2.0 PROJECT DESCRIPTION

This chapter describes the Project as it is currently conceived and includes information on the Project location, siting considerations, and specific Project components and infrastructure. The means by which construction, operation, and decommissioning and abandonment of the Project will be achieved, mitigation by design of the Project, and the anticipated Project workforce and schedule are also described.

2.1 ENVIRONMENTAL PLANNING AND MANAGEMENT

NB Power is a responsible and established proponent with more than 95 years of experience in the planning, design, construction, operation, distribution and management of electrical power generation and transmission in New Brunswick. Currently, NB Power maintains and operates 6,849 km of transmissions lines that are supported by 48 industrial substations and 49 terminals (NB Power 2015).

NB Power, through the Transmission System Operator, owns and maintains the New Brunswick transmission grid as the hub of the Maritimes Area, and is one of only 15 Reliability Coordinators in North America with the authority and means to prevent or mitigate emergency situations in order to maintain system reliability (TSO 2015). The management of the Maritimes Area electrical grid incorporates 15 interconnections in New Brunswick with Québec, Nova Scotia, PEI, and New England, including northern Maine.

NB Power will carefully plan and manage all aspects of this Project from initial design to development to site reclamation. Examples of the methods and tools that NB Power will use to avoid, mitigate, or otherwise manage potentially adverse environmental effects include:

- A review of the major regulatory processes that may apply to the Project (Section 1.7)
- The use of a diverse suite of physical, biological, and socioeconomic constraints in the selection of a route (Section 2.3)
- The identification of potential sources of emissions and wastes related to the Project (Section 2.7)
- The consideration of potential accidents, malfunctions, and unplanned events (Section 2.8)
- An assessment of potential interactions between the environment and the Project (Chapter 4.0)
- A summary of proposed mitigation (Chapter 5.0)
- The development of a Project Specific Environmental Protection Plan (PSEPP) that provides the framework for the management and monitoring of environmental and socio-economic mitigation measures that satisfy corporate and regulatory requirements, best management practices, as well as input from stakeholders and First Nations. The PSEPP defines roles and responsibilities for employees and contractors and includes plans and procedures to address situations that may occur during Construction.

2.2 PROJECT LOCATION

The proposed transmission line will be located in the western part of New Brunswick, within Carleton County, near Woodstock. The line will be approximately 15.7 km in length, and will generally run along the northern edge of an existing right-of-way (RoW) for Route 95. The route, shown in Figure 2.1, will commence at the existing transmission line (# 0038), near the western banks of the Meduxnekeag River in Woodstock, NB, and continue west along Route 95 to a location near the NB-Maine Border crossing.

Two assessment areas are used to facilitate the assessment process. The Project Development Area (PDA) is the immediate area of physical disturbance associated with Construction, Operation and Maintenance, and Decommissioning and Abandonment of the Project. The Local Assessment Area (LAA) is defined as the maximum area where Project-specific environmental effects can be predicted and measured with a reasonable degree of accuracy and confidence.

The PDA encompasses the Project footprint, and includes the 30 m wide RoW beneath the proposed 15.7 km transmission line, the new substation, the upgraded existing terminal, the temporary installation of bridging for watercourse crossings, and any improvements to existing access roads and trails. The PDA is illustrated in Figure 2.1.

Details on the LAA are dependent on the valued components (VCs) being assessed, and will be included in each respective subsection of Section 4.3 of this EIA Registration.

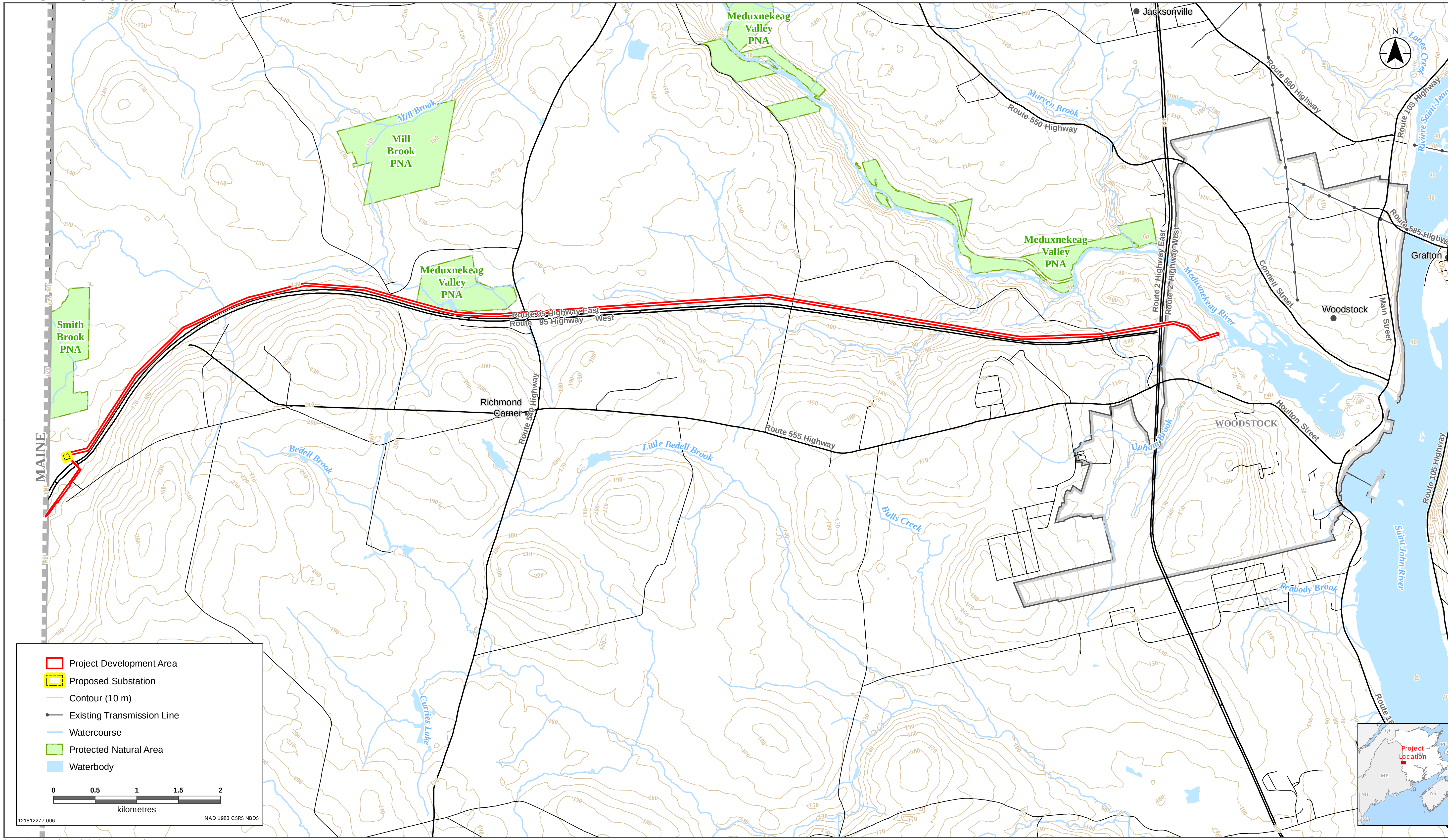
2.3 SITING CONSIDERATIONS

2.3.1 Route

NB Power adhered to several best management practices when selecting a route for the Project. The first best practice was to minimize the overall length of the line by maintaining the straightest alignment possible, since route alignment ultimately influences: the extent and magnitude of any effects on the environment, engineering design, socioeconomic factors, and cost.

The second best practice was to minimize interactions with known environmental constraints. Aerial photographs, GIS based mapping, and biological databases were referenced so as to reduce the potential for the crossing of wetlands, watercourses, known archaeological sites, and environmentally significant areas, among other constraints.

The third best practice incorporated industry recognized engineering and design principles. Particular attention was paid to the type and number of structures in order to reduce the overall environmental footprint. Terrain constraints such as accessibility, slope, and crossing windows were also considered when selecting the route.



Sources: Base data obtained by Service New Brunswick.

Project Development Area for the Proposed International Transmission Line

Stantec

Finally, route selection was conducted in consideration of existing land use. Where possible, the route was located to minimize the proximity to buildings and residences, to follow roadways and property lines where possible, and to avoid bisecting properties to the extent possible.

Initial planning for the Project, conducted in 2014, considered a direct route for a 138 kV line that started at the existing Woodstock terminal and travelled approximately 20 km to the NB-Maine border. This route crossed numerous agricultural lands, watercourses, and green spaces, and required upgrades at the Woodstock terminal to accommodate. The number of environmental constraints associated with this route, and the costs of upgrading the Woodstock terminal prompted NB Power to identify an alternative approach to that would meet needs of the Project while mitigating adverse socio-economic interactions.

NB Power determined that the most environmentally, socially, and economically feasible route for the Project was to tie into an existing transmission line (# 0038) on the western side of the Meduxnekeag River, and to then follow the northern edge of the existing RoW for Route 95 to the NB-Maine border near Houlton, ME. (Figure 2.1). This proposed route reduced the amount of new RoW through comparatively undeveloped green spaces, and minimized interactions with agricultural and residential properties. The clear benefits of this route negated the need for a route alternatives analysis. In so doing, to reflect ongoing discussions with Houlton Water Company, the proposed voltage of the new transmission line was downgraded from 138 kV to 69 kV. A summary of the environmental attributes of the proposed route follows in Table 2.1.

Table 2.1 Summary of Environmental Attributes for the Proposed Route

Constraints / Attributes	Quantity
Total length (km)	15.7
Required new corridor (km)	15.7
Number of properties crossed	49
Length of private land crossed (km)	2.8 km
Length of agricultural land crossed (km)	0.34
Length through forest (km)	10.19
Number of Watercourse crossings	8
Number of waterbodies	1
Wetland area affected (ha)	6.5
Number of roads crossed	13
Number of abandoned railway beds crossed	0
Number of historic sites within 500 m of centreline	0

Table 2.1 Summary of Environmental Attributes for the Proposed Route

Constraints / Attributes	Quantity
Number of pits / mines / quarries / buildings / towers and industrial sites within 500m of centreline	9 pits, 1 Dump/Landfill, 56 Buildings
Known historical occurrence of rare species (no. of individuals)	6 species, approximately 13 individuals (AC CDC 2016)
Total potential Appalachian Hardwood Forest (ha)	There is no Appalachian Hardwood Forest
Length through elevated archaeological potential (km)	2.4 km

2.3.2 New Substation Location

NB Power used aerial photographs, GIS based mapping, and publicly available databases to initially identify four potential locations for the new substation located near the NB-Maine border; however, two of these options (Option 1 and Option 2) were removed as early correspondence with the respective property owners indicated they were not available for purchase. The two remaining location options (Option 3 and Option 4) were selected for further consideration based on their close proximity to the NB-Maine border near Houlton, their location relative to the transmission route, their being the minimum suitable lot size of 0.4 ha, and because initial correspondence with property owners indicated the possibility of acquiring the option property. The potential for interactions with wetlands, watercourses, known archaeological sites, and environmentally sensitive areas, among other constraints was also assessed to minimize interactions with known environmental constraints.

Using these best management practices and principles, and after defining key environmental, socioeconomic and engineering constraints to guide the analysis, a constraints analysis was carried out to identify the preferred substation location for the Project, based on the three aforementioned constraints criteria. The constraints analysis is provided in Appendix B. A brief summary follows.

2.3.2.1 Methodology: Relative Weighting and Ranking of Constraints

Substation location options were evaluated through a weighted ranking process that incorporated three general categories of constraints: environmental, socioeconomic, and engineering. Each category was subdivided into smaller components. For each location option, individual components within a category of constraints were evaluated and ranked using pre-determined criteria, according to the following methodology.

1. Components were ranked on a scale of 0 – 10. A ranking of 10 was given to an ideal potential location component, whereas a ranking of 0 was given to potential location components of low favourability based on their respective criteria. Potential location

components of equal favourability were ranked equally. No scores of less than 0 were assigned.

2. The ranking of each component within a category was then multiplied by its associated weighting factor to give a weighted component ranking.
3. All weighted component rankings were then summed to give an overall category ranking.
4. The overall category ranking was then multiplied by its weighting factor to give a weighted category ranking.
5. Weighted category rankings from each of the three categories were summed to give an overall ranking for each location Option. The overall rankings are displayed as a weighted score out of 100, such that an overall weighted score of 100 will be an ideal location, while an overall weighted score of 0 signifies a very unfavourable location.

The complete Constraints Analysis report for the two initial location Options (Options 1 and 2, now discarded), as well as for the two Options carried forward (Options 3 and 4) is provided in Appendix B for additional detail.

2.3.2.2 Description of Options

The goal of siting considerations was to select options that would meet the siting principles and minimize potential negative interactions during Construction and Operation and Maintenance of the substation. Based on the mapping information, NB Power identified two possible options during the preliminary review process.

2.3.2.2.1 Substation Option 3

Substation Option 3 is not situated on wetlands, watercourses, agricultural land, or areas of archaeological potential. Substation Option 3 does have some steep slope areas, is primarily forested land (0.32 ha), and is situated across federal (Canada Border Services Agency) and Crown (NBDTI) owned properties.

Overall, it was determined that substation Option 3 ranked highest on environmental criteria weighted scores, second on socioeconomic and physical criteria weighted scores, and second overall with an overall weighted score of 79.6 (Appendix B).

2.3.2.2.2 Substation Option 4

Substation Option 4 is not situated on wetlands, watercourses, agricultural land, or areas of archaeological potential. Substation Option 4 is located entirely on forested and private land.

Overall, it was determined that substation Option 4 ranked second on environmental criteria weighted scores, highest on physical and socioeconomic criteria weighted scores, and highest overall with an overall weighted score of 80.2 (Appendix B).

Overall, it was determined that substation Option 4 ranked highest on physical and socioeconomic criteria weighted scores, and had the highest overall weighted score of 80.2 (Appendix B). Based solely on the above-noted environmental, socioeconomic, and physical characteristics, substation Option 4 was considered the preferred option in the constraints analysis.

2.3.2.3 Substation Location Selection

Upon completion of the constraints analysis, NB Power renewed discussions on property acquisition with the owners of the lands where substation Options 3 and 4 were situated. The discussions determined that, although the respective property owners had been initially open to negotiating a land purchase agreement, an agreement with the owners of the provincial and federal lands on which substation Option 3 (ranked second) was situated would require considerable time and regulatory interactions. Additionally, the Canadian Border Services Agency (CBSA) indicated the possibility that this land may be required for a potential future Canada-US border facilities expansion; however, this has not been confirmed to date. As a land purchase agreement was reached with the landowner for substation Option 4, this location was selected for the substation and is therefore carried forward for an evaluation of its environmental interactions in this EIA registration.

2.4 DESCRIPTION OF PROJECT COMPONENTS AND INFRASTRUCTURE

2.4.1 Construction of 69 kV Transmission Line

A high voltage transmission line consists of a series of structures which support conductors (wires) that carry electricity. Various structure types and configurations exist to support the conductors such as wood pole H-frame and single wood poles. During the initial planning stages of a transmission line, an economic evaluation is carried out to determine the structure type. In most instances, factors considered include material cost, cost of structure assembly and erection, structure heights and strength, hardware cost, and available RoW. Environmental and social factors, such as weather and property boundaries, are also considered.

2.4.1.1 Structure Type

Structures are used to support the high voltage conductors and to ensure minimum clearance to ground, to objects under the transmission line, and at road crossings. The distance between structures (span) and their height is determined by the topography of the area and the clearance requirements. For a typical 69 kV transmission line, the spans vary between 100 m to 200 m while the height of poles used in structure design range from 15 m to 20 m. Also, structures are designed to withstand known weather conditions and other related constraints.

Standard structure types to be used for this Project include a wood-pole H-frames, single wood poles, and guyed wood-pole dead-end structures. The latter are required where angle changes along the route occur (Figure 2.2). These structure types will be approximately 15 m to 20 m in height and consist of chromated copper arsenate (CCA) wooden poles. The use of CCA pressure treated wood, currently authorized for use in Canada (Health Canada Pest Management Regulatory Agency 2006), not only protects the wood against fungi and insects, but also provides extra protection against moisture content changes (EC 1999). Untreated poles, such as hemlock, tamarack, and cedar were not considered for this Project as they are more susceptible to decay from wood rot or damage from wood boring insects which would lead to structural weakening and possibly pole failure. CCA-treated poles have greater wood stability and resistance to splitting, which substantially extends the service life of the wood (from less than 10 years to 40 years) and increases its durability. In addition, this type of treatment provides resistance to electrical currents and facilitates the climbing of poles by line maintenance staff (EC 1999). CCA-treated poles are widely available and have the lowest cost. They are a proven product, derived from a renewable resource, are readily available and locally produced. Alternate pole materials (*e.g.*, pre-cast concrete, corrosive-resistant steel and plastic lumber) have proven to be cost prohibitive and were not considered for this Project.

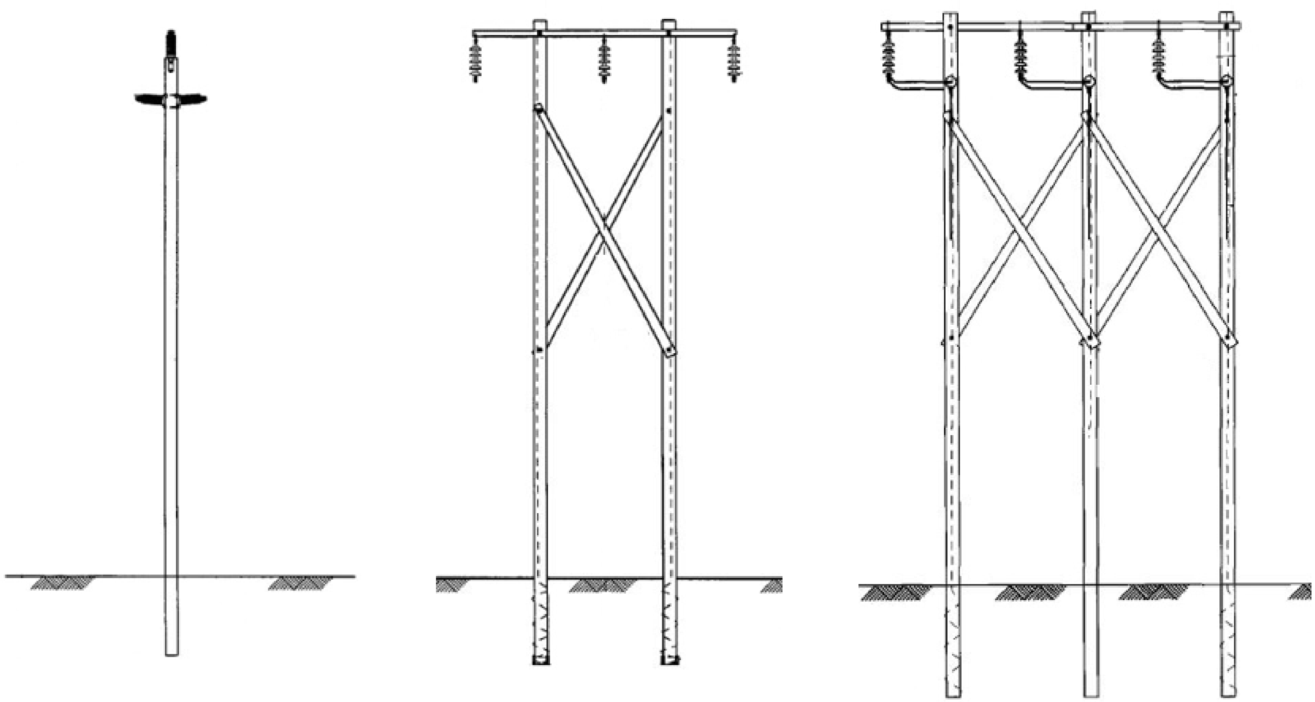


Figure 2.2 Example of structures proposed for 69 kV international power line. Left: Single pole with post-insulators. Middle: Suspension structure with steel cross-arm. Right: Deadend angle structure.

The average height from ground to insulator of the wooden H-frame structure will be approximately 15 m. The span between structures will be approximately 180 m. Three conductor wires will be strung to the insulators, with a spacing of 3.81 m between them. Angle structures (*e.g.*, deadend structures) will be anchored with six to seven guy wires where the line turns and terminates. Poles will be reinforced with a cross arm and cross braces. Based on preliminary line design analysis, it is expected that approximately 85 to 110 structures will be required for the construction of the new line from Woodstock to the NB-Maine border, including a relatively short distribution line segment.

Final structure and pole locations will be determined based on geotechnical field surveys and LiDAR terrain analysis. This will reflect detailed engineering analysis with respect to span, length, local soil conditions, topographic and geologic features, and proximity to existing infrastructure.

Subject to detailed engineering analysis, structure and pole location to avoid known constraints or sensitive environmental conditions has been identified as a mitigation measure to reduce environmental effects, where possible.

2.4.1.2 Conductors and Insulators

There are several types of conductors available for use, which depend on a number of factors that are typically considered during the preliminary design phase. A 266 kcmil Aluminum Conductor Steel-Reinforced (“Partridge”) conductor will be used for the transmission line itself. This wire provides higher corrosion resistance, is lighter in weight, has a recognized longer service life, and offers reduced power losses. It is composed of 26 strands of aluminum alloy wire surrounding a core of seven steel strands. The outside diameter of the wire is approximately 16 mm and is suspended from the cross arms by insulator strings.

2.4.1.3 Overhead Ground Wires and Counterpoise

Lightning strikes on transmission lines pose a significant risk to the stability of the electrical network. In order to mitigate impact to the proposed transmission line, two 9 mm diameter steel cables, called overhead ground wire (OHGW), will be strung above the conductor along the last approximately 1 km of transmission line adjacent to the substation. The OHGW are to protect the transmission line and substation apparatus from the high current and voltage surges present in lightning. In the event the line suffers a direct or indirect strike, these wires provide a path for the high current and voltage to safely discharge down through the structures and into the ground.

Counterpoise will also be installed on all of the structures in order to improve grounding capacities. The counterpoise consists of a steel galvanized wire that is attached to the bottom of the poles and covered with overburden to a depth of approximately 0.5 m and runs radially for a distance of approximately 1 m.

2.4.1.4 Easement and Width of Right-of-Way (RoW)

An easement is defined as a non-possessory, registered interest right acquired by one person on the land of another, permitting partial use of the other’s land for a specific purpose, such as a

RoW across it. For transmission line projects, an easement includes the right to build and erect certain towers and/or other supports, and/or trench for underground wires or cables. It also includes the stringing, placing, and maintaining from one tower or support to the other towers or supports, all necessary wires, cables, supporting cables, anchors and ground rods, and/or wires or cables in underground trenches, all works being for the purpose of conducting and transmitting electric power or signals to, on, or across related lands and premises. The easement allows for the construction and operation of a transmission line on part of a property while ownership of the entire parcel of land remains with the original owner. An easement will be acquired to construct the proposed transmission line.

The cleared width of the RoW is governed by a number of factors such as tree height, structure type, height of conductors, and sag of conductors, flashover distances, and safety factors for tree growth and conductor swing. To ensure safe electrical clearances and prevent trees from falling onto the line or coming into contact with the conductors, the RoW is cleared of vegetation. The planned RoW width for the 69 kV line will be 30 m. The RoW width for the distribution line segment will not exceed 30 m.

2.4.2 Construction of New 69 / 34.5 kV Substation and Upgrades to Existing Woodstock Terminal

The new substation will be located near the NB-Maine border on land to be acquired and owned by NB Power, while modifications to the existing Woodstock Terminal will occur within the existing footprint of the fenced-in site currently owned by NB Power. Each site will be designed with an oil containment system for the transformer. As part of the engineering design, the details of the oil containment system will be determined. The following sections provide details on the additions that will take place at each site.

New 69 / 34.5 kV Substation

The dimensions of the new substation site will be approximately 60 m by 60 m (i.e., approximately 0.4 ha). The site will be cleared of vegetation and graded to take into account the existing drainage patterns surrounding the site and the need to protect the facility from overland flowing during spring runoff or an extreme rainfall event. Grounding grid will be installed to protect personnel, the public and equipment. The grounding grid ensures that people inside and outside the substation are not exposed to critical electrical shock under normal and fault conditions. Furthermore, it also provides a means to bond the equipment to ground. The Canadian Electrical Code requires that all metallic objects in an outdoor substation be bonded to ground. The grounding grid will be made up of mesh copper conductors and ground rods buried in the soil. The grounding grid typically encompasses the entire substation site and extends about 1 m past the fence and gate.

Typical pier-pedestal steel-reinforced concrete foundations will be used for supporting equipment.

Existing Woodstock Terminal

NB Power had pre-existing plans through their Load Growth Program to modify the Woodstock terminal near Jacksontown, NB to proactively manage for possible future increases in transmission capacity. As a result of this Project, NB Power advanced the previously scheduled modifications and additions to the Woodstock terminal.

Additions to the Woodstock terminal will include the necessary concrete foundation for a 138 kV to 69 kV tie-in transformer, steel structure, one 69 kV motor-operated switch, two 138 kV motor-operated switches, a 12.6 megavolt amps (MVAR), 69 kV capacitor bank, and associated protection and control. The new equipment will be bonded to the existing ground grid, and will occupy a footprint of about 10 m by 40 m within the existing fenced footprint of the terminal.

Oil containment will be incorporated into the design of the Woodstock terminal upgrade. The exact collection system has yet to be determined but will be designed to capture and retain any potential release to the environment.

2.5 PROJECT PHASES AND ACTIVITIES

The Project will be carried out in three distinct phases: Construction, Operation and Maintenance, and Decommissioning and Abandonment. Activities to be conducted during each of these phases are described below.

2.5.1 Construction

The construction of a transmission line typically involves the following stages: vegetation clearing, access and staging, excavation and structure assembly, stringing conductors, inspection and energization, and clean-up/revegetation. Both tracked and wheeled equipment and vehicles are used to perform these activities. The type of equipment and vehicles may include, but is not limited to, the following: muskeg, crane, excavator, auger, dump trucks, dozer, tractor trailer and All-Terrain Vehicles. A brief description of the construction details is provided below.

2.5.1.1 Vegetation Clearing

2.5.1.1.1 New Transmission Line

Clearing involves the removal of vegetation from the RoW which may prohibit the construction and safe operation of transmission lines. The extent of cutting will vary depending on the type of structure selected for the design and on vegetation heights. Some areas may not require cutting such as fields and farmland. Vegetation will be largely removed by mechanical means, except within 30 m of a watercourse or wetland. In these areas, vegetation will be removed manually (*e.g.*, chain saws and other hand held equipment), while leaving the under growth and duff layer undisturbed to prevent erosion.

Trees will be felled, de-limbed ,mulched, and/or piled at the edge of the RoW according to clearing contract requirements. The remaining slash and debris will be windrowed a few metres from the edge of the RoW and compacted to a height no greater than 0.5 m. The windrows will be broken (left open) at all roads or access trails, along property lines, and along watercourses. This provides access across the windrow for any wildlife not capable of crossing the low vegetation pile. Felled trees from clearing the RoW may be used to build corduroy access where required and felled vegetation is also used for erosion control. The windrows will be allowed to decompose naturally. Grubbing of the RoW or burning of vegetation will not be undertaken.

Timing of clearing is scheduled for fall 2018 through winter 2019, to avoid the normal bird breeding season, which is generally from April 1 to August 31.

2.5.1.1.2 New Substation

Initial site preparation for the Houlton substation will involve trees being felled, de-limbed, and removed from the 0.4 ha substation lot according to clearing contract requirements. Grubbing will then be conducted in preparation for excavation and levelling (see Section 2.5.1.3.2).

2.5.1.1.3 Upgraded Woodstock Terminal

As there will be no expansion of the footprint of the Woodstock terminal, there will be no vegetation clearing required.

2.5.1.2 Access and Staging

Access is required to allow transportation of clearing and construction equipment, materials and personnel to the RoW. Transmission lines may be located adjacent to, or intersect, existing linear corridors, which can provide access to or near the line. Access may be required along the RoW and deviate where watercourses and wetlands cannot be crossed with equipment. In all cases, maximum use is made of existing access roads.

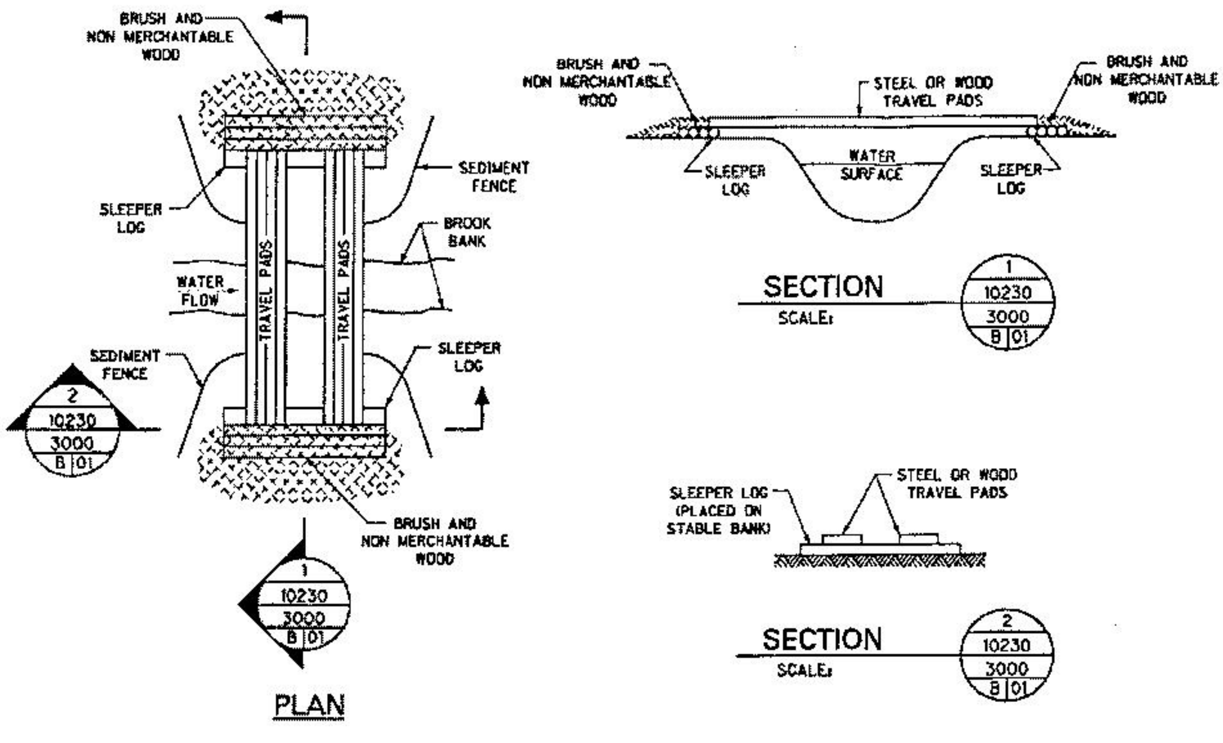
As part of the design stage of the Project, NB Power will avoid locating structures next to watercourses and/or wetland habitat, and their 30 m buffers, where possible. Where these areas cannot be avoided, mitigation measures will be developed in consultation with the appropriate authorities. If access is not available on either side of a watercourse or wetland, temporary bridging or corduroy (for wetlands only) will be used to cross these areas (Figure 2.3), allowing access for both wheeled and tracked vehicles. Where practical, only tracked vehicles (*i.e.*, muskegs, excavators, dump vehicles, small dozers, and terriva-bucket vehicles) will be used in or near watercourses and/or wetlands to reduce the potential for rutting. The figure below provides a generic drawing of a typical temporary bridge crossing.

Existing access roads may require improvements to provide construction vehicle and equipment access to the transmission line RoW. These improvements may include one or more of the following:

- Clearing brush overgrowth to widened sections of roads with the use of a mulching head
- Grading existing roadbeds and, where necessary, placing a few inches of gravel on the newly graded areas (*e.g.* crowning)
- Installing cross-drainage in certain areas to divert storm water runoff to the side of the roads
- Installing culverts, where required

Preliminary reconnaissance work and a review of aerial photographs suggests that all structure locations, with a few exceptions, on the proposed RoW can be accessed using a combination of existing roads and trails. These roads and trails may require some minor improvements which will be identified following field studies. If new access roads are required they will be constructed in accordance with the PSEPP. Permission from landowners will be obtained to access existing roads and trails as required.

Prior to a tender being issued for construction of the new line, staging/storage areas for equipment and material will be identified.



Source: Transmission Line 3016 CAD Drawing No. : 3016-10230-3000-001-DD-B

Figure 2.3 Typical Temporary Bridge Crossing

2.5.1.3 Excavation, Pole Placement, Structure Assembly, and Anchoring

2.5.1.3.1 New Transmission Line

Assembly of structures involves the transportation of construction materials to the RoW, excavation (i.e., pole placement), and backfilling of excavated material. Excavation is commonly carried out by mechanical auger or excavator, hydraulic rock hammer, and/or blasting, depending on soil conditions.

Wood poles of each structure will be embedded a depth of 2.5 to 3 m (10% of pole length plus 0.6 m). Holes are typically dug using mechanical excavators. However, where soil conditions make this method inefficient, hydraulic hammering or blasting may be required to remove the rock. Excavation footprints for each pole are typically 1 m x 3 m at ground surface and 1 m x 1m at excavation bottom. This yields typical excavation volumes of 4.5 to 5.5 cubic metres per pole. Anchors for guy points are typically 1.5 m deep with a typical excavation footprint of 1 m x 2 m and excavation volume of 2 to 3 cubic metres per anchor. Helical anchors may be used at some guy points where practical and this would reduce the excavation footprint to nil.

The assembly of structures will take place on-site at structure locations. The disturbance area around the structure site for the equipment, structure assembly and erection activities will be limited to 700 to 900 m² for H-frame and angle structures. Depending on soil conditions, compacted native soil or material supplied from local established and appropriately licensed quarries will be used to fill the sides of the excavations.

Exact structure locations have yet to be determined. Structure locations will avoid watercourses and wetlands and their 30 m buffers to the extent practical; therefore, blasting near watercourses and wetlands will be minimized or avoided. The Project design will be developed and refined based on available LiDAR data and input from the environmental field surveys.

Although specific information regarding anchor requirements for guy wires at angle structures yet to be finalized, several types may be used during Construction depending on structure location.

It is anticipated that cross plate anchors will be used predominantly for the proposed Project. Cross plate anchors are best suited for soil conditions having good load bearing characteristics. They are installed by auguring or excavating a hole, placing the cross plate assembly at the base and backfilling the hole, and tamping the soil in layers to increase the holding capacity.

Helix (screw type) anchors will be used for soil conditions having limited load bearing characteristics and/or wet areas. This type of anchor is comprised of a steel shaft and helices that are screwed into the ground to a calculated depth. The helices transfer the stress of the load evenly across the soil. These anchors are easier to install, require little to no site preparation, do not result in excavation spoils, and can be withdrawn and reused.

Rock and log anchors may also be used as required. Rock anchors and grout will be used in areas where they are to be installed directly into solid rock while log anchors will be installed in soft areas or at structure locations under high tension. Log anchors are a 1.2 m to 1.8 m section of pole that are typically buried lengthwise 2.4 m underground. Tension (guy) wires are attached to the logs and structures before backfilling and compacting of the area.

2.5.1.3.2 New Substation

Site preparation for the substation will include excavation and levelling of the 0.4 ha lot (see Section 2.5.1.1.2). Clean fill will then be used to build up the site for the installation of the containment pad, and the ground grid. The installation of security fencing will also require the excavation of holes approximately 15 cm in diameter and approximately 1 m in depth. Precise structure locations and numbers have yet to be determined; they will be based on a number of physical and environmental surveys. Structure locations will avoid watercourses, wetlands, and any other environmentally sensitive areas where possible.

2.5.1.3.3 Upgraded Woodstock Terminal

While the existing fenced area of the Woodstock terminal will not change from current conditions, some preparatory work will be required to accommodate the upgrades. Site preparation for the Woodstock terminal may include the addition and levelling of clean fill in preparation of the installation of the containment pad and the concrete foundation. A steel structure will be affixed to the concrete foundation and bonded to the existing ground grid. Tie transformers, motors, capacitor bank, and associated protection and control equipment will be installed. As the modifications will occur within the existing fenced in area, there are no other site preparation activities required for the Woodstock terminal.

NB Power is a mature company, with an established EPP, experienced planners and operators, that uses certified contractors to modify its terminals. The modifications to the Woodstock terminal will occur within an enclosed, previously disturbed site, using pre-assembled components. Given the activities on an existing disturbed footprint within a fenced site, there is little opportunity for environmental interactions to occur during any planned activities related to the Construction, Operation and Maintenance, or eventual Decommissioning and Abandonment of the Woodstock terminal. As such, planned activities related this previously scheduled upgrade of the Woodstock terminal will not be assessed in this EIA registration document.

The potential for unplanned interactions to occur between the activities at the Woodstock terminal and the environment are discussed further in Section 2.8.

2.5.1.4 Conductor Stringing

Large reels of wire (conductor) will be delivered to selected areas along the RoW. The wire will be subsequently strung using tension-stringing equipment and attached to the insulators by hand while pulling lines will be used to pull the wire between structures. In areas where the transmission line crosses a watercourse or wetland, the pulling line (p-line) is walked across and then strung using a tension-pulling machine. A 3-5 m strip along the centreline of the transmission line will be cleared of vegetation in order to string the wires.

Once the conductors are in place, they will be correctly sagged and tensioned, then permanently clipped into the clamps at each structure. Miscellaneous hardware such as structure marking, vibration damping devices, or air flow spoilers may also be installed, as required.

In areas where the transmission line crosses a road, rider poles will be installed on either side of the roadway to support conductors to prevent conductor from sagging which could potentially affect traffic flow and pose safety concerns.

2.5.1.5 Inspection and Energization

Upon completion of construction, ground and air acceptance patrols will be conducted by NB Power staff to verify that the line is ready for service. Any deficiencies discovered during these patrols will be corrected prior to energizing the line.

2.5.1.6 Clean-up / Revegetation

Clean-up and revegetation of any disturbed areas is the final stage of the construction phase of the Project. In areas where soil disturbance due to construction may cause erosion, measures will be taken to stabilize the affected area. Such measures may include trimming and back blading, mulching, seeding, and fabric placement. Erosion control used during construction will be maintained until such time as the disturbed ground has been adequately stabilized with vegetation.

2.5.2 Operation and Maintenance

During the operating life of the transmission line (estimated to be 50 years), certain routine activities will be performed in order to maintain reliability of the network. These activities are described in the following sections.

2.5.2.1 Maintenance of Hardware

Line inspections (*i.e.,* ground and aerial) will be performed by maintenance staff on a regular basis to check for the deterioration of the transmission line components, including wood poles, conductors, insulators, and hardware. These inspections will also assist in identifying weakened support structures and foundations, as well as changes in terrain which may affect structure stability. Typically, air inspections will be performed once a year, while ground patrols will be conducted every eight years by ATV (all-terrain-vehicle) (or other similar forms of transportation) using existing access. Additional inspections may be carried out in the event of an emergency or unplanned outage (*e.g.*, ice storm). Inspection results will be provided to NB Power operational personnel who are responsible for planning and scheduling maintenance work.

2.5.2.2 Vegetation Management

NB Power is responsible for providing safe and reliable electricity to homes, businesses, and industries. Uncontrolled vegetation can create fire and safety hazards, hinder routine line maintenance, and cause interruptions in electric service when it grows into or falls on electric power lines. In order to avoid the constant interruptions in electric service caused by overgrown or fallen vegetation, NB Power restricts the growth of trees and brush along the lines through its integrated vegetation management program.

Integrated vegetation management involves a variety of methods, including hand cutting (e.g., using chainsaws, brush saws and axes), mechanical equipment (e.g., hydro-axes or excavator with mulching head) and herbicide treatments. The frequency of the program varies depending on the vegetation growth rate, but it is typically carried out in 5 to 6 year cycles.

The objective of vegetation management is on the tall growing tree species that have the potential to grow or fall into, or within, the arching distance of the transmission lines and or facilities and cause an outage. The use of the various methods depends upon a number of factors including site conditions and the sensitivity of surrounding areas.

Herbicide treatments are formulated to target undesirable tall growing trees but are also effective on broadleaf weeds, leaving grasses unaffected. Foliar applications of herbicides are applied during the warmer months while dormant stem applications are typically applied in the fall. A permit for herbicide use is obtained from the New Brunswick Department of Environment and Local Government (NBDELG). The process involves public notification as part of the formal permit application.

All herbicide applications are completed and supervised by licensed applicators and in accordance with conditions specified in the Permit. Setback distances, ranging from 15 m to 75 m, are established near sensitive areas such as wetlands and watercourses based on the product used. These setback distances are outlined in the permit issued by NBDELG.

2.5.3 Decommissioning and Abandonment

Transmission lines are designed, operated and maintained to provide safe and efficient service over the long-term. If lines need to be decommissioned, the conductors are removed, structures dismantled, and the RoW is left to revegetate naturally. It is very unlikely that the Project will be decommissioned in the near future. However, should this transmission line no longer be required, NB Power will provide the necessary information to the appropriate regulatory agencies to ensure the regulatory requirements are met prior to commencement of decommissioning activities.

2.6 WORKFORCE AND PROJECT SCHEDULE

Construction will require NB Power staff, line clearing/construction contractor, a contractor for the substation, and a contractor for the Woodstock terminal work. The Project will result in a temporary increase in the workforce of approximately twenty workers. The construction period, including RoW clearing, will last approximately eleven months (December 2018 to October 2019).

Contractors that specialize in building transmission lines and substations typically work 9 to 12 hour days, and Monday to Friday, or Monday to Thursday. Work is not typically conducted overnight or on weekends; however, schedule change may require extended work hours to meet contract completion dates.

A summary of key Project activities and timelines is provided in Table 2.2 below.

Table 2.2 High Level Schedule of Key Project Activities

Project Activities	Timeline
Communication with stakeholders and First Nations	Fall 2016 through fall 2017 (and throughout Project activities)
Environmental field studies	April to November 2016 and June to July 2017
EIA Review	Fall 2017 and winter 2018 (assumed)
Permits/approvals acquisition	Winter 2017 to fall 2018 (assumed)
RoW and substation clearing	Fall 2018 and winter 2019
Construction of substation and modifications to Terminal	Spring, summer and fall 2019
Construction of Line	Winter, spring, and summer 2019
In-service date	Fall 2019

2.7 EMISSIONS AND WASTE

2.7.1 Airborne Emissions

Emissions associated with fuel combustion in heavy equipment and vehicles, and dust associated with any upgrading of existing roads, are anticipated to occur during the Construction and Decommissioning and Abandonment phases. Water sprayers would be used to suppress and control dust levels, as required, in the Construction phase of the Project.

Construction of the Project is not anticipated to result in substantive emissions of air contaminants, and greenhouse gases (GHG) are estimated to be low (see Section 4.3.1). Air contaminant emissions are expected to be generally confined to the PDA and are not expected to result in measurable increases in the air quality conditions in Woodstock, or to exceed provincial air quality standards.

2.7.2 Hazardous Materials

Potentially hazardous materials used during the Construction phase would include, but is not limited to, propane, diesel, gasoline, hydraulic fluids, motor oil, and grease and lubricants for heavy equipment, ATV and vehicle use. Cleaning and maintenance of vehicles and equipment, site inspections, and the monitoring and inventorying of materials would be essential for environmental protection. Construction is not anticipated to result in substantive releases of hazardous materials into the environment, and is addressed further in Section 2.8.1.

2.7.3 Sound Emissions

Sound emissions would occur during the Construction and Decommissioning and Abandonment phases of the Project, and would be limited to the use of heavy equipment, vehicles and chain saws. Mitigation will be used wherever feasible to reduce the potential environmental interactions resulting from sound emissions. Construction is not anticipated to result in substantive emissions of sound into the environment (see Section 4.3.1).

2.7.4 Solid Waste

Solid wastes generated during the Construction phase would include packaging materials, plastics, cardboard, wood, metals, felled vegetation, and sediment runoff. Solid wastes generated during the Decommissioning and Abandonment phase would include wires, conductors, and poles. Wherever possible, solid wastes will be re-used or recycled, and felled vegetation will be windrowed and/or mulched along the edge of the RoW to decompose naturally. Other materials will be properly disposed of through the Southern Valley Solid Waste Transfer Station (Regional Service Commission 12) in Woodstock.

2.7.5 Runoff

Erosion and runoff associated with Construction activities, is not anticipated to result in a significant deposition of sediments into watercourses (see Section 4.3.3). Sedimentation and erosion control measures will be used to provide slope stability and prevent undue siltation of construction-related sediments into watercourses.

2.7.6 Electromagnetic Fields and Corona

No noise from corona discharges will be generated as a result of the Operation of the proposed 69 kV transmission line to the new substation. The operation of higher voltage transmission lines and substations can result in the production of electromagnetic fields (EMF). Extremely high voltage (EHV) lines can also result in corona discharges which, in turn, may result in audible and radio frequency noise. The highest voltage for the proposed transmission line and associated infrastructure is 69 kV.

2.8 ACCIDENTS, MALFUNCTIONS AND UNPLANNED EVENTS

This section describes potential accidents, malfunctions and unplanned events, which are upset conditions or other events that are not part of any planned activity or normal operation of the Project, but have a reasonable probability of occurrence and have the potential to result in adverse environmental interactions. While accidents, malfunctions, and unplanned events could occur during any phase of the Project, many of them can be prevented and addressed by good planning and design, communication, worksite health, safety, and environmental training of personal, emergency response planning, vehicle and equipment maintenance, and mitigation.

Given the adherence of Project-related activities to the mitigation measures and response plans in the Project Specific Environmental Protection Plan (PSEPP) that will be developed prior to Construction, adverse environmental interactions related to accidents, malfunctions and unplanned events are not likely to occur during the Construction, Operation and Maintenance, and Decommissioning and Abandonment of the Project.

This section describes the potential accidents, malfunctions, and unplanned events that have a reasonable probability of occurrence. Mitigative planning and response procedures are also described below.

2.8.1 Hazardous Materials

The potential for the release of hazardous materials can occur from the operation of vehicles, with the most likely source of a release being the rupture of a hydraulic line or the loss of fuel and the operation of oil-filled equipment within the substation or Woodstock terminal. The mitigation and management of hazardous materials will include:

- The training of personnel in spill prevention and response, and Workplace Hazardous Materials Information System (WHMIS)
- Following proper procedures within the Project specific Environmental Protection Plan (PSEPP)
- Design and installation of secondary containment for the transformer and associated equipment
- Routine cleaning, preventative maintenance, and visual inspections of hydraulic equipment and vehicles
- On-site spill response equipment

- Reporting spill to the appropriate Project personnel and New Brunswick Power Transmission System Operator (PSO) (1-800-756-8411). During normal business hours (*i.e.*, Monday to Friday from 8:15 am to 4:30 pm), the PSO will notify the appropriate authorities (*i.e.*, NBDELG. Outside of normal business hours, on weekends and on holidays, the PSO will notify the Canadian Coast Guard/Spills Action Centre (1-800-565-1633)

In the unlikely event that a hazardous material spill reaches a body of water or other nearby sensitive area, measures will be taken to stop the spill and isolate the affected area as soon as possible. An assessment of the affected area will be completed and remediation will be completed as required.

2.8.2 Fire

The potential for fire to occur during Project activities is limited to the use of vehicles, or to infrastructure (e.g., new substation and the upgraded Woodstock Terminal). The mitigation and management of fire will include:

- Equipping all vehicles with fire extinguishers sized and rated as appropriate
- Training personnel in the location and use of fire extinguishers
- Safely storing wastes that may be soaked in flammable materials (*i.e.*, oily rags)
- Avoiding the parking of vehicles in areas of long grass
- Immediately reporting a fire to local emergency response services

As the Project location is not remote, local emergency response services are available.

2.8.3 Vehicle Collisions

Vehicular activity will be most prevalent during the Construction and Decommissioning and Abandonment phases of the Project, and will be minimal during Operation and Maintenance. However, during all phases there is potential for vehicles associated with Project activities to collide with:

- Other vehicles
- Project infrastructure or other infrastructure
- Wildlife

The mitigation and management measures planned to minimize vehicle collisions will include:

- The implementation, as needed, of traffic control measures to reduce the potential for vehicle-to-vehicle collisions
- Project staff will be appropriately licensed to operate vehicles on-site, will obey traffic rules and regulations, and will exercise due care and attention while on-site
- Trucks will use only designated truck routes
- If a collision does occur, Project personnel will immediately contact emergency services

In the event of a vehicle accident there is the potential for loss of life (human or wildlife) and damage to infrastructure. There is also potential for fire and hazardous materials to be released into the environment. These are addressed in previous sections.

2.8.4 Wildlife Encounters

The potential for an unplanned encounter with wildlife is largely limited to disturbances to birds nesting on electrical infrastructure such as equipment and transmission poles during the Operation and Maintenance and Decommissioning and Abandonment phases.

The mitigation and management of wildlife encounters will include:

- Documentation, mapping, and species identification of raptor nests on Project infrastructure
- Scheduling of maintenance activities outside of nesting periods, where possible
- Consultation with New Brunswick Department of Energy and Resource Development (NBDERD) biologists prior to unplanned/emergency maintenance during nesting periods

2.8.5 Infrastructure Malfunctions

The potential for infrastructure to malfunction is largely limited to the replacement of a transmission pole, or to instrument transformers, switches, or circuit breakers at the substation or Woodstock terminal.

The mitigation and management of infrastructure malfunctions will include:

- Regular inspection and maintenance of infrastructure
- If a malfunction does occur, it will be responded to within 24 hours of detection/reporting

As the Project is not remote, and runs along Route 95, there is ready access to inspect and repair infrastructure.

Given the implementation of the mitigation measures and response plans in the existing NB Power EPP, adverse environmental effects related to accidents, malfunctions and unplanned events are not likely to occur during the Construction, Operation and Maintenance, and Decommissioning and Abandonment phases of the Project.