Labrador – Island Transmission Link

Analysis of Current Levels of Accessibility Along the Transmission Corridor

Prepared for:

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1.0 INTRODUCTION

Nalcor Energy is proposing to develop the *Labrador – Island Transmission Link* a High Voltage Direct Current (HVdc) transmission system extending from Central Labrador to the Island of Newfoundland's Avalon Peninsula.

The environmental assessment (EA) process for the Project was initiated in January 2009 and is in progress. An Environmental Impact Statement (EIS) is being prepared by Nalcor Energy, which will be submitted for review by governments, Aboriginal and stakeholder groups and the public.

In preparation for and support of the EA of the Project, this study was completed into order to assess and describe existing levels of human access to and within the transmission corridor, for use in on-going Project planning and design, as well as in the environmental effects analyses being conducted as part of the EA.

1.1 Project Overview

The proposed Labrador – Island Transmission Link (the Project) involves the construction and operation of transmission infrastructure within and between Labrador and the Island of Newfoundland. Nalcor Energy is proposing to establish a High Voltage Direct Current (HVdc) transmission system extending from the lower Churchill River in Central Labrador to Soldiers Pond on the Island's Avalon Peninsula (Figure 1.1).

The proposed transmission system, as currently planned, will include the following key components:

- an ac-dc converter station at Gull Island (or potentially, Muskrat Falls) in Central Labrador, on the lower Churchill River adjacent to the switchyard for the Lower Churchill Hydroelectric Generation Project;
- an HVdc transmission line extending from that site and across Southeastern Labrador to the Strait of Belle Isle. This overhead transmission line will be approximately 400 km in length with a cleared right-of-way averaging approximately 60 m wide, and consist of single galvanized steel lattice towers;
- cable crossings of the Strait of Belle Isle with associated infrastructure, including cables placed across the Strait through various means to provide the required cable protection;
- an HVdc transmission line (similar to that described above) extending from the Strait of Belle Isle across the Island of Newfoundland to the Avalon Peninsula, for a distance of approximately 700 km;
- a dc-ac converter station at Soldiers Pond on the Island of Newfoundland's Avalon Peninsula; and
- electrodes at each end of the HVdc transmission line in Labrador and on the Island, with overhead lines connecting them to their respective converter stations.

Project planning and design are currently at a stage of having identified a 2 km wide corridor the on-land portions of the proposed HVdc transmission line and 500 m wide corridors for the proposed Strait of Belle Isle cable crossings, as well as various alternative corridor segments in particular areas (Figure 1.1). Potential (alternative) on-land corridors and study areas have also been identified for the proposed electrodes, although the nature, type and location of these electrodes are the subject of ongoing analysis and engineering.

It is these proposed transmission corridors and components that were the subject of Nalcor Energy's environmental study program. Project planning is in progress, and it is anticipated that the Project description will continue to evolve as engineering and design work continue. The EA of the Project will also identify and evaluate alternative means of carrying out the Project that are technically and economically feasible.

In conjunction and concurrent with the EA process, Nalcor Energy will be continuing with its technical and environmental analyses of the corridors, in order to identify and select a specific routing for the Project. The eventual transmission routes and locations will be selected with consideration of technical, environmental and socioeconomic factors.

Again, this study focuses on the HVdc transmission corridor as defined at the time that the Project's EA was initiated, and as described in the EA Registration / Project Description (September 2009). At the time of the commencement of the EA and its associated environmental studies, the Labrador component of the Project included a converter station facility at Gull Island on the lower Churchill River, as well as a proposed transmission corridor extending from Gull Island to the Strait of Belle Isle. In mid-November 2010, Nalcor Energy advised the provincial and federal governments that it would also be assessing the potential option of locating the Project's Labrador converter station at or near the Muskrat Falls site on the lower Churchill River. If that were to be the case, the Labrador transmission corridor would potentially extend from Muskrat Falls to the Trans Labrador Highway (Phase 3, TLH3), and then follow generally along the south side of the highway to approximately its southernmost point before meeting and continuing along the previously identified corridor from that location to the Strait of Belle Isle (Figure 1.2).

That additional Labrador transmission corridor option is being fully considered in the EA of the Project. As that option follows generally along the south side of the TLH3, it will utilize existing transportation infrastructure in that portion of Southeastern Labrador rather than requiring or creating new access in that part of the Project area. Given that the "existing access" characteristics of this Muskrat Falls corridor segment are relatively clear, and given the timing of the initiation of this study, it has not been included for detailed analyses in this report.

The access characteristics of both the Gull Island and Muskrat Falls corridor options, including any key differences and similarities between them and the implications for environmental effects, will however be fully considered in the EIS.

Figure 1.1 Labrador-Island Transmission Link: Project Overview

Figure 1.2 Labrador-Island Transmission Link: Muskrat Falls Corridor Option

1.2 Study Purpose and Objectives

The purpose of the study is to provide an understanding of the current degree of accessibility to and within the transmission corridor, as information for use in on-going Project planning and design and in the EA.

Using a combination of automated processes and manual interpretation with both satellite and ortho-imagery and existing road and trail network data, the Study Team has mapped and classified existing access roads and trails and used these data to perform spatial analysis and conducted a quantitative assessment of the current degree of access for the defined regions from Central Labrador through to the Avalon Peninsula. The overall study area (2 km wide transmission corridors and larger 15 km wide regional study area) and the various study sub-regions (Southeastern Labrador, Northern Peninsula, Central and Eastern Newfoundland and the Avalon Peninsula) are illustrated in Figure 1.3. The results and discussion presented in this report are generally structured according to these regional areas.

Figure 1.3 Study Area and Associated Regions

2.0 APPROACH AND METHODS

The following sections provide an overview of the information sources and methods used in this study, including the access data and spatial imagery obtained and utilized, as well as the manner in which it was processed and analysed to describe and quantify existing access levels along and adjacent to the transmission corridor.

2.1 Data Compilation and Review (Access Data and Spatial Imagery)

The access data used for this study were acquired from a variety of sources, as documented in Table 2.1. Upon receipt of the GIS files from the various sources the Study Team verified the spatial reference systems and coverage for each of the layers. Preliminary review of the datasets confirmed that although there were many common features amongst the data sets, no one dataset that contained all access. Also, when compared with the imagery, it was immediately evident that that not all access was captured in these data sets.

Table 2.1 Data Sources Acquired and Used in the Analysis

Data	Source
Newfoundland and Labrador Road Network Data – Edition 6.0	GeoBase - National Road Network Data
Various Data layers including Provincial Road Network data, Forestry Access Roads and Trails	Forestry Branch NL Department of Natural Resources
Existing Transmission Lines and access data	Nalcor Energy
Existing access data prepared by other consultants as part of the Labrador - Island Transmission Link environmental studies	Nalcor Energy (see Amec 2010 – *Labrador-Island Transmission Link: Socioeconomic Component Study, Communities, Land and Resource Use, Tourism and Recreation*)
Snowmobile Trails – Island of Newfoundland	Newfoundland and Labrador Snowmobile Federation

The spatial imagery used for this study was acquired by Nalcor Energy and included imagery previously compiled and used for other environmental studies. The data are comprised of SPOT-5 2.5 m panchromatic and colour imagery as well as 1:30,000 black and white ortho-imagery.

Table 2.2 describes the imagery data sets and their origin. A combination of these imagery products covered the entirety of the approximately 1,100 km long and 15 km wide study area.

Table 2.2 Imagery Acquired and Used in the Study

Data	Date Range	Source
SPOT-5 2.5m and 5m spatial resolution imagery provided in panchromatic and colour	2004-2008	Iunctus Geomatics Corp., National SPOT-5 Distributors
1:30,000 Black and White Ortho-imagery	2005-2007	Surveys and Mapping Division, Lands Branch Department of Environment and Conservation

2.2 Identification and "Extraction" of Access from the Spatial Imagery

The Study Team initially proposed to capture any 'new' access (ie., that not included in the access datasets outlined in Table 2.1) through image classification of the satellite and ortho-imagery. The SPOT-5 satellite imagery would allow for automated classification of access through a combined unsupervised and supervised image classification approach. The majority of the access could be extracted from the imagery based on this method for the areas covered by SPOT-5. For areas where SPOT- 5 imagery was not available, the provincial ortho-imagery was used. Some automated extraction could be performed on the panchromatic (black and white) ortho-imagery as the spectral properties (class) for roads are very distinct from other land classes.

Upon review of the existing access data and a thorough testing of this proposed approach it was determined that an automated extraction process would be successful in extracting new access, but also that it would require significant effort to filter this data from the existing access information without increasing the comprehensiveness and quality of the final product. In addition, classification (assigning access class) of the 'new' access would be a manual process regardless of the chosen method as the access class could not be determined through the image classification process. For these reasons the approach to the extraction of access data from image classification was revisited and revised somewhat, as described below.

Cut lines, trails, roads and other access routes distinguishable from the available imagery for the defined Study Area were collected using a "heads-up" digitizing method. Using ArcGIS software, the GIS operator panned along the study corridor from east to west identifying and manually digitizing polylines representing access routes. A consistent scale (1:15,000) was chosen to digitize the data to maintain a standard collection process for all areas regardless of the underlying imagery. The classified imagery referenced above was used to assist in identifying access that had not been previously captured within the existing data collected, but the access was digitized directly from the satellite and ortho-imagery. Over 1,100 km of new access from 1700 additional line segments was collected as part of the manual extraction exercise.

2.3 Merging and Filtering Access Data

The latest Provincial road network, forest access roads and trail data were acquired from the appropriate sources (Table 2.1 above), and these data served as the framework and baseline for incorporating the access data acquired through manual extraction from the imagery.

The initial filtering step was to “clip” the provided access data using the 15 km study area. The next stage involved addressing the common features between the input datasets. This involved overlaying all of the acquired access from the various sources and the process utilized a combination of automated overlay and manual intervention techniques. Each of the input layers were directly compared to each of the others, and features that shared the same spatial geometry were automatically removed using the proximity overlays within ArcGIS. A number of GIS filters were run to achieve the desired results including testing for exact occurrences of access features between layers.

For features that did not share the same geometry but clearly represented the same feature, a manual process was implemented to eliminate the redundant feature(s). As the GIS operator moved visually along the corridor and Study Area in the digitizing process, all directly overlapping access was compared and redundant features were removed. This decision process was governed by several key guidelines to ensure consistency, including that the access that remained was taken from the most recently acquired dataset and/or the feature that best matched the imagery. For example, if the redundant feature was classed as a resource road from an earlier data set but has since been classed as an abandoned resource road in a more recent data set, the most recent classification was considered more valid.

Attributes derived for the final merged data are defined in Table 2.3. These field definitions and valid entries are a product of refining the provincial forestry roads and trails data provided by the NL Department of Natural Resources (Forestry Branch).

Table 2.3 Merged Features Attribute Table

Field	Description	Valid Entries
ROADSOURCE	Describes how the access data was captured	CP – Colour Photography; BP – Black and White Photography; SI – Satellite Imagery; GP – Global Positioning System; CT – Canadian Topographic Data; UK - Unknown
SOURCE	Describes the original source of the information	Text field documenting the original source of the data
ROADCL	Describes the numeric road class according to the Provincial Forestry classification scheme	30 - Trans-Canada Highway 31 - Paved Public Road 32 - Unpaved Public Road 33, 34, 39 - Resource Roads 27 - Abandoned – Not Passable 28 - Abandoned Resource Roads 29 - Winter Roads 35, 36 - Trails, Extraction Roads 92 - Abandoned Railways 98 - Snowmobile Trails 99 -Existing Transmission Lines
LCP_CLASS	A grouping of the original access classes for the purpose of this study. The grouping of classes is further explained in Section 2.4	Trans-Canada Highway Other Paved Public Roads Resource Roads (existing) Resource Roads (abandoned) Railbed Existing Transmission Lines Snowmobile Trails Other Trails and Other Access
WEIGHT	The weight assigned to each of the 'LCP Classes'. Further information on how these weights were derived is included in Section 2.4	Values from 1 to 10 representing the perceived amount of access use and how that relates to accessing the proposed transmission corridor
LENGTH	Numeric field that is assigned a length (in metres) for each line segment in the database	Numeric field

2.4 Classification of Access Data and Assignment of Attributes and Weightings

The classification scheme inherent in the input access datasets was the basis for the newly acquired access and the resultant merged data. The data acquired from the NL Forestry Branch had the most detailed classification system and thus it was adopted for this study and all other input layers were assigned a related feature type. The NL Forestry Branch classification scheme is presented in Table 2.4.

Table 2.4 Access Classes (NL Forestry Branch)

Original Access Class	Numeric ID
Trans-Canada Highway	30
Paved Public Road	31
Unpaved Public Road	32
Resource Roads	33, 34, 39
Abandoned – Not Passable	27
Abandoned Resource Roads	28
Winter Roads	29
Trails / Extraction Roads	35, 36
Abandoned Railways	92
Snowmobile Trails*	98
Existing Transmission Lines*	99

**Classes created by Study Team as part of this study*

If the class of access was not apparent from the imagery or from the interpretation of surrounding access data, then the lowest level of access class was assigned to avoid over estimation of access class and subsequent weighting in the spatial analysis process. For the purpose of this study, trails were deemed to be the lowest level of access with the highest level being the Trans-Canada Highway.

Similar access types were grouped according to the overall level of accessibility that they likely provide, and a new set of classes were created for the purposes of this study (Table 2.5). Many of the classes remained generally the same, but some grouping was required for 'winter roads' and 'abandoned – not passable' access was very limited amount within the study area and therefore its significance in the spatial modeling was relatively low. Both of these classes were therefore merged into a new 'Other Trails and Other Access' category.

In some cases, the class names were altered slightly to better suit the nature and purpose of this analysis and study.

Table 2.5 Access Classes used for the Study

Access Class	Original Numeric ID
Trans-Canada Highway	30
Other Paved Public Roads	31
Unpaved Public Roads	32
Resource Roads (existing)	33, 34, 39
Resource Roads (abandoned)	28
Railbed	92
Snowmobile Trails	98
Existing Transmission Lines	99
Other Trails and Other Access	27, 29, 35, 36

Accessibility “weightings” were derived by assigning a score from 1 to 10 to the access classes based on the likely degree of accessibility that they provide. This can perhaps best be explained by way of an example - a paved public road offers a far easier access to a site than an ATV trail due to the condition, width, and maintenance of the route. A variety of larger vehicles can travel along a paved and maintained road (ploughed, repaired and serviced) but smaller numbers and fewer types of motor vehicles can travel along a narrow, unmaintained and rough dirt trail. The assignment of weights also considered the potential volume of traffic for the each of the access types.

The weightings provide a range of classes which were then used in the spatial analysis as part of the weighted line density modeling. The assigned weightings for each access class are listed in Table 2.6.

Table 2.6 Weightings Assigned by Access Class

Access Class	Weight
Trans-Canada Highway	10
Other Paved Public Roads	8
Unpaved Public Roads	6
Resource Roads (existing)	4
Resource Roads (abandoned)	3
Railbed	3
Existing Transmission Lines	2
Snowmobile Trails	2
Other Trails and Other Access	1

2.5 Preparation of Data for Spatial Analysis

The dataset was subsequently subdivided into each of the sub-regions that comprise the Study Area: Southeastern Labrador, Northern Peninsula, Central and Eastern Newfoundland, and the Avalon Peninsula, which allow for regional breakdowns of the data for analysis and presentation purposes.

The length of each access "line" segment in the merged access data was calculated within ArcGIS. The length of each line segment within the database was calculated in metres and stored within the 'Length' field. After the data was clipped for each region the 'Length' field was updated to ensure that any clipped line segments were tagged with the appropriate values.

2.6 Spatial Analysis

The length of access for each class was calculated using the 'Summarize' function within the attribute table toolset of ArcGIS. Results were output to Microsoft Excel for summary of data and creation of tables. The summaries were prepared for the 15 km study area and the 2 km proposed transmission line corridor.

Line density analysis was completed across the 15 km wide study area, for each of the associated study regions. Line density modelling basically calculates the length of line segments per unit area. The density results for this study were then output to an ArcGIS raster grid, and the values written to each 250 m grid cell represent the density of access calculated in units of length per square kilometer. Therefore, the density measure used for this study is the number of kilometres of access per square kilometer of area. Based on the study area extent(s) and an understanding of the input access layers scales the parameters presented in Figure 2.1 were chosen for the analysis.

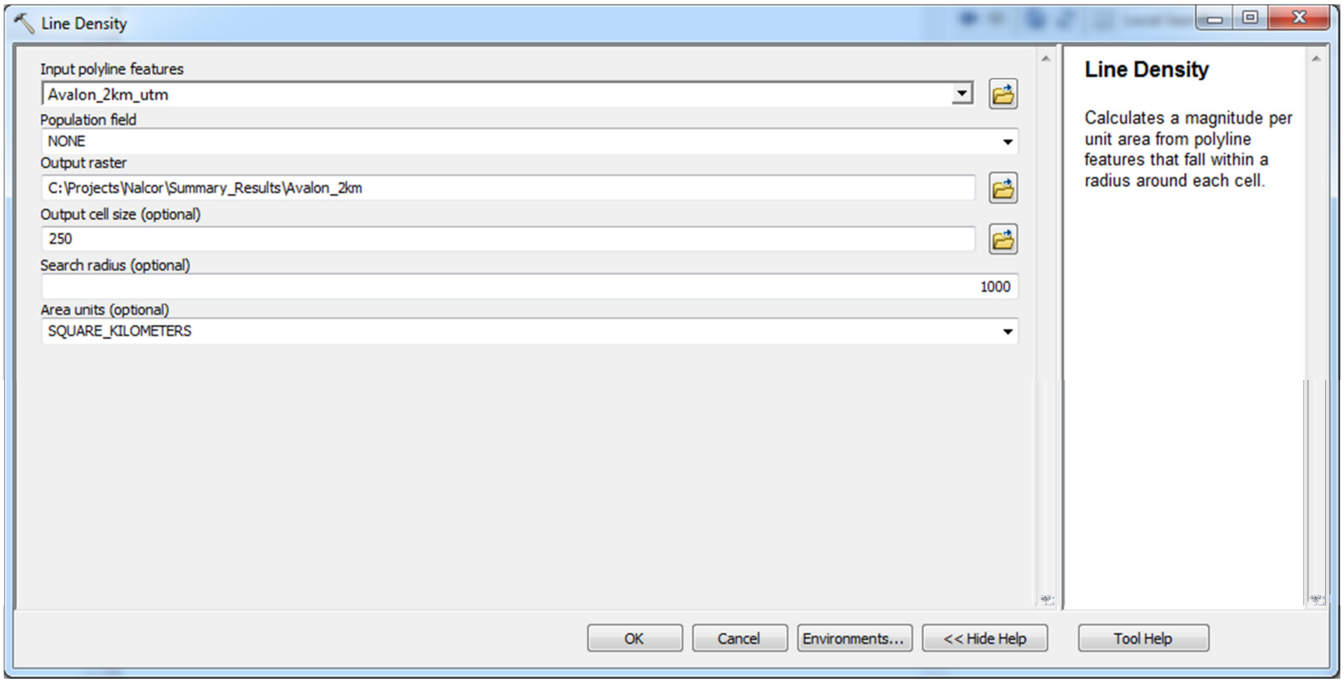
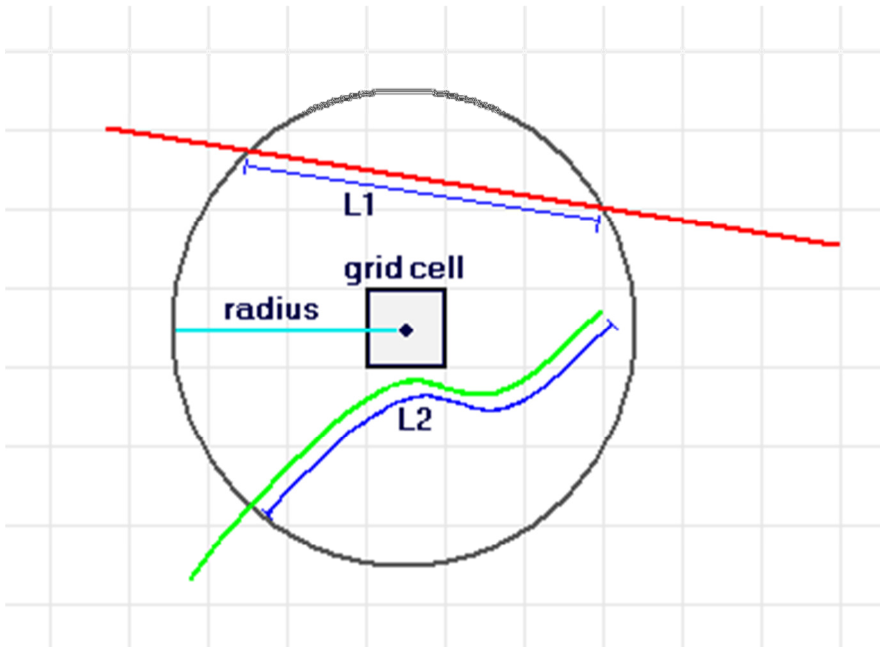


Figure 2.1 Input Parameters for Line Density Analysis

Figure 2.2 illustrates how the line density analysis was calculated, with each raster cell assigned a density value. The formula used to calculate the density analysis is as follows:

$$\boldsymbol{density} = \frac{\boldsymbol{L1 + L2}}{\boldsymbol{area\ of\ circle}}$$

, where L1 and L2 represent the length of the line segments per unit area.



Source (ESRI ArcGIS 10 Help File, 2010)

Figure 2.2 How Line Density Calculation Assigns Values to Raster Cells

Simple line density analysis does not take into account the type of access and therefore, the type and level of access it provides.

Weighted line density analyses were therefore completed for the 15 km study area, for each of the regions. Weighted density modeling uses the same approach for calculating the length of line segments per unit area (kilometres per square kilometre) but this analysis also incorporates the type of access (weighting) into the equation. With reference to Figure 2.2, the following formula was used to calculate the density for each cell for the weighted line density analysis:

$$density = \frac{L1 \times W1 + L2 \times W2}{area\ of\ circle}$$

, where W1 and W2 represent the weights assigned to a particular access class. For the purpose of this study the weightings used were those presented in Table 2.6.

Based on the study area extent(s) and an understanding of the input access layers scale the parameters presented in Figure 2.3 were chosen for the analysis. The parameters chosen are suitable for a regional assessment of this nature and were defined to produce meaningful units of measure (ie., kilometres of access per square kilometre).

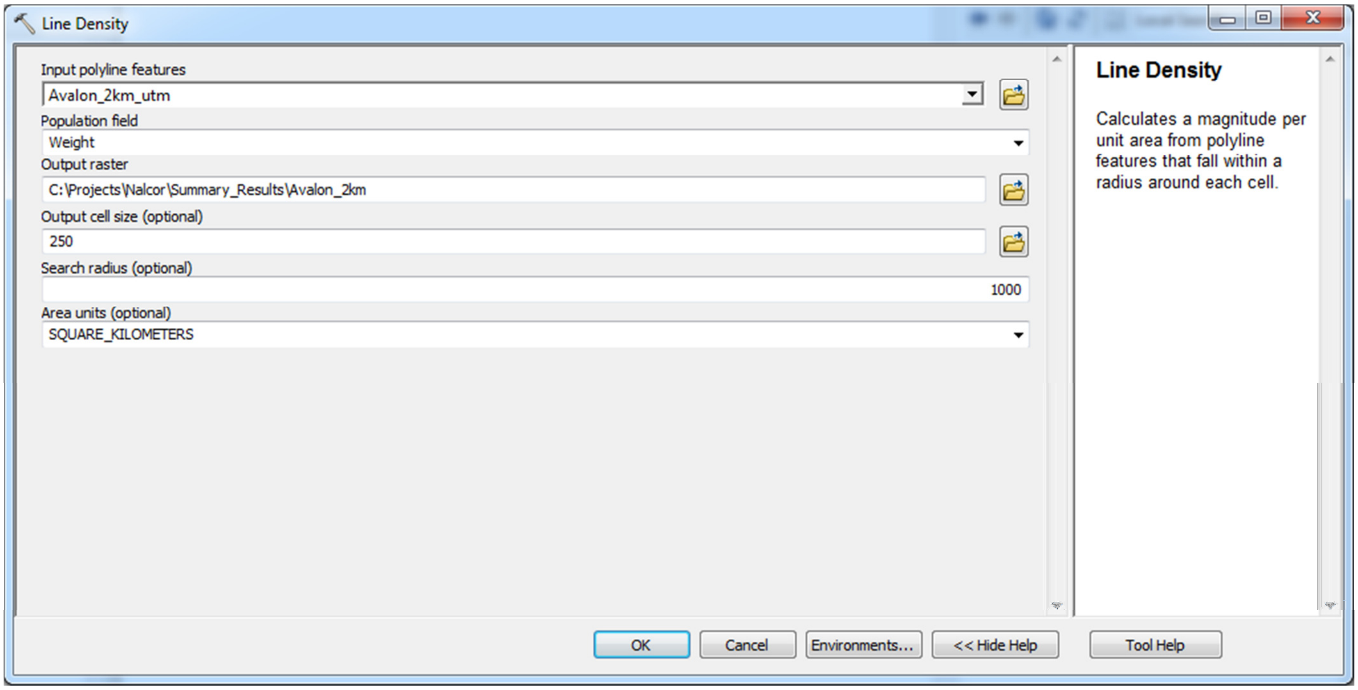


Figure 2.3 Input Parameters for the Weighted Line Density Analysis

2.7 Assumptions and Considerations

It should be noted that the datasets and analysis provided in this study are focussed on existing ground access "infrastructure" only, and specifically, that which involves some visible footprint (eg, cleared area) upon the landscape, and which is available for (and potentially subject to) year-round use. It therefore does not explicitly consider and address more "seasonal" access routes and activities, such as general snowmobile use, which certainly occurs throughout the Study Area but which often does not require such established access routes.

The access data was collected from a variety of sources, and much of the data inputs were lacking detailed metadata and details regarding the use limitations, capture date, spatial accuracy etc. Any information that was present in the original data that documented how the access was derived has been included in the final merged database. Data should not be used for navigation purposes.

The data compiled is a product of multiple scales and resolutions as it was gathered using differing technology such as digitizing and GPS. Because of the variety of data collection techniques and the range of scales some input data sets aligned more closely to the imagery than others. The spatial analysis for this study was performed at a regional level (ie. much smaller scale than input data) and therefore this limitation is minimized.

Some light use trails or other narrow or poorly defined access may not have been visible using the imagery for digitizing and were likely not captured as part of this study. Only access clearly visible and distinguishable from the imagery was captured during the digitizing process. This study is thus inherently conservative in its approach and subsequent results in that there is likely more access within the study area than presented in this study.

There is some level of subjectivity inherent in the process for the assignment of weights for this study. Best efforts were taken to assign weights that were meaningful for each access class. As previously discussed, for access where the GIS operator was uncertain of the class based on the imagery interpretation the lowest level of access class and related weight (trail) was assigned. In doing so, any potential overestimation of the access class was avoided during the modeling and summary of results.

2.8 Study Team

Stephen Rowe is a senior GIS consultant with Integrated Informatics Inc. in St. John's, NL. Mr. Rowe was responsible for all aspects of the GIS data gathering, access digitizing, spatial analysis and report writing. Jason Humber is a Principal Consultant with Integrated and was responsible for senior review of the spatial data, analysis and the report.

3.0 RESULTS AND DISCUSSION

3.1 Access Class and Length by Region

An overview and breakdown of the total and by category lengths of access (in kilometres) within the Study Area and transmission corridor for each study region is provided in Tables 3.1 and 3.2. These numbers can assist the reader in understanding the type and level of ground access that is currently available within each region. Regional maps showing existing access by class are presented in Figures 3.1 to 3.4. The map atlas presented in Appendix A shows this information at a larger scale.

Table 3.1 Access Class and Length within the 15 km Wide Study Area by Region

Access Class	Southeastern Labrador (km)	Northern Peninsula (km)	Central and Eastern Newfoundland (km)	Avalon Peninsula (km)
Trans-Canada Highway	0	0	164	188
Other Paved Public Roads	33	64	282	301
Unpaved Public Roads	59	36	111	318
Resource Roads (existing)	11	667	823	210
Resource Roads (abandoned)	0	7	1,095	0
Railbed	0	0	144	129
Existing Transmission Lines	15	86	319	307
Snowmobile Trails	0	212	298	133
Other Trails and Other Access	47	1609	1,977	1,435
Total (km)	**165**	**2,681**	**5,213**	**3,021**

Table 3.2 Access Class and Length within the 2 km Wide Proposed Transmission Corridor by Region

Access Class	Southeastern Labrador (km)	Northern Peninsula (km)	Central and Eastern Newfoundland (km)	Avalon Peninsula (km)
Trans-Canada Highway	0	0	8	61
Other Paved Public Roads	2	6	19	34
Unpaved Public Roads	4	5	3	52
Resource Roads (existing)	1	153	168	36
Resource Roads (abandoned)	0	0	171	0
Railbed	0	0	12	30
Existing Transmission Lines	0	10	136	143
Snowmobile Trails	0	39	61	22
Other Trails and Other Access	6	385	463	229
Total (km)	**13**	**598**	**1,041**	**607**

Figure 3.1 Existing Access – Southeastern Labrador

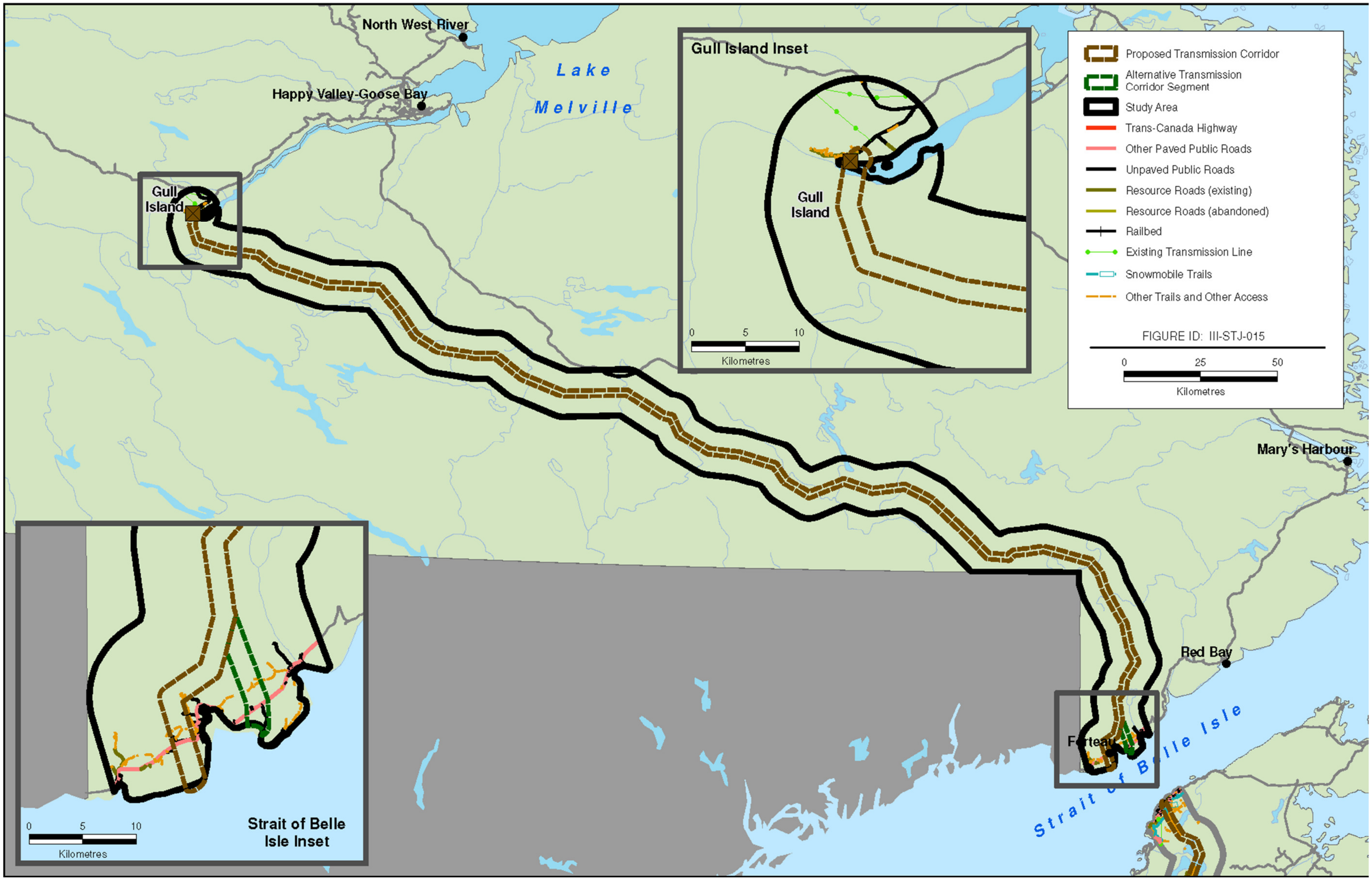


Figure 3.2 Existing Access – Northern Peninsula

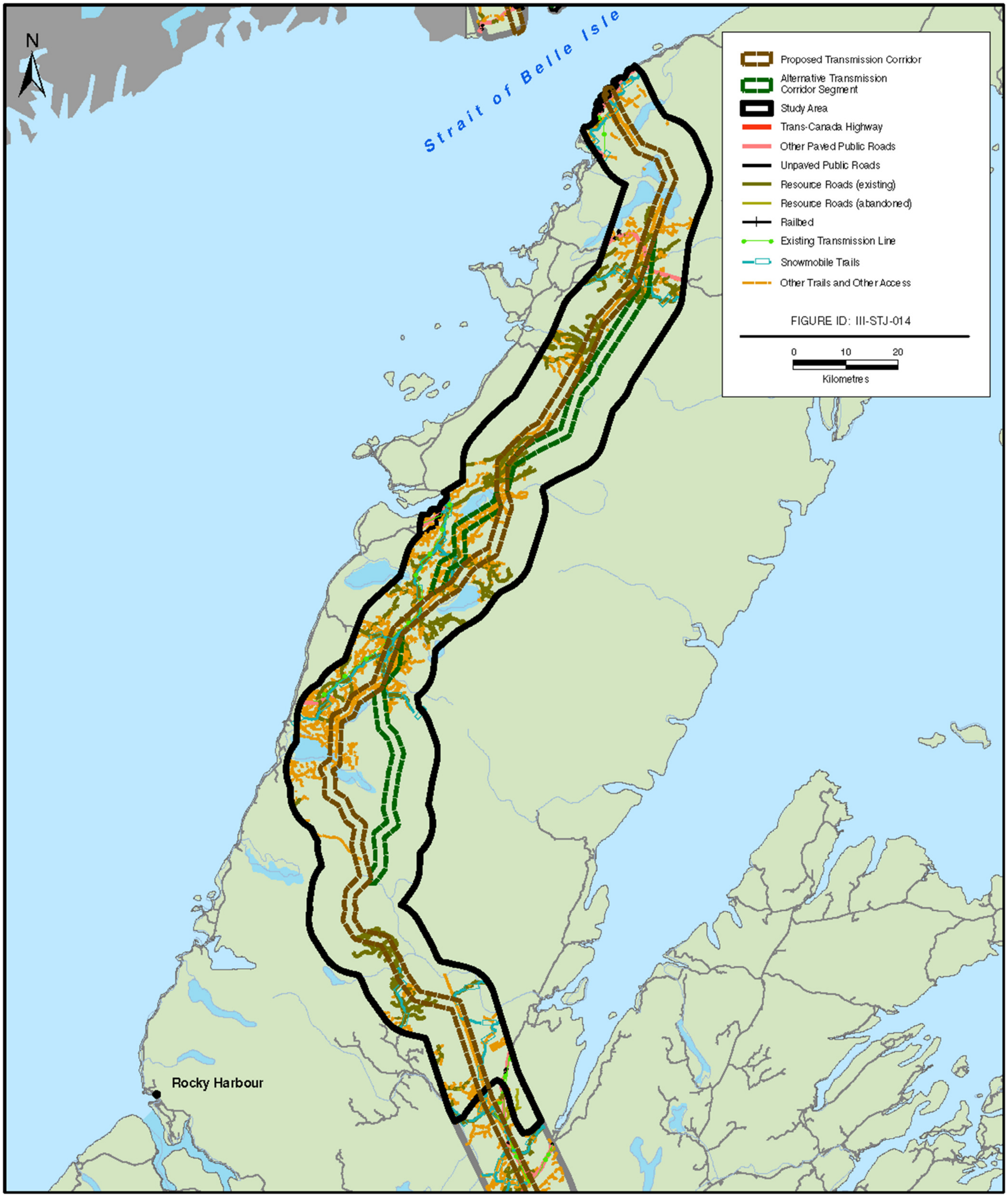


Figure 3.3 Existing Access – Central and Eastern Newfoundland

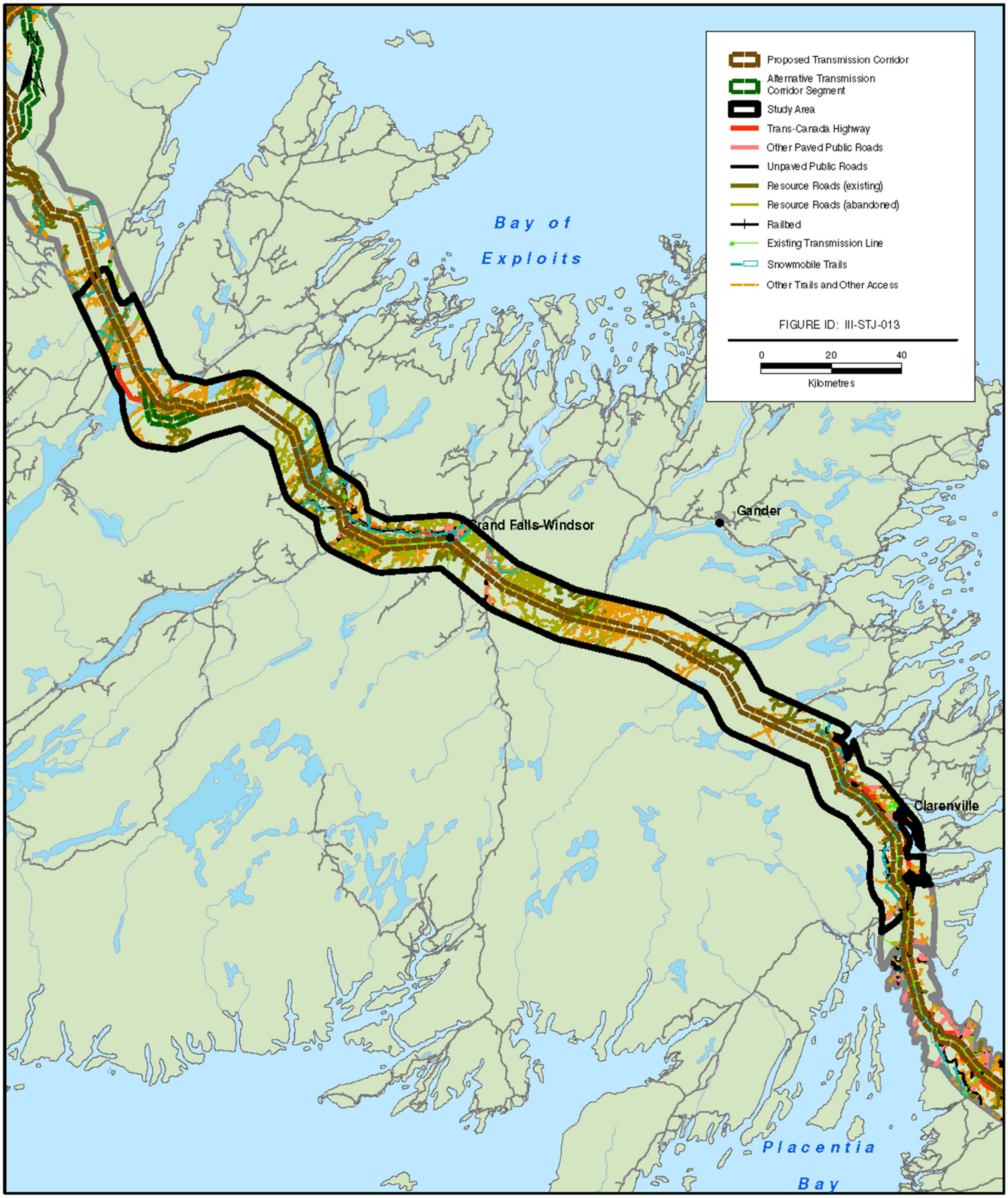
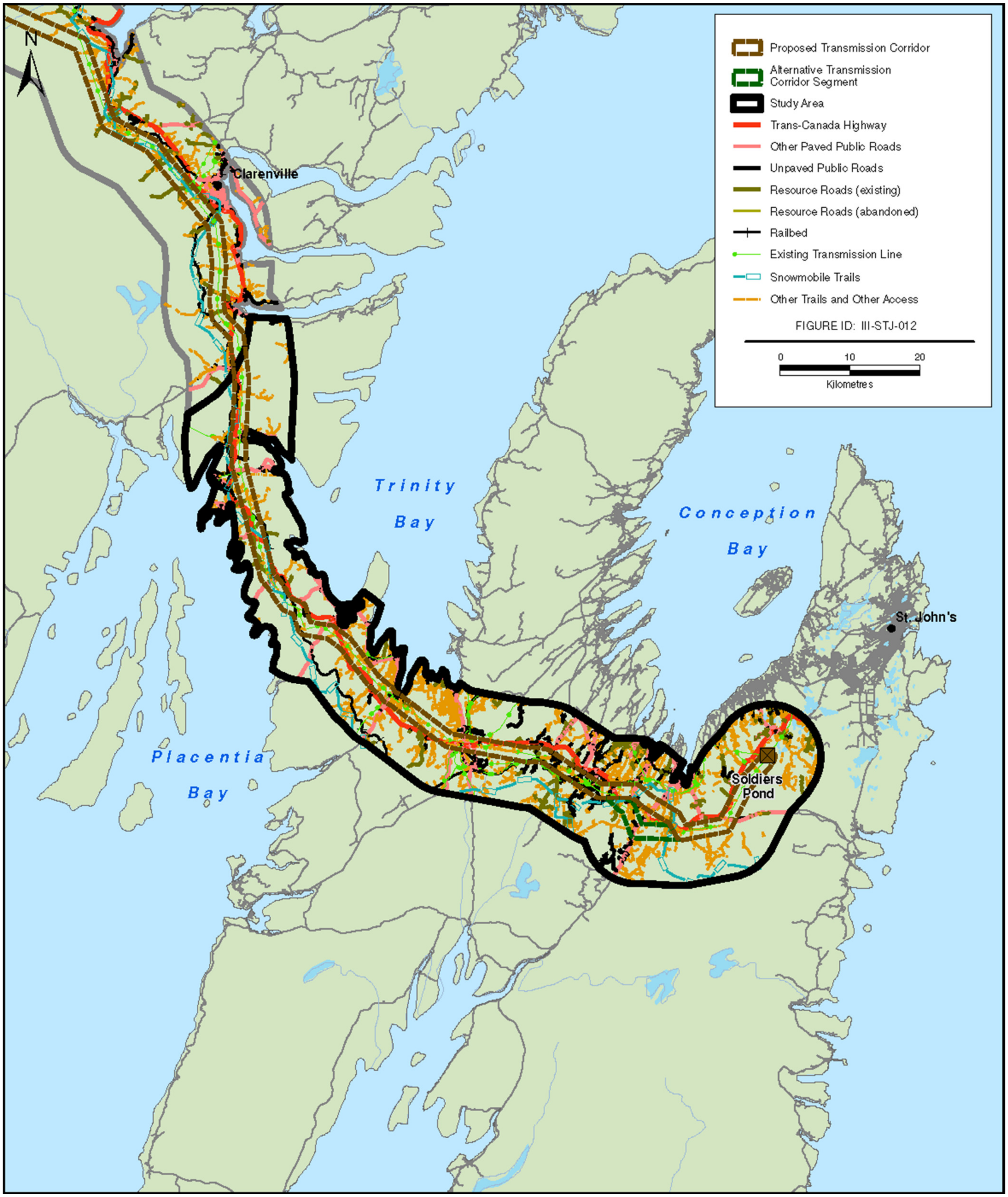


Figure 3.4 Existing Access – Avalon Peninsula



3.2 Line Density Modeling

The line density modeling results are presented in Figures 3.5 to 3.8 for the 15 km study area by study sub-region. The colours for access density range from light yellow to dark brown. As an example, values greater than zero but less than or equal to one fall within the first class (>0 – 1). A value of zero in the modeling results in no shading and therefore is represented by the light green shading depicting land; these areas contain no existing access according to the data used for analysis. The same classes are applied to each of the four regions to ensure standardization and comparability between the Figures.

For clarity, the values presented for each pixel in the model result are derived by calculating the number of kilometres of existing access infrastructure per square kilometre area.

Figure 3.5 Line Density Modeling – Southeastern Labrador

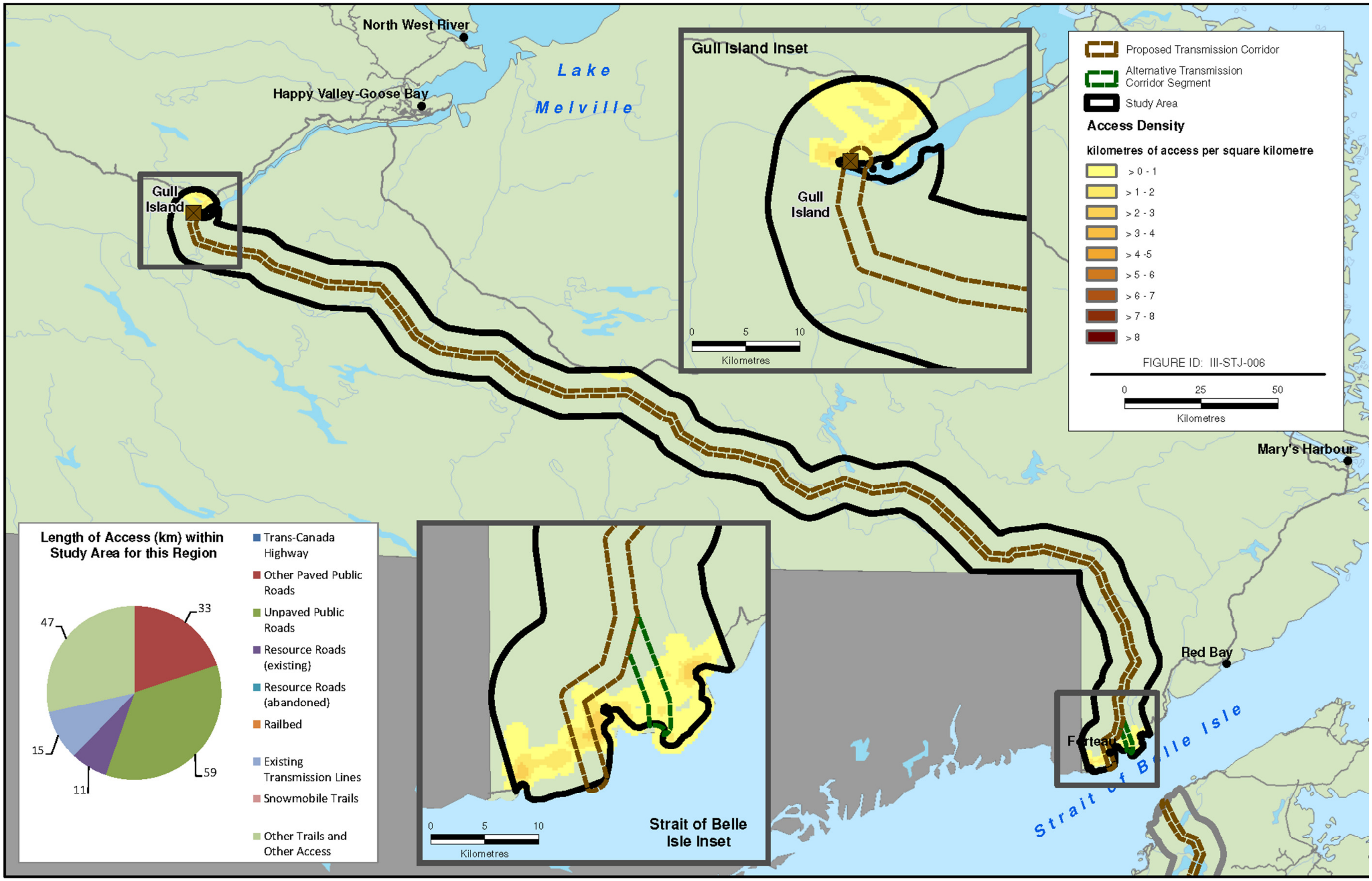


Figure 3.6 Line Density Modeling – Northern Peninsula

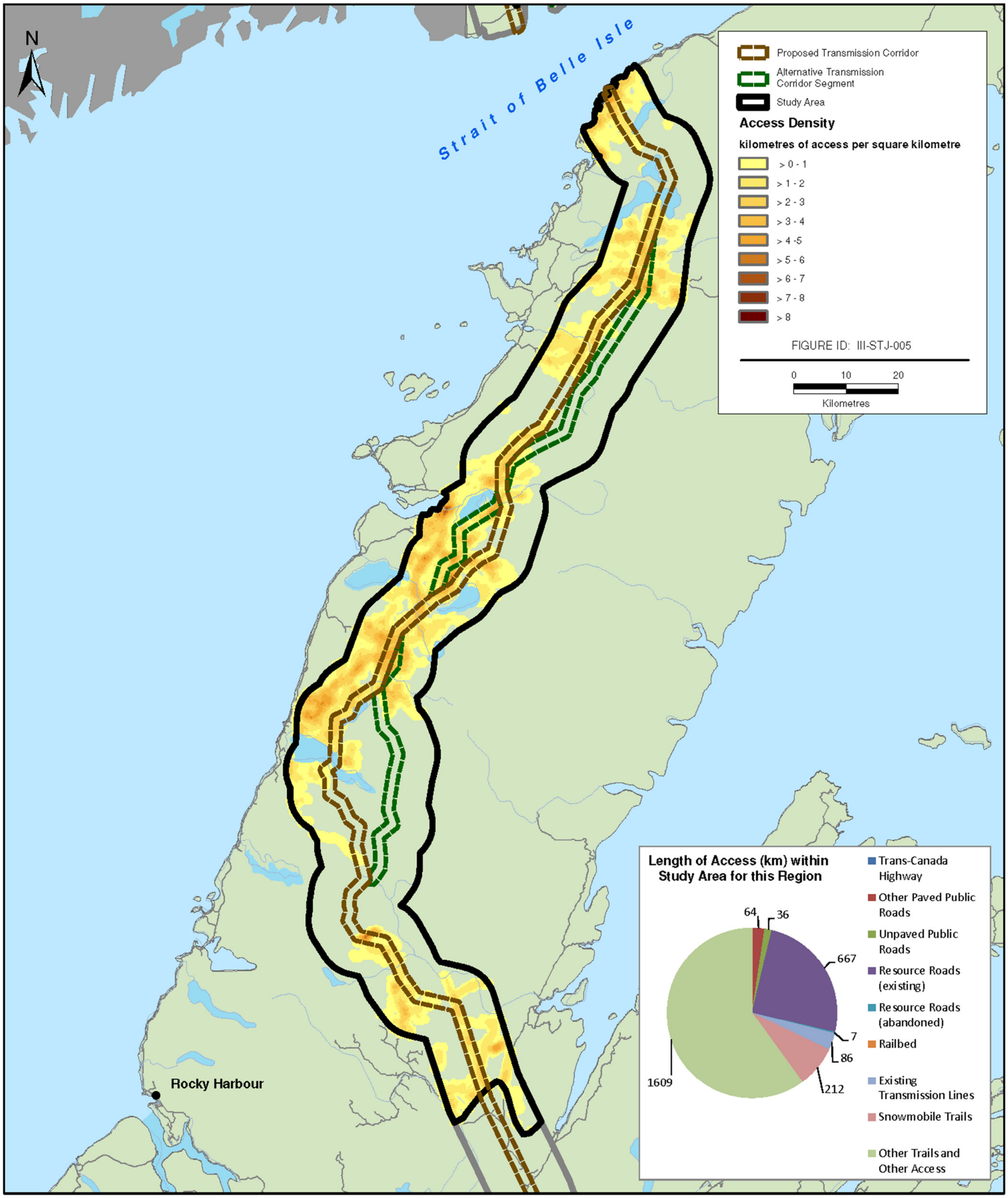


Figure 3.7 Line Density Modeling – Central and Eastern Newfoundland

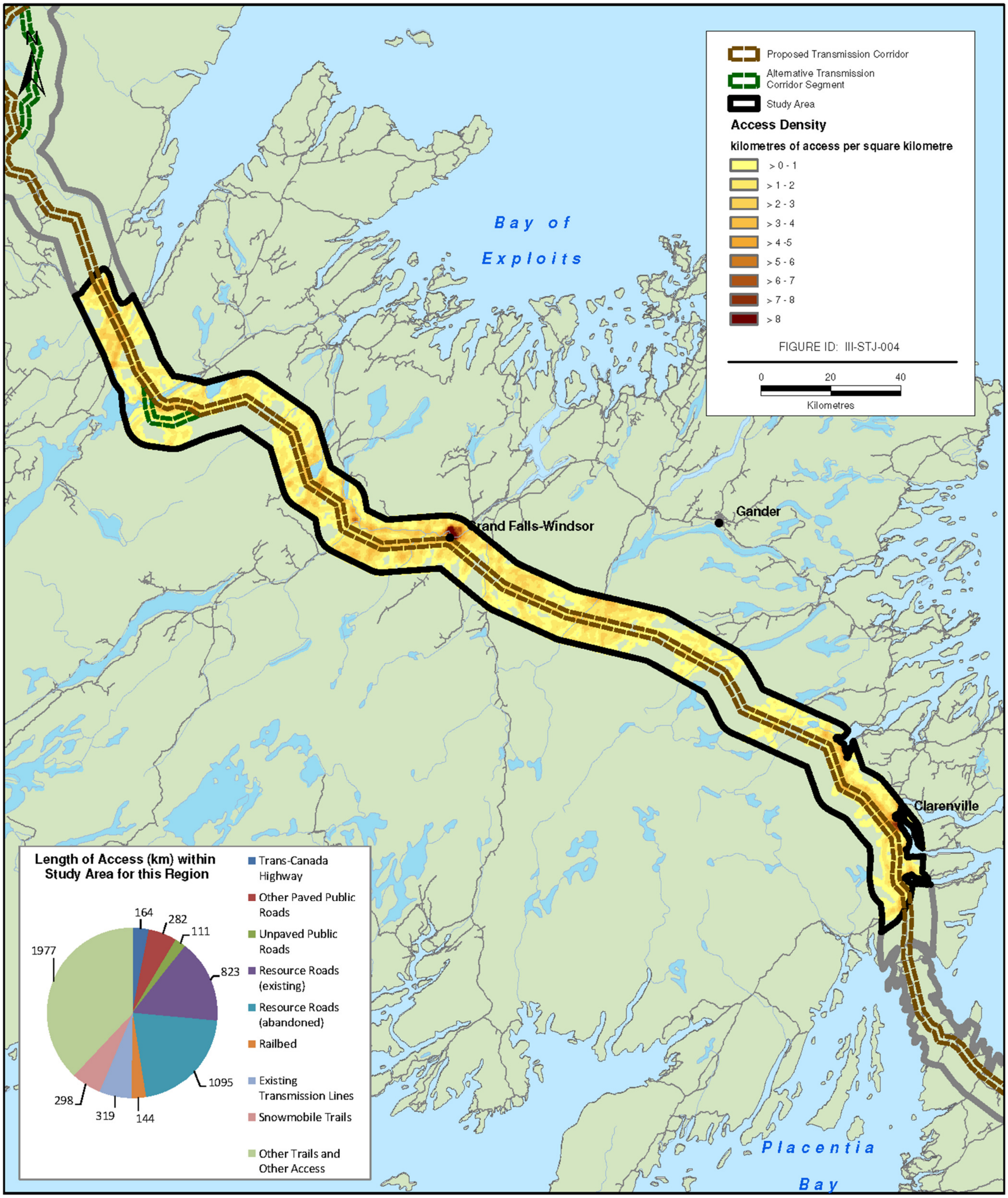
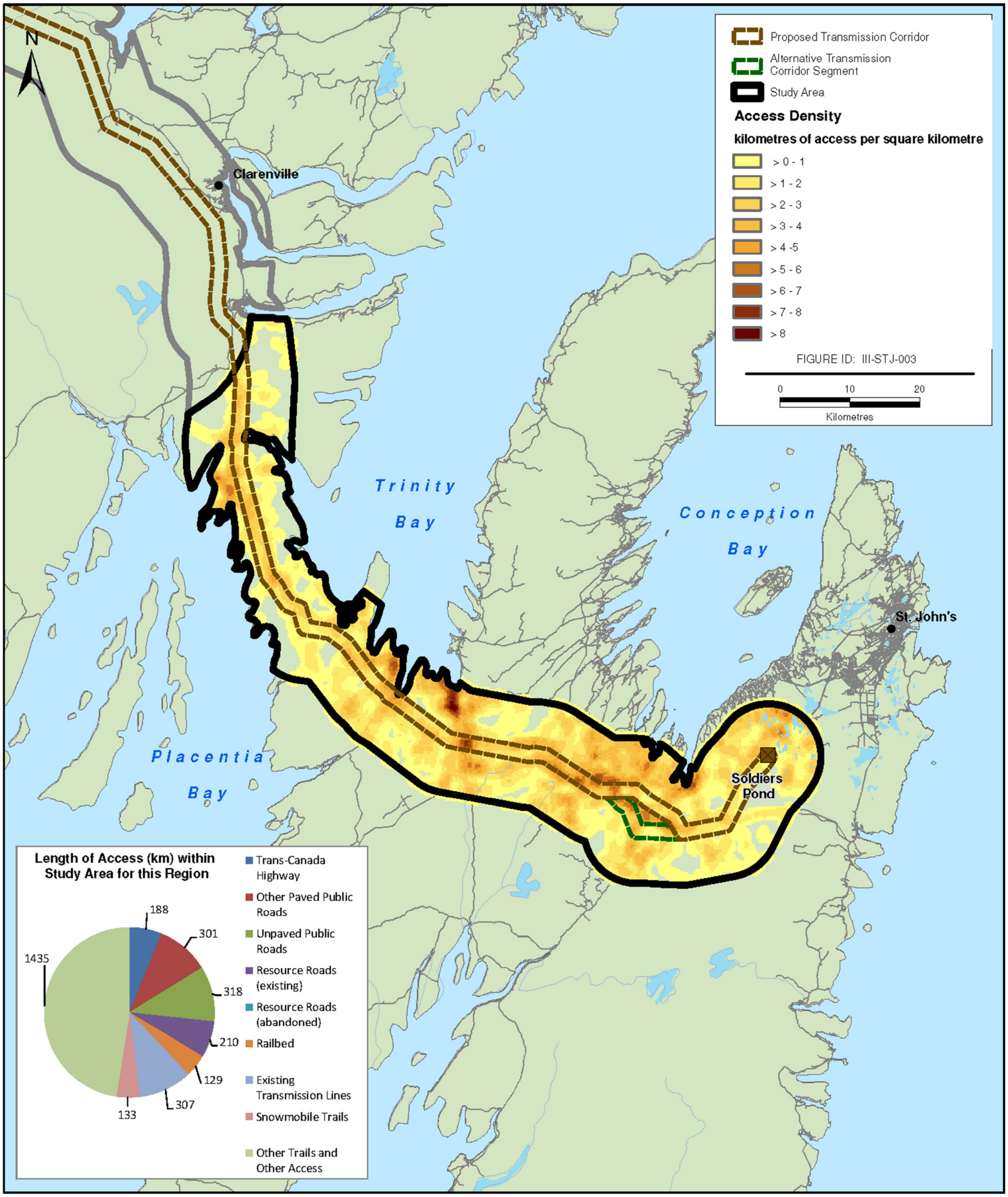


Figure 3.8 Line Density Modeling – Avalon Peninsula



3.3 Results of Weighted Line Density Modeling

The weighted line density modeling results are presented in Figures 3.9 to 3.12. The legend included in each of the figures shows a stretched classification where light yellows represent areas of low density and brown representing areas of relatively high density within the 15 km study area. A value of zero in the modeling results in no shading; these areas are representative of no existing access according to the data used for analysis. The minimum and maximum values are applied to each of the four regions to ensure standardization and comparability between the Figures. These modeling results illustrate the current level of accessibility within the study area with the addition of weighting for the various access classes.

For clarity, the values between one and forty are the calculated access values (weighted) for each pixel in the model result. The calculated access values are derived by multiplying the number of kilometres of access per square kilometer area by the assigned weight for the particular access class.

Figure 3.9 Weighted Line Density Modeling – Southeastern Labrador

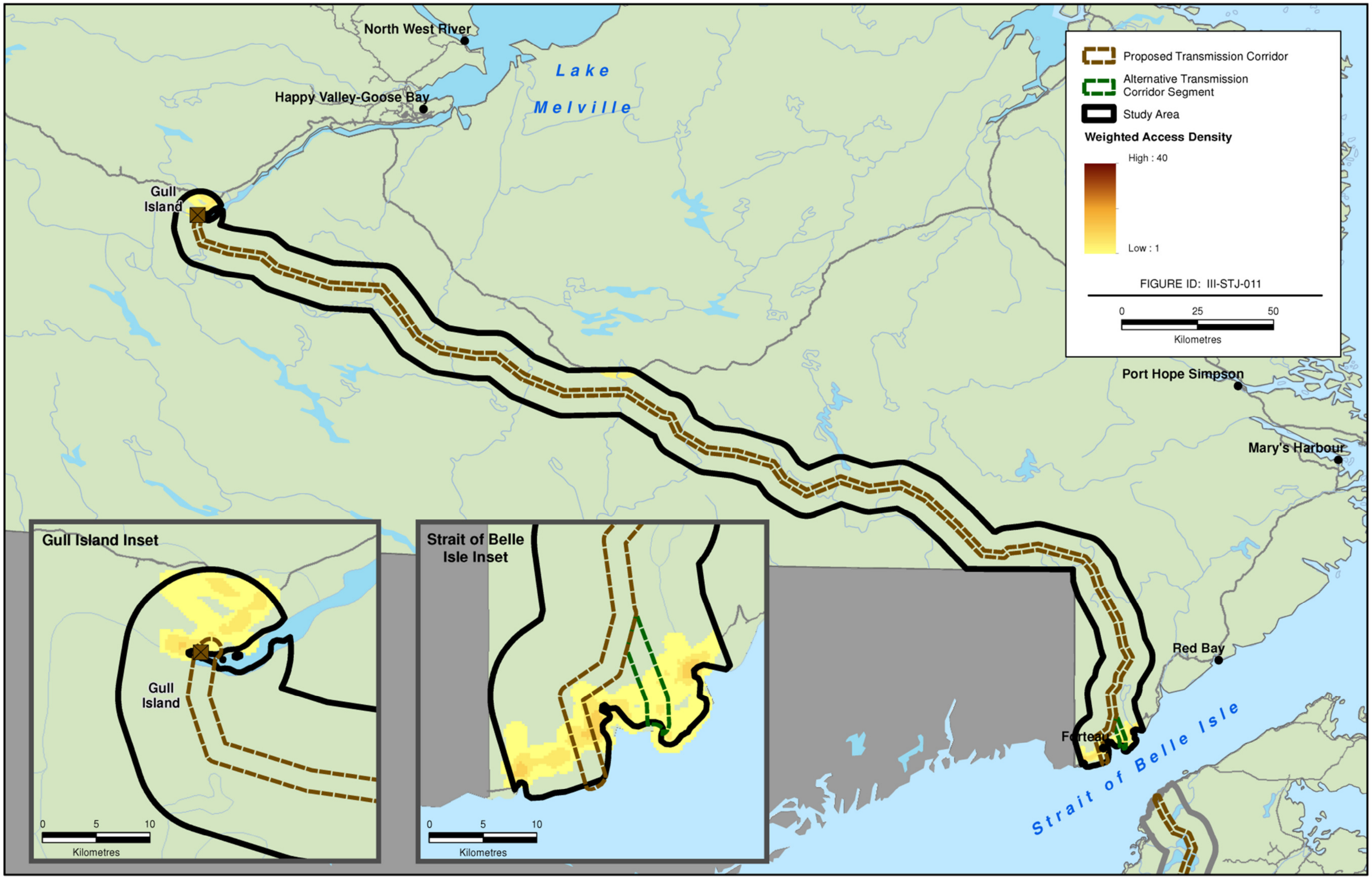


Figure 3.10 Weighted Line Density Modeling – Northern Peninsula

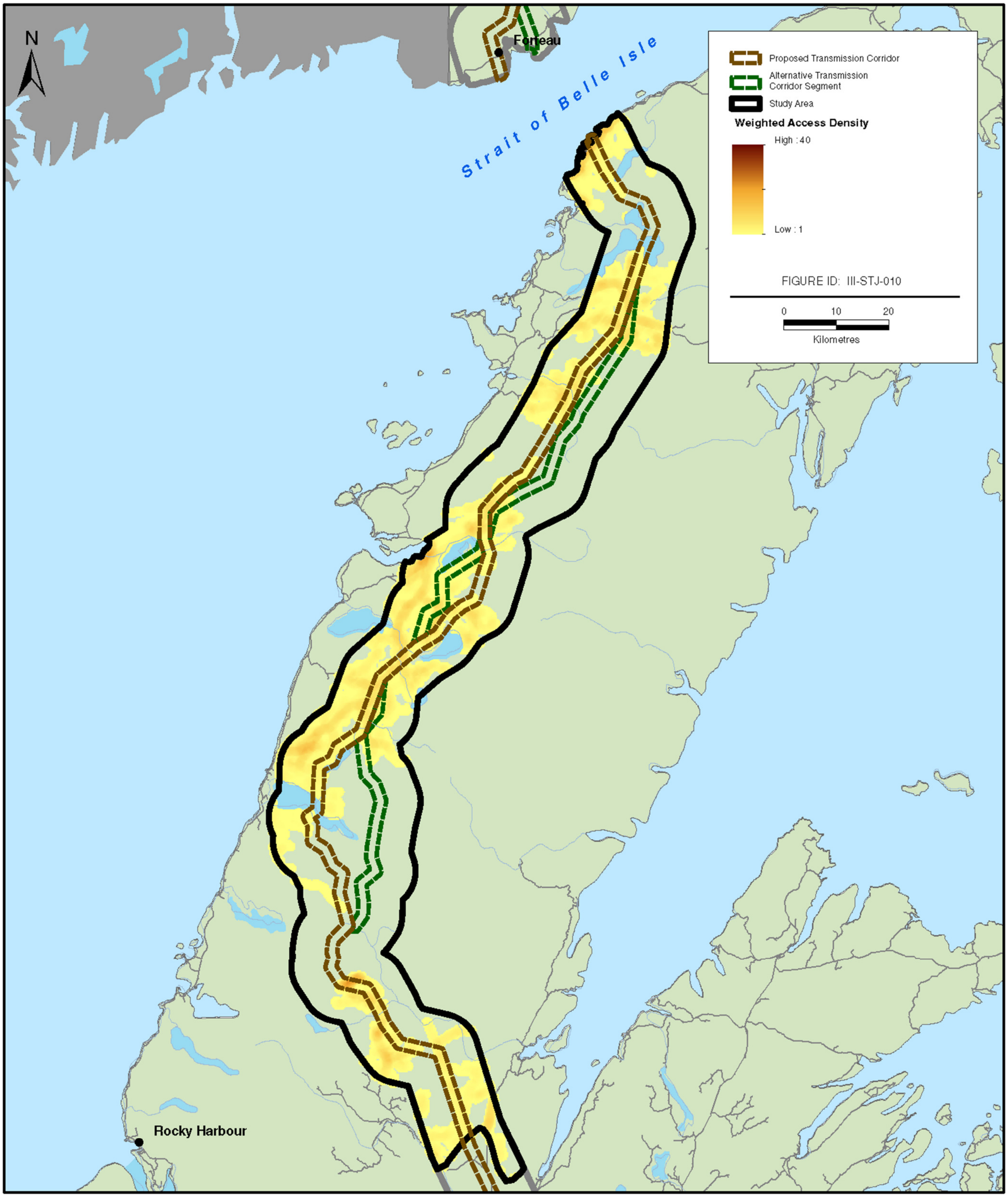


Figure 3.11 Weighted Line Density Modeling – Central and Eastern Newfoundland

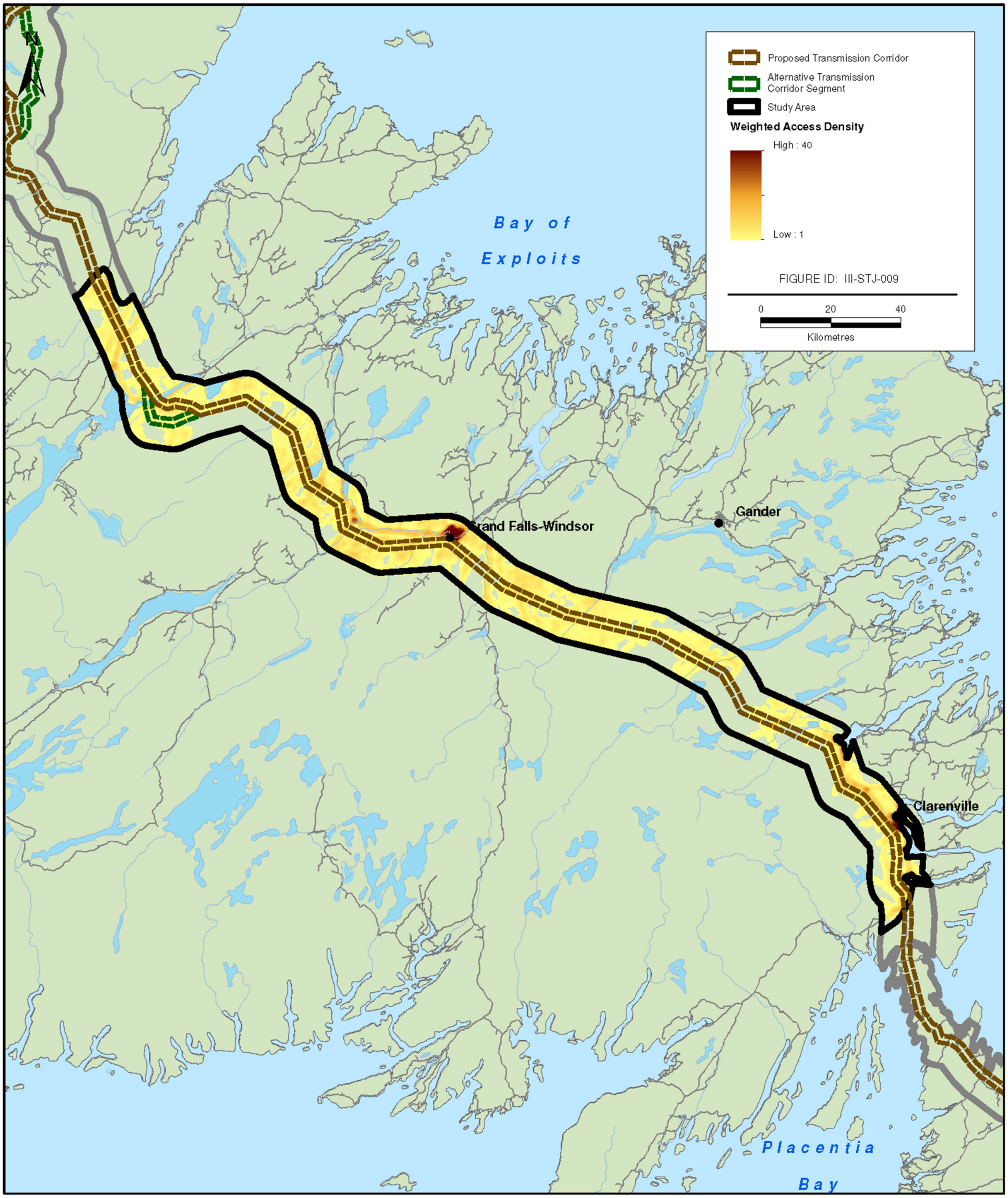
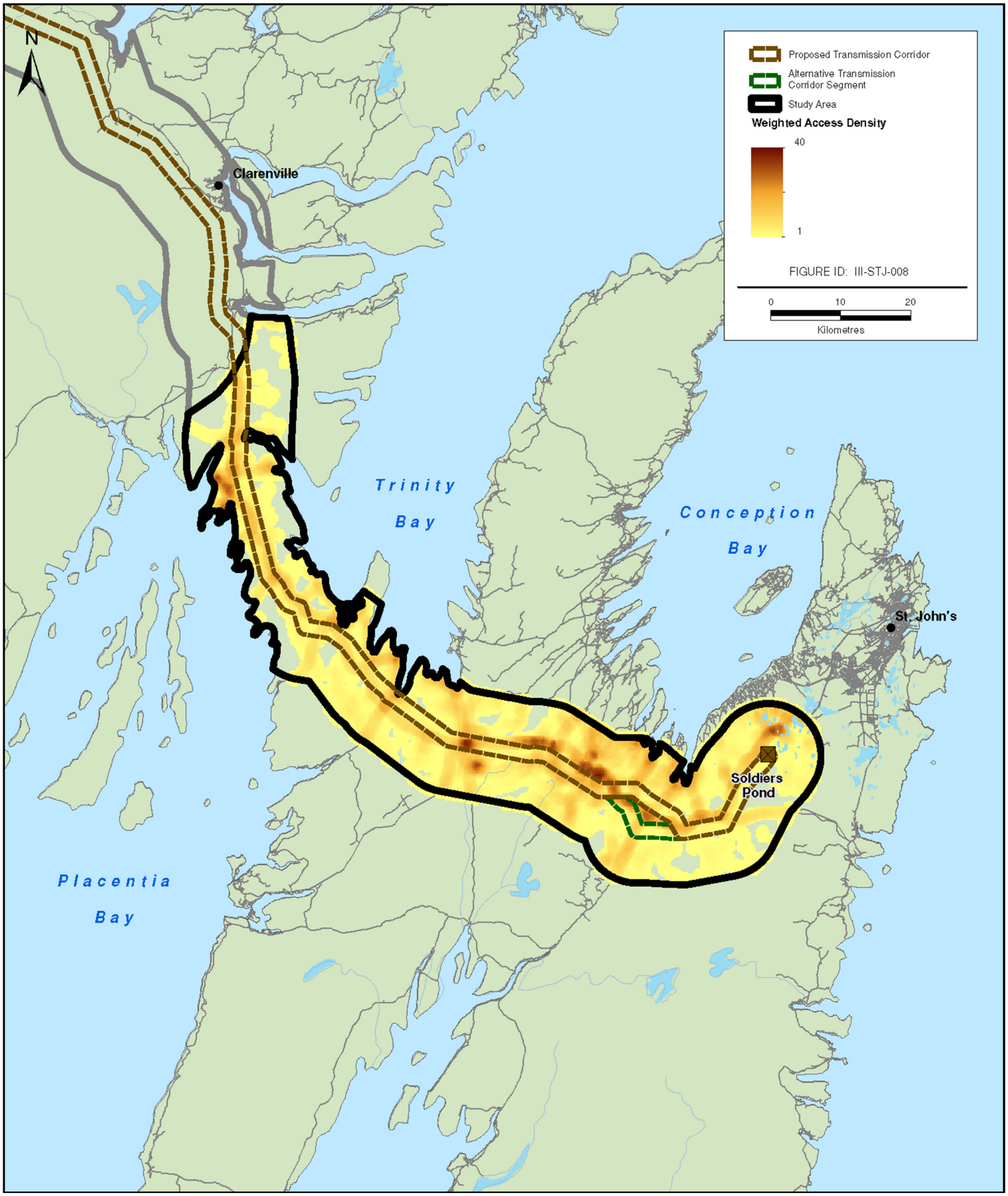
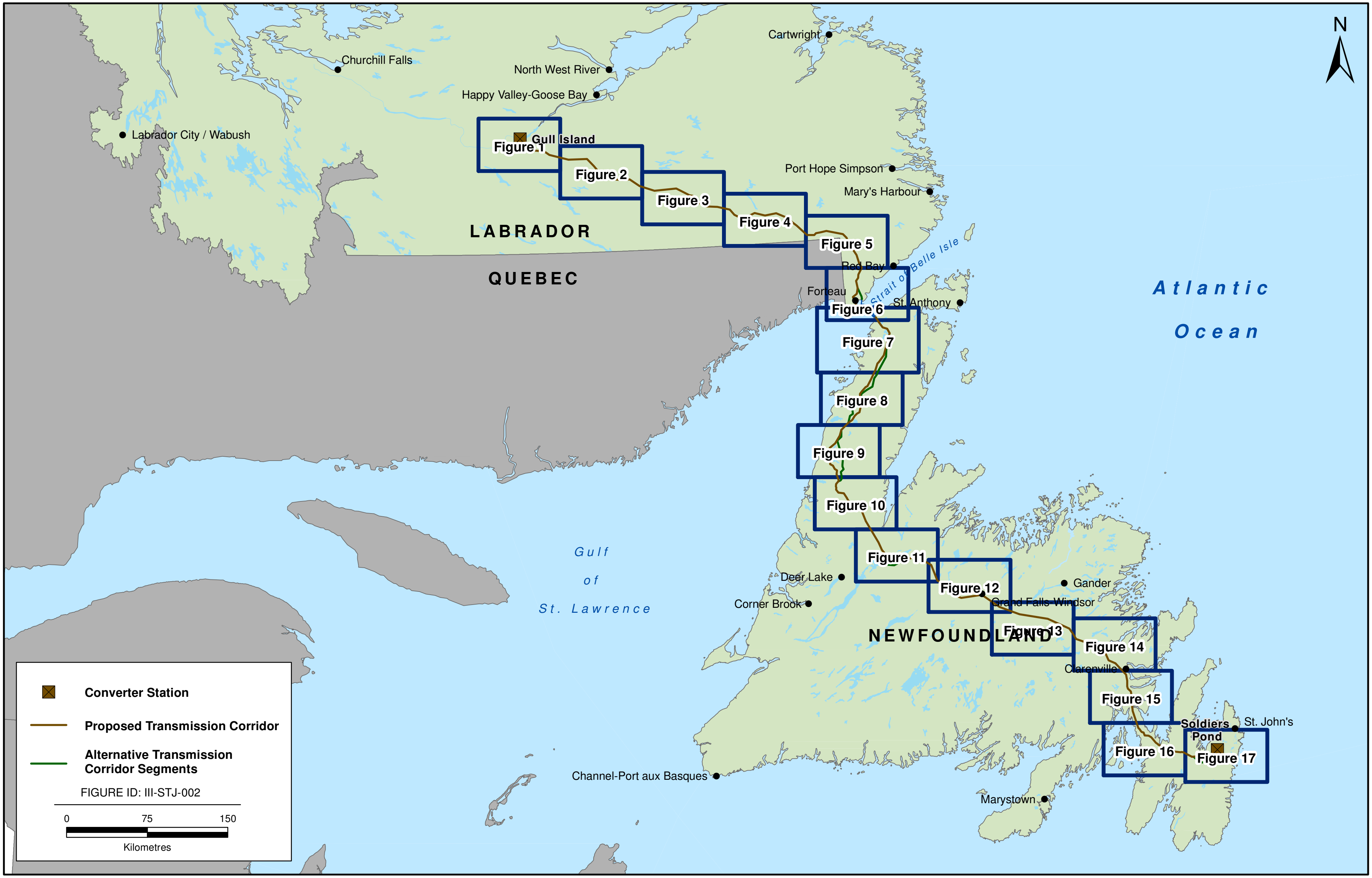


Figure 3.12 Weighted Line Density Modeling – Avalon Peninsula



APPENDIX A

Map Atlas: Labrador-Island Transmission Link Existing Access



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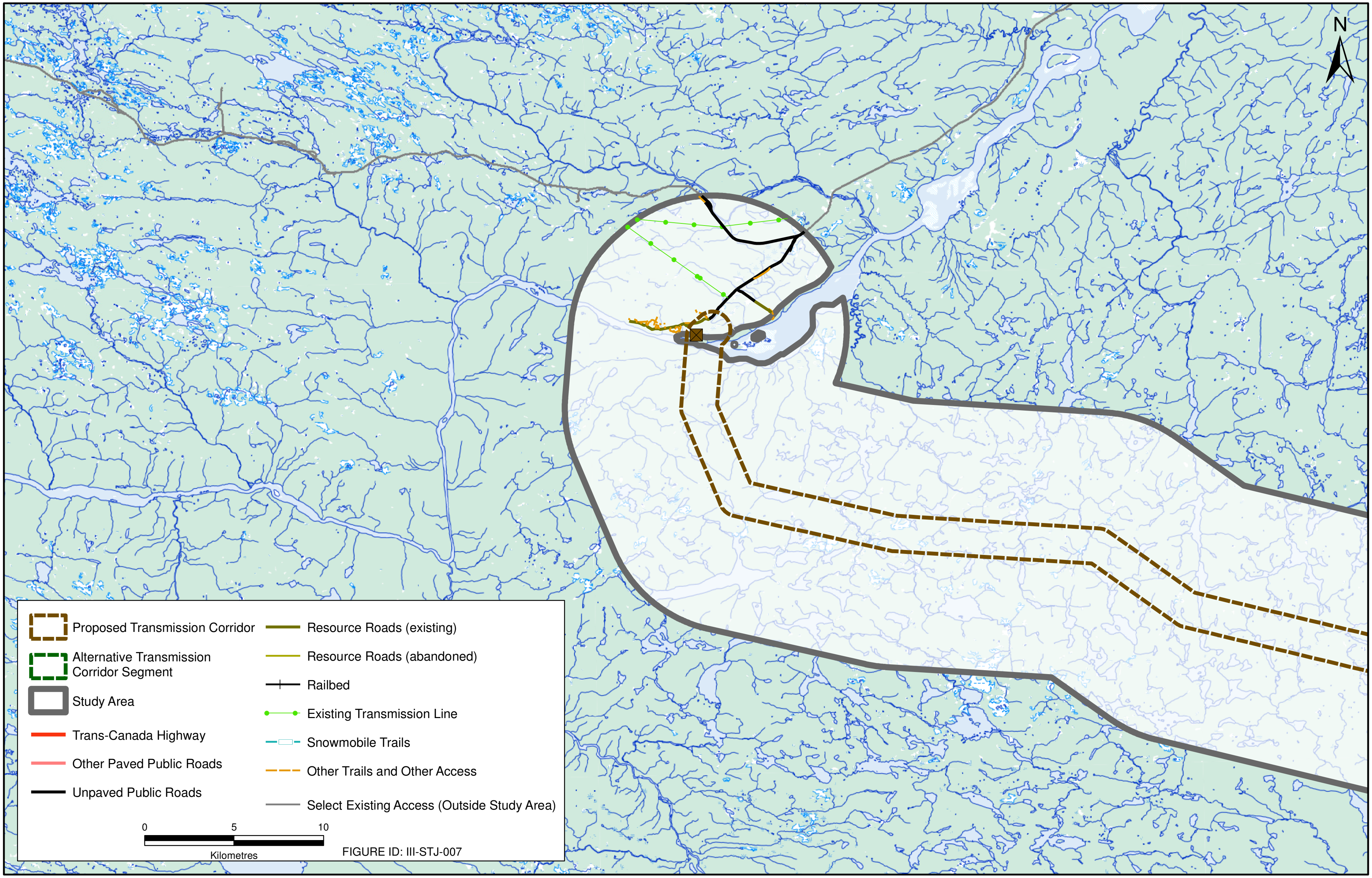
APPENDIX A - INDEX MAP

Labrador - Island Transmission Link: Existing Access



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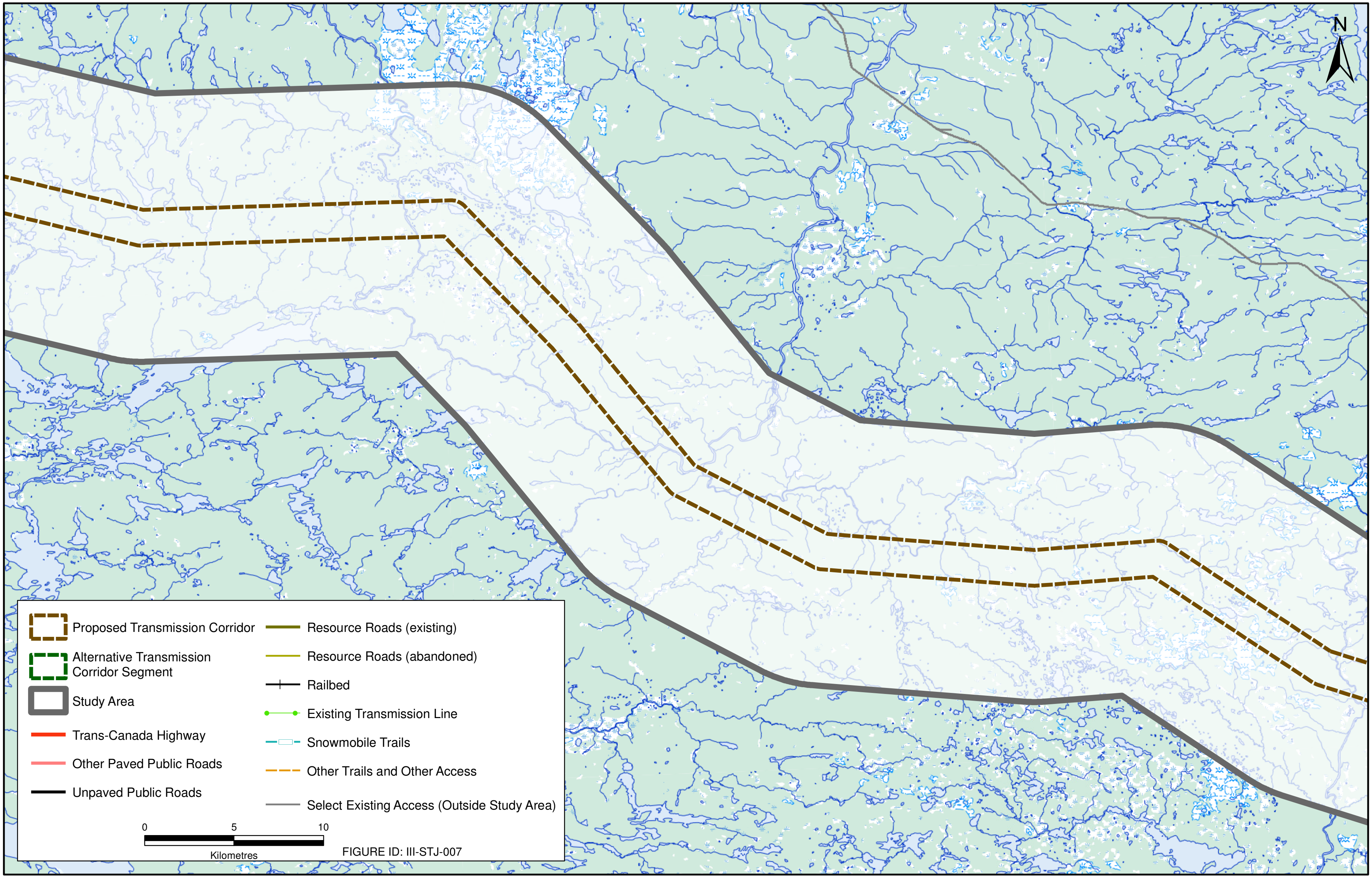
Labrador - Island Transmission Link: Existing Access



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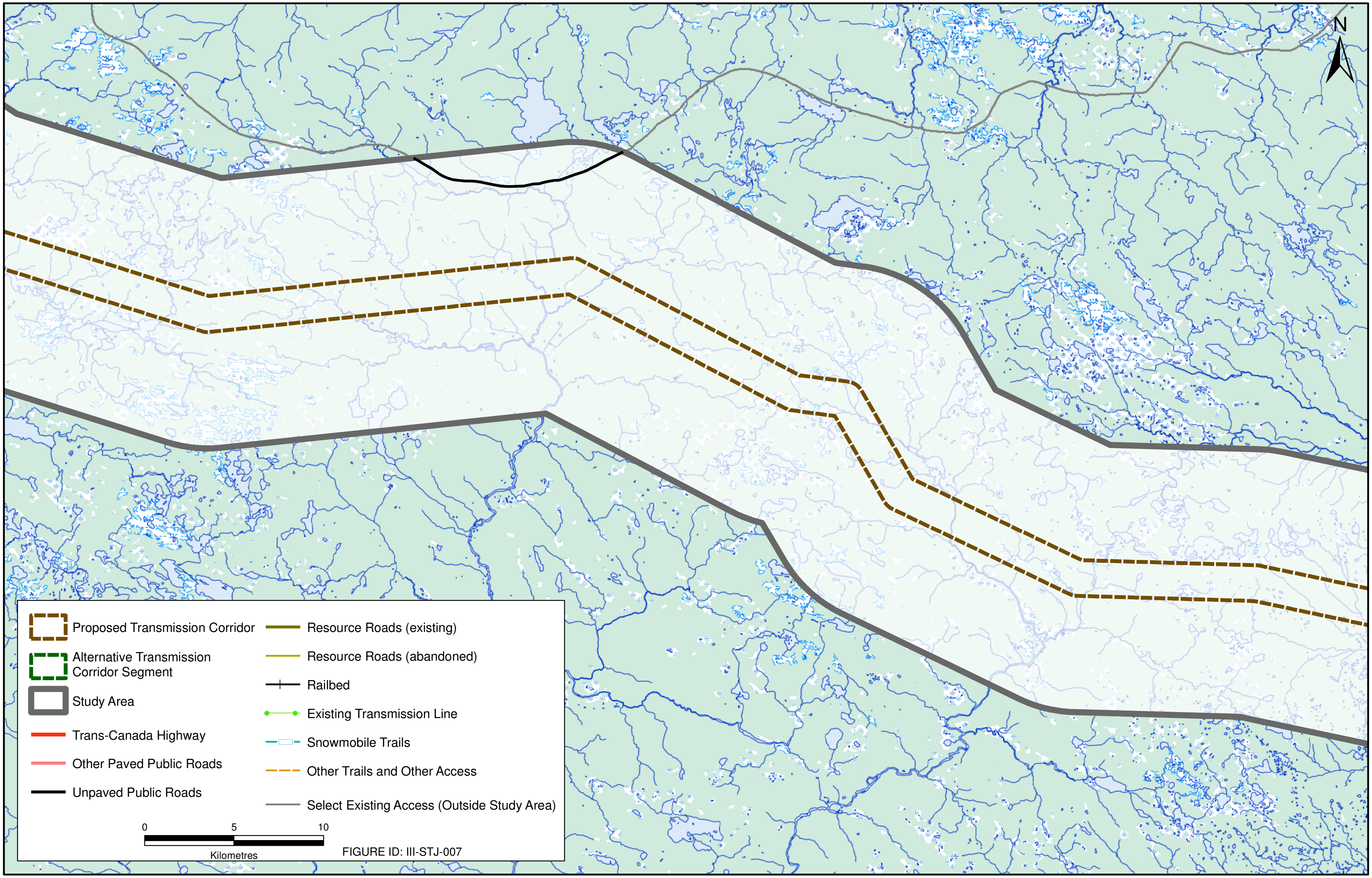
Labrador - Island Transmission Link: Existing Access



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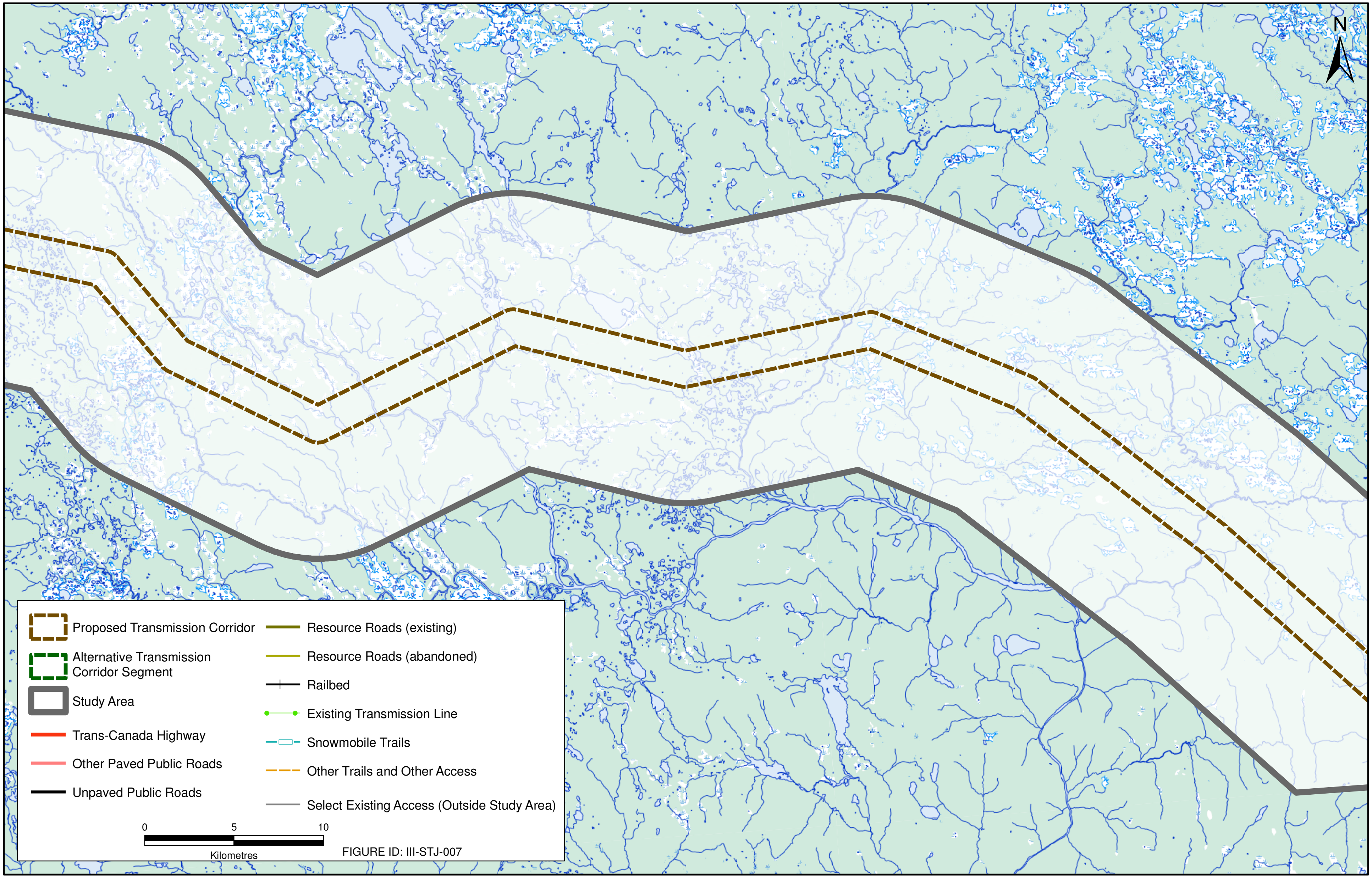
Labrador - Island Transmission Link: Existing Access



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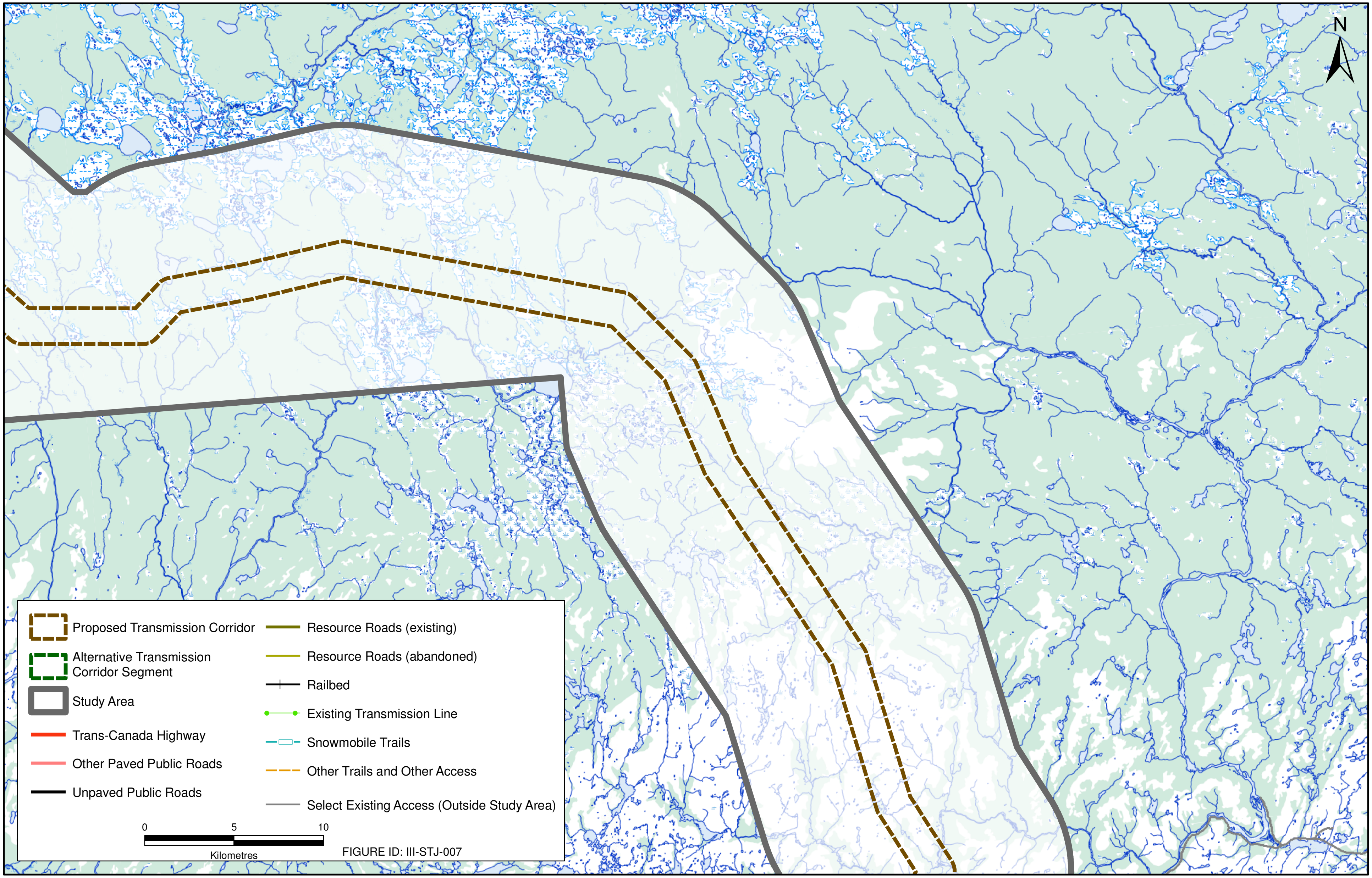
Labrador - Island Transmission Link: Existing Access



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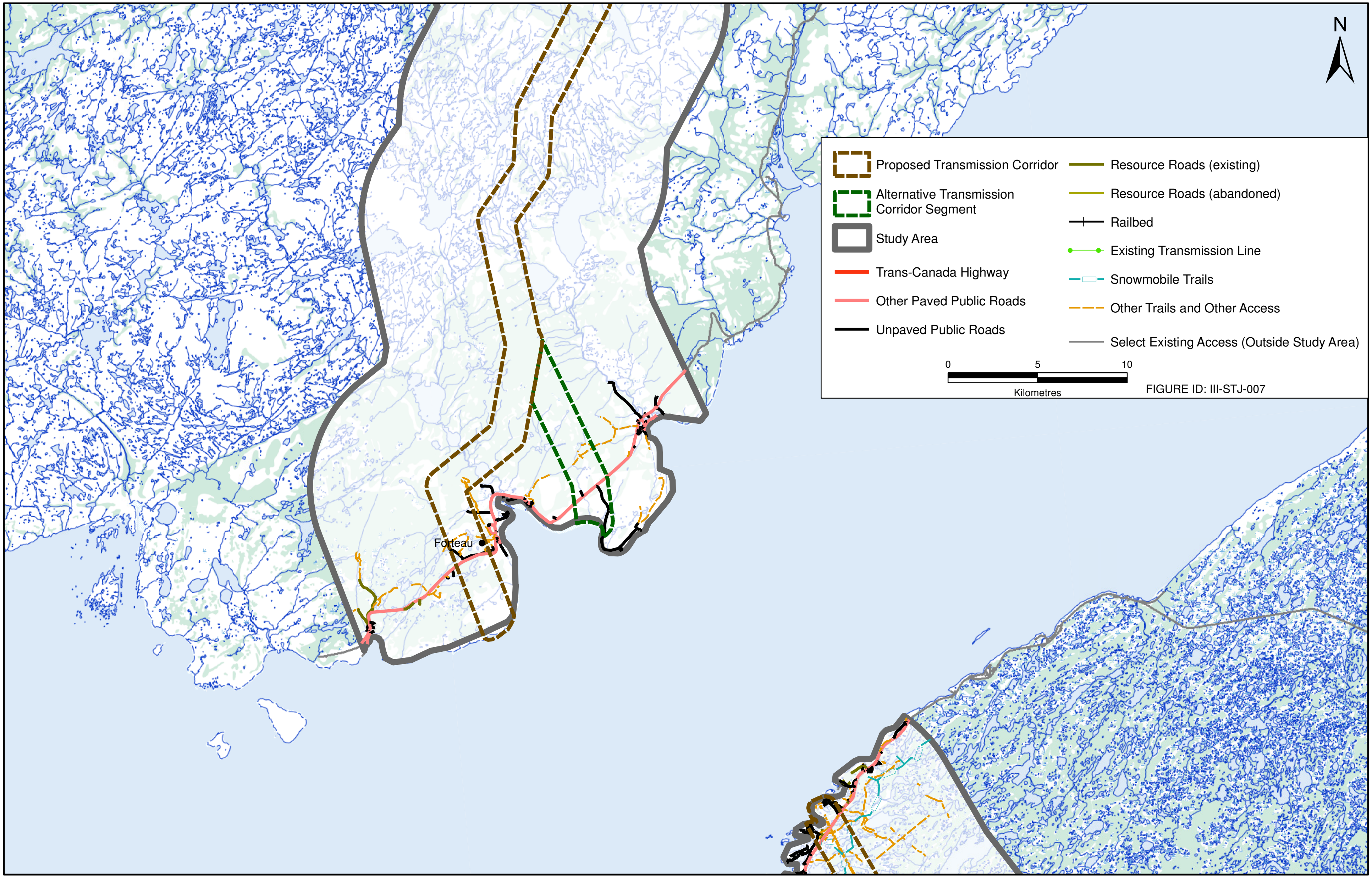
Labrador - Island Transmission Link: Existing Access



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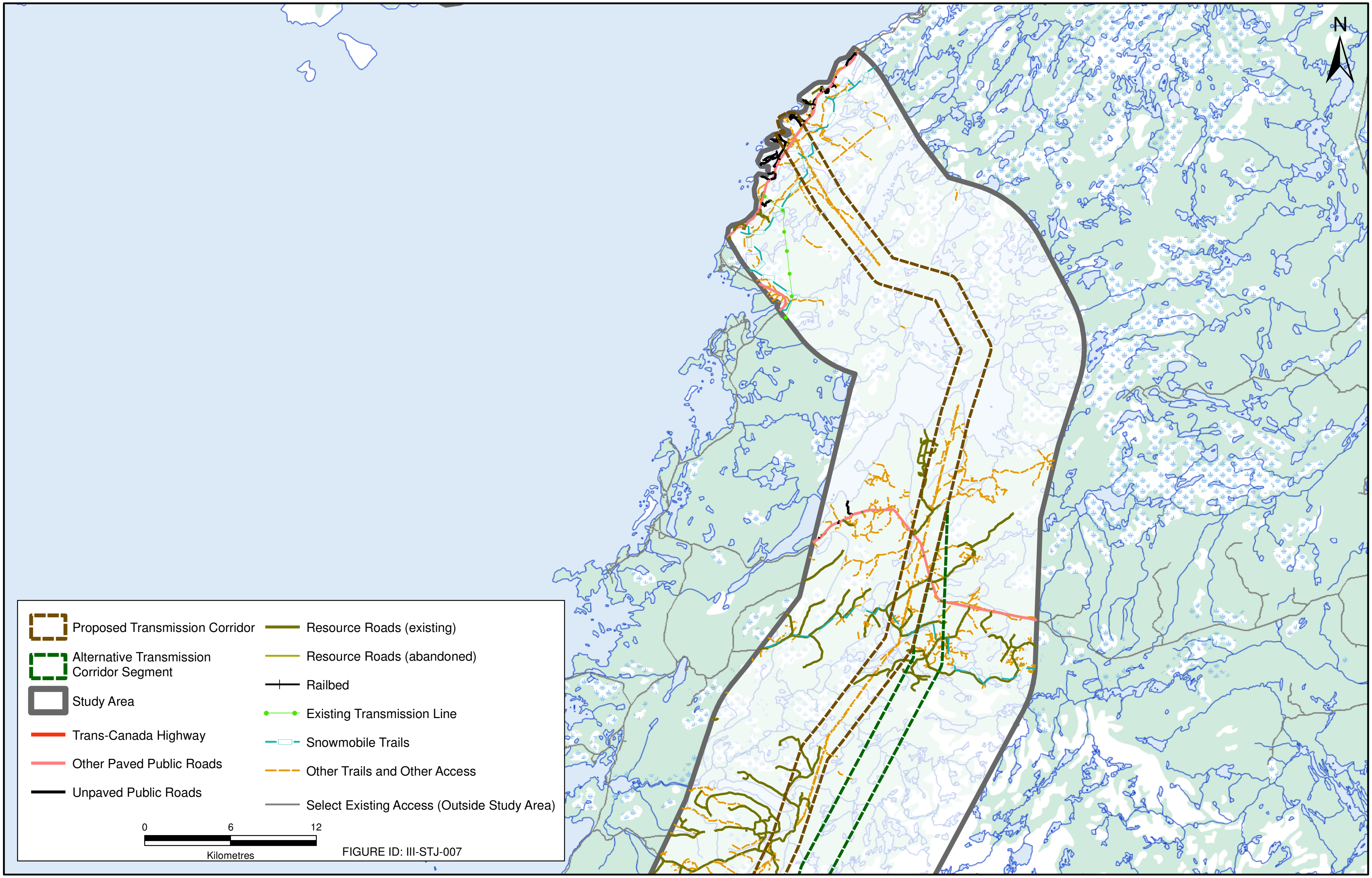
Labrador - Island Transmission Link: Existing Access



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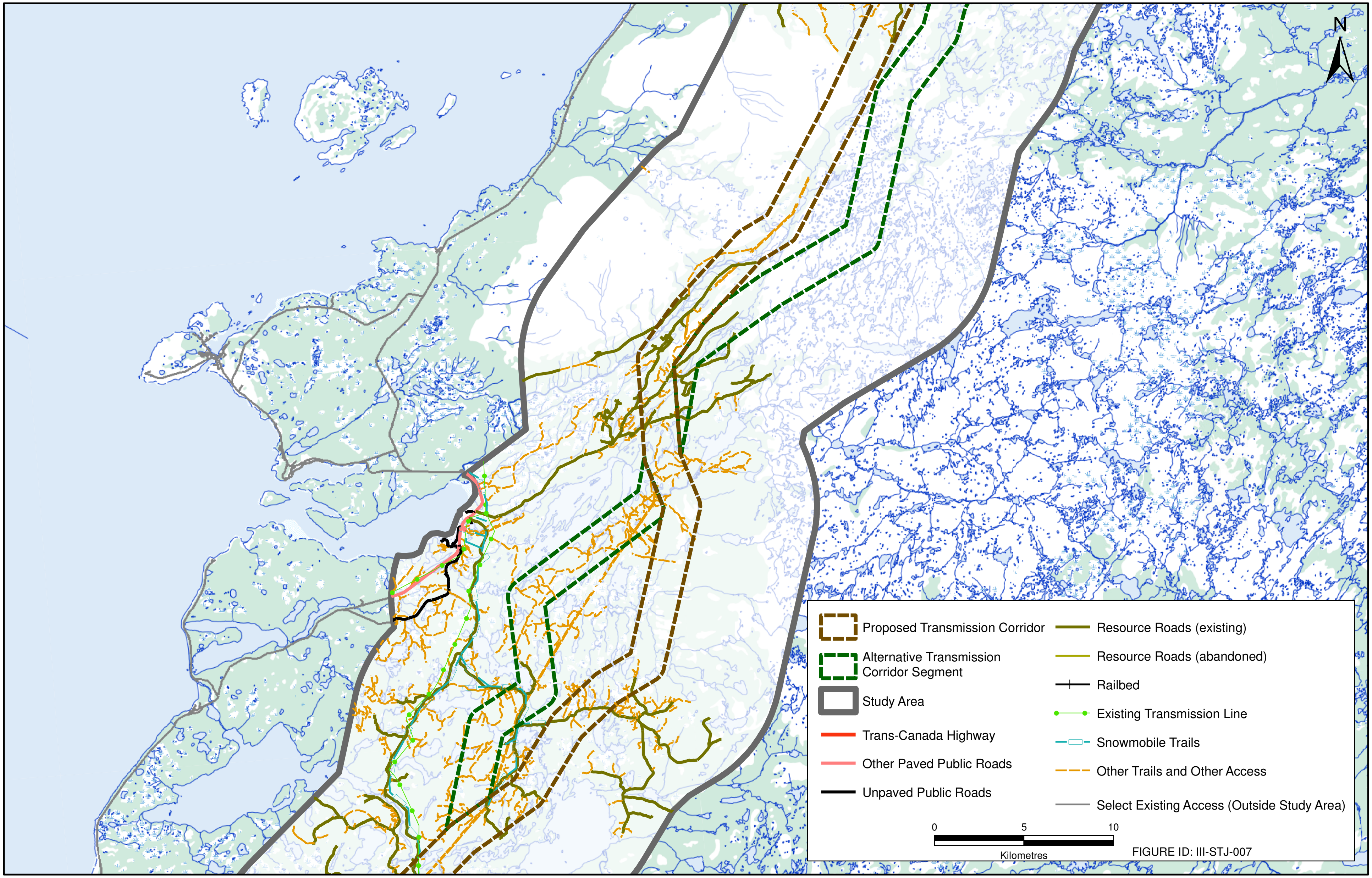
Labrador - Island Transmission Link: Existing Access



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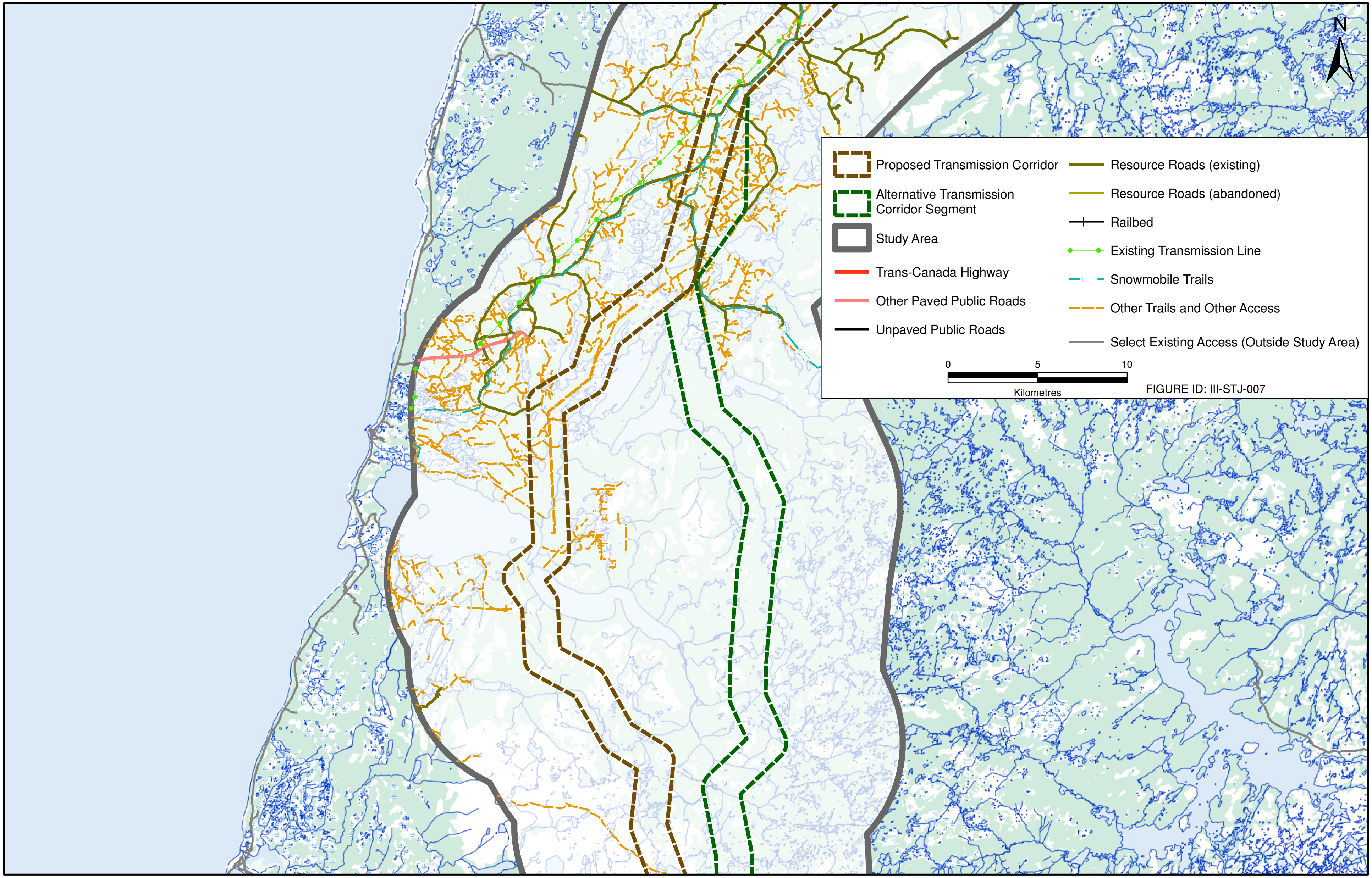
Labrador - Island Transmission Link: Existing Access



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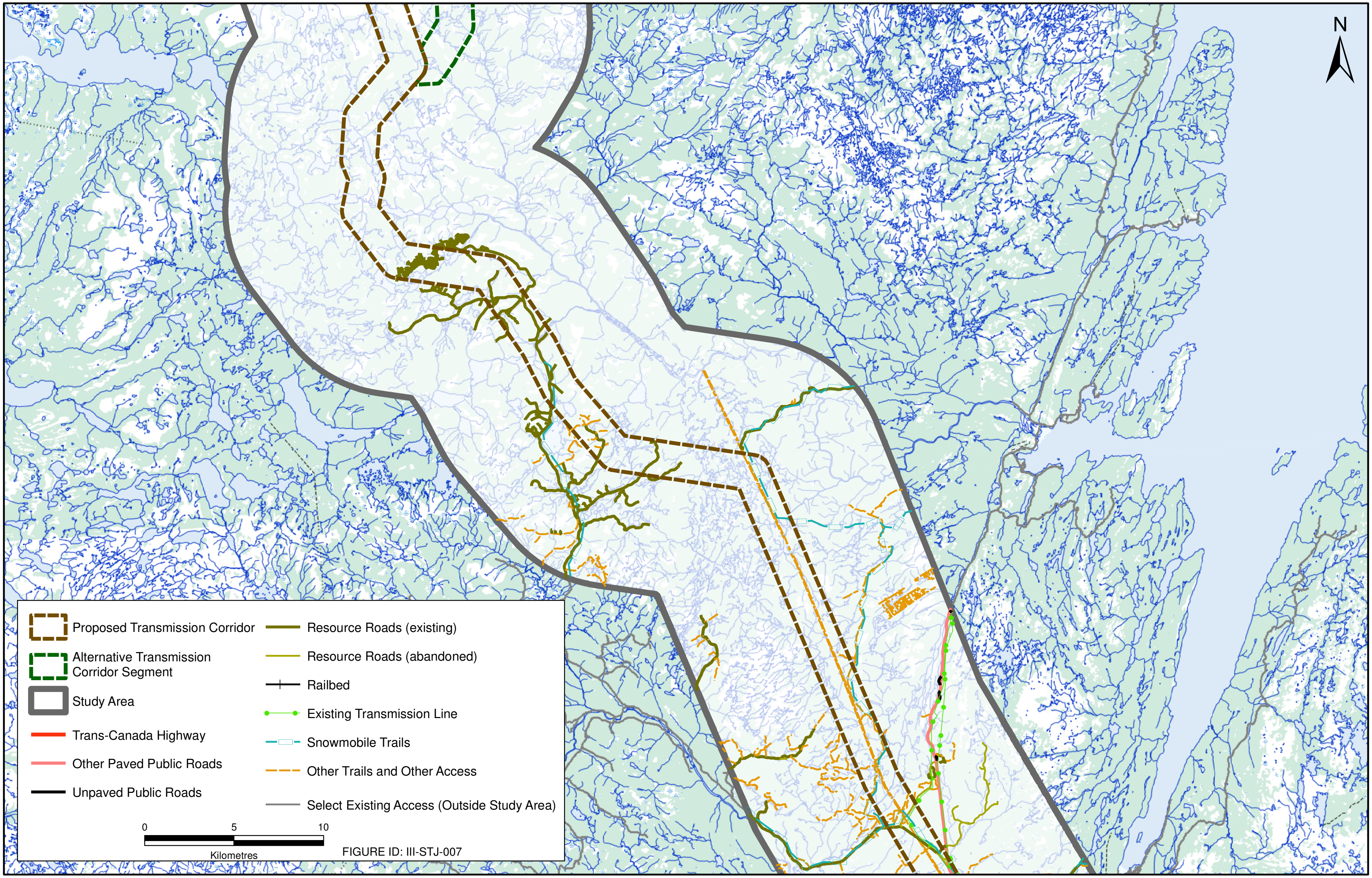
Labrador - Island Transmission Link: Existing Access



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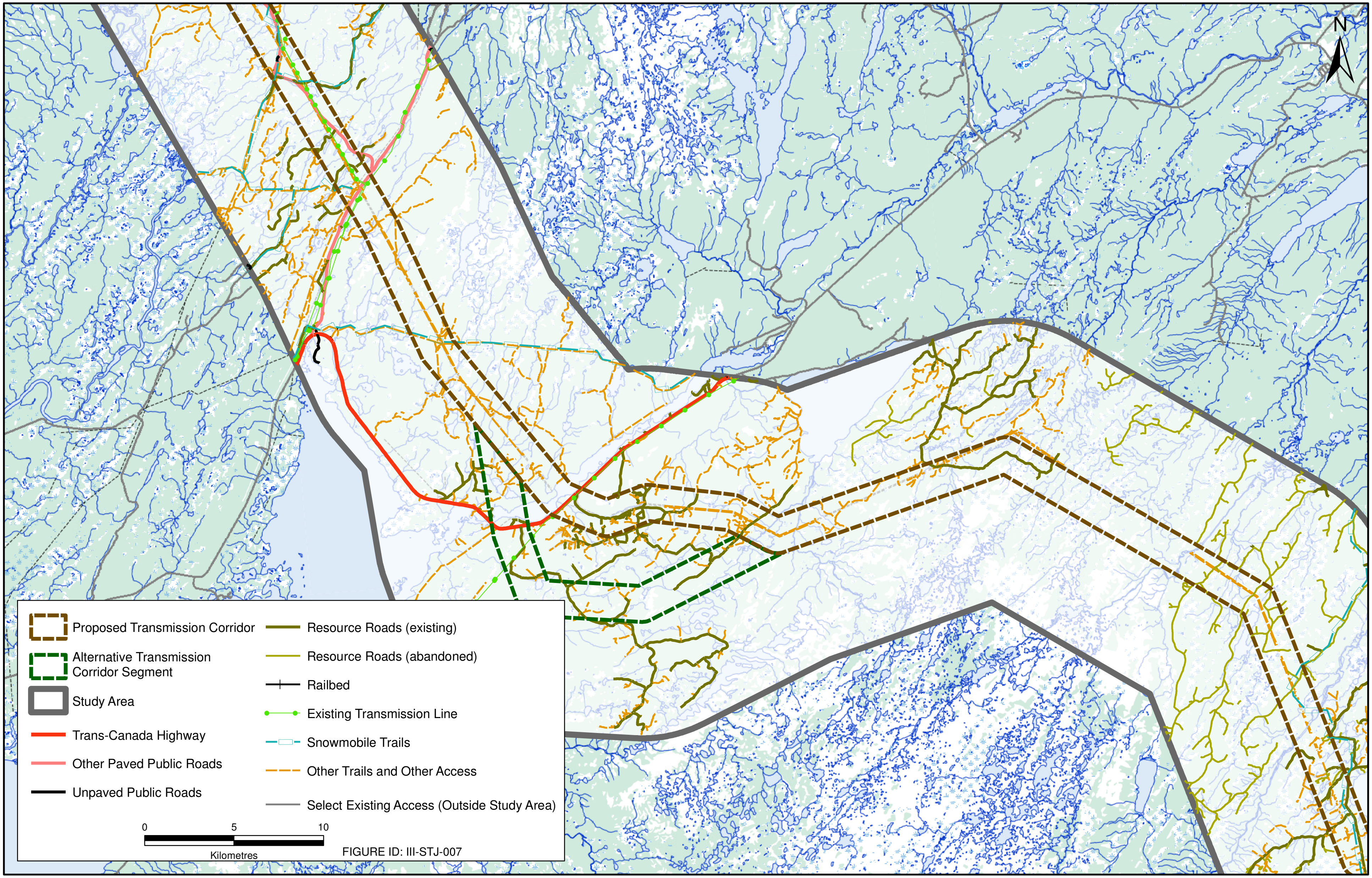
Labrador - Island Transmission Link: Existing Access



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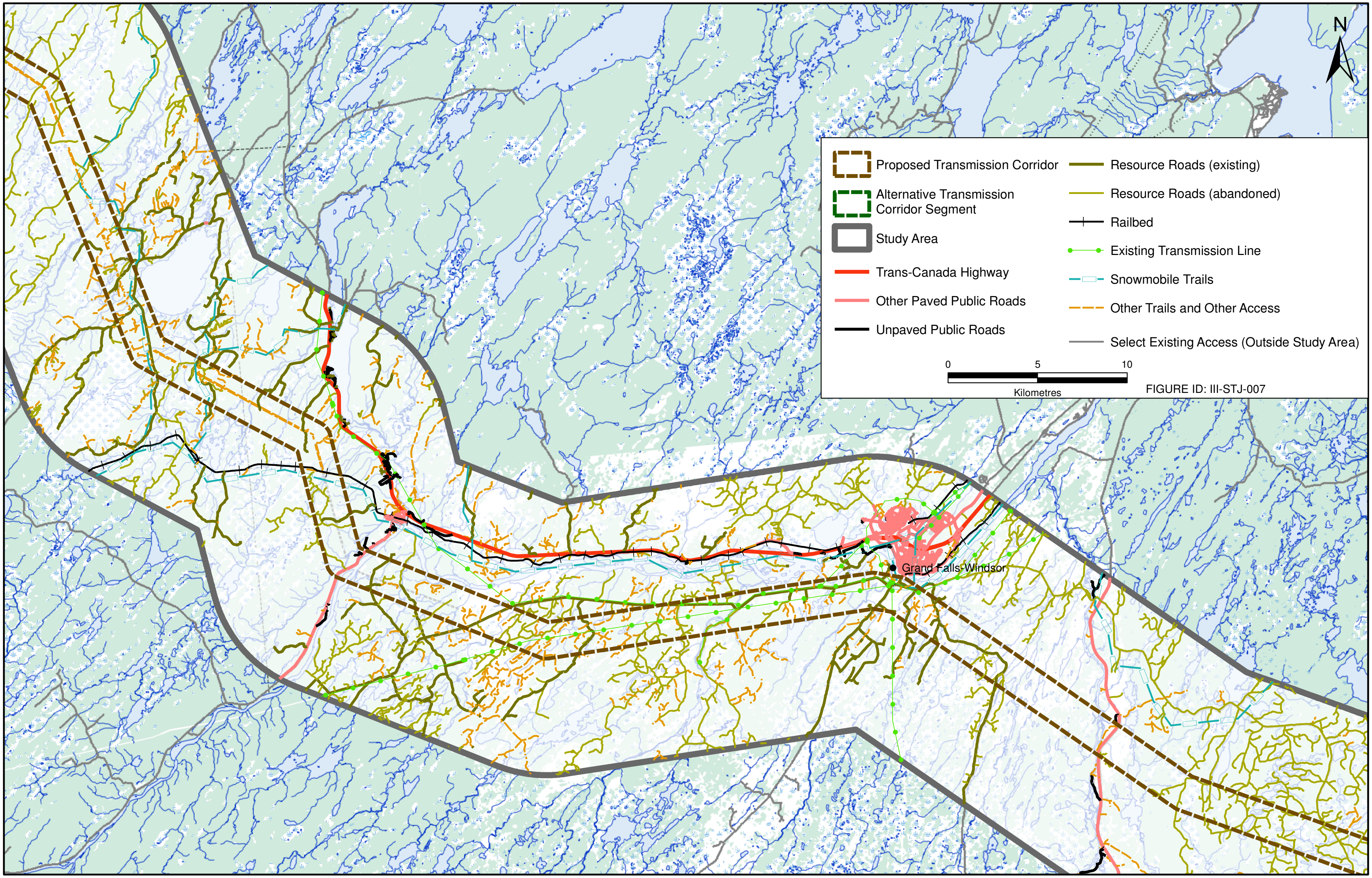
Labrador - Island Transmission Link: Existing Access



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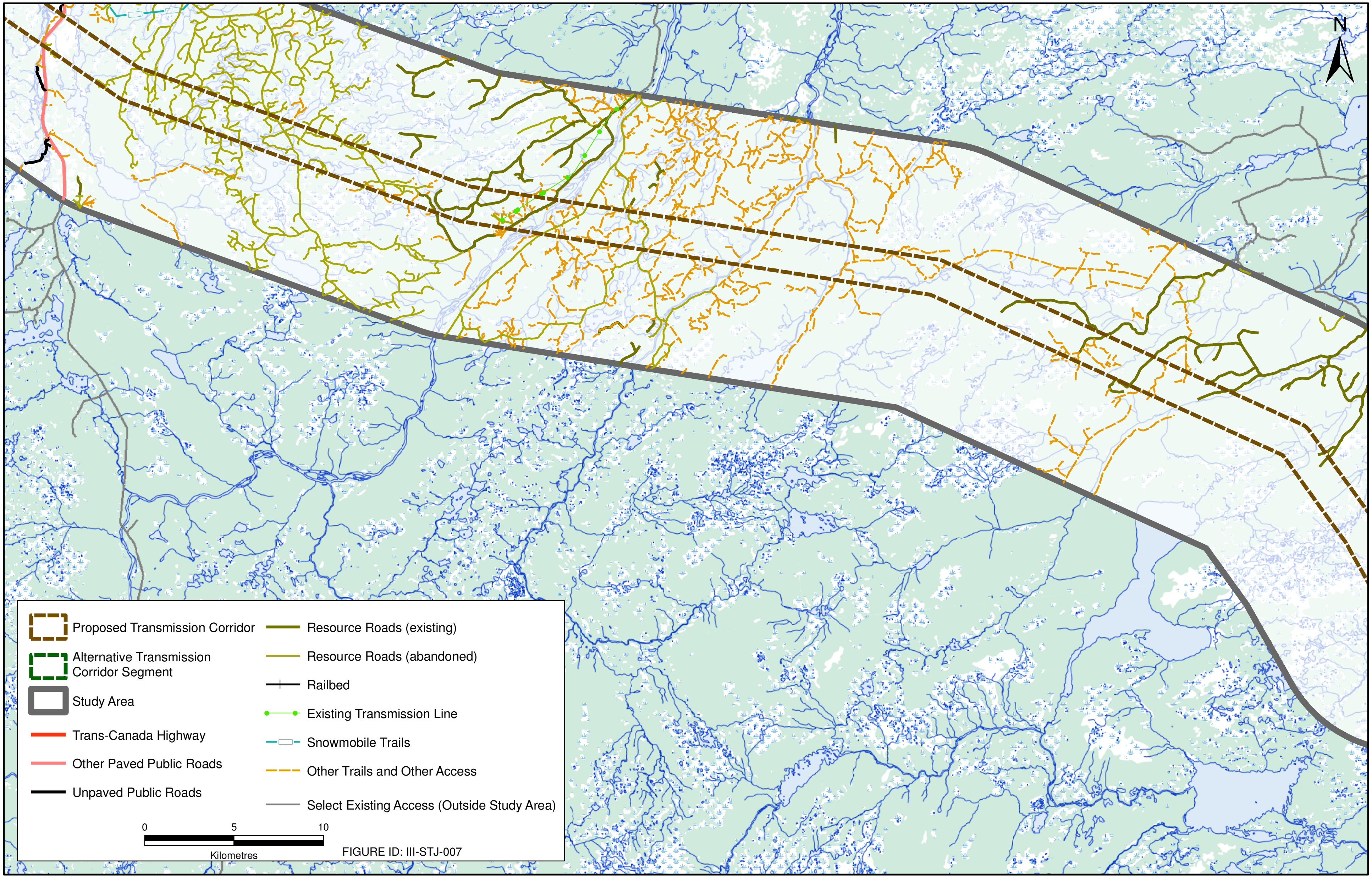
Labrador - Island Transmission Link: Existing Access



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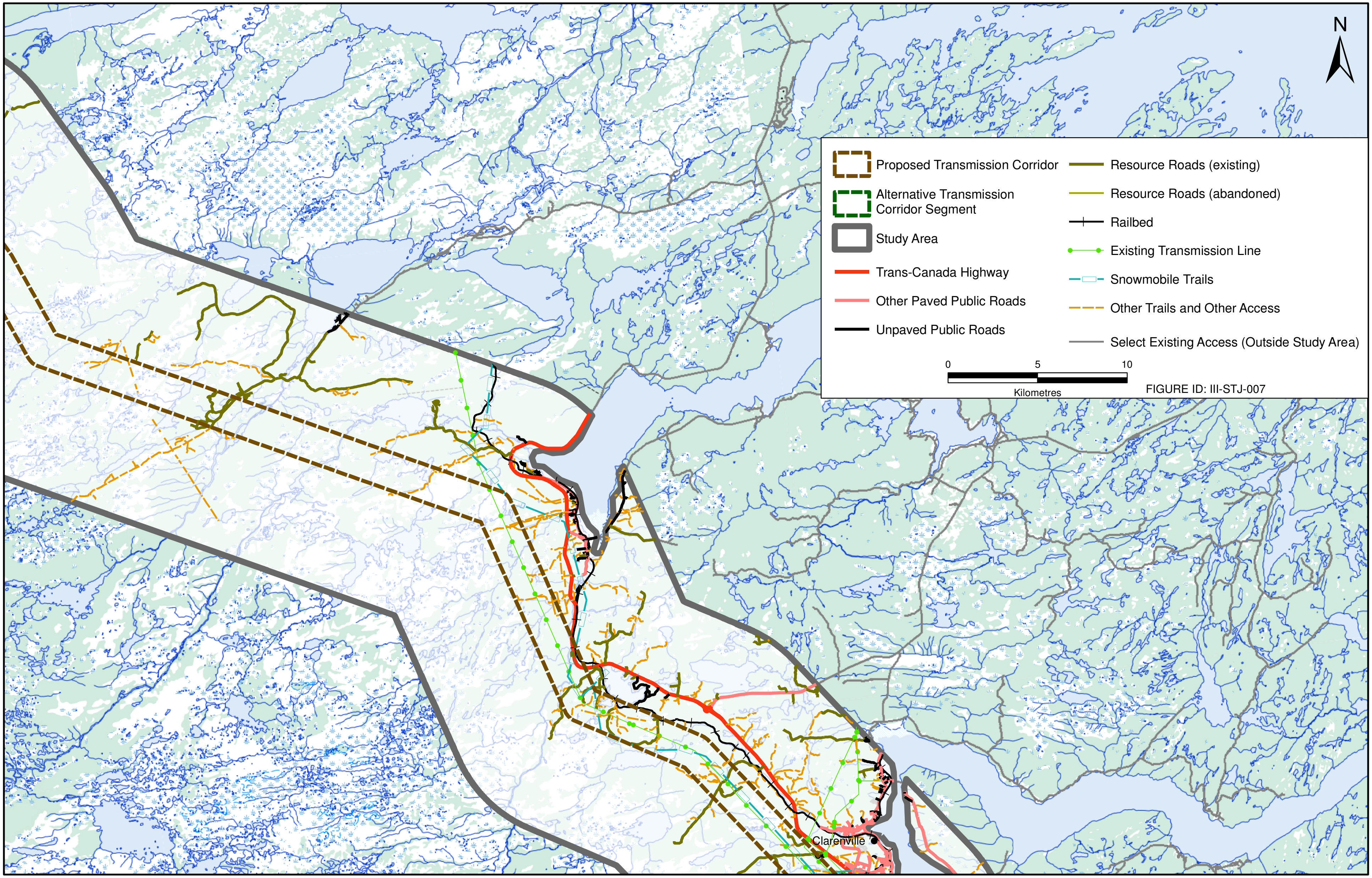
Labrador - Island Transmission Link: Existing Access



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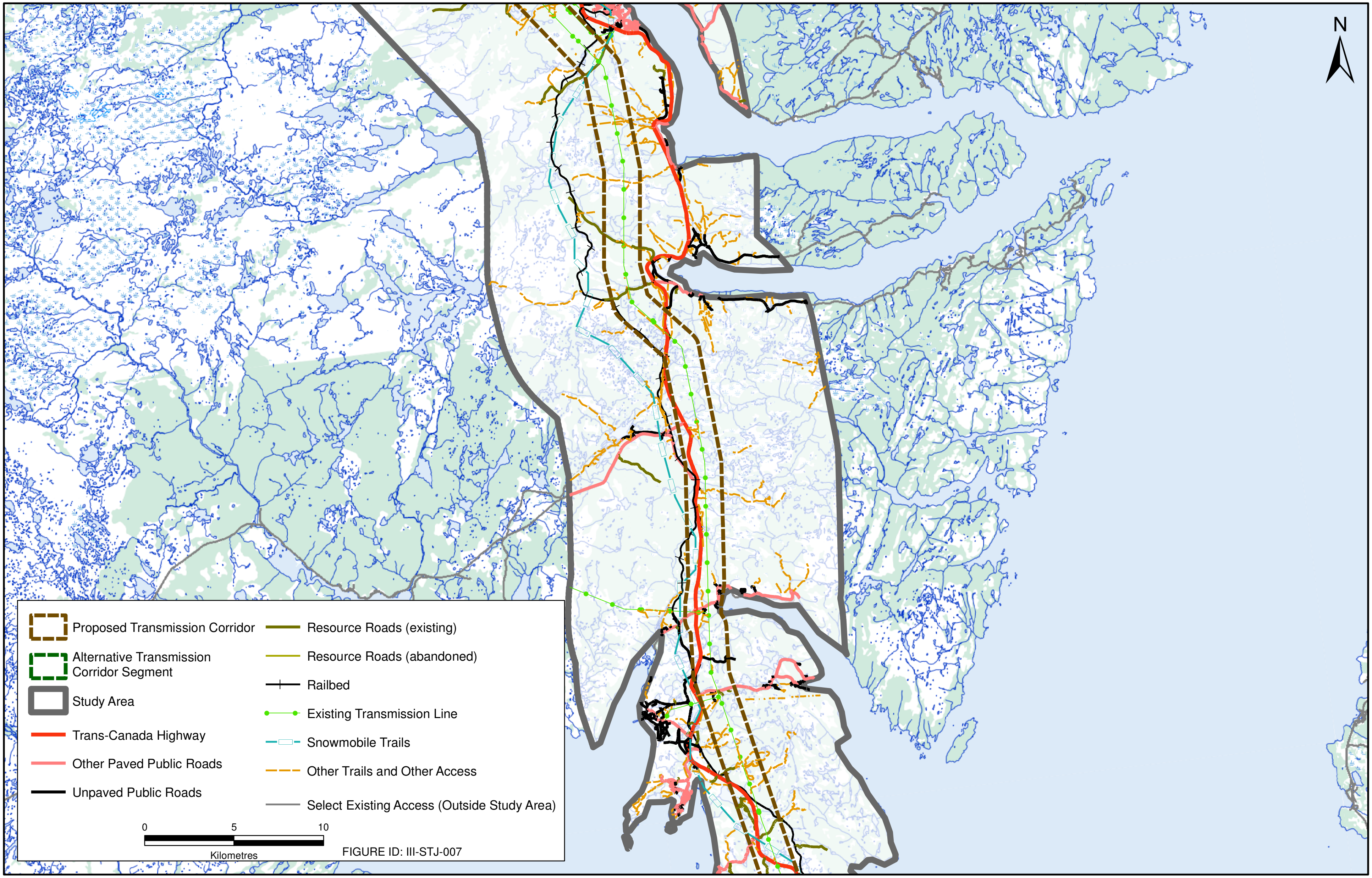
Labrador - Island Transmission Link: Existing Access



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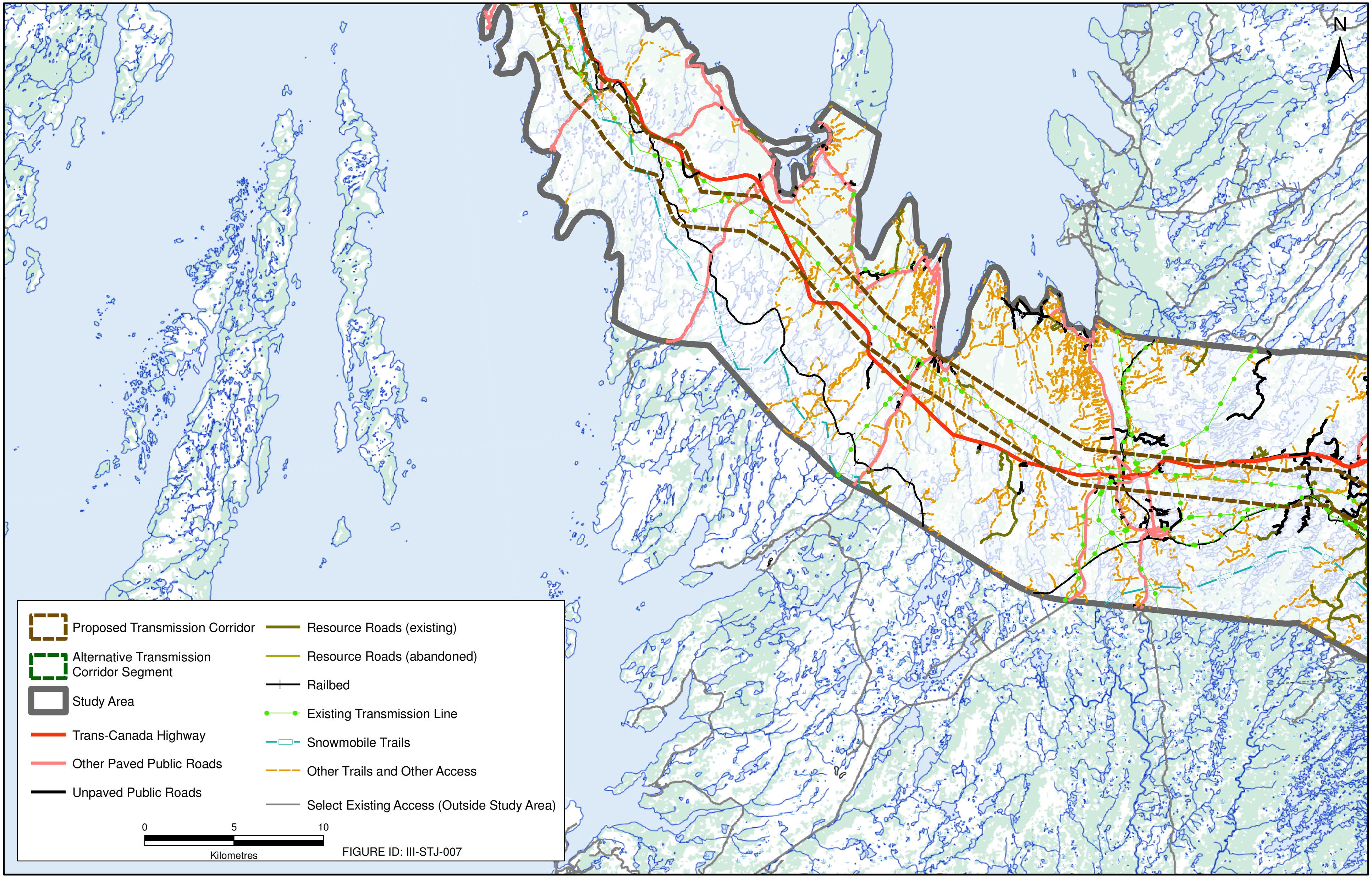
Labrador - Island Transmission Link: Existing Access



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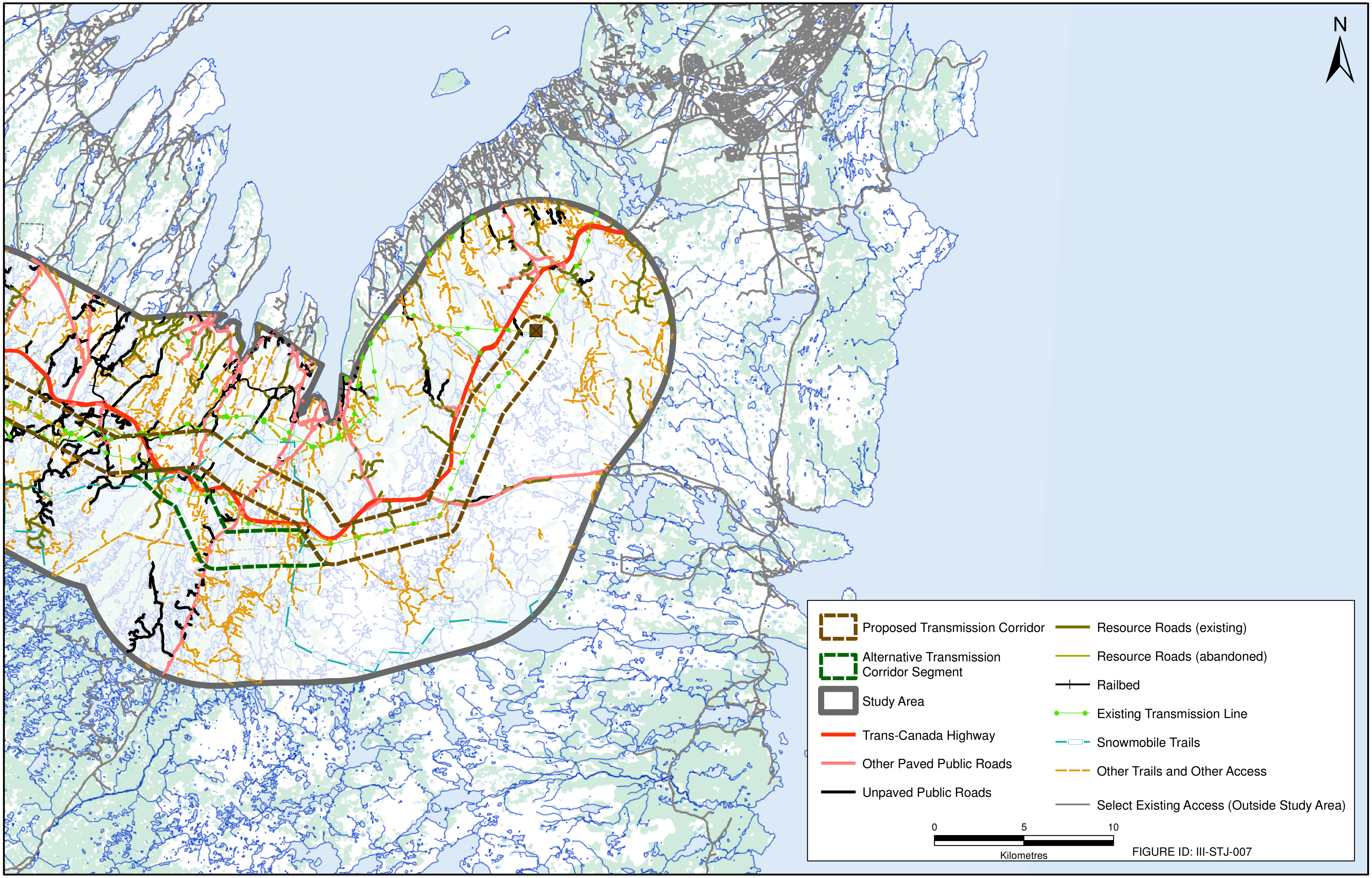
Labrador - Island Transmission Link: Existing Access



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Labrador - Island Transmission Link: Existing Access