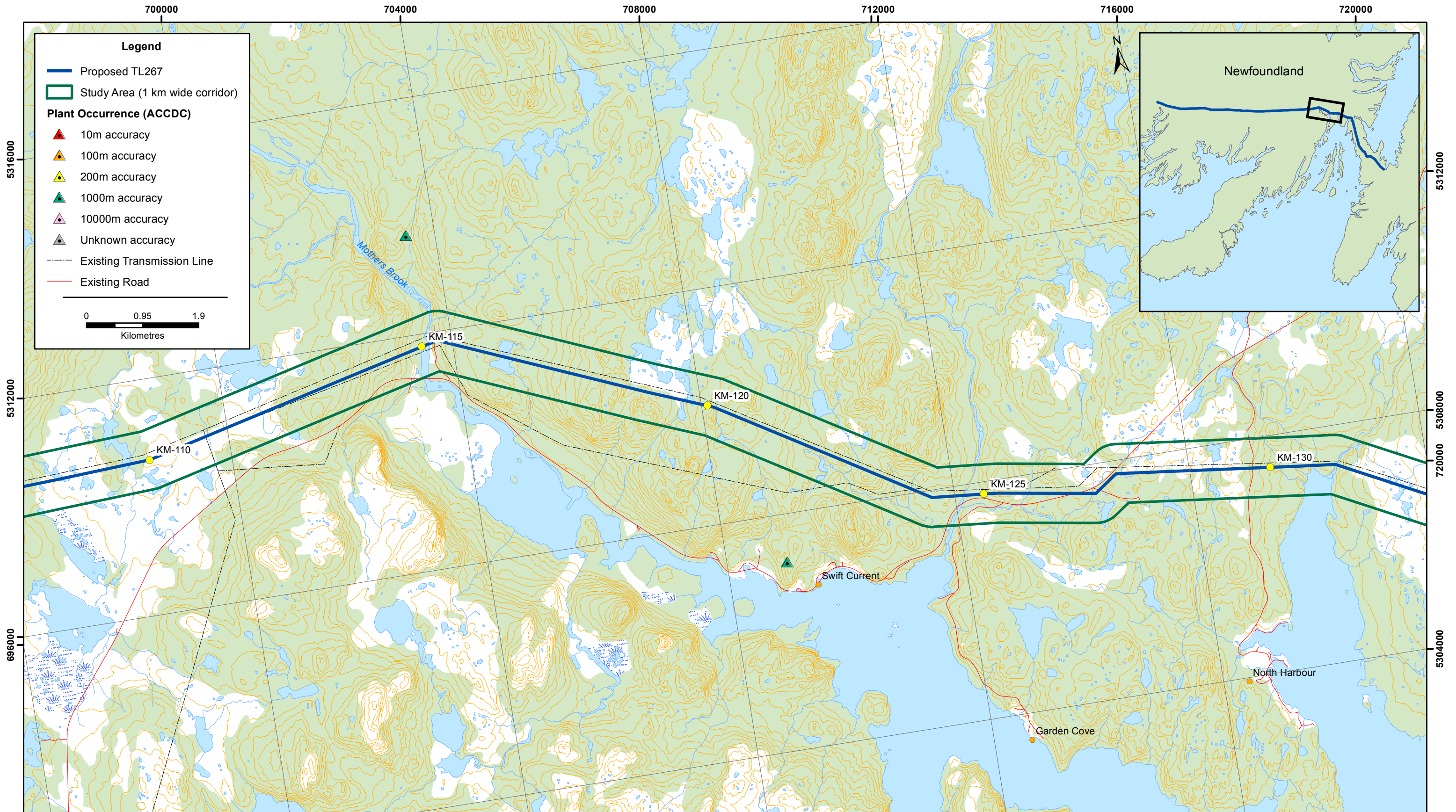


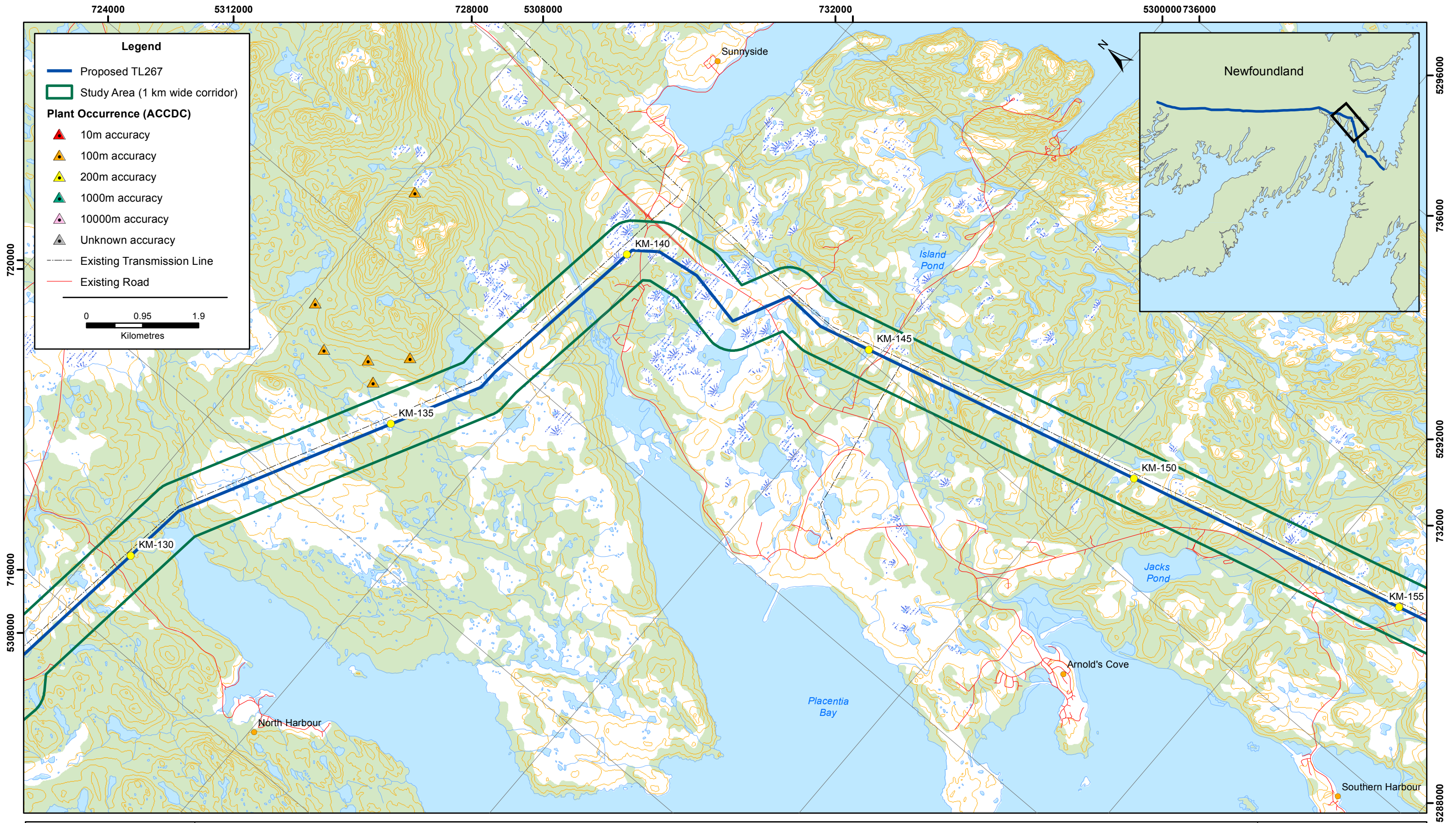


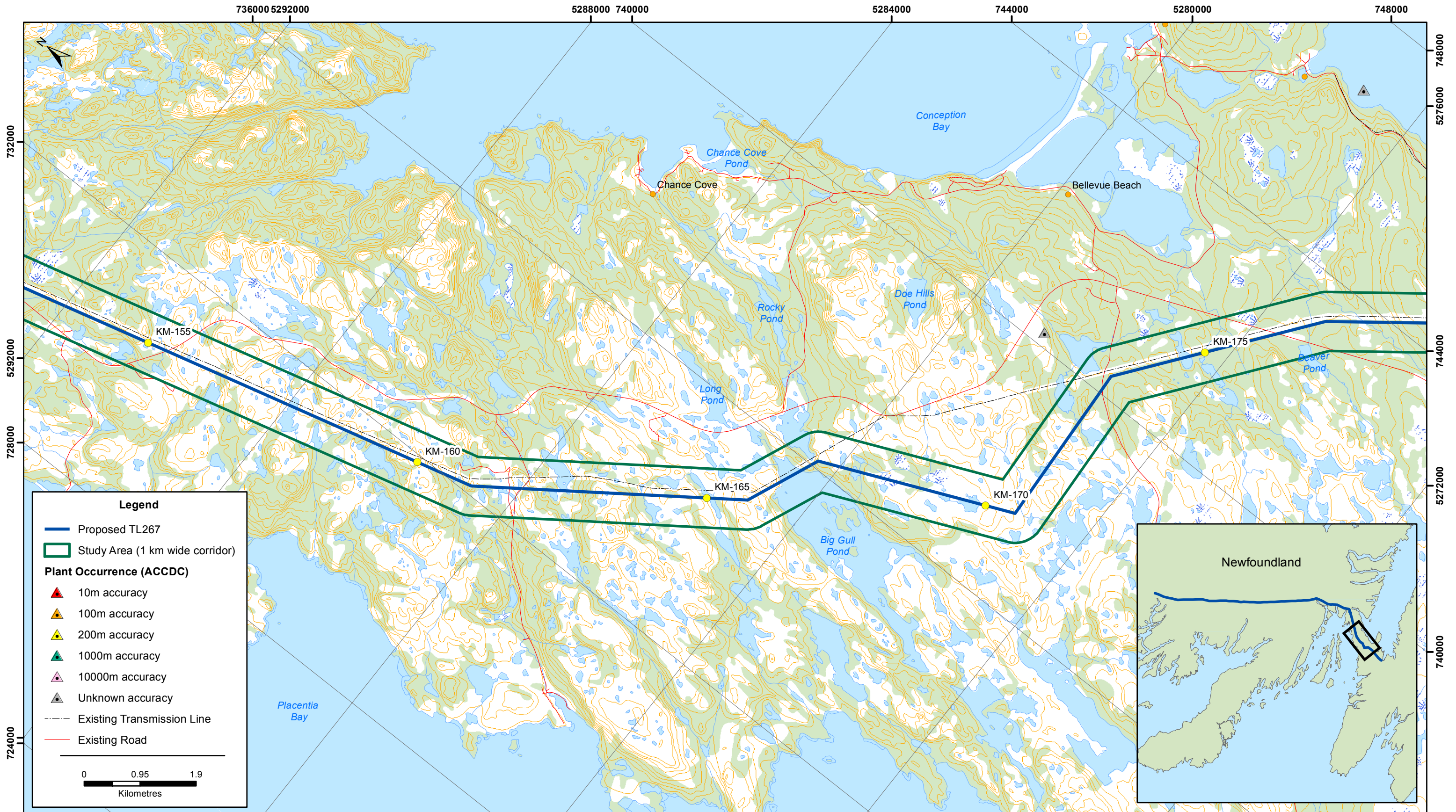


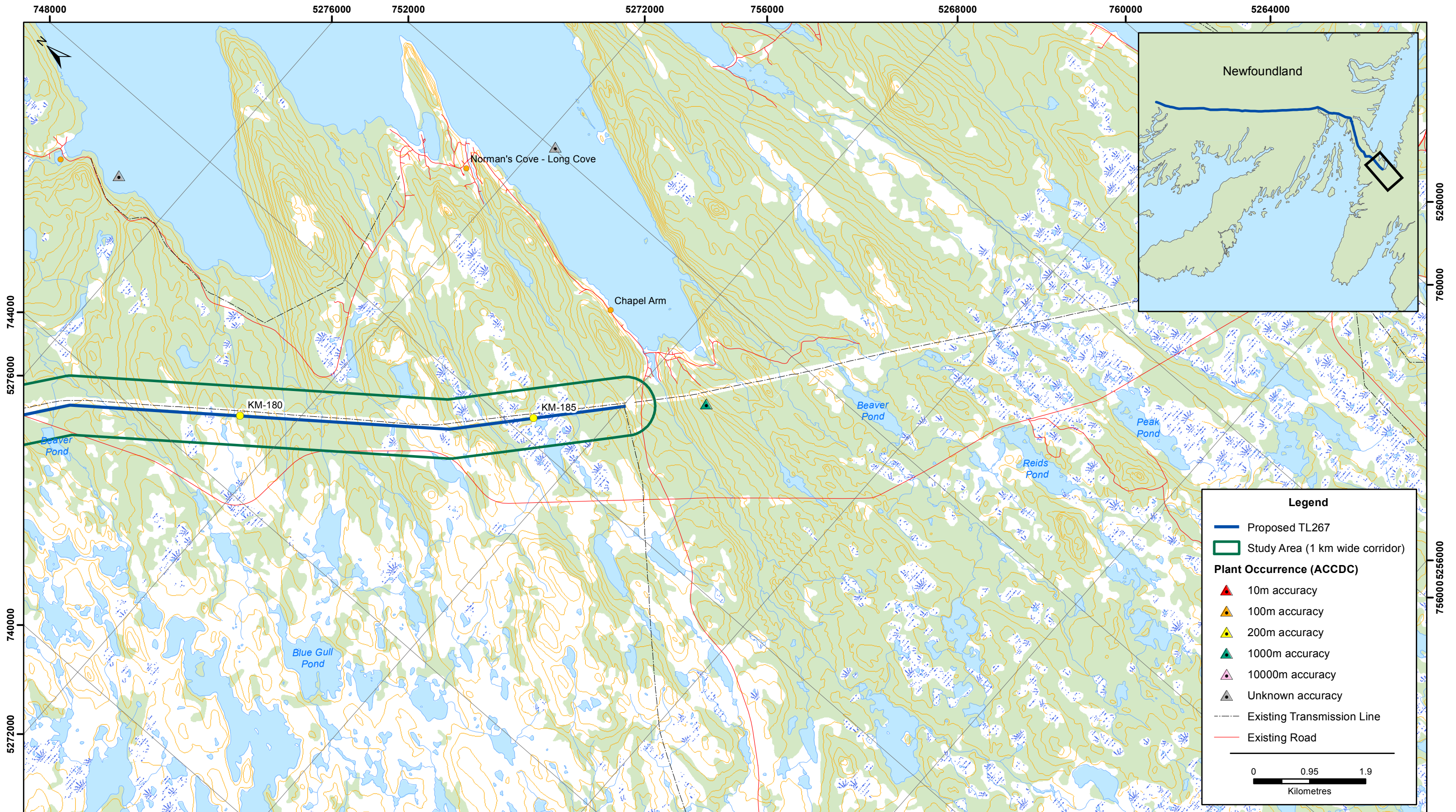








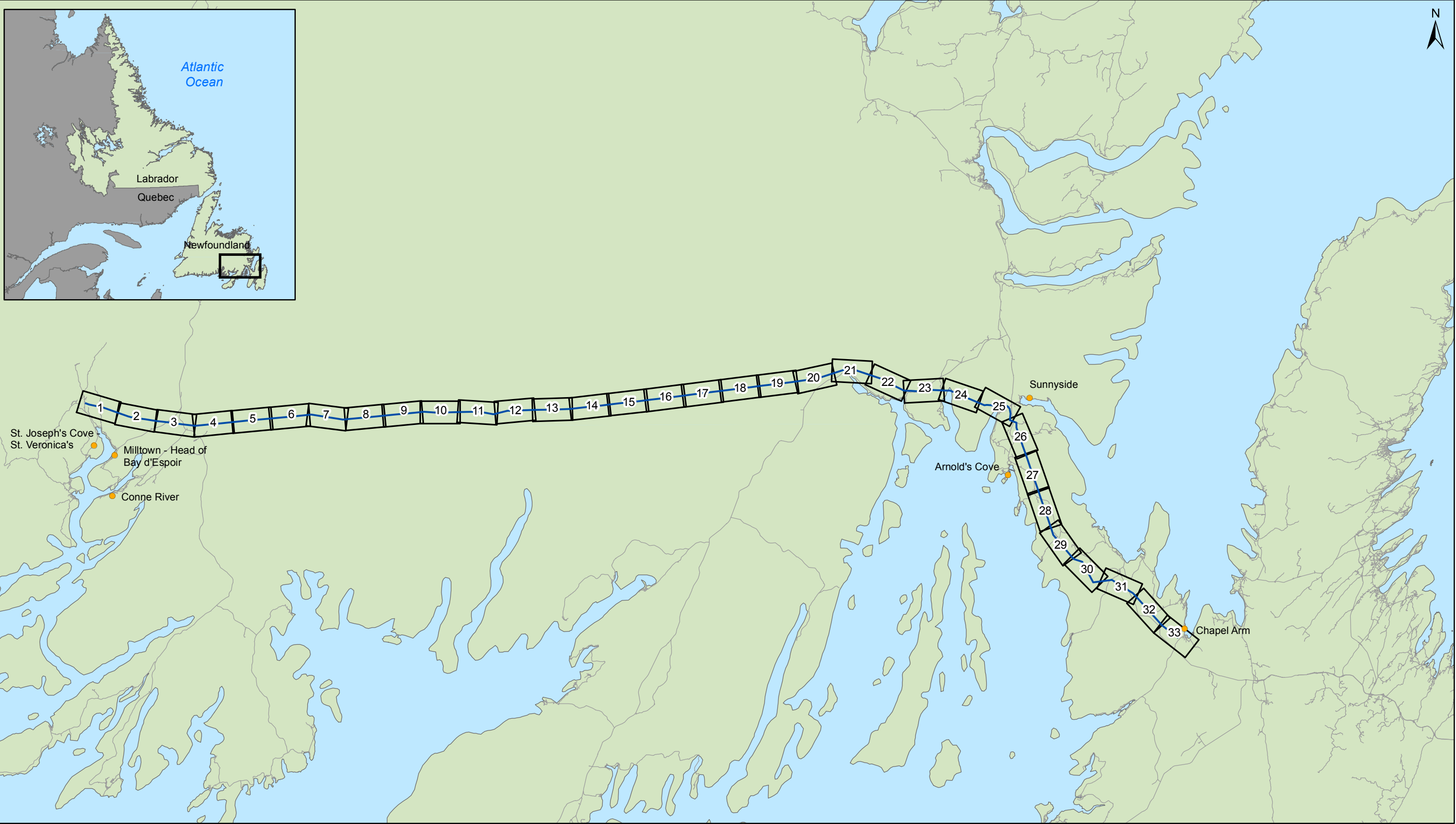


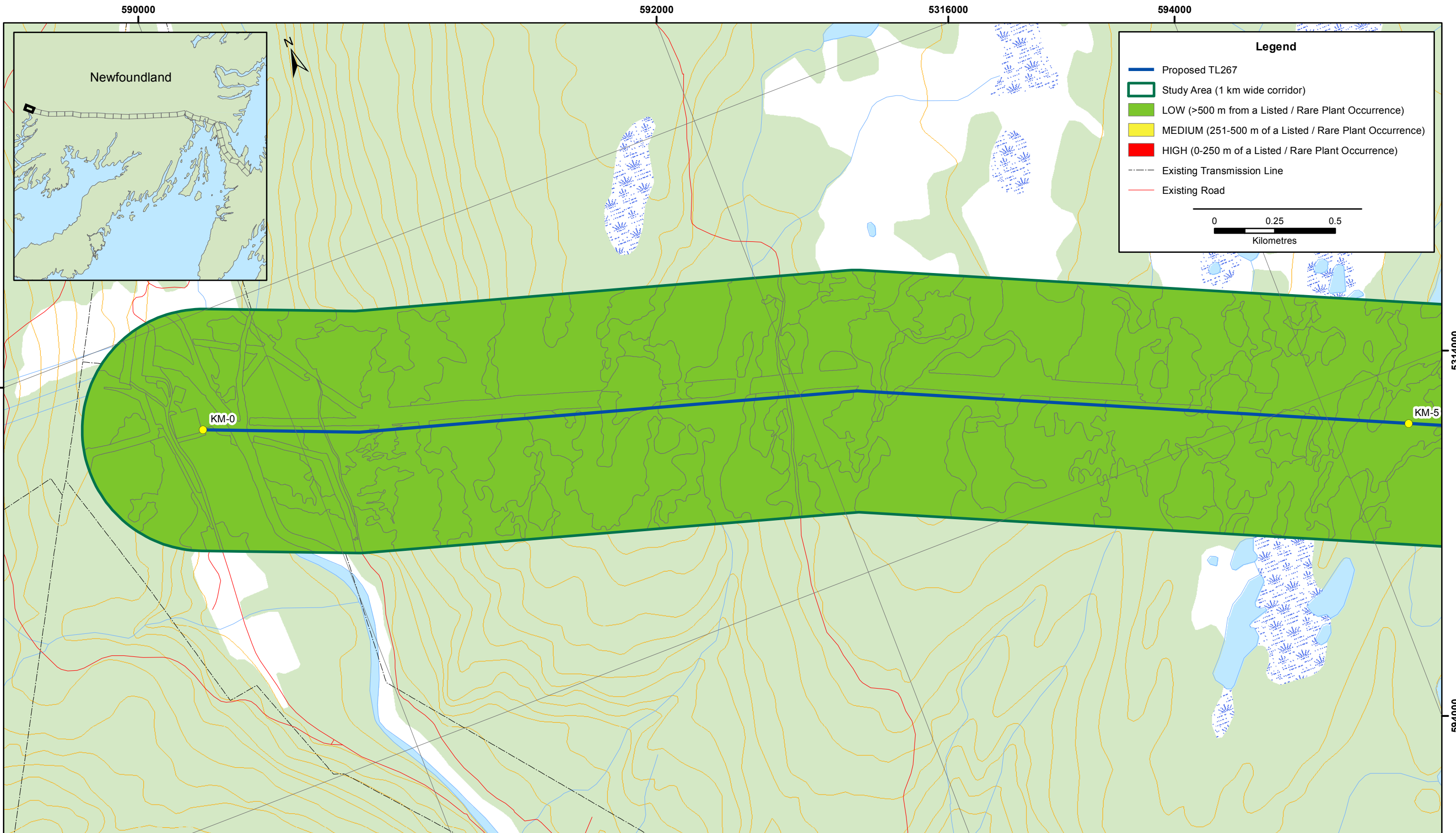


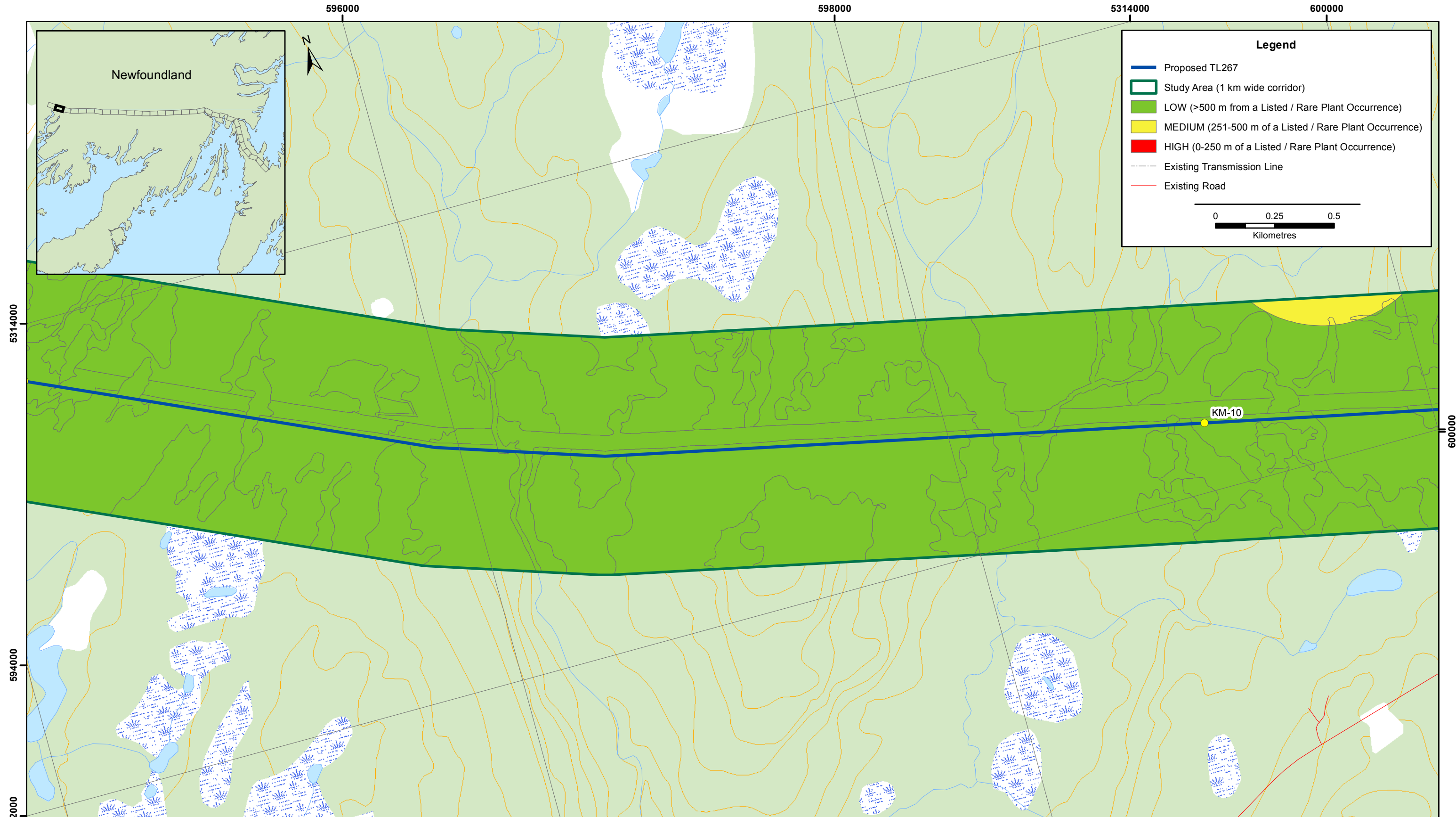
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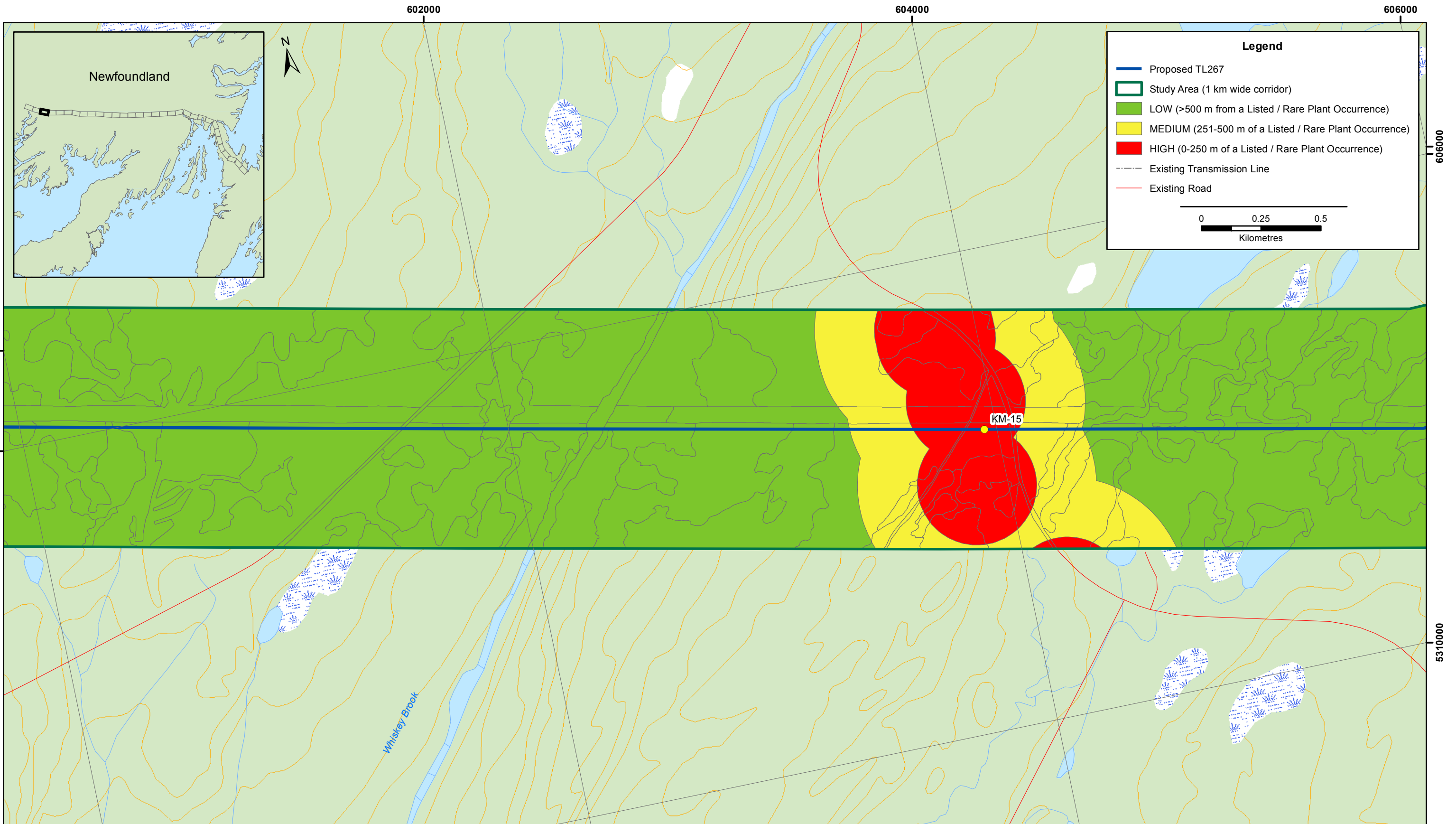
Model #1 Results: Listed / Rare Plant Habitat Potential (Proximity)

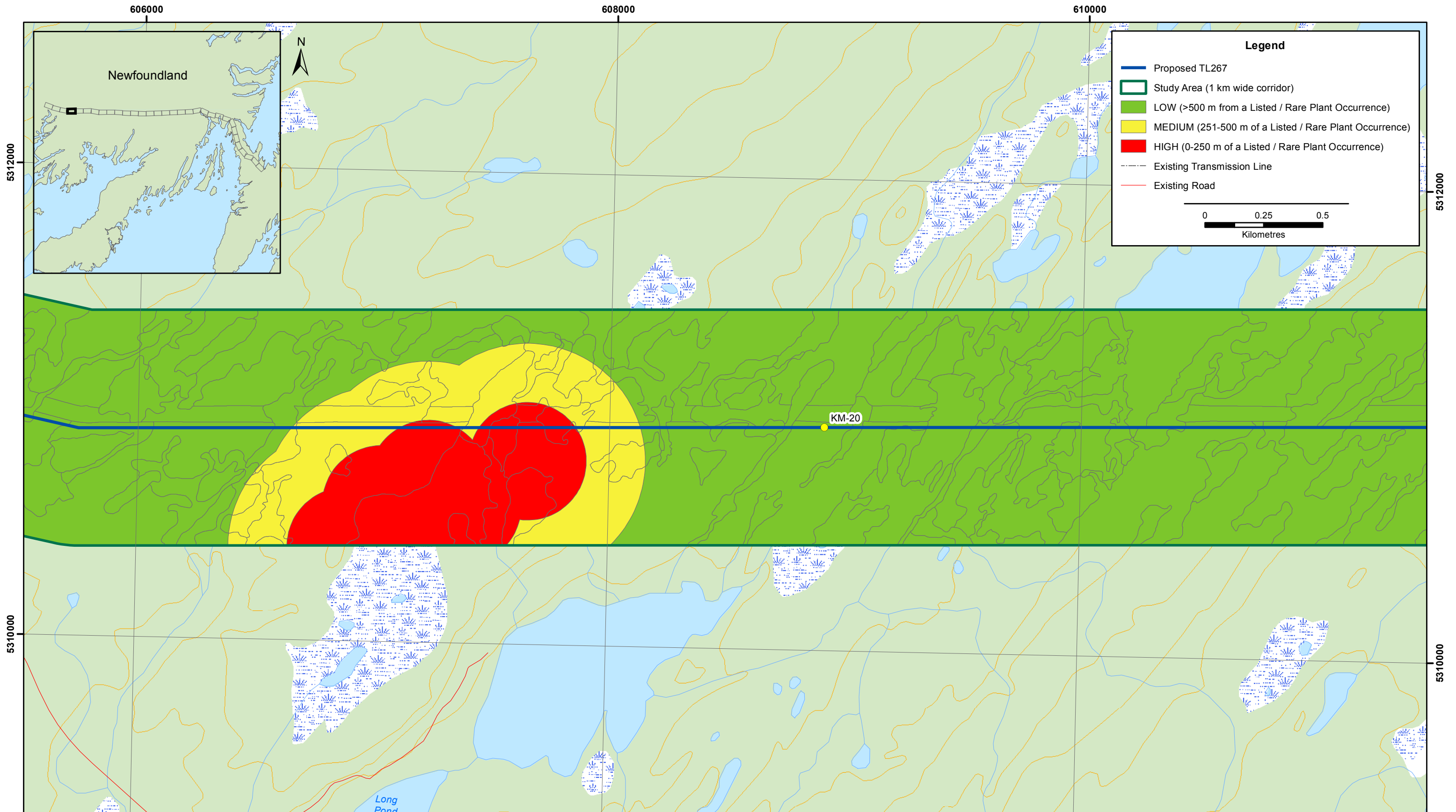
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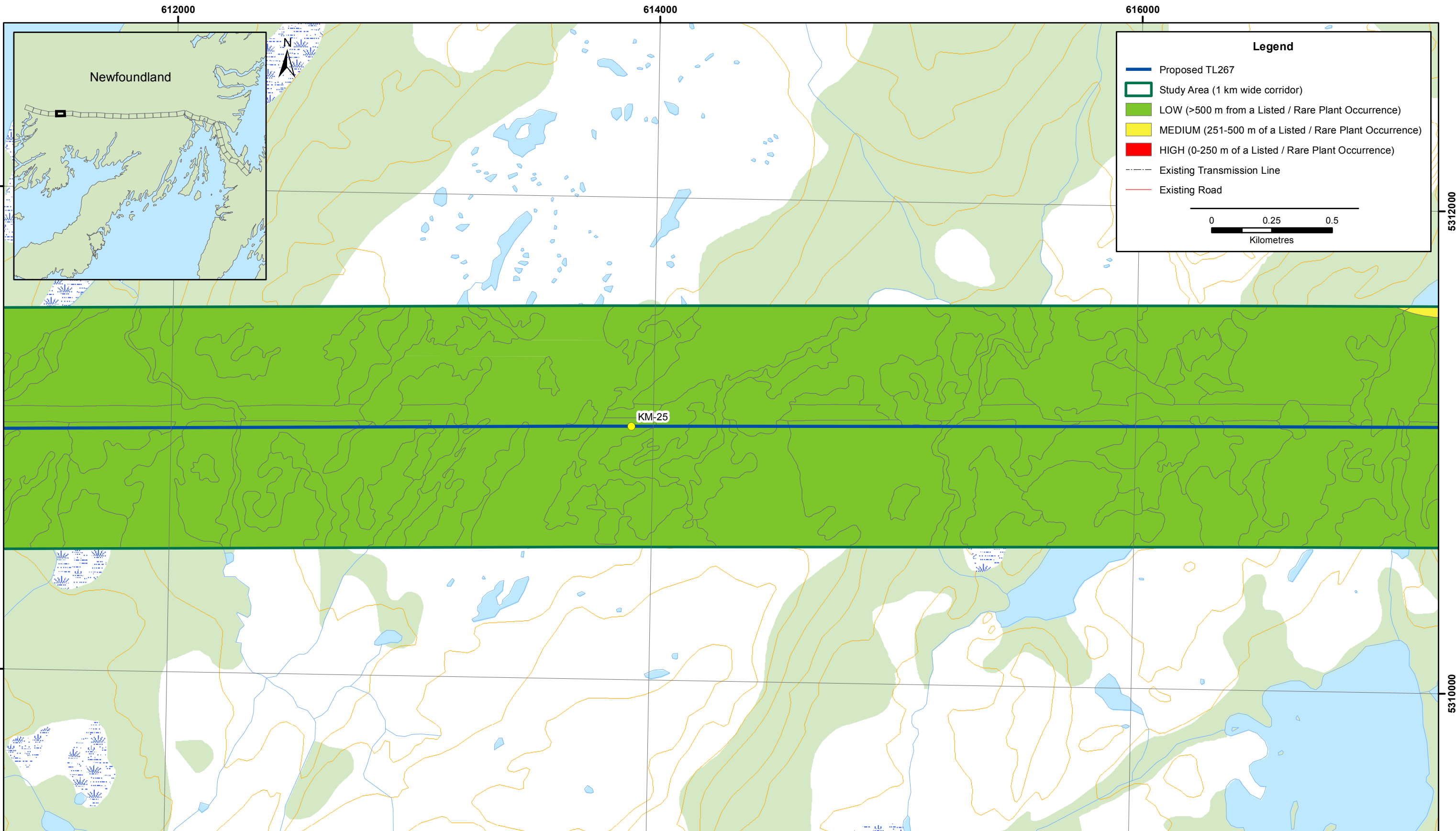


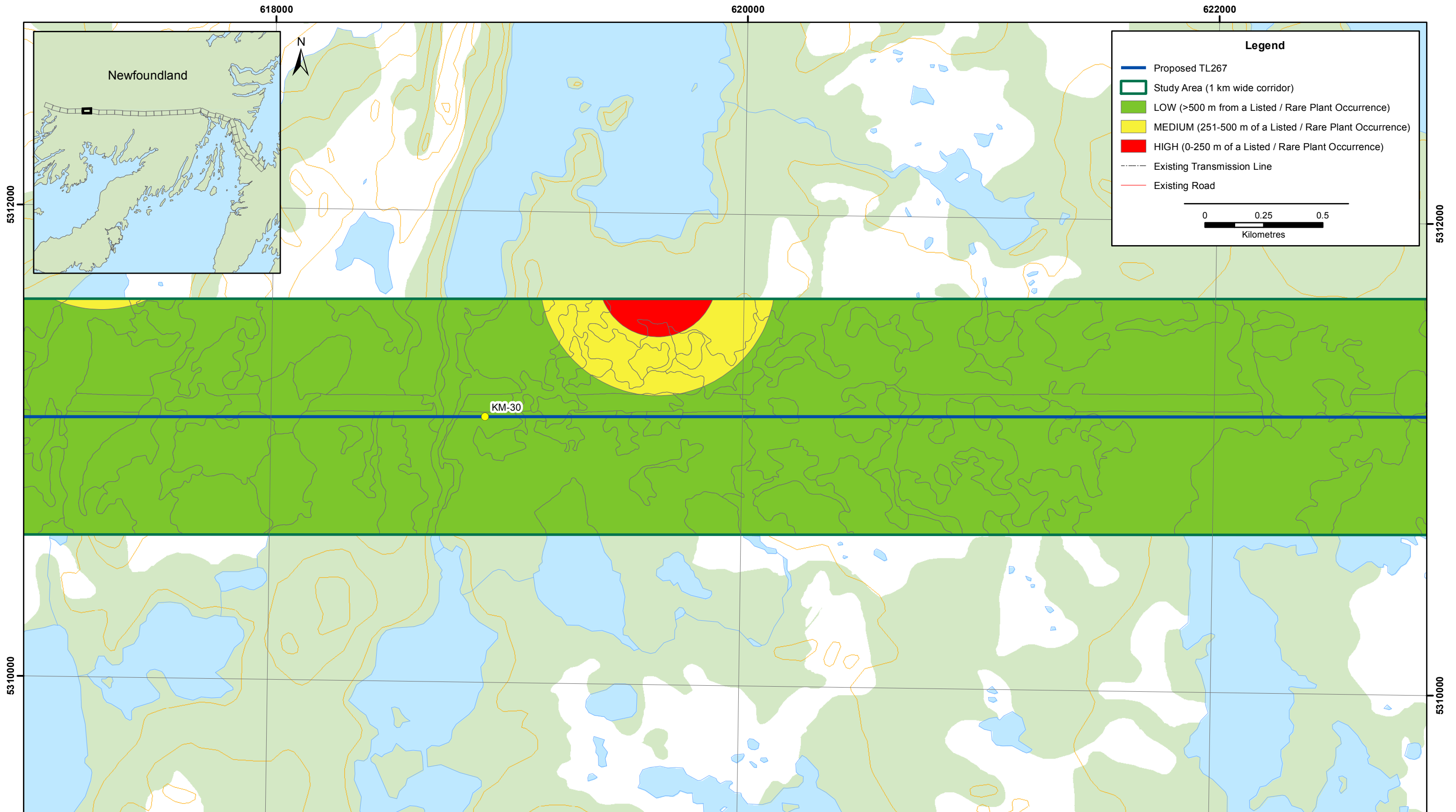


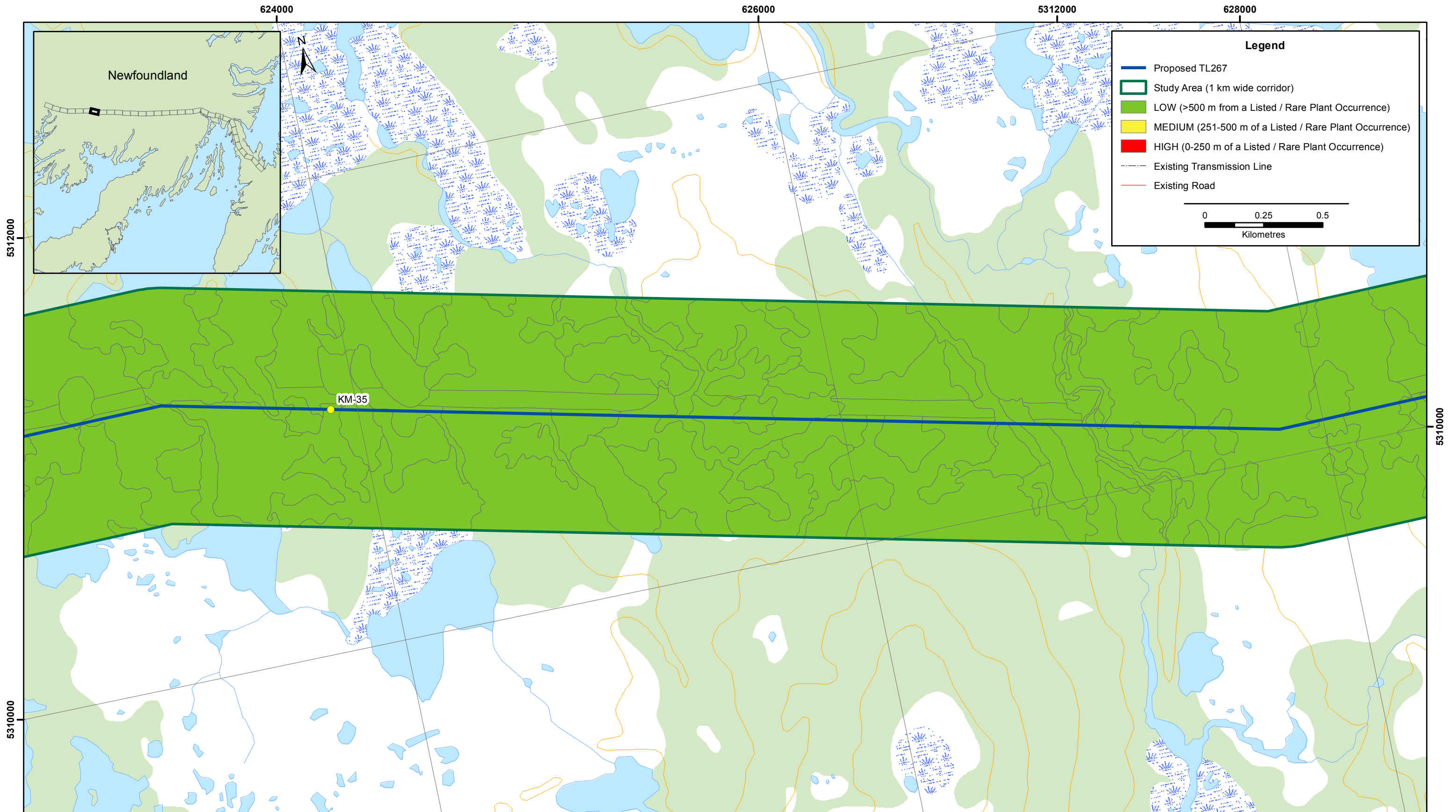








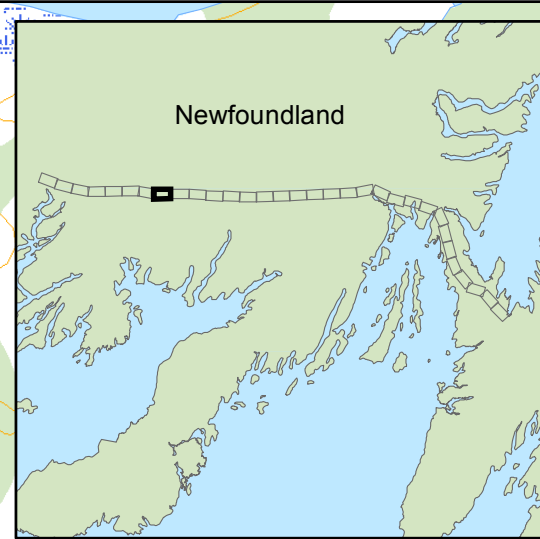











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Legend

-  Proposed TL267
-  Study Area (1 km wide corridor)
-  LOW (>500 m from a Listed / Rare Plant Occurrence)
-  MEDIUM (251-500 m of a Listed / Rare Plant Occurrence)
-  HIGH (0-250 m of a Listed / Rare Plant Occurrence)
-  Existing Transmission Line
-  Existing Road

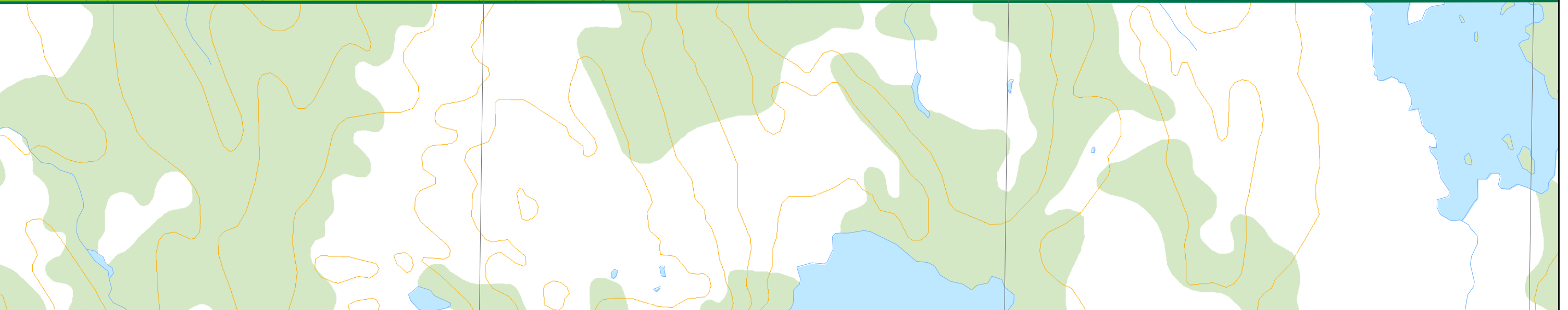
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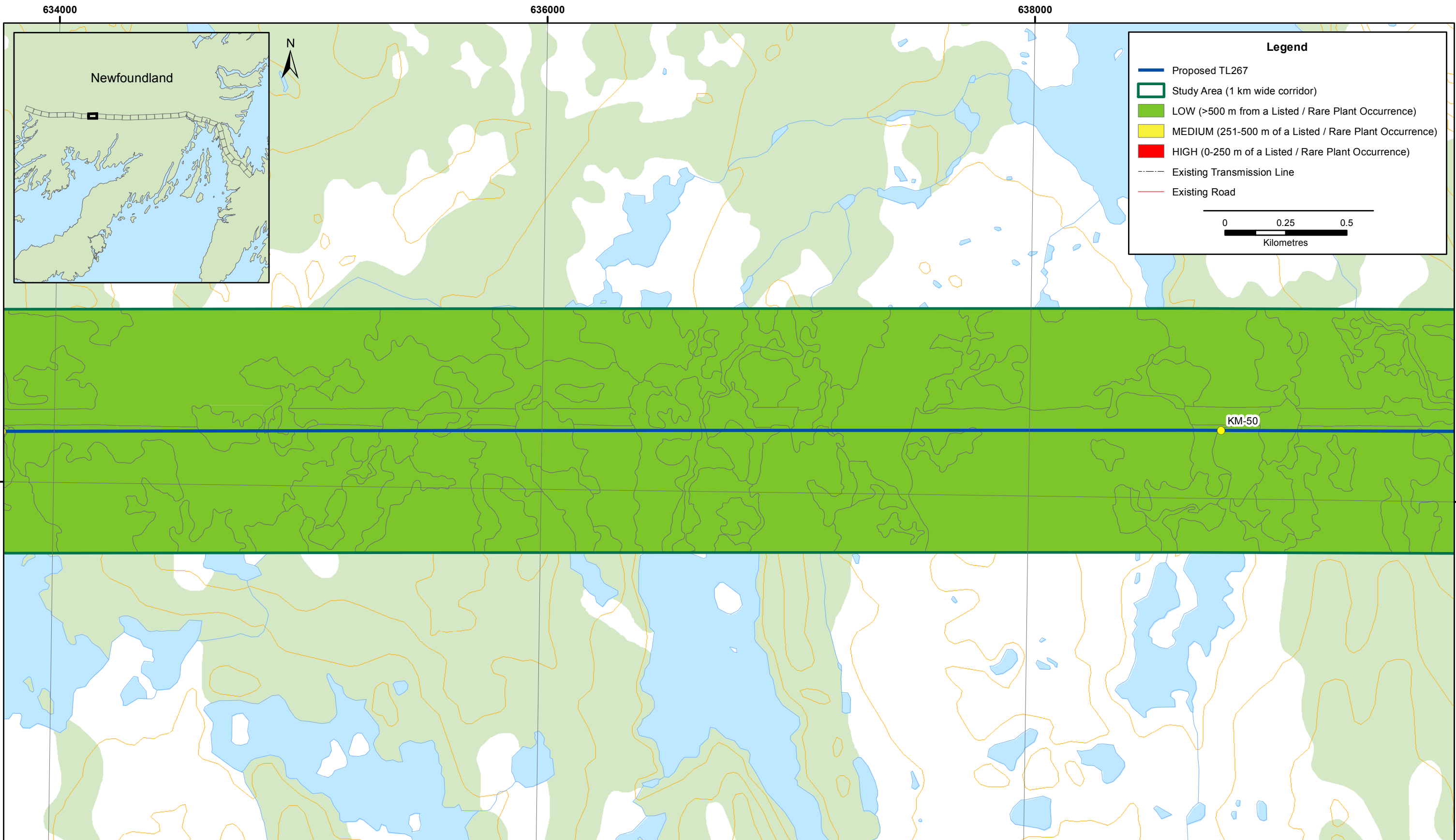
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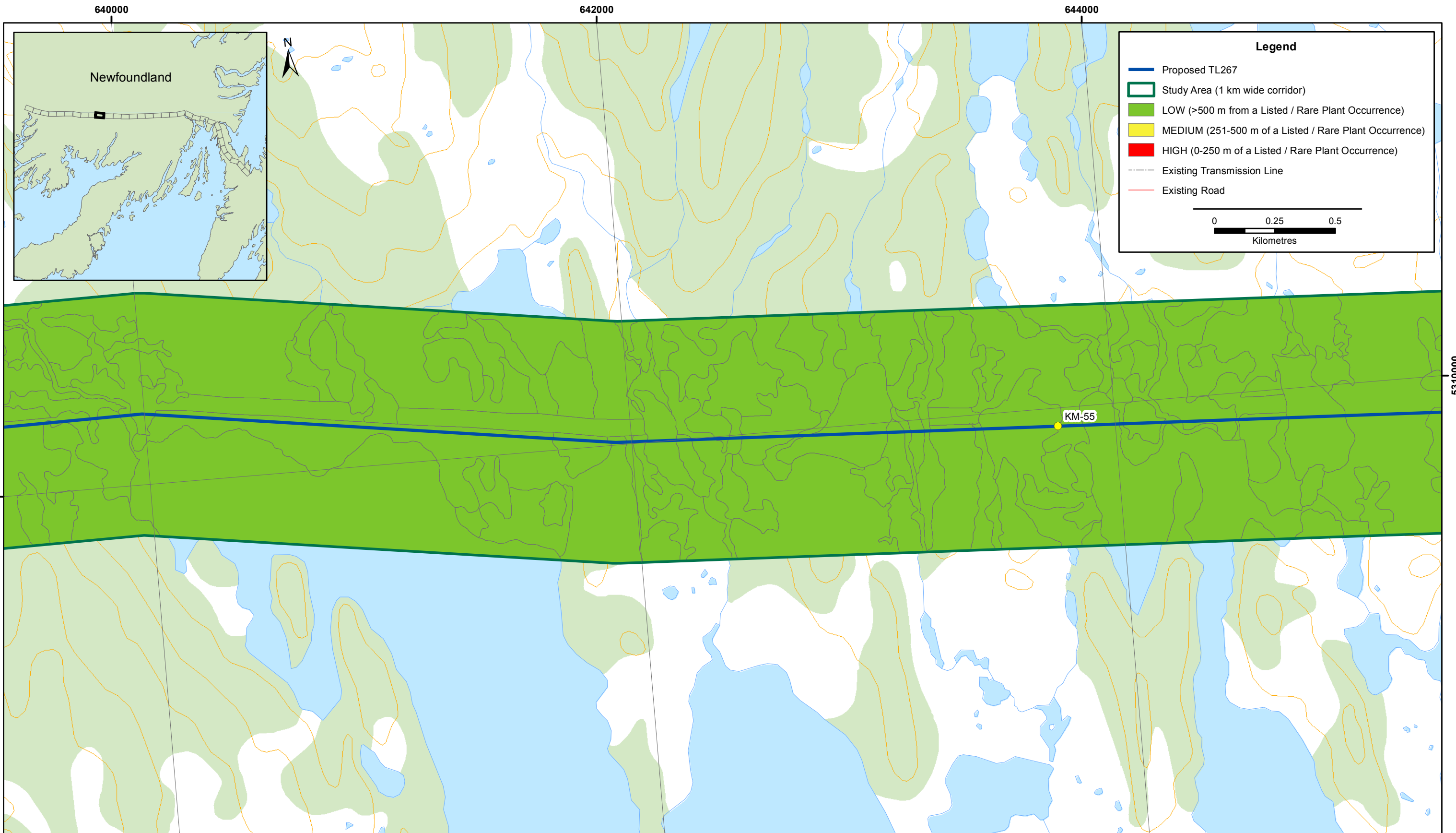
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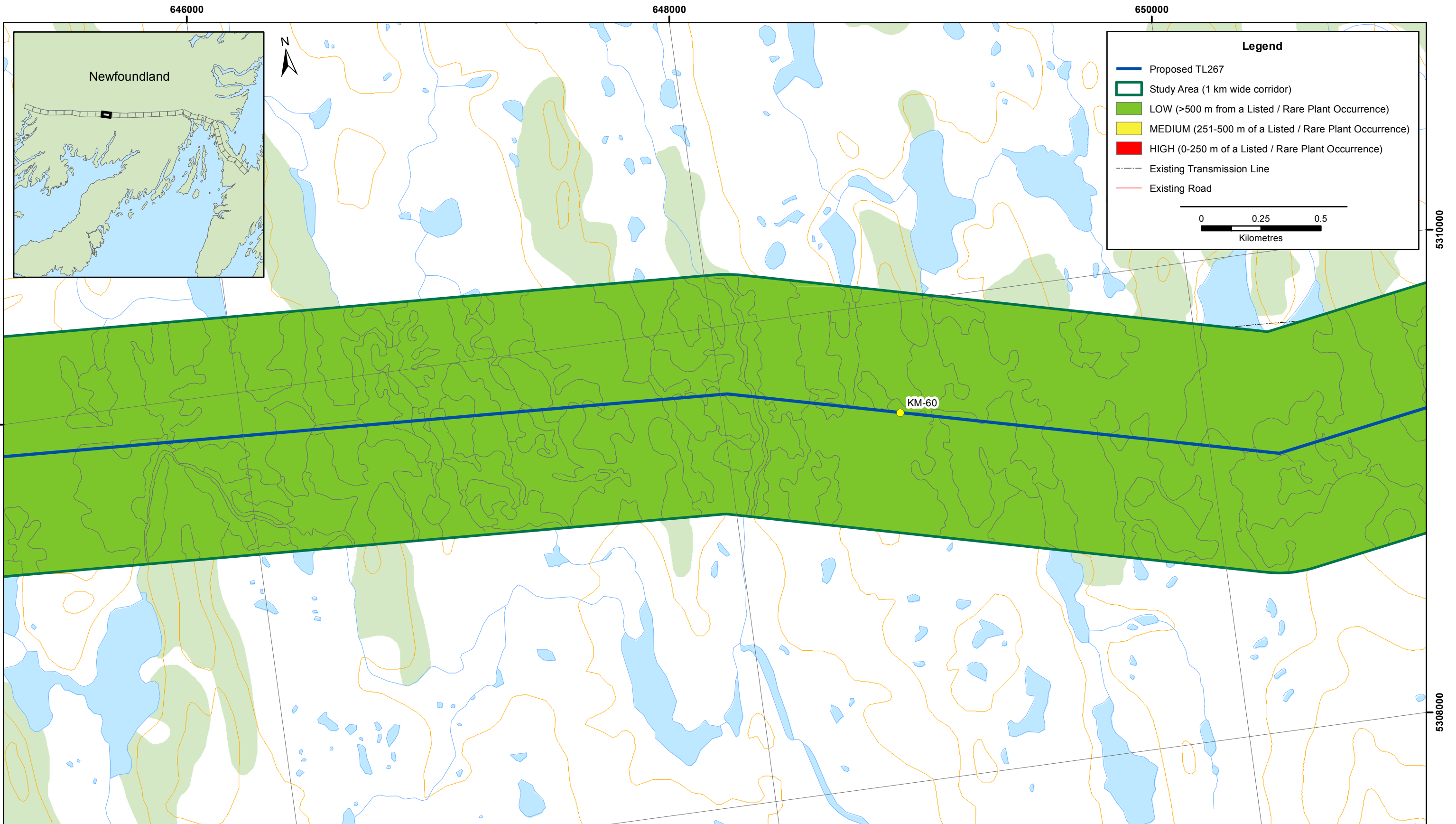
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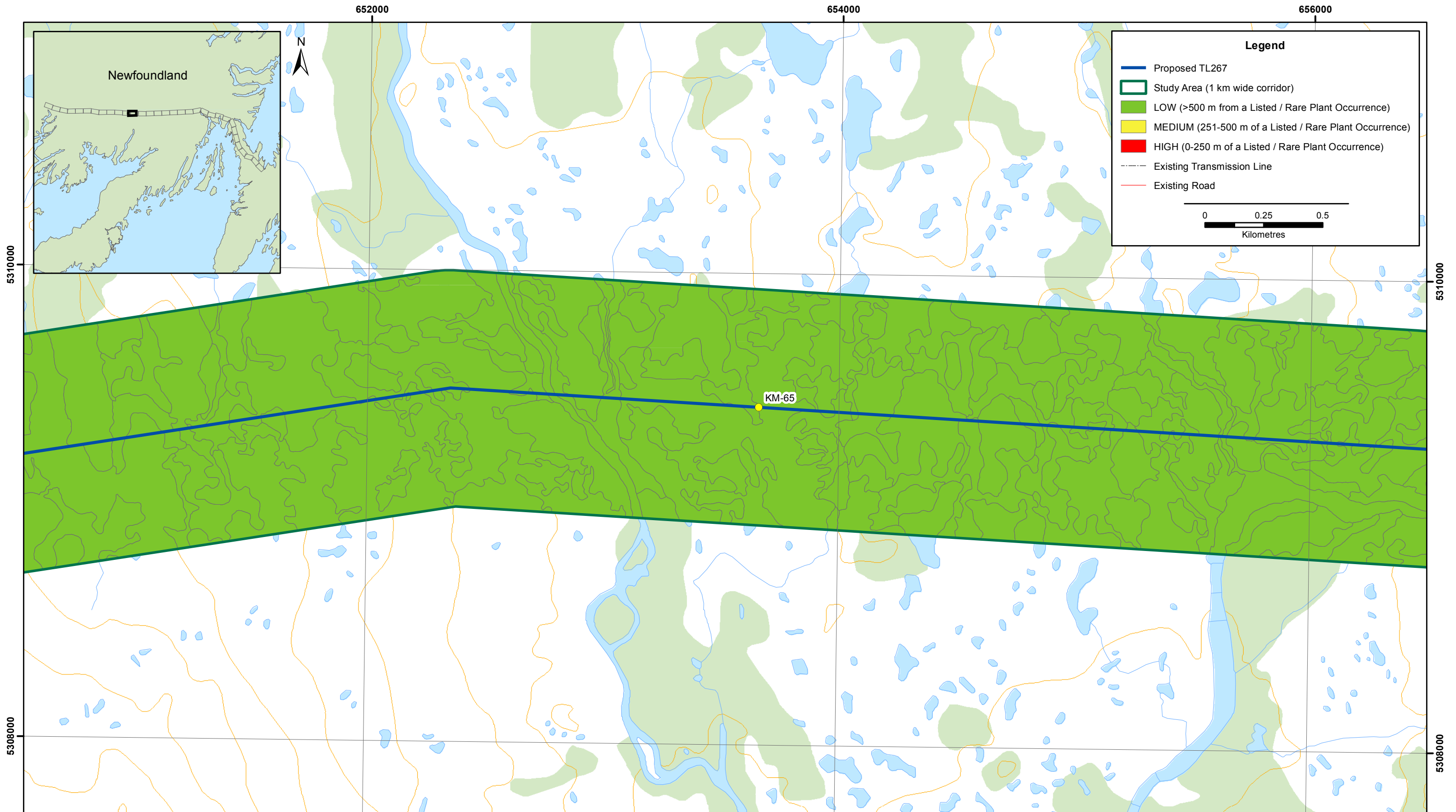
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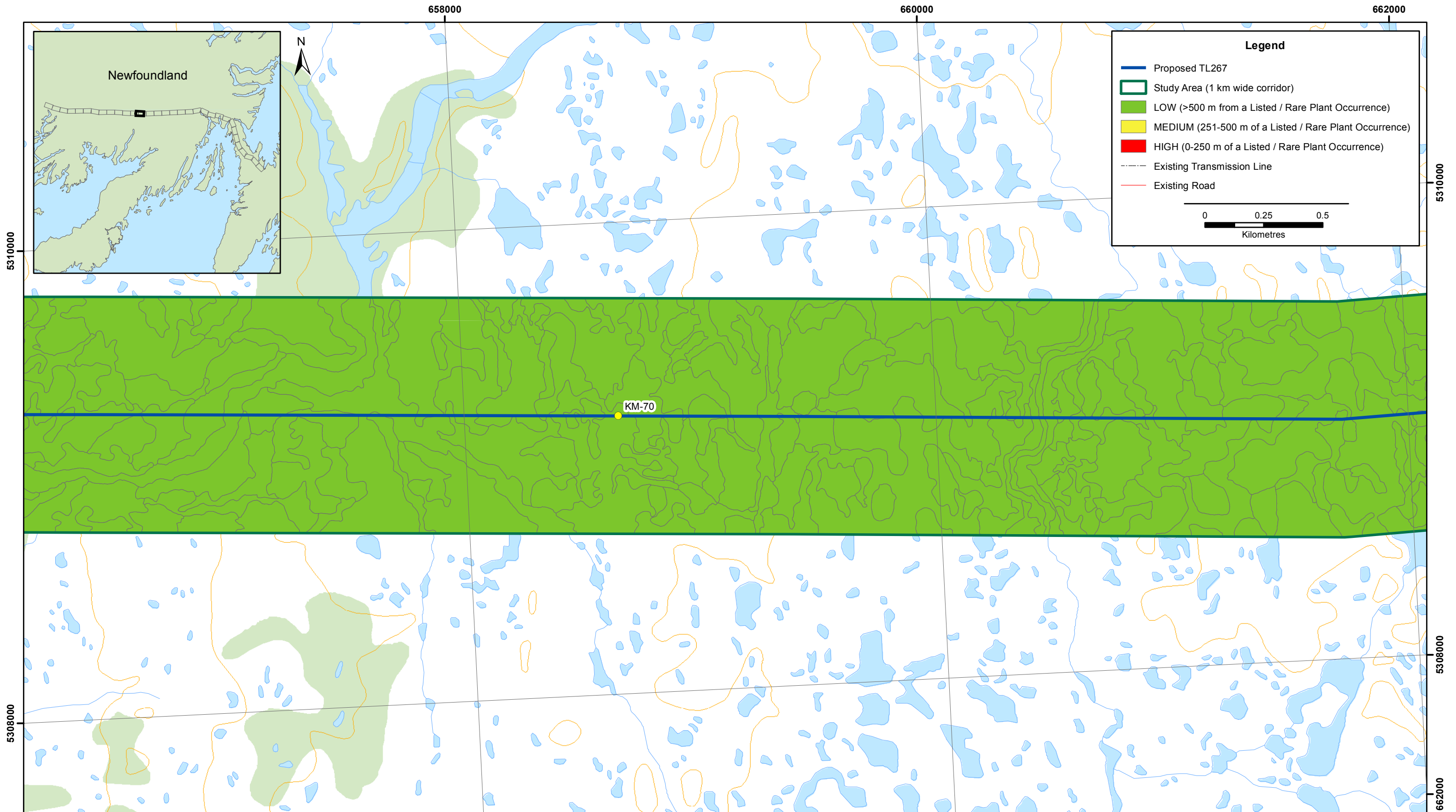


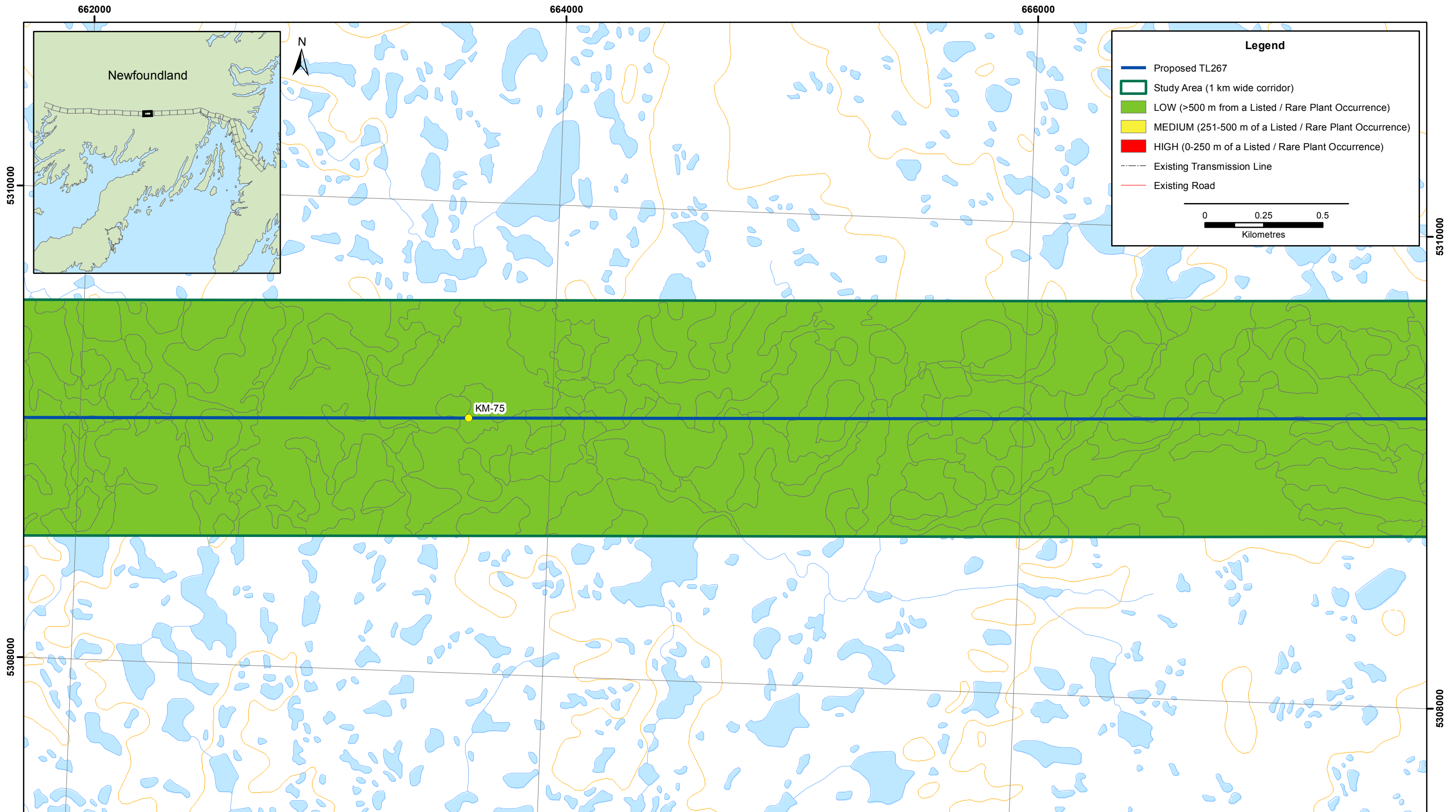


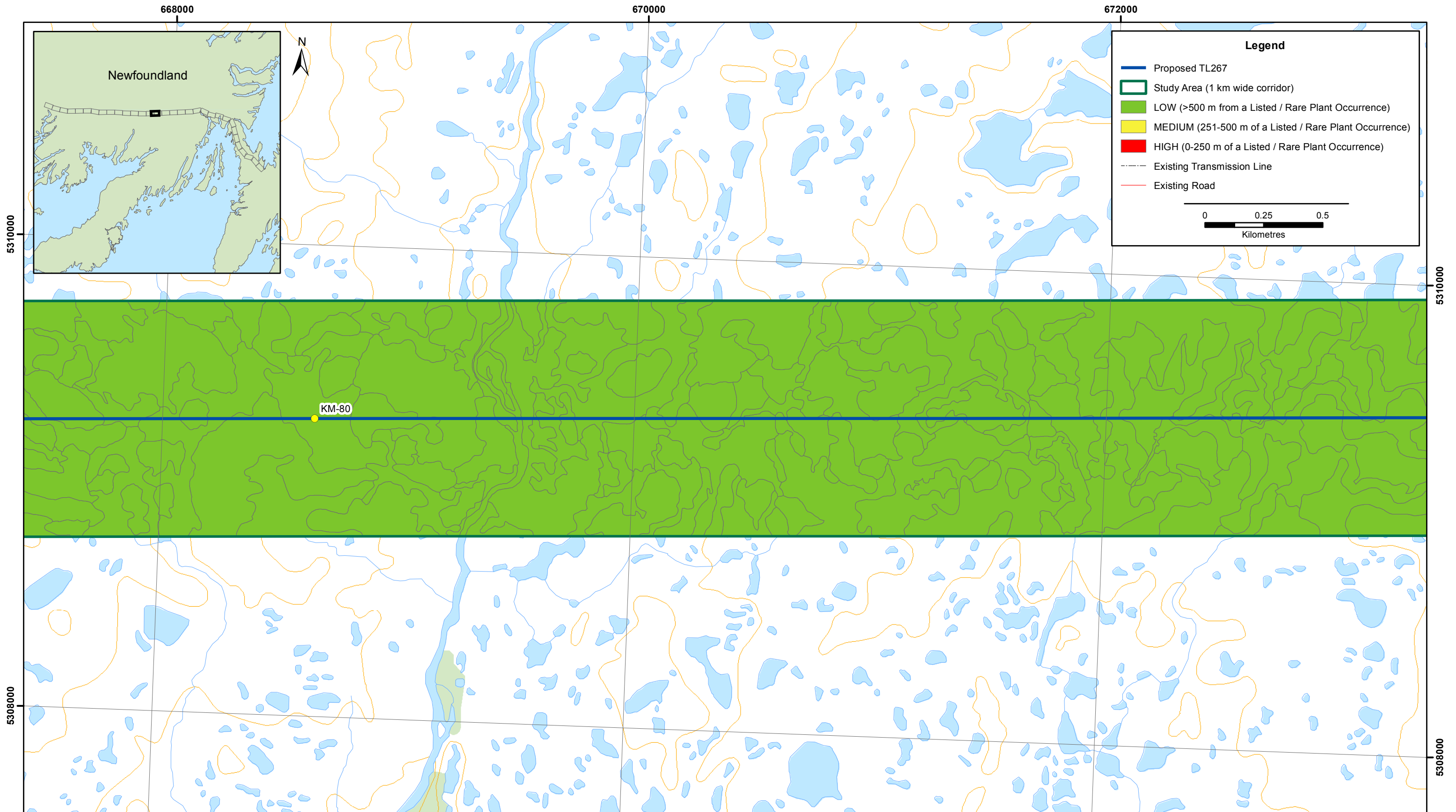


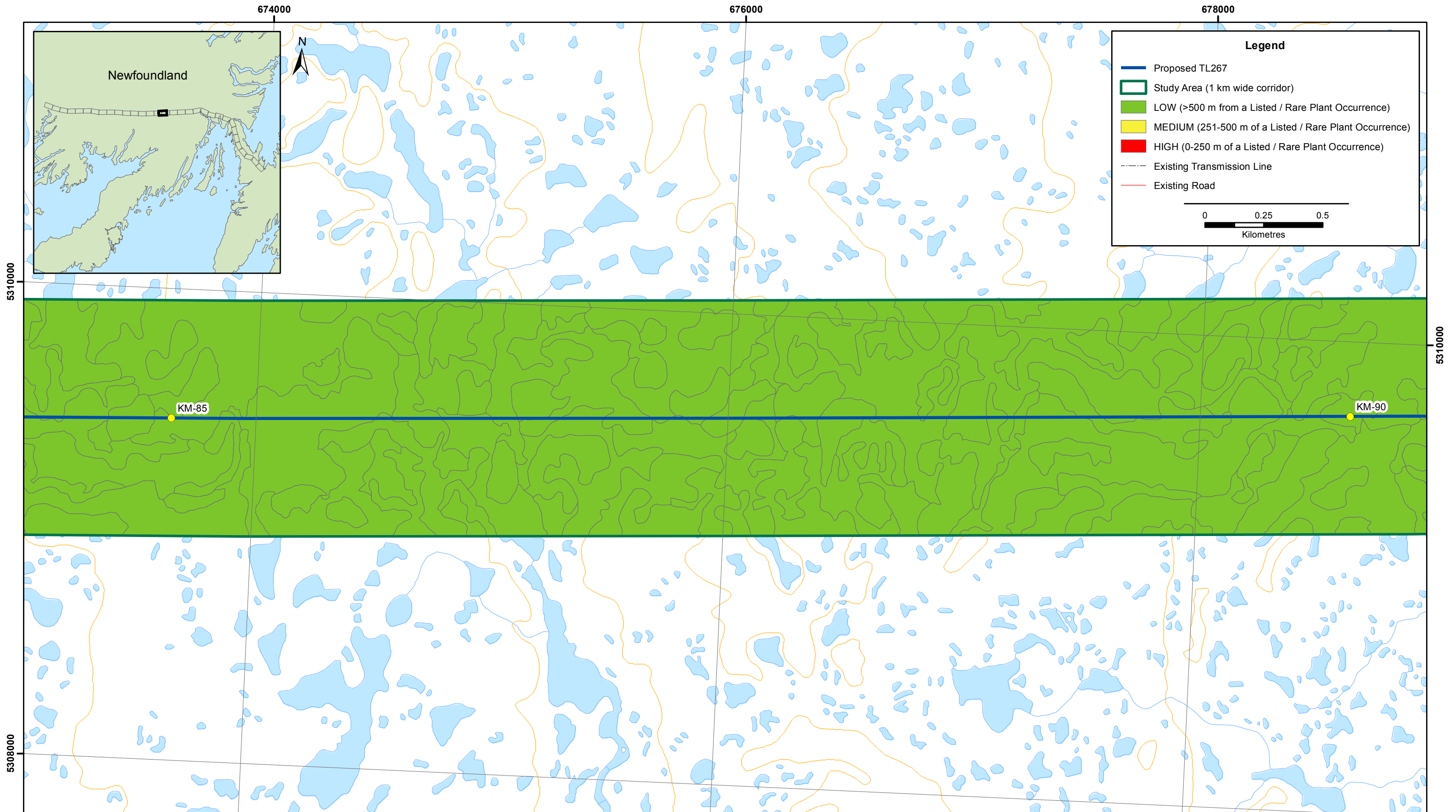


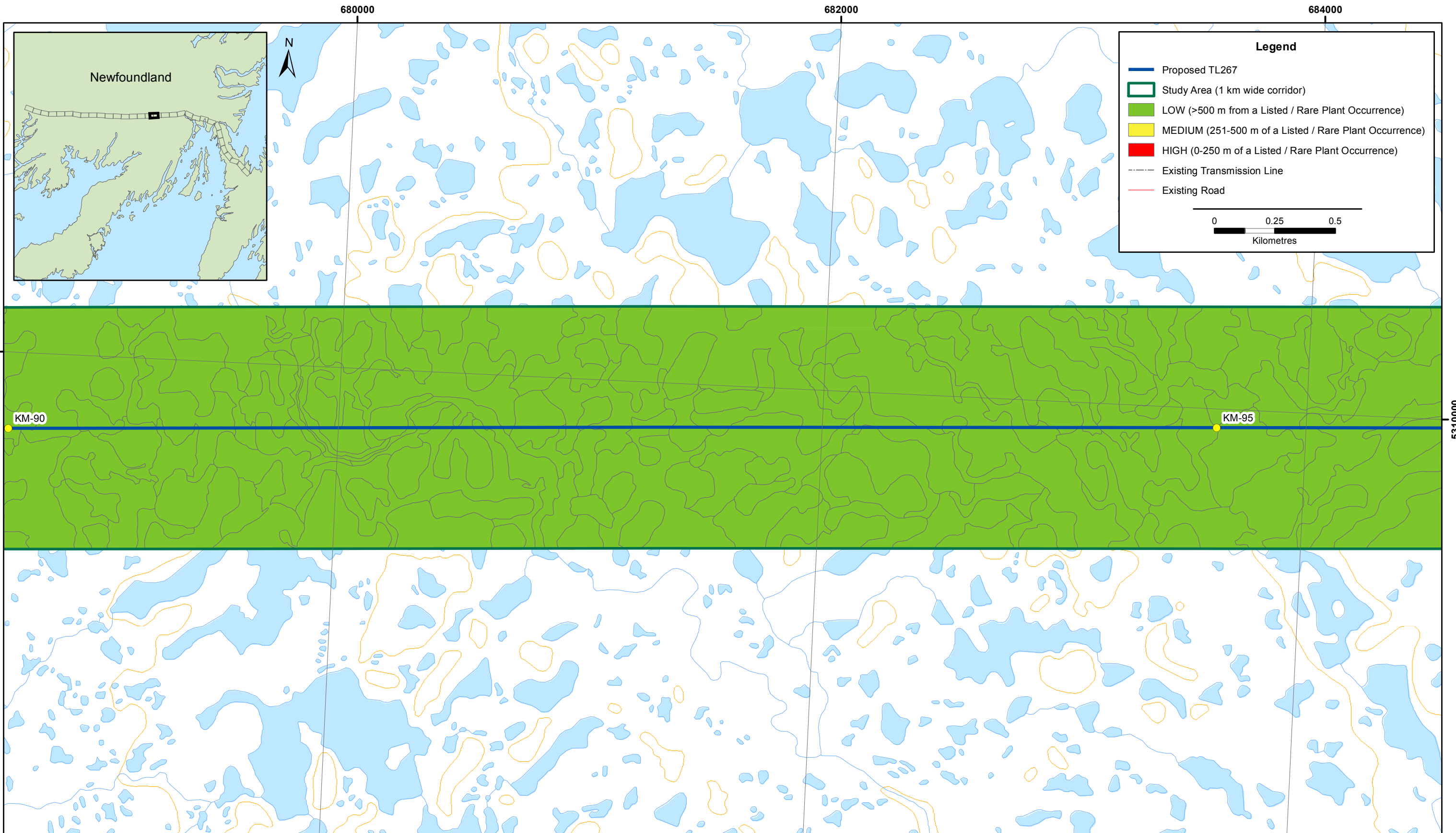



















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Legend

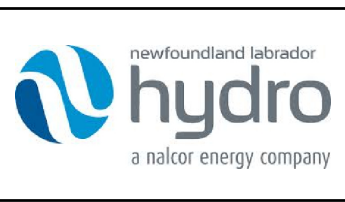
-  Proposed TL267
-  Study Area (1 km wide corridor)
-  LOW (>500 m from a Listed / Rare Plant Occurrence)
-  MEDIUM (251-500 m of a Listed / Rare Plant Occurrence)
-  HIGH (0-250 m of a Listed / Rare Plant Occurrence)
-  Existing Transmission Line
-  Existing Road

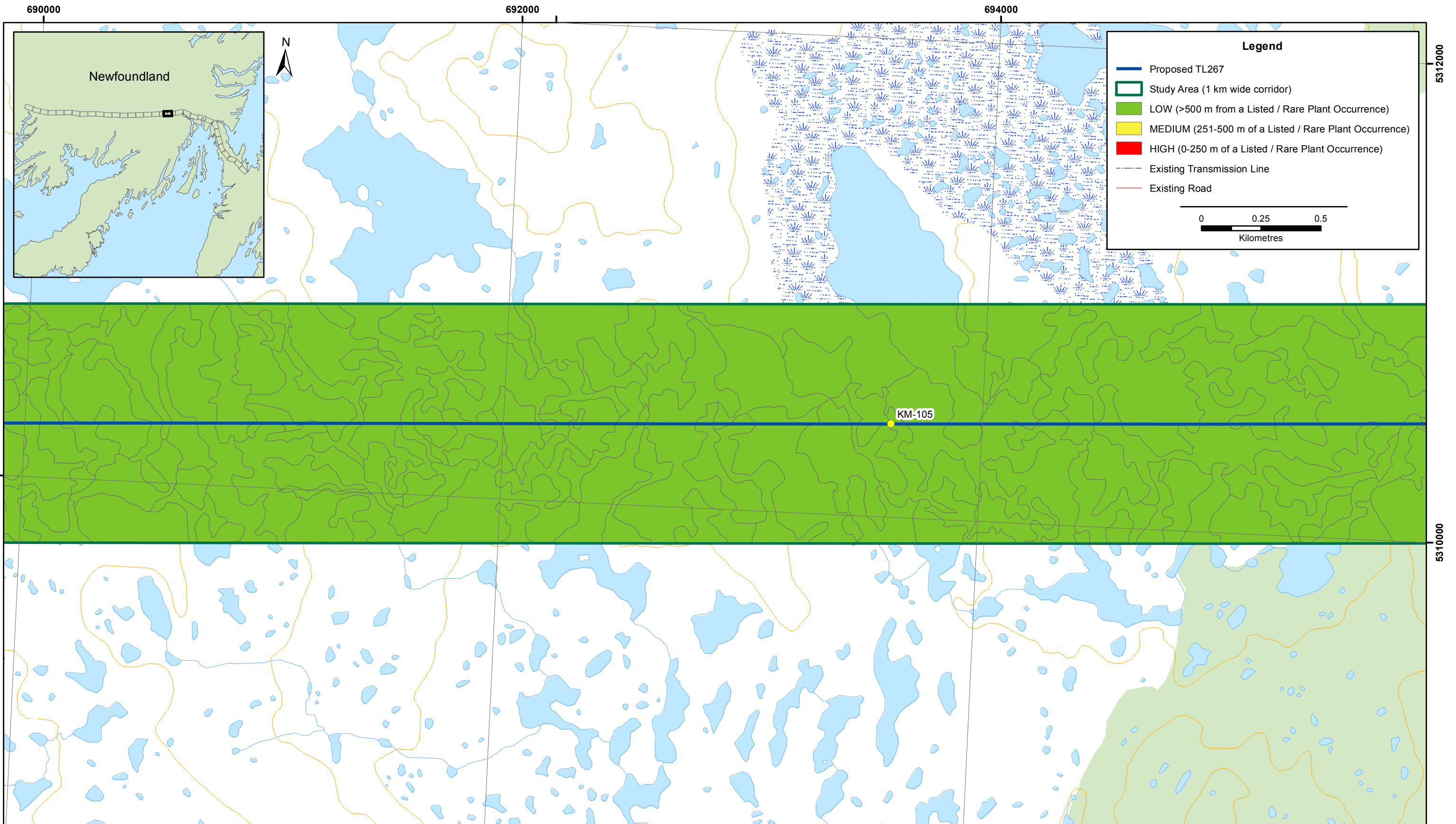
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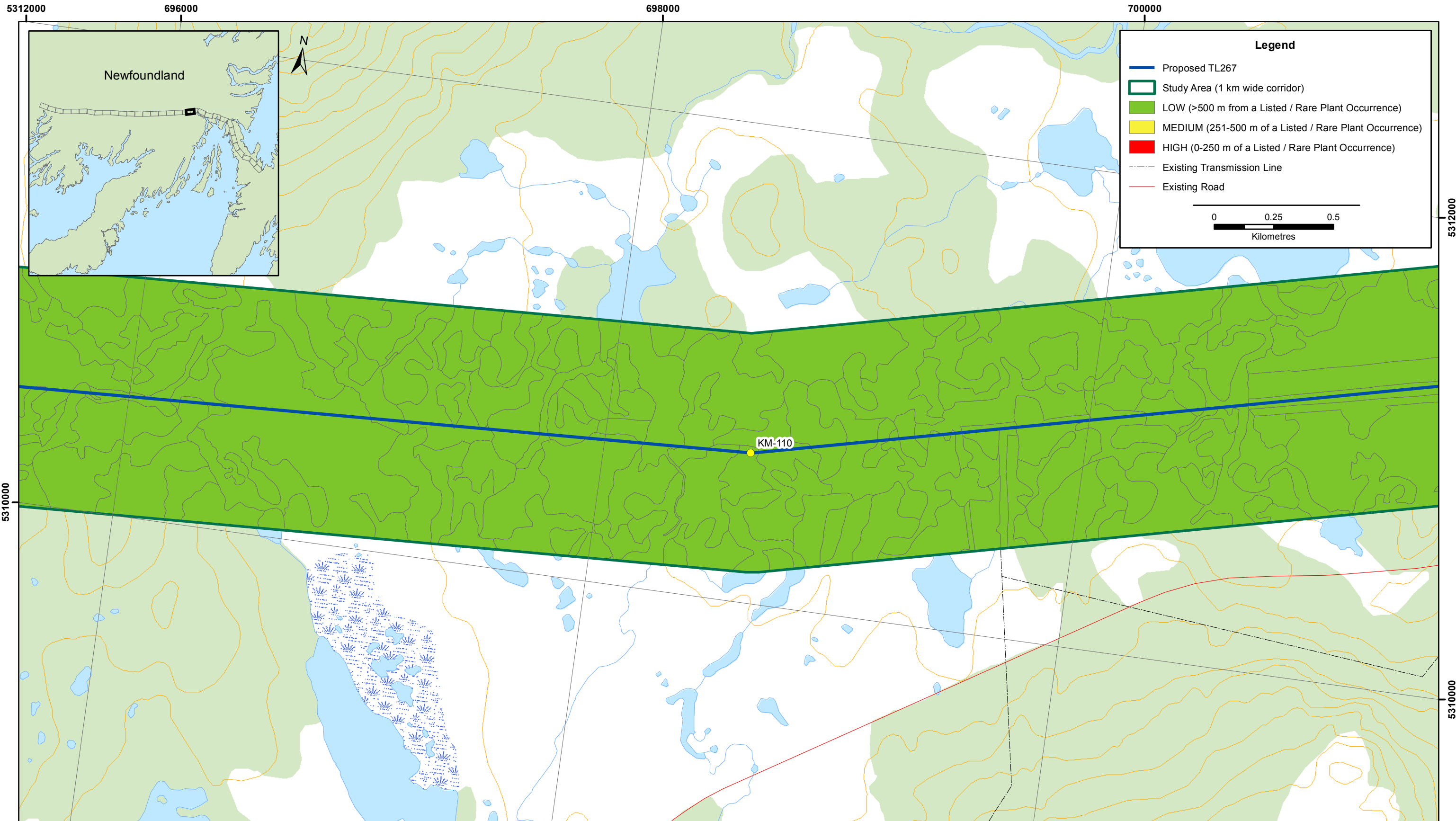
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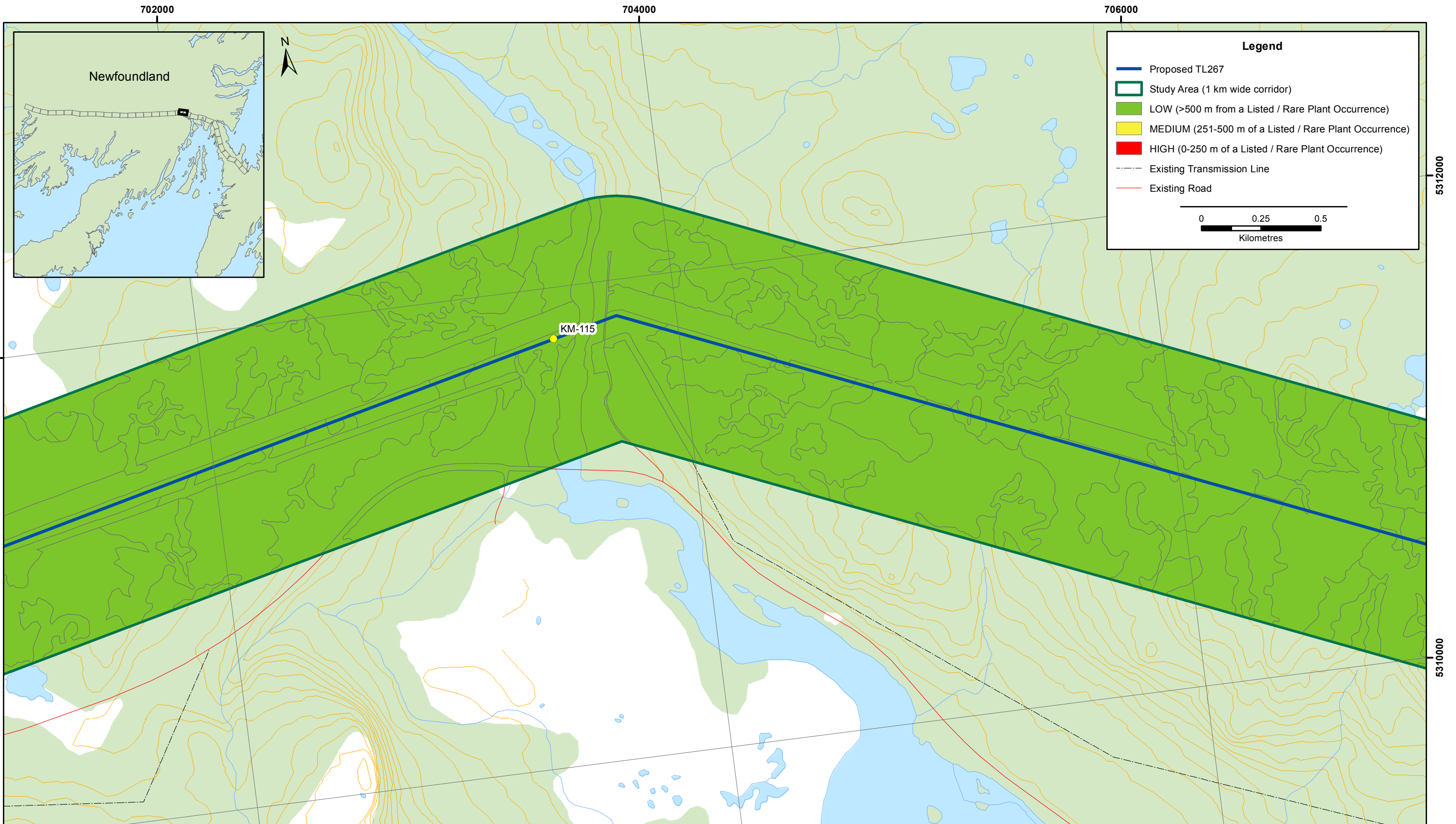
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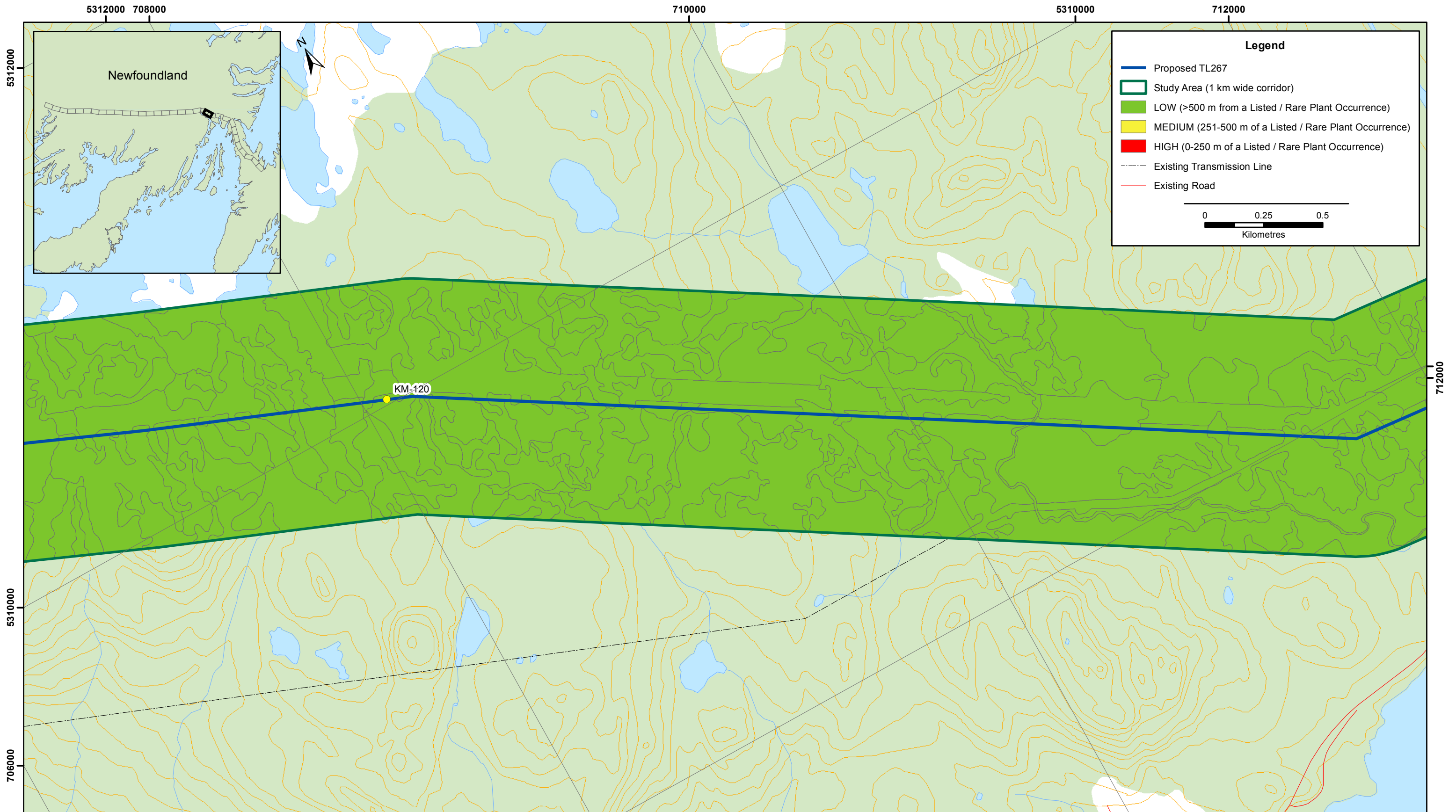
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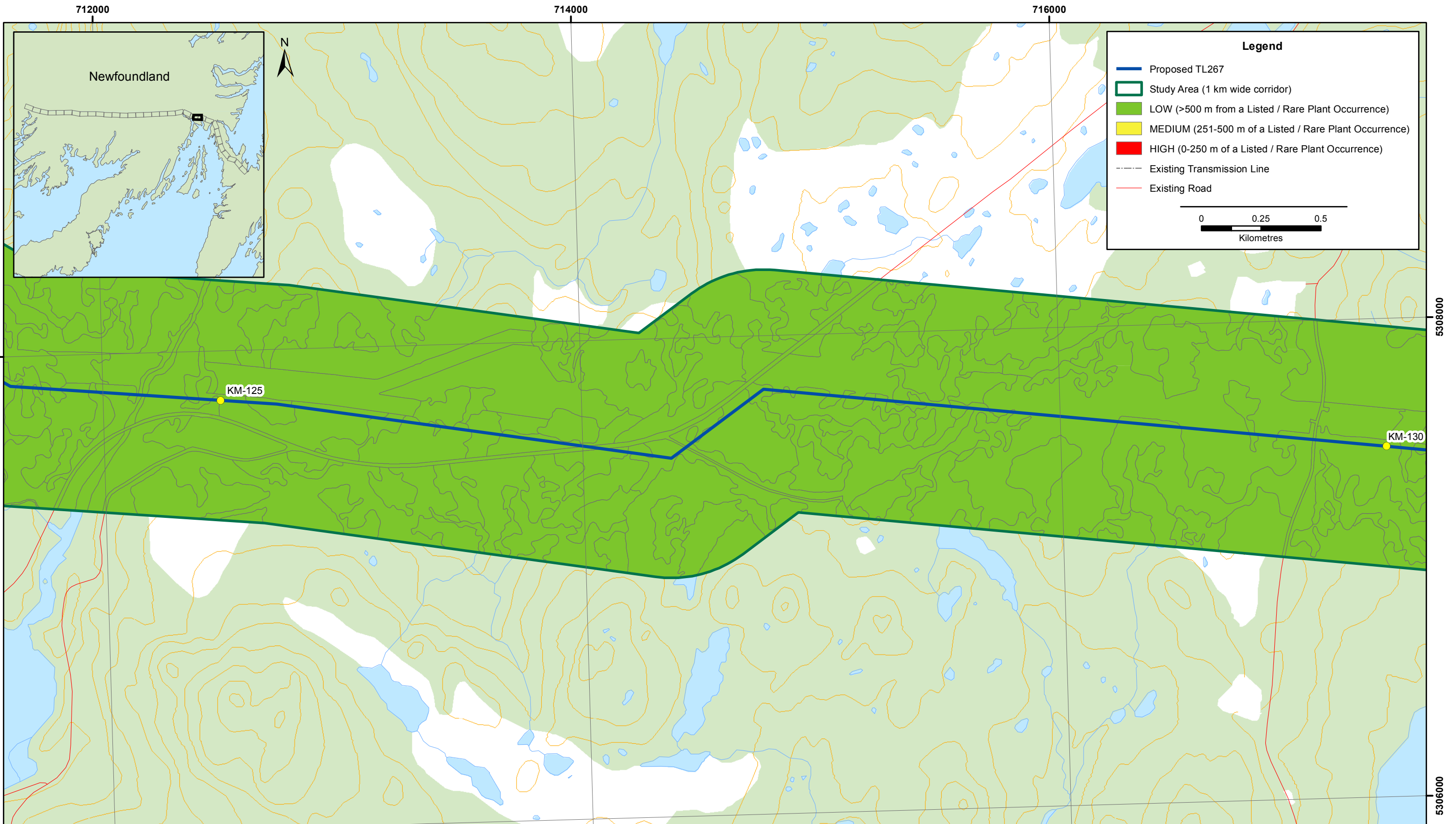


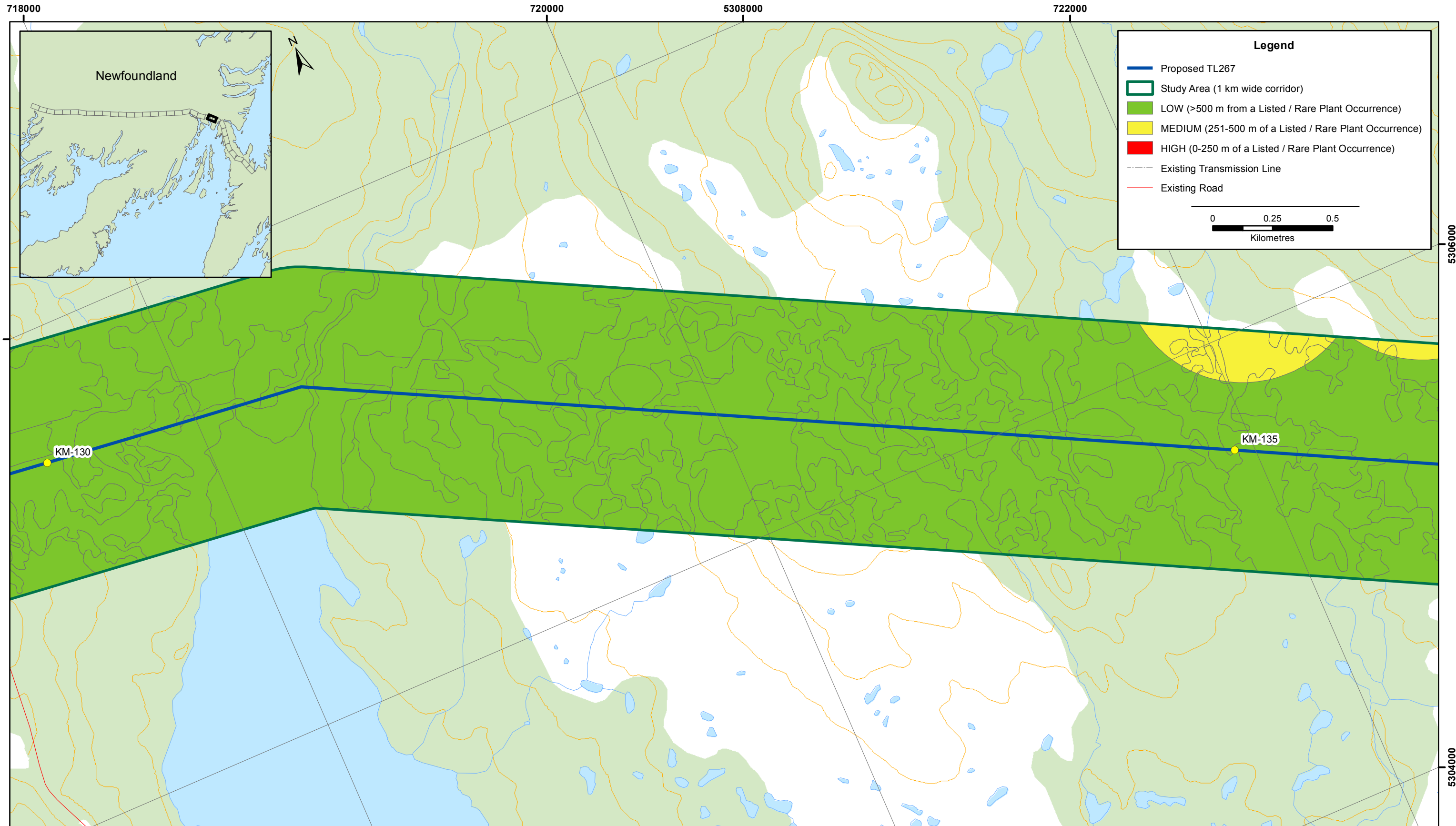


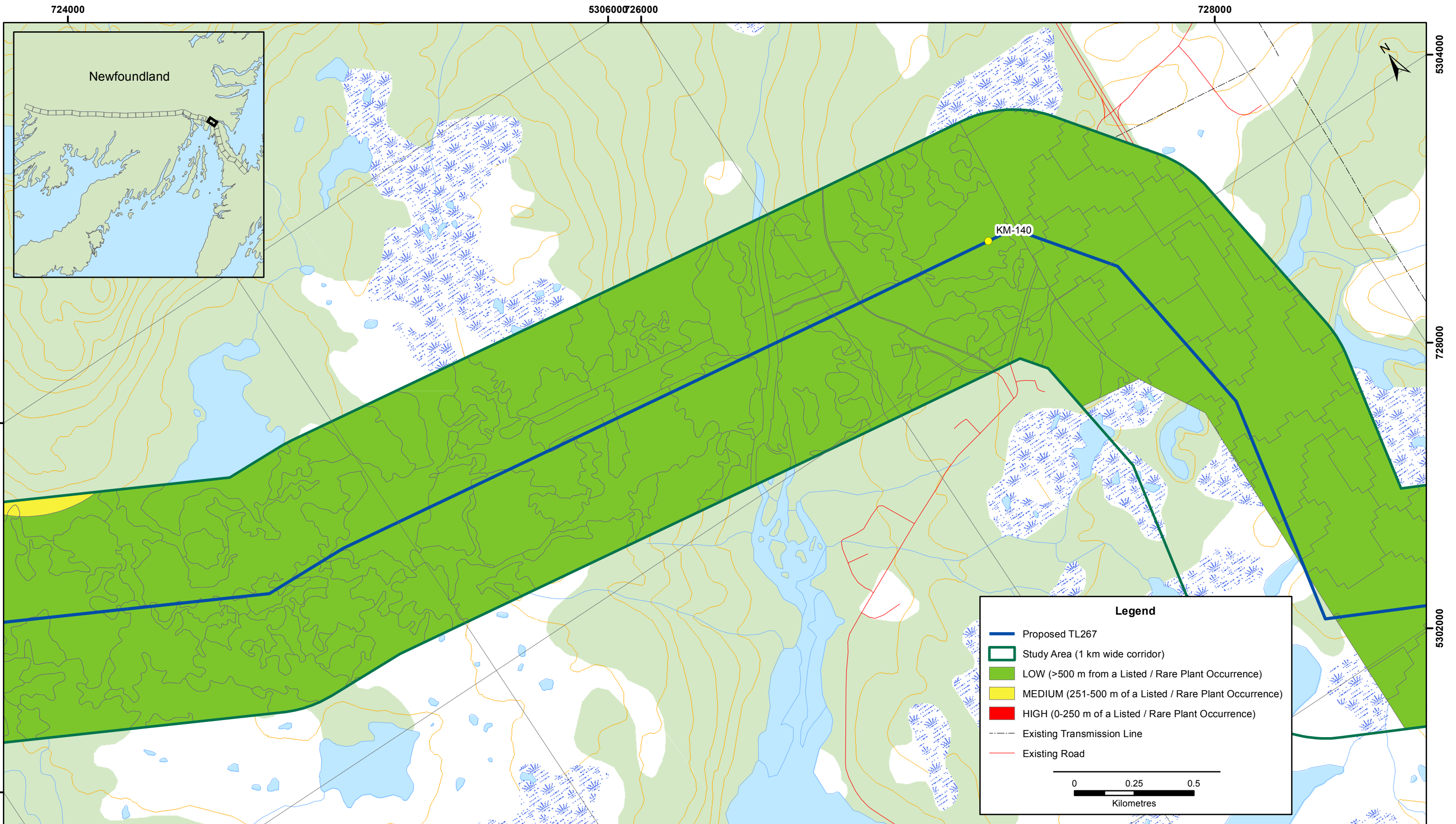


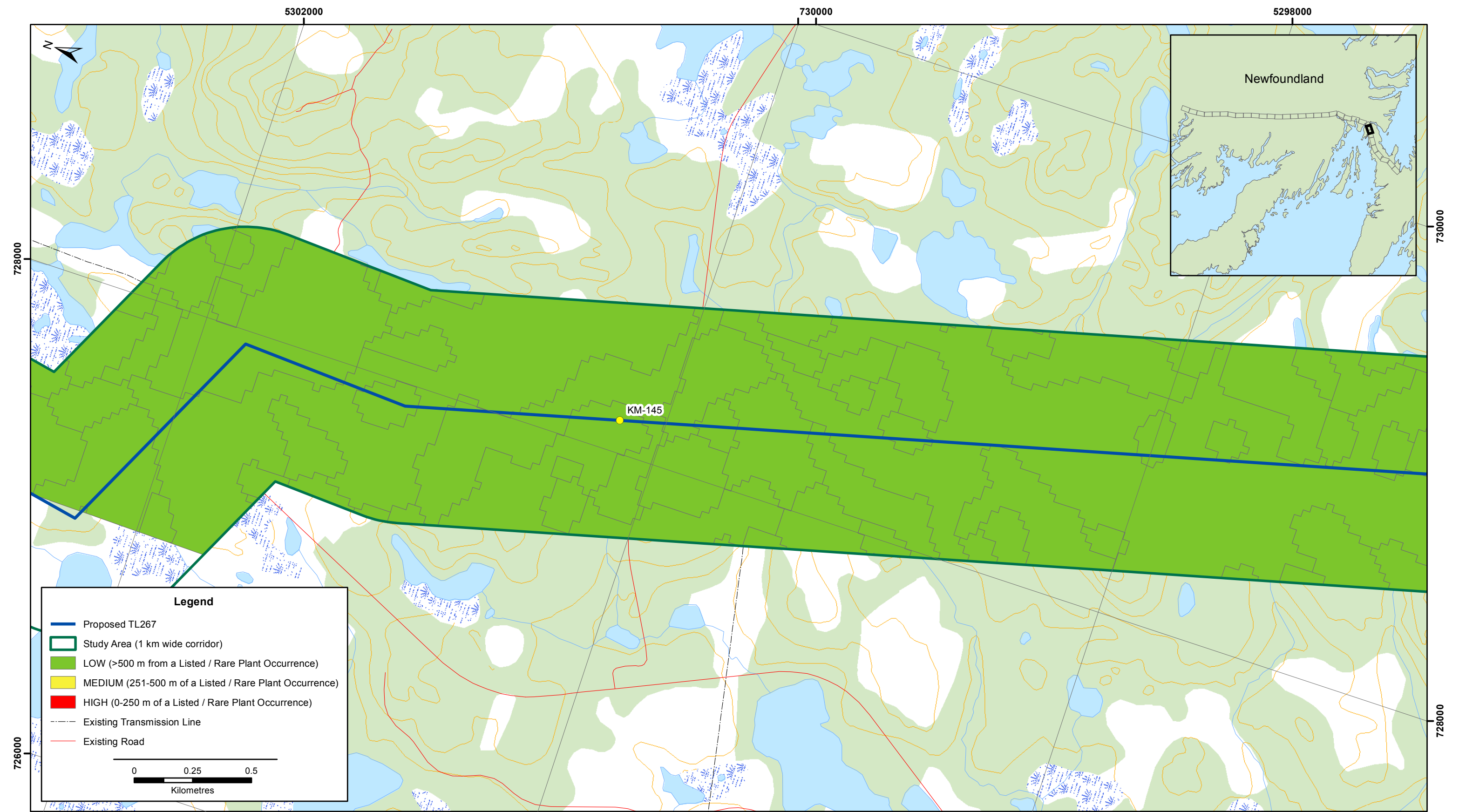


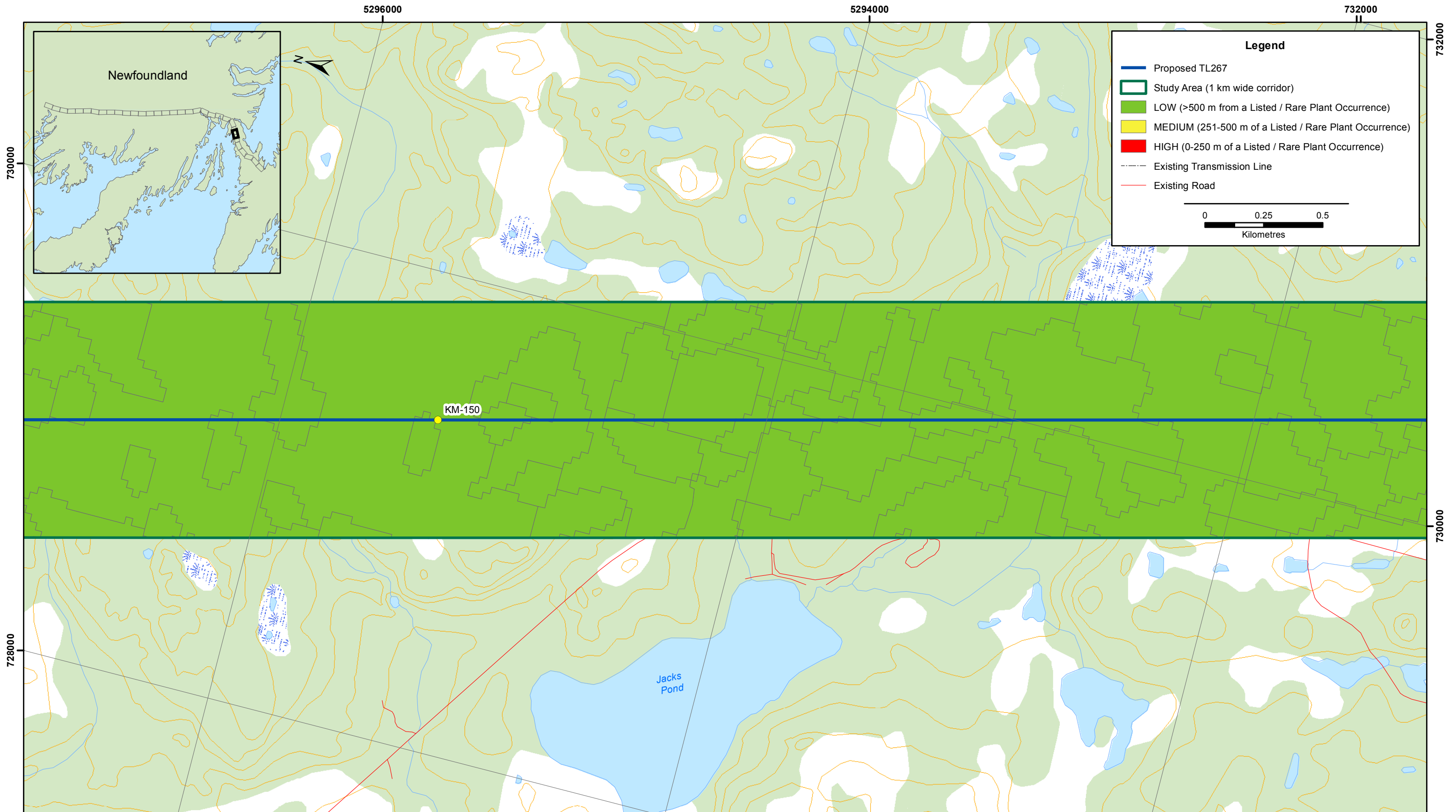








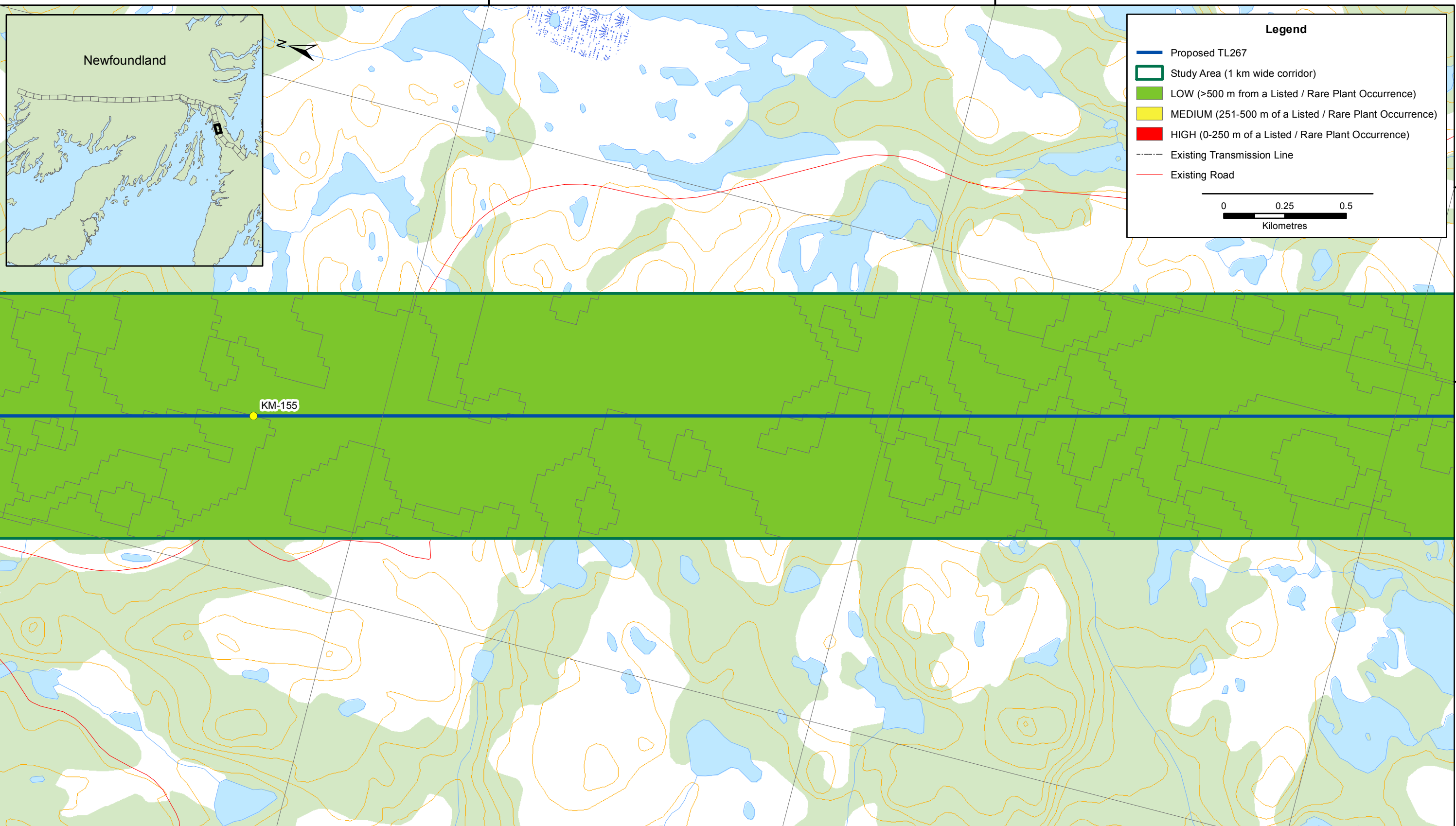




732000

5290000

5288000



Legend

- Proposed TL267
- Study Area (1 km wide corridor)
- LOW (>500 m from a Listed / Rare Plant Occurrence)
- MEDIUM (251-500 m of a Listed / Rare Plant Occurrence)
- HIGH (0-250 m of a Listed / Rare Plant Occurrence)
- Existing Transmission Line
- Existing Road

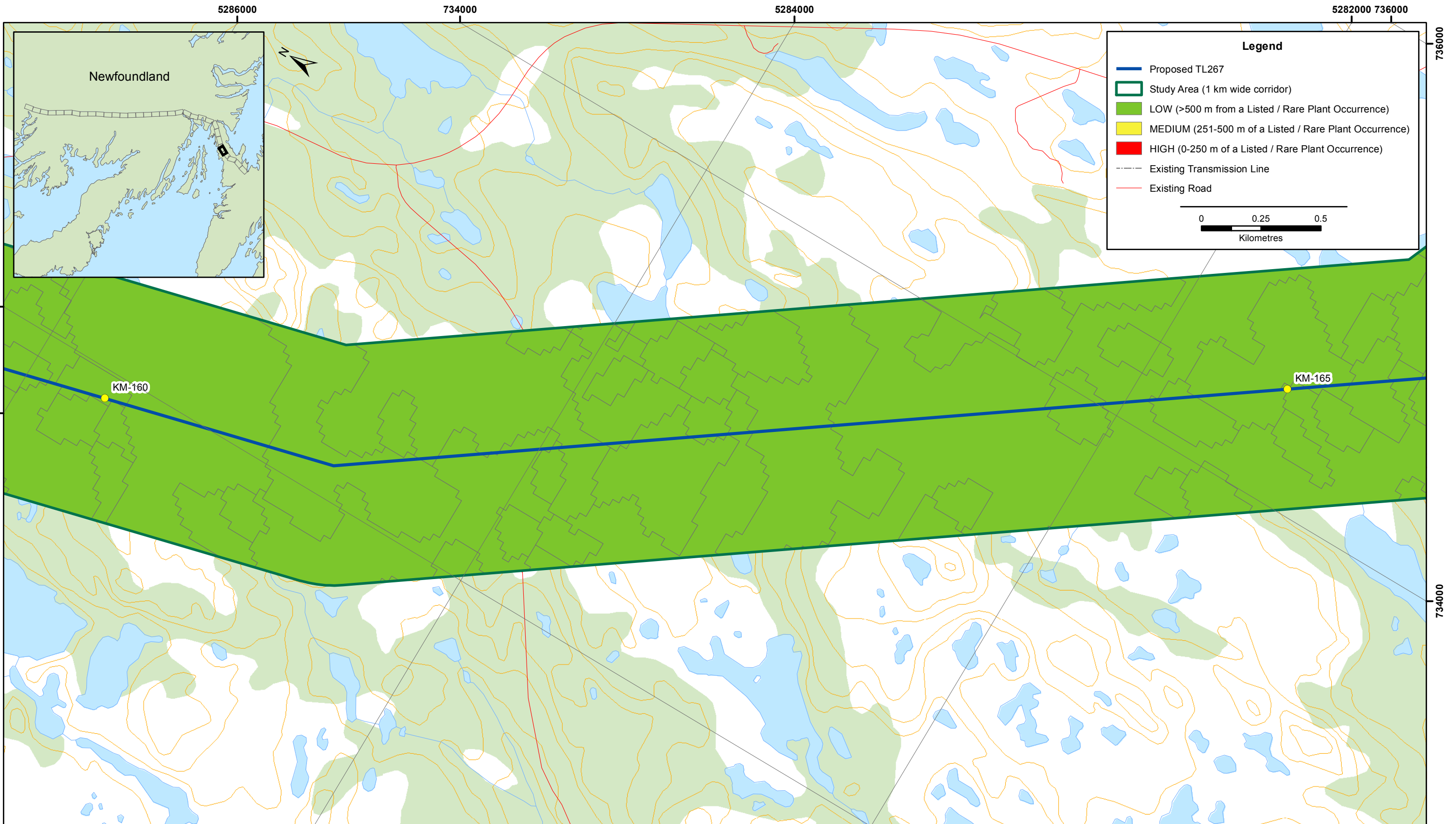
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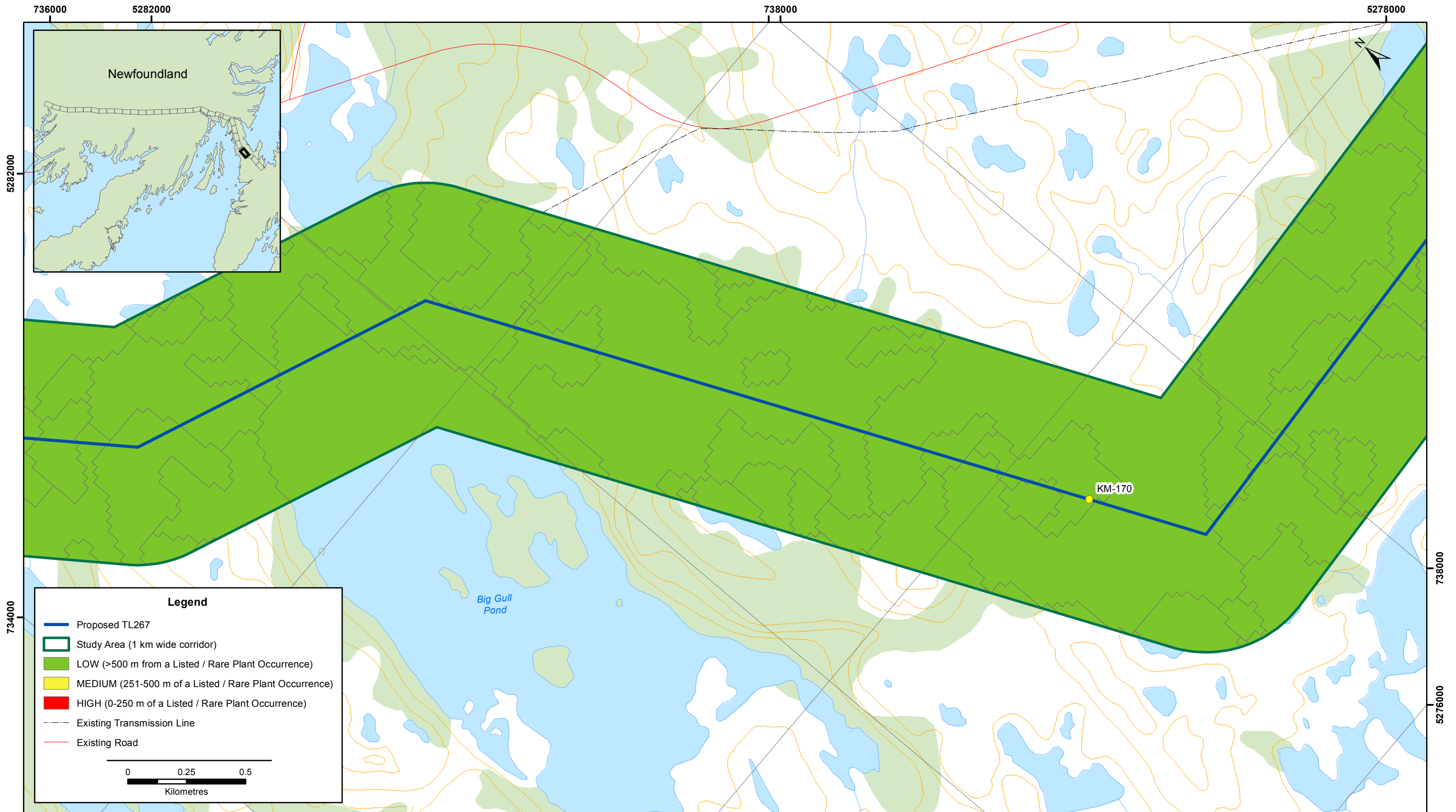
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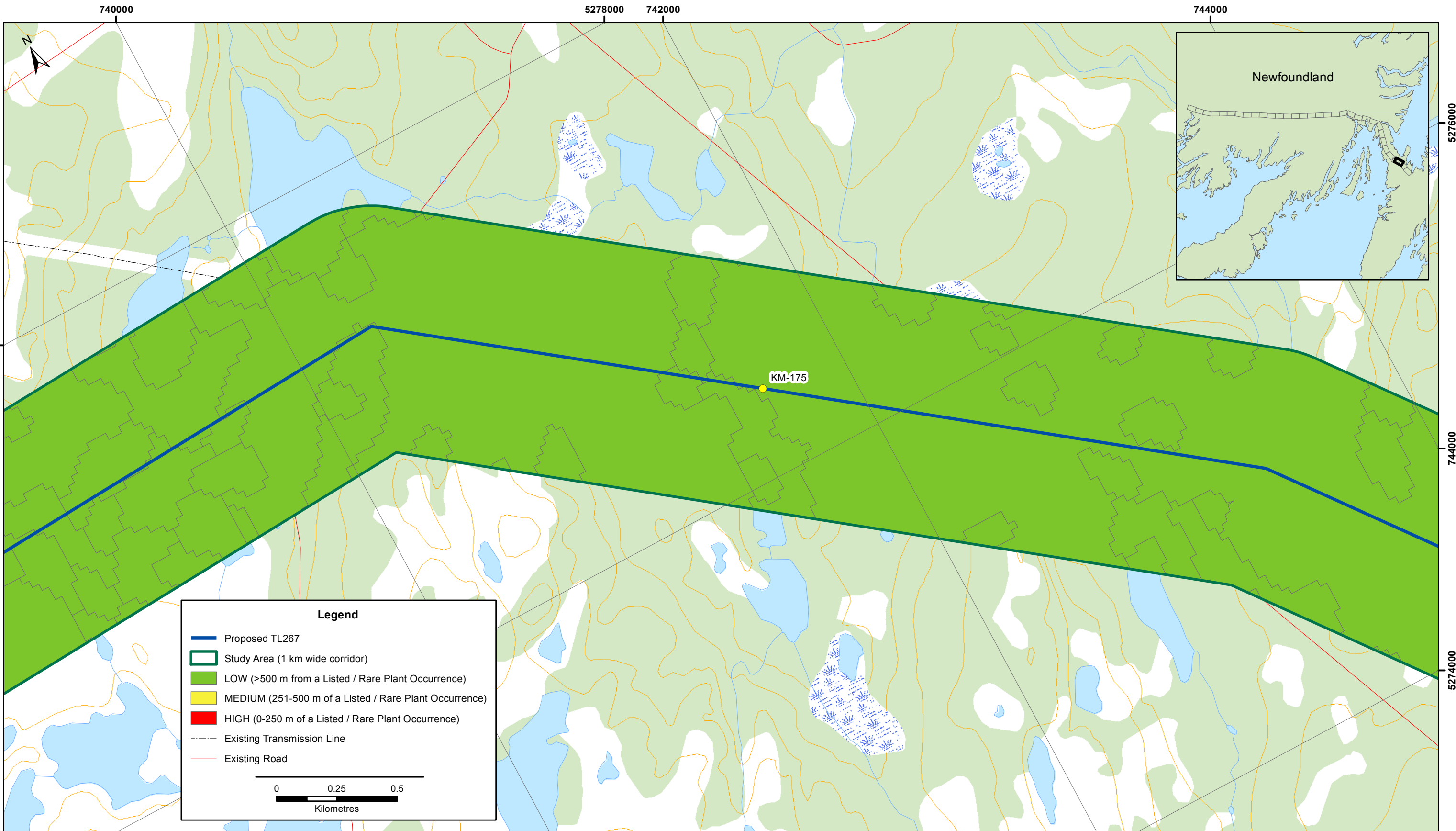
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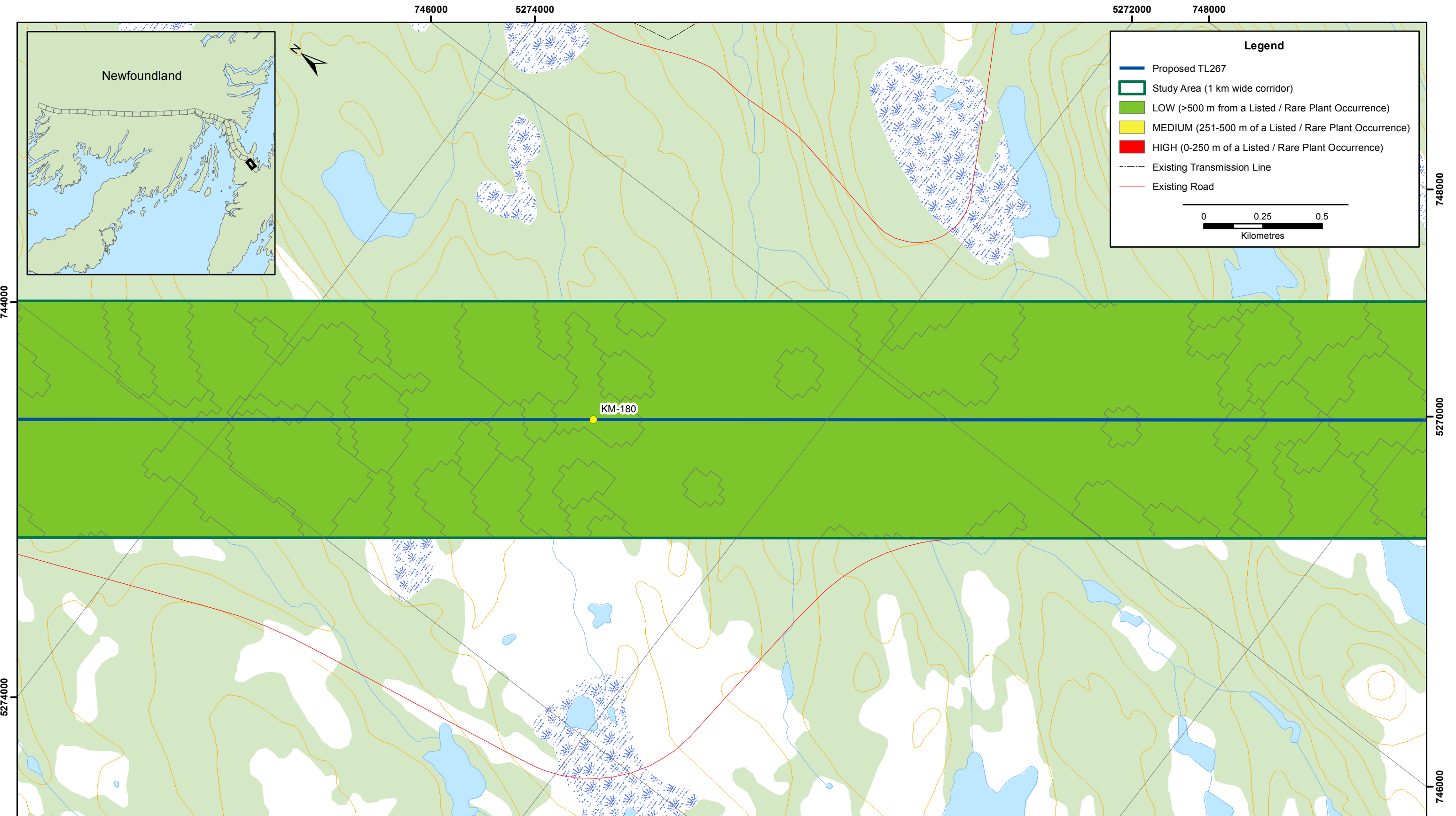
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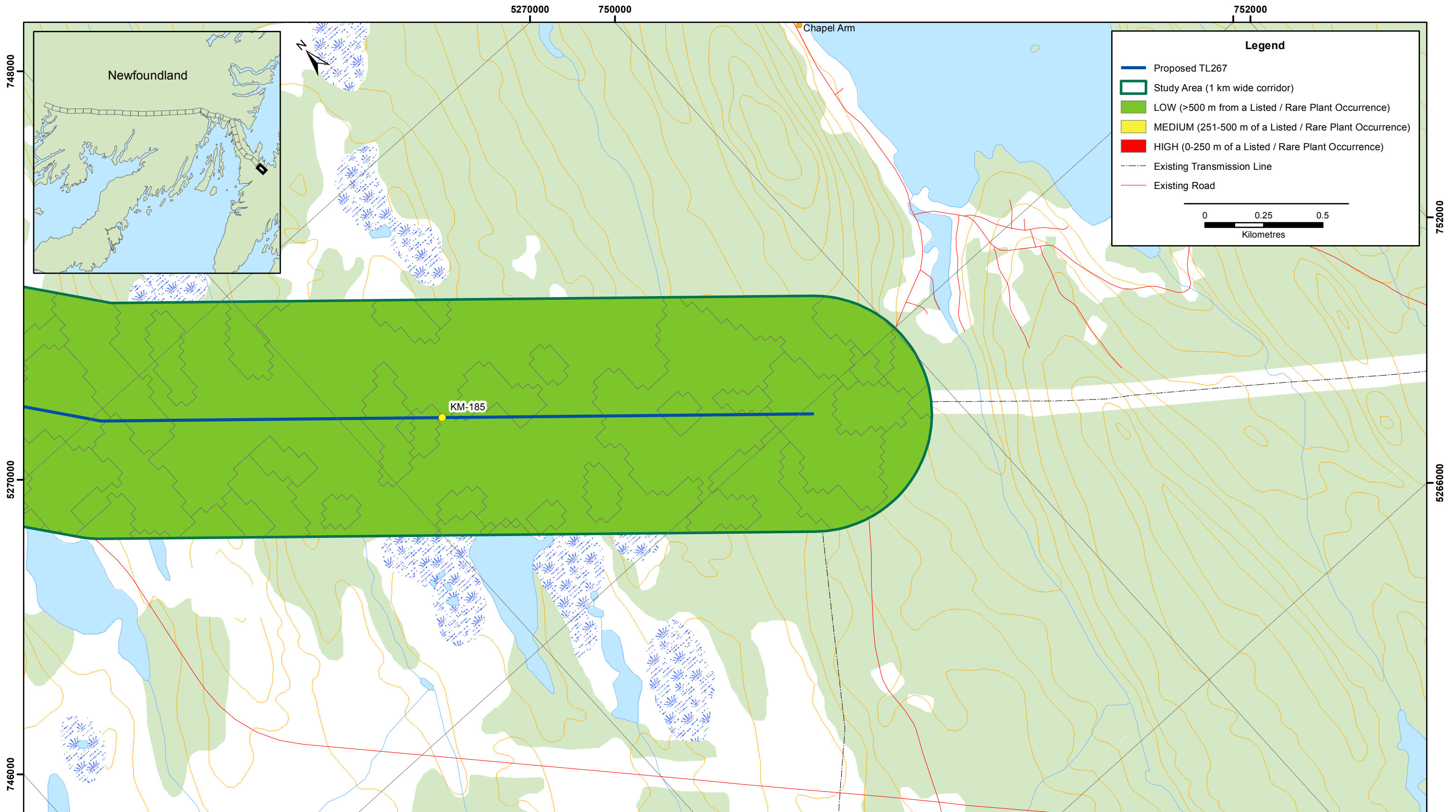
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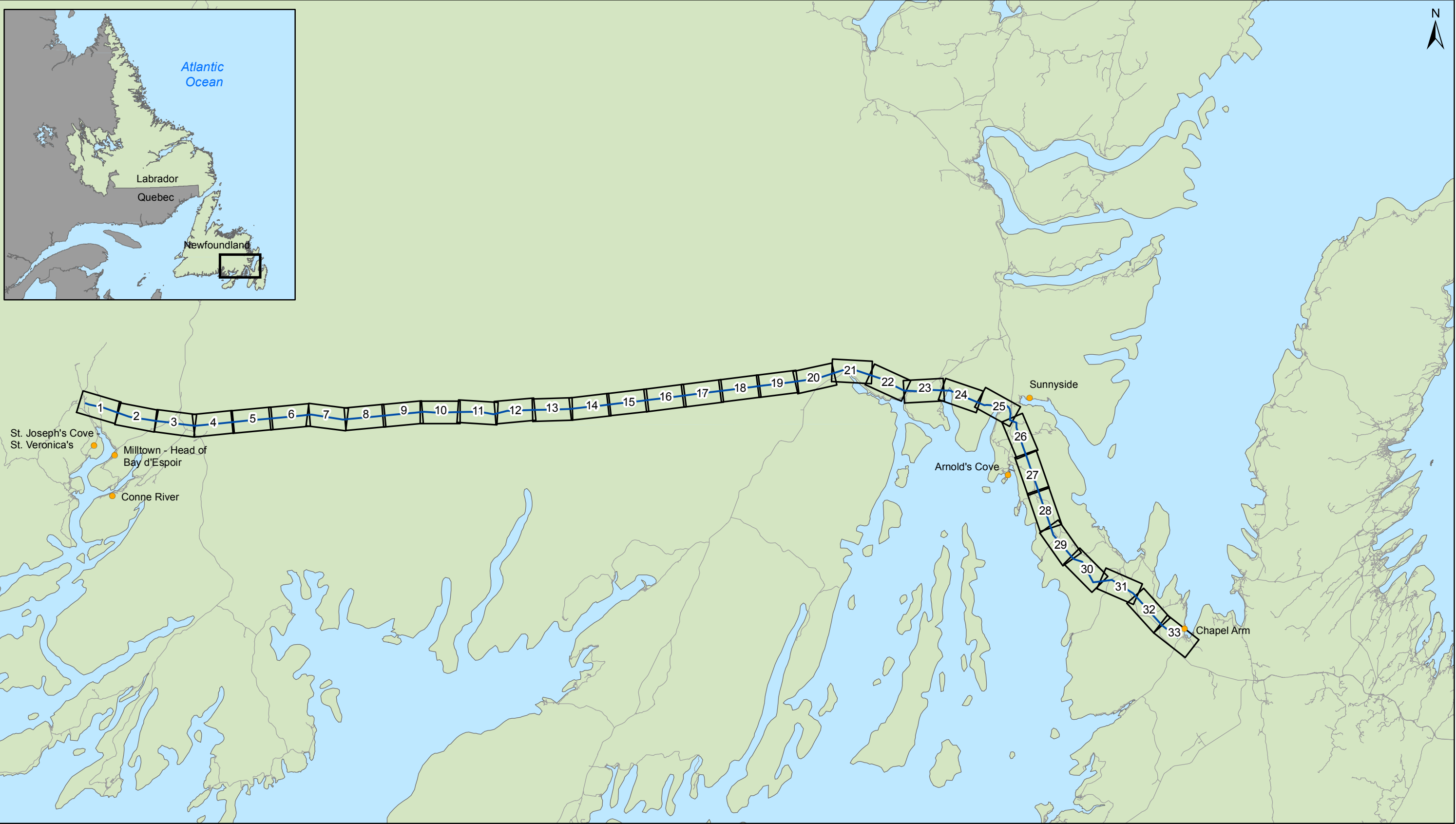


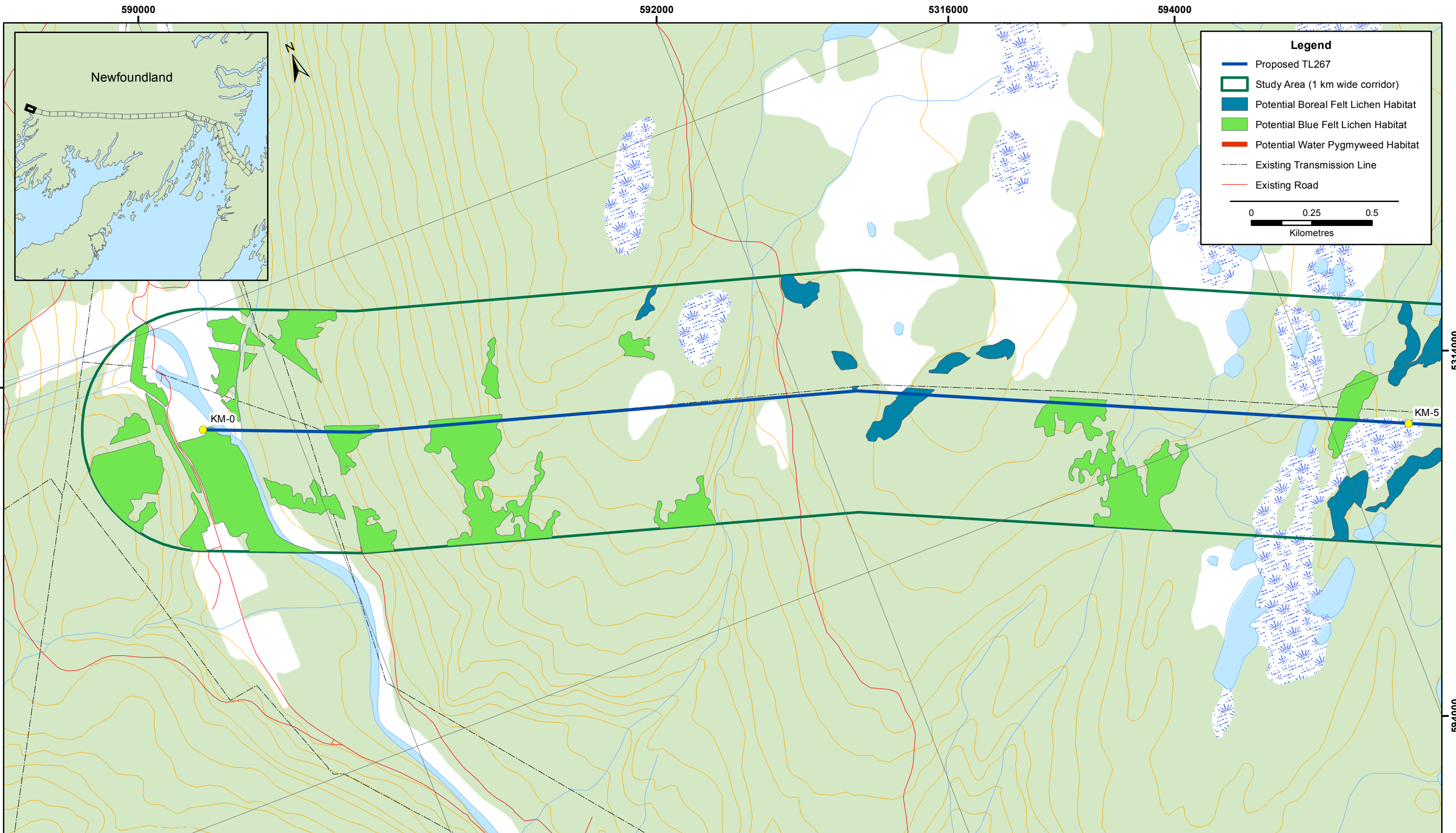
Appendix C

Model #2 Results:

Listed / Rare Plant Habitat Potential (Species- specific Habitat Suitability)

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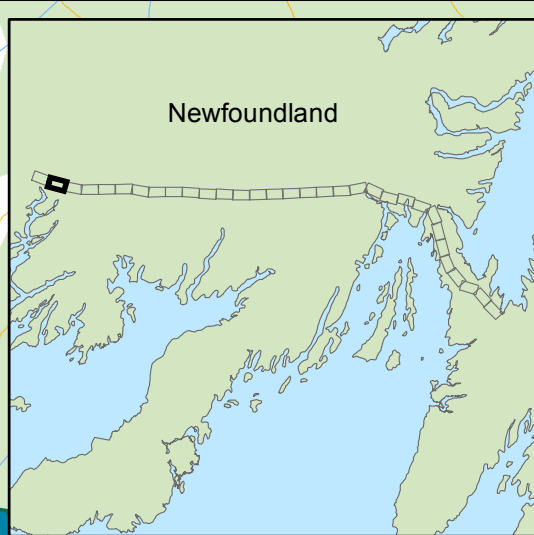


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

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600000



Legend

-  Proposed TL267
-  Study Area (1 km wide corridor)
-  Potential Boreal Felt Lichen Habitat
-  Potential Blue Felt Lichen Habitat
-  Potential Water Pygmyweed Habitat
-  Existing Transmission Line
-  Existing Road

0 0.25 0.5
Kilometres

5314000

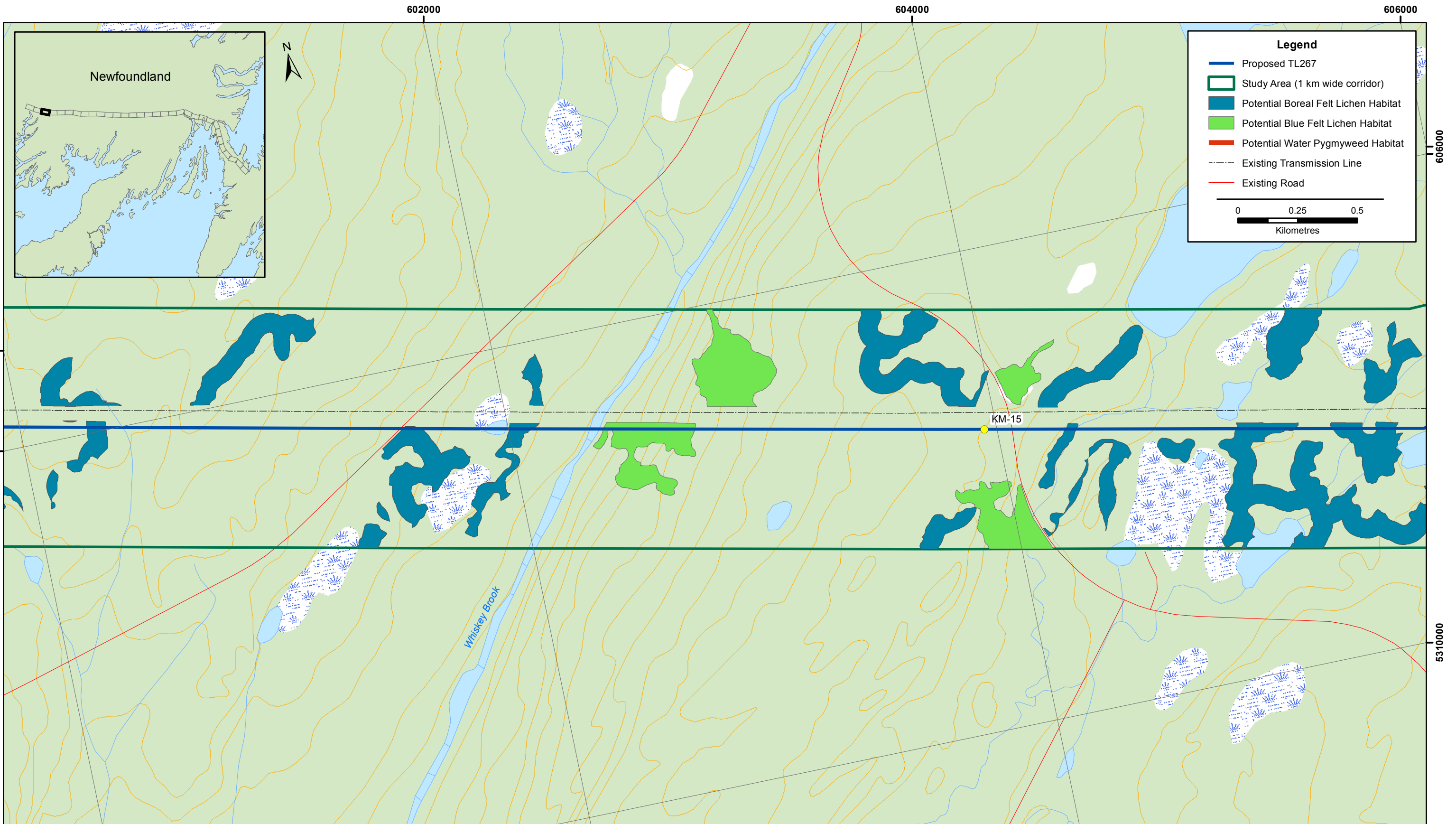
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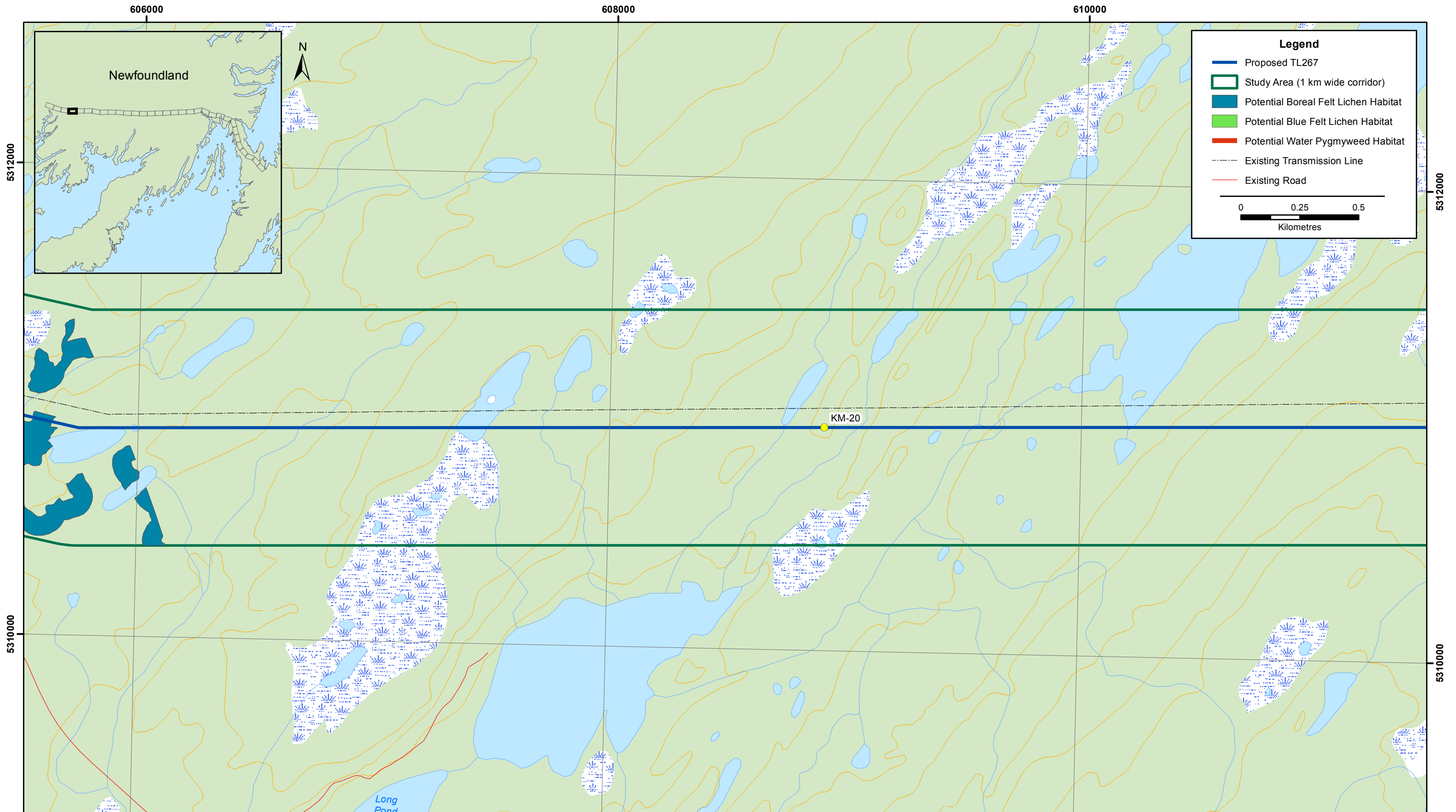
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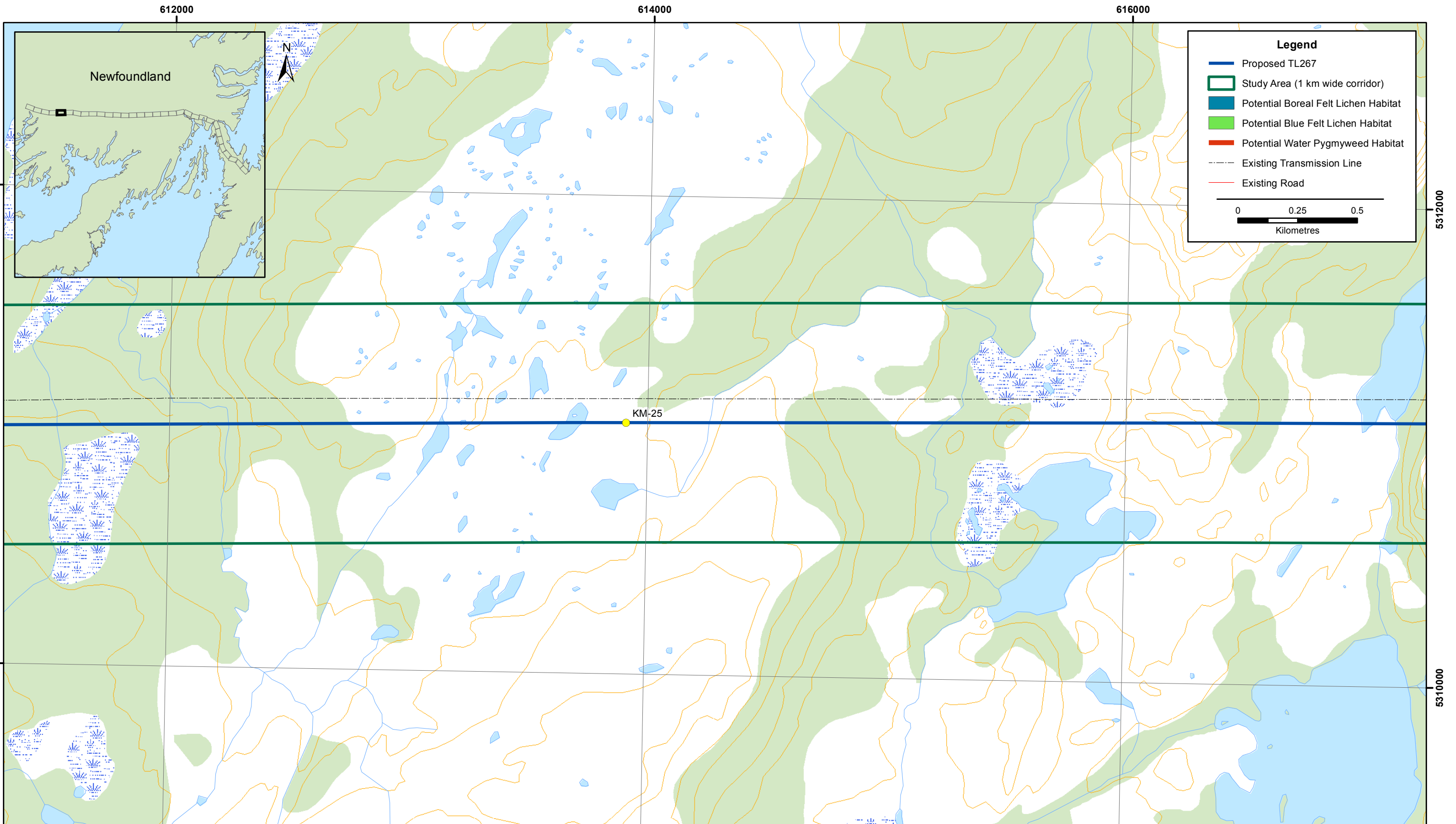
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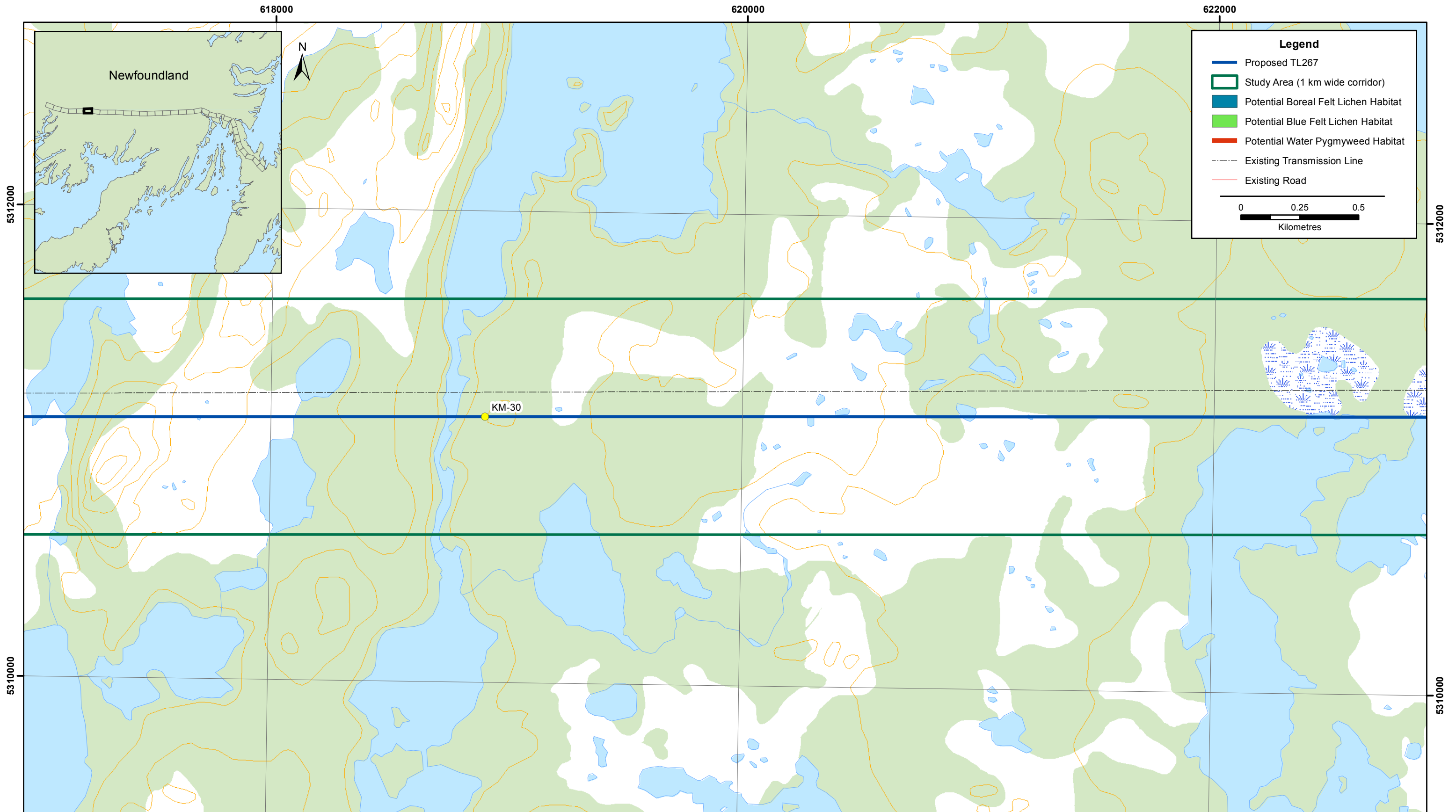
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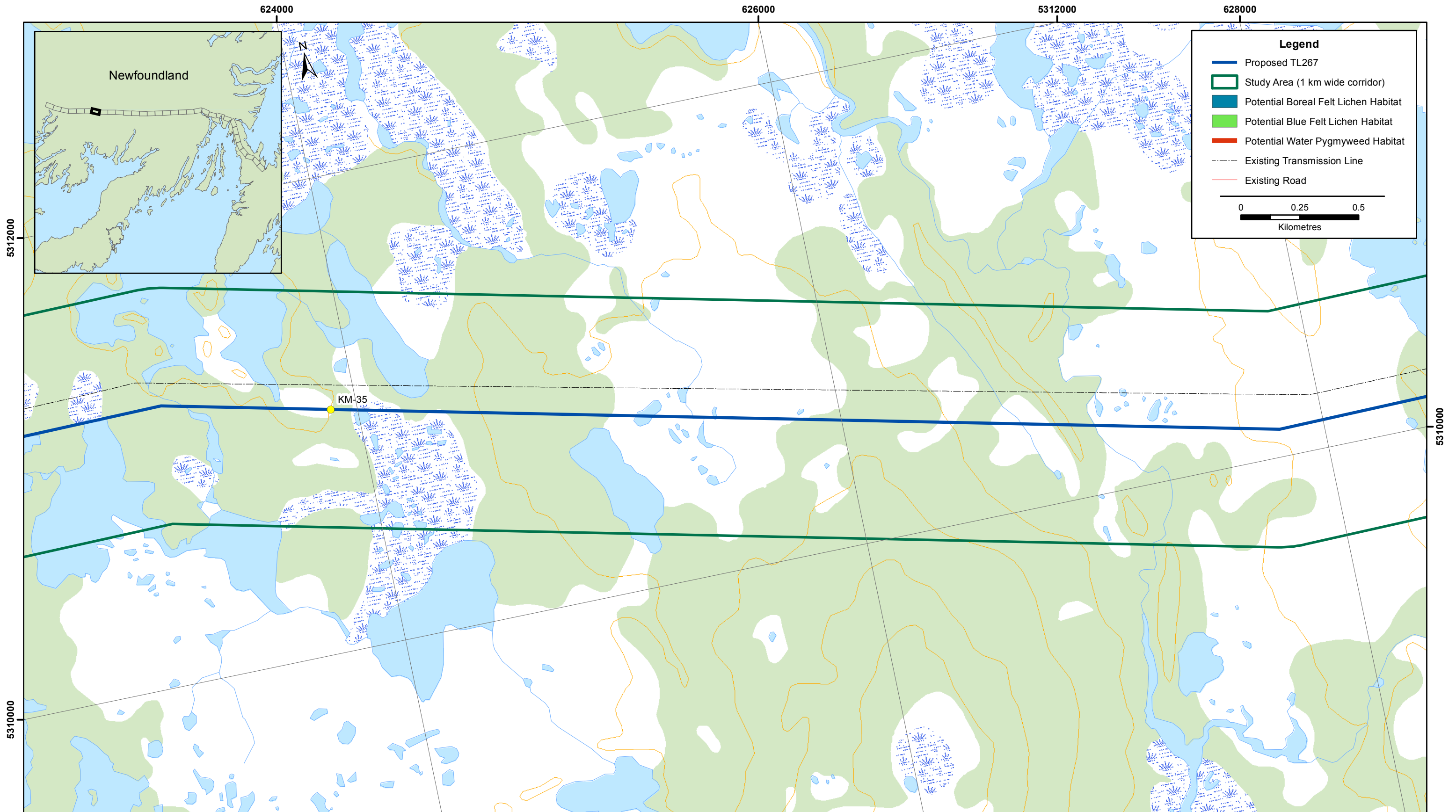








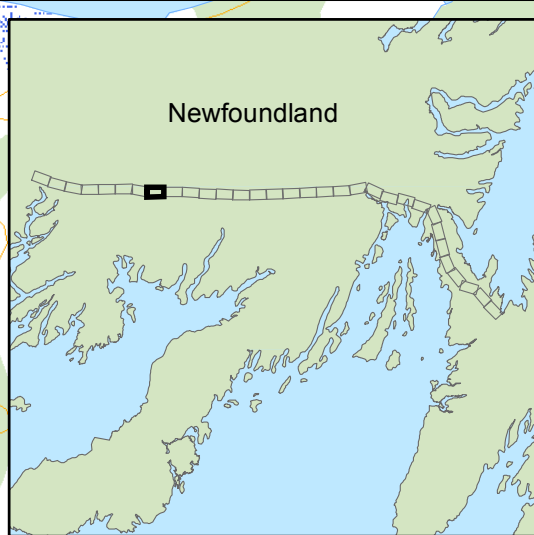











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632000

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Legend

-  Proposed TL267
-  Study Area (1 km wide corridor)
-  Potential Boreal Felt Lichen Habitat
-  Potential Blue Felt Lichen Habitat
-  Potential Water Pygmyweed Habitat
-  Existing Transmission Line
-  Existing Road

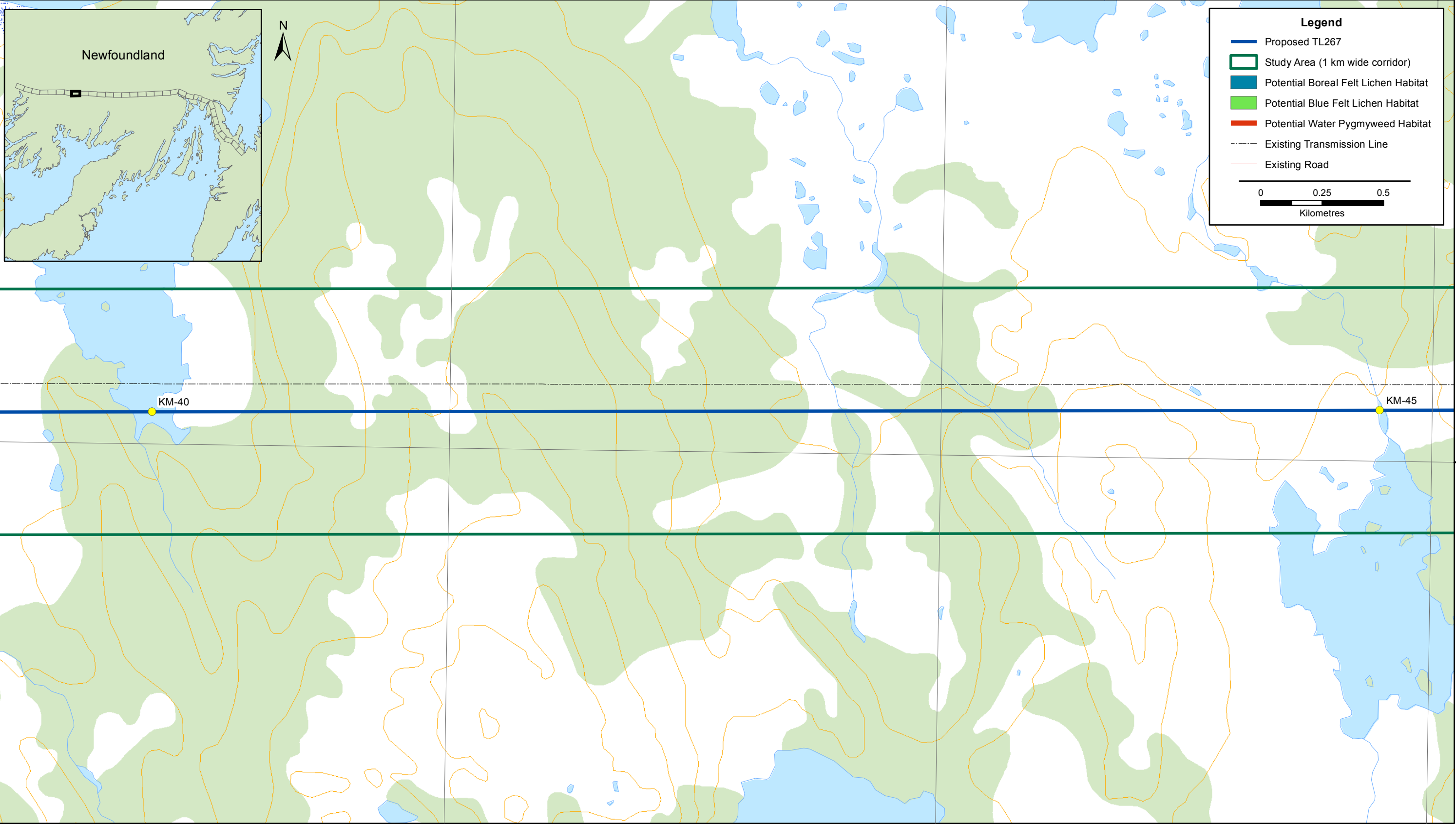
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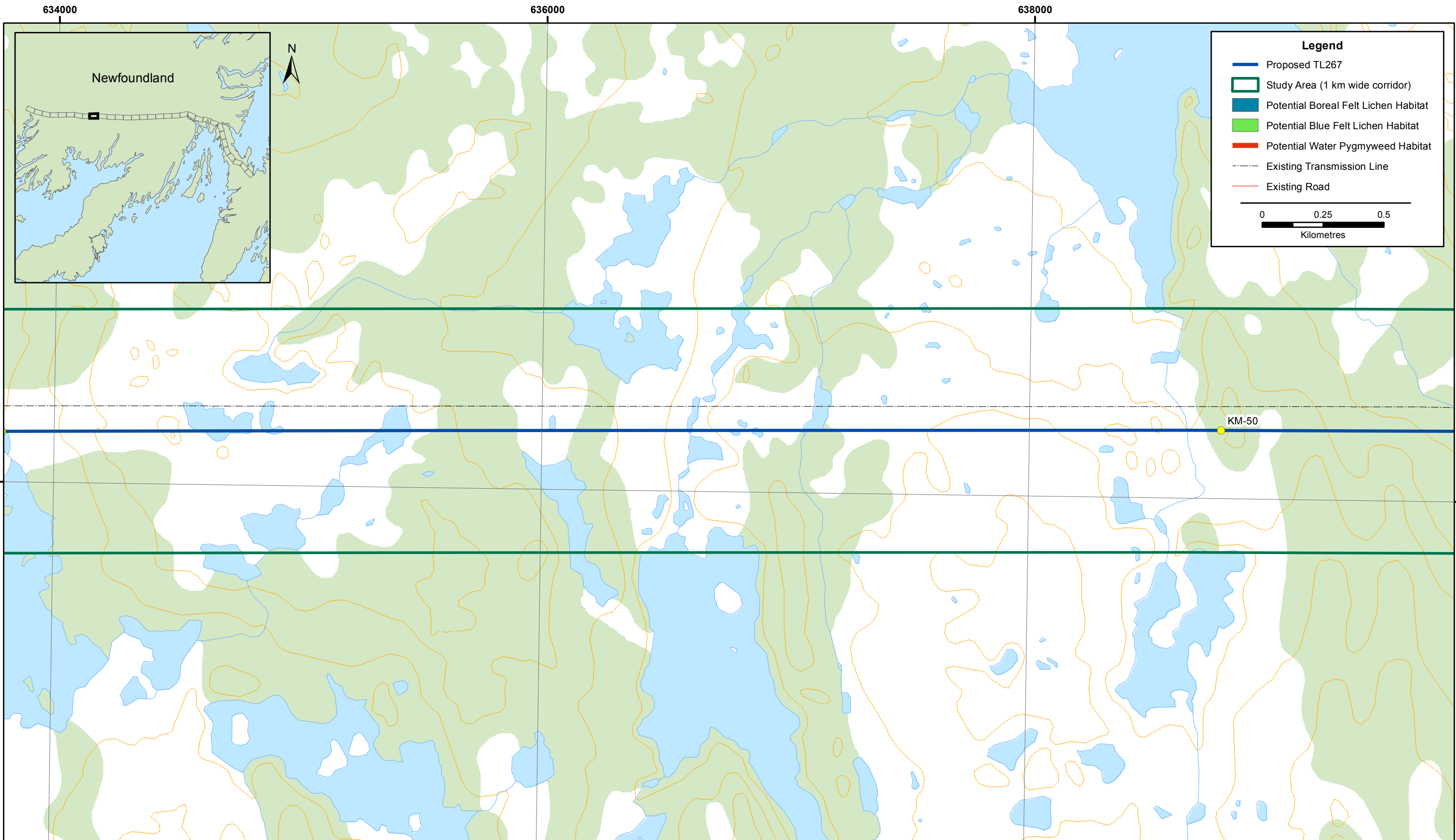
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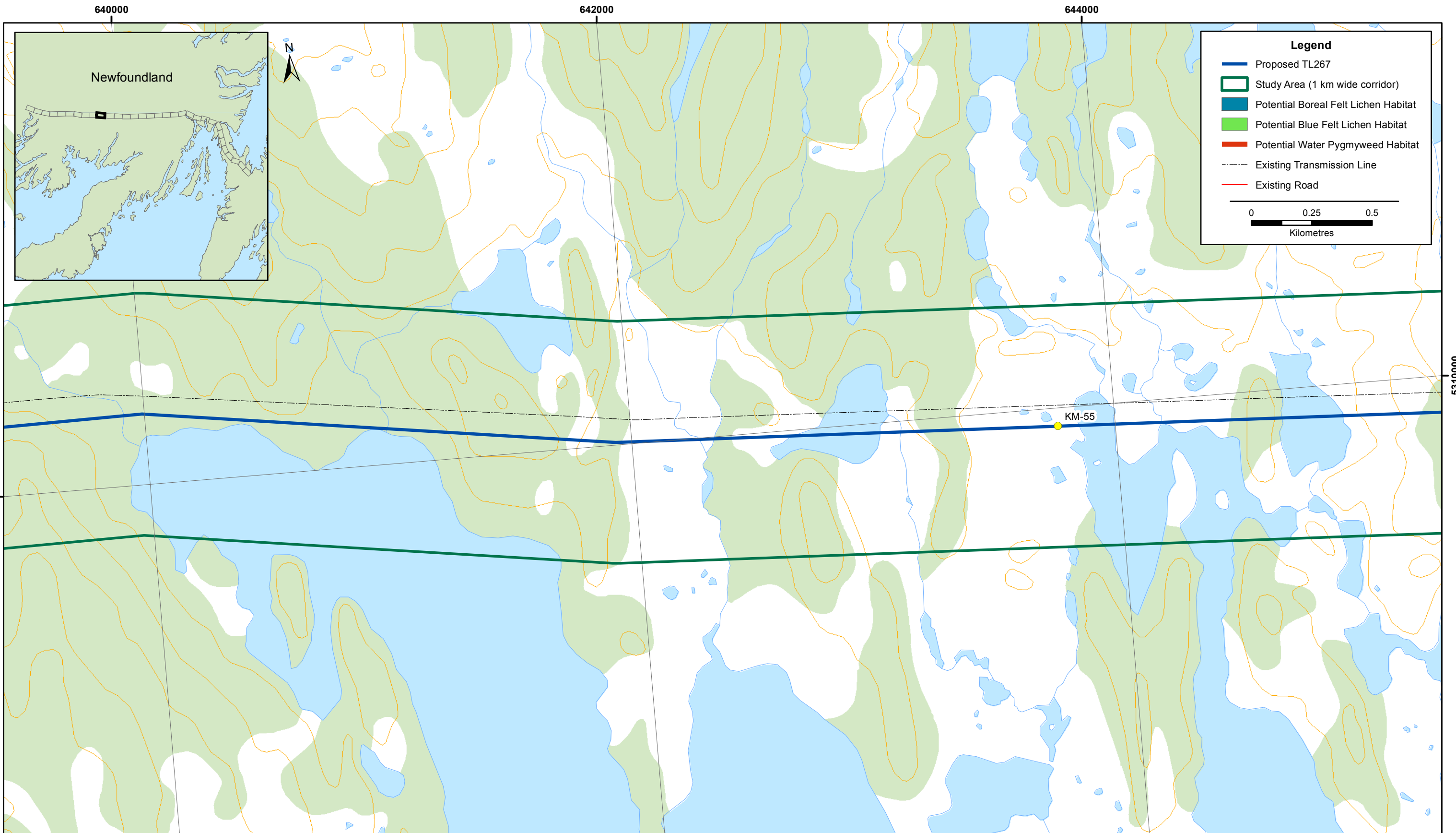
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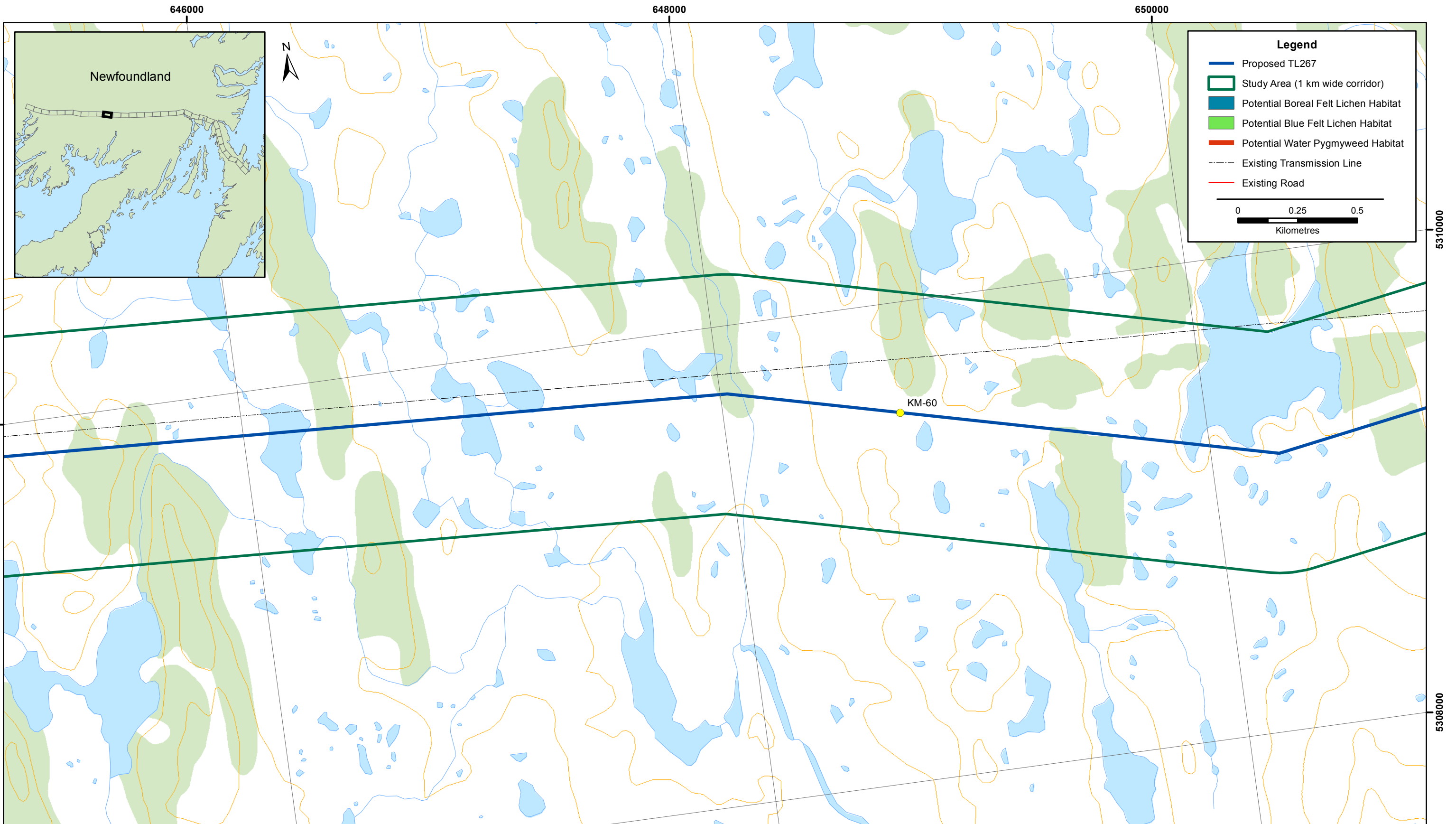
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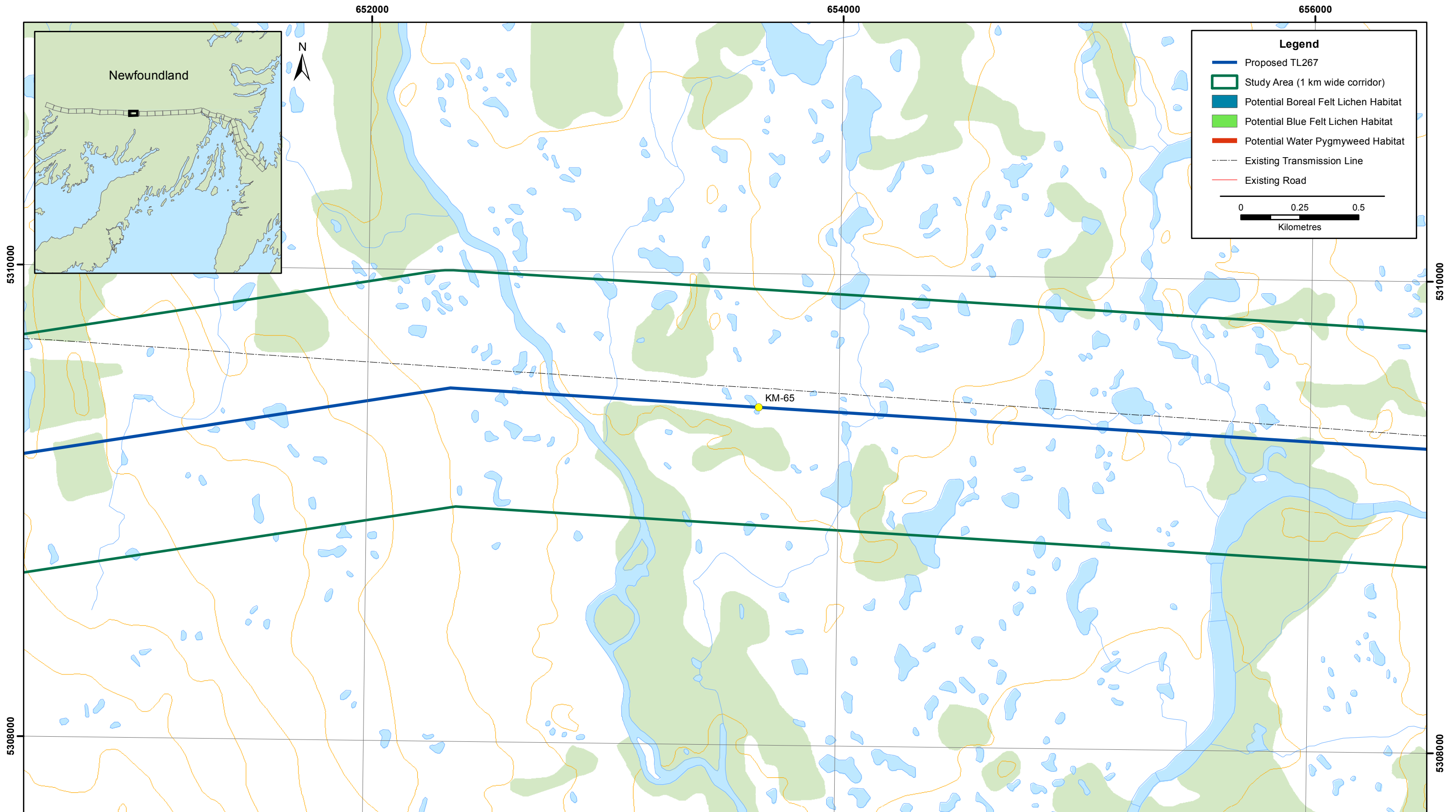
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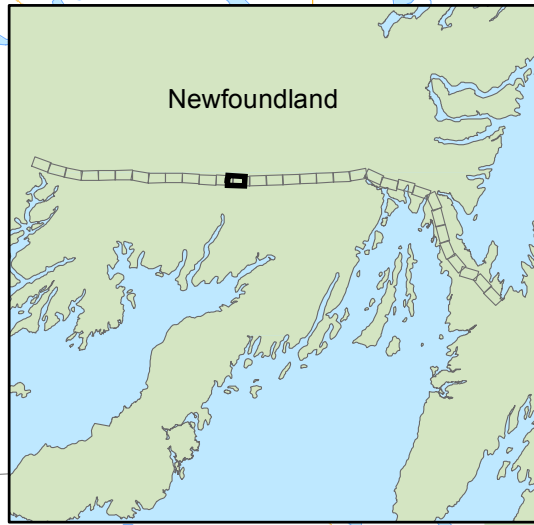




658000

660000

662000



Legend

- Proposed TL267
- Study Area (1 km wide corridor)
- Potential Boreal Felt Lichen Habitat
- Potential Blue Felt Lichen Habitat
- Potential Water Pygmyweed Habitat
- Existing Transmission Line
- Existing Road

0 0.25 0.5
Kilometres

531000

531000

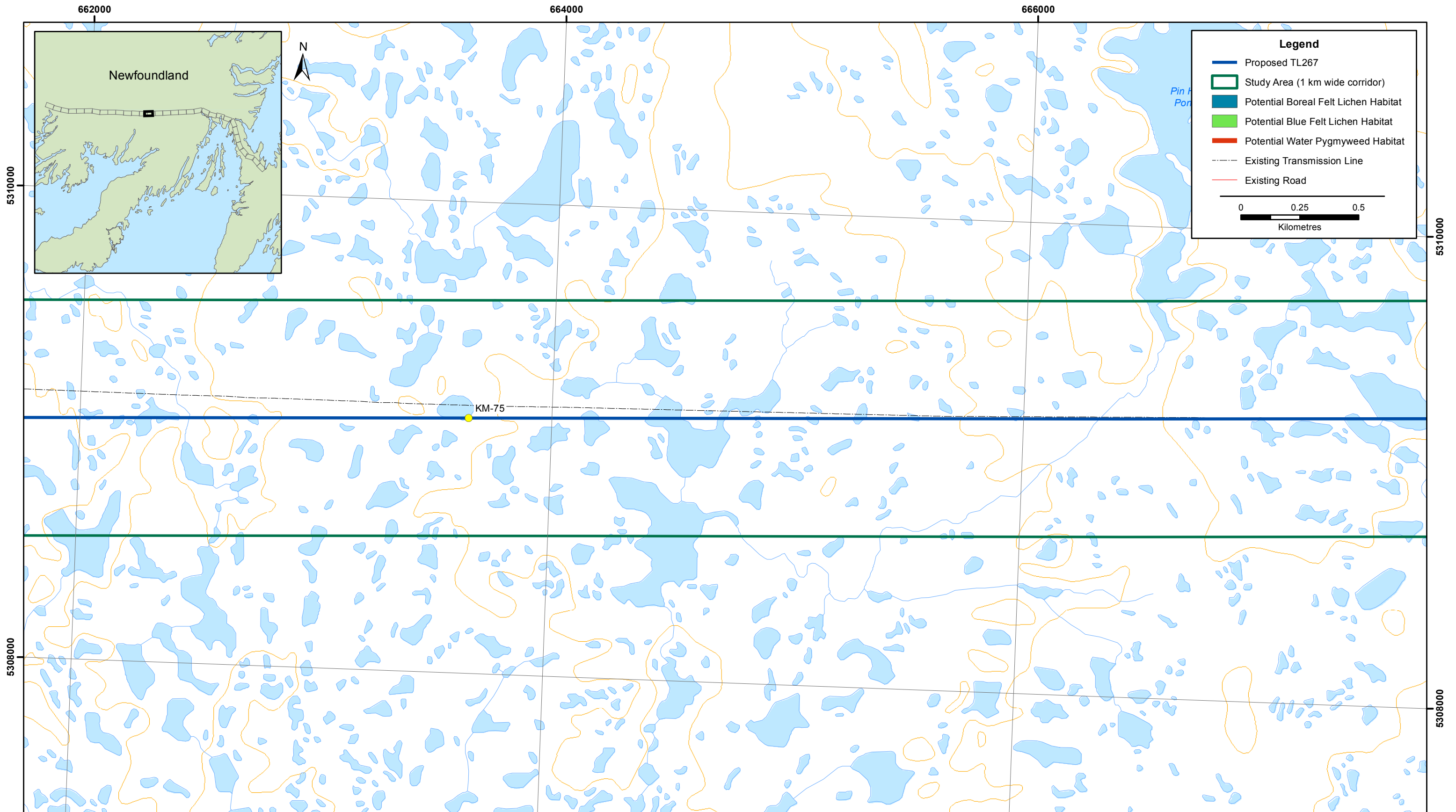
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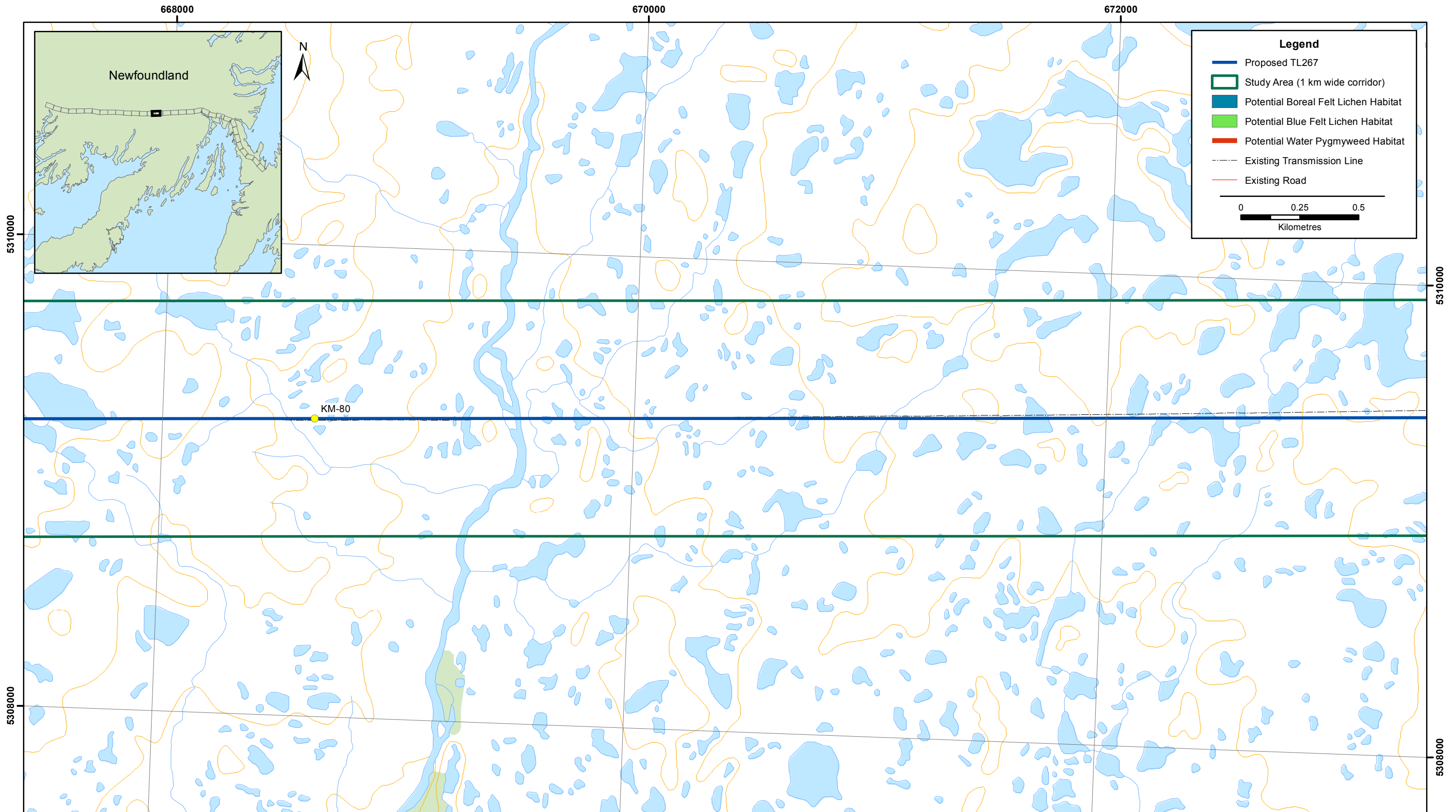
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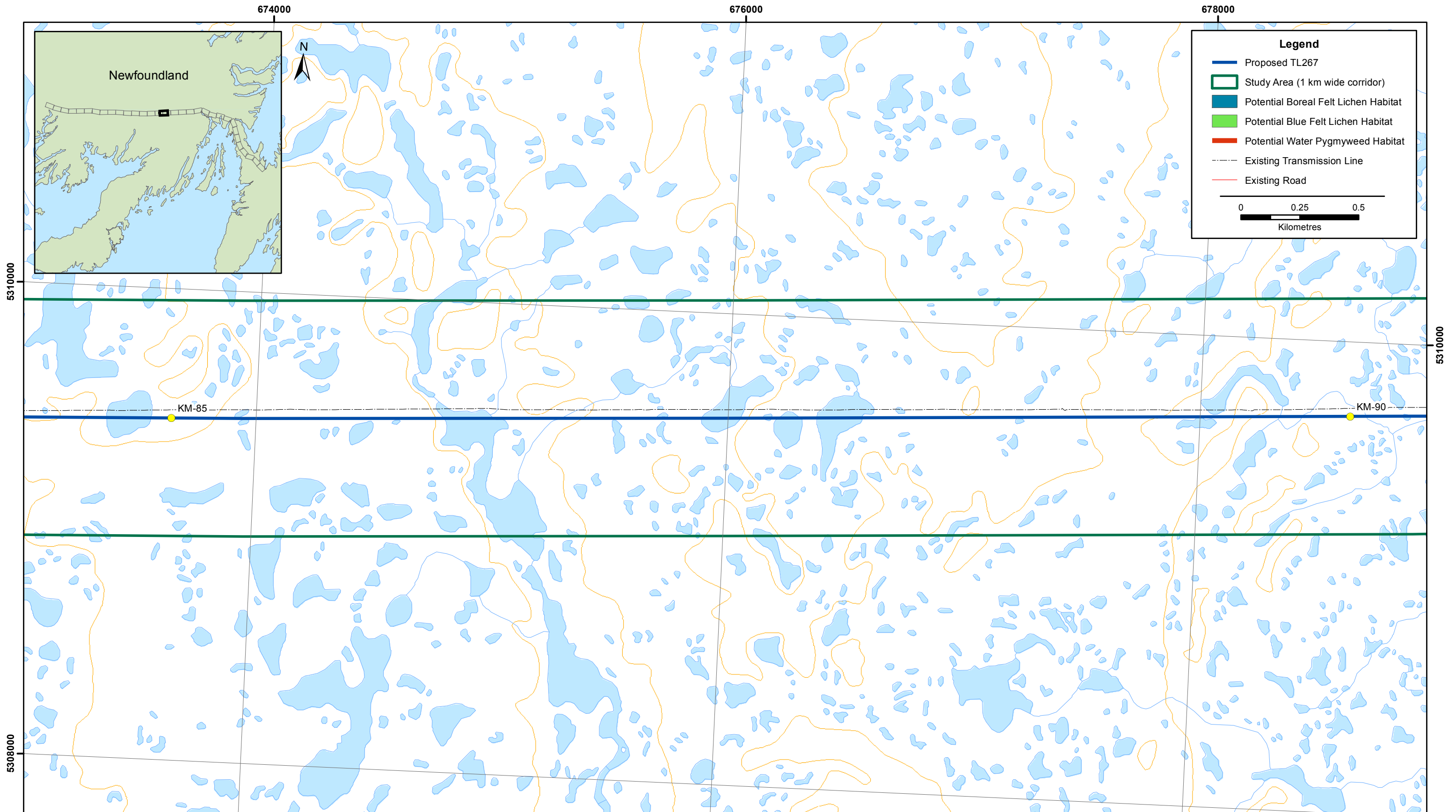
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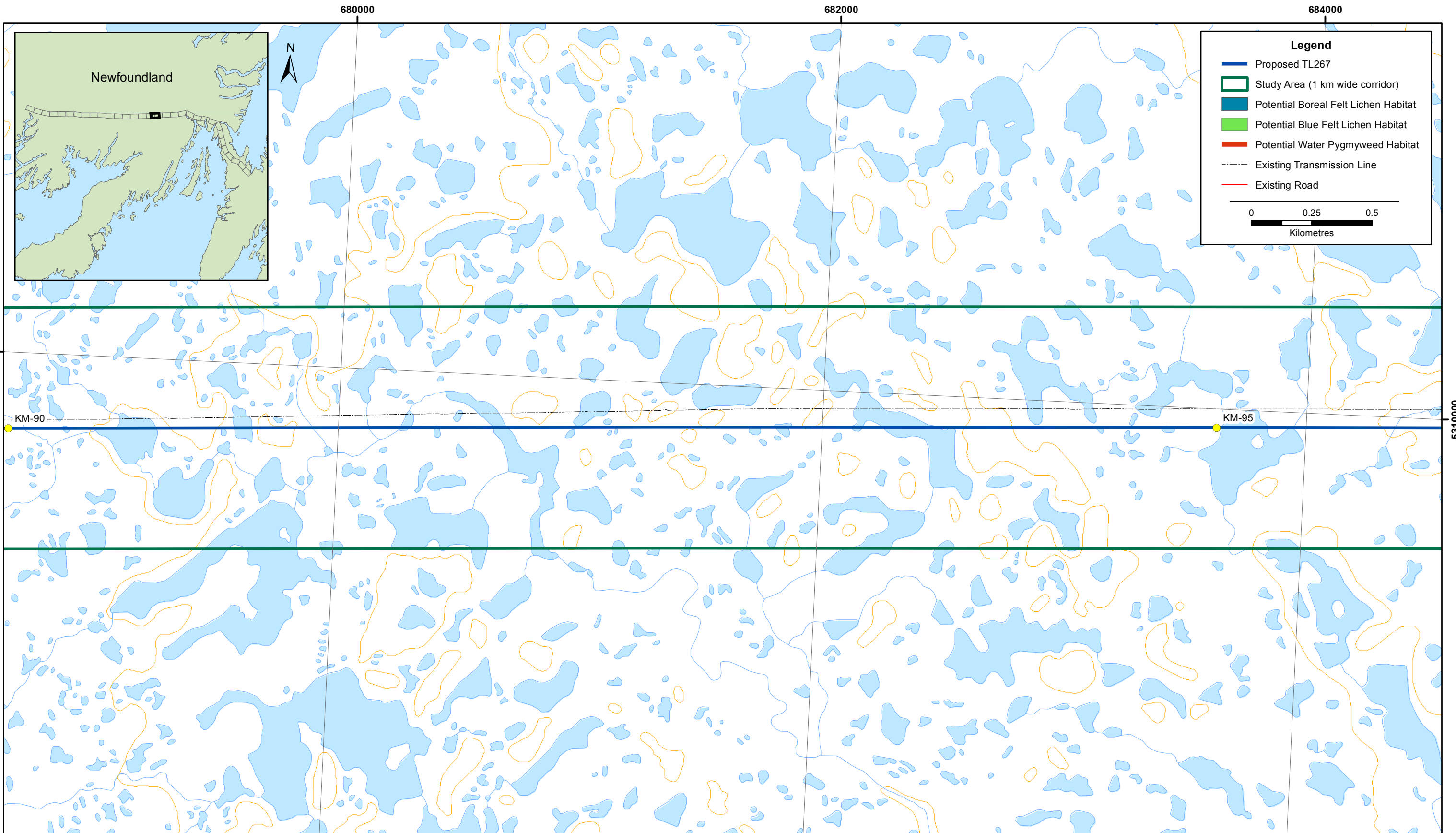
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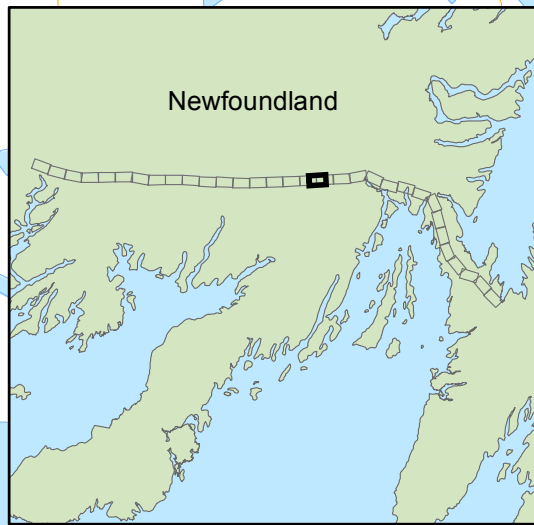




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Legend

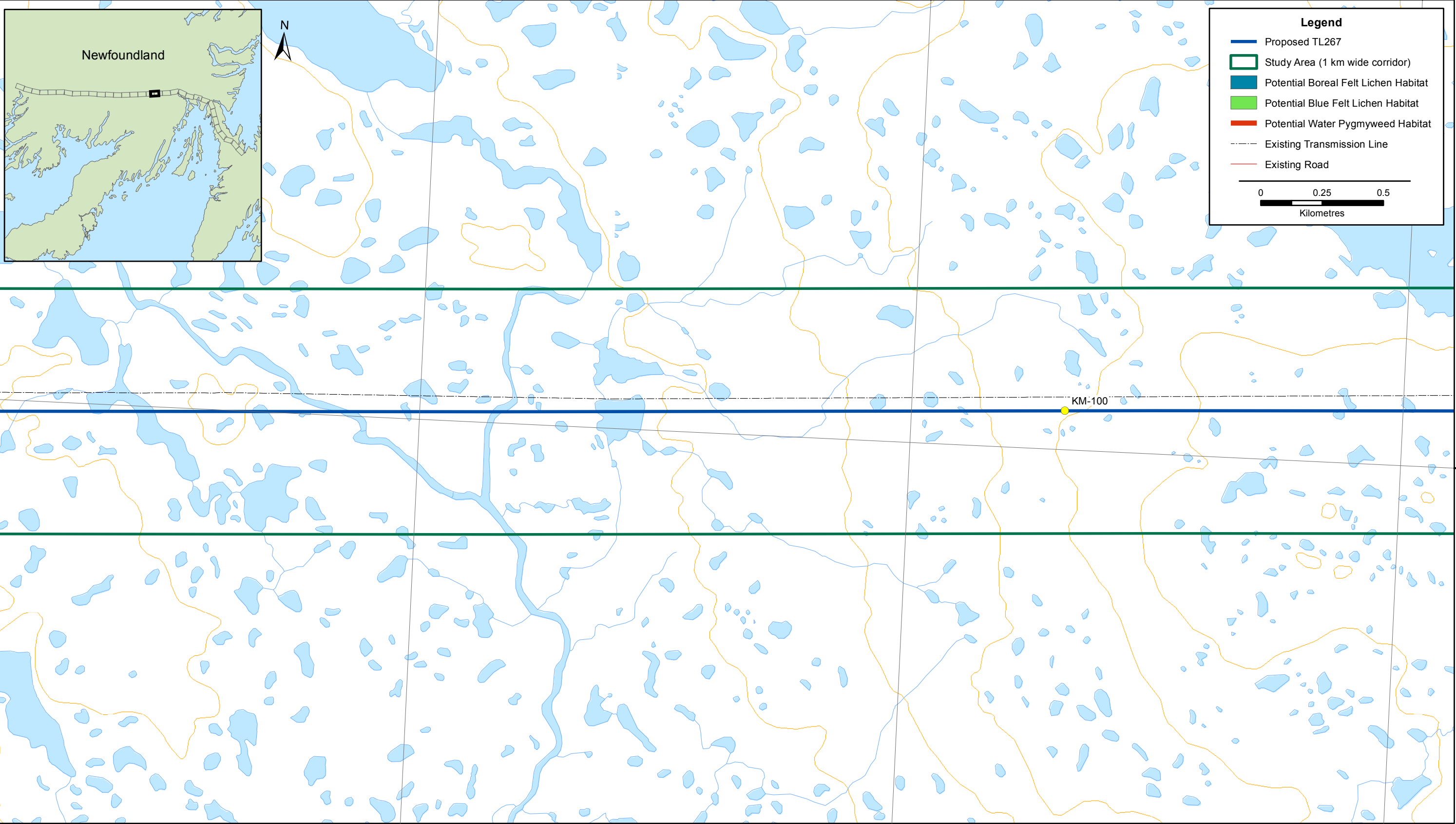
- Proposed TL267
- Study Area (1 km wide corridor)
- Potential Boreal Felt Lichen Habitat
- Potential Blue Felt Lichen Habitat
- Potential Water Pygmyweed Habitat
- Existing Transmission Line
- Existing Road

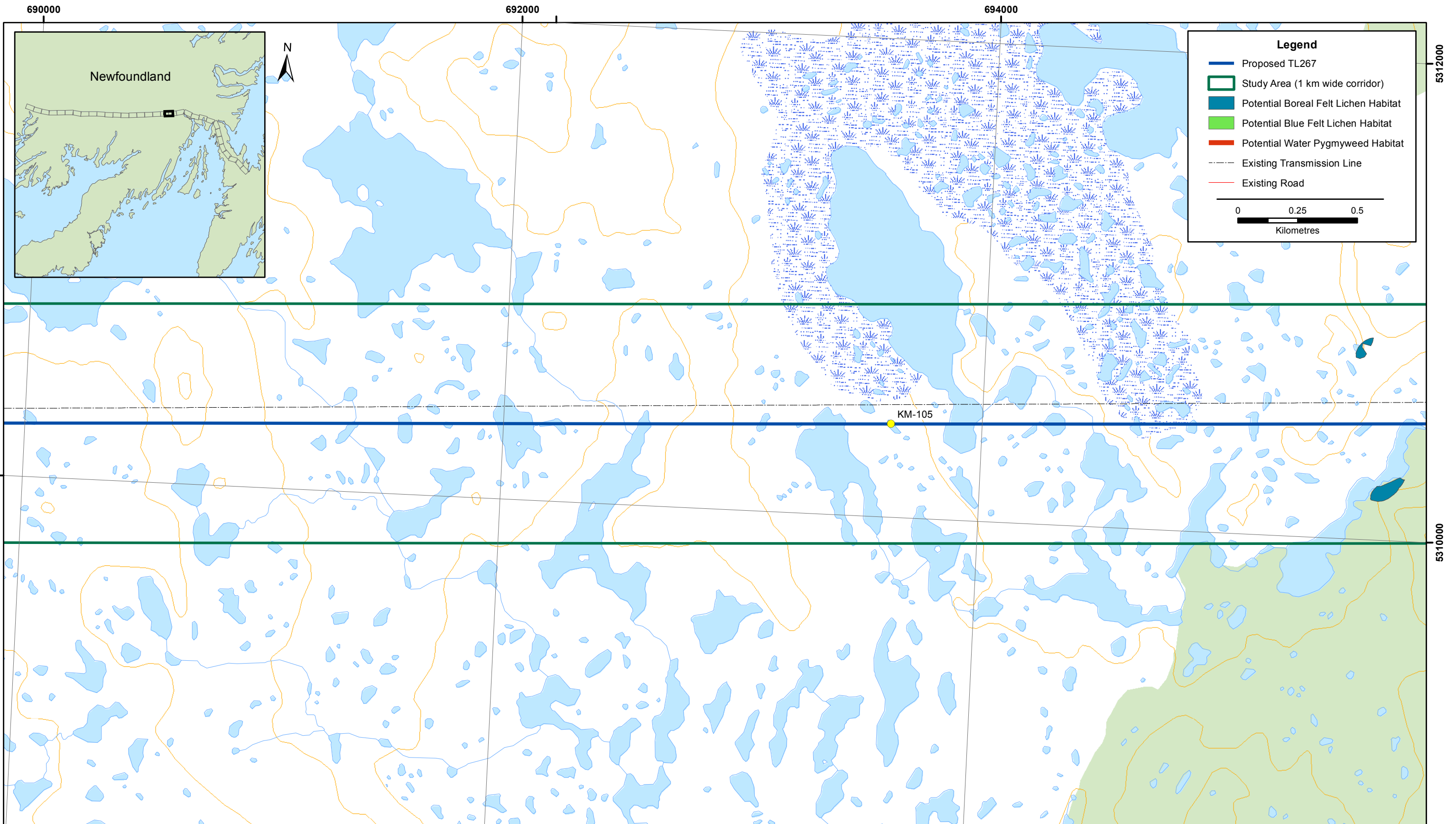
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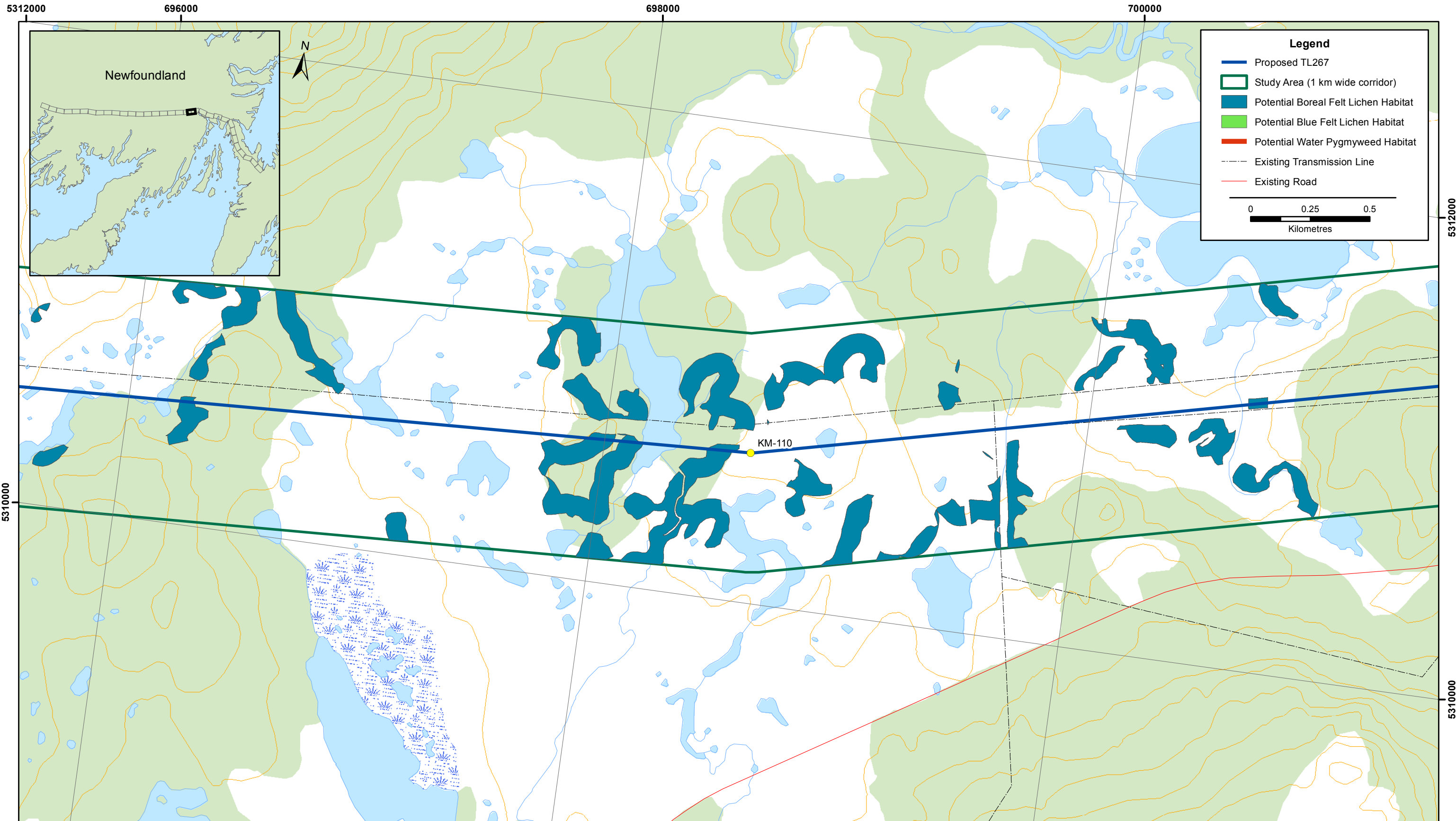
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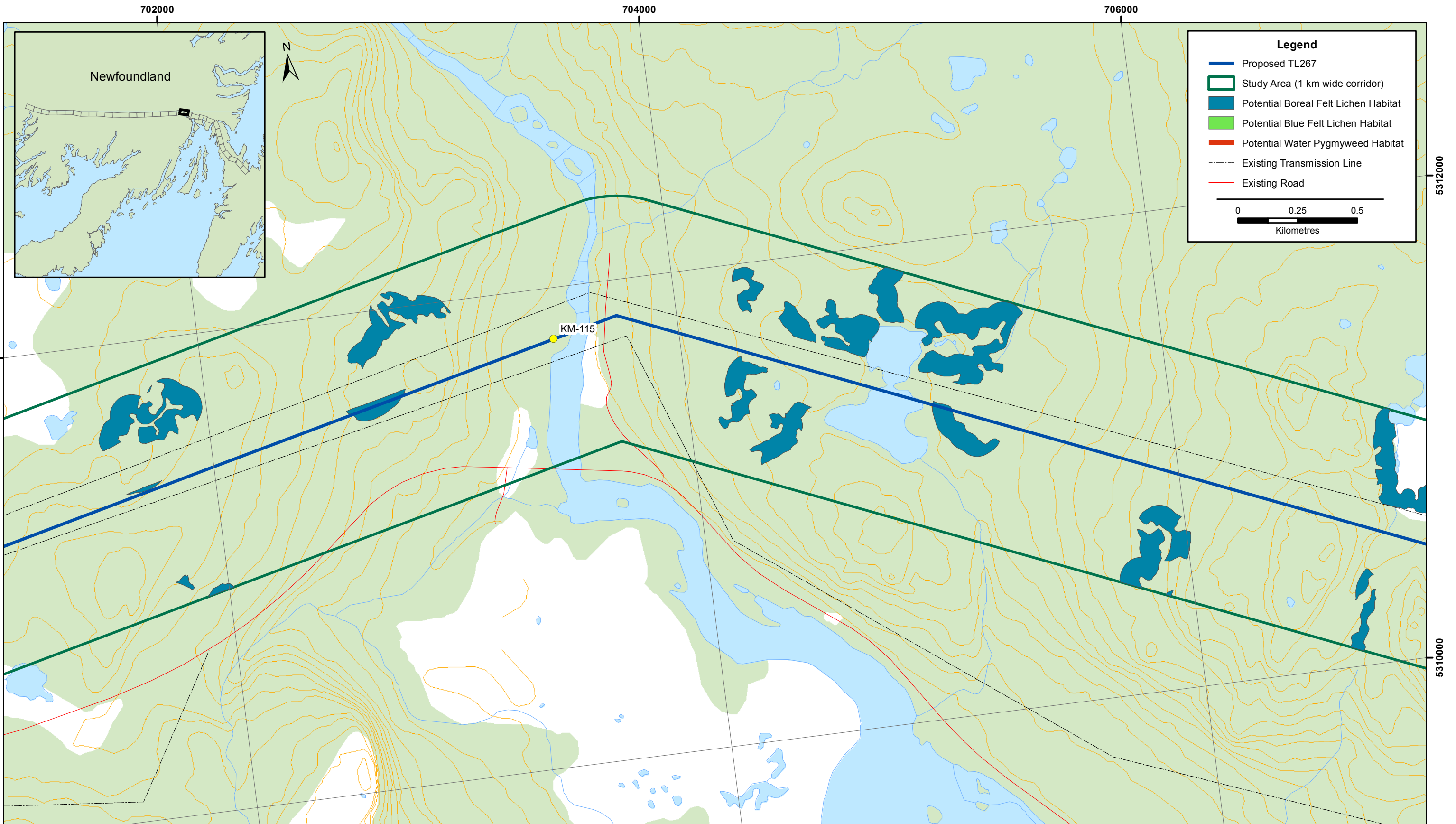
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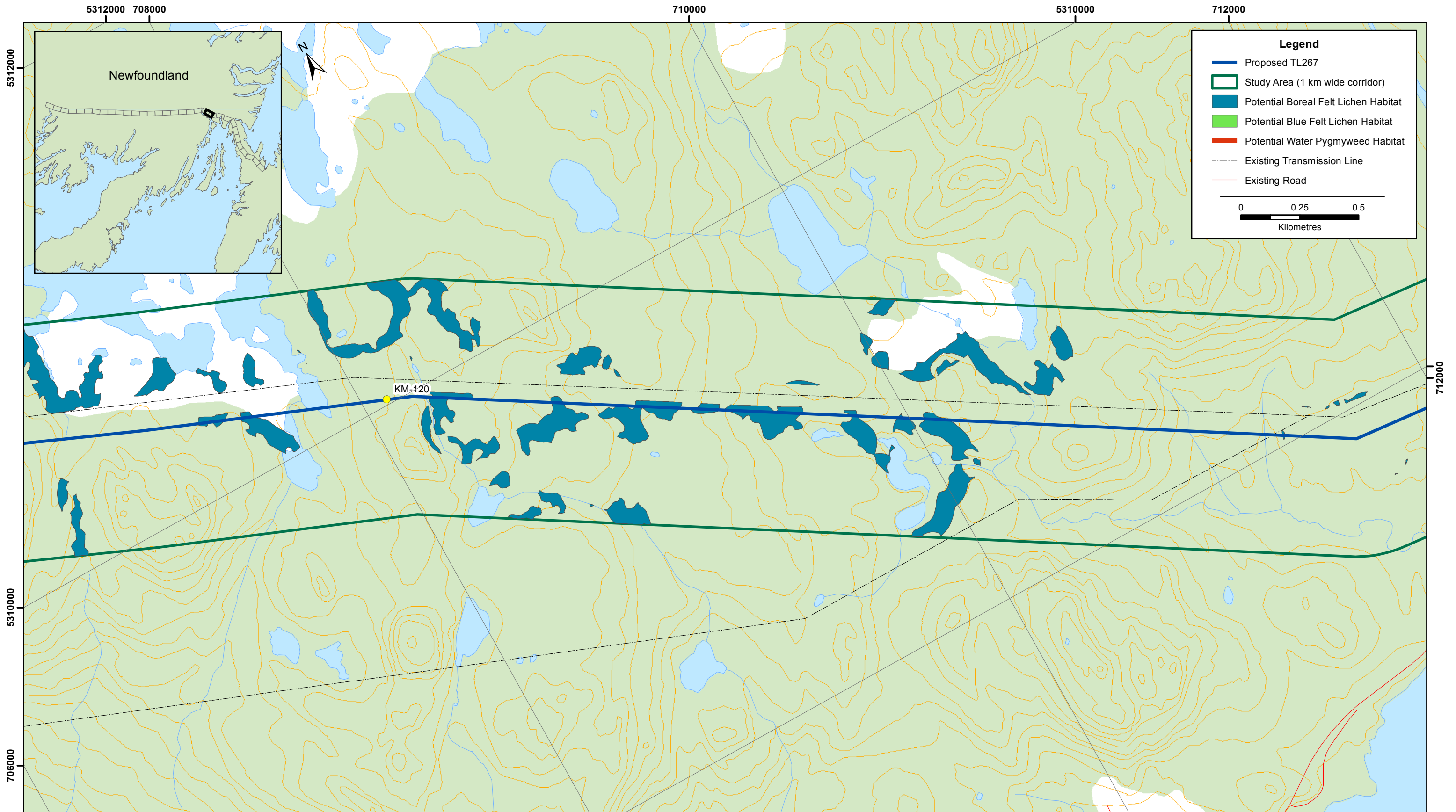
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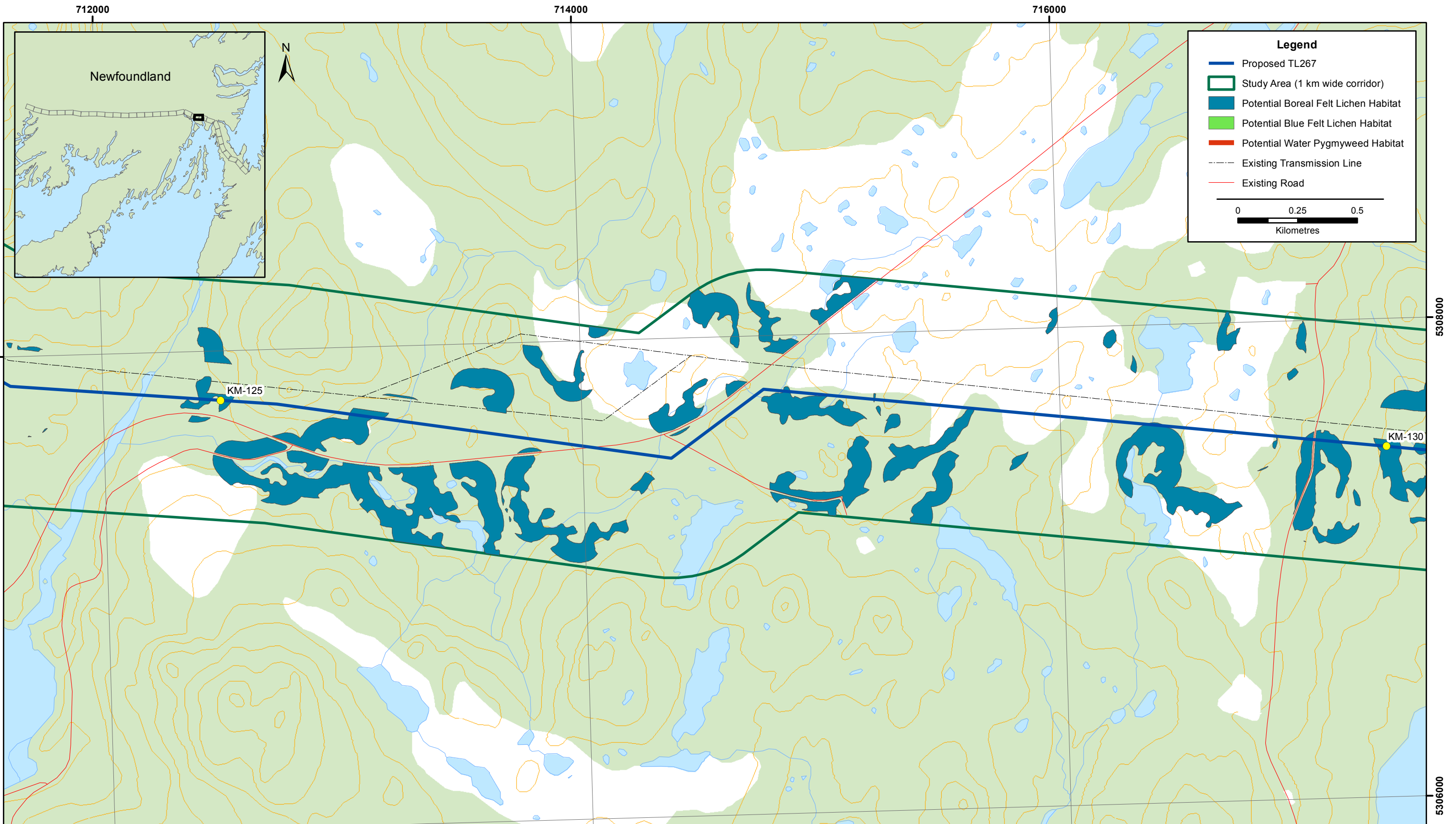


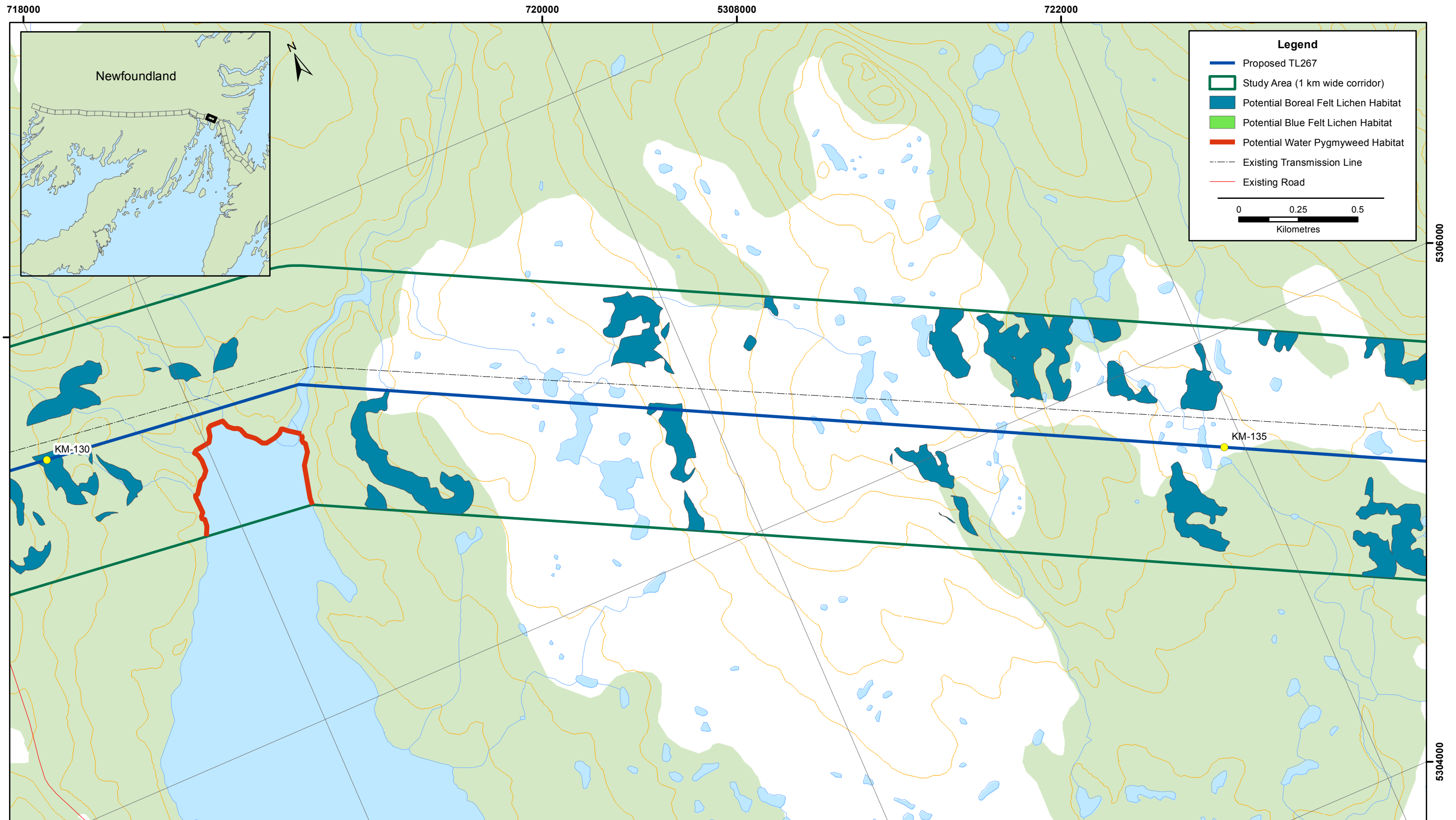


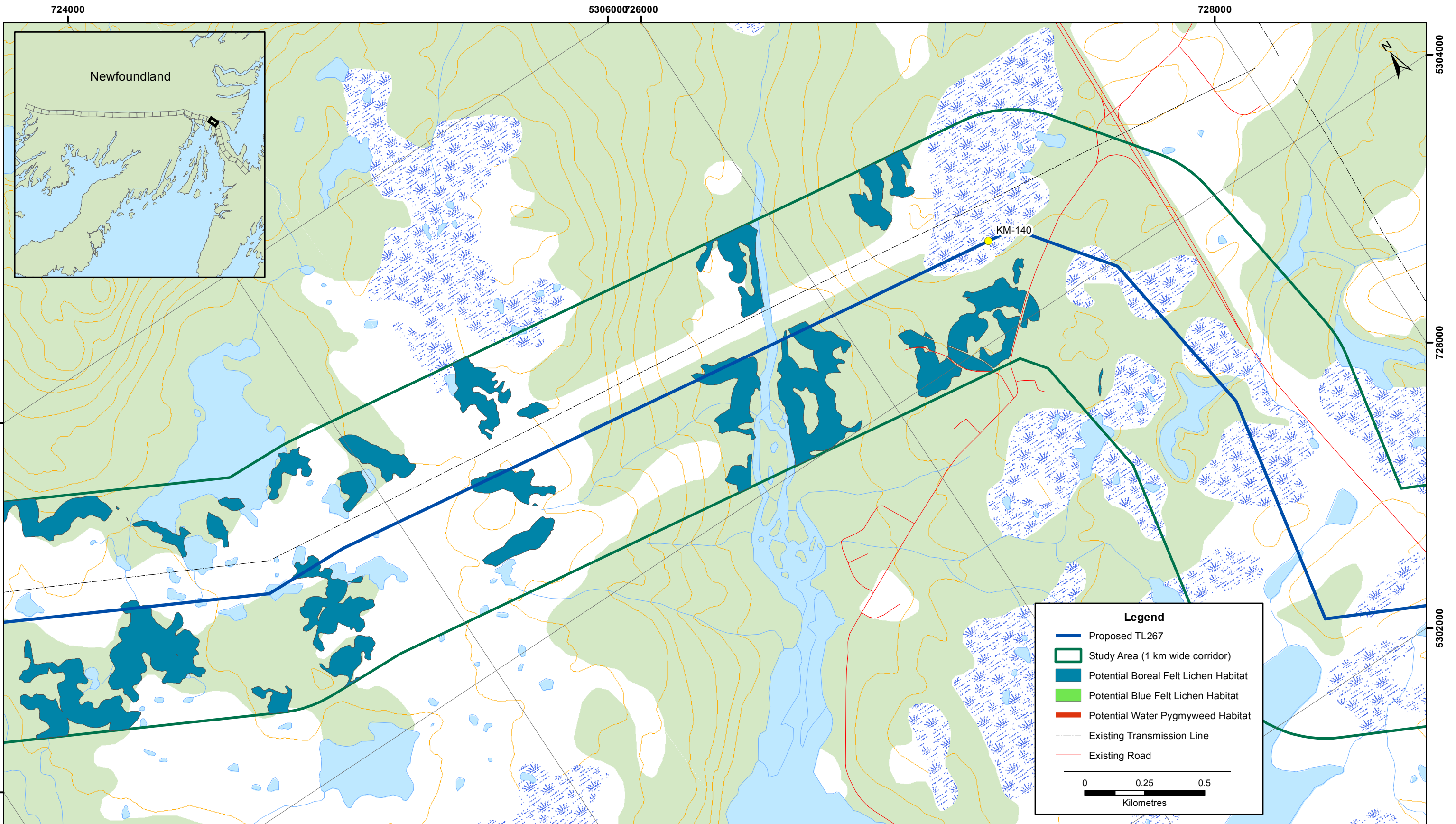








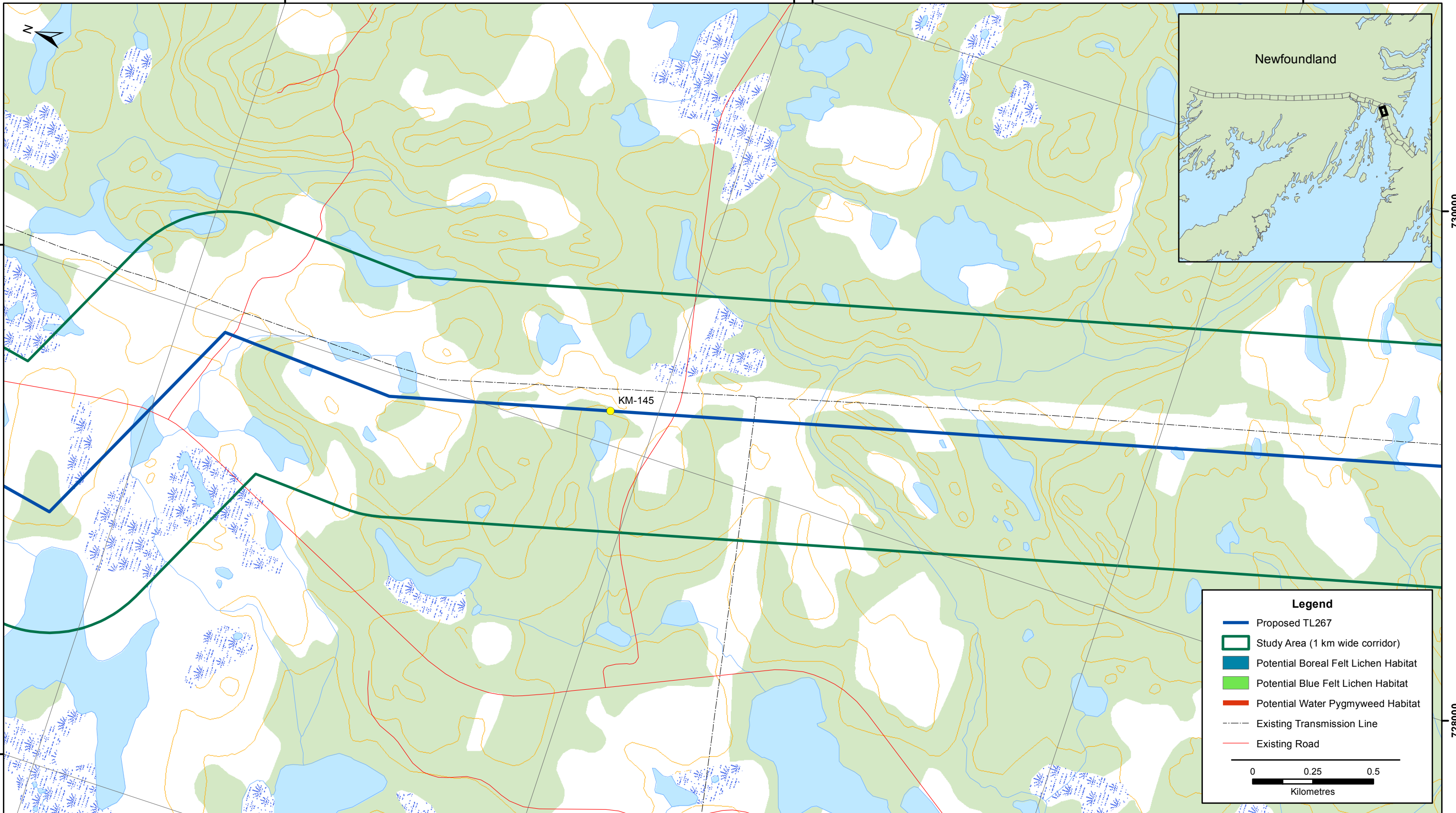


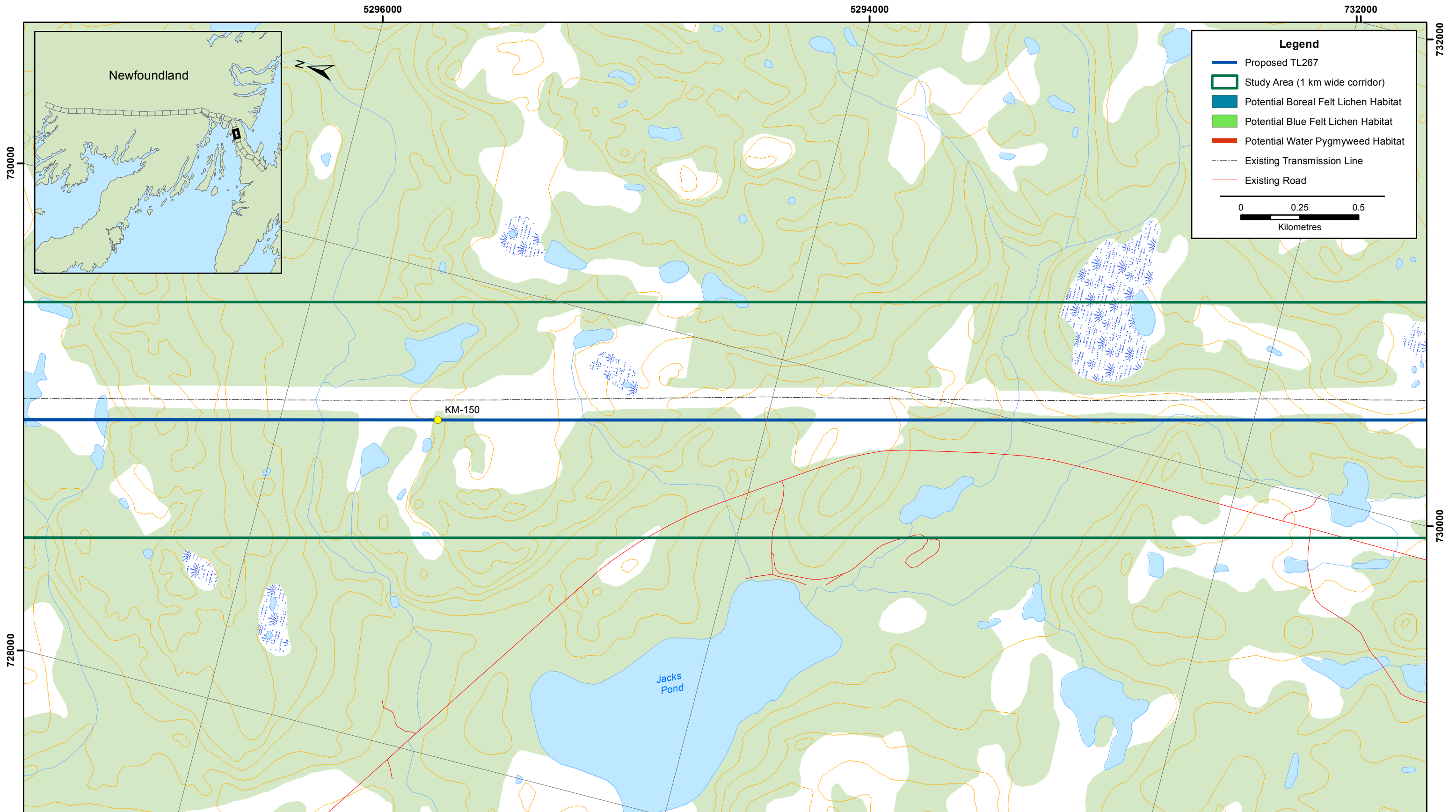


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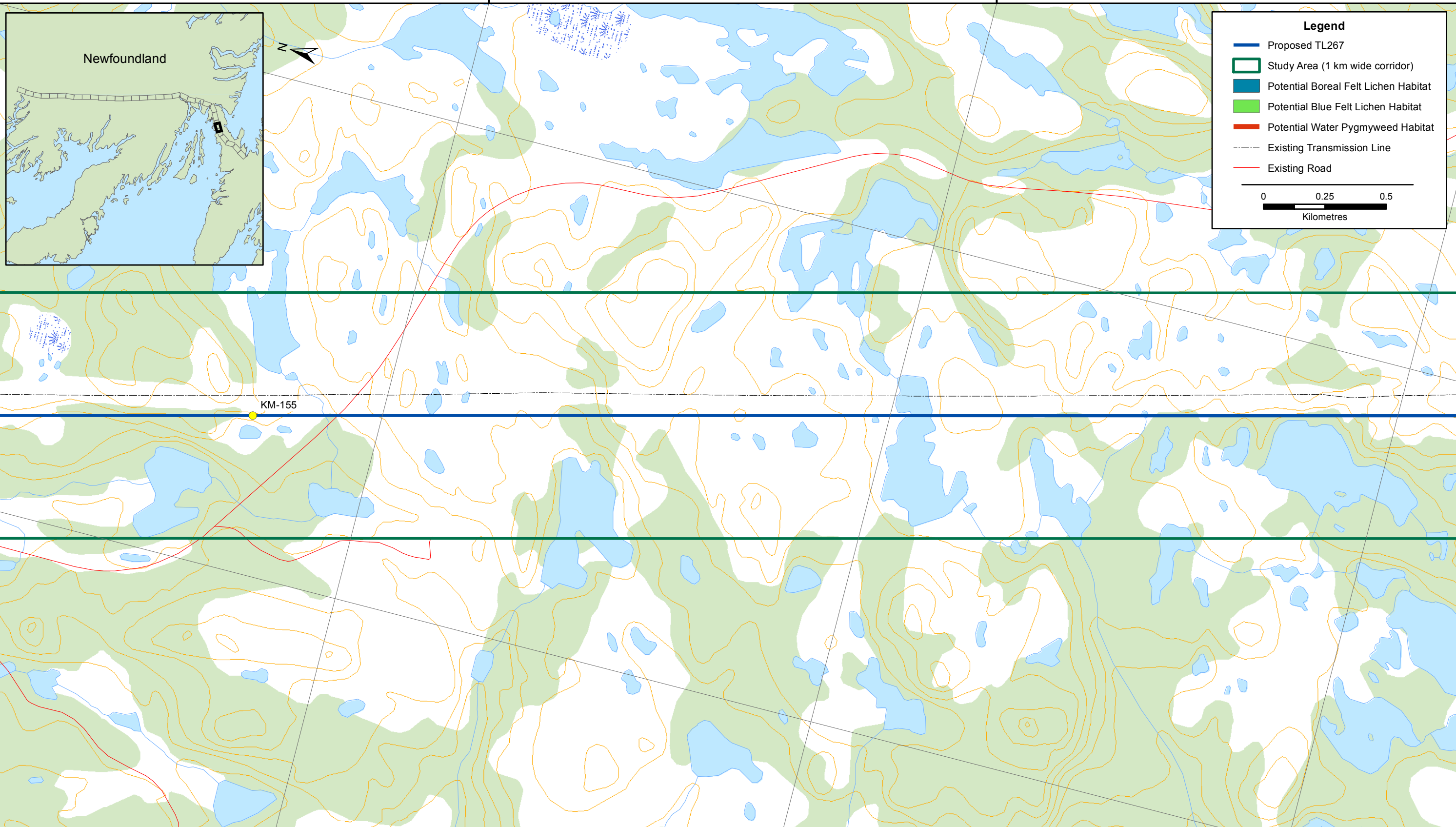




732000

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Legend

- Proposed TL267
- Study Area (1 km wide corridor)
- Potential Boreal Felt Lichen Habitat
- Potential Blue Felt Lichen Habitat
- Potential Water Pygmyweed Habitat
- Existing Transmission Line
- Existing Road

0 0.25 0.5
Kilometres

730000

5286000

732000

