Registration Pursuant To The

Environmental Assessment Regulations 2003

under the

Environmental Protection Act
(O.C. 2003-220)

For The Proposed

100 MW (Nominal) Holyrood Combustion Turbine Project

April 2014

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1.0 Name of Undertaking

100 MW (Nominal) Holyrood Combustion Turbine

1.1 Proponent

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2.0 Project Rationale

Newfoundland and Labrador Hydro (Hydro), a Nalcor Energy Company, is the major supplier of electrical power and energy in the Province of Newfoundland and Labrador. On the Island of Newfoundland Hydro owns and operates hydroelectric generating plants at Bay d’Espoir (604 MW), Cat Arm (127 MW), Hinds lake (75 MW), Upper Salmon (84 MW), Granite canal (40 MW) and Paradise River (8 MW). In addition, it operates an oil fired generating station (490 MW) at Holyrood and 3 Gas Turbines (127 MW) at Hardwoods, Stephenville and Happy Valley-Goose Bay. Hydro operates 25 diesel plants (53 MW) within the province. In Labrador, Hydro is the majority owner of the Churchill

Falls Hydroelectric Generating Facility (5,400 MW). Hydro maintains and operates approximately 4,000 km of transmission lines and 3,500 km of distribution lines to support its generation facilities.

Hydro's *Generation Planning Issues – November 2012* report submitted to the Public Utilities Board in July 2013 identified an Island Interconnected System capacity deficit and violation of accepted generation capacity criteria in 2015. Hydro updated its generation planning analysis in the second half of 2013 in preparation for completing an application to the Public Utilities Board for additional generation capacity to be available to meet forecasted load requirements during high peak winter demand periods prior to completion of the Lower Churchill Project.

In the 2013 review, 60 MW was assumed as the minimum combustion turbine size based on a 50 MW minimum size determined in the 2012 study, and an additional 10 MW requirement to replace a 10 MW combustion turbine unit that had previously been available to the system from a black start facility at the Holyrood Generating Station.

In addition to the new build 60 MW combustion turbine, since the winter of 2013, Hydro has been exploring grey market capacity options to mitigate generation capacity shortfalls. While options put forward included used, used but overhauled, and unused units, Hydro has concentrated on unused units. These are generally units that were purchased by various corporations and for various reasons were not installed or if so never fired. There are options available in the grey market of varying sizes, some of which are of significant interest to Hydro both because of cost advantage and an earlier in-service potential. Options are available that could provide a nominal 123 MW capacity at ISO rating and could be in-service by December 2014. This option offers enhanced reliability for the Island Interconnected System and value for rate payers when compared to a new build 60 MW unit which cannot be achieved until December 2015 at earliest at practically the same cost.

The nominal 123 MW grey market option is the basis for this present proposed undertaking.

3.0 Project Alternatives

As part of the study completed by Hydro, 3 sites were evaluated for construction of a generation source. The sites considered included; Hydro's Hardwoods Gas Turbine site, Hydro's HTGS site and Newfoundland Powers site adjacent to distribution line 74 L in the White Hills area of St. John's. A formal risk assessment workshop was held in March, 2012 at which time the sites were evaluated. The HTGS site was selected as it was an existing industrial site with no construction constraints, a secure site with existing access, no new land required, minimal transmission line requirements and existing environmental monitoring controls at the HTGS.

As part of the study, Hydro evaluated alternative generation sources to provide the necessary peak demand electricity. Reciprocating Diesel Generators used in electrical utility applications for emergency back-up power generation for small isolated systems were evaluated. Combustion Turbine (CT) Generators extensively used in electrical utility applications for peak and intermittent purposes rather than base power generation were evaluated. In January, 2014 Hydro solicited proposals from equipment suppliers, manufacturers, brokers, and energy sector Engineering Procurement Contract Management (EPC) contractors with more than 25 generating equipment options received. A decision matrix was employed to evaluate and rank all the options received. Following this evaluation, the highest ranked alternative was the 123 MW (Nominal) Combustion Turbine. It is an unused, grey market unit, stored, maintained to OEM specifications, and readily available with a full warranty.

In addition to the 60 MW combustion turbine, other options considered as part of the 2013 review included up to 100 MW of combustion turbine capacity, interruptible load arrangements with industrial customers, a review of the potential for CDM to meet the capacity shortfall, and the role of the currently leased black start diesel facility at Holyrood. This review considered both new and used or aftermarket combustion turbines Interruptible load arrangements with industrial customers offer an opportunity to reduce system demand by curtailing a customer's load in return for a financial incentive without adversely affecting the customer's operation. However, these arrangements can have limitations in terms of the number of times it can be called upon, the duration of the curtailment, and the time of year it can be called upon. These factors can affect the suitability to the utility. While these options have not been selected as the sole solution, they are recommended to be pursued to help resolve issues such as unforeseen loss of generation capacity, or as a mechanism to address extreme demand beyond the normal expected.

CDM continues to be a component of the supply side equation for Hydro. Working through both joint utility efforts and targeting Hydro customers directly, programs have continued to expand and reach new customers with new opportunities to save. The focus to date has been on energy savings and reduction of fuel at Holyrood. Capacity and demand reductions are also achievable through CDM once the necessary planning steps have taken place. CDM programs must be economically justified and updating the marginal cost study to reflect current system realities is the first step in that process. An assessment of the current opportunities for demand savings through an updated conservation potential study is also needed. This will confirm which technologies are currently being used by customers and assist in defining the magnitude of new technology opportunities for demand reduction in existence. The utilities undertook a CDM Potential Study in 2008 and are planning to begin an update in 2014 to reflect the changes in the customer market and technology developments. The 2008 study did not explore demand opportunities as capacity was not driving costs on the system. The planned update will address this issue.

As previously mentioned, the current focus of CDM programs has been energy conservation as it is tied to reducing fuel use, primarily at Holyrood. While demand reduction programs are demonstrating successful implementation in other jurisdictions, they take time to be accepted and implemented by customers. Where successful in reducing demand, these programs are generally aided by financial programs that support retrofitting homes, and a rate structure that motivates customers to invest in and change habits. While an enhanced CDM program can be beneficial, it is not a viable option in the timeframe available to change consumer behavior and achieve savings. At this time, a CDM program that includes demand reduction in addition to energy reduction is considered a complementary program to the installation of the combustion turbine. Over time, enhanced CDM programs will serve to better manage overall system demand. However, in the period from now until December 2015, what is needed is a firm increase in generation, or an equivalently firm reduction in demand on the Avalon Peninsula to obtain both transmission and system capacity benefits. The diesels installed at Holyrood are rated at 16 MW peak with a sustainable rating of 14.6 MW. However, limitations of plant equipment (breakers and cabling) limit the power available to the system to 10 MW. If the limitations of the breaker and cables are addressed, an additional 4.6 MW could be supplied to the system on a sustainable basis. These diesels are leased and the lease could be extended or the units purchased with the intent to redeploy following decommissioning of Holyrood's thermal generating capability.
The cost and risk associated with changing breakers, cabling and other internal aspects of an existing operating plant to gain system access to an additional 4.6 MW is not recommended.

4.0 Project Objectives

Hydro intends to add 100 MW (Nominal) of peaking generation capacity to the Island Interconnected Generation System. The additional generation will meet forecasted load requirements during high peak winter demand periods prior to the completion of the LCP. This generation will be added by construction of a 123 MW (Nominal) Combustion Turbine (CT) within the existing HTGS yard. Once in operation the CT will; replace the existing deteriorated HTGS black start turbine facility, replace the existing temporary mobile diesel generator units recently installed to provide HTGS black start capability, be available for emergency back-up generation after completion of the LCP, be available for high peak winter load requirements, and be available for a 1 week operating period each year in the event of a transmission line loss event.

5.0 Project Description

The Project will involve the construction and subsequent operation of a 123 MW (Nominal) CT Generator – Distillate Fuel - to be located within the existing HTGS yard in the vicinity of the location of the old Guard House. The location of the proposed CT is shown in Figure 1. The Project will involve construction of a 123 MW (Nominal) CT. The general layout of the CT without the building enclosure is shown in Figure 2. The CT unit will be enclosed in a building structure approximately 183 feet long by 103 feet wide by 35 feet high. There is another section of building to enclose the de-mineralized water tanks approximately 39 feet long by 37 feet wide. The stack height is approximately 50 feet. There will be no kitchenette or sanitation facilities provided in the CT building. These services will be provided at the adjacent HTGS.

Also included in the Project is a generator step-up (GSU) transformer, 2.5 million litres of No 2 diesel fuel storage and related off loading and handling facilities, a demineralized water plant and storage, and interconnection to the existing HTGS. Internal forces will complete work to interconnect the CT to the existing HTGS. All other work will be undertaken under an EPC contract established for the Project.

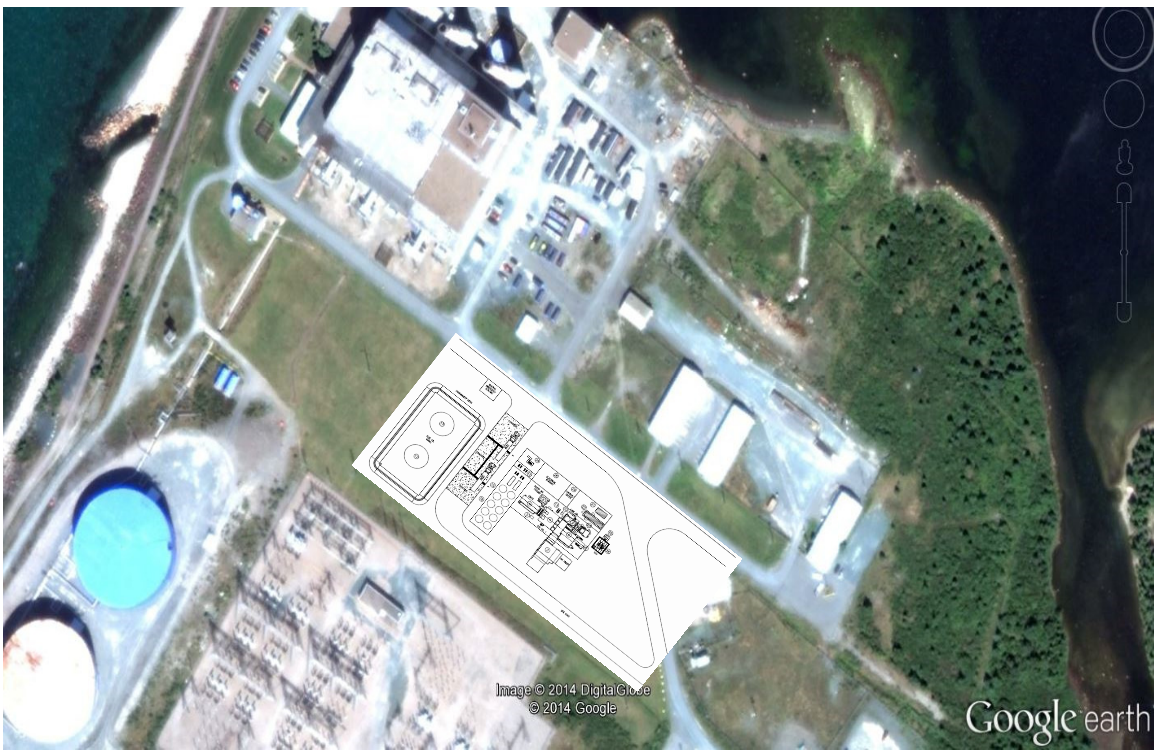


Figure 5-1: Location of CT in the existing HTGS yard.

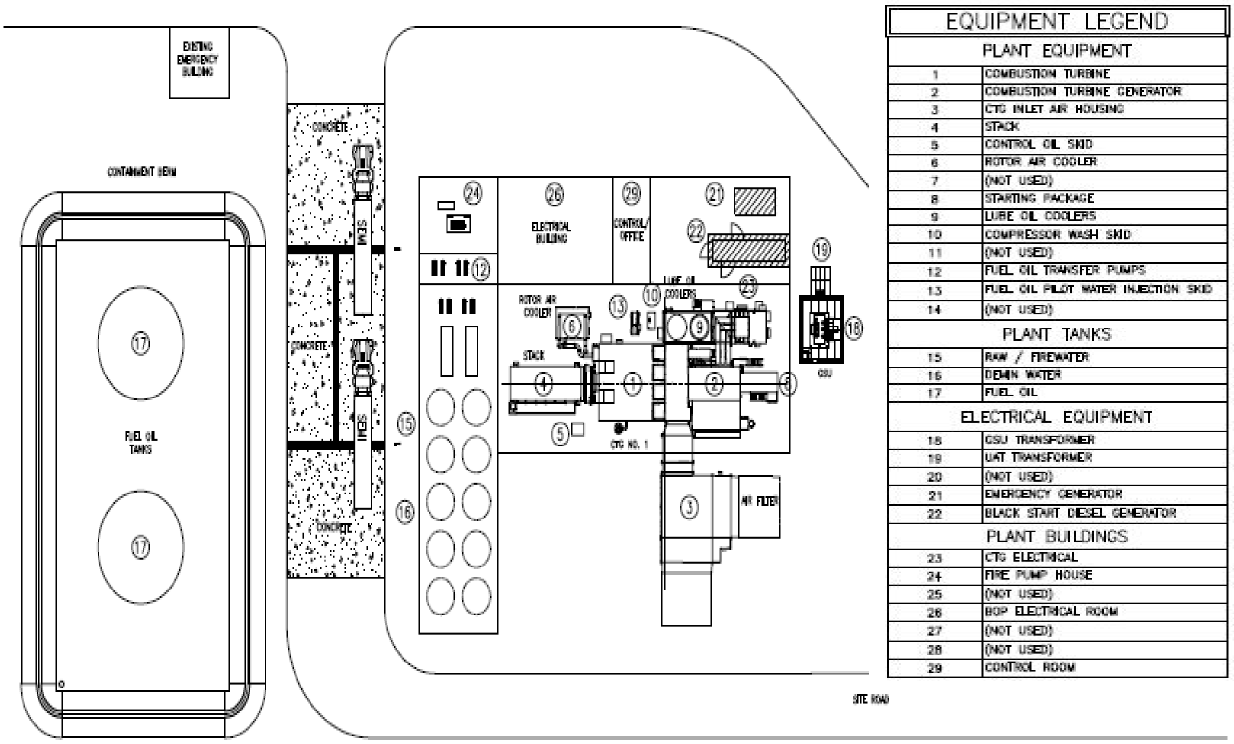


Figure 5-2: General Layout of the CT Unit and Bulk Fuel Storage.

6.0 Project Key Environmental Aspects

The key environmental aspects of this Project include; air emissions produced as a result of the combustion of distillate fuels, fuel storage, transport and handling facilities to support the CT, water use to produce de-mineralized water and related storage facility, transformer oil containment, noise and public consultation. These key environmental aspects are discussed below.

6.1 Air Emissions

One of the major concerns associated with the proposed undertaking is an increase in ground level concentrations of air pollutants from the combined operation of the Holyrood Thermal Generating Station (HTGS) and the gas turbine. To evaluate this concern, Hydro has completed an air dispersion modelling study using the US EPA and Newfoundland and Labrador Department of Environment and Conservation Department approved CALPUFF model system. The parameters assessed in the study include the following and were evaluated as per Table 6.1 below:

Table 6.1: Parameters and Averaging Period for Air Dispersion Study

Pollutant	Averaging Period
Sulphur dioxide (SO_2)	1hour, 3hour, 24hour, annual
Total suspended particulate (TSP)	24hour, annual
Particulate matter less than 10 microns (PM_{10})	24hour
Particulate matter less than 2.5 microns ($PM_{2.5}$)	24hour, annual
Nitrogen dioxide (NO_2)	1hour, 24hour, annual
Carbon monoxide (CO)	1hour, 8hour

These pollutants were compared to the guideline concentrations listed in the *Air Pollution Control Regulations* under the *Environmental Protection Act, 2002*.

To simulate a worst case scenario for modelling, the HTGS production data for the years 2003 and 2004 were used as this period represents the highest levels of generation for the station. Where applicable in the model scenarios, the gas turbine was considered to be operating at base load for twenty four (24) hours of each model day. Four (4) years of site specific meteorology data spanning from 2009 through 2012 were also used.

Three (3) scenarios were input into the model to assess how the operation of the gas turbine unit would interact with the existing generation. These included evaluating the following:

- The operation of HTGS during the winter load season ;
- The operation of the proposed combustion turbine during the winter load season ; and
- The combined operation of HTGS and combustion turbine during the winter load season .

Note: For model purposes, the winter load season is defined as January 1, 2003 to April 30, 2003, November 1, 2003 through April 30, 2004 and November 1, 2004 through December 31, 2004 based off the production data set being used.

By evaluating unit operation under the scenarios listed above, Hydro was able to predict the overall ground level concentrations and how both emission sources (HTGS and gas turbine) contribute to the overall values.

The operating scenarios identified above represent the worst case and the resulting ground level concentrations are expected to be higher than normal operating conditions would produce. The probability of operating the combustion turbine at maximum capacity for a sustained period of time would be low and only occur in the event of an extreme weather event or unplanned outages to transmission and/or generation assets.

An evaluation of the output from each of the scenarios has concluded that the ground level concentrations resulting from these extreme worst case scenarios are less than, and in most cases significantly less than, maximum acceptable ambient air quality standards identified in the *Air Pollution Control Regulations,2004*. The predicted ground level concentrations in model runs combining the operation of HTGS + Gas Turbine were consistent with the runs for HTGS as a singular emission source. While there are predicted ground level concentrations of all parameters in the model output for the gas turbine as a singular emission source, the model suggests that there is little mixing and combination of this plume with the emission plume generated by HTGS.

The observed "non-mixing" of plumes can be explained through an evaluation of the plume height for the two different emission sources. Given the high exhaust flow and temperature emitted from the gas turbine, the emission plume is very buoyant. Under common atmospheric conditions, the plume rises to a height of approximately 860 metres before dispersing. By comparison, the HTGS plume travels at a height of approximately 260 metres. However, when wind speeds are high (>50 km/hr) the gas turbine plume becomes less buoyant and the unit contributes to localized ground level concentrations in close proximity to HTGS. These localized areas of high impact still fall well below regulatory limits and have minimal effects on the air shed as a whole. The model suggests that limited mixing of the two plumes is occurring and that there are minimal contributions to the predicted ground level concentrations that can be attributed to the operation of the gas turbine.

The results of the air dispersion study suggest the operation of the proposed gas turbine does not contribute to any increase in ground level pollutant concentrations above regulatory criteria inside the defined air shed. Based on this finding, Hydro does not anticipate that air emissions from the proposed undertaking will pose a significant risk to the surrounding environment. The summary tables outlining the results of the air dispersion study can be found in Appendix A, attached.

6.2 Fuel Storage, Transport and Handling

The proposed CT will utilize a No.2 distillate fuel (diesel) for operation. Preliminary system designs indicate a storage capacity of approximately 2.5 million litres. The fuel system for the undertaking will be subject to the requirements of the *Storage and Handling of Gasoline and Associated Products Regulation, 2003, Consolidated Newfoundland Regulations, 58/03 (*GAP).

The system will be operated by the staff from the Holyrood Thermal Generating Station. In the event of a spill or leak of fuel, the Holyrood Emergency Response Manuel (ERM) will be used to define appropriate roles and responsibilities. Should such an event occur, Hydro will notify government agencies, remediate the affected area and restore the environment to the satisfaction of the Department of Environment and Conservation.

Hydro is proposing to use field erected vertical tank(s) constructed to the API650 standard or another acceptable standard approved by regulatory agencies. The tank(s) will be surrounded by a dyke having a storage capacity of at least 110%. Final storage capacity of the containment dyke will be determined by the volume and number of fuel tanks in the final design. The dyke will be liquid tight to a permeability of at least 10^{-6} cm/second and be constructed with concrete or compacted earth with a synthetic membrane. All tanks, piping and the secondary containment dyke will registered under GAP and tested as per section 28 of the regulations prior to being placed into operation.

The fuel loading area will consist of a concrete pad designed to drain fuel into a dedicated tank or oil water-separator in the event of a spill or leak from a tanker truck during system fill ups. The oil-water separator or tank system will also be registered under GAP prior to the system being placed into operation. All filling of the system from tanker trucks will be supervised 100% of the time.

The operation of the combustion turbine will follow the reconciliation process for fuel inventory control. At a minimum, fuel tanks will be gauged or dipped (including a water dip) at least weekly. Gauge or dip records will be reconciled against receipt and withdrawal records to determine any apparent fuel losses for the system. Reconciliation records will be kept for a minimum of two (2) years and Hydro will inform the Government Service Centre (GSC) immediately of any apparent losses above normal as indicated by two (2) consecutive reconciliations. As the operator of a storage tank system, Hydro will also determine cumulative apparent losses on a semi-annual basis and inform the GSC if the apparent loss exceeds one-half of 1% throughput for the period.

Given that the fuel system for the proposed undertaking will be designed and registered to meet or exceed all requirements of the *Storage and Handling of Gasoline and Associated Products Regulation, 2003, Consolidated Newfoundland Regulations, 58/03*, Hydro does not believe this aspect of the proposed undertaking will pose any significant risk to the surrounding environment.

6.3 Water Use

Water for use at the existing HTGS is acquired from Quarry Brook, located approximately 500 meters from the station. The proposed CT uses water for NO_x suppression. Water required for NOx suppression is estimated to be 400 L/m at 100% combustion. Water required for CT operation will also be acquired from the existing

Quarry Brook Dam. A take off line from the existing water line will be constructed to a new plant to de-mineralize the raw water for use in the CT. A small storage tank (volume to be determined) will also be constructed at the CT site. It is estimated for 500 hours of operation per year the annual water usage from Quarry Brook will increase by 5% annually while the HTGS remains in operation.

6.4 Plant Drainage

The floors of the CT site will be directed to an oil/water separator designed to handle the estimated excess volume of water produced by the CT. The design of the oil/water separator will be finalized as part of final design for the CT.

6.5 Transformer Oil Containment

The new transformer installed at the CT site will have secondary containment provided in the form of an oil/water separator designed to manage chronic inputs as well containment in the event of a catastrophic failure at the site.

6.6 Noise

Table 6 below contains the design criteria for noise produced by the CT when in operation without a building enclosure. This criteria represents worst case scenario as Hydro is proposing to install the unit inside a building structure which would further reduce ambient noise below the indicated levels. The maximum decibel level noted in the criteria is 85 dBA at a horizontal distance of 3 feet and vertical distance of 5 feet. This noise level is roughly equivalent to normal city noise when travelling inside a vehicle. For comparison, a normal conversation at approximately three (3) feet has 60-65 dBA sound intensity which is the same rating for the proposed unit at approximately 400 feet.

Noise levels produced by the CT are not expected to increase noise levels already present at the HTGS industrial site. This unit produces noise levels similar to Hydro’s Gas Turbine unit at Hardwoods located within the community of Paradise. As Hydro has no history of noise complaints at its Hardwoods Gas Turbine site it is not anticipated to be a concern at the Holyrood site.

Table 6.6: Design Noise Criteria for the proposed CT Unit without the building enclosure

Location	St. John's, Newfoundland
Elevation	338 feet
Minimum Site Temperature	-40°F/-40°C
Maximum Site Temperature	TDB (estimated 80°F)
Design Point Dry Bulb/Wet Bulb Temperature	TBD (estimated 60% RH)
Primary Fuel Source	Liquid Fuel
Seismic Design Criteria (BOP Equipment)	TBD
Seismic Design Criteria (CTG Package)	IBC 2009, Site Class D, Design Category E, Category III Facility with 1.25 Importance Factor
Maximum Wind Speed (Wind Load)	150 mph Wind Speed per ASCE 7-05/IBC 09
Rood Live / Snow Load	60 PSF
Average Near Field Noise at 3 ft horizontal and 5 ft vertical, NOTE 1	85 dB(A)
Far Field Noise, NOTE 1	65 dB(A) at 400 ft

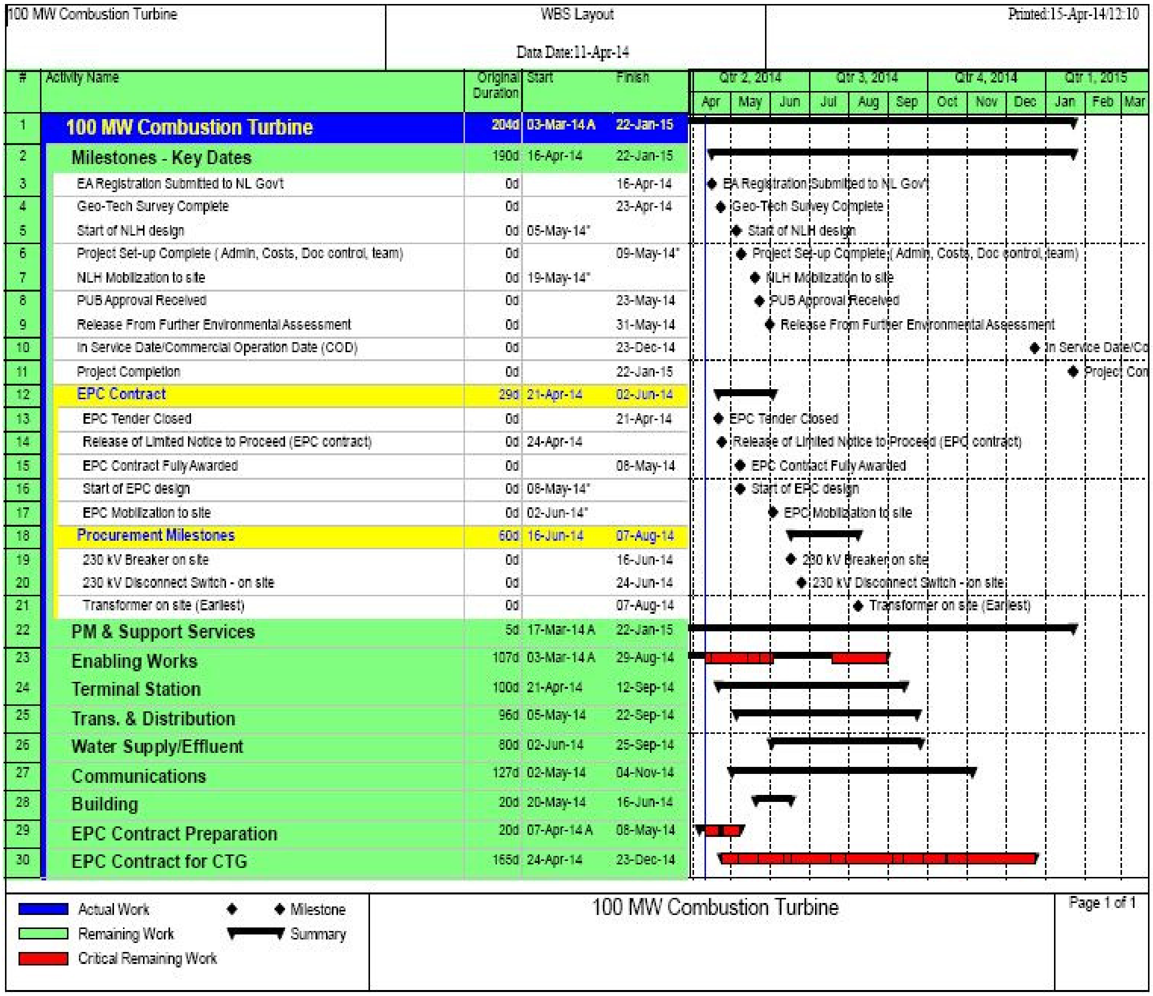
NOTE 1: Based on single-unit only operation. Multiple unit operating at the same time will have an impact on both near and far field noise levels.

7.0 Occupations

Construction of the CT will be executed through an Engineering, Procurement, and Construction (EPC) contract. The EPC contractor is responsible for delivering a 'Turnkey' solution, and the contractor will therefore engage all of the construction trades directly. The construction workforce is expected to peak at approximately 100 to 150 people. The following is a general listing of the trades that are expected to be involved during construction: labourers, welders, carpenters, steamfitters/pipefitters, plumbers, concrete finishers, mechanics, heavy equipment operators, mobile crane operators, powerline technicians.

The combustion turbine generator facility, being located at the existing HTGS, will be operated and maintained by existing staff at the HTGS.

8.0 Project Schedule



#	Activity Name	Original Duration	Start	Finish
1	100 MW Combustion Turbine	204d	03-Mar-14 A	22-Jan-15
2	Milestones - Key Dates	190d	16-Apr-14	22-Jan-15
3	EA Registration Submitted to NL Gov't	0d		16-Apr-14
4	Geo-Tech Survey Complete	0d		23-Apr-14
5	Start of NLH design	0d	05-May-14*	
6	Project Set-up Complete (Admin, Costs, Doc control, team)	0d		09-May-14*
7	NLH Mobilization to site	0d	19-May-14*	
8	PUB Approval Received	0d		23-May-14
9	Release From Further Environmental Assessment	0d		31-May-14
10	In Service Date/Commercial Operation Date (COD)	0d		23-Dec-14
11	Project Completion	0d		22-Jan-15
12	EPC Contract	29d	21-Apr-14	02-Jun-14
13	EPC Tender Closed	0d		21-Apr-14
14	Release of Limited Notice to Proceed (EPC contract)	0d	24-Apr-14	
15	EPC Contract Fully Awarded	0d		08-May-14
16	Start of EPC design	0d	08-May-14*	
17	EPC Mobilization to site	0d	02-Jun-14*	
18	Procurement Milestones	60d	16-Jun-14	07-Aug-14
19	230 kV Breaker on site	0d		16-Jun-14
20	230 kV Disconnect Switch - on site	0d		24-Jun-14
21	Transformer on site (Earliest)	0d		07-Aug-14
22	PM & Support Services	5d	17-Mar-14 A	22-Jan-15
23	Enabling Works	107d	03-Mar-14 A	29-Aug-14
24	Terminal Station	100d	21-Apr-14	12-Sep-14
25	Trans. & Distribution	96d	05-May-14	22-Sep-14
26	Water Supply/Effluent	80d	02-Jun-14	25-Sep-14
27	Communications	127d	02-May-14	04-Nov-14
28	Building	20d	20-May-14	16-Jun-14
29	EPC Contract Preparation	20d	07-Apr-14 A	08-May-14
30	EPC Contract for CTG	165d	24-Apr-14	23-Dec-14

9.0 Construction Mitigation

During Construction of the CT standard engineering, environmental and construction practices will be employed. The site access is a paved road so dust suppression may not be required. If required, standard and approved dust suppression methods will be employed. Any leaks or spills of hydrocarbon or other hazardous material associated with transportation and storage of materials and construction at site will be the responsibility of the Contractor. The Contractor will be required, as part of its contract commitments, to submit an Environmental Emergency Response Plan acceptable to Owner prior to commencing work at the site.

10.0 List of Potential Environmental Approvals

The proposed Combustion Turbine *Project* will require a number of provincial, federal and municipal approvals in relation to its construction and operations activities, which may include those listed in the Table 7 below.

Table 10.1: Holyrood Combustion Turbine Project - List of Potential Environmental Approvals Required

Approval Potentially Required	Legislation / Regulation	Project Component / Activity Requiring Approval or Compliance	Department or Agency	Requirements
Release from the Environmental Assessment Process	Environmental Assessment Regulations, 2003 under the Environmental Protection Act	Project	Department of Environment and Conservation	Greater than 1 MW requires registration as an Undertaking.
Cutting Permit Operating Permit	*Forestry Act* and *Cutting of Timber Regulations*	Clearing land areas for the right-of-way, borrow pits, camp sites or laydown areas	Department of Natural Resources	A permit is required for the commercial or domestic cutting of timber on crown land.
Water Use Authorization	*Water Resources Act*	Water withdrawal for use at CT.	Water Resources Division, Department of Environment and Conservation	Water use authorization is required for all beneficial uses of water.
Policy Directives	*Water Resources Act*	Project activities	Water Resources Division, Department of Environment and Conservation	The Department has a number of potentially applicable policy directives in place, including those related to: Infilling Bodies of Water; Use of Creosote Treated Wood in Fresh Water; Treated Utility Poles in Water Supply Areas; Land and Water Developments in Protected Water Supply Areas; Development in Shore Water Zones; and Development in Wetlands.
Preliminary Application to Develop Land	*Urban and Rural Planning Act, Protected Road*	Construction activity	Service NL	A development permit is required to build on and develop land,

Approval Potentially Required	Legislation / Regulation	Project Component / Activity Requiring Approval or Compliance	Department or Agency	Requirements
	Zoning Regulations			whether Crown or privately owned, within the building control lines of a Protected Road.
Quarry Permit	*Quarry Materials Act* and *Regulations*	Extracting borrow material	Mineral Lands Division, Department of Natural Resources	A permit is required to dig for, excavate, remove and dispose of any Crown quarry material.
Fuel Tank Registration - Storing and Handling Gasoline and Associated Products	*Environmental Protection Act,* and *Storage and Handling of Gasoline and Associated Products Regulations*	Storing and handling gasoline and associated products	Engineering Services Division, Service NL	Fuel Tank Registration required for storing and handling gasoline and associated products.
Permit for Storage, Handling, Use or Sale of Flammable and Combustible Liquids	*Fire Prevention Act,* and *Fire Prevention Flammable and Combustible Liquids Regulations*	Storing and handling flammable liquids	Engineering Services Division, Service NL	This permit is issued on behalf of the Office of the Fire Commissioner. Approval is based on information provided for the Certificate of Approval for Storing and Handling Gasoline and Associated Products.
Compliance Standard	*Dangerous Goods Transportation Act* and *Regulations*	Storing, handling and transporting fuel, oil and lubricants	Department of Transportation and Works	If the materials are transported, handled and stored fully in compliance with the regulations, a permit is not required. A Permit of Equivalent Level of Safety is required if a variance from the regulations is necessary. Transporting goods considered dangerous to public safety must comply with regulations.
Certificate of Approval for a Water Withdrawal System of $\geq$ 4,500 L per day	*Water Resources Act*	Water supply at temporary camps, and for use in construction activities	Water Resources Division, Department of Environment and	Certificate of Approval is required for any private water withdrawal system of 4,500 L/day or greater.

Approval Potentially Required	Legislation / Regulation	Project Component / Activity Requiring Approval or Compliance	Department or Agency	Requirements
			Conservation	
Certificate of Approval for a Waste Management System	*Environmental Protection Act* and *Waste Management Regulations*	Waste disposal associated with construction and operation	Department of Environment and Conservation, Department of Health and Community Services	Approval is required for waste disposal (e.g., incineration or burying). Used tires must be disposed according to regulations.
Compliance Standard	*Fire Prevention Act,* and *Fire Prevention Regulations*	On-site structures (temporary or permanent)	Engineering Services Division, Service NL	All structures must comply with fire prevention standards.
Compliance Standard	*Environmental Control Water and Sewage Regulation* under the *Water Resources Act*	Any waters discharged from the project	Pollution Prevention Division, Department of Environment and Conservation	A person discharging sewage and other materials into a body of water must comply with the standards, conditions and provisions prescribed in these regulations for the constituents, contents or description of the discharged materials.
Compliance Standard	*Occupational Health and Safety Act* and Regulations	Project-related occupations	Service NL	Outlines minimum requirements for workplace health and safety. Workers have the right to refuse dangerous work. Proponents must notify Minister of start of construction for any project greater than 30 days in duration.
Compliance Standard	*Workplace Hazardous Materials Information System Regulations, Occupational Health and Safety Act*	Handling and storage of hazardous materials	Operations Division, Service NL	Outlines procedures for handling hazardous materials and provides details on various hazardous materials.
Compliance Standard	*Environmental Protection Act, Air Pollution Control Regulations*	Project operations (diesel generators)	Pollution Prevention Division, Department of Environment	The Regulations outline specific ambient air quality standards and emission standards, as well as relevant

Approval Potentially Required	Legislation / Regulation	Project Component / Activity Requiring Approval or Compliance	Department or Agency	Requirements
			and Conservation	engineering design (e.g., stack height) requirements and other provisions
Temporary Magazine License	*Explosives Act*	Temporary storage of explosives at certain construction areas	Natural Resources Canada	A license would be required to temporarily store explosives on site.
Explosives Purchase and Possession Permit	*Explosives Act*	Purchase and possession of explosives	Natural Resources Canada	A permit is required to purchase and possess explosives.
Explosives Transportation Permit	*Explosives Act*	Transportation of explosives	Natural Resources Canada	A permit is required for transporting explosives.
Compliance Standard	*Fisheries Act*, Section 36(3), Deleterious Substances	Any run-off from the project site being discharged to receiving waters	Environment Canada Department of Fisheries and Oceans	Environment Canada is responsible for Section 36(3) of the *Fisheries Act*. However, DFO is responsible for matters dealing with sedimentation. Discharge must not be deleterious and must be acutely non-lethal.
Compliance Standard	*Migratory Birds Convention Act* and *Regulations*	Any activities which could result in the mortality of migratory birds and endangered species and any species under federal authority	Canadian Wildlife Service, Environment Canada	Prohibits disturbing, destroying or taking a nest, egg, nest shelter, eider duck shelter or duck box of a migratory bird, and possessing a live migratory bird, carcass, skin, nest or egg, except when authorized by a permit. The Canadian Wildlife Service should be notified about the mortality of any migratory bird in the project area, including passerine (songbirds) and waterfowl species.
Compliance standards; permits may be required.	National Fire Code	On-site structures (temporary or permanent)	Service NL	Approval is required for fire prevention systems in all approved buildings.
Compliance standards; permits may be required.	National Building Code	On-site structures (temporary or permanent)	Service NL	Approval is required for all building plans.

Approval Potentially Required	Legislation / Regulation	Project Component / Activity Requiring Approval or Compliance	Department or Agency	Requirements
Development or Building Permit	*Urban and Rural Planning Act, 2000,* and Relevant Municipal Plan and Development Regulations	Development within municipal boundary	Community Council	A permit is required for any development or building within municipal boundaries.
Approval for Waste Disposal	*Urban and Rural Planning Act, 2000,* and Relevant Municipal Plan and Development Regulations	Waste disposal	Community Council	The use of a community waste disposal site in Newfoundland and Labrador by proponents/contractor s to dispose of waste requires municipal approval. Restrictions may be in place as to what items can be disposed of a municipal disposal site.

Appendix A

Summary of Tables and figures Relating to the Air Emission Study

Table A1: Summary of CALPUFF predicted concentrations for HTGS 2003 production scenario: HTGS + CT

Pollutant	Average Period	2009		2010		2011		2012		AAQS
		Conc. (µgm³)	% of AAQS	Conc. (µgm³)	% of AAQS	Conc. (µgm³)	% of AAQS	Conc. (µgm³)	% of AAQS	
SO_2	1 h	514	57%	550	61%	472	52%	464	52%	900
	3 h	463	77%	365	61%	355	59%	328	55%	600
	24 h	297	99%	177	59%	151	50%	159	53%	300
	Annual	7.1	12%	3.1	5.1%	4.3	7.2%	3.8	6.4%	60
NO_2	1 h	124	31%	153	38%	117	29%	116	29%	400
	24 h	80	40%	55	28%	51	25%	48	24%	200
	Annual	2.4	2.4%	1.1	1.1%	1.5	1.5%	1.2	1.2%	100
CO	1 h	17	0.048%	14	0.039%	16	0.047%	15	0.043%	35,000
	8 h	13	0.085%	8.0	0.053%	12	0.077%	9.0	0.060%	15,000
TSP	24 h	16	13.6%	8.4	7.0%	9.0	7.5%	7.7	6.4%	120
	Annual	0.35	0.58%	0.14	0.24%	0.20	0.34%	0.18	0.29%	60
PM_{10}	24 h	16	33%	7.3	15%	9.0	18%	7.6	15%	50
$PM_{2.5}$	24 h	16	65%	7.3	29%	9.0	36%	7.6	30%	25
	Annual	0.34	3.9%	0.10	1.1%	0.16	1.8%	0.13	1.5%	8.8

Table A2: Summary of CALPUFF predicted concentrations for HTGS 2004 production scenario: HTGS + CT

Pollutant	Average Period	2009		2010		2011		2012		AAQS
		Conc. (µgm³)	% of AAQS	Conc. (µgm³)	% of AAQS	Conc. (µgm³)	% of AAQS	Conc. (µgm³)	% of AAQS	
SO_2	1 h	479	53.2%	663	73.6%	410	45.6%	589	65.4%	900
	3 h	413	68.9%	309	51.5%	320	53.4%	319	53.1%	600
	24 h	234	78.1%	161	53.5%	167	55.6%	170	56.6%	300
	Annual	7.1	11.8%	3.2	5.4%	5.0	8.3%	4.1	6.8%	60
NO_2	1 h	123	30.7%	220	55.0%	131	32.8%	124	31.0%	400
	24 h	68	33.8%	52	25.9%	48	24.2%	48	24.1%	200
	Annual	2.4	2.4%	1.1	1.1%	1.7	1.7%	1.3	1.3%	100
CO	1 h	17	0.0%	14	0.0%	16	0.0%	15	0.0%	35,000
	8 h	13	0.1%	8.0	0.1%	12	0.1%	9.0	0.1%	15,000
TSP	24 h	16	13.6%	8.6	7.2%	9.0	7.5%	8.8	7.3%	120
	Annual	0.36	0.6%	0.16	0.3%	0.24	0.4%	0.19	0.3%	60
PM_{10}	24 h	16	32.7%	7.3	14.7%	9.0	18.0%	7.6	15.2%	50
$PM_{2.5}$	24 h	16	65.4%	7.3	29.4%	9.0	35.9%	7.6	30.3%	25
	Annual	0.34	3.9%	0.11	1.3%	0.16	1.8%	0.13	1.5%	8.8

Table A3: Summary of CALPUFF predicted concentrations for the CT only

Pollutant	Average Period	2009		2010		2011		2012		AAQS
		Conc. (µgm³)	% of AAQS	Conc. (µgm³)	% of AAQS	Conc. (µgm³)	% of AAQS	Conc. (µgm³)	% of AAQS	
SO_2	1 h	41	4.5%	33	3.6%	39	4.4%	36	4.0%	900
	3 h	36	5.9%	22	3.7%	32	5.3%	28	4.7%	600
	24 h	25	8.3%	11	3.7%	14	4.5%	11	3.8%	300
	Annual	0.51	0.85%	0.081	0.1%	0.25	0.42%	0.18	0%	60
NO_2	1 h	94	23%	76	19.0%	89	22%	84	21%	400
	24 h	56	28%	25	13%	29	15%	26	13%	200
	Annual	1.2	1.2%	0.18	0.2%	0.57	0.57%	0.41	0.41%	100
CO	1 h	17	0.048%	14	0.0%	16	0.047%	15	0.043%	35,000
	8 h	13	0.085%	8.0	0.1%	8.5	0.06%	9.0	0.06%	15,000
TSP	24 h	16	14%	7.3	6.1%	9.0	7.5%	7.6	6.3%	120
	Annual	0.34	0.56%	0.053	0.089%	0.16	0.27%	0.12	0.20%	60
PM_{10}	24 h	16	33%	7.3	15%	9.0	18%	7.6	15%	50
$PM_{2.5}$	24 h	16	65%	7.3	29%	9.0	36%	7.6	30%	25
	Annual	0.34	3.9%	0.053	0.6%	0.16	1.8%	0.12	1.4%	8.8

Table A4: Summary of CALPUFF predicted concentrations for HTGS 2003 production scenario: HTGS only

Pollutant	Average Period	2009		2010		2011		2012		AAQS
		Conc. (µgm³)	% of AAQS	Conc. (µgm³)	% of AAQS	Conc. (µgm³)	% of AAQS	Conc. (µgm³)	% of AAQS	
SO_2	1 h	513	57%	536	60%	468	52%	464	52%	900
	3 h	461	77%	364	61%	352	59%	326	54%	600
	24 h	296	99%	176	59%	150	50%	157	52%	300
	Annual	7.0	12%	3.0	5.1%	4.3	7.1%	3.8	6.4%	60
NO_2	1 h	124	31%	145	36%	110	27%	112	28%	400
	24 h	70	35%	50	25%	49	24%	44	22%	200
	Annual	2.2	2.2%	1.1	1.1%	1	1.4%	1.1	1.1%	100
CO	1 h	0.41	0.0012%	0.43	0.0012%	0.30	0.00086%	0.35	0.0010%	35,000
	8 h	0.27	0.0018%	0.19	0.0012%	0.14	0.00091%	0.18	0.0012%	15,000
TSP	24 h	12	10%	7	6.1%	6	5.3%	6.6	5.5%	120
	Annual	0.29	0.48%	0.13	0.21%	0.18	0.30%	0.16	0.27%	60
PM_{10}	24 h	9.2	18%	6	11%	5	10%	5.0	10%	50
$PM_{2.5}$	24 h	7.5	30%	5	18%	4	16%	4.1	16%	25
	Annual	0.18	2.0%	0.085	1.0%	0.11	1.25%	0.10	1.1%	8.8

Table A5: Summary of CALPUFF predicted concentrations for HTGS 2004 production scenario: HTGS only

Pollutant	Average Period	2009		2010		2011		2012		AAQS
		Conc. (µgm³)	% of AAQS	Conc. (µgm³)	% of AAQS	Conc. (µgm³)	% of AAQS	Conc. (µgm³)	% of AAQS	
SO_2	1 h	477	53%	663	74%	409	45%	586	65%	900
	3 h	413	69%	307	51%	320	53%	318	53%	600
	24 h	234	78%	159	53%	167	56%	170	57%	300
	Annual	7.0	12%	3.2	5.3%	4.9	8.2%	4	6.8%	60
NO_2	1 h	116	29%	220	55%	115	29%	112	28%	400
	24 h	62	31%	48	24%	48	24%	45	22%	200
	Annual	2.2	2.2%	1.1	1.1%	1.6	1.6%	1.2	1.2%	100
CO	1 h	0.35	0.0010%	0.40	0.0012%	0.31	0.0009%	0.46	0.0013%	35,000
	8 h	0.23	0.0015%	0.16	0.0011%	0.19	0.0013%	0.19	0.0013%	15,000
TSP	24 h	10	8%	7.0	5.9%	7.2	6.0%	7.8	6.5%	120
	Annual	0.30	0.51%	0.14	0.24%	0.22	0.36%	0.17	0.29%	60
PM_{10}	24 h	7.2	14%	5.6	11%	2.7	5.3%	5.8	12%	50
$PM_{2.5}$	24 h	6	24%	4.7	19%	4.5	18%	4.8	19%	25
	Annual	0.19	2.1%	0.09	1.0%	0.14	1.6%	0.11	1.3%	8.8

Figure A1: Geographic Distribution of 1-hour Concentration of SO_2 in Comparison to Ambient Air Quality Standard: 900 µg/m³ - Holyrood Thermal Generation Station (2003 Production) + 100 MW Gas Turbine

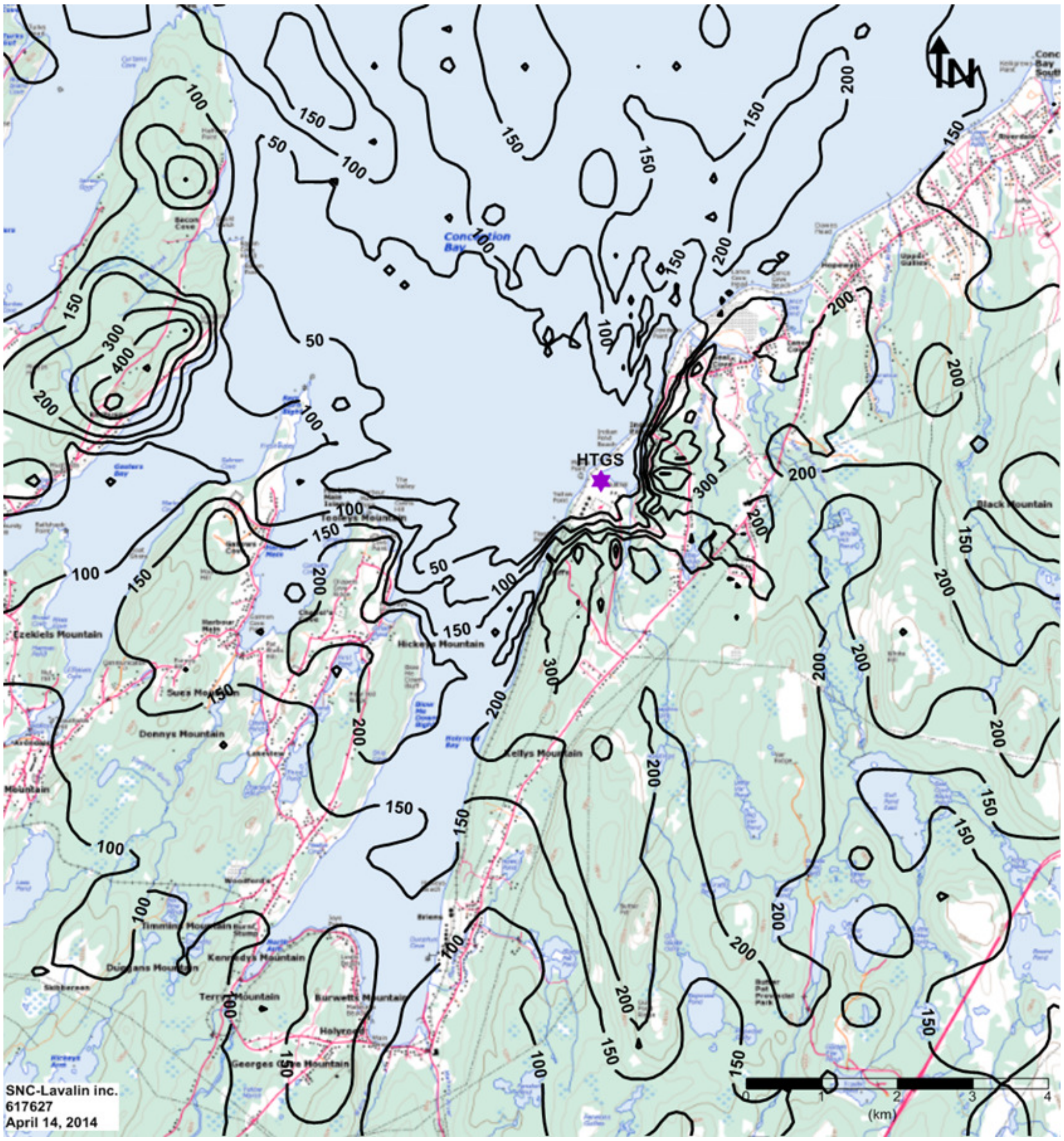


Figure A2: Geographic Distribution of 1-hour Concentration of SO_2 in Comparison to Ambient Air Quality Standards: 900 µg/m³ - Holyrood Thermal Generation Station (2004 Production) + 100 MW Gas Turbine

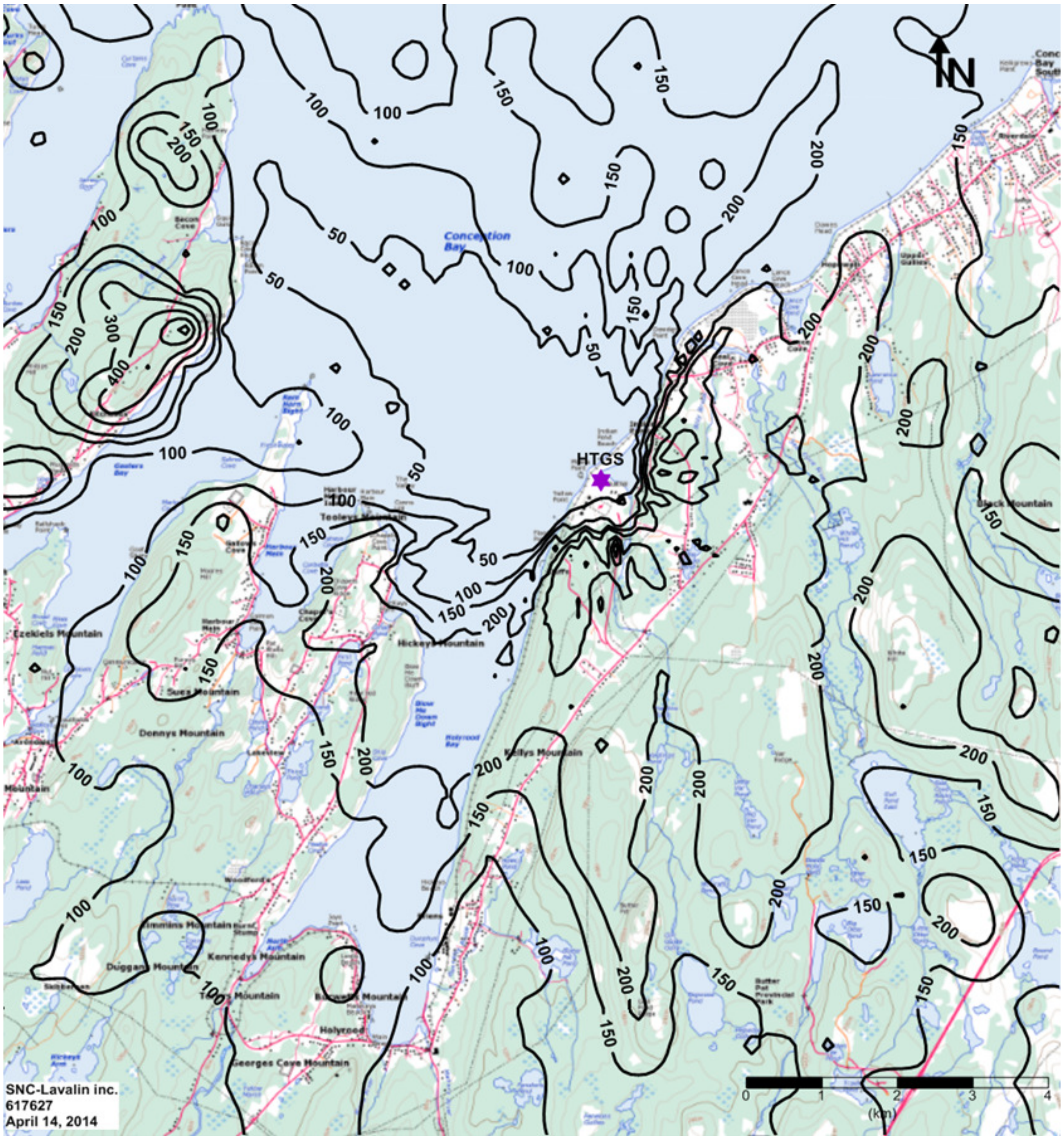


Figure A3: Geographic Distribution of 24-hour Concentration of SO_2 in Comparison to Ambient Air Quality Standards: 300 µg/m³ - Holyrood Thermal Generation Station (2003 Production) + 100 MW Gas Turbine

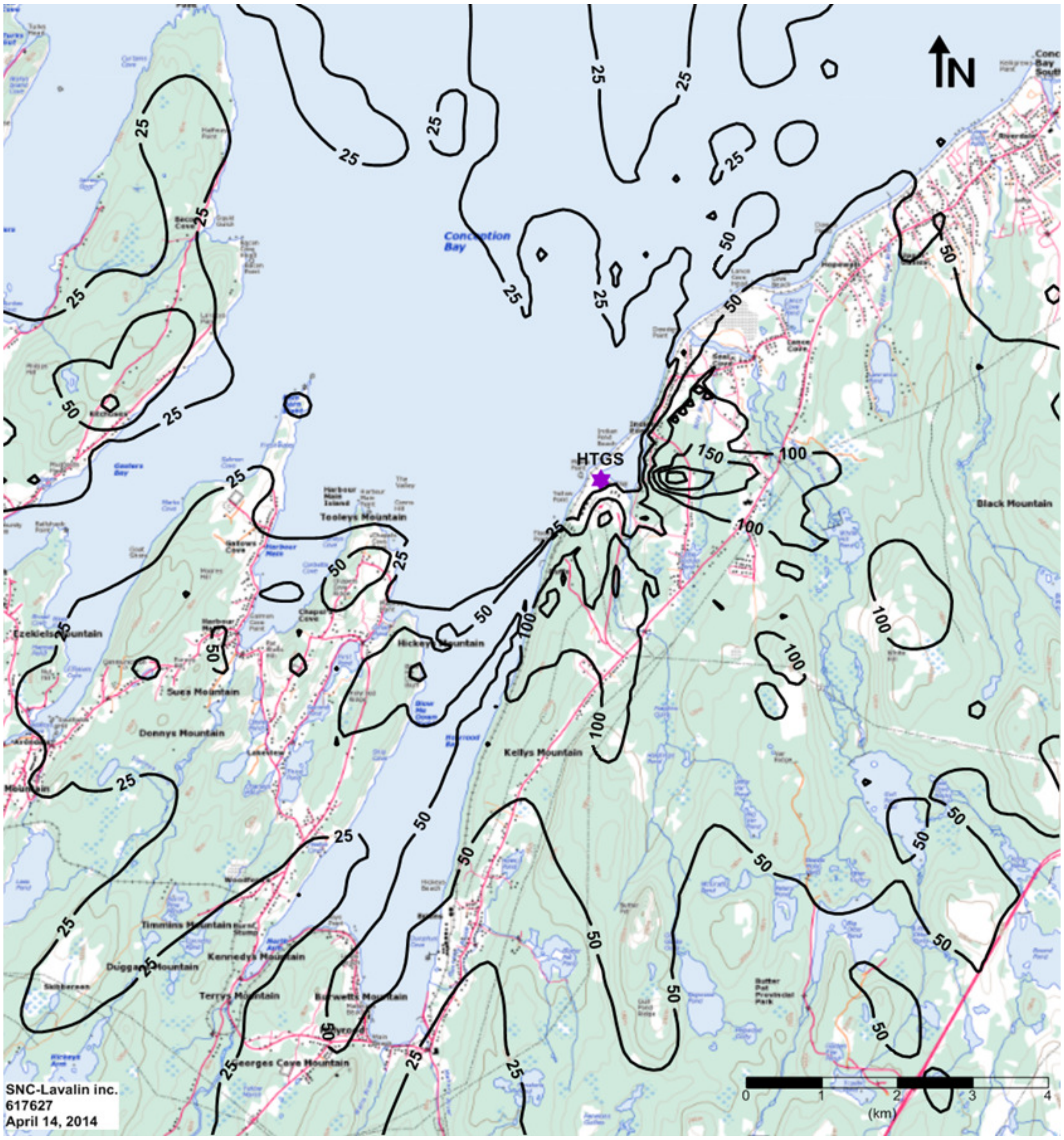


Figure A4: Geographic Distribution of 24-hour Concentration of SO_2 in Comparison to Ambient Air Quality Standards: 300 µg/m³ - Holyrood Thermal Generation Station (2004 Production) + 100 MW Gas Turbine

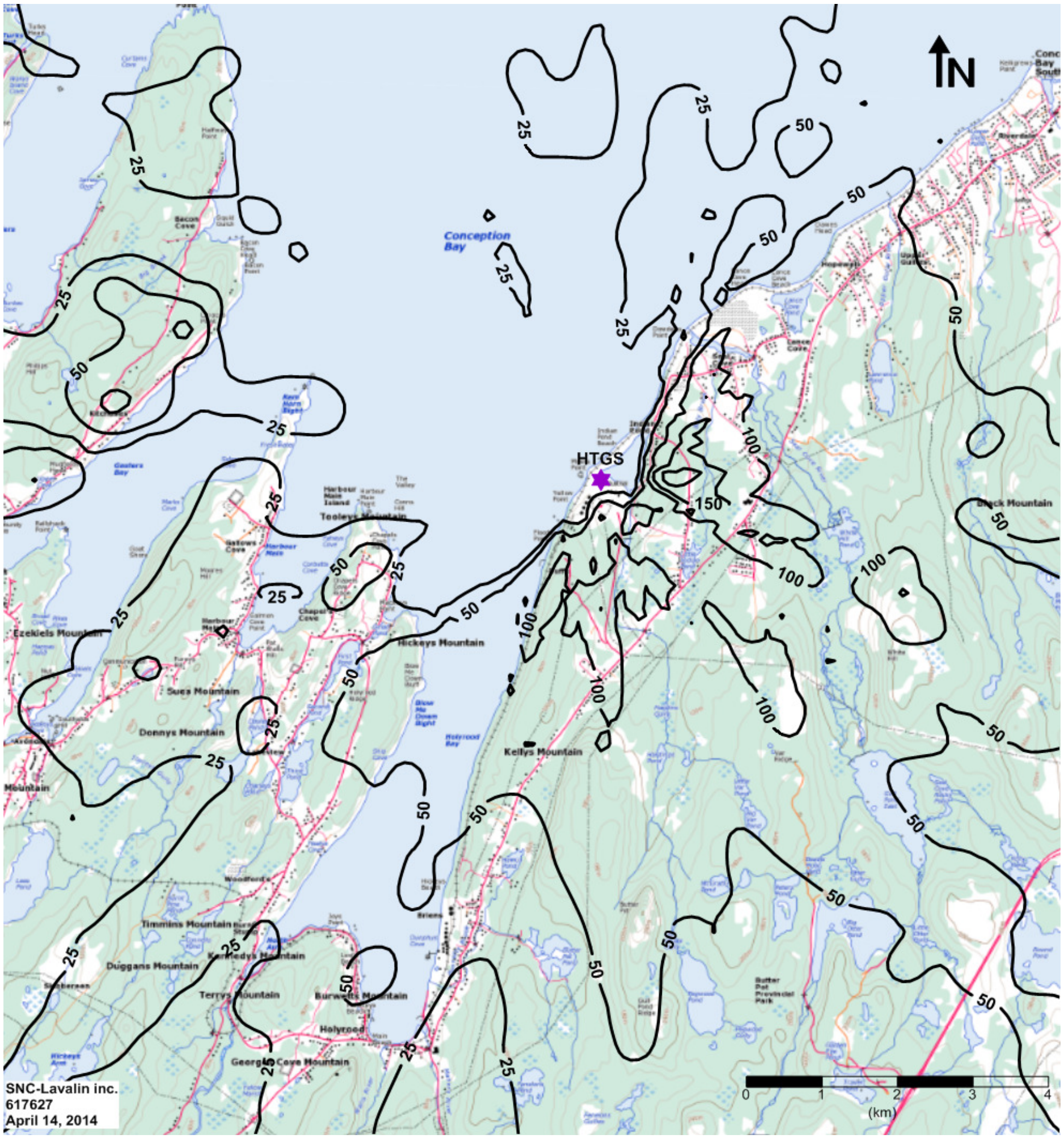


Figure A5: Geographic Distribution of Annual Average Concentration of SO_2 in Comparison to Ambient Air Quality Standards: 60 µg/m³ - Holyrood Thermal Generation Station (2003 Production) + 100 MW Gas Turbine

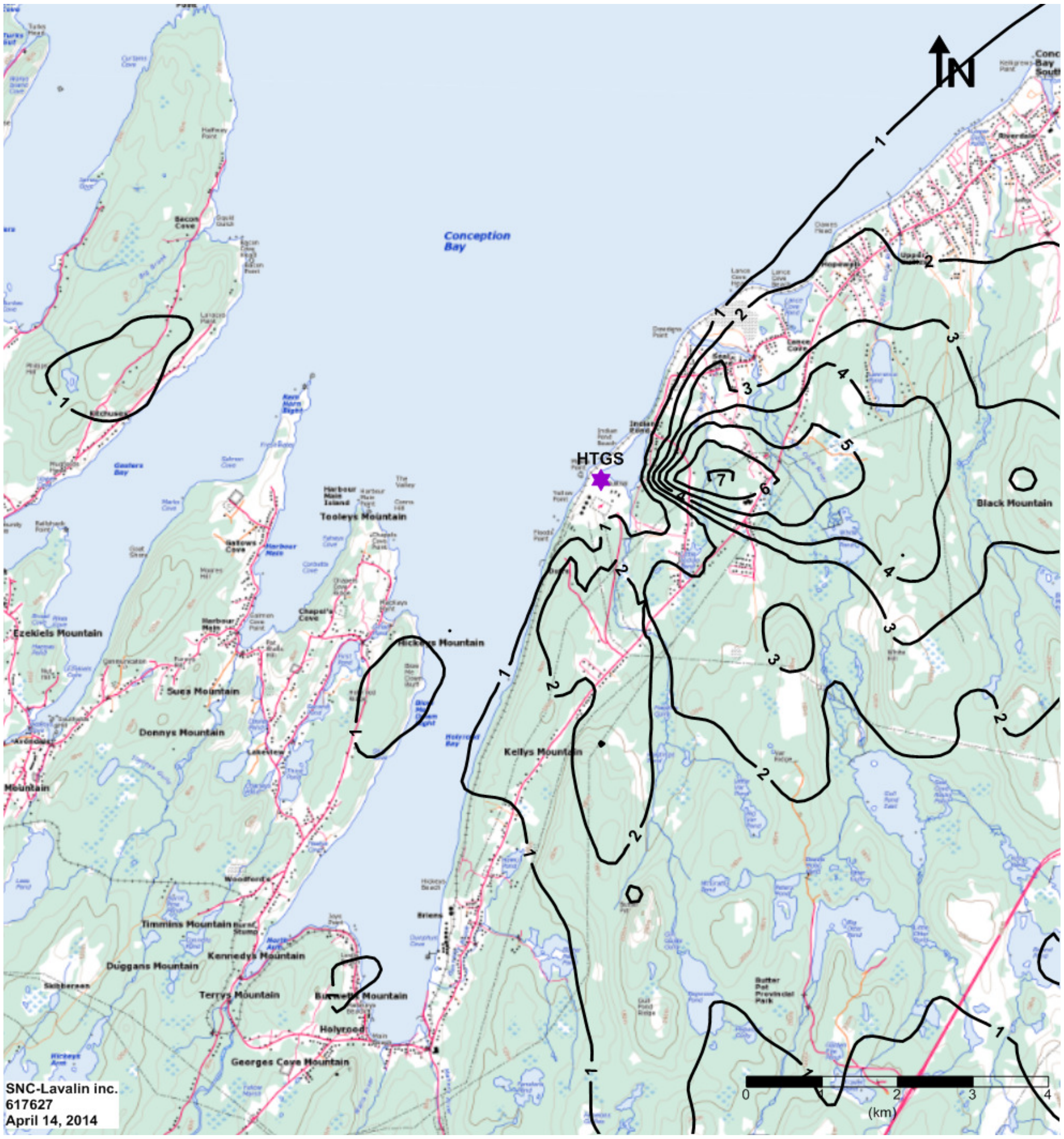


Figure A6: Geographic Distribution of Annual Average Concentration of SO_2 in Comparison to Ambient Air Quality Standards: 60 µg/m³ - Holyrood Thermal Generation Station (2004 Production) + 100 MW Gas Turbine

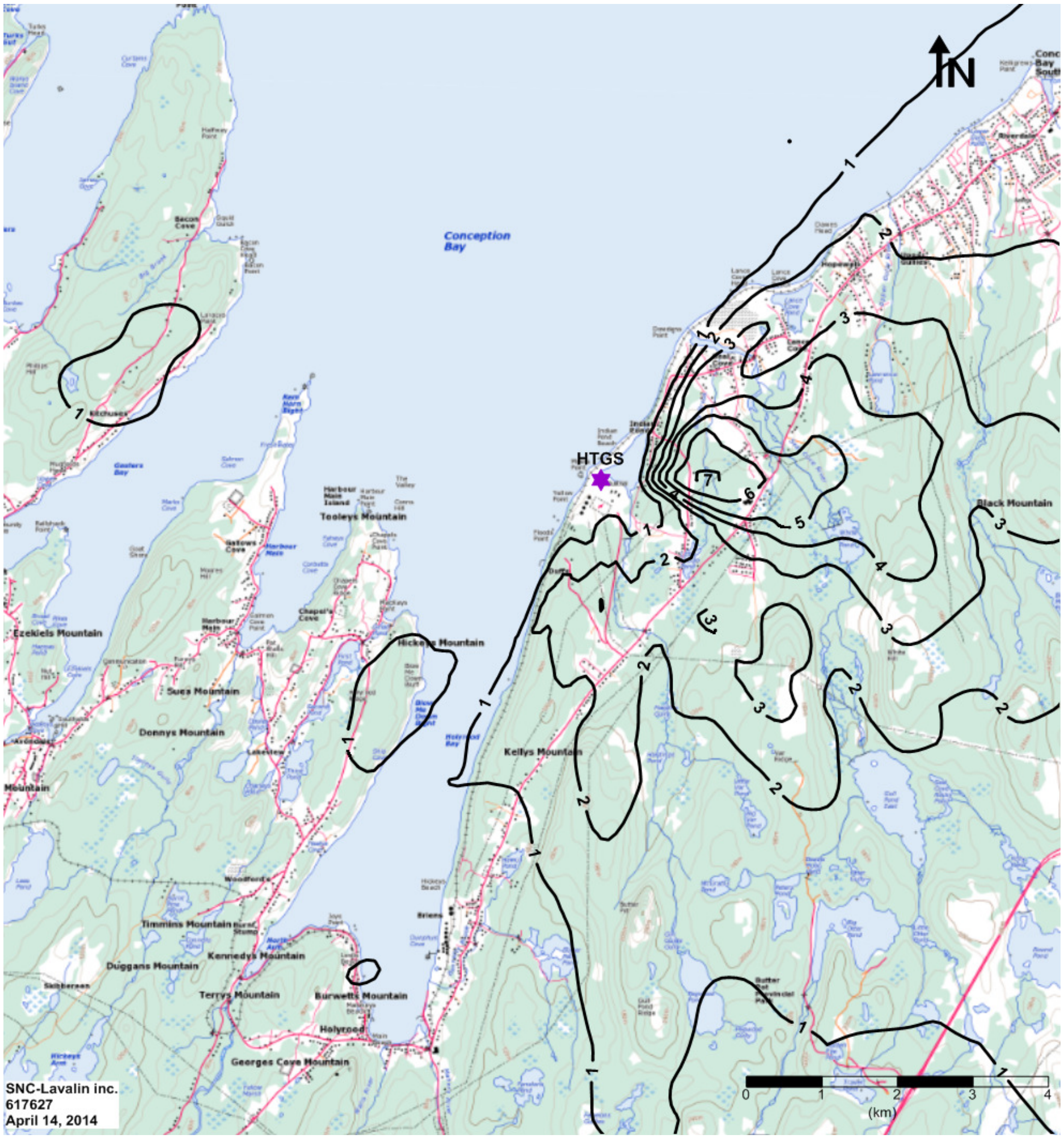


Figure A7: Geographic Distribution of 1-hour Concentration of NO_2 in Comparison to Ambient Air Quality Standards: 400 µg/m³ - Holyrood Thermal Generation Station (2003 Production) + 100 MW Gas Turbine

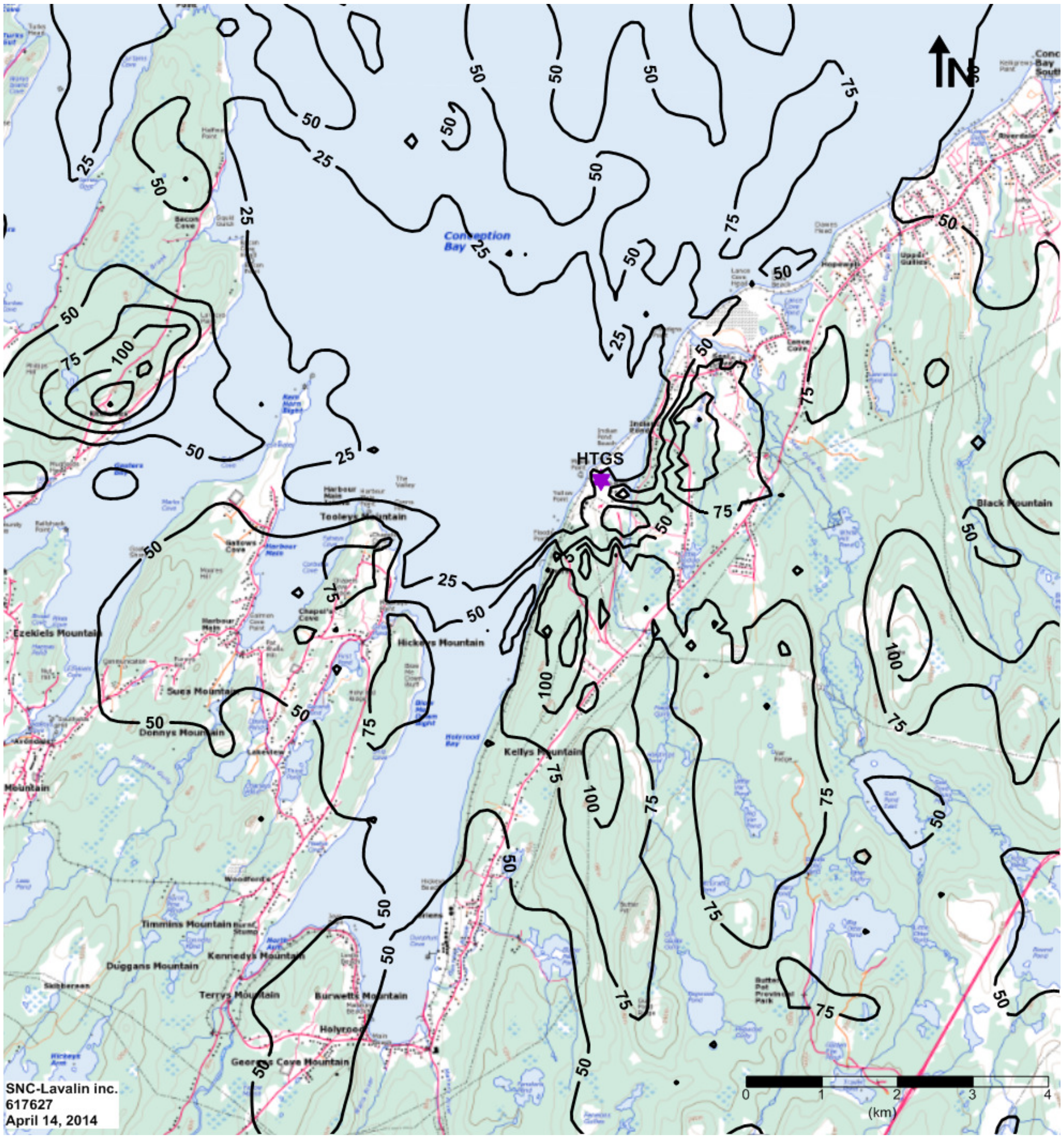


Figure A8: Geographic Distribution of 1-hour Concentration of NO_2 in Comparison to Ambient Air Quality Standards: 400 µg/m³ - Holyrood Thermal Generation Station (2004 Production) + 100 MW Gas Turbine

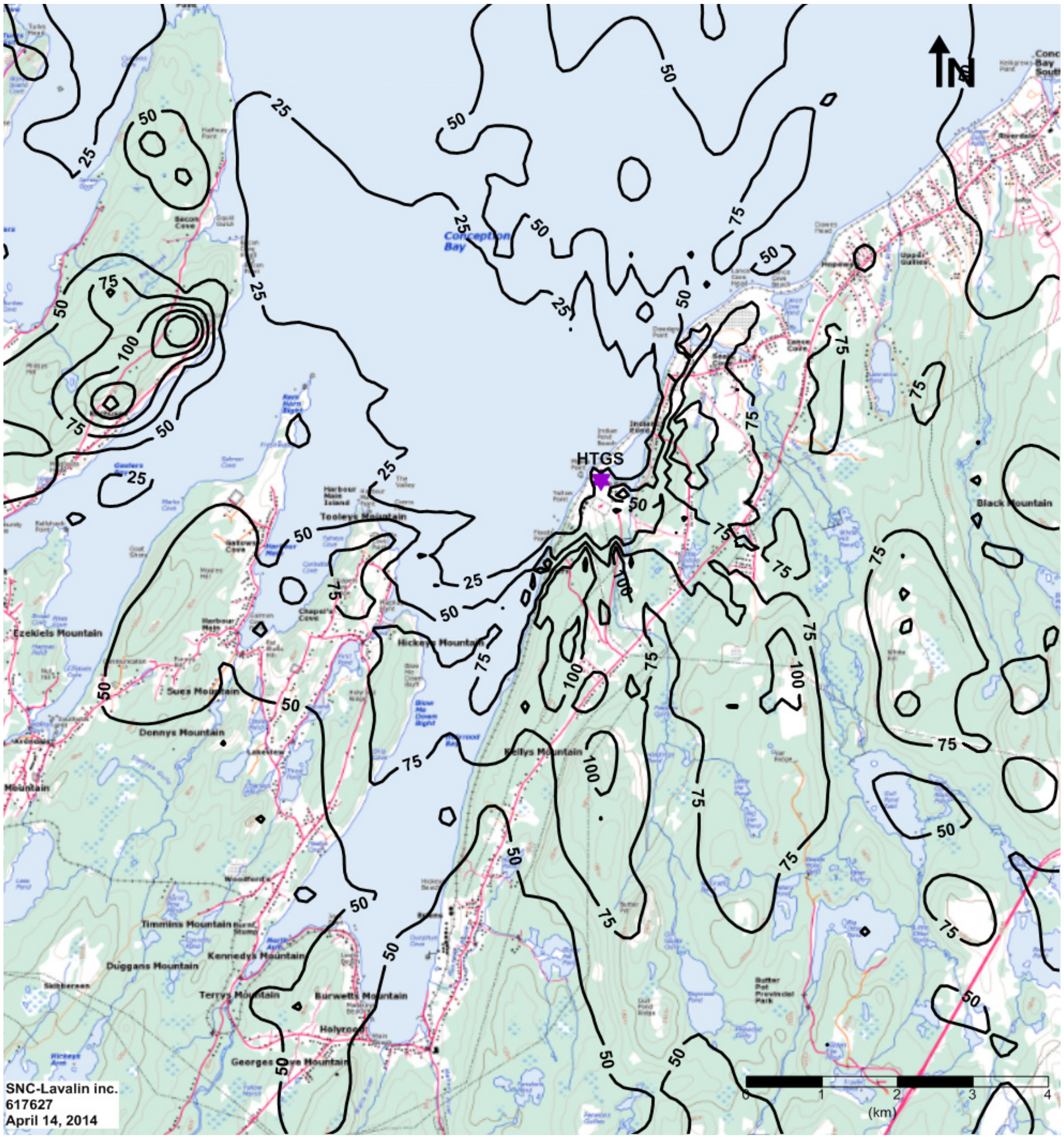


Figure A9: Geographic Distribution of 24-hour Concentration of NO_2 in Comparison to Ambient Air Quality Standards: 200 µg/m³ - Holyrood Thermal Generation Station (2003 Production) + 100 MW Gas Turbine

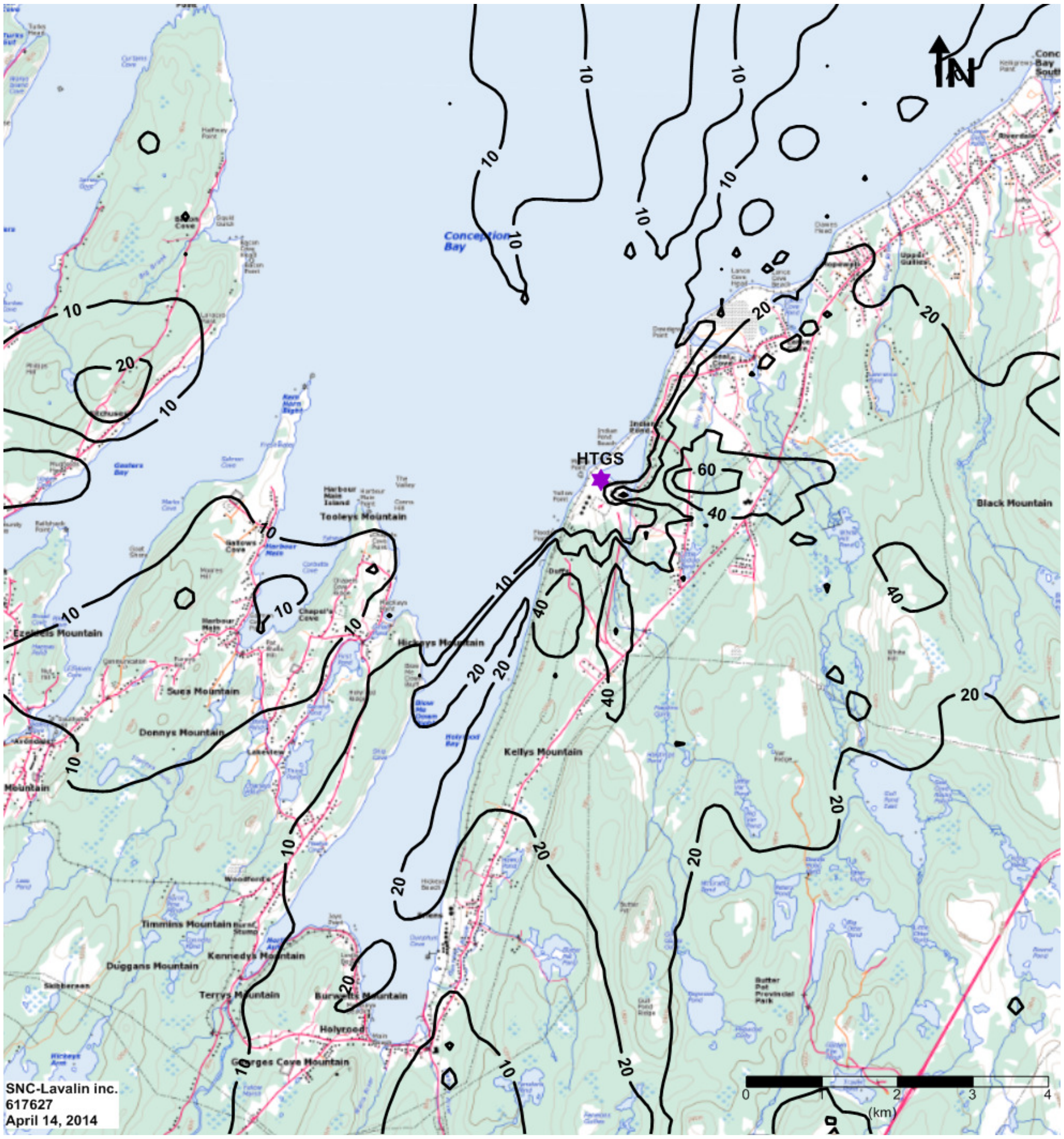


Figure A10: Geographic Distribution of 24-hour Concentration of NO_2 in Comparison to Ambient Air Quality Standards: 200 µg/m³ - Holyrood Thermal Generation Station (2004 Production) + 100 MW Gas Turbine

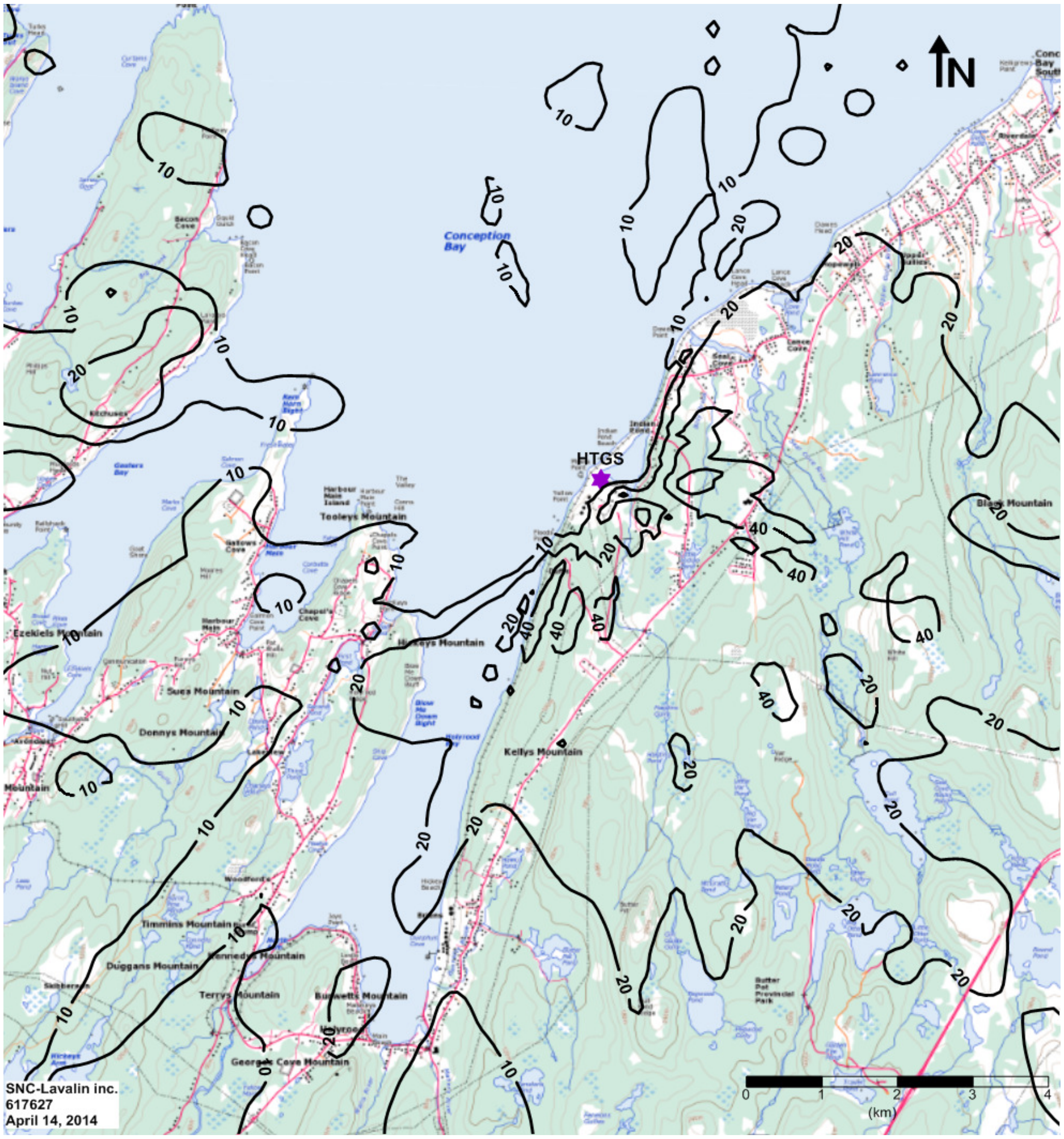


Figure A11: Geographic Distribution of Annual Average Concentration of NO_2 in Comparison to Ambient Air Quality Standards: 100 µg/m³ - Holyrood Thermal Generation Station (2003 Production) + 100 MW Gas Turbine

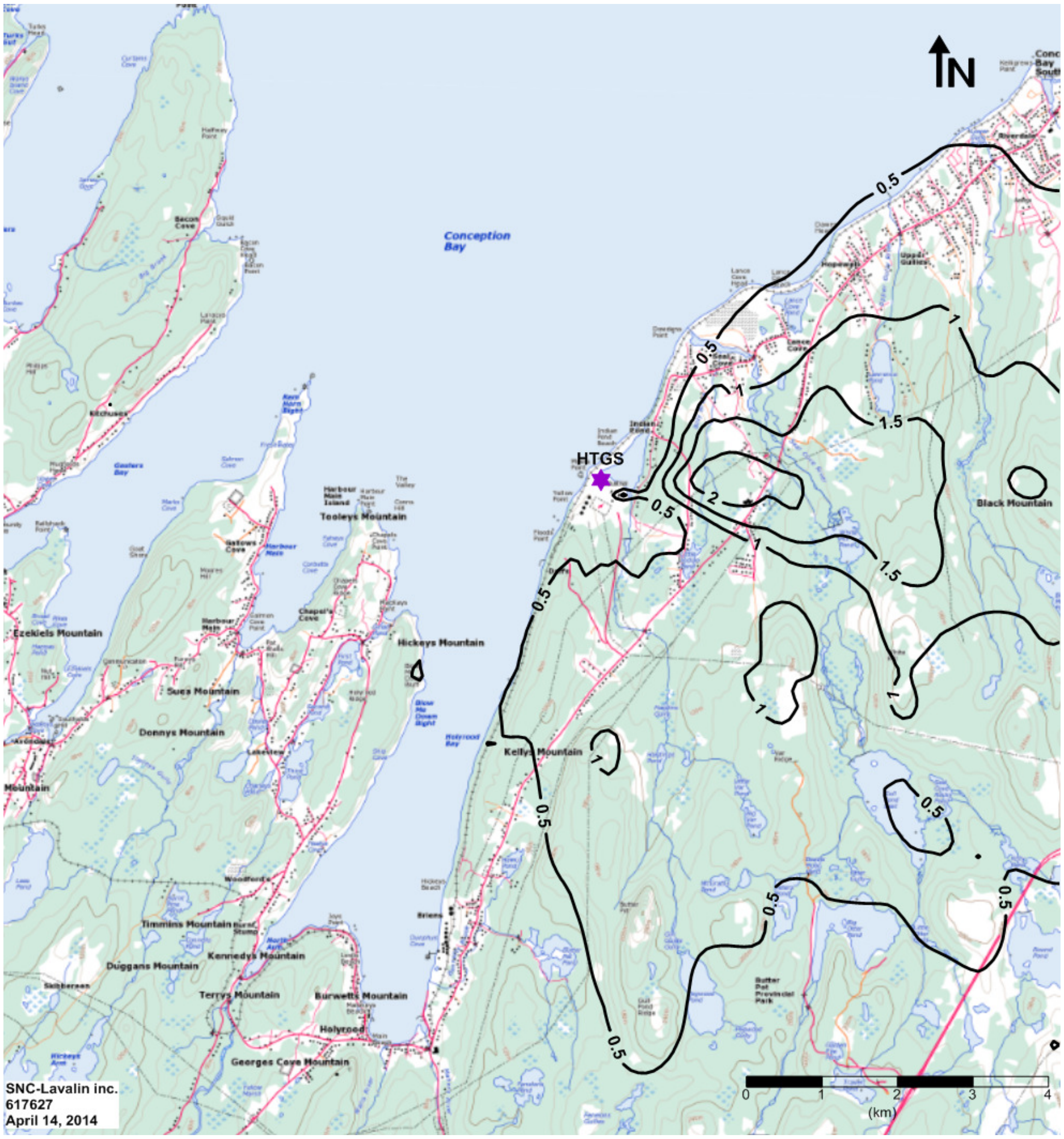


Figure A12: Geographic Distribution of Annual Average Concentration of NO_2 in Comparison to Ambient Air Quality Standards: 100 µg/m³ - Holyrood Thermal Generation Station (2004 Production) + 100 MW Gas Turbine