



## Parks Canada Basic Impact Analysis

### 1. PROJECT TITLE & LOCATION

WWII Bunker Recapitalization, Cape Spear Lighthouse National Historic Site

### 2. PROPONENT INFORMATION

Glenn Keough – Manager, National Historic Sites and Visitor Experience (709) 772-6709

Katherine Davey – Manager, FII, (709) 772-2172

### 3. PROPOSED PROJECT DATES

Planned commencement: 2016-09-19

Planned completion: 2016-12-09

### 4. INTERNAL PROJECT FILE #446

### 5. PROJECT DESCRIPTION

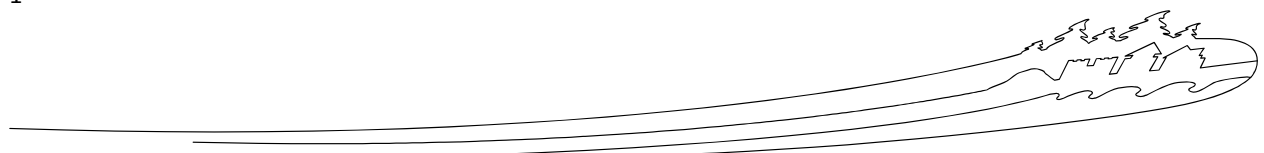
Cape Spear Lighthouse National Historic Site is one of the field unit's biggest attractions, accessible to the public 24/7. The WWII battery complex is situated below the lighthouse near the most easterly tip of Cape Spear. It has a number of interconnected elements that include concrete bunkers, two gun emplacements, two large 30-ton gun barrels, ready rooms, magazines and connected tunnels. The complex has been identified as a cultural resource of other heritage value (formerly known as a Level II cultural resource) according to Parks Canada's *Cultural Resource Management Policy*. Although there is no heritage character statement, it has heritage value through its association with the Second World War and in the subsequent local development.

The site is located at the most easterly point of Continental North America on an exposed, rocky headland with grass, low scrubby vegetation, minimal trees and points of exposed bedrock. It is subjected to extreme weather events (e.g., high winds, freeze thaw cycles, frequent rain, snow, and ocean wave spray). Construction in the fall of 2016 would coincide with the Atlantic Basin Hurricane Season which extends from June 1 to November 30. The hurricane season for 2016 is predicted to be more active than average due to the higher than normal temperatures of the Gulf of Mexico and the Atlantic Ocean.

Red fox have been sighted in the area but not frequently. There are no known flora or fauna Species at Risk in the area. There are many invasive alien species of vegetation present. Various types of marine life such as whales and seabirds are known to frequent the area. The latter two can be found in the area from spring into the fall, with whales feeding as close as 20 feet from the shoreline. Various species of migratory birds are known to nest within the tunnels but the project will take place outside of the nesting season.

Of note, the ocean lies approximately 35 meters downslope from the closest point to be excavated. Two pipe out falls are located on the slopes' down grade in front of both Gun Batteries with actively flowing water observed during site inspection. They are located adjacent to the rocky cliffs along the shoreline and are believed to be connected to four existing drain pits located within the tunnels.

The objective of this project is to control and minimize the moisture content that the structure is exposed to and ensure its structural stability in order to slow further deterioration, make the repairs



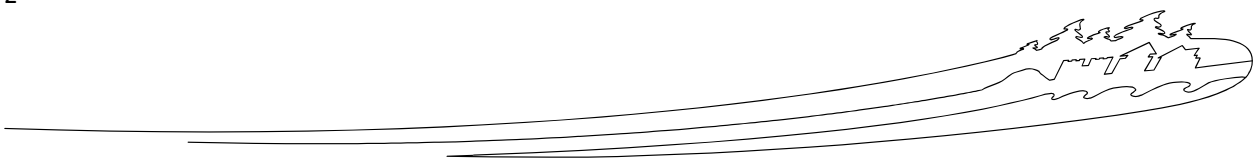


more effective and ensure visitor safety. The structures identified for rehabilitation or replacement include (refer to figure in Appendix 1):

- Drainage system – install new drainage system for the entire structure, renew existing drainage system (under all tunnels and gun emplacements), decommission the two old pipe outfalls and install new ones.
- Waterproofing membrane – install new waterproofing membrane (for the entire structure), renew existing flashing (gun emplacements) and reinstate ventilation shafts (all magazines and ready rooms)
- Gun Emplacements – epoxy injection of cracks, surface repair exposed rebar (ready rooms) and reinstate ventilation shafts
- Magazines - epoxy injection of cracks (all knee and end walls), surface repair exposed rebar, reinstate ventilation shafts (all magazines) and spray foam insulation (all magazines)
- Tunnels – replace sections of tunnel with precast box culvert, epoxy injection of cracks, surface repair exposed rebar and repair/replace embedded steel, restore access/egress at north side of battery, replace/install gates (various locations)
- Electrical – install electrical infrastructure to support next phase

The scope of work includes:

- Site access: A section of the western edge of the paved visitor parking lot will be used as the staging and material storage area. The site will be accessed via the paved trail used by visitors to access the Most Easterly Point. The trail is wide enough to accommodate vehicles and equipment access. The trail currently has a hand rail located on the left hand side and a rest area to the right on the way to the Most Easterly Point which will likely be removed to accommodate access as well as to restore the viewscape to a more natural condition. A temporary access road will have to be established to reach Gun Emplacement #1 and the tunnel and magazines to the right of it.
- Demolition: manual and machinery-facilitated demolition, removal of failed sections of retaining wall, rocks, concrete and other demolition-related debris
- Waste disposal: demolition waste will be sorted and separated by material on-site and disposed of in accordance with industry standards for construction waste.
- Structural repairs: epoxy injections, foam insulation, weather proof membrane installation, concrete surface treatment, concrete finishing and curing, grouting
- Vegetation: clearing and grubbing, removal and stockpiling of sod mats, selective vegetation removal/trimming
- Earthworks: soil and topsoil stripping/stockpiling, grading, spreading soil/topsoil, excavation (external to the structure and within tunnels), trenching, rock removal, dewatering, filling, compaction, erosion and sedimentation control
- Setup of temporary facilities: temporary washroom, office and storage facilities will be situated in the staging area during the construction mobilization phase.
- Use of machinery: dump trucks, large and small excavators, cranes, mobile cranes and lifting devices





- Transport of materials and equipment: materials will be transported to the site along Blackhead Road to the staging area on the parking lot. From there, materials will be transported to the site along the Most Easterly Point paved trail.

## 6. VALUED COMPONENTS LIKELY TO BE AFFECTED

The project will potentially affect *Natural Resources* including Air, Water, Soil and Landforms, Flora and Fauna. It may also affect *Cultural Resources* and *Visitor Experience*.

## 7. EFFECTS ANALYSIS

The primary effects for all valued components will occur during the construction phase of the project. Refer to Appendix 2: Effects Identification Matrix.

### Natural Resources

Air - airborne dust particles from exposed soil and heavy equipment exhaust may result in reduced air quality. The effect is expected to be low given the wet environment, which reduces the potential for dust, the high winds typical of the area and access to other areas of the site.

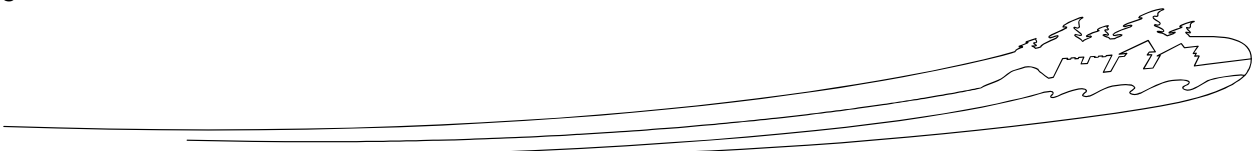
Water – wastes (e.g., garbage, litter, fuel, and construction materials), erosion and sedimentation and surface water runoff may contaminate groundwater and/or the marine environment. The probability of a fuel spill is low, however the area is subject to high winds and storm conditions. Erosion and sediment control and secure storage of materials will be important.

Soil and Landforms - excavation activities and operation of heavy machinery may result in soil compaction and rutting, soil erosion, loss of topsoil, exposure of subsoils, and soil contamination from waste (e.g., garbage, fuel). The area is historically a disturbed area so effects are expected to be low. Effective restoration of the site will be important.

Flora - excavation will require removal of vegetation resulting in disturbance of adjacent natural areas, potential root exposure and physiological stress; ground disturbance may result in the introduction of invasive alien species, or expansion of existing populations; and there may be impacts on valued vegetation features, in particular the few windswept trees existing in the area. Effects are expected to be low given that the site is historically a disturbed area and there are currently a number of invasive species existing on the site. Effective restoration, however, will be important.

Fauna - operation of heavy equipment, increased human presence and noise may result in temporary habitat displacement/ preferred habitat avoidance (e.g., birds); artificial food sources such as garbage and litter may cause wildlife habituation/attraction (e.g., seabirds, fox); potential fuel spills, sedimentation and runoff may contaminate marine habitat; and potential runoff from fuel spills may cause injury or mortality to marine life. The probability of a fuel spill is low, construction will take place outside the migratory bird nesting season and at the end of whale season and this is a disturbed area with existing high levels of human activity.

- Given the magnitude of effects, the short term of the project, and reversibility after construction, the project is unlikely to result in significant adverse effects to air, water, soil and





landforms, flora and fauna should the proposed mitigation measures be implemented effectively.

### Cultural Resources

An Archaeological Overview Assessment (Appendix 3) was completed for this project. Archaeological monitoring and recording of three geotechnical test pits in the immediate project area took place on May 23, 2016 (Appendix 4); no cultural features or artifacts were identified. However, due to the volume of earthworks required there may be impacts to archaeological resources (known or potential) from displacement or destruction resulting in loss of heritage value during the construction period.

Historic resources - due to the nature of rehabilitation efforts required to ensure the structural integrity of the complex, there are potential effects on the heritage value or character-defining elements of the WWII bunker complex including effects on the cultural landscape or landscape features of heritage value during the construction period, and possibly post-construction, depending on how well the site is rehabilitated.

- Given the magnitude of effects, the low potential for damage to archaeological resources, and previous disturbance from construction of the bunkers, the project is unlikely to result in significant adverse effects to cultural resources should the mitigation measures be implemented effectively.

### Visitor Experience

The potential effects on Visitor Experience are anticipated to occur during the construction period, including: reduced quality of visitor experience due to noise and presence of construction equipment; decreased aesthetic appeal and impacted viewscape; restricted access to the WWII bunker complex, the Most Easterly Point and a section of trail leading to the Visitor Centre and Lighthouse; potential hazard to visitors and staff due to construction activities (e.g., heavy equipment operation); and loss of educational opportunities due to decreased accessibility to the site and surrounding area. The project will temporarily decrease the quality of the overall visitor experience but this is limited to the construction period and will result in an improved and safer visitor experience over the long term.

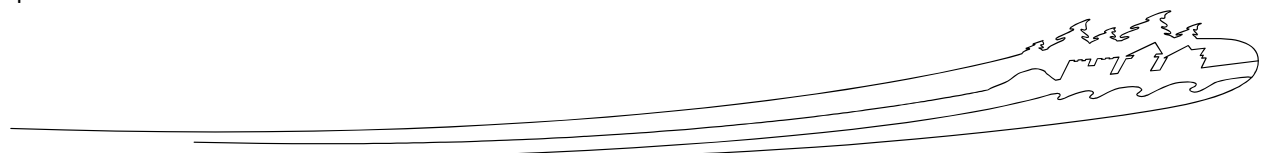
- Given the magnitude of effects, the short term of the project and reversibility after construction, the project is unlikely to result in significant adverse effects to visitor experience should the mitigation measures be implemented effectively.

## **8. MITIGATION MEASURES**

### General

Work Site Conditions/Staging/Laydown:

1. A project start up meeting will be held with the key people working onsite to review the mitigation measures, Parks Canada contact information and any site-specific considerations with Parks Canada staff before work begins.
2. Staging and parking areas for material and equipment will be located on the west side of the parking lot and used for project start up and construction only.





3. The Most Easterly Point paved pathway and other existing disturbed areas approved by Parks Canada staff will be used to access the construction site.
4. Clearly mark staging area, work site and restricted areas with stakes, biodegradable flagging tape, fencing, temporary gates or other means; remove same when project is completed.
5. Isolate operations and ground intrusion activities to the footprint of the immediate construction area and limit vehicular access to essential vehicles only.
6. Confirm presence of buried infrastructure prior to excavation (e.g., there is a buried power cable bringing electricity to the WWII Bunkers from the Visitor Centre) and take precautions to avoid damage.

Equipment Operation:

7. Equipment from outside the national historic site must be washed/steam cleaned prior to arrival.
8. Equipment must be properly tuned, clean and free of contaminants, in good operating order, free of leaks (e.g., fuel, oil or grease), and fitted with standard air emission control devices and spark arrestors prior to arrival on site.
9. During construction, any required cleaning of tools and equipment must be done greater than 30 meters from the shoreline to prevent the release of wash water that may contain deleterious substances.
10. Equipment operators must be fully trained and experienced.
11. Use low pressure/rubber tracked equipment or access matting where feasible to minimize soil compaction and ground disturbance.
12. Minimize idling of engines, contingent on operating instructions and temperature considerations.
13. Machinery (e.g., excavators, bobcats, chainsaws, and generators) must be stored, maintained and refuelled on a flat surface at least 100 meters from the shoreline.
14. Only minor repairs and maintenance (e.g., lubrication) of 'non-mobile' equipment such as flatbeds or shovels are permitted; all major repairs must be undertaken at an appropriate offsite location.

Waste:

15. All solid waste will be securely stored and handled according to applicable federal/provincial regulations.
16. All waste materials (e.g., construction material, refuse material, waste petroleum, and demolition waste) shall be removed from the site on project completion and considered, prior to disposal, for reuse, resale or recycling and then disposed of at an approved facility; cover waste loads during transportation.
17. Portable sanitary facilities must be serviced on a regular basis and accumulated waste disposed of at a sanitary waste disposal facility. The facilities must have sufficient capacity and be managed to ensure waste is not discharged to the receiving environment.
18. Burning of waste is not permitted at the National Historic Site.

Hazardous Materials:

19. Prevent the release of hazardous substances into the environment, including but not limited to, petroleum products and their derivatives and chemicals.
20. All on-site personnel must be briefed on reporting requirements for hazardous materials spills; spills must be reported immediately to the designated Parks Canada contact.
21. All construction sites must be equipped with containers suitable for the secure, temporary storage of hazardous wastes, separated by type.
22. A spill contingency response kit including sorbent material and berms to contain 110% of the largest possible spill (i.e., fuel or other toxic liquids) related to the work must be available on site at all





- times. On-site personnel must be aware of its location and trained in its use. Any contaminants must be recovered at source and disposed of according to applicable laws, policies and regulations.
23. Handle and store hazardous materials as per applicable federal legislation/regulations. The contractor must have all relevant and current Material Safety Data Sheets available onsite.
  24. Petrochemical products, paints and chemicals must be stored 100 meters from the shoreline and away from drains within the tunnels. They must be secured overnight in a Parks Canada approved enclosed area under lock and key.
  25. Any hazardous waste or contaminated material uncovered during excavation / construction must be investigated, source identified, removed and disposed of outside the protected heritage place at an approved facility. Disposal documentation must be provided to the designated Parks Canada contact.

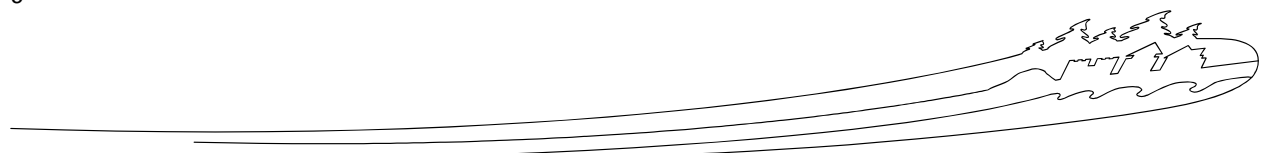
### Natural Resources

#### Water:

26. Concrete mixing activities must take place over tarps at a minimum of 30 meters from the shoreline and from existing drains within the tunnels. Fresh, wet, uncured concrete, concrete dust and wastewater is toxic to the aquatic environment and must not come into contact with any body of water.
27. Prevent construction materials, chemicals, paints and sediments from entering the existing drains within the tunnels.
28. Ensure all materials (e.g., organic materials, soil stockpiles, construction waste and materials) are securely stored in place, especially during high wind/storm conditions.

#### Soil and Landforms:

29. The contractor must prepare an erosion and sediment control plan and submit same to the designated Parks Canada contact for approval prior to the start of excavation activities.
30. Regularly inspect and maintain erosion and sediment control structures during all phases of the project and modify measures as necessary.
31. Use erosion and sediment control products made of 100% biodegradable materials (e.g., jute, sisal or coir fiber) when possible. Ensure backing materials are also biodegradable.
32. Limit duration of soil exposure; phase activities whenever possible and restore disturbed areas as soon as possible.
33. Topsoil separation is required; stockpile topsoil away from subsoils and spoil material and more than 15 meters away from the shoreline, drainage features and/or the top of steep slopes.
34. Excavations must be drained (but not directly into the ocean), back-filled and compacted as soon as possible.
35. Under thawed conditions, backfill material will be compacted prior to topsoil replacement; distribute topsoil evenly over the excavated area as per Parks Canada specifications.
36. Under frozen ground conditions, material will be sufficiently spread over the excavated site to allow for settlement under thawed conditions. Where practical, topsoil replacement will be postponed until the backfill has thawed, settled and dried out.
37. Surface water shall be directed away from work areas. Runoff must not enter the marine environment; sediment must be removed by filtration or other suitable methods and be directed a minimum of 30 meters away from the shoreline.
38. Remove temporary erosion and sediment control products, especially non-biodegradable materials, when they are no longer required.





39. When excavation is complete, shape loosened soils to match the local terrain and ensure noticeable construction impacts (e.g., ruts, holes, depressions, compacted areas) are appropriately re-graded, back-filled with topsoil, re-contoured and capped in preparation for restoration.
40. Restore the site as closely as possible to its pre-construction condition, focusing on re-vegetating sloped and cleared areas of the site with existing preserved sod mats and native plant/seed mix, trees and shrubs as directed by Parks Canada.

Flora:

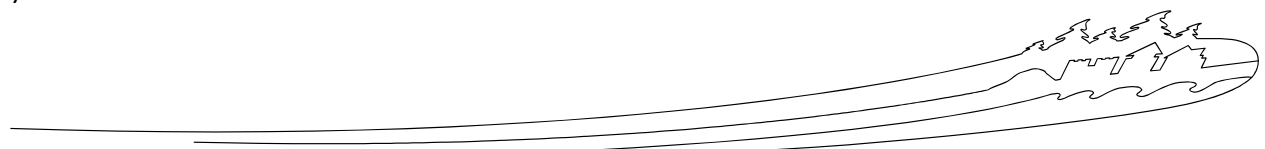
41. Introduction of invasive plant species must be prevented:
  - All soil, gravel, untreated construction lumber, erosion and sediment control products (e.g., hay, straw, mulch), or other applicable materials from outside the protected heritage place must be from a certified weed-free source.
  - Minimise bare soil exposure (e.g., cover stockpiled material with tarps, plant native species, and cover with natural mulch/ground coverings).
  - Minimise ground disturbance and vegetation removal, as practical and within project requirements.
  - Where re-vegetation is required, stabilize and re-vegetate disturbed areas as soon as possible with native plants, soil and seed mix as directed by Parks Canada. If there is insufficient time remaining in the growing season, stabilize the site to prevent erosion and allow for re-vegetation the following spring.
42. Clear minimum area necessary. Remove and maintain sod mats for replacement and improved re-vegetation success when work is complete.
43. Trees must be preserved and left in place. If there is no alternative and select trees/shrubs must be removed, all attempts to dig out and preserve for use in restoration efforts must be made. Any alteration to trees and shrubs must be pre-approved by the designated Parks Canada contact.
44. Protect roots of trees to drip line to prevent disturbance or damage. Avoid traffic, dumping or storage of materials over root zone.

Fauna:

45. All wildlife attractants must be secured (e.g., petroleum products, human food, recyclable drink containers and garbage) within wildlife-proof containers, in a secured building or a vehicle. Keep food waste separate from construction waste and remove daily. Notify the designated Parks Canada contact immediately should wildlife gain access to the above mentioned attractants.
46. Minimize the time excavations remain open and cover or fence when left unattended.
47. Never approach or harass wildlife (e.g., feeding, baiting, luring).
48. Alert the designated Parks Canada contact immediately to any potential wildlife conflict (e.g., aggressive behaviour, persistent intrusion), distress or mortality. In the case of aggressive behaviour or persistent intrusion, stop work and evacuate the area.
49. If a bat is found while work is taking place, stop work and report it immediately to the designated Parks Canada contact. Avoid disturbance and allow the bat to exit the area on its own.

Cultural Resources

50. Preservation of the historic landscape and all historically significant aspects must be given the highest priority during construction. Compliance with all the Cultural Resource Management recommendations outlined in the AOA (Appendix 3) are mandatory:





- The installation of new drainage and electrical systems will require archaeological monitoring during trenching as there will be excavation under and around the battery wall. Although the electrical conduits will be most likely buried above the new drainage system, some electrical infrastructure locations still need to be defined and may be buried outside the drainage footprint.
- The installation of new waterproofing membrane around and over the battery walls will require archaeological monitoring during excavation and fill removal and archaeological recording of the features brought to light. It is important to document the walls, roofing, foundations, and construction techniques of the battery as well as the different fills used to cover its structure.
- The replacement of tunnel sections with precast box culverts will required large-scale archaeological recording (pictures, scale drawings, GPS coordinates) of every feature seen *in situ* before their removal and replacement. Then, the archaeological features and/or soils found underneath and/or behind the removed/replaced sections will need to be properly recorded. Archaeological monitoring will be required during excavation above/around the north entrance of the battery.

51. Should unexploded ammunition be discovered, stop work immediately and notify the designated Parks Canada contact.
52. If cultural or archaeological resources are encountered, work must cease in the immediate area and, Martin Perron (Tel: 819-420-9558) and Virginia Sheehan (Tel: 819-420-9213), Parks Canada, notified immediately. If features (i.e., structural remains and/or artifact concentrations) are encountered, leave in place, mark the location (e.g. with prominent flagging) and do not disturb prior to archaeological assessment of nature and significance being completed.

#### Visitor Experience

53. Construction should be completed in as short a time period as is practicable, to allow for visitor access to the bunkers access for visitors and to ensure visitor safety.
54. Maintain the site in as tidy a condition as possible for the duration of work.
55. Safety risks to visitors during construction must be minimized:
  - The work site must be closed and clearly delineated with fencing, barriers, temporary gates, caution tape, or combination thereof.
  - Appropriate bilingual signage must be posted at common visitor access points and strategic locations.
  - Maintain a safe working distance between work activities and visitors, especially when transporting machinery and materials between the staging area and the site; consider the use of lookouts to manage traffic and direct visitors in this area.
  - Secure and clearly mark unattended safety hazards (e.g., excavations, debris piles) with fencing, warning signs, caution tape or combinations thereof.

#### **9. OTHER Considerations**

- Public/stakeholder engagement
- Aboriginal engagement or consultation
- Surveillance (It is recommended that the environmental surveillance officer assigned to this project visit the site at least twice a week during construction activities to ensure that the mitigation measures detailed in this BIA are adequately carried out and to provide additional mitigation for unforeseen impacts. He or she will be kept informed of project scheduling and will







be notified of changes to the schedule at all times. Focus should be placed on erosion and sediment control measures and secure storage of materials).

- Follow-up monitoring, required to evaluate effectiveness of mitigation measures and/or assess restoration success
- Follow-up monitoring, required by legislation or policy (indicate basis of requirement e.g. required by the *Species at Risk Act*)
- SARA Notification

**10. SIGNIFICANCE OF RESIDUAL ADVERSE EFFECTS**

The project is not likely to result in significant residual adverse effects.

**11. EXPERTS CONSULTED**

*Include Parks Canada experts. Add as many entries as necessary for the project.*

Department/Agency/Institution: Parks Canada	Date of Request: May 2016
Expert's Name & Contact Information: Anne Desgagne Emilie Turgeon Martin Perron	Title: CRM Policy Advisor Built Heritage Advisor Federal Infrastructure Investments Project Archaeologist
Expertise Requested: cultural resources, archaeological resources	
Response: AOA (Appendix 3) and geotechnical investigations report (Appendix 4)	

**12. DECISION**

Taking into account implementation of mitigation measures outlined in the analysis, the project is:

- not likely to cause significant adverse environmental effects.
- likely to cause significant adverse environmental effects.

*NOTE: If the project is identified as likely to cause significant adverse effects, CEAA 2012 prohibits approval of the project unless the Governor in Council (Cabinet) determines that the effects are justified in the circumstances. A finding of significant effects therefore means the project CANNOT go ahead as proposed.*

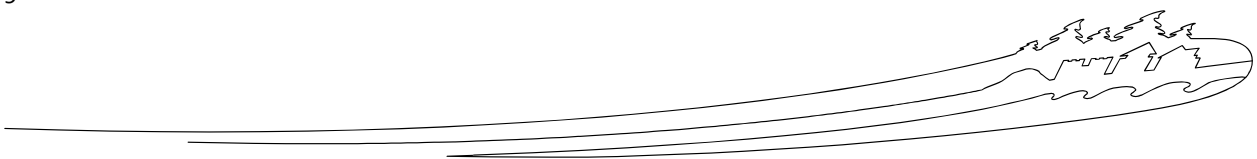
**FOR SARA REQUIREMENTS:**

- There are no residual adverse effects to species at risk and therefore the SARA-Compliant Authorization Decision Tool was not required



**13. RECOMMENDATION AND APPROVAL**

*(Add additional blocks as required)*

<b>Prepared by:</b> Vanessa Rodrigues, Impact Assessment Specialist	Date: August 10, 2016
<b>Recommended by:</b> Katherine Davey, Manager, FII  Glenn Keough, Manager, National Historic Sites & Visitor Experience	Date: August 25th 2016





<b>Approval signature:</b> William Brake, Superintendent, Newfoundland East Field Unit  	<b>Date:</b>  

**14. ATTACHMENTS**

- Project Site Map
- Effects Identification Matrix
- Archaeological Overview Assessment
- Archaeological Monitoring of Geotechnical Investigations at Cape Spear National Historic Site, NL, May 23, 2016

**15. NATIONAL IMPACT ASSESSMENT TRACKING SYSTEM**

- Project registered in [tracking system](#)
- Not yet registered (*CEAA 2012 requires PCA submit a report to Parliament annually. EIAs must be entered in the tracking system **by the end of April** to enable reporting.*)

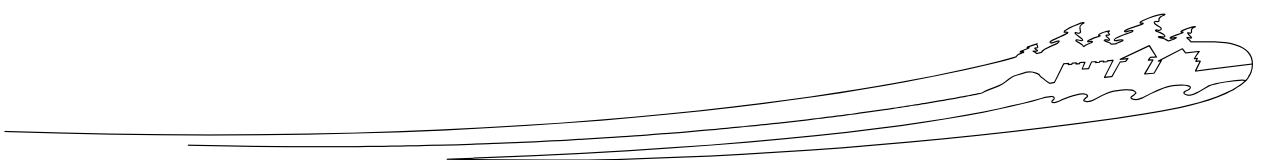
**\*\*\*Ensure that all required mitigation measures and conditions (e.g. follow-up monitoring requirements) are included in project permits and authorizations\*\*\***



August 2016



## Appendix 1: Project Site Map

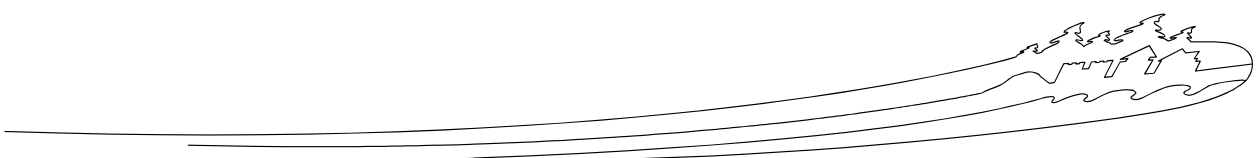




## Appendix 2 : Effects Identification Matrix

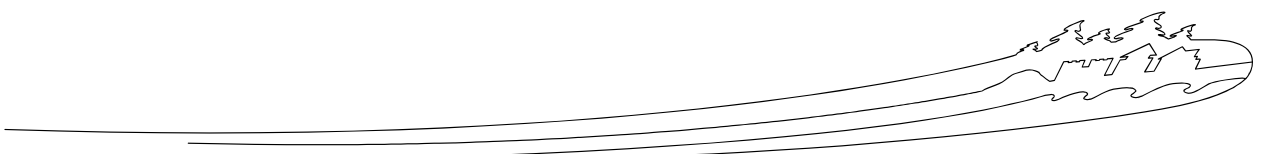
**Section A** focuses on direct effects of the project and **Section B** on indirect effects that are caused by changes to the environment.

A. Direct Effects									
		Valued components potentially directly affected by the proposed project							
		Natural Resources					Cultural Resources		
			Soil & Landforms	Water Quality (groundwater and marine)	Flora (trees, native species vegetation)	Fauna (marine – seabirds, whales, fish terrestrial-fox, birds)	Archaeological Resources	Historic Resources	
Phase	Examples of Associated Activities								
Project Components	Preparation / Construction / Operation / Decommissioning	Supply and storage of materials	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
		Burning	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		Clearing	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
		Demolition	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
		Disposal of waste	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		Blasting/ Drilling	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		Dredging	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		Drainage	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		Excavation	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
		Grading	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
		Backfilling	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
		Use of machinery	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
		Transport of materials/ equipment	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
		Building of fire breaks	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		Use of Chemicals	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Set up of temporary facilities	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Other...	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		



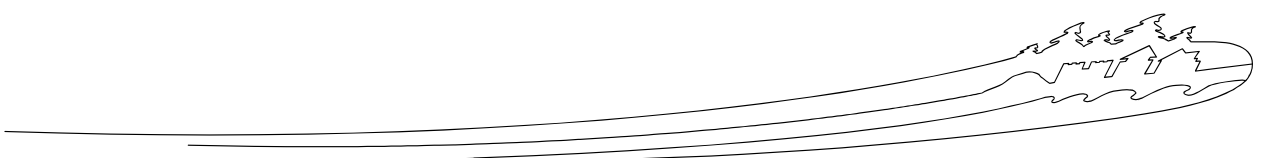


A. Direct effects continued									
		Valued components potentially affected by the proposed project							
		Natural Resources					Cultural Resources		
			Soil & Landforms	Water Quality (groundwater and marine)	Flora (trees, native species vegetation)	Fauna (marine – seabirds, whales, fish terrestrial-fox, birds)	Archaeological Resources	Historic Resources	
Phase	Examples of Associated Activities								
Project Components	Preparation / Construction / Operation / Decommissioning	Waste disposal	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		Wastewater disposal	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		Maintenance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		Use	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		Use/Removal of temporary facilities	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		Use of Chemicals	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		Active fire stage	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		Prescribed burn cleanup	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		Planting	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
		Culling	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		Vehicle Traffic	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		Other...	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



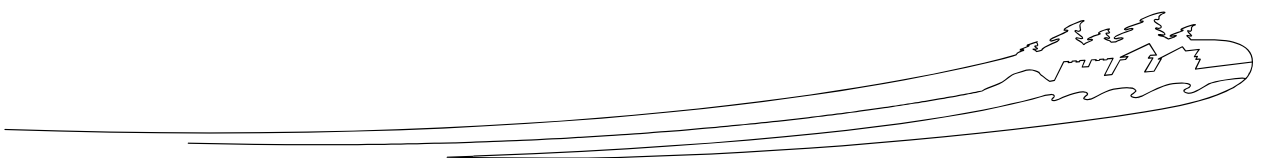


B. Indirect Effects (all phases)							
		Impacts as a result of changes to the environment					
		With respect to non-Aboriginal peoples:	With respect to Aboriginal peoples:		With respect to visitor experience		
		Health and socio-economic conditions	Health & socio-economic conditions	Current use of lands and resources for traditional purposes	Access & services	Recreation & accommod'n opportunities	Safety
Phase	Natural resource components affected by the project						
Preparation /construction operation/implementation/decommissioning	Could impacts to <u>air</u> lead to adverse effects on...	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Could impacts to <u>soils and landforms</u> lead to adverse effects on...	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	Could impacts to <u>water</u> (e.g. surface, ground water and water crossings) lead to adverse effects on...	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	Could impacts to <u>flora</u> (including SAR) lead to adverse effects on...	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	Could impacts to <u>fauna</u> (including SAR) lead to adverse effects on...	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	Other...	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>





## Appendix 3: Archaeological Overview Assessment



August 2016



## Appendix 4: Archaeological Monitoring of Geotechnical Investigations at Cape Spear National Historic Site, NL, May 23, 2016

