TL 267 Overland Transmission Environmental Protection Plan

Updated: June 2016

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1 INTRODUCTION

Environmental Protection Plans are of critical importance to large construction projects. The EPP will ensure a high level of environmental protection in all of the work areas for TL 267 during construction and commissioning. This EPP is a working document for use at the various work sites by Project personnel and contractors. It will help ensure conformance with the Project policy statements. It also will serve as a tool for Project participants, including regulators to monitor regulatory compliance and to improve on environmental performance.

This EPP contains standard environmental protection procedures, or mitigation measures, for activities commonly associated with large projects of this type. The objectives of this EPP are to:

a) anticipate potential negative environmental effects associated with construction; and

b) implement appropriate mitigation measures to minimize or avoid negative effects where practical.

Negative effects include impacts to air quality and climate, groundwater and surface water resources, soil, biota and their habitats, human health and communities, and natural and historic resources.

2 PURPOSE

The purpose of this EPP is to establish work practices and assign roles and responsibilities that all Project participants shall follow to mitigate negative environmental effects associated with construction and commissioning of the Project. Specifically, the purpose of this EPP is to:

a) Document the conditions and requirements of Environmental Assessment (EA) release;

b) Outline NL Hydro's commitments to minimize potential environmental effects, including commitments made in the TL 267 EA Registration document;

c) Provide concise and clear instructions to TL 267 participants regarding procedures for protecting the environment and minimizing potential impacts to the environment;

d) Provide direction to NL Hydro participants regarding issues and concerns of stakeholder groups;

e) Provide a reference document for TL 267 participants to use when planning and/or conducting specific construction and commissioning activities;

f) Provide direction for environmental orientation programs for TL 267 participants;

g) Document changes to the EPP originating through the interactive revision process;

h) Provide a reference to applicable legislative requirements and guidelines; and

i) Provide a detailed summary of environmental issues and protection measures to be implemented during construction.

3 SCOPE

The scope of this EPP covers the engineering, procurement, construction, and commissioning phases of NL Hydro's Bay D'Espoir to Western Avalon transmission line (TL 267). Section 6 "Project Description" describes the Project in more detail.

This EPP does not cover the Operations phase of the Project. A separate EPP for this will be developed and submitted at a later date.

This EPP applies to all Project participants, including Project personnel, contractors, subcontractors, suppliers, service providers, and all employees of these organizations.

Accepted Contract-Specific Environmental Protection Plans (C-SEPPs*)* shall be required by NL Hydro. C-SEPPs shall be prepared by all contractors for all construction contracts to ensure that effects on the environment are minimized to the extent practical. These C-SEPPs shall provide sufficient detail on the contractor's:

a) Scope of work;
b) Methods of construction;
c) Sequence of activities;
d) List of resources (i.e., equipment and site workforce);
e) Temporary and permanent installations;
f) Environmental protection procedures and alternative procedures, if required; and
g) Environmental contingency measures.

This EPP shall serve as a resource to contractors as they prepare their own C-SEPPs. Contract packages shall include C-SEPP templates with specific instructions on how these templates are to be properly completed. All C-SEPPs shall require acceptance by the Project prior to the contractor's mobilization for the Project.

In certain cases, particularly in areas where environmental risks are elevated, specific mitigation measures shall be engineered for the Project. These measures, detailed in the form of technical specifications and construction drawings, shall form part of the contract packages.

4 DEFINITIONS

Authorized Escort: A contractor or subcontractor representative who has completed site orientation, is fully aware of the site's emergency response and evacuation procedures, and has the authority to accompany site visitors.

Contractor: Any contractor engaged by NL Hydro or any subcontractor engaged by NL Hydro, or engaged on behalf of NL Hydro, or any subcontractor engaged by a contractor to carry out work at the site.

Employee: All employees employed by NL Hydro and consultants engaged by NL Hydro to work at any of the sites, either through third-party agencies or consultants hired or contracted by NL Hydro directly. This includes, but is not limited to full time, part time, casual, term, intermittent or occasional employees, and seconded employees who are either directly employed by or under assignment to NL Hydro.

Personnel: NL Hydro employees, contractors, subcontractors and their respective employees.

Site: Construction areas between the terminal station at Bay D'Espoir and the terminal station at Western Avalon and the transmission line between the two stations for TL 267.

Visitor: Any person(s) visiting the sites, including, but not limited to, vendors, couriers, delivery personnel, regulatory personnel, consultants, engineering representatives, stakeholders, and other personnel not assigned to the site.

5 ABBREVIATIONS AND ACRONYMS

ARD	Acid Rock Drainage
ATV	All-Terrain Vehicle
CCME	Canadian Council of Ministers of the Environment
CEAA	Canadian Environmental Assessment Act
CEPA	Canadian Environmental Protection Act
C-SEPP	Contract-Specific Environmental Protection Plan
DFO	Department of Fisheries and Oceans Canada
DNR	Department of Natural Resources
DOEC	Department of Environment and Conservation
EA	Environmental Assessment

ECWSR	Environmental Control Water and Sewer Regulations
EEM	Environmental Effects Monitoring
EEMP	Environmental Effects Monitoring Plan
EPA	Environmental Protection Act
EPP	Environmental Protection Plan
ERC	Environment and Regulatory Compliance
ERP	Emergency Response Plan
ESA	Endangered Species Act
ETA	Estimated Time of Arrival
ETD	Estimated Time of Departure
GAP	Storage and Handling of Gasoline and Associated Products Regulations
H&S	Health and Safety
IMO	International Maritime Organization
MCTS	Marine Communication and Traffic Services
MSDS	Material Safety Data Sheet
MW	Megawatt
NLDOEC-WD	NL Department of Environment and Conservation – Wildlife Division
NPAG	Non-Potential Acid Generation
NWPA	Navigable Waters Protection Act
OSEM	On-site Environmental Monitor
PAG	Potential Acid Generation
PAO	Provincial Archeology Office
PPWSA	Protected Public Water Supply Area
PDT	Project Delivery Team
RCP	Regulatory Compliance Plan
RECP	Rolled Erosion Control Products
RFP	Request for Proposal
ROW	Right-of-Way

RP	Rehabilitation Plan
RRF	Revision Request form
RRIF	Revision Request Initiation Form
SARA	Species At Risk Act
SOP	Standard Operating Procedure
TC	Transport Canada
TRM	Turf Reinforcement Mats
TSS	Total Suspended Solid
WHMIS	Workplace Hazardous Materials Information System

6 PROJECT DESCRIPTION

The Project will involve the construction of approximately 188 km of new, 230 kV steel tower transmission line between Bay D'Espoir and the western portion of the Avalon Peninsula on the Island of Newfoundland.

TL 267 will parallel existing transmission line infrastructure (TL 202 and TL 206) from Bay D'Espoir to Come By Chance and further parallels TL 203 (and eventually, the existing TL 237) from that location to the Western Avalon Terminal Station in Chapel Arm. In addition to the development of TL 267 itself, upgrades to existing infrastructure are required at the Bay D'Espoir and Western Avalon terminal stations.

6.1 CONSTRUCTION RELATED INFRASTRUCTURE

Construction related infrastructure will be established to support construction activity for TL 267. Some of this infrastructure is temporary and will be decommissioned before the end of the construction phase. It is anticipated that the following infrastructure will be required:

a) Equipment fuel facilities;
b) Spoil disposal areas;
c) Temporary camp;
d) Waste disposal;
e) Insulating oil storage tanks for transformer oil (many thousands of litres) and treatment facilities;
f) SF6 and welding gas cylinder storage and handling facilities;

g) Blasting materials storage facilities;
h) Telecommunication services;
i) Telecommunication infrastructure inside the trailer offices; and
j) Transmission line construction camps and all associated infrastructure;
    i. Temporary access and bypass for both ROW clearing and transmission line construction, as well as use of corduroy roads;
    ii. Temporary bridges and culverts for both ROW clearing and transmission line construction;
    iii. Borrow pits and possible quarries;
    iv. Material storage and lay-down areas;
    v. Fuelling and fuel storage facilities; and
    vi. Possible helipads and associated facilities.

6.2 CONSTRUCTION SCHEDULE

Commencing in 2015 with detailed engineering and the procurement and manufacture of key long-lead components, the current Project schedule would see construction activity in the field beginning in the spring of 2016 and continuing year-round, concluding in early 2018 followed by eventual commissioning of the Project and the commencement of operations.

7 ENVIRONMENT TEAM

7.1.1 Auditing Function

The purpose of the auditing function will be to evaluate compliance and effectiveness of the EPP and to identify opportunities for continual improvement. Auditing will consist of daily field reports, risk based and semi-annual environmental compliance audit reports, and annual performance reviews.

The daily field reports will be completed by the On-Site Environmental Monitors (OSEM), who review daily activities of the Contractors. The risk based and semi-annual environmental compliance audit reports will be completed by a member of the environment team. The reports will document all incidents of non-compliance with the EPP and their causes. The environment team will distribute the environmental compliance audit reports to relevant Project participants.

The annual performance review will be completed by the key members of the environment and construction teams. This audit will include a review of all work activities that relate to environmental concerns, issues and/or mitigations, and will include a review of environmental audits carried out by the environment team during the year. The review process will give all parties a chance to evaluate overall

environmental performance and compliance with government regulations, permits, this EPP, and C-SEPPs.

7.1.2 Individual Responsibilities

Project Manager

The Project Manager shall be accountable for the acceptance of the EPP. The Project Manager shall be consulted on the various aspects of EPP management. This person shall also be consulted on environmental compliance monitoring processes such as daily field reports, environmental audits and annual environmental performance reviews. Environmental effects monitoring is the responsibility of the environment team and the Project Manager shall be accountable. The Project Manager shall be supported in this function by the Environmental Services Manager.

Environmental Services (ES) Manager

The ES Manager shall be accountable for development, acceptance, implementation and management of this EPP. They shall be accountable for review and acceptance of the C-SEPP, as well as all environmental compliance monitoring. The ES Manager is responsible for implementation and management of the C-SEPP, along with the Contractor. The ES Manager will be informed of all activities that are the responsibility of the environment team such as acceptance of this EPP, C-SEPP and environmental effects monitoring.

Team Lead – Capital Projects/EA

The Team Lead – Capital Projects/EA is responsible to review and ensure commitments and requirements of EA release are included in this EPP as it relates to their work. This person is responsible to ensure legislative and permit conditions are reflected in this EPP. They are also responsible for communicating results of the environmental effects monitoring program to the environment team.

The Team Lead – Capital Projects/EA shall also be responsible for:

a) Providing support for the development and implementation of the EPP and will be a consulted on management or revisions of the EPP;
b) Providing support for C-SEPP implementation and project environmental awareness through orientation;
c) Providing support and consultation for several aspects of environmental compliance monitoring; and
d) Consulting on the review of the EPP to ensure compliance with condition of permits.

On-Site Environmental Monitor (OSEM)

The OSEM shall be responsible for:

a) Monitoring on-Site Project activities, evaluate the Contractors' environmental performance with respect to requirements established in the EPP and C-SEPP;

b) Evaluating the performance of designed/constructed environmental mitigation systems through sampling and testing programs, and track on-site compliance with regulatory requirements and conditions of all permits and approvals;

c) Producing daily field reports as part of environmental compliance monitoring and shall provide support for managing the opportunity for improvements, corrective action and non-conformance registries;

d) Reporting directly to the Team Lead – Capital Projects/EA;

e) Interacting with the Contractors on environmental procedures and requirements, participating in Project team meetings, toolbox meetings, conduct environmental reviews of drawings, and assisting in the revision and update of the EPP and C-SEPP, as necessary; and

f) Ensuring the Employees, Visitors and Contractors travelling to the Site receive the appropriate orientation and training before going on site.

Construction Managers

The Construction Managers shall be responsible for:

a) Overseeing construction management, including management of on-Site environmental issues through implementation of the EPP;

b) Acceptance and implementation of the C-SEPP, and for revisions to this document;

c) Reporting directly to the Project Manager and for certain aspects of environmental compliance monitoring and compliance tracking; and

d) Ensuring Visitors, Contractors and Employees travelling to the Site receive the appropriate orientation and training required

Contractors

Contractors shall build, supply and/or install various components of the Project, or be involved in provision of services to support construction and/or procurement, as defined in the work scopes of their respective contract packages. The Contractors shall be accountable and responsible for the following:

a) Implementing environmental protection procedures as outlined in the EPP and developing, implementing, and maintaining their own C-SEPP, as applicable;

b) Holding toolbox meetings at the start of each shift to discuss health, safety and environmental issues;

c) Developing their own orientation and training package to deliver to individuals entering the Sites on their behalf in addition to the Project training noted above; and

d) Ensuring EPP conditions are reflected in their proposals and bids, and shall comply with all relevant regulations, guidelines, permits, approvals and authorizations.

The Contractor may be consulted, as required; on aspects of environmental compliance monitoring and environmental effects monitoring.

7.2 PROJECT ENVIRONMENTAL AWARENESS

7.2.1 Employee Orientation

A Project environmental orientation shall be developed and shall be presented to all Site Visitors that arrive at the Project Site. The orientation is considered a prerequisite to entering any NL Hydro Sites.

Project environmental orientation shall include elements of this EPP such as: environmental protection procedures; proper storage and handling of materials; encounters with wildlife, rare/endangered species, historic resources, waste management, and emergency response. Project environmental orientation shall be delivered by experienced individuals with an in depth knowledge of the EPP and a knowledge of construction and execution activities.

The project environmental orientation shall include a review of:

a) Environmental management;
b) Environmental considerations;
c) Non-compliance and corrective actions;
d) Environmental contingency measures;
e) Incident reporting requirements;
f) All permit-required work; and
g) Construction site rules and regulations.

All Personnel who attend the Project Environmental Orientation session shall be required to sign an attendance sheet, and shall be provided with access to copies of the EPP, or C-SEPP as appropriate. All documentation must indicate the completed training and expiration dates.

7.2.2 Visitor Orientation

A temporary orientation shall be provided to those Site Visitors who have arrived at the Project, but shall not be completing any field construction work (meetings, office work, deliveries, etc.). The Visitor orientation shall cover relevant environmental protection measures, Project emergency procedures, environmental incident reporting requirements, and other general project environmental requirements.

Any person, who has not taken the full orientation program, shall be supervised by a designated, oriented Project Personnel at all times, and shall abide by the EPP.

7.2.3 Contractor Orientation

Contractors may develop and deliver additional environmental orientations to their workforces, Visitors, consultants and inspectors on the details of their C-SEPP, and/or corporate requirements. The Contractor orientations may be reviewed by NL Hydro.

7.2.4 Toolbox Meetings

Toolbox meetings (short, informal meetings) shall be held by the Contractor with its field crews and supervisors at the beginning of each work shift. The tool box meeting shall involve discussion of work task assignments for the day and any associated safety hazards. These meetings shall also provide the opportunity to discuss environmental concerns and applicable mitigation measures that apply.

8 REFERENCES

Information and documents referenced in this EPP can be found at the NL Hydro Office in St. John's. A listing of the key reference material is provided below:

Provincial Government Guidelines (Water Resources Division, DOEC)

i) Environmental Guidelines for Watercourse Crossings;
ii) Environmental Guidelines for Stream Crossings by All-Terrain Vehicles;
iii) Environmental Guidelines for Bridges;
iv) Environmental Guidelines for Culverts;
v) Environmental Guidelines for Fording;
vi) Environmental Guidelines for Diversions, New Channels, Major Alterations;
vii) Environmental Guidelines for Pipe Crossings; and
viii) Environmental Guidelines for General Construction Practices.

DFO Operational Statements

ix) Aquatic Vegetation Removal in Freshwater Systems Operational Statement;
x) Beaver Dam Removal Operational Statement;
xi) Bridge Maintenance Operational Statement;
xii) Clear Span Bridges Operational Statement;
xiii) Culvert Maintenance Operational Statement;
xiv) Dock and Boathouse Construction Operational Statement;
xv) Ice Bridges and Snow fills Operational Statement;

xvi) Isolated Pond Construction Operational Statement;

xvii) Maintenance of Riparian Vegetation in Existing Right-of-ways Operational Statement;

xviii) Overhead Line Construction Operational Statement; and

xix) Punch and Bore Crossings Operational Statement;

DFO Fact Sheets

xx) Fact Sheet on Effects of Silt on Fish and Fish Habitat;

xxi) Fact Sheet on Blasting – Fish and Fish Habitat Protection;

xxii) Fact Sheet on Ditching;

xxiii) Fact Sheet on Temporary Fording Sites;

xxiv) Fact Sheet on Forwarder Trails;

xxv) Fact Sheet on Filter Fabric;

xxvi) Fact Sheet on Rock Check Dam;

xxvii) Fact Sheet on Temporary Bridges;

xxviii) Fact Sheet on Resource Road Construction;

xxix) Fact Sheet on Instream Work in the Dry – Cofferdams;

xxx) Fact Sheet on Streambank Stabilization;

xxxi) Fact Sheet on Instream Work in the Dry – Temporary Diversion;

xxxii) Fact Sheet on Instream Work in the Dry – Elevated Pipes;

xxxiii) Fact Sheet on Culvert Stabilization;

xxxiv) Fact Sheet on Storm Drain Outlets;

xxxv) Fact Sheet on Temporary Settling Basins;

xxxvi) Fact Sheet on Bridge Construction/Demolition;

xxxvii) Fact Sheet on Freshwater Salmonid Habitat Requirements;

xxxviii) Fact Sheet on Highway Construction/Upgrading – Infilling, Stabilization and No-Grub Zones;

xxxix) Fact Sheet on Freshwater Intake End-of-Pipe Fish Screen;

xl) Fact Sheet on Stream Clean-up;

xli) Fact Sheet on Timber Crib;

xlii) Fact Sheet on Water and Sewer Installation – Stream Crossings;

xliii) Fact Sheet on Culvert Installation; and

xliv) Fact Sheet on AVTs, Fish Habitat and You

Other Pertinent Federal Documents

xlv) Guidelines for the Use of Explosives In or Near Canadian Fisheries Waters, Wright and Hopky, 1998;

xlvi) Freshwater Intake End-of-Pipe Fish Screen Guidelines, Fisheries and Oceans Canada, 1995;

xlvii) Guidelines for Protection of Freshwater Fish Habitat in Newfoundland and Labrador. Fisheries and Oceans Canada, St. John's, NF, Gosse, M.M., et. al. 1998;

xlviii) Standard Methods Guide for the Classification/Quantification of Lacustrine Habitat in Newfoundland and Labrador, Bradbury C., et. Al. 2001;

xlix) Forestry Guidelines for the Protection of Fish Habitat in Newfoundland and Labrador, Scruton, D.A., et. al. 1997; and

l) Standard Methods Guide for Freshwater Fish and Fish Habitat Surveys in Newfoundland and Labrador Rivers & Streams, Sooley, Darrin R. 1998.

Other Pertinent Provincial Documents

i) NL Water Resources Act;

ii) Accredited Laboratory Policy (PD:PP 2001-01.02)

iii) Environmental Policy for Infilling Bodies of Water W.R. 91-1(*Water Resources Act*, DOEC);

iv) Environmental Policy for Land and Water Developments W.R. 95-01 (*Water Resources Act*, DOEC);

v) Environmental Policy for Development in Shore Water Zones W.R. 97-1 (*Water Resources Act*, DOEC);

vi) Environmental Policy for Development in Wetlands W.R. 97-2 (*Water Resources Act*, DOEC);

vii) Environmental Code of Practice for Concrete Batch Plant & Rock Washing Operations (Department of Environment and Lands);

viii) Newfoundland and Labrador Species at Risk Data Sheets; and

ix) Motorized Snow Vehicles and All-Terrain Vehicles Regulations (NL Department of Natural Resources).

9 RELEVANT LEGISLATION

There are regulatory requirements at the provincial, federal and municipal levels that apply to the design and construction of the Project. Compliance shall be evaluated through a program of environmental compliance monitoring, primarily implemented by On-Site Environmental Monitors.

NL Hydro has adopted Nalcor Energy's Corporate Environmental Policy and Guiding Principles and its Environmental Management System, which meet the requirements of ISO 14001:2004 (Environment).

As a result, environmental protection measures and mitigation associated with this Project shall meet the same high corporate Standard.

All work undertaken during the design, construction and commissioning phases of this Project shall be in accordance with the most recent guidelines.

9.1 FEDERAL

The following federal environmental acts apply to one or more aspects of Project:

a) Species at Risk Act (SARA);
b) Navigable Waters Protection Act (NWPA);
c) Transportation of Dangerous Goods Act, 1992;
d) Canada Shipping Act;
e) Migratory Birds Convention Act; and
f) Fisheries Act.

9.2 PROVINCIAL

The following provincial acts and regulations apply to one or more aspects of the Project:

a) Dangerous Goods Transportation Act;
b) Endangered Species Act;
c) Forestry Act;
d) Historic Resources Act;
e) Newfoundland and Labrador Lands Act;
f) Environmental Protection Act (EPA);
g) Air Pollution Control Regulations, 2004;
h) Gasoline Volatility Control Regulations, 2003;
i) Pesticides Control Regulations, 2003;
j) Storage and Handling of Gasoline and Associated Products Regulations, 2003;
k) Used Oil Control Regulations, 2002;
l) Waste Diversion Regulations, 2005;
m) Waste Management Regulations, 2003;
n) Waste Material Disposal Areas, 1996;
o) Wild Life Act;
p) Water Resources Act;

q) Wilderness and Ecological Reserves Act;

r) Well Drilling Regulations, 2003;

s) Water Power Rental Regulations, 2003; and

t) Environmental Control Water and Sewage Regulations, 2003.

9.3 MUNICIPAL

In some areas, construction activity will take place within municipal boundaries. In these areas, local bylaws shall be complied with and permits obtained.

10 PREFACE-MAINTENANCE OF THE ENVIRONMENTAL PROTECTION PLAN (EPP)

This Environmental Protection Plan (EPP) shall at times require updating in response to changes in the Project, Contractor work methods, group structure, or technological advancements that provide higher level of environmental protection. The subsections below indicate the process with respect to maintenance and implementation of the EPP.

10.1 INITIATING REVISIONS

This EPP is a controlled document and revisions may only be processed by the ES Manager. It is anticipated that most of the revisions to this EPP shall be initiated by the Environment Team at the work fronts or at the NL Hydro office in St. John's.

Other Project staff may request revisions. EPP holders and readers/reviewers (within the Environment Team, government agencies, contracting firms, other stakeholders, etc.) may request revisions by forwarding the request to the ES Manager. These revision requests shall be screened and reviewed by the ES Manager and forwarded to the Project Manager for approval.

10.2 COMPLIANCE INSTRUCTIONS

Revision requests that have been accepted by the Project Manager shall be sent to the ES Manager for distribution to key Project participants as "Compliance Instructions". These instructions shall be signed off by key holders of the EPP and returned within two (2) days of receipt. A log of compliance instructions shall be maintained and these shall be incorporated periodically into a revised edition of the EPP.

10.3 REVISION PROCEDURES

Revisions to the EPP shall be made annually, or as required, in accordance with Project document control procedures. The ES Manager shall issue the accepted revisions of the EPP to key holders, Contractors, and readers/reviewers.

11 GENERAL ENVIRONMENTAL PROTECTION PLAN

In general, environmental mitigation shall be planned and designed prior to issuing proposal calls for construction contracts. Environmental mitigation plans and specifications shall be incorporated into documents provided to prospective contractors for proposal purposes.

Environmental mitigation shall be consistent with applicable standards, codes, acts and regulations, and the conditions of Environmental Assessment (EA) release. This section contains a comprehensive suite of environmental protection procedures to be used.

The procedures in this section may need to be modified in the future to address new activities, unforeseen Site conditions, changes in engineering design and/or construction work methods, or new environmental performance standards. These changes shall be part of the maintenance of the EPP as outlined in the front of this report.

11.1 SCHEDULING AND TIMING OF CONSTRUCTION ACTIVITIES

Construction planning is one of the most fundamental activities in the management and execution of construction projects. One of the most important factors in a large scale project is the scheduling and timing of various activities. However, sensitive time periods, outlined in the section below and presented in Table 11-1, shall be considered in Project planning, where practical. Where activities are to be carried out during sensitive time periods, additional mitigations shall be applied, as required.

Environmental Concerns

Construction activities shall be organized so that various tasks that must be accomplished have the necessary precedence and resources required to complete the task.

Environmental Protection Procedures

a) A complete schedule of activities, provided by the Contractor and accepted by OSEMs, shall be completed prior to commencement of any construction task and any restrictions on timing shall be noted on the schedule;

b) While the ideal time of year for construction located near a body of water is typically in early June through to late October, which is due to the low flow and low rainfall period, construction

shall be occurring at other times and specific attention shall be paid to ensure environmental mitigations are applied during this period;

c) Stripping, grading, excavating and/or rehabilitation activities shall be scheduled to minimize the amount of time the soil is exposed to elements;

d) Activities shall be conducted in such a way as to reduce the amount of time spent in or around a stream or waterbody;

e) Construction activities shall be scheduled, where possible, to avoid any sensitive areas of fish and wildlife habitat and critical periods in fish and wildlife cycles. The sensitive life stages of wildlife in the Project area are illustrated below. These sensitive life stages as indicated in blue, are used to identify the timing of migration, spawning and calving in the vicinity of the Project area; and

f) If timing is not ideal, alternative mitigations shall be implemented.

Table 11-1 - Sensitive Life History Stages of Aquatic and Terrestrial Fauna

Species	Jan		Feb		Mar		Apr		May		Jun		Jul		Aug		Sept		Oct		Nov		Dec	
Aquatic																								
American Eel																								
Atlantic Salmon																								
Brook Trout																								
Rainbow Smelt																								
Terrestrial																								
Early Nesting Waterfowl																								
Late Nesting Waterfowl																								
Forest Avifauna																								
Raptors																								
Caribou																								
Moose																								
Semi-aquatic Furbearers																								
Terrestrial Furbearers																								
Black Bear																								

11.2 CONSTRUCTION ENTRANCE

Environmental Concerns

Construction entrances typically consist of a gated Right-Of-Way (ROW) and a security building, but would also include access to transmission line ROW from public roads/highways. Environmental concerns include the vegetation clearing that may be required for the construction of these features, and tracking of dirt and mud from the Site onto public roads and streets.

Environmental Protection Procedures

Measures to remove mud and dirt from vehicles, heavy equipment and pedestrians shall be required. Measures include rumble racks, tire washes and sediment traps.

a) All cleaning activities should occur on a gravel pad with runoff running through a sediment trapping device prior to discharge;
b) The gravel pad should be designed for the heaviest vehicle anticipated on Site;
c) Ensure proper cleaning of machinery/vehicles to prevent potential spread of invasive species;
d) Ensure all Site traffic use the facility and ensure the sediment trapping device is cleaned and maintained regularly; and
e) Temporary erosion control measures shall be applied as required in the area of vegetation clearing for any gate areas or entrance buildings. See Section “Erosion Prevention and Sediment Control” for applicable control measures.

11.3 LINEAR DEVELOPMENTS

Environmental Concerns

Linear developments encompass a diverse range of standard construction related activities such as ditching, right-of-way clearing, roads and transmission line construction. Environmental concerns associated with linear developments include potential sedimentation/erosion, and the loss of vegetation and fish/wildlife habitat. Linear features can also have a negative impact on caribou beyond habitat loss.

Environmental Protection Procedures

Road Construction & Ditching

a) Aggregate (fill) materials for construction purposes shall not be removed from any stream;
b) Sedimentation control measures, as outlined in Section, “Erosion Prevention and Sediment Control”, shall be followed. Solids that accumulate in a settling pond or behind a sediment trap shall be removed on a regular basis to ensure such systems remain effective;

c) Work shall not be undertaken on easily erodible materials during or immediately following heavy rainfalls without accepted protection measures in place;

d) Buffer zones shall be flagged prior to any disturbance activities, as required;

e) Natural vegetation shall be left in place where possible. Rights-of-way, particularly in areas of dense vegetation, shall be as narrow as practicable; loss of ground vegetation shall be kept to a minimum;

f) Roads shall be adequately ditched so as to allow for good drainage. Where possible, ditches shall be kept at the same gradient as the road;

g) Drainage from areas of exposed fill shall be controlled by grade or ditching and directed to vegetated areas away from all watercourses and at least 30 m from stream crossings. These drainage areas shall be determined in consultation with the OSEMs;

h) Surface water shall be directed away from work areas by ditching. Runoff from these areas shall have sediment removed by filtration or other suitable methods as outlined in Section, "Erosion Prevention and Sediment Control" and shall be directed away from wetlands and watercourses;

i) The sediment control measures shall be determined on Site by Contractor Personnel and accepted by the On-Site Environmental Monitor;

j) Check dams shall be used, as required, to reduce runoff from work areas with exposed soil;

k) In areas where natural vegetation must be removed, the topsoil layer shall be separately stored from grubbed material for rehabilitation;

l) Cut areas through silt and clay materials shall have erosion prevention measures in place (Section "Erosion Prevention and Sediment Control");

m) Temporary erosion control shall be applied on exposed slopes in sensitive areas immediately following exposure of a slope. A permanent control measure shall be installed shortly thereafter. Refer to Section "Erosion Prevention and Sediment Control" for applicable erosion control measures;

n) The cutting and filling phase of road construction, and the development of other work areas, shall be conducted as outlined in the following procedures:

   i. Cutting and filling shall be done only upon completion of grubbing. Where engineering requirements do not require grubbing (e.g., within the buffer zone of a stream crossing), filling shall occur without any disturbance of the vegetation mat or the upper soil horizons;

   ii. Filling in the vicinity of stream crossings shall be done in a manner which ensures that erosion and sedimentation of watercourses, waterbodies and other ecologically sensitive areas, such as wetlands, is minimized and done in strict compliance with the

required watercourse alteration permits from the DOEC. The hydrologic function of wetlands shall be maintained;

iii. The infilling of watercourses and waterbodies shall not be permitted, except as authorized by regulatory agencies and with the approval of the OSEM. The OSEM shall inspect the work to ensure it is completed in compliance with the required watercourse alteration permits from the DOEC, and any guidance provided by DFO;

iv. Buffer zones shall be maintained between the roads and the bank of any watercourse they parallel (refer to Section "Erosion Prevention and Sediment Control"); and

v. Road fill shall be dry and ice free. On areas of sensitive terrain, excess fill shall be end-dumped from the established roadbed.

o) Culverts shall be properly installed to maintain natural cross-drainage and to prevent ponding;

p) The number of stream crossings shall be minimized. Where access must cross a stream, the environmental protection procedures detailed in Section "Erosion Prevention and Sediment Control" shall be followed;

q) Where possible, construction activities shall avoid areas of wildlife concentrations to prevent undue disturbance of wildlife during critical periods (refer to Sections: "Scheduling and Timing of Construction Activities", "Resource Specific Mitigations" & "Site Rehabilitation"). If encounters with wildlife are unavoidable, then contingency plans detailed in the Contingency Plan Section of this document shall be followed;

r) Where possible, rights-of-way shall avoid known archaeological, historic and/or spiritual sites and required buffers shall be respected (See Section "Buffer Zones"). Where they cannot be avoided, the site shall be mitigated to the satisfaction of Provincial Archaeology Office (PAO) prior to work proceeding. If any archaeological or historic sites are encountered (known or otherwise), all work shall cease in that area until approval to proceed has been granted by the PAO;

s) Reference shall be made to the Guidelines for Protection of Fish Habitat in Newfoundland and Labrador, 1998; and

t) Boundaries of right-of-way and road easements and all boundaries of the facility, infrastructure and borrow sites that shall be developed shall be staked.

Right-of-Way Clearing

a) All salvaged timber shall be piled at right angles to rights-of-way so as not to obstruct the access or work of others, damage vegetation or be placed within buffer zones;

b) Disposal of cleared non-merchantable timber, slashing and cuttings from cleared areas shall take place through mulching and/or piling to minimize the amount of slash. No burning of materials is permitted for this Project;

c) If slash piles are to be used, they shall be piled so as not to cause unnecessary damage to vegetation outside the right-of-way. A 6.5 m break in slash piles shall be made every 200 m to allow for drainage and animal access. The maximum height of the piles shall not exceed 3 m; and

d) All conditions outlined under Road Construction and Ditching (above), as well as Transmission Line Development (below) that also apply to right-of-way clearing shall be adhered to.

Transmission Line Development

a) Access for the transmission line development shall follow the protective measures as listed above for roads and ditching; and

b) Ground travel on the transmission line shall follow existing trails and tote roads, where practical. Stream crossings shall follow DFO Standard Operating Procedures (SOP), where feasible (one time ford, clear span bridge, etc.).

11.4 WINTER CONSTRUCTION

Environmental Concerns

The principal concerns associated with winter construction are potential effects on freshwater ecosystems and water quality.

Environmental Protection Procedures

a) Winter vehicles shall be confined to properly prepared, groomed and approved trails and to work sites;

b) Maintenance and refuelling of vehicles shall be restricted to designated areas;

c) Only streams or waterbodies that are frozen shall be traversed, unless permits to ford are in place (see the DFO Operational Statement for Ice Bridges and Snow Fills);

d) Any debris or materials placed upon the ice surface of any waterbody shall be removed immediately after job completion; and/or prior to spring melt;

e) The ground must be frozen or a minimum 0.5 m snow cover for unfrozen ground is required for winter trails to avoid ground disturbance;

f) All known archaeological sites shall be avoided;

g) Snow removed for snow clearing operations shall be disposed of in areas directed by the OSEM; and

h) Gaps of at least 2 m are to be left in windrowed snow to allow for animal movements.

11.5 EQUIPMENT OPERATION AND MOVEMENT

A variety of equipment shall be used on Site during construction. This is a potential source of noise, air emissions, and potential leaks or spills.

Environmental Concerns

Noises associated with equipment operation and movement may negatively affect humans and wildlife. Air emissions may have air quality implications. Accidental leaks or spills of fuel or other hazardous materials may affect soils, water, fish, vegetation and wildlife. Tracked equipment has the potential to disturb the ground around/at work fronts.

Environmental Protection Procedures

a) All approvals, authorizations and permits for Project activities shall be followed;

b) Prior to the commencement of construction, equipment shall be inspected for the presence of soil that could contain seeds and/or propagules of invasive and non-native species. If equipment is found to have soil attached, it shall be cleaned (i.e., pressure washed) to remove the potential seed source. In addition, equipment coming from other regions or provinces shall be clean and free of potential seed sources of invasive plants;

c) Noise control procedures shall be followed during all work activities (Section “Noise Control”);

d) All equipment shall have exhaust systems regularly inspected and mufflers shall be operating in accordance with manufacturer’s recommendations;

e) All equipment (e.g., diesel generators) shall meet the requirements of the *NL Air Pollution Control Regulations* under the *Environmental Protection Act,* as required. Diesel generators shall be registered with DOEC, as required. Refer to the guidance document for Approval of Diesel Generators (GD-PPD-061) for the registration form and guidance on completion;

f) All equipment used during construction shall follow the environmental protection procedures outlined in this EPP. In the case of an accidental event resulting from the use of equipment (e.g., a fuel spill), refer to Section, “Contingency Plans”;

g) All equipment on the Project site shall use only oils/lubricants that classify as “biodegradable”, where feasible (refer to Section, “Storage, Handling, Use and Disposal of Fuel & Other Hazardous Materials" of this document for additional information on the use of biodegradable oils/lubricants);

h) ATVs and tracked vehicles shall only be used where necessary. ATV use shall comply with the Motorized Snow Vehicles and All-Terrain Vehicle Regulations, 1996, the Environmental Guidelines for Stream Crossings by ATV, 1994 and the DFO Fact Sheet ATVs, Fish Habitat and You;

i) The use of heavy equipment in or near watercourses shall be minimized and restricted;

j) All equipment shall be regularly maintained and inspected. If problems are identified the equipment shall be taken out-of-service and repaired to prevent release of hydrocarbons into the environment;

k) Best Management Practices outlined in "Best Practices for the Reduction of Air Emissions from Construction and Demolition Activities" (May 2005, ChemInfo Services Inc. for Environment Canada) shall be implemented to mitigate air quality effects during the site preparation, clearing, and construction phases, where practical; and

l) Equipment coming from other regions or provinces shall be clean and free of potential seed sources of invasive plants.

11.6 HELICOPTER TRAFFIC

Helicopter use at the Project site during construction may be required.

Environmental Concerns

Noise from the aircraft may disturb wildlife. Collisions with wildlife could result in mortality for both wildlife and humans. Fuelling of helicopters may result in spills.

Environmental Protection Procedures

a) All aircraft shall maintain an altitude of no less than 500 m from concentrations of birds or other wildlife;

b) Flights for wildlife viewing or photography are not permitted, except when conducting wildlife surveys. Permits from the Wildlife Division are required for wildlife surveys;

c) The OSEM shall inform all charter pilots of the EPP requirements;

d) All aircrafts shall inform the Contractor of their expected arrival and departure times;

e) Aviation fuel caches shall have approval from Service NL;

f) The Contractor shall ensure that helicopter landing areas are kept clear of equipment, materials/supplies at all times throughout the construction phase to avoid accidents or damage to the helicopter;

g) All aircraft operators shall review marine and aviation weather forecasts prior to departure;

h) Raptors are known to nest within the Project area. Under no circumstances shall nesting raptors be approached. The disturbance effects that helicopters have on nesting raptors can be detrimental for both the birds and the safety of the aircraft. All aircrafts shall maintain a 300 m vertical and horizontal buffer from known active raptor nests;

i) Helicopters moving during spring and fall staging periods (typically May or September) shall maintain a minimum altitude of 500 m from concentrations of waterfowl; and

j) The number of helicopter trips should be minimized to the extent feasible by combining trips or using other appropriate means of travel.

11.7 CLEARING OF VEGETATION

Environmental Concerns

Vegetation clearing (e.g., trees, shrubs) shall be required during site preparation for work areas, laydown areas, roads, and ROWs. Environmental concerns include loss of habitat, sedimentation of watercourses, and disturbance or destruction of historic resources.

Environmental Protection Procedures

The following measures shall be implemented to reduce the potential effects of vegetation clearing:

General

a) Cutting activities shall be limited to those areas that are required for construction of infrastructure and ROW clearing;

b) Clearing within waterbody buffer zones along the ROW shall be reduced to a 5 m wide travel route, or as required for equipment;

c) All clearing shall comply with the requirements of all applicable permits, including a Commercial Cutting Permit and an Operating Permit;

d) A cutting permit shall be obtained prior to the start of any site clearing. Clearing and tree removal shall be restricted to the minimum areas needed for the site and stockpiles;

e) Clearing shall consist of cutting to within 15 cm or less of the ground and stockpiling of all merchantable timber; as well as the removal, piling and mulching of shrubs, debris and other non-merchantable timber in the area, as appropriate;

f) Disposal of cleared non-merchantable timber, slash and cuttings from cleared areas shall take place through mulching and/or piling to minimize the amount of slash;

g) If slash piles are to be used, they shall be piled so as not to cause unnecessary damage to vegetation outside the right-of-way. A 6.5 m break in slash piles shall be made every 200 m to allow for drainage and animal access. The maximum height of the piles shall not exceed 3 m;

h) Limits of clearing shall be shown on all drawings issued for construction. Only those areas designated on drawings shall be cleared. Trees shall be blazed/flagged at intervals in advance of clearing to demarcate the limits of the work. Blazed trees shall not be felled. Clearing activities shall not remove any trees outside the authorized clearing limits;

i) Slash, mulched debris and any timber shall not be permitted to enter any watercourse. All timber and slash/debris shall be piled/disposed of above spring flood levels;

j) Mechanical clearing by mechanical harvesters shall likely take place within the main construction areas and ROWs. For other clearing required, chain saws or other hand-held equipment may be used except where alternative methods or equipment are accepted by the OSEM;

k) Mechanical clearing by means other than mechanical harvesting equipment (i.e., bull dozer or excavators) shall not occur;

l) Firefighting tools and water delivery systems must be available, as required, by the Operating Permit for the activity;

m) A buffer zone of undisturbed vegetation shall be maintained between construction areas and all waterbodies, watercourses, and ecologically sensitive areas (refer to Section, "Buffer Zones" within this document), unless otherwise authorized. Buffer zone features shall be key elements of the environmental review of drawings prior to construction;

n) Where possible, timber shall be felled inward toward the work area to avoid damaging any standing trees within the immediate work area;

o) Workers shall not destroy or disturb any features that are indicative of a historic or archaeological site. Any such findings shall be reported immediately to the OSEM (refer to Section "Historic or Archaeological Resources");

p) Clearing activities shall be in compliance with the Avifauna Management Plan;

q) No clearing shall take place within 800 m of an active raptor nest (refer to Table 10-13). If a nest is encountered during clearing activities, all work shall stop until the site is cleared by the OSEM, in consultation with the appropriate regulatory agencies;

r) If a tree containing an inactive eagle or osprey nest is encountered during clearing of construction sites (other than transmission lines), the nest shall be assessed for viability and if the nest is deemed viable a platform shall be established as approved by the provincial Wildlife Division. For other raptors such as hawks and owls, active nests shall be identified as per the Avifauna Management Plan and appropriate buffers applied;

s) If a tree containing an inactive raptor nest is encountered during transmission line clearing, a platform shall not be required as the tower shall provide an alternative nesting site;

t) Merchantable timber is defined as being 2.5 m or more in length with a top diameter not less than 9.1 cm and being of generally sound condition. Non-merchantable timber consists of all other vegetation with no merchantable value, such as small trees, shrubs, limbs and/or branches;

u) All merchantable timber shall be salvaged. It shall be cut into standard harvesting lengths (i.e., 2.5 - 3.5 m lengths), trimmed, and stored in identified stockpile areas. See Figure 10-1 for poorly cut and piled wood and Figure 10-2 shows properly cut and piled wood; and

v) All merchantable timber within the specific clearing limits shall be stockpiled so as not to obstruct the access of work of others.

Transmission Line/Road Rights-of Way

a) All salvaged timber shall be piled at right angles to rights-of-way so as not to obstruct the access or work of others, damage vegetation or be placed within buffer zones of critical habitat; and

b) Slash and debris is to be disposed of as per items g) and i) of the general conditions outlined above.

Figure 11-1 - Poorly Cut and Piled Wood

Figure 11-2 - Properly Cut and Piled Wood

11.8 PUMPS AND GENERATORS

Environmental Concerns

A variety of water pumps, hoses and generators shall be in frequent use in many construction sites and at remote work camps. Environmental concerns are associated with any accidental spills or chronic

leaks contaminating waterbodies and soil. There may also be concerns with noise, as well as air emissions from generators at the Sites.

Environmental Protection Procedures

The following measures shall be implemented to reduce the potential effects of the storage, handling, use and disposal of the fuel and other hazardous materials.

a) Refer to Section, "Buffer Zones" for required buffer zones for fuel and other hazardous materials storage and handling;

b) Noise control procedures shall be followed during use (refer to Section "Noise Control");

c) Drip pans shall be placed underneath pumps and generators. The drip pans shall be lined with absorbent material. Absorbent material shall be kept at all sites where pumps and generators are in use;

d) Spill kits shall accompany all pumps and generators at the site (refer to Section "Storage, Handling, Use and Disposal of Fuel & Other Hazardous Materials" with this document);

e) Pumps and generators shall be located as far as practical from all waterbodies;

f) Pumps and generators shall be located on a level, stable surface. All pumps used for freshwater supply shall have a fine mesh screen on the intake hose (Please refer to DFO's "Freshwater Intake End of Pipe Fish Screen" guidelines);

g) Hoses and connections on equipment shall be inspected routinely for leaks and drips;

h) A Water Use License from the Water Resources Management Division shall be required for withdrawal of water from a waterbody;

i) All diesel generators at the Sites shall meet the requirements of the *Air Pollution Control Regulations, 2004* under the *Environmental Protection Act* as required, Generators built to Tier 4 Final emission standard may be exempt from NLDOEC Certificate of Approval*;* and

j) All leaks shall be reported immediately to the OSEMs. Upon detection of a leak, the equipment (i.e. pump, generator, etc.) shall be shut down immediately and corrective action taken to repair the leak and clean-up any contaminated soil and/or water (Refer to the Spill Response Plan).

11.9 SURVEYING

Surveying activities may include: vegetation removal, traversing, establishing targets, permanent benchmarks and transponder stations.

Environmental Concerns

Surveying activities may disturb vegetation, wildlife, and historic resources.

Environmental Protection Procedures

Vegetation Removal

a) Vegetation removal shall be scheduled to minimize disturbance to animals in sensitive areas or during sensitive time periods, where possible;

b) Width of survey lines shall be limited to that which is absolutely necessary for line of sight and unobstructed passage;

c) Whenever possible, cutting lines to the edge of open areas shall be avoided;

d) Trees and shrubs shall be cut flush with the ground wherever possible with stumps not to exceed 15 cm;

e) Cutting of survey lines shall be kept to a minimum;

f) All trees not exactly on transit lines shall be left standing and trees partly on line should be notched (notch not to exceed 1/3 tree's diameter) instead of removed, to allow sighting;

g) Discretion shall be used when large trees are encountered. For example, trees 30 cm at Diameter Breast Height (DBH) or larger should, whenever possible, not be cut. On grid lines, trees of 30 cm diameter or larger shall be left intact and shall be traversed to continue the line;

h) Wildlife shall not be harassed or disturbed;

i) Vehicles shall yield the right-of-way to wildlife;

j) There shall be no cutting in areas designated as sensitive without notification to the OSEMs;

k) Archaeological sites and features shall not be disturbed during survey work. Any historic resource discoveries shall be reported as per Section, “Historic or Archaeological Resources”; and

l) Survey crews shall have a briefing on the recognition of historic resources prior to commencing work.

Traversing

a) ATVs shall not be allowed off the right-of-way, except where acceptable to the OSEM. ATV use shall comply with the *Motorized Snow Vehicles and All-Terrain Vehicle Regulations, 1996*, the *Environmental Guidelines for Stream Crossings by ATV, 1994* and the DFO Fact Sheet *ATVs, Fish Habitat and You.* ATVs are not permitted off the right-of-way or existing or new approved trails in within the Bay du Nord Wilderness Reserve;

b) No motorized vehicles shall enter the areas designated as sensitive without notification of the OSEMs;

c) Activity within sensitive areas shall be minimized; and

d) Walking in sensitive areas shall be restricted to established walking paths, where available.

Establishing Targets, Permanent Benchmarks and Transponder Locations

a) A driven T-bar, embedded to readily identify each benchmark location, shall be used;
b) Access to sensitive areas shall be accepted by the OSEMs;
c) Standard iron bars and sledgehammers shall be used to establish benchmarks; and
d) Heavy equipment shall not be used to access sensitive areas.

11.10 DRILLING

11.10.1 Geotechnical

Drilling shall be required as part of geotechnical investigations to recover soil samples, characterize the subsurface of proposed foundations, excavate areas and probe the bedrock surface. Seismic geophysical methods may also require drilling of shot holes in which small sources of energy (explosives, weight drop, air gun, etc.) are to be placed.

Environmental Concerns

The environmental concerns associated with drilling are surface disturbances, disposal of drilling fluids and cuttings, generation of dust, noise, and the potential effects on terrestrial habitats, historic resources, air quality and aquatic ecosystems.

Environmental Protection Procedures

The following mitigation measures must be followed when drilling at the Site:

a) A Water Use License from the Water Resources Management Division is required;
b) Shot holes for seismic activities shall not be within 100 m of any water well, structure or buried service line;
c) Drilling mud, together with drilling cuttings and return water, shall be treated using a polydrill filter box or suitable alternative (See Figure 10-3). Solids collected shall be disposed of at an approved waste disposal site. All treated water shall be discharged on land to the environment in a manner that shall promote permeation into overburden soils and shall not enter or impair waterbodies. If drilling mud is required, biodegradable products such as clear-bore or an approved equivalent shall be used. The type shall be documented and the up-to-date MSDS provided and kept on file;

Figure 11-3 - Polydrill Filter Box used for Solids Removal in Drilling Applications

d) All discharges shall meet the Environmental Control Water and Sewer Regulations (ECWSR);

e) Drilling of boreholes shall be conducted in compliance with all conditions of the Exploration Approval for the work required under the *Mineral Regulations* issued under the *Mineral Act*;

f) All drilling equipment on the Project Site shall use only oils/lubricants that classify as "biodegradable" (refer to Section, "Storage, Handling, Use and Disposal of Fuel & Other Hazardous Materials" within this document for additional information on the use of biodegradable oils/lubricants);

g) Due to the nature of drilling activities (quicksnaps, couplings) oil drops and leaks may occur. The area shall be cleaned up at every opportunity and all rigs shall be equipped with spill kits (as outlined in Section "Storage, Handling, Use and Disposal of Fuel & Other Hazardous Materials" within this document);

h) In the event of a hose rupture or loss of hydraulic fluid, the Spill Response Plan shall be followed;

i) Abandoned drill holes shall be sealed with a cement grout bentonite mixture;

j) If explosives are used in seismic shot holes, a blasting plan shall be reviewed with the OSEM to ensure any unexploded charges are removed from the holes prior to sealing;

k) If blasting occurs near water, DFO's "Guidelines for the use of Explosions in or near Canadian Fisheries Waters" shall be consulted;

l) Drilling sites shall be cleared of vegetation following the procedures detailed in Section, "Clearing of Vegetation" of this document;

m) Disposal of all drilling materials and associated solid wastes shall be undertaken in accordance with the procedures in Section, "Solid Waste Disposal" of this document;

n) Fuel shall be stored, handled and transported according to Sections “Storage, Handling, Use and Disposal of Fuel & Other Hazardous Materials” and “Buffer Zones within this document;

o) Water applications shall be used to control dust. Water-based drilling dust suppression systems may require anti-freeze in winter months, which shall be approved by the DOEC. The use of water for dust control or coring/wash boring shall be undertaken in a manner that ensures return water does not enter watercourses;

p) Drilling equipment shall have muffled exhaust to minimize noise;

q) No person shall deposit or permit deposition of oil, oil wastes or any other substance harmful to migratory birds in any waters or any area frequented by migratory birds; and

r) If possible, drilling shall be scheduled to minimize disturbance to animals in sensitive areas during sensitive time periods.

11.10.2 Water Well

Water well drilling may be required on land during hydrogeological investigations to evaluate groundwater quality and quantity of bedrock aquifers.

Environmental Concerns

The environmental concerns associated with drilling water wells are surface disturbances, disposal of drilling fluids and cuttings, generation of dust, noise, and the potential effects on terrestrial habitats, historic resources, air quality and aquatic ecosystems.

Environmental Protection Procedures

a) Drilling sites shall be cleared of vegetation following the procedures detailed in Section, “Clearing of Vegetation” of this document;

b) Disposal of all drilling materials and associated solid wastes shall be undertaken in accordance with the procedures in Section, “Solid Waste Disposal” within this document;

c) Fuel shall be stored, handled and transported according to Section, “Storage, Handling, Use and Disposal of Fuel & Other Hazardous Materials” within this document;

d) Drilling equipment shall have muffled exhaust to minimize generated noise;

e) Drilling of water wells shall be conducted in compliance with the *Water Resources Act* and the *Well Drilling Regulations*; and

f) Potential drilling sites in sensitive areas shall be confirmed by the OSEMs.

11.11 SURFACE WATER AND GROUNDWATER USE

Groundwater and/or surface water may be extracted from wells or intake structures at different Project areas and various construction camps.

Environmental Concerns

Environmental concerns associated with water wells include potential for saltwater intrusion, proximity to sources of contamination, and excessive drawdown at the aquifer. Environmental concerns associated with surface water use at the site include excessive removal of water and the potential effect on fish habitat.

Environmental Protection Procedures

a) Wells shall be developed in consultation with the DOEC Water Resources Management Division to avoid areas of groundwater constraint such as potential sources of contamination (septic fields, landfills, etc.), proximity of other wells, and seawater;

b) Water extraction rates shall be established, under approval of the Water Resources Management Division, to address concerns for drawdown or potential effects on the water table, and to ensure withdrawal from surface waterbodies does not affect the natural flow regime and fish/fish habitat;

c) Water withdrawal shall be documented in the Water Withdrawal Form as per applicable Water Use License;

d) Applicable reference documents include Freshwater Intake End-of-Pipe Fish Screen Guidelines, 1995, Freshwater Intake End-of-Pipe Fish Screen Fact Sheet, Guidelines for the Protection of Freshwater Fish Habitat in Newfoundland and Labrador, 1998 and the Policy for Allocation of Water Use W.R. 88-1 (rev1995); and

e) A Water Use License is required from the Water Resources Management Division.

11.12 STORAGE, HANDLING, USE AND DISPOSAL OF FUEL & OTHER HAZARDOUS MATERIALS

A variety of fuels and potentially hazardous materials shall be used during Project construction activities. Gasoline, diesel fuel, grease, motor oil and hydraulic fluids are all needed for equipment. Other potentially hazardous materials, which may be routinely used, include but are not limited to:

- Propane;
- Explosives;
- Acetylene (i.e., welding);
- Oxygen;
- Paints;
- Epoxies;
- Concrete additives;
- Wood Treatments;
- Antifreeze; and

- Cleaners and solvents.

Environmental Concerns

The primary concern regarding the use of fuel and hazardous materials is their uncontrolled release to the environment through spillage, and the subsequent adverse effects on human health and safety, terrestrial, aquatic and marine habitat and species, soil, and groundwater quality.

Environmental Protection Procedures

General Practices

a) All fuel, hazardous and controlled product storage areas, including temporary and permanent fuelling and fuel storage facilities shall be designed in accordance with applicable codes and regulations;

b) The *Storage and Handling of Gasoline and Associated Products Regulations, 2003* (referred to as the "GAP Regulations") under the *Environmental Protection Act* controls the construction, operation, and registration of "storage tank systems"[1] in the province of Newfoundland and Labrador;

c) Information on storage tanks, storage tank systems, and equipment storage tanks proposed for use on the Project shall be provided for review. Tanks that are not already registered under GAP shall be evaluated on a case-by-case basis to determine if GAP Regulations apply. Tank registration shall be accompanied by any necessary regulatory variances;

d) In general, the GAP Regulations apply to all stationary storage tanks and storage tank systems except in the following cases:

   i. Tanks with capacities of 2,500 litres or less that are connected to a heating appliance;

   ii. Tanks that are designed, constructed, and utilized in the inherent operation of a piece of equipment. In this case, the tanks must be physically secured and dedicated to the equipment requiring the fuel for its operation; and

   iii. "Mobile" tanks (e.g., tank trucks and tank truck trailers) used for temporary, stationary storage. In this case storage period must not exceed fourteen (14) days and no additional fuel can be added to the tank. There must also be a minimum of fourteen (14) days of downtime between separate storage periods and there can be no more than two, fourteen (14) day storage periods within a twelve (12) month timeframe.

Note: that all provisions of the GAP Regulations, including registration, apply for all tanks associated with mobile generators.

[1] The GAP Regulations defines "storage tank system" as an "… atmospheric or low pressure closed tank container and all vents, fill and withdrawal piping associated with it installed in a fixed location and includes temporary arrangement on cradles and skids".

Consideration for the design and construction of storage facilities shall include:

a) Contracted fuel suppliers shall comply with this EPP. A C-SEPP shall be developed by the Contractor, including contingency plans which shall require acceptance by the Project. Before transporting or positioning fuel at the site the contractor shall read and accept the Spill Response Plan;

b) All fuel storage and handling shall be in compliance with *GAP Regulations.* Necessary registrations and variances shall be obtained from Service NL for storage facilities, as required;

c) The Spill Response Plan that contains information regarding spills of fuel and hazardous materials shall be kept on Site near all fuel storage facilities (In addition, refer to Section, "Contingency Plans" regarding fuel suppliers contingency plans);

d) Any soil contaminated by small leaks of fuel, oil or grease from equipment (including hydraulic hose ruptures and loss of fluid) shall be disposed as per policies and guidelines. For larger leaks and spills a disposal plan shall be developed and submitted to regulators for approval*;*

e) The *Used Oil Control Regulations* shall be used to determine requirements for the storage and disposal of used oil;

f) All equipment on the Project Site shall use only oils/lubricants[2] that classify as "biodegradable"[3]; unless demonstrated by the Contractor and accepted that it is not feasible because of:

   x) Technical or performance constraints;

   xi) Negative impacts on equipment warranties;

   xii) Cost constraints; and/or

   xiii) Unavailability of biodegradable oils and lubricants.

g) Empty drums shall be stored and backhauled to nearest receiving community. Bungs shall be inspected and tightened prior to shipping;

h) Contractors shall at all times maintain in good condition at least one spill kit dedicated to each piece of fuel-powered equipment. Each spill kit shall be located on the equipment and stored in a weather-proof container. Each spill kit shall have an absorption capacity of no less than 23 litres. Examples of acceptable spill kits with various absorption capacities are as follows:

   <u>23 Litre Absorption Capacity</u>

   i) One (1) 10-liter bag Oclansorb®, or equivalent;

   ii) Two (2) 4-mil heavy duty disposal plastic bag 30" * 48";

[2] For example: hydraulic oil; multipurpose lubricant; chain oil; form oil; gear oil; transmission fluid; differential fluid; rust proofing; heat transfer fluids; compressor fluid; saw guide oil; electrical insulating fluid; and grease.

[3] i.e. the product must be either "readily biodegradable"; or have inherent, primary biodegradability; or inherent, ultimate biodegradability, as defined by the *OECD 301 B: Ready Biodegradability Test* procedure.

iii) One (1) steel hand spade;

iv) Two (2) 100mm * 1200mm Sorb Sox®, or equivalent;

v) Five (5) sorbent pads 3/8" * 17" * 19".

64 Litre Absorption Capacity

i) One (1) 13-liter bag Oclansorb®, or equivalent;

ii) Ten (10) sorbent pads 3/8" * 17" * 19", or equivalent;

iii) Two (2) 4-mil yellow heavy duty disposal bag 30" * 48";

iv) One (1) steel hand spade;

v) Two (2) 4" * 4' Sorb Sox®, or equivalent;

vi) Two (2) 4" * 8' Sorb Sox®, or equivalent;

121 Litre Absorption Capacity

i) Twenty five (25) sorbent pads 3/8" * 17" * 19";

ii) Ten (10) 4-mil yellow heavy duty disposal bag, 30" * 48":

iii) One (1) 44-liter bag Oclansorb®, or equivalent;

iv) Eight (8) Sorb Sox® 4" * 4', or equivalent;

v) Five (5) Sorb Sox® 4" * 8', or equivalent;

vi) Two (2) Spillows® 2" * 17" * 19", or equivalent;

vii) One (1) spark resistant poly-shovel;

viii) One (1) Sorb Sox® Boom 7" * 10', or equivalent; and

ix) One (1) Pair of chemical resistant gloves.

i) To mitigate environmental effects of fuel and hazardous material spills and leaks, Contractors shall at all times maintain in good condition at least one spill kit dedicated to each piece of fuel-powered equipment. Each spill kit shall be located on the equipment and stored in a weather-proof container. Each spill kit shall have an absorption capacity of no less than 23 litres;

j) The Contractor shall ensure adequate and appropriate spill response materials and equipment are available for use relative to the scope of work and environmental sensitivities - i.e., spill kit containing aquatic booms for working near water and spill kits capable of capturing 110% of reasonable potential spill volumes should be present at the camp site(s) and with mobile field crews;

k) Only trained, qualified persons shall handle fuels and other hazardous materials. The Workplace Hazardous Materials Information System (WHMIS) shall be implemented to ensure proper handling and storage is achieved. Operators shall be in attendance for the duration of all fuelling operations;

l) The Canadian Transport Emergency Centre (CANUTEC – 613-996-6666) operated by Transport Canada can assist emergency response personnel in handling dangerous goods emergencies;

m) Waste oils, lubricants, and other used oil shall be reused, recycled or disposed of at an approved, licensed waste management facility in accordance with the *Used Oil Control Regulations, 2002* and the *Air Pollution Control Regulations, 2004)*;

n) Fuel storage areas shall be equipped with firefighting equipment, in accordance with approvals;

o) Smoking shall be prohibited within 50 m of a fuel storage area; and

p) Refer to Section, "Buffer Zones" within this document for specific information related to buffer zones required for fuel storage, equipment fuelling and fuel transfer activities.

Fuel Storage Requirements

a) Fuel storage tanks shall comply with *GAP Regulations* and shall be equipped with vacuum gauges and vent pipes, as applicable;

b) Waste oil storage tanks shall comply with the *Used Oil Control Regulations, 2002* (see Figure 10-4 for a typical waste oil tank equipped with vacuum gauges, vent pipe, etc.);

c) All bulk fuel and waste oil storage (> 2000 L) shall be in tanks with suitable secondary containment (i.e., double walled, self dyked, lined, earthen dyke);

Figure 11-4 – Typical Waste Oil Tank

d) A letter of consent shall be obtained from designated officials of the Service NL for fuel caches of ten (10) or more 205 L drums (including helicopter fuel caches). A letter of consent is not required for fuel caches under 10 drums;

e) A marker stake or flag shall be required for a petroleum products storage site of less than 10 x 205 L drums;

f) Boundary poles or posts with colourful flags or a painted marker shall be required for temporary petroleum product sites of 10 to 100 x 205 L drums;

g) Fuels stored inside dykes or self-dyked units shall be clearly marked to ensure they are not damaged by moving vehicles and are visible under all weather conditions. Dykes and barriers shall be designed and constructed in accordance with the *GAP Regulations* (see Figures 10-5 and 10-6 below for typical dyked and concrete pad methods for tank installation);

h) Used oil shall be stored in an appropriate storage tank meeting the requirement of Section 18 and 21 of the *Used Oil Control Regulations*; and

i) Used oil can be stored in a 205 L drum as long as the drum is:

   i) clearly marked "used oil";

   ii) made of 18 gauge steel;

   iii) stored in an area providing secondary containment;

   iv) equipped with sufficient size openings to prevent spillage during filling or emptying;

   v) equipped with venting if they are intended to be vacuumed out; and

   vi) in compliance with CAN/GSSB-43.150-95 if they are to be transported by road.

All used oil tanks shall be inspected on a regular basis as per Section 24 of the *Used Oil Control Regulation.* All fuel storage tank systems shall be inspected on a regular basis as per Sections 20 and 21 of the *GAP Regulations*. This involves, but is not limited to, gauging or dipping and the keeping of reconciliation records for the duration of the program.

Figure 11-5 - Acceptable Fuel Storage with Dykes

Figure 11-6 - Fuel Storage on Concrete Pad

11.12.1 Fuel Transfer

The following procedures shall apply to the transfer of fuel or hazardous material:

a) In all cases, a qualified person shall attend the transfer to storage tanks for the duration of the operation. This person shall be trained in proper fuel handling procedures to minimize the risk of a spill. The attendant shall be trained in the requirements of the fuel suppliers approved Spill Contingency Plan, Spill Response Plan and WHMIS;

b) Hoses or pipes used for fuel transfer shall be equipped with properly functioning and approved check valves, spaced to prevent backflow of fuel in the case of failures;

c) All tanks shall be dipped before and after filling;

d) Exposed pipelines shall be protected from vehicular collision damage by the installation of guardrails; and

11.12.2 Equipment Fuelling and Lubrication

The following procedures shall apply to the fuelling of heavy construction equipment:

a) Fuelling and lubrication of equipment shall occur in such a manner as to minimize the possibility of contamination to soil or water;

b) When refuelling equipment, operators shall:

   i. Use leak-free containers and reinforced rip and puncture-proof hoses and nozzles;

   ii. Be in attendance for the duration of the operation; and

   iii. Seal all storage container outlets except the outlet currently in use.

c) Regular inspections shall be performed on the hydraulic and fuel systems of machinery. Leaks shall be repaired immediately;

d) Fuelling or servicing of mobile equipment on land shall not be allowed within 30 m of watercourses or waterbodies, except in designated areas with dewatering pumps; and

e) Fuelling attendants shall be trained in the requirements under the contractors Spill Contingency Plan in the C-SEPP and the Spill Response Plan.

11.12.3 Hazardous Materials

The following procedures shall apply to the use of hazardous materials:

a) Hazardous materials shall be used only by personnel who are trained and qualified in the handling of these materials and only in accordance with manufacturers' instructions and government regulations. WHMIS and the provisions of the *Transportation of Dangerous Goods Act* shall be implemented throughout the job site. All Employees involved with hazardous materials shall be appropriately trained;

b) All hazardous wastes shall be stored, removed and disposed of in accordance with government regulations and applicable permits;

c) Up-to-date Material Safety Data Sheets (MSDS) must be available on-Site prior to receipt of any hazardous materials;

d) A hazardous waste storage area shall be constructed and properly marked. A permit may be required for construction of this area; and

e) Hazardous waste shall not be permitted to be poured down drains, oil/water separators, septic systems or discharged into the environment in any form.

11.13 SEWAGE DISPOSAL

All sewage disposal activities shall comply with Newfoundland and Labrador's Health and Community Services Act, 1997 and the Environmental Control Water and Sewage Regulations, 2003 under the *Water Resources Act*, 2003.

Environmental Concerns

The accidental release of untreated sewage is a concern to human health, drinking water quality, and freshwater and marine ecosystems. This applies to effluent from a sewage treatment system that does not meet the limit set in Schedule A of the *Environmental Control Water and Sewage Regulations, 2003.*

Environmental Protection Procedures

a) Development of sewage treatment facilities shall be undertaken in consultation with the relevant regulatory agencies for a temporary or permanent sewage collection system, and a Certificate of Approval shall be obtained from the Service NL and/or the DOEC;

b) The health inspector with the Service NL is the approval authority for sewage flows under 1000 gallons. The general sanitization of the site is under the jurisdiction of the health inspector who shall perform periodic inspections;

c) All sewage disposal activities shall comply with Section 36(3) of the Fisheries Act;

d) Wastewater, septage, sludge, bio-solids, or other types of hazardous or deleterious liquids from the Project Site shall not be allowed to be discharged to public wastewater collection systems or treatment facilities;

e) For septic systems, the location of a tile field shall be clearly marked and vehicular traffic shall not be permitted to operate within this defined boundary; and

f) Portable washrooms and toilets used at any Project site shall be routinely inspected and properly maintained. Sewage sludge removed from the facilities shall be transported off Site for approved treatment and disposal. Companies engaged to perform this work must have approval from the Service NL and/or DOEC. Copies of government approvals must be provided to the OSEM before work can proceed. All human sanitary waste must be contained and disposed in a manner that meets all environmental and health requirements. Any concerns must be brought to the immediate attention of the OSEMs and H&S Coordinator.

11.14 SOLID WASTE DISPOSAL

Environmental Concerns

Solid waste (e.g. construction waste, domestic waste, paper, cardboard, and wood), if not properly controlled and disposed of, can be unsightly, may cause human safety and health concerns, and could negatively affect wildlife.

Environmental Protection Procedures

a) Any procedures or strategies for management of solid waste shall also be in accordance with the Provincial Waste Management Strategy;
b) Waste management at all sites shall comply with all regulatory approvals and regulations;
c) Waste material shall not be deposited in a body of water; and
d) Waste material shall not be deposited anywhere except at a facility or site approved to accept that specific type of waste.

11.15 WORKING WITHIN 15 METRES OF A BODY OF WATER

Environmental Concerns

Working close to waterbodies poses a risk of introducing contaminants into the aquatic ecosystem, affecting fish, fish habitat, and other receptors, and affecting the natural flow regime of the waterbody. Contaminants such as sediment, petroleum hydrocarbons, and other deleterious substances may impact fish, wildlife, plants, and human receptors. Proper protection plans are required to minimize or eliminate sedimentation and water pollution and maintain riparian habitat near waterbodies.

Environmental Protection Procedures

Mitigation measures provided in various sections (refer to Sections, "Erosion Prevention and Sediment Control", "Storage, Handling and Disposal of Fuel and Other Hazardous Material", and "Buffer Zones") shall be consulted to ensure that appropriate measures are understood and implemented during the course of construction.

In addition, the following steps shall be taken to ensure protection of waterbodies:

a) A joint engineering and environmental reconnaissance of the Site shall be completed in the early planning stages to identify all nearby bodies of water and mitigation and protective measures shall be identified;
b) The majority of construction works shall take place during low flow and low rainfall period, where possible;
c) Any vehicles or equipment working near a body of water shall be clean and in good condition;
d) Heavy equipment shall be kept outside the high water mark of all bodies of water, where possible; and
e) All equipment on the Project Site shall use only oils/lubricants[1] that classify as "biodegradable"[2] where feasible (refer to Section "Storage, Handling and Disposal of Fuel and Other Hazardous Material" within the document for additional information on the use of biodegradable oils/lubricants).

11.16 WATERCOURSE CROSSINGS – FORDING, CULVERTS AND BRIDGES

Environmental Concerns

The environmental concerns associated with fording, culvert installations, bridge construction and maintenance include direct disturbance to, or mortality of, fish, disturbance to waterfowl, and loss of fish habitat caused by sedimentation and removal of substrate, and disturbances to stream bank vegetation.

Environmental Protection Procedures

Erosion stabilization methods and effective sedimentation control practices shall be implemented when required (refer to Section, "Erosion Prevention and Sediment Control" within this document), and these shall conform to requirements, guidelines, and principles contained in DFO Factsheets, Operational Statements, DOEC Environmental Guidelines, and specific requirements of regulatory permits and approvals.

All watercourse crossings (fording, culvert installation and bridge crossings) shall comply with permits issued by DOEC. Additionally, Notifications and Requests for Project Reviews to DFO must be approved in order for work to occur. If a guidance letter is issued for Works and Undertakings Affecting Fish and Fish Habitat from DFO, all conditions shall be followed.

The following measures shall be implemented to minimize negative effects of watercourse crossings:

a) Attention shall be given to scheduling in order to minimize the time the watercourse is disturbed and therefore minimize the sediment entering the watercourse. The ideal time for construction is during low flow and low rainfall period;

b) Any alterations to a body of water, which may impact navigation, shall require a Navigable Waters Permit Application under *Navigable Waters Protection Act (NWPA)* request for project review under NWPA from Transport Canada (TC). If a NWPA authorization is issued, the conditions shall be adhered to;

c) Any alterations to a body of water which may impact water quality shall require a DOEC permit(s) under the *Water Resources Act;*

d) Watercourse crossing construction activities, in areas of fish habitat, shall be undertaken in accordance with DFO requirements and under the direct guidance of the OSEM;

e) To the extent practical, construction activities in waterbodies or watercourses shall be scheduled to occur during low flow or frozen conditions, to avoid sensitive periods / habitat for fish, and shall be shut down during heavy precipitation events;

f) Where possible, all in-water works shall be completed inside the appropriate fisheries timing windows (June 1 – September 30). Work outside the fisheries timing windows shall be done in consultation with DFO;

g) All watercourses and bodies of water shall be examined by the OSEM or Contractor/Subcontractor environmental Personnel on a site-specific basis in order to evaluate each watercourse crossing (including upstream and downstream);

h) Work shall be performed in such a way as to ensure that materials such as sediment, fuel and oil do not enter watercourses and waterbodies;

i) The banks and flood plains of watercourses must be adequately protected from erosion using an applicable erosion prevention method as outlined in Section, "Erosion Prevention and Sediment Control"; and

j) A suitable buffer (refer to Section, "Buffer Zones" within this document) of undisturbed natural vegetation shall be left between the access road and the bank of any adjacent watercourse, unless otherwise specified. The typical buffer width shall be determined in consultation with the OSEM according to the following formula:

Buffer width (m) = 20 m + 1.5 x slope (%) (where slope >30%);

Refer to Section, "Buffer Zones" within this document for buffer widths related to temporary fuelling services or washing of equipment near watercourses or waterbodies.

11.16.1 Fording

When fording any watercourse, the DOEC Environmental Guidelines for Fording and the DFO fact sheet for Temporary Fording Sites shall be followed in conjunction with the following:

a) Areas of known or suspected spawning habitat shall be avoided;

b) Where feasible, crossings shall be restricted to a single location and made at right angles to the watercourse;

c) Equipment activity within the watercourse shall be minimized by limiting the number of crossings. Equipment shall only be in the watercourse during fording;

d) All equipment shall be clean and mechanically sound to avoid the introduction of oil, gasoline, and hydraulic fluids to waterbodies;

e) No servicing or washing of heavy equipment shall occur adjacent to a watercourse, waterbody, or ecologically sensitive area. These areas shall be identified on constraint mapping and shall be identified in the field by the OSEM;

f) In the case that the ford area is not natural bedrock or is easily disturbed by fording, the entire fording area shall be stabilized using vegetation mats, corduroy or coarse material (125 mm diameter or greater) when such material is available from a reasonably close location within the right-of-way, when the substrate of the ford area is not subject to easy disturbance by fording, or coarse material is not easily available within the right-of-way. Fording under existing substrate conditions may occur under the guidance of the OSEM;

g) Fording activities shall not decrease the depth of the watercourses to less than 20 cm. Where the existing depth is less than 20 cm, that depth shall be maintained;

h) Photographs of all ford sites shall be taken prior to and after the fording has been completed (as per applicable DOEC temporary water crossing permit conditions). The OSEM shall be responsible for collecting these photographs. However, the Contractor can collect these photographs in order to proceed with schedule if the OSEM is not available. The Contractor would then be responsible to provide these crossing site photographs to the OSEM within twenty-four (24) hours;

i) Waterbodies shall not be forded during high flow periods;

j) All bank sections, which contain erodible materials, shall be stabilized or avoided if possible. If banks must be sloped for stabilization, no material shall be deposited within the watercourse; sloping shall be accomplished by back-blading and the material shall be deposited above the high water mark of the watercourse; and

k) Proposed fording activities on waterbodies or watercourses visible on 1:50,000 scale maps shall require a permit from DOEC.

11.16.2 Culverts

In those locations where installations or upgrading of existing culverts are required, permits are required from DOEC.

The culverts used shall be sized to handle the 1-in-100 year return period flood (however design criteria may vary depending on Site-specific conditions and the length of time a culvert shall be used (i.e. temporary vs. permanent) and shall be constructed in accordance with the DOEC Environmental Guidelines for Watercourse Crossings and Culverts and the DFO operational statement for Culvert Maintenance, DFO fact sheets for Culvert Installations, as well as any applicable permits in place and their conditions. The following measures shall also be implemented:

Installation of Culverts

a) Install culvert(s) shall be in accordance with good engineering and environmental practices. Photographs of culvert installation are shown as Figures 10-9 and 10-10;

b) Proposed culvert installations on watercourses visible on a 1:50,000 scale map shall require a permit from DOEC;

c) Unless otherwise indicated, all work shall take place in dry conditions, either by the use of cofferdams or by diverting the stream with pumps and hoses. All work involving major

alterations to stream channels shall be carried out at a time of low flow and in a manner that prevents downstream sedimentation;

d) Cylindrical culverts shall be counter sunk when installed in fish habitat (as recommended by DFO) as such that the culvert bottom is one-third the diameter below the stream bed, in the case that culverts less than 750 mm outside diameter. For culverts greater than 750 mm outside diameter, the culvert bottom shall be installed a minimum of 300 mm below the streambed;

e) If two (2) culverts are to be installed at one (1) location, one culvert shall be installed at an elevation lower than the other one. A maximum of two (2) culverts are allowed at one (1) location;

f) The natural low flow regime of the watercourse shall not be altered; culverts shall not disrupt flow of water or cause ponding at the upstream side of the installation;

g) A culvert shall not be installed before site-specific information such as localized stream gradient, fish habitat type and species present have been evaluated, as required;

h) Photographs of all culvert installations shall be taken prior to and after the installation has been completed (as per applicable DOEC temporary water crossing permit conditions). The OSEM shall be responsible for collecting these photographs. However, the Contractor can collect these photographs in order to proceed with schedule if the OSEM is not available. The Contractor would then be responsible to provide these crossing site photographs to the OSEM within twenty-four (24) hours;

i) Inlet and outlet areas shall be adequately protected from erosion by installing erosion prevention structures as outlined in Section, “Erosion Prevention and Sediment Control”;

j) When rock energy dissipaters are utilized at culvert outlets, proper fish passage must be ensured. Both upstream and downstream fish passage shall be provided and maintained post-construction;

k) Culverts shall be of sufficient length to extend a short distance beyond the toe of the fill material;

l) Backfill material shall be of texture that shall support the culvert and limit seepage and subsequent washing out;

m) Culverts shall be aligned such that the original direction of streamflow is not significantly altered and the gradient at the culvert follows the stream channel gradient to the extent possible. Infilling or reduction of the natural cross-sectional area of the watercourse shall not be permitted;

n) Fill, construction debris, and mulched debris shall be removed from the culvert area to a location above the peak flow level to prevent its entry into the watercourse;

o) Construction activity shall be confined to the immediate area of the culvert;

p) Fill material shall not be removed from streambeds or banks, except when removal of material is necessary to ensure a flat foundation for installing a culvert;

q) The use of heavy equipment in watercourses or bodies of water shall not be permitted;

r) Culverts shall be marked to indicate their position under the snow;

s) As required, cofferdams of non-erodible material shall be installed above and below work areas to separate them from the watercourse when excavating for culverts and footings. All sandbags used in construction must be accounted for and removed after work is completed. Where pumping is used to bypass flow, pumps shall have sufficient capacity to prevent washout of the cofferdams. Refer to DFOs fact sheet for Instream Work in the Dry – Cofferdams;

t) Cofferdams shall be removed upon completion of construction and the streambed returned as closely as possible to its original condition;

u) Water pumped from work areas or other runoff must have sediment and turbidity removed by settling ponds, filtration, or other suitable means before discharging to a waterbody;

v) The release of sediment laden water into a waterbody, watercourse or ecologically sensitive area, due to construction activities, shall comply with applicable discharge guidelines as presented in the *Newfoundland and Labrador Environmental Control Water and Sewage Regulations, 2003* under *the Water Resources Act*;

w) With respect to maintenance of water quality within receiving waterbodies on and around the Site, the *CCME Canadian Water Quality Guidelines for the Protection of Aquatic Life* shall be used; and

x) Culvert installations shall not require a DFO review when the following conditions are met (unless the culvert installations are within fish habitat):

   i) The work does not include realigning the watercourse, installing a culvert liner or support struts, replacing damaged or destroyed bevels ends, or extending/replacing the existing culvert;

   ii) Explosives are not used to remove debris; and

   iii) The work does not include any dredging, infilling (e.g., filling scour pools) or excavation of the channel upstream or downstream of the culvert.

Culvert Upgrading/Maintenance

Culvert maintenance includes the removal of accumulated debris (e.g., logs, boulders, garbage, and ice build-up) that prevents the efficient passage of water and fish through the structure, as well as reinforcement of eroding inlets and outlets. The following measures shall be implemented when upgrading/maintaining culverts:

a) In locations where upgrading and/or alterations are required for an existing culvert at the Site, the mitigation measures listed above for installation of a culvert shall be reviewed and followed, as applicable;

b) Culverts shall be inspected regularly so that immediate action can be taken to clear blockages caused by ice or debris and to identify any apparent problems, such as erosion, which may require remedial action;

c) An inspection of culverts shall be made during and after major floods to observe the culvert operation and record high water marks. Conditions which require corrective maintenance shall be noted, including debris accumulations, sedimentation, erosion, piping, scour, and structural damage and reported if applicable;

d) Culverts which have been damaged by ice or debris by improper installation or construction procedures, or are in a condition, which could impair their proper functioning, shall be replaced immediately to prevent overtopping, erosion, or flooding; and

e) Access for maintenance shall be provided, especially where debris control structures are installed. Such access shall not disrupt the Site rehabilitation efforts.

Figure 11-7 - Example of Well Installed Culvert

Figure 11-8 - Example of Culvert Installation

11.16.3 Bridges

a) Environmental protection measures outlined above, which are applicable to bridge construction and maintenance, shall be adhered to;

b) Any proposed bridge installations require a permit from DOEC;

c) Photographs of all bridge installations shall be taken prior to and after the installation has been completed (as per applicable DOEC temporary water crossing permit conditions). The OSEM shall be responsible for collecting these photographs. However, the Contractor can collect these photographs in order to proceed with schedule if the OSEM is not available. The Contractor would then be responsible to provide these crossing site photographs to the OSEM within twenty-four (24) hours;

d) During bridge construction all applicable guidelines shall be adhered to, including, but not limited to: DOEC Environmental Guidelines for Bridges and Watercourse Crossings, DFO Clear Span Bridges Operational Statement, DFO Fact Sheet for Temporary Bridges, and DFO Fact Sheet for Bridge Construction/Demolition;

e) To safely convey peak flows, permanent bridges shall be designed for a hundred (100) year return period streamflow;

f) Temporary bridges shall consider the following basic design criteria:

   i) Hydraulic design shall be based on the 1:2 year storm event, or as applicable in DOEC permit conditions;

   ii) Abutment logs shall be placed a minimum of 1 meter from the top of the bank;

   iii) Deck height shall be a minimum of 250 cm above the bank height; and

   iv) Deck height shall be a minimum of 450 cm above the water surface at the time of installation.

f) Each installation shall take into consideration site-specific conditions and appropriate criteria shall be accepted by the OSEM;

g) The upstream and downstream sides of abutments must be protected with erosion prevention structures as outlined in Section, “Erosion Prevention and Sediment Control” within this document, to prevent erosion and scouring;

h) Roadside embankments near the watercourse shall be adequately protected from erosion by installing applicable erosion prevention structures as outlined in Section, “Erosion Prevention and Sediment Control”;

i) Adequate erosion protection as per Section, “Erosion Prevention and Sediment Control”, shall be provided where roadside ditches discharge into the watercourse near the bridge;

j) Abutments and piers shall be constructed in the dry and where possible during times of low flow;

k) During construction of concrete components, formwork shall be constructed to prevent any fresh concrete from entering bodies of water. Dumping of concrete or washing of tools and equipment in any body of water is prohibited;

l) Periodic maintenance such as painting, resurfacing, clearing of debris, or minor repairs, shall be carried out without causing any physical disruption of the watercourse. Care shall be taken to prevent spillage of pollutants into the water;

m) All waste materials shall be disposed of in accordance with all regulations and approvals;

n) All areas affected shall be returned to a state that resembles local natural conditions; and

o) During rehabilitation activities following the end of construction, all temporary bridges shall be removed. All crossing sites shall be inspected by the OSEM for satisfactory site rehabilitation with respect to bank slopes and in-stream conditions.

11.17 BUFFER ZONES

Environmental Concerns

The potential for erosion/sedimentation, spills, and resulting effects on water quality, fish and fish habitat are key environmental concerns associated with construction activities. In addition, sensitive and rare environmental receptors (e.g., raptor nesting sites, archaeological/historic resources) require protection from activities associated with construction.

Buffer zones of natural vegetation or undisturbed areas that separate these environmental receptors from construction activities are needed to mitigate adverse environmental effects. These undisturbed areas may also provide wildlife habitat and/or travel corridors near work areas and Project features.

Due to the many buffer zones referenced in various government documents and others that may be stated in regulatory permits yet to be obtained, the appropriate buffer zone to use in a specific area may vary over time. Therefore, the OSEM shall be the only Site Personnel to determine which buffer is applicable, and Contractors shall be required to consult with these individuals prior to establishing buffers. The policy for Land and Water Related Developments in Protected Public Water Supply Areas shall be adhered to.

For general guidance, the following procedures shall define the minimum requirements during construction.

Environmental Protection Procedures

a) DFO recommends buffer zones to separate areas of land disturbance/roadways from waterbodies shall be calculated by the following formula:

Buffer Width (m) = 20 m + 1.5 x slope (%) (where slope >30%);

b) In the vicinity of a Public Protected Water Supply Area (PPWSA), the following activities shall not be conducted by NL Hydro, unless otherwise approved by the Engineer and NLDOEC Water Resources Management Division:

i) Placing, depositing or discharging or permitting the placing, depositing or discharging into a body of water, any sewage, refuse, chemicals , and industrial wastes or any other material which impairs or has potential to impair water quality;

ii) Using an intake pond, lake or specified buffer zones for any activity detrimental to water quality;

iii) Using ice covered waterbody for transporting logs, riding skidoos/motor vehicles/all-terrain vehicles, or any other activity, which impairs or has potential to impair water quality;

iv) Using or operating existing facilities in such a manner which impairs or has potential to impair water quality;

v) vehicle maintenance facilities, warehouses, and chemicals storage areas;

vi) Storage and disposal of pesticides, and application of chemicals in specified buffer zones;

vii) Mechanical clearing of forest in sensitive areas (manual clearing shall be conducted in the PPWSA), establishment of camps and camp facilities, and storage of chemicals;

viii) Activities, operations or facilities associated with aggregate extraction, maintenance facilities, washing of aggregates, asphalt plants, discharge or deposit of waste material into a body of water;

ix) Application of herbicides in the right-of-way, and use of chemically treated utility poles and other related structures; and

x) Creation and operation of waste disposal facilities.

c) A minimum buffer zone of natural vegetation 20 m from the high water mark of waterbodies, watercourses and ecologically sensitive areas shall be maintained around work areas, where available space poses a constraint, except where specified otherwise. If space available, then wider buffer zones of 100 m shall be maintained between construction areas and watercourses, waterbodies and ecologically sensitive areas (Figure 10-9 shows a typical buffer zone being protected by tarp fencing);

Figure 11-9 - Tarp Fence Outlining a Vegetation Buffer Zone

d) Sediment control devices shall be constructed outside buffer zones, as required. These devices are required to control runoff from areas of exposed soils and prevent transport of sediments towards waterbodies. Section, "Erosion Prevention and Sediment Control" outlines all acceptable sediment control measures;

e) All aircraft must maintain a 300 m vertical and horizontal buffer from known active raptor nests;

f) No clearing shall take place within 800 m of an active raptor nest;

g) For all work activities other than clearing, a 200 m buffer shall be respected for active raptor nests. Within this 200 m buffer zone the following applies, after consultation with the Provincial government:

   i) Only essential vehicular activity shall be permitted;

   ii) Work shall only be permitted in the presence of the OSEM; and

   iii) Crews shall cease work if there is a disturbance at a nest until activity at the nest has returned to normal; work shall not commence again until approval from the OSEM.

h) Crews shall not establish a permanent or temporary camp within 800 m of a known raptor nest;

i) Helicopters moving during spring and fall staging periods (typically May or September) shall maintain a minimum altitude of 500 m from concentrations of waterfowl;

j) For known harlequin duck nesting areas, a 100 m buffer of natural vegetation shall be maintained along the river's edge during their breeding, nesting and staging times (May through September). A 30 m buffer shall be maintained outside the sensitive nesting season. Clearing and construction within these buffers during the specified times shall not occur unless otherwise authorized;

k) Buffer zones for other bird species not indicated in this document are outlined in the Avifauna Management Plan and shall be respected;

l) A minimum buffer zone of 100 m shall be maintained from the high water mark of waterbodies, watercourses and ecologically sensitive areas around any bulk fuel storage activities;

m) The typical buffer zone for quarries and borrow pits in relation to a waterbody is 100 m. In some instances, the development of quarries and borrow pits shall be allowed within this 100 m buffer zone, however applicable permits from regulators shall be required, as well as consultation with the Site Environmental Manager;

n) A minimum buffer zone of 50 m shall be maintained around any archaeological site. The size of buffer zones may increase or decrease depending on the type of site and the buffer zone shall be determined by the Provincial Archaeology Office (PAO). Where the site has been designated for recovery and/or recording, the buffer zone shall be maintained until it has been cleared with the OSEM. Where available space poses constraints, this width may be reduced and supplemented by other protective measures. Site-specific mitigative measures for known historic resources in the Project area are addressed within Section, Historic or Archaeological Resources";

o) Buffers for working around caribou are outlined in Section, "Wildlife Protection"; and

p) Table 11-2 provides a summary of recommended buffer zones.

Table 11-2 - Recommended Buffer Strips for Various Activities

Activity	Environmental Receptor	Recommended Width (m) of Buffer Strip
Handling, use and storage of bulk fuels (> 2000L)	Waterbody	100 m
Storage and handling of small quantities (<2000L) of fuel in appropriately contained areas and with adequate spill response	Waterbody	30 m
Handling and use of fuels (including transfer and fuelling of equipment). Storage of fuel in containers ≤25L	Waterbody	15 m
Clearing of Vegetation	Waterbody	20 m (+1.5 x slope (%) where >30%)
	Active Raptor Nests	800 m (between May 1 to August 15)
Other Work Activities	Active Raptor Nests	200 m (between May 1 to August 15)
Aircrafts	Active Raptor Nests	300 m (vertical and horizontal)
	Waterfowl and Harlequin Duck Concentrations	500 m vertical distance
Quarrying and Aggregate Removal from Borrow Areas	Waterbody	100 m

Activity	Environmental Receptor	Recommended Width (m) of Buffer Strip
All Activities	Archaeological sites	50 m
Cutting	Scheduled Salmon Rivers	30 m
Cutting	Black Bear Denning Sites (Late October – Late April)	50 m
Cutting/Construction	Harlequin Duck	100 m during nesting, breeding and molting seasons (Early May through September) 30 m outside the sensitive time
Cutting/Construction	Active waterfowl/waterbird nests (species not of management concern)	100 m
Cutting/Construction	Active passerine nests (species not of management concern)	30 m
Cutting	Waterbody occupied by a beaver	30 m

11.18 ALTERATIONS TO A BODY OF WATER/INSTRAM WORKS

Environmental Concerns

The environmental concerns associated with alterations to a body of water include direct disturbance to, or mortality of, fish, disturbance to waterfowl, and loss of fish habitat caused by sedimentation and removal of substrate, and disturbance to stream bank vegetation. Typical alterations to a body of water include fording, bridges and culverts. However other less common alterations include cofferdams, pumping and stream diversions. Fording, bridges and culverts have been discussed in Section, watercourse Crossing – Fording, Culverts and Bridges", therefore this section shall concentrate on cofferdams, pumping and stream diversions.

Environmental Protection Procedures

a) Any work within 15 m of a waterbody visible on a 1:50,000 scale map shall require a permit from DOEC;

b) Erosion stabilization methods and effective sedimentation control practices shall be implemented when required, and these shall conform to requirements, guidelines, and principles contained in DFO Factsheets, Operational Statements, DOEC Environmental Guidelines and specific requirements of regulatory permits and approvals;

c) Two (2) cofferdams or a square type structure shall be used for best results. The first cofferdam shall be upstream of the construction area and shall keep the construction area dry and provide a basin for water to be pumped. The second cofferdam shall be downstream of the construction area and shall prevent any sediment laden water that may have accumulated in the construction area from discharging directly into the watercourse;

d) Pumping the water shall commence prior to starting intrusive work to prevent the river from being silted as water passes the work area. When a watercourse is too large to divert by other measures, part of the river may be blocked off to allow work to take place in dry conditions. One third the width of the watercourse or less shall be blocked at any time in order to ensure efficient remaining capacity in the channel to safely accommodate flow without causing excessive high velocity, erosion or overtopping of banks. A dewatering plan shall be developed prior to dewatering activities;

e) An alternative means of isolating the work area shall be to construct a temporary diversion channel lined with plastic sheeting or an impermeable material. The channel shall be designed to handle the predicted flows of the watercourse. Figure 10-10 shows the typical use of a cofferdam in a river and Figure 11-11 shows an illustration of a stream diversion coupled with the upstream and downstream cofferdams;

Figure 11-10 - Cofferdams Surrounding Work Area

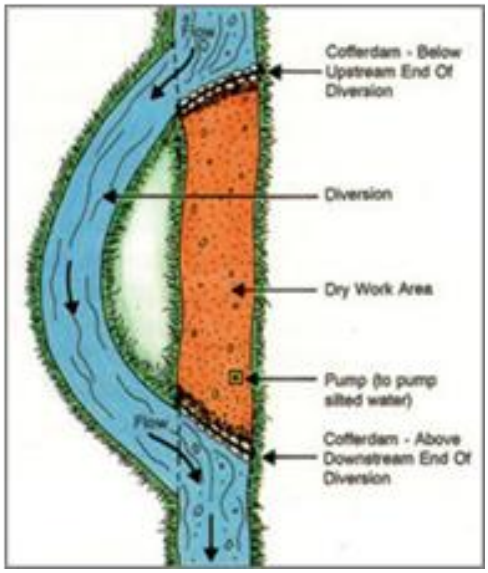

Figure 11-11 - Illustration of Stream Diversion and Cofferdams

f) Floating silt curtains or suitable alternative shall be used to contain and control the dispersion of turbidity and sediment when working in or near a waterbody;

g) The curtain shall be located beyond the lateral limits of the construction site; the alignment shall be as close as possible to the activities but not so close as to be disturbed by the construction equipment;

h) The curtain shall be firmly anchored in place by posts;

i) The Contractor shall remove built up sediment and debris as required; if the fabric becomes clogged it shall be replaced; and

j) The following applies for fish habitat and relocation:

   i. A license to conduct fish sampling/collection permits shall be obtained from DFO prior to any sampling, collection or relocation activities;

   ii. The waterbody shall be de-watered using a screened pump, which shall be deployed on a floating structure near the deepest portion of the pond/river. The pump shall be monitored during all de-watering. Water shall be directed to a vegetated area so that any sediment carried by the pump shall be further filtered through vegetation before reaching another waterbody. The pumped water and the screen shall be monitored for fish during all pumping. Optimally, the pond shall be reduced to a small containment area capable of being electrofished/ seined by boat;

   iii. If soft sediment moves toward the deeper part of the area during draw-down, this shall effectively reduce the size of the area and shall require careful monitoring of water levels so that too much water is not removed hence trapping all fish in a thick layer of sediment;

   iv. Electrofishing inside the small containment area left after de-watering shall be conducted by a small boat so as to reduce the amount of sediment disturbance. Other techniques shall be available should electrofishing become inefficient due to increased sediment disturbance (e.g. seining and/or casting net). The boat shall be of a non-conducting material so that the electrofisher shall not short out (e.g. zodiac, fibreglass/plastic canoe). A second small boat shall be used to transport any captured fish to shore so that disturbance of bottom sediment is minimized. This boat shall be moved between the shore and collection boat by ropes. This may be modified in the field as necessary;

   v. Water temperature shall be another critical factor in successful relocation of all fish, as the reduced pond shall warm relatively quickly. Optimally, it would be desirable to begin collection of fish in the early morning hours. Coordination of the draw-down shall be conducted to ensure this can occur. Water temperature shall be monitored continually and any exceedance of the Experimental License requirement shall mean a stop in collection, is required. However, this may be a field-call as pausing once the pond is

reduced may cause more harm than completing the relocation. This situation shall be avoided;

vi. Monitoring shall include recording water temperatures, dissolved oxygen levels, pH, and visual observations of stress and/or overcrowding. If signs of stress and/or overcrowding are observed, additional measures may be required;

vii. Once the pond has been de-watered, the small containment area shall be electrofished, seined, and/or netted to remove any remaining fish;

viii. All fish shall be contained in 20 litre buckets for transport to the release point. Each bucket shall be relocated once five fish are exceeded or thirty minutes have passed so that stress is avoided;

ix. All fish shall be acclimatized prior to release. Each bucket shall be laid into the receiving water so that water temperatures between both are equal (measured using thermometers). Once acclimated, fish shall be released;

x. An estimate of the length of each fish shall be obtained in order to calculate the total weight of the fish;

xi. Experienced personnel shall be responsible for capture and release of the fish. The person responsible for capture shall be familiar with all equipment and shall be able to adjust the voltage on the electrofisher as water levels and conductivities change. They shall also be able to detect signs of fish stress. The person responsible for fish release shall be experienced in acclimating fish and monitoring their health. They shall also be able to estimate fish species and lengths;

xii. If dewatering is required as part of the execution of work, a dewatering plan shall be developed as part of the C-SEPP; and

xiii. Stream diversion (pumps/diversion channels) shall be provided for fish passage for projects of longer duration – DFO regulations for instream works shall be adhered to.

11.19 GRUBBING AND DISPOSAL OF RELATED DEBRIS

Environmental Concerns

The principal concerns associated with grubbing and disposal of related debris are the potential effects of erosion and sedimentation on marine and freshwater ecosystems and water quality.

Environmental Protection Procedures

All grubbing and disposal of related debris near watercourses shall adhere to relevant regulatory requirements, including the permits from DOEC and the formal “Letters of Advice”, “Operational Statements”, and/or Authorizations for Works or Undertakings Affecting Fish Habitat from the Fisheries and Oceans Canada.

Other specific measures to be undertaken to minimize potential effects on aquatic habitat and resources are as follows:

a) Grubbing of the organic vegetation mat and/or the upper soil horizons shall be minimized (shall not occur within 2 m of standing timber). These shall be left in place where possible. Limits of stripping and/or grubbing shall be shown on all drawings issued for construction;

b) The organic vegetation mat and upper soil horizon material, which has been grubbed, shall be spread in a manner that attempts to cover exposed areas. Any surplus material shall be stored or stockpiled for site rehabilitation and re-vegetation purposes elsewhere in the Project area. Topsoil and peat shall be stockpiled separately from the overburden and separated by a buffer zone (refer to Section, "Buffer Zone") from any waterbodies, watercourse or ecologically sensitive areas. The location of the stockpiles shall be shown on drawings issued for construction and accessible for future rehabilitation purposes;

c) A minimum of 5 metres should separate stockpiles of grubbed material from standing timber;

d) Grubbed material and/or topsoil shall be stored in low piles to decrease the effect of compaction on structure. Stockpiles of topsoil should be seeded or otherwise protected using erosion control methods as outlined in Section, "Erosion Prevention and Sediment Control" to prevent erosion and loss of nutrients. This is especially important if stockpiles are to remain in place for periods of a year or more;

e) Erosion prevention and sediment control measures shall be installed to minimize and control runoff soil erosion and transport of sediment laden water during grubbing and the re-spreading and stockpiling of grubbed materials. Section, "Erosion Prevention and Sediment Control" outlines all acceptable prevention and control methods (i.e. use of sediment ponds);

f) Where grubbed materials are re-spread or stockpiled, as many stumps and roots as possible shall be left in place to maintain soil cohesion to dissipate the energy of runoff and promote natural re-vegetation;

g) The length of time that grubbed areas are left exposed to the natural elements shall be minimized to prevent unnecessary erosion. These areas shall be monitored for erosion and such findings shall be reported to the OSEM;

h) During grubbing, care shall be taken to ensure that grubbed material shall not be pushed into areas that are to be left undisturbed (Figures 11-12 and 11-13 show examples of grubbing activities and a grubbed right-of-way);

i) Grubbing shall be avoided on steep slopes near watercourses. A buffer zone shall be maintained between grubbed areas and watercourses, waterbodies and ecologically sensitive areas (refer to Section, "Buffer Zones"). Grubbing limits adjacent to watercourses shall be flagged in the field prior to undertaking grubbing/stripping activities;

j) Grubbing and other debris shall not be permitted to enter any watercourse;

k) Bog and other wet material that is excavated from the site shall be piled and graded on well drained ground in low piles. The piles shall be seeded or otherwise protected using erosion control methods as outlined in Section, "Erosion Prevention and Sediment Control"; and

l) Where the piles are in the transmission line right-of-way they shall not impede access to the line for future maintenance or access.

Figure 11-12 - Example of Grubbing Activities

Figure 11-13 - Example of Grubbed and Cleared Path

11.20 QUARRYING AND AGGREGATE REMOVAL FROM BORROW AREAS

Environmental Concerns

The principle concerns for quarry development and associated aggregate removal include the potential for impacts on aquatic systems, noise, dust, loss of terrestrial habitat and historic resources, potential quarry development/rehabilitation plans.

Environmental Protection Procedures

The following measures shall be implemented to minimize these effects:

a) Permits to quarry shall be obtained from the NL Department of Natural Resources before quarries are established. Quarry activity shall be undertaken in compliance with these quarry permits and shall comply with all other relevant regulations;

b) Noise control procedures shall be followed (refer to Section, “Noise Control”);

c) Quarries shall not be located 100 m from a waterbody unless otherwise approved by the Department of Natural Resources. If approved, additional mitigative measures may be required;

d) The development of quarry sites and rock excavations shall require monitoring to determine the absence or presence of sulphide bearing rock. For environmental protection against Acid Rock Drainage (ARD), the OSEM shall visually inspect bedrock before, during, and after excavation work on a periodic basis. Visible evidence of ARD is typically a yellowish colour of water or sediment called yellow boy or evidence or sulphides in rock. In the event that visible evidence of ARD is noted, the OSEM shall be notified immediately. Photographs of yellow boy and sulphides (Figures 11-14 – 11-17) are shown below;

Figure 11-14 - Photograph of Yellow Boy Water Runoff

Figure 11-15 - Photograph of Yellow Boy Water Runoff

Figure 11-16 - Typical Sulphides in Rock

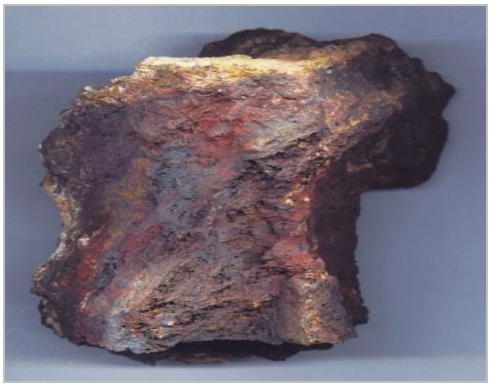

Figure 11-17 - Typical Sulphides in Rock

e) Quarry areas shall be developed in a controlled manner so as to minimize potential environmental effects and locations shall consider sensitive wildlife areas. The following protection procedures shall be implemented to minimize disturbance and facilitate rehabilitation:

   i) A buffer zone of undisturbed vegetation shall be maintained between borrow areas/quarries and watercourses, waterbodies and ecologically sensitive areas (refer to Section, “Buffer Zones”);

   ii) The quarry area, stockpile area and limits of clearing shall be staked and/or flagged to prevent over-extension of the development, (corner posts at least 1 metre high above ground shall be installed to mark the quarry area);

   iii) The area to be excavated shall be clear cut of all vegetation prior to grubbing, excavation or removal of any material. Only the area necessary for one (1) year production shall be cleared;

   iv) All stumps, organic matter and topsoil shall be stripped from the area to be excavated and stockpiled at least 5 m from uncleared areas; stockpiles shall be kept at least 10 m

from the area of excavation; separate overburden piles shall be developed where this material is present; topsoil and the underlying overburden shall not be mixed (refer to Section "Grubbing and Disposal of Related Debris");

v) Stockpile areas are to be confirmed by the OSEM, prior to stripping;

vi) Upon completion of excavation of a quarry, no cliff faces or benches shall be left at a height of greater than 5 m. Available material left over from quarrying and stockpiled overburden shall be used to minimize slopes and face heights and to rehabilitate the area;

vii) Each quarry shall be evaluated by the OSEM on a site-specific basis to determine whether the cliff faces shall be converted to rubble slopes; and

viii) Following sloping, the topsoil and any organic materials shall be re-spread over the disturbed area to promote natural re-vegetation by adjacent seed sources.

f) In order to prevent sedimentation of waterbodies, watercourses and ecologically sensitive areas, sediment control measures (basins and traps) shall be established, if required, and cleaned on a regular basis, as required, to ensure that the designed retention capacity is maintained at all times. Section, "Erosion Prevention and Sediment Control" outlines all acceptable sediment control measures;

g) The Total Suspended Solid (TSS) content of construction-altered water that is released into a natural waterbody shall not exceed 30 milligrams per litre[4] and be in compliance with *Environmental Control Water and Sewage Regulations, 2003*;

h) With respect to maintenance of water quality within receiving waterbodies on and around the site, the *CCME Canadian Water Quality Guidelines for the Protection of Aquatic Life* shall be used;

i) The pH level of construction-altered water that is released into a natural waterbody shall be between 5.5 and 9 pH units and be in compliance with *Environmental Control Water and Sewage Regulations, 2003*;

j) Dust from aggregate processing, storage and handling shall be controlled with water as required during times when temperatures are above freezing. A Water Use License must be obtained from the Water Resources Management Division;

k) If crushing activities in the quarry require a water source, a license from the DOEC, Water Resources Management Division, shall be obtained prior to any water use; and

l) Quarry operations shall consider sensitive wildlife periods as outlined in Section, "Scheduling and Timing of Construction Activities".

[4] If water is being abstracted from a watercourse, used, treated and subsequently returned to the same watercourse, these solids data mean that the effluent should not contain more than 30 milligrams per litre more than was in the water originally abstracted.

11.21 TRENCHING

Environmental Concerns

Where linear excavations for the construction of water lines or any other infrastructure is undertaken, potential runoff of sediment-laden water could result in effects on marine or freshwater fish and fish habitat, water quality and historic resources.

Environmental Protection Procedures

The following measures shall be implemented to minimize the potential effects of trenching:

a) Topsoil and excavated overburden and bedrock shall be stored in separate stockpiles for later use during rehabilitation;
b) Any unsuitable material shall be disposed of in a disposal area to be confirmed by the OSEM;
c) Dewatering of trenches, as outlined in Section, Dewatering Work Areas" shall make use of measures to minimize and control the release of sediment laden water through the use of acceptable sediment control measures as outlined in Section, "Erosion Prevention and Sediment Control"; and
d) Backfilling of linear trenches shall allow for settlement to ensure that the finished grade of the trench is level with the surrounding surface.

11.22 EXCAVATION, BACKFILLING AND GRADING

Excavation, backfilling and grading of common rock and other materials may be required at various locations within the Project Site.

Environmental Concerns

The principal environmental concerns associated with excavation, backfilling and grading are potential effects on water quality and fish and fish habitat due to runoff of sediment laden water. Potential disturbance to rare species and habitat and archaeological resources must also be taken into account.

Environmental Protection Procedures

All work shall be conducted in a manner that ensures the minimum amount of disturbance necessary and controls potential sedimentation of watercourses and waterbodies in or adjacent to the work areas as outlined in the following procedures:

a) Excavation, backfilling and grading shall be done only after grubbing and stripping is completed. Where engineering requirements do not require grubbing and stripping (e.g., within the buffer zone of a stream crossing), filling shall occur without any disturbance of the vegetation mat or the upper soil horizons;
b) Excavation, backfilling and grading in the vicinity of stream crossings shall be done in a manner that minimizes erosion and sedimentation of watercourses and waterbodies; and

c) A buffer zone of undisturbed vegetation shall be maintained between construction areas and all watercourses, waterbodies and ecologically sensitive areas (refer to Section, “Buffer Zones”).

11.23 EROSION PREVENTION AND SEDIMENT CONTROL

Environmental Concerns

The potential for erosion and resulting effects to water quality and fish and fish habitat is a key environmental concern associated with construction activities. The following (Figures 11-18 and 11-19) show sediment runoff situations that can be avoided by following the environmental protective measures herein.

Figure 11-18 - Sediment Plume in Water

Figure 11-19 - Sedimentation on Land

Environmental Protection Procedures

Erosion prevention and sedimentation control shall be a main objective in all work areas where soil may be transported by water, wind, or ice. Storm water discharge into any waterbody showing on 1:50,000 mapping shall require a DOEC permit under the Water Resources Act.

11.23.1 Erosion Prevention

The primary way to control erosion is to prevent activities that can contribute to it. However, specific erosion control measures may be required to be designed for the site to minimize the effects of construction activities on the environment. Options for erosion prevention are discussed in the following sections.

11.23.1.1 Discussion of Erosion Control Options

Slope Treatments

Several slope treatments can be used to reduce erosion. Slope treatments are used prior to seeding for vegetation growth. Roughening a slope with horizontal depressions helps control erosion by creating safe seeding sites, therefore increasing vegetation, reducing runoff velocity, and increasing infiltration. The depressions also trap sediment on the face of the slope. The amount of roughening required depends on the steepness of the slope and the type of soil. Stable, sloping rocky faces may not require roughening or stabilization, while erodible slopes require special surface roughening. Roughening methods include stair-step grading, grooving, and tracking. All three (3) methods are shown in Figures 11-20 to 11-22.

Figure 11-20 - Photograph of Grooving Slope Treatment Method

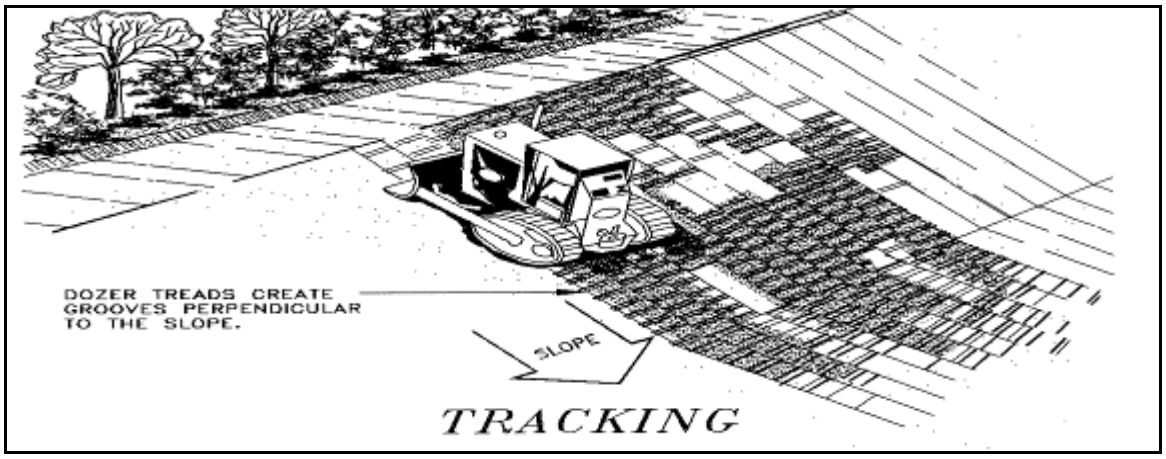

Figure 11-21 - Illustration of Tracking Slope Treatment Method

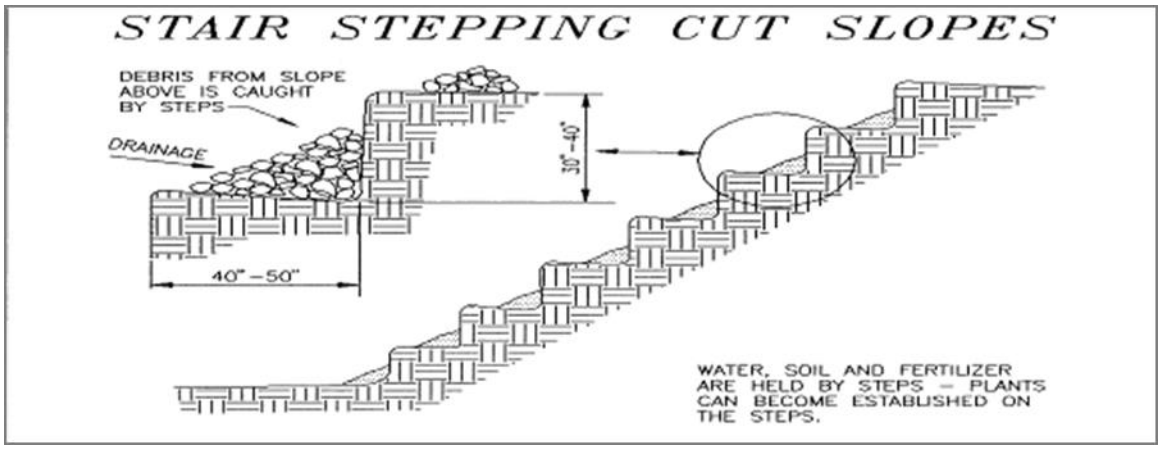

Figure 11-22 - Illustration of Stair Stepping Slope Treatment Method

Erosion Control Nets/Mats/Blankets/Fibrous Rolls

Erosion control blanchets are temporary protective barriers laid on top of bare soil vulnerable to erosion, commonly made of mulch, wood fibre, straw or synthetics. They are typically used on short steep slopes where there is a high erosion potential and slow vegetation establishment. Rolled erosion control products (recps) are manufactured mulch blankets (see Figure 11-23) that protect soil from erosion and turf reinforcement mats (trms) are used to help establish vegetation in channels.

Figure 11-223 - Photograph of Erosion Control Blanket used on a Slope

Erosion control nets are typically synthetic textiles or nets that degrade over time. The nets are woven to permit plants to take root through the holes in them. They also act as a medium to retain water for longer period of time. Different grade of nets are used based on the topography of the ground. The more closely knit nets can be used to curtail erosion in steep areas, while the more loosely knit nets can be used in flatter terrain. Installation of erosion control mats and blankets shall take into consideration the criteria listed in Section, "Design criteria and installation procedures for Erosion Control Measures".

Fibre rolls serve as barriers between up-gradient construction and down-gradient waterbodies. Fibre rolls are installed on slopes in line with one another with one at the base of the slope. The space between each row of fibre roll is dependent on the steepness of the slope. The steeper the slope, the more rows of evenly spaced horizontal rolls is required. Fibre rolls are fastened to the ground with wooden stakes. Figures 10-24 and 10-25 show some of the methods of erosion control.

Figure 11-34 - Photograph of Fibre Rolls used to Stabilize

Figure 11-25 - Photograph Shows Erosion Control Blanket on Slope And Erosion Control Mat in Channel

Rip Rap

Rip rap can be used as an erosion-resistant ground cover and when installed properly it reduces runoff velocity and increases infiltration. Rip rap typically works well on river banks and/or bottoms, roadside ditches and tops of slopes. A non-woven geo-textile liner should be used at the top of the channel to prevent migration of fines. Rip rap placement shall follow criteria listed in Section, "Design criteria and installation procedures for Erosion Control Measures" and applicable construction specifications and drawings. Figure 11-26 shows properly placed rip rap while Figure 11-27 shows poorly placed rip rap with geotextile exposed.

Figure 11-26 - Photograph of Rip Rap Placed Along a Slope

Figure 11-27 - Photograph of failed Rip Rap Protection a Slope

Check Dams and Dikes

Check dams and dikes are temporary barriers that are typically constructed of rocks, gravel bags, sandbags or fibre rolls that are installed across a constructed swale or drainage ditch to reduce water velocity. They are placed in areas where runoff erosion has occurred or where runoff needs to be diverted or channelled. They are not designed to stop the water, but to slow it down. Check dam and dyke installation shall follow the criteria listed in Section, "Design criteria and installation procedures for Erosion Control Measures" and applicable construction specifications and drawings.

Check dams shall be maintained and inspected periodically, as well as unscheduled inspections prior to, and after, a significant rainfall event, anticipated heavy precipitation or runoff event (e.g. snowmelt). Removal of sediment from check dams shall be conducted as required, in order to ensure that the dam continues to perform its design function of reducing the amount of sediment present in the runoff. Photographs of rock constructed check dams are shown below in Figures 11-28 and 11-29.

Figure 11-4 - Photograph of Rock Constructed Check Dam

Figure 11-29 - Photograph of a Rock Constructed Dike

Energy Dissipaters

Energy dissipaters (or outlet protection devices) are devices that are installed on the downstream end of a culvert or outlet and are used to reduce the velocity of the water flow. Energy dissipaters are typically made of rocks (rip rap apron); however they can be man-made devices such as concrete blocks or metal prongs. Energy dissipaters required for fish bearing waters shall be of natural means (not man-made). Energy dissipaters require engineering design to accommodate the velocity and volume of flow and shall follow the criteria listed in Section, "Design criteria and installation procedures for Erosion Control Measures" and applicable construction specifications and drawings. Figure 11-30 shows properly constructed or placed energy dissipaters while Figure 11-31 shows improperly placed rocks as energy dissipaters.

Figure 11-30 - Correct Construction of Rock Energy Dissipaters

Figure 11-31 - Incorrect Construction of Rock Energy Dissipaters

11.23.1.2 Design Criteria and Installation Procedures for Erosion Control Measures

Design criteria and installation procedures for applicable options discussed above are listed below. Reference shall be made to these criteria if either of these options is deemed suitable for site-specific conditions.

Straw Mats

Design criteria and installation procedures for applicable options discussed above are listed below. Reference shall be made to these criteria if either of these options is deemed suitable for site-specific conditions.

Straw Mats

a) Straw mats shall be applied at a rate of 3000 to 8000 lb/acre;
b) Soil shall be visible through the straw mat (not too heavily applied);
c) Straw shall be applied by blower or by hand; and
d) Straw shall be anchored to prevent it from blowing away.

Wood Fibre Mulch

a) Preferable on steep cut slopes of 2H:1V or steeper; and
b) Wood fibre mulch shall be applied at a rate of at least 1000 lb/acre (increasing the rate of application shall increase effectiveness).

Rolled Erosion Control Products (RECPs)

a) May be used for gradients of 2.5H:1V or steeper;
b) Shall be installed on unfrozen ground;
c) Slopes shall be top soiled and seeded prior to placing RECP;

d) Blankets shall be in full contact with the soil by properly grading soil, removing rocks or deleterious materials, prior to placing blanket;

e) In channels, blankets shall extend above the anticipated flow height, with a minimum 0.5 m of freeboard;

f) For Turf Reinforcement Mat (TRM), blanket shall be placed immediately after top soiling;

g) Blanket shall be anchored by using wire staples, metal geotextile stake pins, or triangular wooden stakes; and

h) Blankets shall be placed parallel to direction of flow, with fabric not stretched but maintaining contact with underlying soil.

Rolled Erosion Control Products (RECPs) on Slopes

General installation methods for RECPs on slopes are listed below however all installation shall be designed on a site-specific basis and products shall be installed according to manufacturer's procedures.

a) Prepare surface and place topsoil and seed (surface should be smooth and free of rocks, debris, or other deleterious materials);

b) Blanket shall be anchored at top of slope in a minimum 0.15 m by 0.15 m trench for the entire width of the blanket;

c) The blanket shall be rolled out downslope;

d) Where the blanket roll is not long enough to cover the entire length of the slope, a minimum 0.15 m by 0.15 m check slot shall be excavated at the location of the lap, and the downslope segment of blanket anchored in the check slot, similar to the method used for the top of the slope, or when blankets, must be spliced down the slope, place blanket end over end (shingle style) with approximately 0.10 m overlap. Staple through overlapped area at 0.3 m intervals;

e) The upslope portion of blanket shall overlap the downslope portion of blanket, shingle style, at least 0.15 m with staple anchors placed a maximum 0.3 m apart;

f) Adjacent rolls of blanket shall overlap a minimum 0.1 m;

g) Anchors shall be placed along central portion of blanket spaced at $4/m^2$ minimum (0.5 m spacing) for slopes steeper than 2H:1V and $1/m^2$ (1 m spacing) for slopes flatter than 2H:1V; and

h) Anchors along splices between adjacent rolls shall be placed 0.9 m apart.

Rolled Erosion Control Products (RECPs) in Channels

General Installation Methods for RECPs in channels are listed below however all installation shall be designed on a site-specific basis and products shall be installed according to manufacturer's procedures.

a) Prepare surface and place topsoil and seed (surface should be smooth and free of large rocks, debris, or other deleterious materials);

b) Excavate a minimum 0.15 m deep and 0.15 m wide trench at the upstream end of channel and place end of RECP into trench;

c) Use a double row of staggered anchors approximately 0.1 m apart (i.e. 0.2 m linear spacing) to secure RECP to soil in base of trench;

d) Backfill and compact soil over RECP in trench;

e) Roll centre RECP in direction of water flow on base of channel;

f) Place RECP end over end (shingle style) with a minimum 0.15 m overlap downgrade;

g) Use a double row of staggered anchors approximately 0.1 m apart to secure RECP to soil;

h) Full length edge of RECP at top of side slopes shall be anchored in a minimum 0.15 m deep and 0.15 m wide trench;

i) Use a double row of staggered staple anchors a maximum of 0.1 m apart (i.e. 0.2 m linear spacing) to secure RECP to soil in base of trench;

j) Backfill and compact soil over RECP in trench;

k) Overlap RECP on side slopes (shingle style down channel) a minimum of 0.1 m over the centre RECP and secure RECP to soil with anchors spaced a maximum of 0.2 m apart;

l) In high flow channels, a check slot across the width of the channel is recommended at a maximum spacing of 10 m to anchor the ends of the RECP to the underlying soil;

m) Use a double row of staggered staple anchors a maximum of 0.1 m apart (0.2 m linear spacing) to secure RECP to soil in base of check slot; and

n) Backfill and compact soil over RECP in check slot.

Rip Rap

The following criteria shall be considered when installing rip rap:

a) Used for grades 5-15%;

b) It shall be constructed of durable, large, loose stone;

c) A non-woven geo-textile liner shall be used at the top of the channel to prevent migration of fines;

d) Side slopes of rip rap must be a slope of 3H:IV or less;

e) Rip rap shall be of angular stone;

f) Rip rap depth shall be at least 300 mm and 1.5x the maximum stone diameter; and

g) Rip rap should be clean and free of substances deleterious to fish and fish habitat.

Check Dams and Dikes

The following criteria are to be considered when installing a check dam:

a) Check dams shall not be used in live streams or in channels with extended base flows, as this may have a detrimental effect on fish or fish habitats;

b) The check dam sediment trap shall consist of rockfill with filter fabric on the upstream face held in place with small shot rock;

c) Accumulated sediment shall be cleaned out of the filter fabric at regular intervals as required and the material shall be disposed of so that it cannot subsequently run into any waterbodies containing fish;

d) Any damaged section(s) of filter fabric as well as any undercut or end flow areas where water flows freely around the filter fabrics shall be repaired or replaced, as soon as practical;

e) Drainage area shall be less than 4 ha;

f) The filter fabric shall be of a weight of at least 200 g/m^2;

g) The rockfill shall be clean rock, with rock fragments sized between 100 and 150 mm;

h) The small shot rock shall be clean rock, with fragments no larger than 120 mm;

i) When used in series, the top of the downstream check dam shall be level with the bottom of the next dam upstream;

j) The check dam shall extend beyond the top of the ditch banks and the centerline elevation shall be low enough that flow does not go around the structure; and

k) Check dams shall be maintained and inspected periodically as well as unscheduled inspections prior to, and after, a significant rainfall event, anticipated heavy precipitation or runoff event (e.g. snowmelt). The following maintenance shall be completed, as required:

   i. Remove any accumulations of sediment; and

   ii. Add or remove rock as necessary to maintain design height, cross-section and flow through characteristics.

Energy Dissipaters

The following criteria are to be considered when installing energy dissipaters:

a) Energy dissipaters are preferably constructed on level grade for a distance which is related to the outlet flow rate and the tailwater level;

b) The sill or transition to the natural channel shall be level with and at the same slope as the receiving channel;

c) Energy dissipaters are applicable for small and medium size culverts of any cross-section where the depth of flow at the outlet is less than the culvert height;

d) For rip rap aprons, the apron width at the pipe end shall be 3x the pipe diameter;

e) Energy dissipaters shall drain by gravity when not in operation; and

f) Energy dissipaters shall be self cleaning and require minimum maintenance.

11.23.1.3 Silt Fences/Sediment Barriers

Sedimentation Prevention

Sediment barriers are temporary sediment control devices that are used to protect water quality of down gradient rivers, streams and other waterbodies from sediment in water runoff. The most common barriers are silt fences; however other options include straw or hay bales or a berm of erosion control

mix. Silt fences are typically used in combination with other site water control measures, including sediment traps and basins. Engineering requirements may vary depending on the locations of the silt fence and shall take such factors into consideration as drainage/surface area of exposed soils and time of year the silt fence is employed.

Silt fences typically consist of a piece of synthetic filter fabric stretched between a series of wooden stakes. The stakes are installed on the downhill side of the fence, and the bottom edge of the fabric is trenched into the soil and backfilled on the uphill side. The storm water passes through the fence and sediment is deposited on the uphill side of the fence.

Silt fences are suitable for sheet runoff from exposed areas of soil with grades less than 5% as a result of construction activities. Figures 10-32 to 10-34 show proper construction of silt fences and Figures 10-35 and 10-36 show poorly constructed silt fences that have failed and allowed silt or silty water to pass through. The following criteria shall be taken into consideration when installing silt fences:

a) The silt fence shall consist of a filter fabric fence held in place by posts;
b) The woven filter fabric shall be of a weight of at least 200 g/m^2;
c) No single run of silt fence shall exceed 100 m in length;
d) The drainage area behind the silt fence shall not exceed 0.1 ha per 30 meters of fence;
e) Silt fences shall not be installed on a slope, and be located no nearer than 1 m from the toe of slope;
f) Silt fences shall not be used when the overland flow exceeds 0.03 m^3/sec;
g) The fabric shall be at least 900 mm wide/high;
h) The fence posts shall be of sufficient length to support the fabric, be sturdy and be of dimensions of at least 50 mm square;
i) The staples shall be sufficiently sturdy to support the fabric for the required life of the fence;
j) The posts shall be secured at 3 m intervals on the immediate down slope side of the trench;
k) The filter fabric shall be taken from a continuous roll, and cut to the required length. The maximum length of the filter fabric shall be stapled to the upstream side of the stakes, with 200 mm of fabric extending into the trench and spread over the trench bottom;
l) When installing a silt fence in frozen earth or rock, metals posts shall be used and wire ties shall be used to attach the filter fabric (Figure 11-32);
m) When a fence is installed in frozen earth it shall be checked and potentially replaced during spring melt as the posts may have shifted with the melting earth;
n) Silt fences shall be removed when the site has been stabilized, or re-vegetated;
o) Silt fences shall be inspected and maintained on a regular basis as well as before any anticipated heavy precipitation or runoff event (e.g. snowmelt). Accumulation of sediment shall be periodically removed and disposed of in an area where it shall not re-enter any waterbody; and
p) Also, repairs and replacement of damaged silt fences shall be addressed immediately.

Figure 11-32 - A Well Constructed Silt Fence

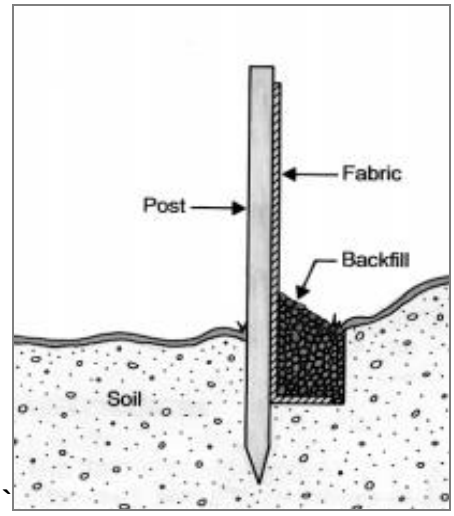

Figure 11-33 - Properly Constructed Silt Fence (Downhill Side on Left, Uphill Side on Right)

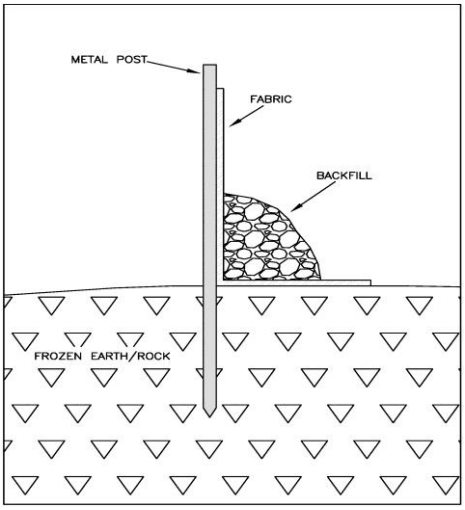

Figure 11-34 - Properly Constructed Silt Fence for Frozen Earth or Rock

Figure 11-35 - Examples of Poorly Installed Silt Fences

Figure 11-36 - Examples of Poorly Installed Silt Fences

11.24 BLASTING AND WASTE ROCK DISPOSAL

Environmental Concerns

The general environmental concerns associated with on-land blasting include:

a) Destruction of vegetation outside excavation limits;
b) Noise disturbances to humans and wildlife;
c) Disturbance of archaeological resources;
d) Release of chemicals (i.e., ammonia) to the environment (explosive mixtures and products); and
e) Dust generation.

Blasting in or near waterbodies can affect organisms with swim bladders (fish) but may also affect a variety of aquatic animals including shellfish, marine mammals, otters, seabirds and waterfowl. The introduction of sediment into the water column is also a concern for marine/freshwater water quality and related effects on aquatic life.

Environmental Protection Procedures

The handling, transportation, storage and use of explosives and all other hazardous materials shall be conducted in compliance with all applicable laws, regulations, orders of the DOEC and the Service NL, the *Explosives Act*, and the *Transportation of Dangerous Goods Act*. The following measures shall be implemented to minimize the effect of the use of explosives and blasting:

a) Explosives shall be used in a manner that shall minimize damage or defacement of landscape features, trees, ecologically sensitive areas such as wetlands, and other surrounding objects by controlling through standard best practice (including precisely calculated explosive loads and adequate stemming), the scatter of blasted material beyond the limits of activity. Outside of cleared areas, inadvertently damaged trees shall be cut, removed, and salvaged if merchantable (refer to Section, "Clearing of Vegetation"). Fly rock, which inadvertently enters a waterbody, watercourse, or any ecologically sensitive area and that can be recovered without further damage to the environment, shall be removed. Instances where larger fly rocks (boulders) enter these areas or deep waterbodies, recovery of this shall be discussed with the OSEM;

b) Blasting patterns and procedures shall be used, which minimize shock or instantaneous peak noise levels. Incident of fish kills should also be reported to DFO. Refer to "Response Procedures for Natural and Pollution-Related Fish Kill Incidents in the Atlantic Region";

c) Time delay blasting cycles or blasting mats shall be used, if necessary, to control the scatter of blasted material;

d) Blasting shall not occur in the vicinity of fuel storage facilities;

e) All blasters shall have a Blasters' Safety Certificate from the NL Department of Labour. This certificate and a Temporary Magazine License shall be obtained prior to drilling and blasting;

f) Use of explosives shall be restricted to authorized Personnel who have been trained in their use;

g) There shall be separate magazines on Site for explosives and for dynamite blasting caps. All temporary magazines for explosive storage shall have appropriate approvals;

h) The immediate area of the blast site shall be surveyed within one (1) hour prior to a blast, and operations shall be curtailed if wildlife (e.g., black bears, water fowl, raptors, etc.) is observed within 500 m. Environmental Personnel and OSEMs shall conduct pre-blast monitoring to see and identify species of concern. Additionally, any individual animal sightings by other Personnel shall be reported to the OSEM. Blasting may be delayed in such circumstances until wildlife have been allowed to leave the area of their own accord;

i) All blasting associated debris, such as explosive boxes and used blasting wire, must be collected for proper disposal as soon as possible following blasting activity;

j) If blasting is necessary within the vicinity of an archaeological site, precautions shall be taken to ensure that blasted material and shock waves do not disturb any part of the site. If necessary, protective covering shall be applied to the site under the supervision of an approved archaeologist. Blasting shall not be undertaken in these areas without first notifying the OSEM;

k) Waste rock that is suitable for usage at the site shall be set aside for subsequent use. Waste rock not suitable for site use shall be deposited in the designated stockpile area; and

l) If possible, blasting shall be done outside of sensitive time periods for important wildlife areas.

11.24.1 Blasting in Close Proximity to or In a Body of Water

The following measures shall be implemented to minimize the effect of the use of explosives and blasting in or near water:

a) When blasting operations are within 200 m of a waterbody occupied by fish, the operations shall be carried out in accordance with DFO guidelines;

b) Downstream areas shall be monitored after each blast for evidence of fish kills and if any are evident, blasting operations shall cease and the incident shall be reported to the OSEM;

c) Three (3) hours prior to any blasting activities near waterbodies, a visual reconnaissance of the area shall be undertaken to establish the presence of water fowl or aquatic mammals;

d) If blasting is necessary within 15 m of a waterbody, it shall be undertaken in compliance with the required Water Resources permits from the DOEC, and DFO Guidelines for the Use of Explosives In or Near Canadian Fisheries Waters, 1998. A copy of this reference shall be kept at the Project site and made available to all Contractors;

e) Drilling and blasting activities shall be undertaken in a manner that ensures the magnitude of explosions is limited to that which is absolutely necessary. A blasting plan shall be reviewed with the OSEM in advance of work in close proximity to waterbodies;

f) For multiple charges, time delay detonators shall be used to reduce the overall detonation to a series of single explosions separated by minimum delay;

g) Large charges shall be subdivided into a series of smaller charges with minimum delay detonation;

h) The on land set-back distance from the blast site to the waterbody or the set-back distance around the blast site in the waterbody shall be based on the maximum weight of charge to be detonated at one instant in time, the substrate, and the type of fish or fish habitat in the area of the blast. These set-back distances are outlined in the Guidelines for Use of Explosives In or Near Canadian Fisheries Waters, 1998 and the DFO Fact Sheet for Blasting – Fish and Fish Habitat Protection; and

i) Blast holes shall be stemmed with sand or gravel to grade or to streambed/water interface to confine the blast.

11.24.2 Waste Rock Disposal

For environmental protection against ARD and other leaching of heavy metals the OSEM shall visually inspect rock before, during, and after blasting work and on a periodic basis. Visible evidence of ARD is typically a yellowish colour of water or sediment called yellow boy or evidence or sulphides in rock. In the event that visible evidence of ARD is noted, the OSEM shall be notified immediately. Photographs of yellow boy and sulphides are shown in Section, “Quarrying and Aggregate Removal from Borrow Areas”.

Stockpiling shall be completed in a manner that shall reduce the potential for ARD and metal leaching. All stockpiles shall be placed in an area where drainage can be collected, tested and treated, if required.

Consideration shall be given to installing a settling pond for runoff to deal with suspended solids. Stockpile areas and limits of clearing shall be staked and/or flagged to prevent overextension of the development, thereby minimizing the extent of the operation.

Treatment shall be site-specific based on analytical results. However, typical treatment shall include settling ponds, and the addition of chemicals or the use of mechanical processes to aid in settling or filtration. Treatment options shall be confirmed by the OSEM and approved by DOEC.

The release of water from blasting activities and waste rock drainage shall meet Schedule A of the *Environmental Control Water and Sewage Regulations, 2003* before it shall be permitted to be discharged directly or indirectly into a storm sewer, body of water or onto the ground.

11.25 CONCRETE PRODUCTION

Environmental Concerns

The major concern relating to concrete production is the effects of effluent released to the environment. Liquid wastes may contain hazardous materials such as cement, concrete additives, and form oil.

Cement is very alkaline and washwater from spoiled concrete or from the cleaning of the mixers and mixer trucks, conveyors and pipe delivery systems can have pH levels outside the acceptable range. Similarly, spoiled concrete or washwater would contain concrete additives and agents, some of which are toxic to aquatic species. Aggregates, particularly the finer sand fractions may be washed from spoiled concrete or discharged in washwater. Uncontrolled release of such washwater, chemicals and sediments could adversely affect aquatic life and aquatic habitat.

Environmental Protection Procedures

a) When concrete is to be placed within 15 m of a waterbody, provisions of all required permits shall be followed. Under no circumstances shall fresh concrete come into contact with a waterbody, before the concrete has cured;
b) Washwater from the cleaning of mixers, mixer trucks and concrete delivery systems shall be handled using the procedures outlined in Section 3.0 of the *Environmental Code of Practice for Concrete Batch Plant and Rock Washing Operations.* The following outlines important steps to take; however the code of practice shall be reviewed thoroughly:
c) The rinsing of the chute may be carried out at the delivery site, unless concrete is being rinsed from the chute; in this case, rinsing must occur prior to site delivery. It is permissible to rinse onto the ground or soil, but under no circumstances into a pond or stream or onto a surface that leads directly to a waterbody, such as a storm sewer;

11.26 DUST CONTROL

Environmental Concerns

The environmental concerns associated with dust include effects on human health and aquatic ecosystems, waterfowl and vegetation.

Environmental Protection Procedures

The following measures shall be taken to mitigate potential effects of dust:

a) Dust from construction activities shall be controlled where possible by using frequent applications of water. Waste oil shall not be used for dust control, but other agents, such as wood chips, calcium chloride, matting and re-vegetation, shall be considered on a site-specific or as needed basis and shall require the approval of appropriate regulators;

b) Environment Canada's Best Practices for the Use and Storage of Chloride-Based Dust Suppressants, (February, 2007) shall be followed for the application of chloride-based dust suppressants. This includes, but is not limited to, the following:

   i. Chloride based dust suppressants shall not be applied prior to a heavy rainfall or if rain is threatening for at least thirty-six (36) hours;

   ii. Dust suppressants shall be applied after a rainfall event to aid in mixing;

   iii. Suppressants shall be applied during early morning or evening times to reduce evaporation; and

   iv. Chloride suppressants shall not be applied to a bridge deck or paved surface.

c) Dust control agents (e.g., wood chips, calcium chloride, matting) shall be stored at suitable distances from all watercourse, waterbody, or ecologically sensitive areas using proper buffer zones (refer to Section, "Buffer Zones").

11.27 NOISE CONTROL

Environmental Concerns

A variety of noises associated with construction and operation activity can negatively affect wildlife and fish and can affect human safety and health. Noises associated with blasting are temporary in nature and noises associated with drilling are considered long-term, but localized.

Environmental Protection Procedures

Measures shall be implemented wherever possible to minimize potential effects arising from a variety of noise sources, including:

a) Wildlife surveillance shall be conducted prior to and post noisy activities. Activities may be delayed until wildlife have been allowed to leave the area as directed by the OSEM;

b) Adherence to all applicable regulations;

c) Mitigation such as enclosing noisy equipment and constructing temporary noise-reducing berms;

d) All equipment shall have exhaust systems regularly inspected and mufflers shall be operating properly in accordance with the manufacturers recommendations; and

e) Low level flying of aircraft shall be avoided in areas where sensitive wildlife is present (i.e. caribou, osprey, harlequin duck and other waterfowl).

11.28 RESOURCE SPECIFIC MITIGATIONS

Environmental Concerns

Construction activities have the potential to impact a number of specific resources in the work areas of TL 267. The resources include historic and archaeological resources, species at risk, forestry resources, and land use.

11.28.1 Historic and Archaeological Resources

When working in areas of high potential for historic or archaeological sites, Site-specific work measures shall be developed

As per the requirements of the PAO, a historic and archaeological resources impact assessment shall be conducted at Sites where there is potential for historic and archaeological resources to be located. For low potential sites a desktop review may be adequate. For higher potential sites, field assessment may be required.

Existing information shall be provided where available, and where activity shall take place in an area that has not been previously reviewed a historic resources overview assessment may be required.

The following mitigations shall be implemented with respect to historic and archaeological resources:

a) All persons on Site shall be informed of the historic resources potential of the area, of their responsibility to report any unusual findings, and to leave such findings undisturbed;

b) An environmental awareness session to be attended by all staff and contractors to identify areas of high historic resources potential;

c) The OSEM shall report to the PAO if any potential archaeological resources are uncovered during excavation (Martha Drake, Provincial Archaeologist, 709-729-2462);

d) Where possible, known sites shall be avoided by modifying design (i.e. road and transmission line alignment adjustment) to ensure a 50 m minimum buffer (actual size to be determined by the PAO). Where the site cannot be avoided, the site shall be recorded/recovered to the satisfaction of the PAO before work can proceed as per Historic Resources Management Plan developed by the ERC Team;

e) The On-Site Environmental Monitor shall be contacted immediately if any historic resources are discovered during the course of the work. All work within 50 m of the discovery location shall stop and contingency plan procedures implemented; and

f) Regular monitoring shall be conducted by the OSEM to ensure that site protection measures are adequate and that the terms and intent of the EPP requirements are being met. Sites registered with the PAO outside the immediate Project area shall be visited annually by the OSEM during periods when the sites are not snow covered to ensure they have been left undisturbed.

11.28.2 Species at Risk

Many wildlife species (including plants, animals and birds) and their habitat are protected under provincial and federal regulations such as the national *Species at Risk Act*, *Migratory Birds Convention Act* and the *NL Endangered Species Act*. Of primary concern are disturbances, destruction or degradation of critical habitat, recovery habitat and disturbance during critical life periods (i.e. nesting and spawning). Displacement of species due to construction activities (i.e., blasting) or encounters with construction equipment and Personnel are also concerns.

Several species have been identified through the Environmental Assessment process as being of concern in the Project Area. They include vegetation, furbearers, avifauna and waterfowl and are as follows:

a) Boreal Felt Lichen (SARA special concern; NL ESA vulnerable);

b) Blue Felt Lichen (NL ESA vulnerable);

c) Water Pygmyweed (NL ESA vulnerable);

d) American Marten, Newfoundland Population (SARA threatened; NL ESA endangered);

e) Harlequin Duck (SARA special concern: NL ESA vulnerable);

f) Olive Sided Flycatcher (SARA threatened; NL ESA threatened);

g) Grey-cheeked Thrush (SARA none; NLESA vulnerable);

h) Rusty Blackbird (SARA special concern; NL ESA vulnerable);

i) Red Crossbill (SARA endangered; NL ESA endangered);

j) Short-eared Owl (SARA special concern; NL ESA vulnerable);

k) Barrows Goldeneye (SARA special concern; NL ESA vulnerable); and

l) Red Knot (SARA endangered; NL ESA endangered).

Reference should be made to the fact sheets for species listed on the SARA list and the Endangered Species Act to find further information about these species.

11.28.3 Wildlife Protection

The following mitigative measure shall be implemented for the protection of wildlife at the Site:

a) Construction activities shall be scheduled considering any sensitive areas of fish and wildlife habitat and critical periods in fish and wildlife cycles, and considering additional mitigation measures that may be required. Annual timing of migration, spawning and calving in the vicinity of the Site shall be considered at all times;

b) Personal pets shall not be brought to the construction site;

c) Buffer zones shall be implemented to protect wildlife at the site. Refer to Section, “Helicopter Traffic” for the buffer zones for helicopter traffic at the site;

d) Fishing and hunting are prohibited at or near the Project area. All project participants shall be prohibited from fishing and hunting at or near the construction site while working on the Project;

e) Mitigation measures provided in various sections (refer to Sections “Erosion Prevention and Sediment Control”, “Storage, Handling and Disposal of Fuel and Other Hazardous Material”, “Buffer Zones”, etc.) shall be consulted while working close to water to ensure that appropriate measures are understood and implemented to protect freshwater fish and fish habitat;

f) Under no circumstances are wildlife to be fed and all measures shall be taken to avoid inadvertent feeding;

g) Wildlife shall not be chased, caught, diverted, followed or otherwise harassed by project participants;

h) All wildlife sightings and nuisance wildlife shall be reported to the OSEM;

i) The forestry branch shall be contacted and updated with regards to nuisance wildlife and wildlife encounters;

j) Equipment and vehicles shall yield the right-of-way to wildlife and adhere to construction site speed limits;

k) Environmental awareness training, with regular briefings, shall be implemented for all Personnel by the Contractor;

l) All persons on Site shall be made aware of the potential for encounters with black bears and instructed to report all sightings to the OSEM;

m) Black bear deterrent measures such as bear bangers and bear spray may be used, and translocation of bears shall be undertaken before any lethal means are considered. A research permit for relocation of bears may be required from the Wildlife Division, Department of Environment and Conservation, Government of Newfoundland and Labrador;

n) Fire arms shall not be permitted on site, with exception of approved bear monitors;

o) Black bear protection permits shall be obtained for each black bear monitor. Permits shall be signed by the individual that the permit is issued to;

p) An Avifauna Management Plan shall be implemented. The Plan includes:

i) Surveying for migratory and resident bird nests prior to cutting during the nesting season;

ii) Surveying for sensitive habitat that typically supports nest;

iii) Information regarding avoiding identified nests until fledged;

iv) Information regarding cutting in sensitive habitats during nesting season; and

v) Employing on-site support of qualified biologists during construction, as required.

q) Clearing activities between (refer to Table 10-1) shall be in compliance with the Avifauna Management Plan.

r) No one shall disturb, move or destroy migratory bird nests. If a nest or young birds are encountered, work shall cease in the immediate area of the nest. Work shall not continue in the area until the nest is no longer occupied, otherwise the work plan shall be modified to avoid nest sites by a minimum of 30 m (100 m for Rusty Blackbird).

Caribou

Several sensitive caribou areas are crossed by TL 267. These areas are identified on constraint mapping and in these areas the following mitigation measures apply:

a) Caribou shall be permitted to cross work areas, and access roads with traffic yielding to the animals when crossing a road;

b) If a caribou is observed within 500 m of an activity, the OSEM shall determine if the activity shall be delayed or curtailed;

c) If human-mediated caribou mortality occurs, NL Hydro shall contact NLDOEC-WD immediately;

d) Garbage control measures shall be used to prevent bears, wolves, and other animals from accessing garbage and prevent attraction of animals to garbage storage areas; and

e) The Project footprint shall be minimized to the extent possible, including access and other disturbances on the landscape being kept within existing areas of disturbance where possible.

11.29 COMMISSIONING

Environmental Concerns

Commissioning occurs after installation and prior to release for commercial operation; it is a means of verifying and documenting that each component, system and assembly of a facility is built, installed and tested as planned and designed to meet Project requirements.

Commissioning the proposed transmission line is related to mechanical acceptance so that all hardware is in place and properly installed.

Environmental concerns related to commissioning relate to unintended release of hydrocarbons into the environment.

Environmental Protection Procedures

a) All equipment containing fluids shall be checked for leaks by the supplier and/or manufacturer and shall be tested according to the manufacturer's directions prior to commissioning activities;
b) There shall be monitoring during commissioning for spills and/or leaks;
c) Appropriate spill kits shall be on hand to respond to a spill or leak;
d) In the event that a spill or leak is detected, the Spill Response Plan shall be referred to for response to any incidents; and
e) All other requirements of this EPP shall be adhered to during commissioning.

11.30 SITE REHABILITATION

Environmental Concerns

The primary concern with environmental rehabilitation is site stabilization and erosion prevention. This is particularly pertinent to temporary structures such as roads, quarries, and cofferdams.

Environmental Protection Procedures

Environmental rehabilitation shall be consistent with all applicable standards, codes, acts and regulations and the conditions of EA release.

General rehabilitation approaches are provided in this section. However specific rehabilitation approaches shall also be developed in compliance with regulatory requirements and industry best practice and shall be completed on a site-by-site basis and included in the C-SEPP. An outline of the requirements of the site-specific rehabilitation plan is provided below.

11.30.1 Site-Specific Rehabilitation Plan

The following outlines the requirements of the Site-Specific Rehabilitation Plan:

a) Removing and stockpiling overburden and organic material for re-use;
b) Re-grading areas to control erosion and establish suitable drainage;
c) Replacing the overburden and organic material to produce conditions for re-growth; and
d) Encouraging natural re-vegetation.

On some Sites there may be limited overburden and organic matter. Nutrient poor soils and a shorter growing season may also slow down and reduce the rate of vegetation re-establishment. In these cases, it may be necessary to import seed, mulch or geotextiles to artificially improve re-vegetation for key areas. Measures to prevent the invasion of disturbed sites by non-native plant species shall be considered. Acceptable approaches include, but are not limited to, the following:

a) Use of native plant and soil material for rehabilitation and re-vegetation;
b) Use of only species that are non-aggressive and non-persistent (where local plants are not available or shall not meet the rehabilitation objectives); and

c) Implementation of measures to ensure that additional materials (required to limit erosion, reduce sedimentation or enhance establishment) are weed and disease free.

All areas of the construction sites shall require careful consideration of the landscape within which the work is taking place to ensure that the correct approach is taken. Areas shall be prioritized in terms of need and importance and the level of rehabilitation shall be modified accordingly. Factors that shall be considered in determining the rehabilitation approach include, but are not limited to, the following:

a) Site and public safety (including future access requirements);
b) Sedimentation concerns and proximity to waterbodies;
c) The natural habitat of the area (i.e., vegetation, soil, and hydrology);
d) Wildlife habitat considerations;
e) Riparian habitat considerations;
f) The productivity of the site (i.e. moisture, content and nutrient regime) and its effect on re-vegetation;
g) The availability of materials and implications of importing unnatural material;
h) Land use and their effect on success of rehabilitation techniques; and
i) Overall cost of rehabilitation measures.

Once the schedule of work at each construction area has been developed, a detailed schedule for carrying out rehabilitation work shall be developed in accordance with regulatory requirements and shall also consider industry best practice for implementation of site rehabilitation. The site-specific rehabilitation plan shall indicate timing of the rehabilitation works for each area to be rehabilitated. Consideration shall be given to progressive rehabilitation throughout the construction period, as opposed to waiting for the end of construction before starting with rehabilitation.

11.30.2 General Measures

a) Rehabilitation shall be required for all temporary works, including roads, stream crossings, camps and quarry and borrow areas;
b) No temporary buildings or structures associated with the work shall be left on Site upon completion of the work;
c) All solid waste, including petroleum, oil and lubricant containers shall be removed from Site;
d) Pre/Post occupation inspection shall be completed by the OSEM; and
e) The OSEM shall prepare a report for all sites documenting Site conditions prior to disturbance and upon Site abandonment and rehabilitation. Each report shall include a description of the condition of vegetation and other aspects of natural environment.

Quarry/Borrow Areas

The following measures are specific to quarry and borrow areas and shall be considered in rehabilitation plans for those areas:

a) Any organic material or overburden removed during development of the borrow pits and quarries shall be stockpiled near the pit or quarry area for future use during rehabilitation of the borrow pit or quarry. Overburden (and non-PAG rock) that is not suitable for rehabilitation purposes shall be stockpiled for temporary use or permanent disposal. Stockpiling shall be in stable configurations and contoured to match the surrounding landscape. For temporary stockpiling it shall be and returned to the borrow pit or quarry opening once extraction from the pit or quarry is complete;

b) As site conditions dictate, vegetation or other cover materials may be established on slopes to control erosion and dust (as outlined in Section, "Erosion Prevention and Sediment Control"). Quarries and pits reclaimed during operations may be used as test plots to evaluate suitable re-vegetation techniques to be used for the rehabilitation of other work areas in the future;

c) Arrangements shall be made with the representatives of the Department of Natural Resources for an inspection to be conducted prior to abandonment of the site;

d) All equipment and material shall be removed from the site;

e) All pit and quarry slopes shall be graded to slopes less than 20%, or to a slope conforming to that existing prior to quarrying;

f) Excess overburden may be used for sloping but topsoil or organic material may not be used for sloping. Following sloping, topsoil or organic material may be spread over the entire quarry area to promote vegetation; and

g) Quarry conditions, including slope on rock walls, shall be determined through the Rehabilitation Plan. Each quarry shall be evaluated on a site-specific basis to determine if cliff faces should be converted to rubble slopes.

Roads/Stream Crossings

The following measures are specific to road and culvert/bridge rehabilitation and shall be considered in rehabilitation plans for those areas:

a) The Contractor shall submit a plan for controlling erosion during rehabilitation activities. This plan would address construction activities that have the potential for stream sedimentation;

b) When working in a stream or waterbody, remove all fill around pipes before water bypass installation and pipe removal;

c) The stream shall be dewatered at the site using a non-eroding, water tight diversion during excavation. Settling basins shall be used to ensure that muddy water does not enter the waterbody;

d) Fill material that requires temporary placement shall be placed in stable areas outside of stream channels and flood plains;

e) Channel banks shall be armoured with large rock, woody debris and vegetation when needed;

f) Channel and vegetation rehabilitation shall be required if there are disturbances upstream and downstream of the stream crossing site;

g) Stream channels shall be restored to natural grade and dimensions and re-vegetation may be required;

h) All culverts shall be removed;

i) Temporary bridges in all areas of the site shall be removed; and

j) Removed culverts and other structural materials shall be disposed.

12 ENVIRONMENTAL MONITORING AND FOLLOW UP

12.1 ENVIRONMENTAL COMPLIANCE MONITORING

To ensure that appropriate and effective environmental mitigation measures are employed during construction, the Project shall have full-time OSEMs at various work fronts. These individuals shall continuously inspect worksites and activities for conformance with the EPP, C-SEPP*s,* engineered mitigation measures required by design; and compliance with government regulations and permits.

This EPP establishes the basis for environmental compliance monitoring at the work fronts, i.e., monitoring for regulatory compliance to verify that conditions of all permits and approvals are satisfied, and that all environmental regulatory requirements are met.

Non-conformance with this EPP, C-SEPP, and/or non-compliance with permits, approvals, and regulatory requirements shall be documented, as indicated in the following paragraphs, and as addressed under the Contractor responsibilities for mitigation measures. Corrective action shall be identified, target dates shall be agreed upon, and responsibilities shall be assigned to appropriate Personnel. This documentation shall be distributed to other members of the Project's environmental management team and written notice of agreed corrective action shall be forwarded to the Contractor so that issues are resolved to the satisfaction of the Project's environmental management team.

If non-conformance items are noted that require immediate attention, or if agreed corrective action is not implemented in a timely and effective manner, then appropriate resources shall be contracted by the Project to immediately undertake the required action.

Daily Field Reports shall be prepared by the OSEM and approved by the Team Lead – Capital Projects/EA. They are distributed to appropriate Project team members including the Construction Manager and the Environmental Services Manager. These reports shall include a description of work being undertaken by the Contractor and document incidents of non-conformance with environmental requirements.

The Contractor shall be responsible for developing a site-specific Compliance Monitoring Plan to be included in the C-SEPP. This shall include such things as frequency of monitoring, parameters, locations and media to be monitored, etc. All analysis conducted to support compliance monitoring are subject to the Accredited Laboratory Policy.

12.2 ENVIRONMENTAL EFFECTS MONITORING

The intent of Environmental Effects Monitoring (EEM) is to confirm predictions made as part of the Environmental Assessment. EEM monitoring shall be carried out by the Environment Team. The EEM program results shall be communicated to the Environmental Services Manager.

Should effects deviate from predicted, the Environment Team shall determine the cause and appropriate action. Should this information be linked to work practices, the EPP shall be revised and updates shall be provided to contractors and staff. It is noted that there may be additional requirements for approvals and communication with the regulators related to the EEM Plans and regulatory guidelines.

12.3 ANNUAL ENVIRONMENTAL PERFORMANCE REVIEW

At the end of each construction year the project shall convene an environmental performance workshop to review all work activities that relate to environmental concerns, issues and/or mitigations. This workshop shall include a review of environmental audits carried out by project staff during the year. The review process shall give all parties a chance to evaluate overall environmental performance and compliance with government regulations, permits, the EPPs, and C-SEPPs.

13 CONTINGENCY PLANS

Contingency plans to address unplanned occurrences and emergency situations are provided in the following sections. The following unplanned occurrences and emergencies have been addressed under contingency plans:

a) Fuel and Hazardous Material Spills (Spill Response Plan);
b) Wildlife Encounters (including nesting and denning sites);
c) Historic and Archaeological Resources; and
d) Forest Fires (ERP).

13.1 FUEL AND HAZARDOUS MATERIALS SPILLS

Spills of fuel and/or hazardous materials can potentially be harmful to human health and safety, vegetation, soil, surface water, ground water, wildlife, aquatic organisms, historic resources and human health and safety.

In case of a fuel or hazardous material spill project staff shall refer to the Spill Response Plan for detailed contingency measures. A site-specific fuel and hazardous materials response plan shall form part of the C-SEPP.

To mitigate environmental effects of fuel and hazardous material spills and leaks, Contractors shall at all times maintain in good condition at least one spill kit dedicated to each piece of fuel-powered equipment. Each spill kit shall be located on the equipment and stored in a weather-proof container. Each spill kit shall have an absorption capacity of no less than 23 litres.

The Contractor shall ensure adequate and appropriate spill response materials and equipment are available for use relative to the scope of work and environmental sensitivities - i.e., spill kit containing aquatic booms for working near water and spill kits capable of capturing 110% of reasonable potential spill volumes should be present at the camp site(s) and with mobile field crews.

13.2 WILDLIFE ENCOUNTERS

Wildlife encounters pose a potential risk for stress or injury to both the wildlife and Site Personnel. To reduce the risk and stress, control measures and environmental protection procedures have been put in place and are shown below. As a protection measure, hunting, trapping or fishing by Project Personnel is not permitted on Site.

The following procedures shall be implemented on site to prevent the attraction of wildlife to work fronts and camps:

a) work fronts and camps shall be kept clean of food scraps and garbage;
b) Animal proof disposal containers shall be used and shall be regularly emptied and transferred to an approved waste disposal site; and
c) No personal pets, domestic or wild, shall be allowed on the Site.

In the case of wildlife encounters the following shall be implemented:

a) No attempt shall be made by any worker at the project site to chase, catch, divert, follow or otherwise harass wildlife by vehicle or on foot;
b) Equipment and vehicles shall yield the right-of-way to wildlife;
c) Any wildlife sightings or encounters shall be reported to the OSEM;
d) The OSEM shall be responsible for all actions in response to nuisance animals, including the use of firearms by bear monitors in the project area. A research permit for relocation of nuisance animals may be required from the Wildlife Division, Department of Environment and Conservation, Government of Newfoundland and Labrador;
e) If the nest of any bird is encountered during construction and operation activities, work around the nest shall be stalled until the Wildlife Division has assessed the situation and appropriate mitigation is applied;
f) Any incidents that result in the displacement or killing of wildlife shall be reported to the OSEM complete with details on the incident and the names (and contact information) of the persons involved; and

g) In the event of a bear encounter project personnel shall follow the procedures as outlined in the Bear Awareness Training.

13.3 HISTORIC AND ARCHAEOLOGICAL RESOURCES

Historic resources that are disturbed, destroyed or improperly removed from a site represents a potential cultural loss of information and history that could otherwise be handled and interpreted in an efficient and appropriate manner.

Under the *NL Historic Resources Act* RSNL 1990, c.H-4, all archaeological sites and artifacts are the property of the Crown, and shall not be disturbed. The Project shall take all reasonable precautions to prevent Employees or other persons from removing or damaging any such objects or sites. Persons in contravention may be held liable for prosecution under Section 35.1 and 35.2 of the *Historic Resources Act RSNL1990, c. H-4*. Personnel working in the vicinity shall be advised of the find, including the OSEM.

In case of a suspected discovery of an archaeological site or artifact the following procedures shall apply:

a) Archaeological materials encountered shall be reported initially to the OSEM. The OSEM shall then immediately report this to the Environmental Services Manager, the Environmental Coordinator, and Construction Manager. The Provincial Archaeologist at PAO (Martha Drake, Provincial Archaeologist, 709-729-2462) shall be informed of the discovery by Environmental Coordinator with the following information:
   i. Nature of activity;
   ii. Nature of the material discovered; and
   iii. Precise location of the find.

b) The site area shall be flagged for protection and avoidance;

c) All work shall cease within 50 m of the discovery until the ERC team advises the PAO of the discovery. The PAO, in consultation with the ERC team, shall provide direction regarding the discovery and may authorize a resumption of the work. If required, a full archaeological assessment shall be conducted of the site and immediate area; and

d) The PAO shall assess the significance of the discovery and determine if mitigation is required. The ERC team in consultation with the PAO shall develop mitigation measures which are approved by the PAO.

13.4 FOREST FIRES

Construction for the development of TL 267 may have activities that increase the risk of fire in the natural environment. Fires on Site could spread to the surrounding area and forest. The main concerns include human health, damage to vegetation, wildlife and air and water quality. In case of a forest fire Project Personnel shall refer to the Emergency Response Plan for detailed contingency measures.

The operator shall take all precautions necessary to prevent fire hazards when working at the site. These include but are not limited to:

a) An Operating Permit shall be required during the forest fire season;

b) All flammable materials shall be stored and handled properly; and

c) All flammable waste shall be appropriately disposed of on a regular basis.

In the case of a fire being encountered the following shall be implemented:

a) The Construction Manager shall appoint a supervisory staff member as "On Scene Commander" for fighting any forest fires for each work front;

b) Immediate steps shall be taken by the operator and Contractors on site to contain or extinguish the fire. Applicable personnel shall be trained in firefighting and the use of such equipment. Equipment shall be provided in proper operating condition to suit the labour force and shall comply with manufacturer's standards;

c) Fires shall be immediately reported to the Construction Manager who shall in turn report it to the applicable authorities (1-866-709-3473). The following information is required when reporting a fire:

   i) name and telephone number;

   ii) time of detection of fire;

   iii) size of fire, location of fire; and

   iv) weather conditions (rain, sun, wind direction and speed, temperature).

d) Sufficient firefighting equipment to suit the labour force and fire hazards shall be provided by the Contractor. Equipment shall be provided as specified in the forest fire regulations and Operating Permit and shall include shovels, back tanks and axes. Such equipment shall comply with and be maintained to manufacturer standards. Project personnel shall be trained in the use of such equipment;

e) During the fire season, ATV's shall be equipped with a fire extinguisher or suitable equivalent containing a minimum of 227 grams of ABC dry chemical. Other machinery and equipment shall be equipped with a fire extinguisher containing a minimum of 4.5 kilograms of ABC dry chemical;

f) The forest fire suppression equipment referred to in the Operating Permit shall be provided at the operating site in Table 13-1:

Table 13-1 - Forest Fire Suppression Equipment Requirements

Employees	Back Tank Pumps	Axes or Pulaski Tools	Grubbers or Shovels
5 or less	1	1	1
6-10	2	2	2

11-15	3	3	3
16-20	4	4	4
>20	Add 1 back tank pump, 1 axe or Pulaski tool and 2 grubbers or shovels to the above figure for each group of 5 additional employees or fraction of that number of employees. The back tank pump must have a capacity of 20 litres and be of a type approved by the forest service.		

g) The Contractor is required to ensure all fire pumps are approved by Forest Services, and all approvals shall be documented;

h) When the number of Employees reaches 20 or over, one fully functional forest fire pump, such as the Wajax Mk3, shall be available at the work front. Pump accessories shall include: a gated "Y" valve, hose strangler and two nozzles for each unit, additionally, 610 meters of forest fire hose shall be available for each unit. If there are greater than forty (40) Employees, two (2) of these systems are required;

i) The forestry official issuing the Operating Permit may specify deviations from the equipment requirements (should local operating conditions warrant deviations);

j) The actual location of the forest fire suppression equipment in relation to the operating site may be designated by the forestry official issuing the permit;

k) A copy of the Operating Permit shall be on the operating site and shall be shown when requested by a forestry official or during a TL 267 Environmental Audit;

l) The Operating Permit may be temporarily suspended by a forestry official if the fire weather index for that locality rises to high or extreme;

m) Where a forest fire occurs on forest land in an area where logging or industrial operations are being carried out the person/s carrying out the operations shall immediately notify the nearest forest management district office or ranger station and commence fighting the fire with all labour, materials, equipment and facilities at his or her disposal until relieved of this responsibility by a forestry official or the fire is extinguished; and

n) For additional information regarding forest fire contingency planning, refer to the ERP.

14 CONTACT LIST

TL 267: NL Hydro – St. John's

1-(888)-576-5454

DOEC Water Resources – St. John's:

(709) 729-5713

DOEC Wildlife Division:

(709) 637-2029

DNR Forestry Division:

(709) 497-8479

DNR Mines Division:

(709) 729-6447

Provincial Archaeology Office:

(709)729-2462

Environment Canada Environmental Emergency Report Line:

(709)772-2083 or 1-(800)-563-9089

Appendix A: Rare Lichen Protection and Monitoring Plan

RARE LICHEN PROTECTION AND ENVIRONMENTAL EFFECTS MONITORING PLAN

TABLE OF CONTENTS

FIGURE

1 PURPOSE

The purpose of this Rare Lichen Protection and Environmental Effects Monitoring Plan (RLPEEMP) is to demonstrate how any adverse environmental effects will be mitigated, and to set out a program for monitoring the effectiveness of mitigation measures, and to comply with commitments made in the Environmental Assessment Registration Document (NL Hydro, 2015) and the conditions of environmental assessment release.

The RLPEEMP relates to two listed plant species that have been identified to occur within five kilometres of the proposed TL 267 centreline – the Boreal Felt Lichen (*Erioderma pedicellatum*) and the Blue Felt Lichen (*Degelia plumbea*). In addition, it should be noted that although Graceful Felt Lichen (*Erioderma mollissimum*) has not been recorded within five kilometres of the project study area, because the habitat requirements of this species is very similar to Boreal Felt Lichen, this species has also been included in this RLPEEMP.

2 SCOPE

This plan addresses the required aspects of rare lichen protection and effects monitoring for the design, construction, and operation phases of TL 267 (described in Section 3).

3 TL 267 PROJECT DESCRIPTION

The Project includes the construction and operation / maintenance of the following primary elements:

- A 188 km, 230 kV transmission line between the BDE and WAV terminal stations (Figure 3-1), comprised of steel towers with both Overhead Ground Wire (OHGW) and Optical Ground Wire (OPGW) which includes optical fibre for communication along its entire length;
- Required modifications and upgrades to the existing BDE and WAV terminal stations; and
- Project construction and maintenance infrastructure requirements (camps, access, marshalling yards, laydown areas and other infrastructure as required).

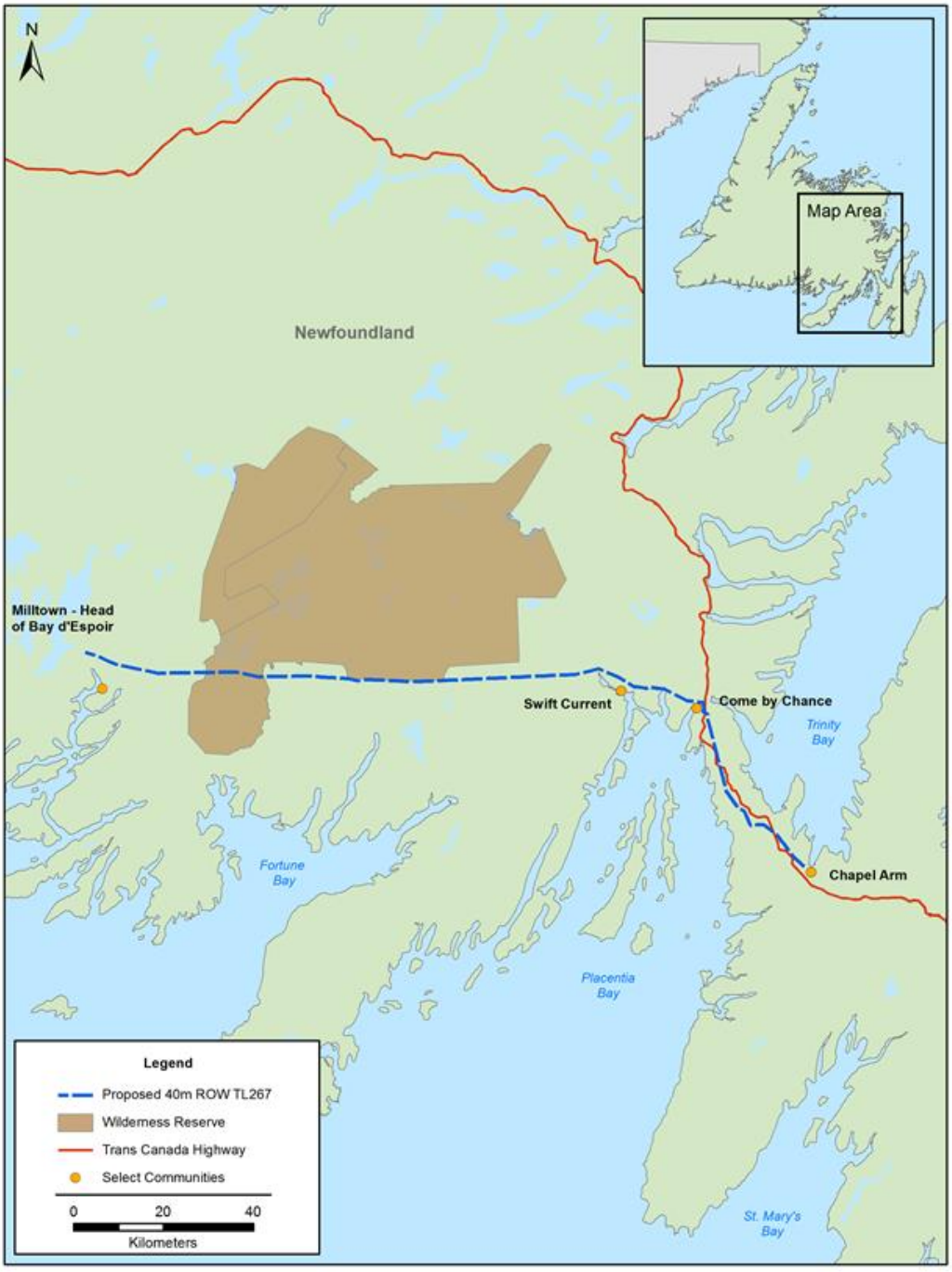

Figure 3-1 The Proposed Bay D'Espoir To Western Avalon Transmission Line (TL 267)

3.1 OVERVIEW OF COMPONENTS

The following section provides an overview description of TL 267's key components, based on previous and ongoing engineering studies and reflecting the current stage of planning and design. As described above, TL 267 is the subject of ongoing engineering design, and as with any development project, this will be subject to continued refinement and optimization.

A proposed 230 kV transmission line (TL 267) will be established between BDE and WAV. The new transmission line will leave the BDE terminal station and travel east for a distance of approximately 144 km until it reaches CbC where the transmission line turns southeast and crosses the TransCanada Highway (Figure 3-1). At this point, TL 267 meets the existing 230 kV woodpole line (TL 203) and follows it, and eventually the existing TL 237, south for approximately 44 km until it reaches the WAV terminal station.

The proposed transmission line will be located adjacent to existing 230 kV transmission lines between the BDE and WAV terminal stations. The proposed transmission line will occupy a cleared ROW approximately 40 m wide, which is governed primarily by its electrical voltage, required conductor clearances and proximity to existing transmission lines.

A number of possible transmission tower structure types are being considered and evaluated for the TL 267. One option would see the use of guyed-Y lattice steel structures for tangential structures with free-standing lattice structures where angles and dead-ends are required (see Figures 3-2 and 3-3). The guyed-Y structure uses a galvanized steel grillage foundation (approximately 2 m by 2 m in size) for the centre mast, and has four supporting guy wires. Rock foundations will be used in the presence of sound bedrock. The towers and any associated foundations will be contained entirely within the transmission line ROW.

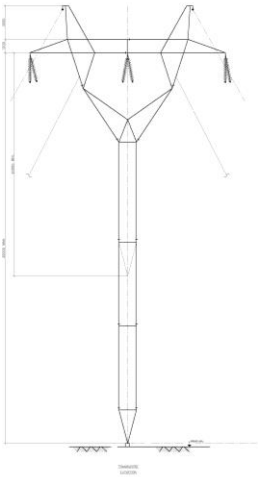

Figure 3-2 Typical Guyed Tower

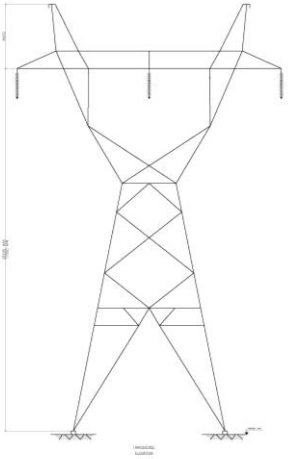

Figure 3-3 Typical Dead-end Tower

The transmission tower structures will be spaced approximately 400 m apart from BDE to Piper's Hole and approximately 300 m apart from Piper's Hole to the WAV terminal station. Based on this spacing, approximately 550 tower structures will be erected across the length of the preferred transmission line routing. Tower heights for the line will be governed by ground clearance depending on the terrain at particular sites along the route but will generally average approximately 105 feet (32 m). Under the current development concept, the transmission line towers will carry three phases, each of which will be comprised of a single 804 kcmil, 54/19, AACSR/TW conductor. The transmission towers will carry two overhead shield wires to provide protection from lightning strikes, one of which will include a fibre optic cable for communications.

The centre line for the TL 267 will be located approximately 40 m south of the centre line of the existing TL 206 from BDE to CbC, follow 40 m to the west of TL 203 and TL 237 centerline with few deviations from CbC to WAV.

4 EXISTING INFORMATION

4.1 BOREAL FELT LICHEN

Boreal Felt Lichen is an epiphytic species which grows on the trunks and branches of coniferous trees (NLDEC 2015). This species usually prefers Balsam Fir (*Abies balsamea*) trees but has also been recorded on other tree species such as Black Spruce (*Picea mariana*) and Trembling Aspen (*Populus tremuloides*). It is typically found in moist coniferous forests, close to the coast where the local topography provides suitable microclimate such as near the base of northern slopes

and at the edges of wetlands. In Newfoundland this species is concentrated in two major areas including the central Avalon Peninsula and Bay d'Espoir (NLDEC 2015). Boreal Felt Lichen is listed and protected under the *Newfoundland and Labrador Endangered Species Act* (NLESA) as vulnerable and by the federal *Species at Risk Act* (SARA) as special concern (Government of Canada 2015).

4.2 GRACEFUL FELT LICHEN

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

4.3 BLUE FELT LICHEN

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

5 ENVIRONMENTAL EFFECTS MANAGEMENT

Mitigation and monitoring for rare lichens are outlined in Section 5.1 and Section 5.2, respectively.

5.1 MITIGATION MEASURES

5.1.1 Field Surveys

The first steps and mitigation for the protection of rare lichens involves habitat modeling followed by field surveys in areas that provide suitable habitat for Boreal Felt Lichen, Graceful Felt Lichen, and Blue Felt Lichen.

Habitat modeling for the two listed lichen species was carried out for the environmental assessment using information on:

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

As a result, two plant habitat potential models were developed for the Project. Atlantic Canada Conservation Data Centre (ACCDC) provided a database of the known occurrences of listed and rare plant species within the overall Regional Area (ACCDC 2015). The first model was created using these known occurrences within this area, and is based on the premise that as the number of known occurrences within a particular area increases, the likelihood of encountering another such plant within that particular area also increases. The categories and associated criteria for this "occurrence based" plant habitat model were identified as:

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

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

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

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

Results of the habitat modelling were used to identify high potential polygons within the 40 m wide ROW for which to conduct field surveys. Upon discussions with Newfoundland Department of Environment and Conservation - Wildlife Division (NLDEC-WD)it was agreed to also include all softwood forests within the 40m ROW as a medium potential habitat to be field assessed. If deemed to provide suitable habitat, these medium potential areas were also surveyed (see Figures 1-9).

Field surveys of each identified area (high and medium potential) took place between November 7, 2015 and November 17, 2015. Surveys consisted of experienced team members

conducting active searches for both lichen species in areas of identified suitable habitat within the Project Area (ROW). The areas of potential habitat were dispersed along the extent of the transmission line Study Area including within the Bay Du Nord Wilderness Reserve.

Surveys within the identified habitat polygons were conducted by foot in order to visually assess the entire polygon. Each tree (trunk and branches) was examined on all sides from base to approximately 4 meters (as high as could be visually assessed by surveyors from the ground). Balsam Fir trees received higher effort than other species of tree but Black Spruce trees were also examined during the surveys.

Data recorded at each listed lichen location included:

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

A total of 113 ha of forest habitat was identified during the desktop component of the study as either high or medium potential to contain listed lichens (see Figures 1-9). During field work, it was determined that both the high potential polygons and medium potential polygons both had the potential to provide suitable habitat for Boreal Felt Lichen and Graceful Felt Lichen and that the presence of Boreal Felt Lichen seemed to be more influenced by the dominance of mature Balsam Fir trees rather than the proximity to a wetland. It was also noted that some of the high potential polygons turned out to be dominated by Black Spruce where Boreal Felt Lichen is not known to occur.

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

- dense Black Spruce forest with no or very little presence of Balsam Fir;

- regenerating forest (early successional);
- highly disturbed forest;
- sparse forest dominated by Black Spruce and Larch (*Larix laracina*); or
- fragmented forest patches, offering only edge habitat.

The 2015 field surveys resulted in locating a total of 242 individual thalli of Boreal Felt Lichen on 80 trees within the Project Study Area. No Blue Felt Lichen or Graceful Felt Lichen individuals were recorded during the 2015 surveys. The majority of Boreal Felt Lichen individuals were recorded within Balsam Fir forests on Balsam Fir trees; however, one location did report a Boreal Felt Lichen on a Black Spruce tree (see Figures 1-9).

Prior to construction, in areas immediately adjacent to the Reserve and other areas with expected occurrence of rare lichens, NL Hydro will conduct a lichen survey in the area of the roads, trails and quarries. In advance of the survey, NL Hydro will provide to NLDEC-WD and Department of Environment and Conservation - Parks and Natural Areas Division (NLDEC-PNAD) maps of potential lichen habitat in those areas planned for clearing outside of the right-of-way (ROW). These maps will be used to determine areas that may require lichen surveys. Potential survey areas are to be approved by NLDEC-WD and NLDEC-PNAD, and must target rare lichen species. The surveys, like the surveys conducted in the fall of 2015 of the right-of-way, will be conducted by an independent third party whose qualifications and methodology have been approved by NLDEC-WD.

5.1.2 Lichen Relcoations

The second step in protecting rare lichens is translocation in the case of Boreal Felt Lichen. Prior to clearing activities commencing, NL Hydro will hire a third party consultant with experience conducting lichen translocations to remove known occurrences of Boreal Felt Lichen from the host trees by carefully excising the thalli from the bark substrate. The specimens will then be placed between sterile wipes moistened with distilled water and placed in labelled paper bags. Paper bags will be kept in aerated plastic containers for storage, and kept cool until transported to recipient transplant sites. Each thalli will remain intact to attach to a recipient tree at the transplant site.

Potential transplant sites will be deemed favourable based on the following criteria:

- Occurrence of Boreal Felt Lichen on receptor tree or within stand
- Rare lichen habitat model described in Section 5.1 which was revised based on input received from NLDEC-WD
- Wherever possible the transplants will be attached on areas of tree bark containing thin mats of the epiphytic bryophyte (*Frullania asagrayana*). (This

bryophyte species is hypothesized to be important in the lichenization process of Boreal Felt Lichen.)

- At a minimum, a 100-250 m buffer will be used to separate the recipient host tree from TL 267 right-of-way
- Maximum number of relocations per receptor tree will be five
- Recipient balsam fir trees will be selected that are of similar size and age as the donor trees
- Translocations will only occur to the trunk of receptor tress regardless of whether the host location was on branches
- Thalli/propagates will be attached at a similar height from the forest floor and cardinal orientation as supported on donor trees.
- Transplant sites will be selected in relatively close proximity to the host location See Figures 1-9 for indication of the 12 monitoring sites to be established.

A fully intact thallus will be attached directly to the bark of recipient trees using one or two hand-made no.18 gauge stainless steel wire staples fashioned from a larger roll using wire-cutters. Using forceps to hold thalli in place, the transplants will be 'mounted' with stainless steel wire ‘staples’ using needle-nosed pliers by slipping the wire under the bark of the recipient tree, and over the surface of the thalli. The more common application results in a criss-cross arrangement of the wires. Care will be taken not to puncture the sapwood. Properly placed, the stainless steel wire inserts between the inner bark layer but on the outside surface of the sapwood. An additional important precaution is that the wire staples will not insert into the bark above the thalli as this can result in sap flow downward over the transplant.

Following each transplant a unique ID will be assigned, a permanent forestry tag and high-quality forestry grade flagging tape will be deployed, and Boreal Felt Lichen morphometric data and digital photographs will be collected. Habitat descriptions for each transplant site will also be recorded.

590000
592000
5316000
594000
5316000
5314000
594000

N

Newfoundland

KM-0
KM-5

Relocation grouping #1

Legend

Proposed TL267
Study Area (40m ROW)
1 km wide corridor
Boreal Felt Lichen Location

Survey Type
Ground Survey
Air Survey

Class
High
Medium
Existing Transmission Line
Existing Road

0 0.25 0.5
Kilometres

Figure 1

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

596000
598000
5314000
600000
5314000
600000
5312000
N
Newfoundland
KM-10
Relocation grouping #2
Relocation grouping #3
Legend
Proposed TL267
Study Area (40m ROW)
1 km wide corridor
Boreal Felt Lichen Location
Survey Type
Ground Survey
Air Survey
Class
High
Medium
Existing Transmission Line
Existing Road
0
0.25
0.5
Kilometres

Figure 2

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

602000
604000
606000
606000
600000
5312000
5310000
N
Newfoundland
KM-15
Relocation grouping #3
Relocation grouping #4
Relocation grouping #5
Whiskey Brook
Legend
Proposed TL267
Study Area (40m ROW)
1 km wide corridor
Boreal Felt Lichen Location
Survey Type
Ground Survey
Air Survey
Class
High
Medium
Existing Transmission Line
Existing Road
0
0.25
0.5
Kilometres

Figure 3

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

606000

608000

610000

5312000

5310000

N

Newfoundland

KM-20

Relocation grouping #6 and #7depending on site conditions and nearby suitable habitat

Legend

Proposed TL267

Study Area (40m ROW)

1 km wide corridor

Boreal Felt Lichen Location

Survey Type

Ground Survey

Air Survey

Class

High

Medium

Existing Transmission Line

Existing Road

0 0.25 0.5

Kilometres

Pond

Figure 4

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

612000
614000
616000
5312000
5310000
N
KM-25
Relocation grouping #8
Newfoundland
Legend
Proposed TL267
Study Area (40m ROW)
1 km wide corridor
Boreal Felt Lichen Location
Survey Type
Ground Survey
Air Survey
Class
High
Medium
Existing Transmission Line
Existing Road
0
0.25
0.5
Kilometres

Figure 5

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

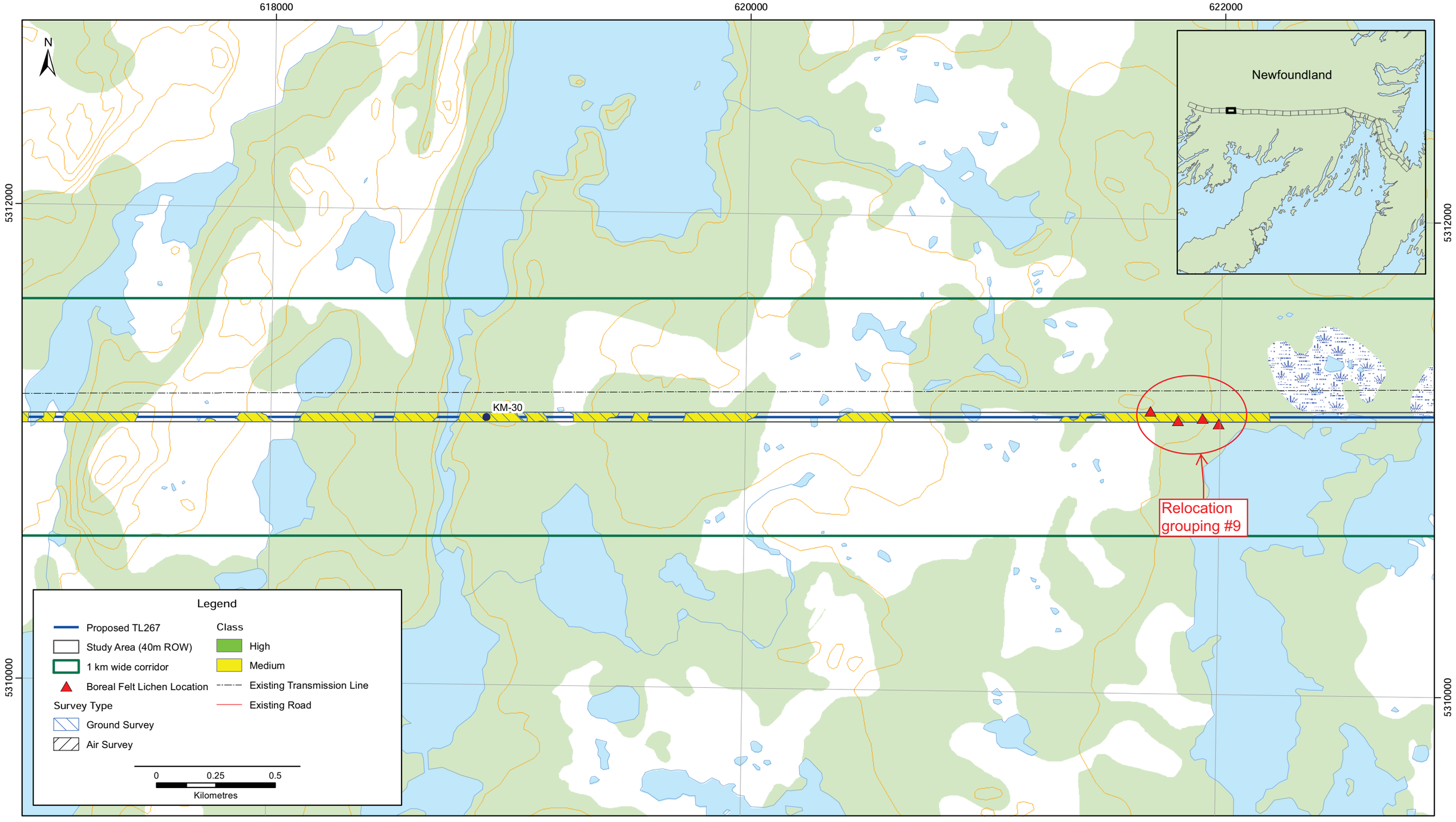

Figure 6

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

624000
626000
5312000
628000
5312000
5310000
5310000
N
Newfoundland
KM-35
Relocation grouping #10
Relocation grouping #11
Legend
Proposed TL267
Study Area (40m ROW)
1 km wide corridor
Boreal Felt Lichen Location
Survey Type
Ground Survey
Air Survey
Class
High
Medium
Existing Transmission Line
Existing Road
0
0.25
0.5
Kilometres

Figure 7

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

630000
632000
634000
5310000
5310000
N
Newfoundland
KM-40
KM-45
Relocation grouping #12
Legend
Proposed TL267
Study Area (40m ROW)
1 km wide corridor
Boreal Felt Lichen Location
Survey Type
Ground Survey
Air Survey
Class
High
Medium
Existing Transmission Line
Existing Road
0
0.25
0.5
Kilometres

Figure 8

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

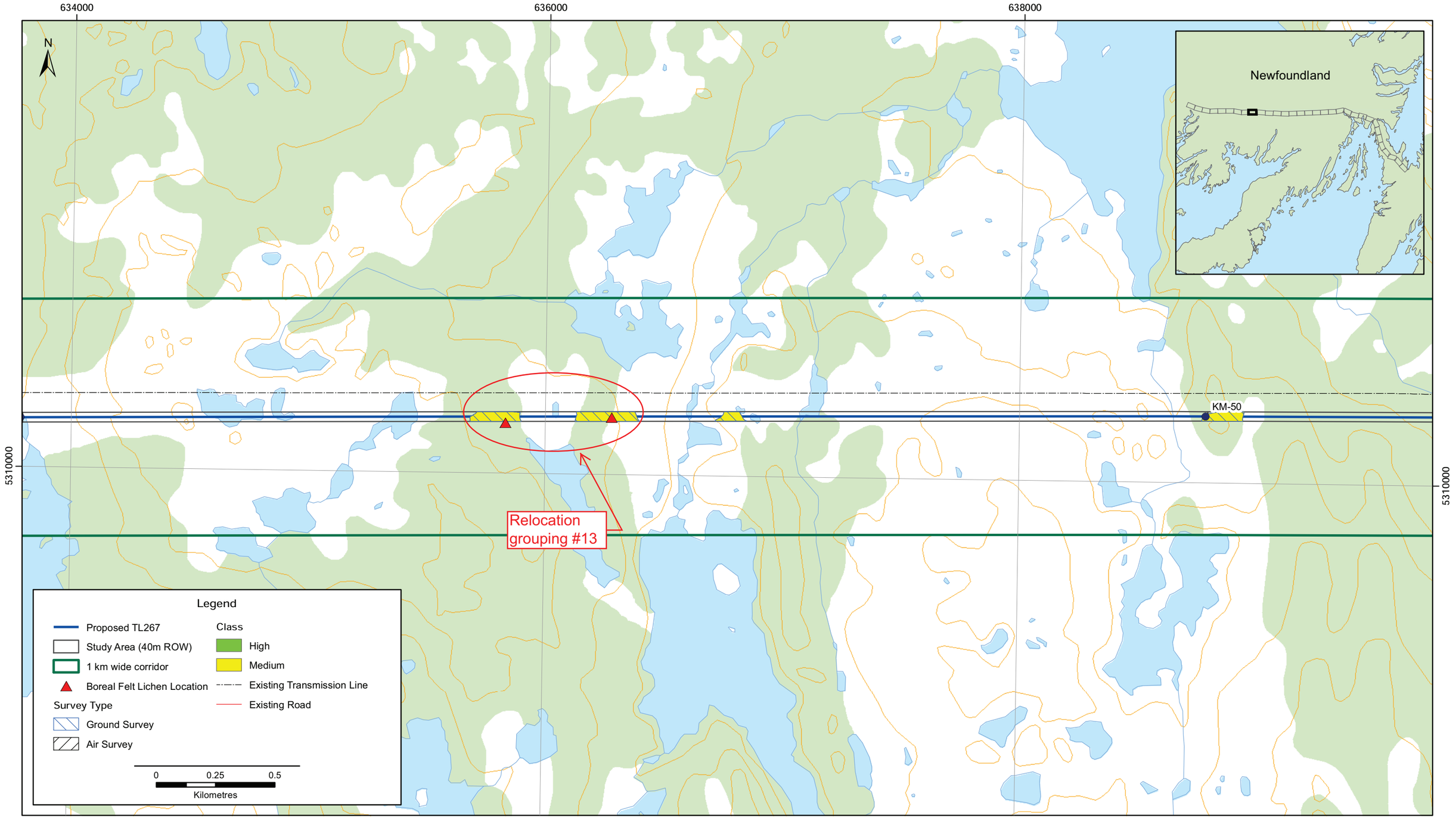

Figure 9

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

5.2 MONITORING

Monitoring will occur annually and will include a comparative analysis of survival of transplanted thalli. All thalli will be reassessed relative to their status recorded when initially transplanted to detect positive, neutral (no change), or negative rates of survival for each transplant site. Assessment variables will include change in developmental stage, degree of necrosis, and size of exposed epithelia surface area. Monitoring will occur for five years post transplantation. Following Year 5, a review of the results of the program will be evaluated to determine if additional monitoring years is warranted.

5.3 REPORTING

A report will be submitted to NLDEC-WD and NLDEC-PNAD annually that will present the results of the monitoring program described in Section 5.2.

The annual report will document field activities and present tabular information collected during the monitoring program of transplanted Boreal Felt Lichen thalli. The report will include details on the comparative annual survival of transplanted thalli of the Boreal Felt Lichen relocation program. All digital data products taken during conduct of the field program will accompany annual reports.

5.4 CONTINGENCY PLAN

At this time, contingency plans are not anticipated for rare lichens and any changes to NL Hydro's procedures or mitigation plans would be addressed through the adaptive management approach, if and as appropriate.

6 REFERENCES

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

Government of Canada. 2015. Species at Risk Public Registry. Available online: http://www.sararegistry.gc.ca/sar/index/default_e.cfm?stype=species&lng=e&index=1&c

ommon=&scientific=&population=&taxid=11&locid=7&desid=0&schid=0&desid2=0&. Accessed on 20 October, 2015.

Newfoundland and Labrador Department of Environment and Conservation (NLDEC). 2015. Species at Risk – Plants. Available online: http://www.env.gov.nl.ca/env/wildlife/endangeredspecies/plants.html#13. Accessed on 20 October, 2015

Appendix B: Avifauna Management Plan

TL 267 Avifauna Management Plan

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FIGURE

1 PURPOSE

Avifauna in Newfoundland and Labrador are managed by both federal and provincial regulatory agencies. For certain species, there are policies and regulations governing development activities on the landscape. As there is a risk that activities associated with the construction of the TL 267 Transmission Line, from Bay d'Espoir to the Western Avalon, may cause disturbance to bird species, the following Avifauna Management Plan (AMP) has been developed to manage these potential effects.

2 SCOPE

This plan addresses the required aspects of avifauna management for the construction phases of the TL 267 Transmission Line (described in Section 5.0).

3 DEFINITIONS

Environmental Assessment: An evaluation of a project's potential environmental risks and effects before it is carried out, and identification of ways to improve project design and implementation to prevent, minimize, mitigate, or compensate for adverse environmental effects and to enhance positive effects.

Environmental Management: The management of human interactions with the environment (air, water, land, and all species that occupy these habitats, including humans).

Environmental Management System: Part of an organization's management system used to develop and implement its environmental policy and manage its environmental aspects.

Environmental Protection Plan: Document outlining the specific mitigation measures, contingency plans and emergency response procedures to be implemented during the construction or operations of a facility.

Environmental Effects Monitoring: Monitoring of overall Project effects to confirm the predictions of EA and to fulfill EA commitments.

Environmental Compliance Monitoring: Monitoring of Project activities to confirm compliance with regulatory requirements and commitments made through the EA process.

4 ABBREVIATIONS AND ACRONYMS

COSEWIC	Committee on the Status of Endangered Wildlife in Canada
CWS	Canadian Wildlife Service
EA	Environmental Assessment
EMP	Environmental Management Plan
EPP	Environmental Protection Plan
EMS	Environmental Management System
ERC	Environment and Regulatory Compliance
Gen	Generation
HSE	Heath Safety and Environment
NLDEC	Newfoundland and Labrador Department of Environment and Conservation
OSEM	On-Site Environmental Monitor
PEEMP	Protection and Environmental Effects Monitoring Plan
RCP	Regulatory Compliance Plan
RP	Rehabilitation Plan
SARA	Species at Risk Act

5 PROJECT DESCRIPTION

TL 267 will consist of a 188 km long, 230 kV steel tower transmission line between Bay d'Espoir Terminal Station and Western Avalon Terminal Station. The line will occupy a cleared 40 m wide right of way that parallels existing transmission line infrastructure, including TL 202 and TL 206 (Figure 5-1) that runs from Bay d'Espoir to Come by Chance, and from there the TL 203 wood pole line (and eventually TL 237) that continues to the Western Avalon Terminal Station in Chapel Arm.

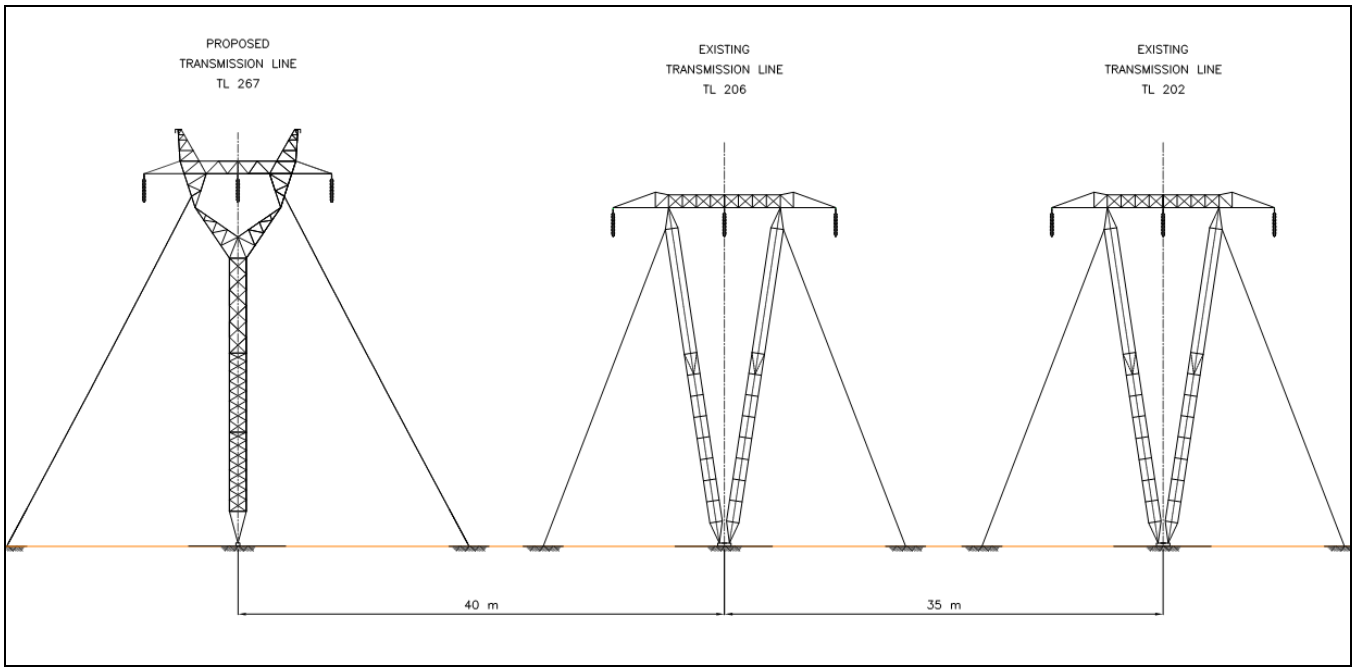

Figure 5-1 TL 267 Right of Way in Relation to Existing, Adjacent Transmission Lines.

The key components for the construction and development of this Project are listed below:

- A 188 km, 230 kV transmission line between the Bay d'Espoir and Western Avalon terminal stations, comprised of steel towers with both overhead ground wire (OHGW) and an optical ground wire (OPGW) which includes optical fibre for communication along its entire length (Figure 5-2).
- Required upgrades to the existing Bay d'Espoir and Western Avalon terminal stations.
- Project construction and maintenance infrastructure requirements, including a temporary camp, access routes and other components as required.

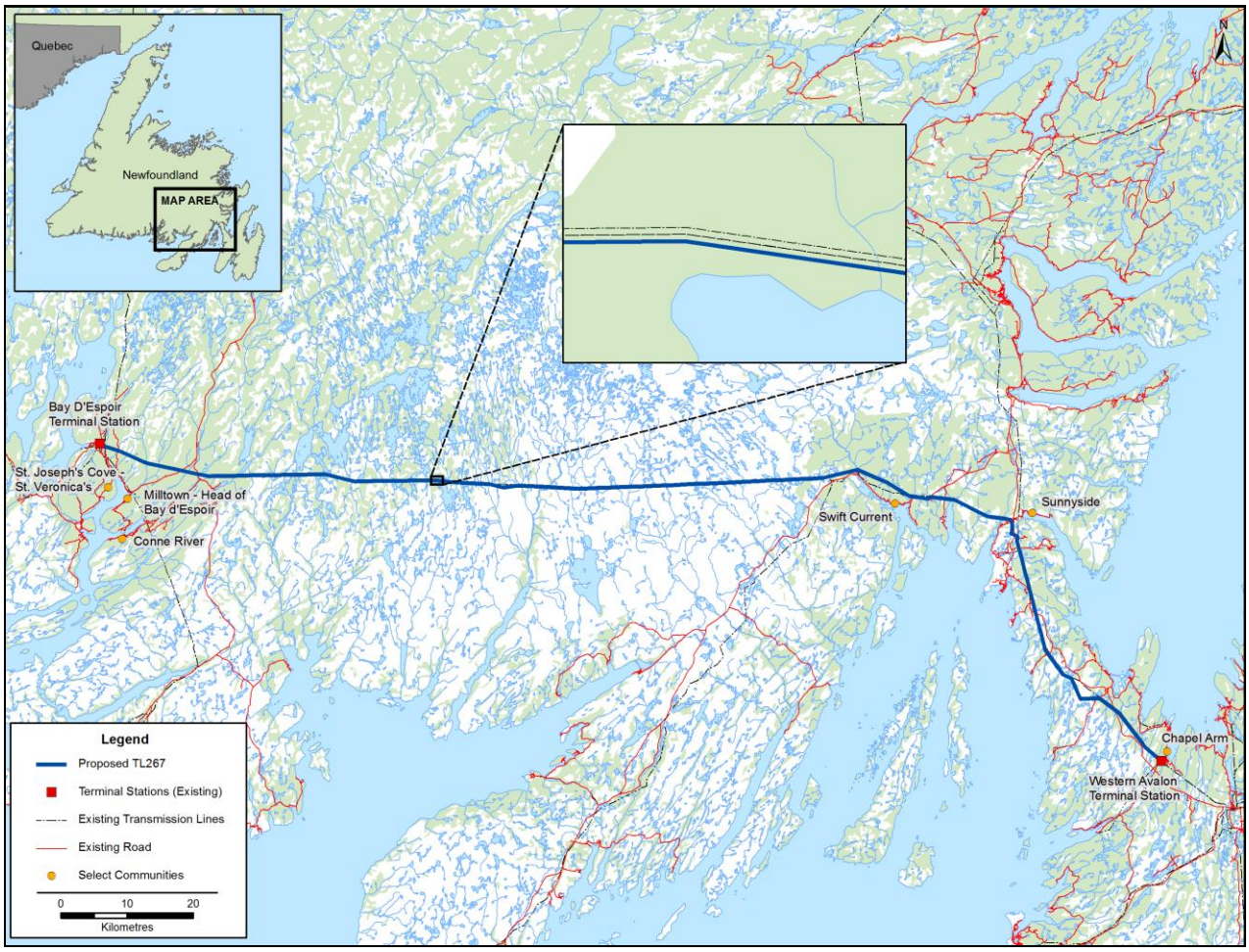

Figure 5-2 TL 267: Proposed Transmission Line Routing

6 REGULATORY CONTEXT

6.1 Migratory Birds Convention Act

The Migratory Birds Convention Act (MBCA) was designed to protect and conserve migratory birds, both as populations and individual birds, and their nests (internet site: Government of Canada 1994a). In Canada, the MBCA and associated Migratory Birds Regulations (internet site: Government of Canada 1994b) are administered through Environment Canada by the Canadian Wildlife Service (CWS) (internet site: Government of Canada 1994a). Coverage of the MBCA includes landbirds (e.g., warblers, thrushes, and sparrows), waterfowl (e.g., ducks, loons and geese), and waterbirds (e.g., gulls and terns) but does not include grouse, ptarmigan, hawks, eagles, owls, crows or jays (Environment Canada 1991).

The Migratory Birds Regulations prohibit the disturbance, destruction, or taking of a nest, nest shelter, eider duck shelter or duck box of a migratory bird, or the possession of a live migratory bird, or a carcass, skin, nest or egg of a migratory bird (internet site: Government of Canada 1994b). Permits for these activities cannot be issued by CWS or Environment Canada (Joint Review Panel 2011, pg. 140).

6.2 Species at Risk Act

The Species at Risk Act, 2002 (SARA) was established to provide wildlife species additional protection against extirpation, extinction or endangerment (internet site: Government of Canada 2002). This includes protection from human activity. Species at risk are classified by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) as extirpated, endangered, threatened or of special concern depending on the level of risk. Like the MBCA, this affords protection at a federal level by prohibiting the killing, harming, harassment, capture or taking, or collection of a listed species, and the damage or destruction of a residence of a listed species (internet site: Government of Canada 2002).

6.3 Newfoundland and Labrador Endangered Species Act

Provincially, wildlife species at risk are managed under the *Newfoundland and Labrador Endangered Species Act*, 2004 (NLESA), designed to complement federal SARA legislation. The NLESA protects wildlife species, subspecies or populations within the province that are considered endangered, threatened or vulnerable based on recommendations from COSEWIC or the provincial Species Status Advisory Committee (SSAC) (internet site: Government of Newfoundland and Labrador 2004). Under NLESA it is prohibited to disturb, harass, injure or kill any individual of a listed species, disturb or destroy the residence of listed species, or be in possession of individuals of a listed species (internet site: Government of Newfoundland and Labrador 2004). There are currently 14 bird species listed under NLESA (NLDEC 2012a).

7 BASELINE INFORMATION

7.1 Key Avifauna Species

The majority of migratory species, which are protected under federal and / or provincial legislation, can be grouped into four categories:

- Landbirds;
- Waterfowl;

- Waterbirds; and
- Shorebirds.

Although raptors are not covered under the MBCA, they are subject to provincial regulations.

Of particular concern are the species at risk. The species at risk known to occur within south-central and eastern Newfoundland include the Olive-sided flycatcher (*Contopus cooperi*), Barrow's Goldeneye (*Bucephala Islandica*), Rusty Blackbird (*Euphagus carolinus*), Harlequin Duck (*Histrionicus histrionicus*), Gray-cheeked Thrush (*Catharus minimus*), Red Knot (*Calidris canutus rufa*), and Red Crossbill (*Loxia curvirostra percna*). Additional details on the above mentioned species are listed in sub-section 7.2, Table 7-2.

A number of taxonomic and functional groups of avifauna are relatively well represented in the Study Area including waterfowl, shorebirds, wood warblers, birds of prey, sparrows and finches. Collectively, these species inhabit all terrestrial and riparian habitats including dense coniferous and mixed-wood forest, wetlands, open spruce woodland, barrens, bog, and both inland and coastal shorelines. Common species that are known to breed in the area include American Black Duck (*Anas rubripes*), Canada Goose (*Branta canadensis*), Greater Yellowlegs (*Tringa melanoleuca*), Spotted Sandpiper (*Actitis macularius*), Yellow-Rumped Warbler (*Dendroica coronate*), Blackpoll Warbler (*Dendroica striata*), Osprey (*Pandion haliaetus*), Great-Horned Owl (*Bubo virginianus*), White-Throated Sparrow (*Zonotrichia albicollis*) and Pine Grosbeak (*Pinicola enucleator*).

7.2 Avifauna Associated with Study Area

Of the avifauna species that may breed within south-central and eastern Newfoundland, many have specialized habitat requirements and therefore are associated with particular habitat types. Table 7-1 provides a list of all bird species that are known or suspected to breed on the island of Newfoundland. The table also includes the species that have been confirmed to occur within 5 km of the proposed right of way for TL267, the relative abundance of the species, and their habitat.

Table 7-1 Avifauna Species That Are Known or Likely to Occur Within The Study Area.

Common Name*	Scientific Name	Occurrence	Information Source**	Relative Abundance (Breeding Status)	Habitat(s)
Canada Goose	*Branta canadensis*	Confirmed	PNAD	Common (breeder)	Wetlands
American Black Duck	*Anas rubripes*	Confirmed	NFB	Common (breeder)	Wetlands
Ring-necked Duck	*Aythya collaris*	Confirmed	PNAD, NFB	Common (breeder)	Wetlands
Harlequin Duck	*Histrionicus histrionicus*	Confirmed	ACCDC	Uncommon (breeder)	Wetlands
Common Merganser	*Mergus merganser*	Confirmed	PNAD, EBIRD, NFB	Uncommon (breeder)	Wetlands
Common Loon	*Gavia immer*	Confirmed	PNAD, EBIRD, NFB	Common (breeder)	Wetlands
Northern Harrier	*Circus cyaneus*	Confirmed	BBS, ACCDC, NFB	Common (breeder)	Barrens
Semi-Palmated Plover	*Charadrius semipalmatus*	Confirmed	EBIRD	Common in migration	Coastal shoreline
Black-Bellied Plover	*Pluvialis squatarola*	Confirmed	EBIRD	Common in migration	Coastal shoreline
Spotted Sandpiper	*Actitis macularius*	Confirmed	PNAD	Common (breeder)	Coastal/inland shoreline
Greater Yellowlegs	*Tringa melanoleuca*	Confirmed	EBIRD	Common (breeder)	Wetlands/coastal shoreline
Semipalmated Sandpiper	*Calidris pusilla*	Confirmed	EBIRD	Common in migration	Coastal shoreline
White-Rumped Sandpiper	*Calidris fuscicollis*	Confirmed	NFB	Common in migration	Coastal shoreline
Red Knot	*Calidris canutus rufa*	Confirmed	ACCDC	Uncommon	Coastal shoreline
Wilson's Snipe	*Gallinago delicata*	Confirmed	PNAD, BBS	Common (breeder)	Wetlands

Common Name*	Scientific Name	Occurrence	Information Source**	Relative Abundance (Breeding Status)	Habitat(s)
Herring Gull	*Larus argentatus*	Confirmed	PNAD, BBS, EBIRD	Common (breeder)	General
Common Tern	*Sterna hirundo*	Confirmed	PNAD	Common (breeder)	Coastal habitats
Great Horned Owl	*Bubo virginianus*	Confirmed	PNAD	Uncommon (breeder)	Forest
Northern Saw-Whet Owl	*Aegolius acadicus*	Confirmed	ACCDC	Uncommon (breeder)	Forest
Downy Woodpecker	*Picoides pubescens*	Confirmed	PNAD	Common (breeder)	Deciduous forest
Northern Flicker	*Colaptes auratus*	Confirmed	PNAD, BBS, NFB	Common (breeder)	Forest
Gray Jay	*Perisoreus canadensis*	Confirmed	PNAD, BBS	Common (breeder)	Coniferous forest
American Crow	*Corvus brachyrhynchos*	Confirmed	BBS, EBIRD	Common (breeder)	General
Common Raven	*Corvus corax*	Confirmed	PNAD, BBS, EBIRD	Common (breeder)	General
Tree Swallow	*Tachycineta bicolor*	Confirmed	PNAD	Common (breeder)	Wetlands
Black-Capped Chickadee	*Poecile atricapillus*	Confirmed	BBS, EBIRD	Common (breeder)	Forest
Boreal Chickadee	*Poecile hudsonicus*	Confirmed	PNAD, BBS, EBIRD	Common (breeder)	Forest
Red-Breasted Nuthatch	*Sitta canadensis*	Confirmed	EBIRD	Common (breeder)	Forest
Ruby-Crowned Kinglet	*Regulus calendula*	Confirmed	PNAD, BBS	Common (breeder)	Forest
Hermit Thrush	*Catharus guttatus*	Confirmed	PNAD, BBS	Common (breeder)	Forest
American Robin	*Turdus migratorius*	Confirmed	PNAD, BBS	Common (breeder)	General
Magnolia Warbler	*Dendroica magnolia*	Confirmed	PNAD, BBS, NFB	Common (breeder)	Forest
Yellow-Rumped Warbler	*Dendroica coronate*	Confirmed	PNAD, NFB	Common (breeder)	Forest
Palm Warbler	*Dendroica palmarum*	Confirmed	PNAD, BBS, NFB	Common (breeder)	Forest
Blackpoll Warbler	*Dendroica striata*	Confirmed	PNAD, BBS, NFB	Common (breeder)	Forest

Common Name*	Scientific Name	Occurrence	Information Source**	Relative Abundance (Breeding Status)	Habitat(s)
Black-and-White Warbler	*Mniotilta varia*	Confirmed	PNAD, BBS, NFB	Common (breeder)	Forest
Northern Waterthrush	*Seirus noveboracensis*	Confirmed	PNAD, BBS, NFB	Common (breeder)	Forest
Common Yellowthroat	*Geothlypis trichas*	Confirmed	PNAD, BBS, NFB	Uncommon (breeder)	Forest
Wilson's Warbler	*Wilsonia pusilla*	Confirmed	PNAD, BBS, NFB	Common (breeder)	Forest
Savannah Sparrow	*Passerculus sandwichensis*	Confirmed	PNAD, BBS	Common (breeder)	Barrens
Fox Sparrow	*Passerella liliaca*	Confirmed	PNAD, BBS	Common (breeder)	General
Lincoln's Sparrow	*Melospiza lincolnii*	Confirmed	PNAD, BBS, NFB	Common (breeder)	Barrens
Swamp Sparrow	*Melospiza georgina*	Confirmed	PNAD, BBS, NFB	Common (breeder)	Forest
White-Throated Sparrow	*Zonotrichia albicollis*	Confirmed	PNAD, BBS	Common (breeder)	Forest
Dark-Eyed Junco	*Junco hyemalis*	Confirmed	PNAD, BBS, EBIRD	Common (breeder)	Forest
Rusty Blackbird	*Euphagus carolinus*	Confirmed	PNAD, NFB	Uncommon (breeder)	Wetlands
Red Crossbill	*Loxia curvirostra percna*	Confirmed	NFB	Uncommon (breeder)	Coniferous forest
American Goldfinch	*Spinus tristis*	Confirmed	PNAD, BBS	Common (breeder)	Forest
Barrow's Goldeneye	*Bucephala islandica*	Confirmed	ACCDC	Uncommon	Wetlands
Barn Swallow	*Hirundo rustica*	Confirmed	ACCDC	Uncommon (breeder)	Wetlands
Olive-Sided Flycatcher	*Contopus cooperii*	Confirmed	NFB	Uncommon (breeder)	Open forest
Gray-Cheeked Thrush	*Catharus minimus minimus*	Confirmed	BBS	Uncommon (breeder)	Forest
Rough-Legged Hawk	*Buteo lagopus*	Confirmed	ACCDC	Uncommon (breeder)	Barrens

Common Name*	Scientific Name	Occurrence	Information Source**	Relative Abundance (Breeding Status)	Habitat(s)
Black-Headed Gull	*Chriococephalus ridibundus*	Confirmed	ACCDC	Uncommon	Coastal Shoreline
Gryfalcon	*Falco rusticolus*	Confirmed	ACCDC	Common (breeder)	Forest
Wood Duck	*Aix sponsa*	Confirmed	EBIRD, NFB	Uncommon	Wetlands
American Wigeon	*Anas americana*	Unknown		Uncommon (breeder)	Wetlands
Mallard	*Anas platyrhynchos*	Unknown		Common (breeder)	Wetlands
Northern Pintail	*Anas acuta*	Unknown		Uncommon (breeder)	Wetlands
Green-Winged Teal	*Anas crecca*	Confirmed	NFB	Common (breeder)	Wetlands
Greater Scaup	*Aythya marila*	Unknown		Uncommon (breeder)	Wetlands
Common Goldeneye	*Bucephala clangula*	Confirmed	NFB	Common (breeder)	Wetlands
Red-Breasted Merganser	*Mergus serrator*	Confirmed	NFB	Common (breeder)	Wetlands
Ruffed Grouse	*Bonas umbellus*	Confirmed	BBS	Common (breeder)	Forest
Spruce Grouse	*Falcipennis canadensis*	Confirmed	NFB	Uncommon (breeder)	Forest
Willow Ptarmigan	*Lagopus lagopus*	Confirmed	NFB	Common (breeder)	Barrens
Rock Ptarmigan	*Lagopus muta*	Unknown		Uncommon (breeder)	Barrens
Leach's Storm Petrel	*Oceanodroma leucorhoa*	Unknown		Common (breeder)	Lakes
American Bittern	*Botaurus lentiginosus*	Confirmed	NFB	Common (breeder)	Wetlands
Osprey	*Pandion haliaetus*	Confirmed	BBS	Common (breeder)	Riparian forest
Bald Eagle	*Haliaeetus leucocephalus*	Confirmed	BBS, EBIRD	Common (breeder)	General
Sharp-Shinned Hawk	*Accipiter striatus*	Probable		Common (breeder)	Forest
Northern Goshawk	*Accipiter gentilis*	Confirmed	NFB	Common (breeder)	Forest

Common Name*	Scientific Name	Occurrence	Information Source**	Relative Abundance (Breeding Status)	Habitat(s)
Peregrine Falcon	*Falco peregrinus anatum*	Unknown		Uncommon	Forest/barrens
American Kestrel	*Falco sparverius*	Confirmed	NFB	Uncommon (breeder)	Barrens
Merlin	*Falco columbarius*	Probable		Common (breeder)	Forest/barrens
American Golden Plover	*Pluvialis dominica*	Probable		Common in migration	Upland barrens/shoreline
Killdeer	*Charadrius vociferous*	Probable		Uncommon (breeder)	Coastal shoreline
Sanderling	*Calidris alba*	Probable		Common in migration	Coastal shoreline
Whimbrel	*Numenius phaeopus*	Probable		Common in migration	Upland barrens
Least Sandpiper	*Calidris minutilla*	Probable		Common (breeder)	Upland barrens/shoreline
Pectoral Sandpiper	*Calidris maritime*	Probable		Common in migration	Coastal shoreline
Dunlin	*Calidris alpina*	Probable		Common in migration	Coastal shoreline
Ring-Billed Gull	*Larus delawarensis*	Confirmed	BBS	Common (breeder)	General
Iceland Gull	*Larus glaucoides*	Probable		Common (winter)	Coastal habitats
Glacous Gull	*Larus hyperboreus*	Confirmed	EBIRD	Common (winter)	Coastal habitats
Ivory Gull	*Pagophila eburnea*	Unknown		Uncommon	Coastal habitats
Great Black-Backed Gull	*Larus marinus*	Confirmed	BBS	Common (breeder)	General
Black-Legged Kittiwake	*Rissa tridactyla*	Confirmed	BBS	Common (breeder)	
Northern Hawk Owl	*Surnia ulula*	Confirmed	EBIRD, NFB	Uncommon (breeder)	Barrens/forest
Short-Eared Owl	*Asio flammeus*	Probable		Uncommon (breeder)	Barrens

Common Name*	Scientific Name	Occurrence	Information Source**	Relative Abundance (Breeding Status)	Habitat(s)
Boreal Owl	*Aegolius funereus*	Probable		Uncommon (breeder)	Forest
Common Nighthawk	*Chordeiles minor*	Unknown		Unusual	Open forest
Chimney Swift	*Chaetura pelagica*	Unknown		Very uncommon	Wetlands/towns
Belted Kingfisher	*Megaceryle alcyon*	Confirmed	EBIRD	Common (breeder)	Wetlands
Hairy Woodpecker	*Picoides villosus*	Confirmed	NFB	Common (breeder)	Forest
American Three-Toed Woodpecker	*Picoides dorsalis*	Probable		Uncommon (breeder)	Coniferous forest
Black-Backed Woodpecker	*Picoides arcticus*	Confirmed	NFB	Uncommon (breeder)	Coniferous forest
Yellow-Bellied Flycatcher	*Empidonax flavivetris*	Confirmed	BBS	Common (breeder)	Forest
Alder Flycatcher	*Empidonax alnorum*	Probable		Common (breeder)	Forest
Least Flycatcher	*Empidonax minimus*	Unknown		Uncommon (breeder)	Forest
Blue-Headed Vireo	*Vireo solitaries*	Confirmed	BBS, NFB	Uncommon (breeder)	Mixed forest
Red-eyed Vireo	*Vireo olivaceus*	Unknown		Uncommon (breeder)	Mixed forest
Philadelphia Vireo	*Vireo philadelphicus*	Unknown		Uncommon (breeder)	Mixed forest
Blue Jay	*Cyanocitta cristata*	Probable		Common (breeder)	Forest/towns
Horned Lark	*Eremophila alpestris*	Probable		Common (breeder)	Barrens
Bank Swallow	*Riparia riparia*	Unknown		Uncommon (breeder)	Wetlands
Brown Creeper	*Certhia americana*	Probable		Common (breeder)	Forest
Winter Wren	*Troglodytes troglodytes*	Confirmed	BBS, NFB	Uncommon (breeder)	Forest
Golden-Crowned Kinglet	*Regulus satrapa*	Probable		Common (breeder)	Forest
Veery	*Catharus fuscescens*	Unknown		Uncommon (breeder)	Forest

Common Name*	Scientific Name	Occurrence	Information Source**	Relative Abundance (Breeding Status)	Habitat(s)
Swainson's Thrush	*Catharus ustulatus*	Confirmed	BBS	Common (breeder)	Forest
European Starling	*Sturnus vulgaris*	Confirmed	NFB	Common (breeder)	Towns
American Pipit	*Anthus rubescens*	Probable		Common (breeder)	Barrens
Bohemian Waxwing	*Bombycilla garrulus*	Probable		Uncommon	Forest
Cedar Waxwing	*Bombycilla cedrorum*	Probable		Uncommon (breeder)	Forest
Snow Bunting	*Plectrophenax*	Probable		Common (winter)	Barrens
Tennessee Warbler	*Vermivora peregrine*	Confirmed	BBS, NFB	Common (breeder)	Forest
Northern Parula	*Parula americana*	Unknown		Uncommon (may breed)	Forest
Yellow Warbler	*Dendroica petechial*	Confirmed	BBS, NFB	Common (breeder)	Forest
Cape May Warbler	*Dendroica tigrina*	Unknown		Uncommon (breeder)	Forest
Black-Throated Green Warbler	*Dendroica virens*	Confirmed	BBS, NFB	Common (breeder)	Forest
Blackburnian Warbler	*Dendroica fusca*	Unknown		Uncommon (breeder)	Forest
Bay-Breasted Warbler	*Dendroica castanea*	Unknown		Uncommon (breeder)	Forest
American Redstart	*Setophaga ruticilla*	Confirmed	BBS, NFB	Common (breeder)	Forest
Ovenbird	*Seiurus aurocapilla*	Probable		Common (breeder)	Forest
Mourning Warbler	*Oporornis philadelphia*	Confirmed	BBS, NFB	Common (breeder)	Forest
American Tree Sparrow	*Spizella arborea*	Unknown		Uncommon (breeder)	Barrens/forest
Chipping Sparrow	*Spizella passerina*	Unknown		Uncommon (breeder)	Barrens/forest
Song Sparrow	*Melospiza melodia*	Confirmed	NFB	Common (breeder)	Forest
White-Crowned Sparrow	*Zonotrichia leucophrys*	Unknown		Uncommon (breeder)	Forest

Common Name*	Scientific Name	Occurrence	Information Source**	Relative Abundance (Breeding Status)	Habitat(s)
Bobolink	*Dolichoyx oryzivorus*	Unknown		Uncommon (breeder)	Grassland/agricultural fields
Red-Winged Blackbird	*Agelaius phoeniceus*	Unknown		Uncommon (breeder)	Wetlands
Common Grackle	*Quiscalus quiscula*	Unknown		Uncommon (breeder)	Towns
Pine Grosbeak	*Pinicola enucleator*	Confirmed	BBS	Common (breeder)	Forest
Purple Finch	*Carpodacus purpureus*	Confirmed	BBS	Common (breeder)	Coniferous forest
White-Winged Crossbill	*Loxia leucoptera*	Probable		Common (breeder)	Coniferous Forest
Common Redpoll	*Acanthis flammea*	Confirmed	EBIRD	Common (breeder)	Barrens/forest
Pine Siskin	*Spinus pinus*	Confirmed	BBS	Common (breeder)	Barrens/forest
Evening Grosbeak	*Coccothraustes vespertinus*	Probable		Common (breeder)	Forest

* **Bold** font indicates confirmed observations within 5 km of proposed TL 267 ROW. Underlined common names are restricted to shoreline habitats and are not likely to occur within the Study Area.

** Information sources; ACCDC = Atlantic Canada Conservation Data Centre, PNAD = Parks and Natural Areas Division; BBS = Environment Canada Breeding Bird Survey; NFB = Observations submitted to nf.birds.com from recreational birders, EBIRD = Observations submitted to e.bird from recreational birders.

7.3 Species at Risk Associated With Study Area

There are 14 bird species at risk that are known to occur or that potentially occur within the Study Area and surrounding region. These include species that are listed on either Schedule 1 of the federal *SARA* and/or under the *NL ESA* (Table 7-2).

Some general characteristics of each of these listed and protected species is provided below, including a description of their likely habitat(s) and the potential for their occurrence in the Study Area. It should be noted that critical habitat has not been designated for any of these species in Newfoundland and/or elsewhere.

Table 7-2 Species at Risk Potentially Occurring Within the Study Area

Species*	**Scientific Name**	***SARA* Status**	***NL ESA* Status**	**Likely Habitat(s)**
Harlequin Duck	*Histrionicus histrionicus*	Special Concern	Vulnerable	Wetlands and coastal shoreline during the winter
Barrow's Goldeneye	*Bucephala islandica*	Special Concern	Vulnerable	Wetlands and coastal shoreline during the winter
Red Knot	*Calidris canutus*	Threatened	Endangered	Coastal shoreline
Olive-Sided Flycatcher	*Contopus cooperii*	Threatened	Threatened	Open forests
Gray-Cheeked Thrush	*Catharus minimus minimus*	No status	Threatened	Forests
Rusty Blackbird	*Euphagus carolinus*	Special Concern	Vulnerable	Wetlands
Red Crossbill	*Loxia curvirostra*	Endangered	Endangered	Coniferous forests
Piping Plover	*Charadrius melodus melodus*	Endangered	Endangered	Coastal shoreline
Ivory Gull	*Pagophila eburnea*	Endangered	Endangered	Coastal habitats
Peregrine Falcon	*Falco peregrinus anatum*	Special Concern	Vulnerable	Forests/barrens
Short-Eared Owl	*Asio flammeus*	Special Concern	Vulnerable	Barrens

Common Nighthawk	*Chordeiles minor*	Threatened	Threatened	Open forests
Bobolink	*Dolichonyx oryzivorus*	Threatened	Vulnerable	Grasslands/agricultural fields
Chimney Swift	*Chaetura pelagica*	Threatened	Threatened	Wetlands/towns
* Species that are identified in **bold** font are those that have been observed within 5 km of the proposed TL 267.				

8 PROPOSED MITIGATION MEASURES

There are three levels of mitigation measures to be implemented with this Avifauna Management Plan:

- Level I - designed to reduce the likelihood of interaction during clearing and other construction activities;
- Level II - considerations personnel should be aware of that may identify an active nest; and
- Level III – protocols for aerial and ground avifauna surveys that should be completed by surveyors in areas of potential habitat within or near the Project footprint.

8.1 Level I Protection – General Mitigation Measures

There are a number of general mitigation measures that will be implemented to reduce the effects of construction on all species of wildlife, including avifauna:

- Avoid disturbance and / or the clearing of sensitive wildlife areas during all clearing;
- Implement no harvesting policy and other harassment of wildlife, and no possession of firearms or pets by Project personnel;
- Implement environmental awareness training and conduct regular briefings for all personnel;
- Trained and experienced environmental monitors to implement the EPP;
- Use existing roads, quarries and other disturbed areas, where possible;
- Restrict public access to temporary roads and work areas;
- Post and enforce speed limits;
- Locate construction roads within the reservoirs where possible;

- Rehabilitate work areas and access roads no longer required in accordance with the EPP to encourage re-formation of natural conditions;
- Undertake blasting in accordance with permits and standard procedures;
- Use existing right-of-way corridors for construction of transmission lines where possible; and
- Schedule activities related to transmission line construction around sensitive periods or areas, to the extent practical.

8.2 Level 2 Protection – General Awareness Mitigation Measures

The disturbance footprint for the Project will include potential nesting habitat for many migratory bird species (ground, tree and shrub nesters). The presence of natural upland and wetland habitat in the disturbance footprint increases the chances of the presence of a nesting migratory bird species onsite.

Nests could be located in trees or shrubs or on the ground. An active nest can be identified by:

- the presence of birds or eggs in a nest
- adult birds carrying food or nesting materials to a specific location
- adult birds defending territory, through singing, screeching, or diving

When one or more of these indicators are noted, measures should be undertaken to identify if the potential location of the nest is in the disturbance footprint or within a recommended setback buffer. If the nest is not physically detected, the area will be considered a potentially active nest and have a recommended setback buffer.

8.3 Level 3 Protection – Directed Survey Protocols

Additional avifauna mitigation measures include surveys of the construction areas prior to activity including activity surveys of known raptor nests, aerial search for additional nests (either previously unknown raptor nests or nest of other species), and ground surveys to identify breeding migratory bird species within the areas.

Aerial Surveys

Helicopter surveys for active raptors (Landbirds) nests will be completed during late May through early June of the area of interest. Results will be reported to Avifauna coordination personnel, and Construction Managers who will communicate findings to the On-site Environmental Monitors.

Ground Surveys

Trained surveyors will complete ground searches for avifauna nests approximately from 15 May to 31 July, though this is dependent on regional conditions and could change season to season. The surveys will be conducted <7 days prior to clearing activities. This may be adjusted later in the nesting season. The census techniques will vary according to habitat but will be based on 100% coverage of the area of interest. Crews of varying sizes will walk transects, usually approximately 10 m apart.

Active and potentially active nests will be identified using the criteria identified above according to species with information collected based on Maritime Bird Breeding Atlas Nest Record Card (Bird Studies Canada, 2006) and locations and mitigation measures communicated to the Construction Manager who will communicate to the On-site Environmental Monitors. The area of interest will only be cut after the survey team has cleared the area after completing their search. No cutting will be permitted until the survey team has returned to a buffered area to confirm fledging within the appropriate timeframe for the species in question found at the active nest. Note that an experienced avifauna biologist will be available for assistance and consultation following the initial surveys and throughout the identified period for the project.

In addition, personnel will be instructed in the identification of such nests that may be readily visible or well concealed. It is therefore important to be aware of behavioural cues that suggest the presence of an active nest, even if it cannot be seen. These include singing males, pairs observed together (including courtship and copulation), adult birds repeatedly carrying nest materials or foods to a specific location, aggressive defense of a location (against other birds or people), or the presence of recently fledged birds (often with some tufts of down feathers remaining, or begging persistently for food). Shorebirds may also attempt to lure intruders away from an active nest with a broken-wing display. Table 8-1 provides an overview of the types of nests that may be expected within the Project area.

Table 8-1 Identification of Active Avifauna Nests

Nest Type	Location	Typical Species	Notes

Nest Type	Location	Typical Species	Notes
Open cup – small nests woven from coarse plant fibres such as grass stems, leaves and bark strips	Usually in shrubs or trees, but can be on the ground; depends on foraging and shelter preferences of species	Flycatchers, vireos, thrushes, warblers, sparrows, finches, blackbirds	Often concealed in forks of trees, within shrubs, or under overhanging forbs or other dense vegetation; difficult to see in trees
Domed - ground nests with grasses or other vegetation used to cover the nest, leaving an entrance hole on one side	Ground	Some warblers and sparrows	Often well camouflaged and difficult to detect; best found through behavioural cues
Bank – burrows in sandy slopes	Sand banks, especially along rivers	Bank Swallow, Belted Kingfisher	Usually the nest holes can be seen from a distance; bird activity is easy to monitor from a distance
Cavity – excavated inside a rotting trunk or stump	On the main trunk of living or dead trees	Woodpeckers, chickadees, nuthatches, Tree Swallow	Used by different species over time; look for woodpecker activity (holes and missing bark) on nearby trees
Stick – large nest made of small to large sticks, lined with bark and grasses	On or near the top of large trees	Osprey, Bald Eagle, Great Horned Owl, Common Raven	Visible from the air, difficult to detect from below; nest may be built by one species and then adopted by another; often used for several years
Scrape – lightly excavated depression on the ground, often lined with grasses, down, or other material from nearby	Wetland edges	Dabbling ducks, geese, shorebirds	Well concealed; females may remain on nest hoping that their plumage provides good camouflage (better than allowing the eggs to be visible)
Floating – clumps of aquatic vegetation upon which a loose cup platform is built	Over water, often in sheltered part of a wetland	Waterfowl	Relatively poorly constructed and can look like a naturally occurring clump of vegetation
Source: The Cornell Lab of Ornithology 2012 Available: http://www.allaboutbirds.org/Page.aspx?pid=1189			

9 PROCEDURES FOR ACTIVE NESTS

If a potentially active nest has been identified during pre-construction surveys, the setback buffer needs to be established around the nest site to ensure no further disturbance of the nesting migratory species occurs. The size of the buffer is based on the nest setback guidelines recommended by Environment Canada (M. Gahbauer, pers. comm.) or the Government of Newfoundland and Labrador for species of management concern (NLDEC 2012a). Setback distance for nests of species not of management concern is 30 m for passerine nests and 100 m for waterfowl/waterbird nests. Any adjustments to the recommended setback buffers need to be discussed with the appropriate regulatory body.

In forested and non-forested habitats, painted lath with flagging or other suitable marking should be used to mark the buffers with appropriate direction and bearing recorded in the field notes. If an occupied nest is discovered on or adjacent to the disturbance footprint during construction, activities within a minimum of 30 m from the nest should not occur until the environmental monitor has been notified by the Construction Manager. Once the environmental monitor is notified, a wildlife monitor will be dispatched to the site (if not already present) to identify the nest or bird species and determine the appropriate mitigation in consultation with the Construction Manager and appropriate TL 267 personnel. If a nest is found adjacent to an existing trail, vehicles will be allowed to continue using the trail but will be prohibited from stopping within the recommended setback buffer.

9.1 Avoidance of Active Raptor Nests

Buffers for known active raptor nests include:

- Replace physically disturbed Osprey or Bald Eagle nests with artificial platforms;
- Restrict activities within 200 m of active raptor nests; and
- Restrict clearing within 800 m of active raptor nest.

9.2 Protocol for Removing Exclusion Areas

In order to reduce the potential for nest abandonment or failure, monitoring or rechecking of an identified active nest will occur after the estimated completion of the fledging period (or when the young have left the nest). Depending on the nesting stage (i.e., incubating or fledging) observed during the nest search, the timing of follow-up nest checks will be determined using literature-based estimates of the species-specific incubation and fledging periods (i.e.,

approximate number days for incubation and/or fledging to be completed). Inactive raptor nests will be relocated, as required, to support construction activities.

10 REPORTING

NL Hydro will institute a series of reporting and documentation initiatives regarding activities and results related to the scope of this Avifauna Management Plan. On a daily basis a suitable form would be completed by the On-Site Environmental Monitor and/or on-site survey team member during approximately 15 May to 31 July (and as appropriate thereafter regarding avifauna) documenting the following:

- Instance of personnel briefing and training;
- Results of dedicated aerial survey for tree-nesting raptors or ground surveys for other nesting avifauna;
- Locations of any active nests and mitigation measures implemented to address potential incidental take;
- Documentation that such nests are no longer active (i.e., post-fledging) before proceeding with construction activities; and
- Documentation of all communications with appropriate federal and provincial authorities.

These daily reports will be kept onsite with active nests identified in subsequent daily briefings and other notifications regarding stated avoidance measures.

11 EXTERNAL REFERENCES

Internet Sources

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Government of Newfoundland and Labrador. 2004. Endangered Species Act, 2004. Available at: http://www.assembly.nl.ca/Legislation/sr/statutes/e10-1.htm#31 . Accessed on: 13 April 2012.

Government of Canada. 2012. Species at Risk public Registry: Schedule 1 – List of Wildlife Species at Risk. Available at: http://www.sararegistry.gc.ca/species/schedules_e.cfm?id=1s. Accessed on: 16 April 2012.

NLDEC (Newfoundland and Labrador Department of Environment and Conservation). 2012a. Species at Risk: Birds. Available at: http://www.env.gov.nl.ca/env/wildlife/endangeredspecies/birds.html. Accessed on: 13 April 2012.

Personal Communication

Gahbauer, M. Senior Wildlife Biologist, Stantec Consulting Ltd. Correspondence with Environment Canada in 2009.

APPENDIX A: NEST PROTECTION PROCEDURES

The TL 267 Environmental Protection Plan indicates the following measures for raptor nests:

- Replace physically disturbed nests with artificial platforms;
- Restrict activities within 200m of active raptor nests; and
- Restrict clearing within 800 m of active raptor nest.

Clearing and access plans for the TL 267 Transmission Line limit the ability to maintain these buffers or relocate nests prior to nesting season largely due to remote locations of the nests (i.e., there is no access to the nest locations to relocate prior to TL 267 access construction).

Raptor Nests

The following measures are proposed to limit the impact of construction on raptor nests:

Active raptor nest within RoW at accessible location

1. Create bypass trail with a 100 m buffer on the nest. This bypass should be expedited to limit interaction with the nest within the 800 m buffer.
2. Constant monitoring of the nest is required during bypass construction. If the bird appears to be in danger of vacating the nest, construction should be delayed until bird settles on the nest.
3. Nest can be relocated and the tree and buffer can be cleared following the nesting season, as per conditions of the Wildlife Act permit and procedures discussed with NL Hydro environmental personnel.

Active raptor nest within RoW at remote location or where bypass is not feasible

1. Clear up to nest with constant monitoring. If the bird is in danger of vacating the nest construction should be delayed until bird re-settles on the nest.
2. Nest will have to be relocated with consultation of ornithologist to a nearby location accessible by appropriate equipment (i.e., excavator). Relocation to utilize active relocation procedures as discussed with NL Hydro environmental personnel.
3. Nest can then be cleared with constant monitoring of the relocated nest. This clearing should be expedited to limit interaction with nest and increase probability of successful relocation.
4. Follow up and monitoring protocol to be implemented to confirm successful relocation.

Songbird and waterfowl nests

This procedure will not change from the Avifauna Management Plan.

Setback distance for nests of species of management concern is 75 m, 30 m for passerine nests and 100 m for waterfowl/waterbird nests. Any adjustments to the recommended setback buffers need to be discussed with the appropriate regulatory body.

In forested and non-forested habitats, flagging is used to mark the buffers with appropriate direction and bearing recorded in the field notes. If an occupied nest is discovered on or adjacent to the disturbance footprint during construction, activities within a minimum of 30 m from the nest should not occur until the OSEM has been notified by the Construction Manager. Once the OSEM is notified, a wildlife monitor will be dispatched to the site (if not already present) to identify the nest or bird species and determine the appropriate mitigation in consultation with the Construction Manager and appropriate TL 267 personnel. If a nest is found adjacent to an existing trail, vehicles will be allowed to continue using the trail but will be prohibited from stopping within the recommended setback buffer.

Protocol for Removing Exclusion Areas

In order to reduce the potential for nest abandonment or failure, monitoring or rechecking of an identified active nest will occur after the estimated completion of the fledging period (or when the young have left the nest). Depending on the nesting stage (i.e., incubating or fledging) observed during the nest search, the timing of follow-up nest checks will be determined using literature-based estimates of the species-specific incubation and fledging periods (i.e., approximate number days for incubation and/or fledging to be completed). Inactive raptor nests will be relocated, as required, to support construction activities.

Protocol for Songbird Nests in Areas of Critical Infrastructure

If a nest exists in an area in which the nest buffer cannot be avoided during the nesting season the following protocol will apply:

1. On-site construction management will contact On-Site Environmental Monitor to confirm the necessity of interacting with the identified buffer.
2. Avifauna teams will be directed to return to the nest location and confirm the exact location of the nest.
3. The following options will be confirmed by Brent Sellars (or designate), Wayne Lidster (or designate) and On-Site Environmental Representative (Carl Newcombe or designate or Avifauna Rep) depending on certain factors (e.g. species, time of year, egg presence):
    a. Reduce buffer
    b. Maintain buffer
    c. Attempt relocation