Attachment 9

Water Supply Analysis & Environmental Review Report

Hatch Ltd.

MAJOR PROJECTS CONTRACTOR DOCUMENT FRONT COVER SHEET

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REVIEW DOES NOT CONSTITUTE APPROVAL OF DESIGN DETAILS, CALCULATIONS, TEST METHODS, OR MATERIAL DEVELOPED AND/OR SELECTED BY THE CONTRACTOR, NOR DOES IT RELIEVE THE CONTRACTOR FROM FULL COMPLIANCE WITH CONTRACTUAL OR OTHER OBLIGATIONS.

- ☐ 01 REVIEWED AND ACCEPTED – NO COMMENTS
- ☐ 02 REVIEWED – INCORPORATE COMMENTS, REVISE AND RESUBMIT
- ☐ 03 REVIEWED – NOT ACCEPTED
- ☐ 04 INFORMATION ONLY
- ☐ 05 NOT REVIEWED

NLH Lead Reviewer	Date (DD-MMM-YYYY)	NLH Project Manager	Date (DD-MMM-YYYY)

General Comments:

Newfoundland and Labrador Hydro
150 MW Combustion Turbine Plant FEED Study

Water Supply Analysis & Environmental Review Report

			[redacted]		
2024-09-26	0	Approved for Use			
Date	**Rev.**	**Status**	**Prepared By**	**Checked By**	**Approved By**
HATCH					

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As this report is a scoping study all estimates and projections contained in this report are based on limited and incomplete data. Accordingly, while the work, results, estimates and projections in this report may be considered to be generally indicative of the nature and quality of the Project, they are not definitive. No representations or predictions are intended as to become the results of future work, and Hatch does not promise that the estimates and projections in this report will be sustained in future work.

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1. Introduction

Newfoundland and Labrador Hydro (NL Hydro) currently operates a three-unit, 490 MW, thermal generating station at Holyrood (HTGS). The HTGS is located at the end of Thermal Plant Road, off Route 60 in the town of Holyrood, on the Avalon Peninsula in Newfoundland and Labrador, Canada. The property covers approximately 40 acres, and also houses a 120 MW Combustion Turbine (CT), as well as other ancillary infrastructure and equipment to support generation at the facility.

HTGS will be phased out over the next decade, as part of NL Hydro's transition to lower emission power generation. NL Hydro is therefore considering the role of a 150 MW emergency plant CT, during and post-decommissioning of the HTGS. Although the existing facilities are located on a industrial brownfield portion of the property, the proposed project footprint will extend outside of these area, on a largely undeveloped tract of vegetated land.

As a component of the 50% FEED design of the new 150 MW CT, a social and environmental review of the HTGS property, and more specifically the greenfield portion, was undertaken to inform design criteria via identifying various attributes of the site, including but not limited to:

- Commercial and recreational use of the area.
- Existing land-use and zoning.
- Indigenous rights and land use.
- Potential for archaeological resources.
- Flora and fauna.
- Potential for Species at Risk.
- Proximity to protected areas.
- Required Regulatory Authorizations and Approvals.

Capacity for Quarry Brook to provide sufficient service water, firewater, domestic water, and power generation was also evaluated and assessed to determine the ability of continued water use at the existing Holyrood facilities, as well as for the proposed development. Further context to this investigation is provided in Section 5 of this report.

This report provides a summary of key findings from the environmental review, as well as subsequent hydrotechnical investigations undertaken by Hatch.

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2. Biophysical Attributes of the Site

Due to NL Hydro's existing facilities at HTGS, the site is already serviced by a switch yard, and various high-voltage lines, including a 230 kV line connecting it to the grid at Soldiers Pond, as well as smaller transmission voltage lines operated by NL Hydro and Newfoundland Power. The existing property where the HTGS and associated generating assets owned by NL Hydro, has space available for the expanded footprint of the new project, as shown in **Figure 2-1**.

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Figure 2-1: Site Location

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2.1 Flora, Fauna, and Potential for Species at Risk

Hatch submitted a data request to the Atlantic Canada Conservation Data Centre (AC CDC) for a scan of provincially and federally listed species within a 5 km buffer of the Holyrood Generating Station. The return of this data request from March 2023 is presented in Figure 2-2.

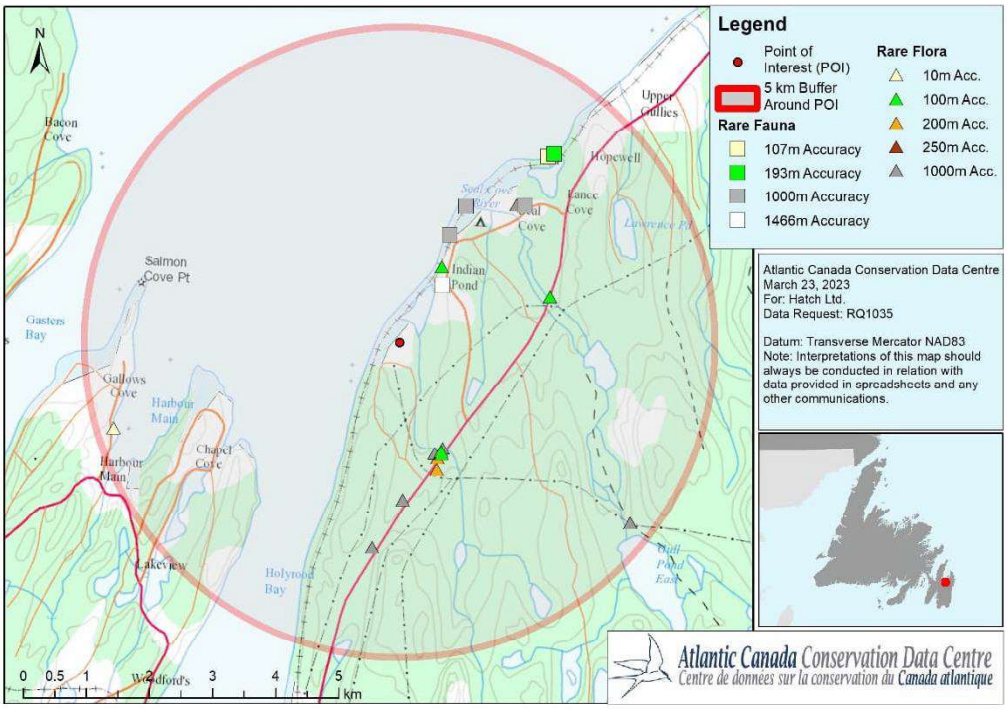

Figure 2-2: GIS Scan of Rare and Provincially/Federally Listed Species for Holyrood Generating Station (AC CDC, 2023)

Within the study area, there were seventeen (17) rare plant records and eleven (11) rare animal records found. The seventeen (17) rare plant records are plants which are not listed under the provincial Endangered Species Act (ESA) or federal Committee on the Status of Endangered Wildlife in Canada list. Outside of Newfoundland & Labrador, only Lady's Thumb (*Persicaria maculosa*) is considered globally rare.

As for the eleven (11) rare animal records, there was one (1) record of Bank Swallow (Threatened under both COSEWIC and our ESA), one (1) record of Ivory Gull (listed as Endangered under NL ESA and COSEWIC), one (1) record of Red-necked Phalarope and one (1) record of Yellow-banded Bumble Bee record (both Special Concern under COSEWIC, Vulnerable under the ESA). The other animal records are for species which aren't listed, but are considered rare on the Island of Newfoundland.

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AC CDC Expert Opinion Maps also suggest that Boreal Felt Lichen, Short-eared Owls, Red Crossbills, and Rusty Blackbirds are possibly present at the site, while Banded Killifish, spring/summer Polar Bears and Newfoundland Marten are possible, but unlikely. This area is also said to be within the Barrow's Goldeneye's range, a federally marked “species of special concern.”

AC CDC documented observations of fauna are provided in Table 2-1 and Appendix A.

Table 2-1: AC CDC Fauna Observations Report

Scientific Name	Common Name
Lycaena Dorcas	Dorcas Copper
Strongylocentrotus Droebachiensis	Green Sea Urchin
Vanessa Atalanta	Red Admiral
Pennisetia Marginata	Raspberry Crown Borer
Mitopus Morio	Saddleback Harvestman
Sericomyia Chrysotoxoides	Oblique-Banded Pond Fly
Charadrius Semipalmatus	Semipalmated Plover
Pagophila Eburnea	Ivory Gull
Riparia Riparia	Bank Swallow
Enallagma Civile	Northern Bluet
Sympetrum Costiferum	Saffron-Winged Meadowhawk
Calidris Fuscicollis	White-Rumped Sandpiper
Calidris Alba	Sanderling
Somatochlora Walshii	Green Eyed Skimmer
Bombus Terricola	Yellow-Banded Bumble Bee
Phalaropus Lobatus	Red-Necked Phalarope
Aeshna Eremita	Lake Darner
Aglais Milberti	Milbert's Tortoiseshell
Haliaeetus Leucocephalus	Bald Eagle
Picoides Arcticus	Black-backed Woodpecker
Ischnura Verticalis	Eastern Forktail
Larus Marinus	Great Black-backed Gull
Sterna Hirundo	Common Tern
Sterna Paradisaea	Arctic Tern
Bombus Borealis	Northern Amber Bumble Bee

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Scientific Name	Common Name
Falco Columbarius	Merlin
Pandion Haliaetus	Osprey
Colias Philodice	Clouded Sulphur
Turdus Migratorius	American Robin
Gallinula Galeata	Common Gallinule
Bonasa Umbellus	Ruffed Grouse
Bombus Vagans Subsp. Bolsteri	Bolsters Bumble Bee

Flora observations are provided in Table 2-2 and Appendix B.

Table 2-2: AC CDC Flora Observations Report

Scientific Name	Common Name
Platanthera X Andrewsii	Andrew's Bog Orchid
Aronia Ã—Prunifolia	Purple Phokeberry
Dichanthelium acuminatum var. fasciculatum	Western Witchgrass
Pinus Strobus	White Pine
Xyris Montana	Northern Yellow-Eyed-Grass
Ilex Verticillata	Black Holly
Ramalina Farinacea	Dotted Line Lichen
Brachyelytrum Aristosum	Northern Shorthusk
Gaylussacia Bigeloviana	Dwarf Huckleberry
Bartonia Paniculata	Twining Bartonia
Pyrola Americana	American Wintergreen
Juncus Stygius Subsp. Americanus	American Moor Rush
Diervilla lonicera	Northern Bush-Honeysuckle
Galium Tinctorium	Stiff Marsh Bedstraw
Juncus Tenuis	Slender Rush
Juncus Pelocarpus	Brown-Fruited Rush
Hypericum canadense	Canadian St. John's-Wort
Cypripedium Acaule	Pink Lady's-Slipper
Osmunda Regalis Var. Spectabilis	Royal Fern

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Scientific Name	Common Name
Spiranthes Romanzoffiana	Hooded Ladies'-Tresses
Platanthera Psycodes	Small Purple Fringed Orchid
Juncus Canadensis	Canada Rush
Rhynchospora Alba	White Beakrush
Populus Tremuloides	Quaking Aspen
Rosa Nitida	Shining Rose
Vaccinium Macrocarpon	Large Cranberry
Drosera Intermedia	Spoon-Leaved Sundew
Juniperus Communis Var. Depressa	Dwarf Juniper
Dryopteris Intermedia	Glandular Wood Fern
Juncus Brevicaudatus	Narrow-Panicled Rush
Linnaea Borealis Subsp. Borealis	Twinflower, Longtube Twinflower
Sisyrinchium Montanum	Strict Blue-Eyed-Grass
Platanthera Clavellata	Club-Spur Orchid
Salix Humilis Var. Humilis	Tall Prairie Willow
Utricularia Cornuta	Horned Bladderwort
Vaccinium Angustifolium	Late Lowbush Blueberry
Lysimachia Terrestris	Swamp Loosestrife
Kalmia Angustifolia	Sheep-Laurel
Sanguisorba Canadensis	Canada Burnet
Anaphalis Margaritacea	Pearly Everlasting
Rhinanthus Minor Subsp. Minor	Common Yellowrattle
Juncus Bulbosus	Bulbous Rush
Plantago Major	Nipple-Seed Plantain
Trifolium Pratense	Red Clover
Rumex Crispus	Curly Dock
Persicaria Hydropiper	Common Smartweed, Waterpepper
Persicaria Maculosa	Lady's-Thumb, Redshank
Lupinus Polyphyllus	Lupine
Cirsium Vulgare	Bull Thistle
Cirsium Arvense	Creeping Thistle

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Scientific Name	Common Name
Linaria Repens	Striped Toadflax
Achillea Millefolium	Common Yarrow
Vicia Cracca	Tufted Vetch
Phleum Pratense	Meadow Timothy
Rubus Canadensis	Smooth Blackberry

The full AC CDC reports are provided as full tables in Appendices A and B.

2.2 Wetlands and Watercourses

The project site includes some wetland and a small watercourse that must be altered for construction (diversion around the site). These alterations will require 'Permits to Alter a Body of Water' as outlined in the *Water Resources Act*, and in line with the provincial '*Policy for Development in Wetlands'.* Both of which allow for such work to be considered for approval.

Delineation of the existing wetlands may be required by regulators as they are not identified on Natural Resources Canada's CanVec S1:50,000 database, nor found on National Topographic Survey (NTS) maps, however were observed as present during a site visit on June 11, 2024.

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3. Social Attributes of the Site

3.1 Noise and Visual Aesthetic

With the presence of the existing generating station at Holyrood, local residents may be accustomed to impacts related to noise emissions and visual aesthetics. Due to the repurposing of the existing area for prolonged power generation (extended beyond current station life), impacts may detract from future enjoyment and social interest in the region. The nearest receptors are located along Indian Pond Drive approximately 200-300 m from the proposed project, and will likely experience impacts related to noise emissions and visual aesthetics.

Community baseline noise measurements are recommended, to compliment operational noise modelling, the results of which can inform a future Environmental Assessment Registration Document that will be required for the facility. A separate report will be submitted by Hatch to NL Hydro on operational noise.

As there are currently no regulations regarding noise provincially, federal guidance should be used to assess baseline and anticipated noise levels. Such guidance includes Health Canada's Guidance for Evaluating Human Health Impacts in Environmental Assessment: Noise (Health Canada, 2017), which prescribes requirements to undertake baseline.

3.2 Recreation and Safety

Public access to the current HTGS station is currently restricted, and it is presumed that restricted access would eventually extend to the greenfield area proposed for the development (See Figure 2-1). However, it is of note that the Newfoundland T'Railway – a Provincial Park – currently transects a segment of the site. The exiting station is also located within a 5 km radius of Butter Pot Provincial Park. Both parks are protected under the *Provincial Parks Act*.

Recreational boating occurs in Indian Pond. Despite these activities, conflicts are not anticipated due to the period for which the existing HTGS plant has been in operation (since the late 1960's and 70's) within the community of Holyrood and in proximity to this recreational sites or activities.

Since the development is located adjacent to primarily industrial lands within the communities of Holyrood and Conception Bay South, the actual and perceived risks around public safety are anticipated to be relatively low.

3.3 Indigenous Rights and Land Use

The proximity to First Nations and Legislated Boundaries of Aboriginal Lands was also investigated. Agents of the crown, have a duty to consult Indigenous groups about contemplated government actions or decisions that might have a negative impact on Aboriginal and treaty rights. There are two registered bands under the Indian Act on the Island of Newfoundland: Miawpukek First Nation, and Qalipu First Nation, neither have

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reserve lands or active land claims near the proposed site. The nearest Qalipu community is Swift Currant, located 135 km from Holyrood.

3.4 Potential for Archaeological Resources

The proposed site is located outside of the Brownfield area of the existing HTGS operations, in an undeveloped portion of the NL Hydro property. According to the Provincial Archaeology Office, there are three (3) archaeological sites within 5 km of the project site. Given the proposed site is outside of the brownfield portion of the property, an archaeological investigation may be required in the future to support the Environmental Assessment Registration.

4. Regulatory Authorizations and Approvals

The Newfoundland and Labrador Environmental Assessment Regulations list designated undertakings that are required to be registered with the Minster, under the *Environmental Protection Act*. As currently defined, the Project is subject to the provincial EA process due to the following:

> "34 (1) *An undertaking that will be engaged in electric power generation and the provision of structures related to that power generation, including (e) diesel electric power generating plants with a capacity of more than one megawatt; and (f) gas turbine electric power generating plants with a capacity of more than one megawatt*;" [Requires Registration]

The project will also be subject to other provincial and federal legislated requirements, with various authorizations to be acquired prior to facility operations. All of the anticipated environmental approvals, permits and authorizations that may be required for the Project are outlined in Table 4-1. However, this list is not exhaustive, and will require further refinement in future, as dictated by project schedule and detailed design.

Table 4-1: Potential Environmental Approvals, Permits and Authorizations

Activity	Approval, Permit, or Authorization	Legislation	Regulatory Agency	Review Period
Federal - Government of Canada (not all inclusive)				
Work in and near water	Fish and Fish Habitat Protection Program (Request for Review)	*Fisheries Act*	Fisheries and Oceans Canada (DFO)	30 days
Work in and near water (Pending outcome of DFO Letter of Advice)	Fisheries Act Authorization	*Fisheries Act*	Fisheries and Oceans Canada (DFO)	60 (Completeness review) &90 days (Approval Period)
If Project will likely result in harm of species at risk	Species at Risk Permit	*Species at Risk Act*	Environment and Climate Change Canada	90 days

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Activity	Approval, Permit, or Authorization	Legislation	Regulatory Agency	Review Period
Provincial - Government of Newfoundland and Labrador (not all inclusive)				
Project – 150 MW Combustion Turbine	Release from the *Environmental Protection Act*, Part X, Environmental Assessment	*Environmental Protection Act*	DECC, EA Division	45 days for Review, 60 days for EPR guidelines, 120 days for EIS guidelines
Project General Industrial Compliance	Certificate of Approval (Amendment to existing)	*Environmental Protection Act (Section 83)*	DECC, Pollution Prevention Division	8-10 weeks
Work within 15 m of a water body and work in water (e.g., culverts, bridges, fording)	Permit to Alter a Body of Water	*Water Resources Act*	DECC, Water Resources Management Division	4-6 weeks
Infilling the wetland, redirecting drainage	Permit to Alter a Body of Water (Schedule H)	*Water Resources Act*	DECC, Water Resources Management Division	4-6 weeks
Pipe Crossing/Water Intake	Permit to Alter a Body of Water (Schedule E)	*Water Resources Act*	DECC, Water Resources Management Division	4-6 weeks
Water withdrawal (amendment to existing WUL to include new CT)	Water Use Licence	*Water Resources Act*	DECC, Water Resources Management Division	4-6 weeks
Protection of Archaeological and Heritage Resources	Archaeological investigation permits	*Heritage Resources Act*	Department of Tourism, Culture, Arts and Recreation Provincial Archaeological office (PAO)	8-10 Weeks
Extracting borrow material	Quarry Permit	*Quarry Materials Regulations*	Department of Industry, Energy, and Technology, Mineral Lands Division	8-10 Weeks
Clearing timber (e.g., right of way, laydown areas)	Commercial Cutting Permit	*Cutting of Timber Regulations*	Department of Fisheries, Forestry and Agriculture, Forest	8-10 Weeks

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Activity	Approval, Permit, or Authorization	Legislation	Regulatory Agency	Review Period
			Management District Office	
Cutting during forest fire season	Operating Permit	*Forest Fire Regulations*	Department of Fisheries, Forestry and Agriculture, Forest Management District Office	8-10 Weeks
Stationary fuel tanks	Gasoline and Associated Products (GAP) Registration	*Storage and Handling of Gasoline and Associated Products Regulations*	Department of Digital Government and Service NL	8-10 Weeks
Used oil tanks (greater than 205 L), and oil water separator(s)	Used Oil Storage Approval	*Used Oil and Used Glycol Control Regulations*	Department of Digital Government and Service NL	8-10 Weeks
Standby diesel generators with capacity greater than 100 kW and operate more than 500 hours per year	Certificate of Approval (Requires plume dispersion modelling)	*Air Pollution Control Regulations, 2022* Guidance Document – Approval of Diesel Generators	DECC, Pollution Prevention Division	8-10 Weeks
General Site – Wildlife	Permit to Destroy Problem Animals	NL *Wildlife Act*	Department of Fisheries, Forestry and Agriculture	8-10 Weeks

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5. Water Supply

The 150 MW Combustion Turbine will require a water supply for several operational purposes. The existing HTGS and CT both utilize Quarry Brook for water supply. To minimize changes to current water uses and environmental impacts, the existing water supply at Quarry Brook has been evaluated on its capacity to be used for the additional 150 MW Combustion Turbines.

5.1 Quarry Brook Capacity Review

During the 50% FEED design, Hatch defined the expected increase in water consumption by the new power plant operations, defining the impact to the existing license and water availability. This has allowed for the determination that Quarry Brook has sufficient water supply capacity to support the new power plant in addition to the existing Holyrood asset operations.

The HTGS site is currently permitted to extract fresh water from their dam and intake at Quarry Brook, under an existing Water Use License (WUL-21-1160). This license permits HTGS to withdraw water required for thermal power generation, service water, firewater, domestic water, and combustion turbine operations for the existing site assets.

Water usage data for the existing facility from 2023 (the only year for which monthly values are available) indicates that the demand is lowest in summer, and highest in winter (Figure 5-1). Water usage for the 150 MW CT proposed for Phase 1 and additional 150 MW CT proposed for Phase 2 are also anticipated to be maximized for winter operation.

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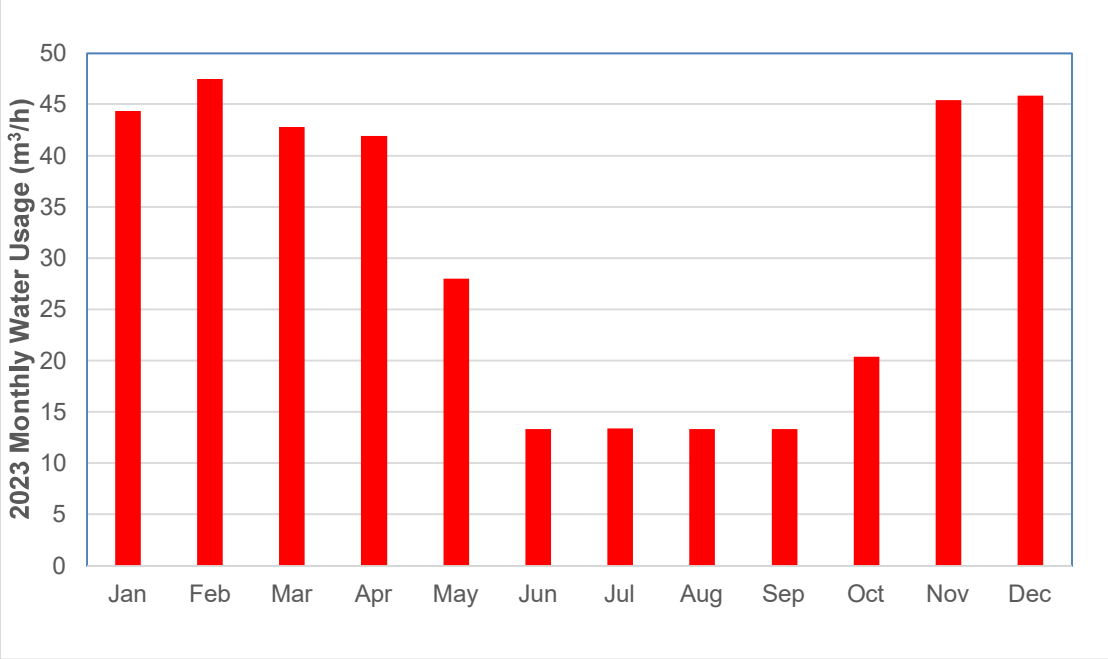

Figure 5-1: 2023 HTGS Monthly Water Usage

Based on the above, an existing continuous winter demand of approximately 50 m^3/h was assumed. For the purpose of this assessment, the assumed continuous winter demand was 100 m^3/h for each 150 MW expansion, which incorporates a margin of safety. This assumption was based on calculations and information presented in the Process Flow Diagrams (H363979-0000-210-282-0002 and H363979-0000-210-282-0003), as well as the Stream Table Basis Memo (H373979-0000-240-249-0005). This implies a total continuous demand (with the existing facility in operation) of 150 m^3/h for Phase 1 and 250 m^3/h for Phase 2.

The water supply adequacy was reviewed in terms of annual volume, and in terms of ability to meet the continuous demand during periods of low natural inflow.

The existing Water Use License (WUL) allows for withdrawal of 450,000 m^3/year. Over the last 7 years, site operation water abstraction on an annual basis ranged between a low of 227,314.6 m^3 in 2022, to a high of 394,216.6 m^3 in 2017. It was assumed that the Phase 1 and Phase 2 expansions will each operate at the continuous demand of 100 m^3/h for up to 1,000 hours (six weeks) per year; thus each expansion adds 100,000 m^3 annually to the existing water use. There may be an issue with WUL compliance in Phases 1 and 2 if existing HTGS water use were to reach an amount comparable to 2017 levels. Compliance could be maintained by curtailment of generation or through the planned phaseout of the existing HTGS units as the new CT units come on line.

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With respect to natural inflows, there are no long term records of natural inflow to Quarry Brook. Therefore, adequacy of water availability from Quarry Brook to supply water to the new plant was evaluated via delineation of the drainage area contributing to Quarry Brook, coupled with a review of the nearest available Environment Canada long term stream gauge record (02ZM016 South River near Holyrood). Stream flows were transposed to the site and compared to the assumed total future water demand to estimate the risk of demand exceeding supply.

The Quarry Brook Dam has a drainage area of 12.9 km^2. The South River gauge has a drainage area of 17.3 km^2. The delineation of the two drainage areas is provided in Figure 5-2. The South River gauge was considered to be appropriate for the analysis, after a review of topographic mapping and data records from several stations in the area. It is close to the project location, is in a hydrologically similar region, and has a drainage area similar in order of magnitude to Quarry Brook. It also has a good length of record for estimation of extreme low flows, with 39 years of observed daily flows, from 1983 to 2021. Inflows at Quarry Brook Dam were estimated using the drainage area ratio (DAR) method. Mathematically,

$$Q_u = Q_g(A_u/A_g)$$

Where:

Q_u = flow at ungauged site

Q_g = flow at gauged site

A_u = watershed area of ungauged site

A_g = watershed area of gauged site

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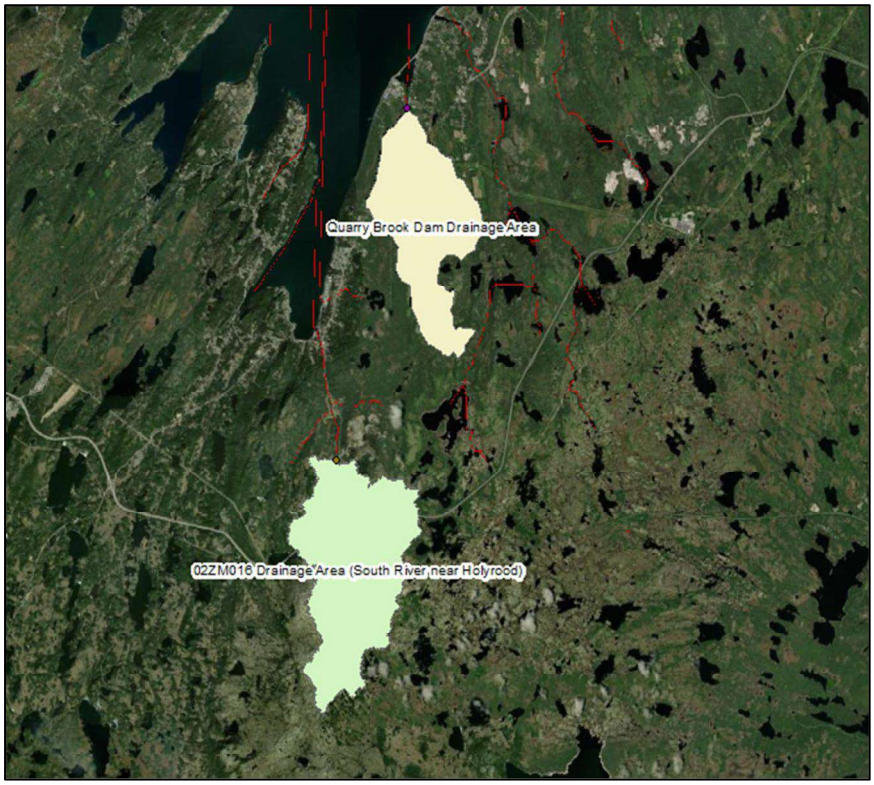

Figure 5-2: Delineated Watershed Drainage Areas near Holyrood

Transposition of the observed flows at South River yielded the following estimated mean monthly inflows at Quarry Brook, Figure 5-3.

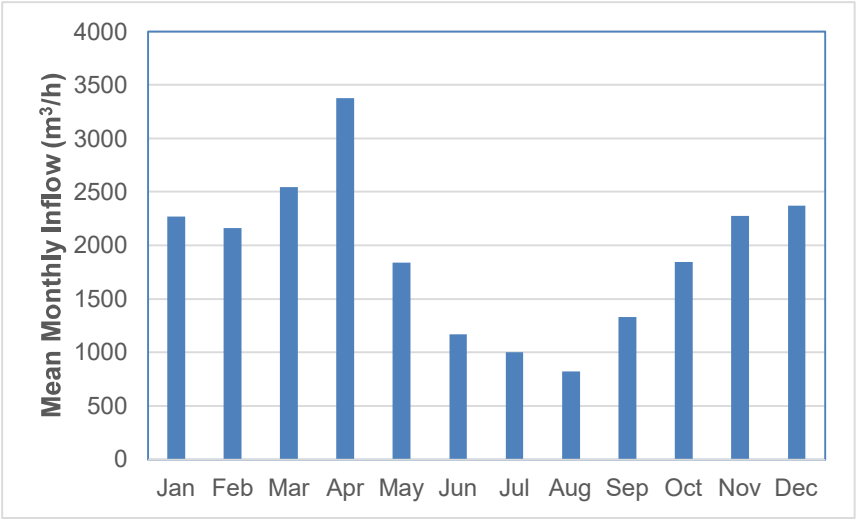

Figure 5-3: Estimated Mean Monthly Inflows at Quarry Brook (1983-2021)

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The estimated mean annual inflow in Quarry Brook is 1,916 m^3/h, but there is significant seasonal variation. On average, April is the wettest month while July, August, and September are the driest months. The lowest 7-day inflow on record was 96 m^3/h in August of 2004, which is a value many times greater than existing summer usage at HTGS. The continuous water demand is highest in winter. The water supply reliability is defined by its capacity to meet the demand when the inflow is much lower than average. Therefore, the extreme historical low inflows for the winter period (taken to be November to April inclusive) were reviewed to assess the risk of demand exceeding supply.

The 7-day minimum inflows were extracted for each winter in the flow record. A frequency analysis was then carried out on the 7-day minimum inflows using the HYFRAN-PLUS version 2.2 statistical analysis software package. The inflows were then fit to the Gumbel Type III (Weibull) distribution, which is recommended by Environment Canada for low flow series. The fitted distribution was used to assign probability estimates to the inflows. The 7-day minimum inflows (with 95 percent confidence limits) for various annual probabilities of non-exceedance are shown in Table 5-1. The probability is the risk of that flow (or lower) occurring in any year.

Table 5-1: Quarry Brook Winter 7-Day Minimum Inflow Estimates

Annual Probability of Non-exceedance	Minimum 7-day Inflow (m^3/h)	Upper 95% Confidence Limit (m^3/h)	Lower 95% Confidence Limit (m^3/h)
1/100	249	165	333
1/50	299	211	387
1/20	382	292	473
1/10	462	373	552
1/5	563	478	648
1/2	759	684	833

According to published climate change projections for NL (Finnis and Daraio, 2018), there is little to no future change expected in the mean daily precipitation in the winter months in the St. John's region (including the HTGS site). Winter temperatures are expected to increase and the number of frost days is expected to decrease, with the likely result that more of the precipitation over the winter season will occur as rain instead of snow. It is difficult to quantify the impacts on the frequency of low flows, but extreme low flows in winter tend to be associated with prolonged "deep freeze" conditions, which are expected to be less prevalent in future. Based on climate projections, we can at least conclude that winter low flows are not expected to be any more severe than in the past.

The frequency analysis indicates that the assumed Phase 2 demand (250 m^3/h) has an annual probability of not being met of about 1/100, i.e., a risk of one percent in any given year. Expressed another way, the assumed Phase 2 demand is about equal to winter low inflow with a return period of about 100 years. The existing and Phase 1 demands would have annual risks of less than one percent. It is noted that, from the perspective of generation

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system planning, the risk may be mitigated by alternative generation being available should such a temporary low-flow condition occur in Quarry Brook.

Available storage at Quarry Brook was also briefly assessed. According to the Concept Design Study report, all plant sizing scenarios have an on-site raw water volume requirement of 1,000 m^3 for use as demineralized water, and an additional volume of 1,500 m^3 available for the fire water system. The surface area of the Quarry Brook pond is approximately 10,276 m^2 as measured on aerial ortho-imagery. Based on this surface area, the demineralized and fire water volume requirements are equivalent to drawdowns of approximately 0.097 and 0.146 m, respectively. For comparison there is 0.45 m between the spillway crest and the crest of the fishway baffle. Thus these drawdowns appear to be quite small and the pond can meet these requirements from a volume perspective.

Withdrawal from the impoundment may temporarily exceed inflows for short term uses (e.g., fire water withdrawal requirements during unplanned events). The existing Water use Licence (WUL-21-1160), will require an amendment in future, to list the new CT as an abstraction source. Given that the intention is for the existing HTGS units to be phased out as each new CT comes online, the likelihood of withdrawal exceeding supply is low, and compliance can be maintained with the WUL as long as withdrawal volumes for the existing facility are reduced or are no longer required in future (post CT commissioning).

5.2 Freshwater Intake

A fish ladder is present at Quarry Brook dam to allow for the passage of anadromous and resident fish between the lower reaches of Quarry Brook, and the reservoir. Fish were also observed in the reservoir, during a Site Visiting on June 11th, 2024. As such any freshwater intake will be required to install an end-of-pipe water intake fish screen, to prevent entrainment and impingement of fish. The screen shall conform to the DFO (2020) *Interim code of practice: End-of-pipe fish protection screens for small water intakes in freshwater*.

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6. References

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Finnis, J., & Daraio, J. (2018). Projected Impacts of Climate Change for the Province of Newfoundland & Labrador. Memorial University of Newfoundland (MUN). Retrieved from: Final_Report_2018 (turnbackthetide.ca) Accessed on: September 20, 2024.

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Appendix A: Detailed Fauna Observations

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	GCOMNAME	FAMILY	Observer	Total	Month	Day	Year	SRANK 2015	SRANK 2010	NRANK	GRANK	General Status	COSEWIC	PROVINCIAL	SARA	CITATION	Lat	Long
Lycaena dorcas	Dorcas Copper	Lycaenidae	Ross							N5	G5	Secure				Ross Newfoundland Data.xls	47.46666392	-53.08333435
Strongylocentrotus droebachiensis	Green Sea Urchin		inaturalist user: salmonskyview		8	4	2018									iNaturalist record export 2020	47.459205	-53.08793
Vanessa atalanta	Red Admiral	Nymphalidae	inaturalist user: nadaci		8	21	2018		S5B	N5B,N5M	G5	Secure				iNaturalist record export 2020	47.480016	-53.05893582
Pennisetia marginata	Raspberry Crown Borer	Sesiidae	inaturalist user: nadaci		8	12	2018									iNaturalist record export 2020	47.47262929	-53.06265469
Mitopus morio	Saddleback Harvestman	Phalangiidae	inaturalist user: nadaci		8	21	2018			NU						iNaturalist record export 2020	47.47260695	-53.06249969
Sericomyia chrysotoxoides	Oblique-banded Pond Fly		inaturalist user: nadaci		8	12	2018									iNaturalist record export 2020	47.47263832	-53.06185011
Charadrius semipalmatus	Semipalmated Plover	Charadriidae	inaturalist user: salmonskyview		8	4	2018	S1B, S4M	S2B, S5N	N5B,N5M	G5	Secure				iNaturalist record export 2020		
Charadrius semipalmatus	Semipalmated Plover	Charadriidae	inaturalist user: rpmoutdoors		9	8	2019	S1B, S4M	S2B, S5N	N5B,N5M	G5	Secure				iNaturalist record export 2020		
Pagophila eburnea	Ivory Gull	Laridae	Paul Linegar	1	1	11	2009	S1N,SUM	S2N	N1B,N1N, N1	G4	At risk	Endangered	Endangered	Endangered	Nf.Birds, Data Entry by WD Summer Student, 2012		
Riparia riparia	Bank Swallow	Hirundinidae	B. Windsor	approx. 30	7	29	1998	S1S2B, SUM	S3B	N5B,N5M	G5	Secure	Threatened	Threatened	Threatened	The Status of Bank Swallow (Riparia riparia riparia) in Newfoundland and Labrador, SSAC Report No. 23NF.Birds		
Enallagma civile	Northern Bluet	Coenagrionidae	Larson D.J.		9	14	1980	S2	S3S4	N5	G5	Undetermined				2DDragonflydata.xls		
Sympetrum costiferum	Saffron-winged Meadowhawk	Libellulidae	Larson D.J.		9	14	1980	S3	S3	N5	G5	Undetermined				2DDragonflydata.xls		
Calidris fuscicollis	White-rumped Sandpiper	Scolopacidae	inaturalist user: salmonskyview		8	4	2018	S3M	S5N	N5B,N5M	G5	Secure				iNaturalist record export 2020		
Calidris alba	Sanderling	Scolopacidae	inaturalist user: rpmoutdoors		9	8	2019	S3M	S4N	N3B,N4N5N,	G5	Secure				iNaturalist record export 2020		
Somatochlora walshii	Brushed-tipped Emerald/ Green Eyed Skimmer	Corduliidae	Larson D.J.		9	14	1980	S3S4	S4S5	N5	G5	Secure				2DDragonflydata.xls		
Bombus terricola	Yellow-banded Bumble Bee	Apidae	inaturalist user: salmonskyview		8	4	2018	S3S4		N5	G3G4	Secure	Special Concern	Vulnerable	Special Concern	iNaturalist record export 2020		
Phalaropus lobatus	Red-necked Phalarope	Scolopacidae	Dave Brown	5 or 6	9	8	2011	S3S4N	S3S4N	N4N5B,N3N4	G4G5	Secure	Special Concern	Vulnerable	Special Concern	nf.birds, Sep 8 2011		
Aeshna eremita	Lake Darner	Aeshnidae	Ferguson D.C.		7	20	1954	S4	S4	N5	G5	Secure				2DDragonflydata.xls	47.47000319	-53.07000108
Aeshna eremita	Lake Darner	Aeshnidae	Cannings R.J.		7	14	1976	S4	S4	N5	G5	Secure				2DDragonflydata.xls	47.47000319	-53.07000108
Aglais milberti	Milbert's Tortoiseshell	Nymphalidae	Ross					S4	S5	N5	G5	Secure				Ross Newfoundland Data.xls	47.46666392	-53.08333435
Haliaeetus leucocephalus	Bald Eagle	Accipitridae	Dave Brown	1	10	17	2009	S4	S4B	N5B,N5N, N5	G5	Secure				Nf.Birds, Data Entry by WD Summer Student, 2012	47.433692	-53.145836
Haliaeetus leucocephalus	Bald Eagle	Accipitridae	Lesley Sweetapple & Keith Fillier	2	2	27	2011	S4	S4B	N5B,N5N, N5	G5	Secure				Nf.Birds, Data Entry by WD Summer Student, 2012	47.42264	-53.12339

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	GCOMNAME	FAMILY	Observer	Total	Month	Day	Year	SRANK 2015	SRANK 2010	NRANK	GRANK	General Status	COSEWIC	PROVINCIAL	SARA	CITATION	Lat	Long
Haliaeetus leucocephalus	Bald Eagle	Accipitridae	Bill Winsor	1	7	17	2004	S4	S4B	N5B,N5N, N5	G5	Secure				Nf.Birds, Data Entry by WD Summer Student, 2012	47.468213	-53.07525
Picoides arcticus	Black-backed Woodpecker	Picidae	John Maunder	1	8	19	2002	S4	S4	N5	G5	Secure				Nf.Birds, Data Entry by WD Summer Student, 2012	47.44391	-53.156645
Haliaeetus leucocephalus	Bald Eagle	Accipitridae	rhayesnfld@gmail.com	2	3	28	2010	S4	S4B	N5B,N5N, N5	G5	Secure				Nf.Birds, Data Entry by WD Summer Student, 2012	47.482657	-53.052388
Ischnura verticalis	Eastern Forktail	Coenagrionidae	iNaturalist user: nadaci		7	3	2017	S4	S4S5	N5	G5	Secure				iNaturalist record export 2018	47.47197655	-53.061838
Larus marinus	Great Black-backed Gull	Laridae	inaturalist user: salmonskyview		8	4	2018	S4	S5B	N5B,N5N, N5	G5	Secure				iNaturalist record export 2020	47.459205	-53.08793
Sterna hirundo	Common Tern	Laridae	inaturalist user: salmonskyview		8	4	2018	S4B,SUM	S4B	N5B,NUN, N5	G5	Secure				iNaturalist record export 2020	47.459205	-53.08793
Sterna paradisaea	Arctic Tern	Laridae	inaturalist user: rpmoutdoors		9	8	2019	S4B,SUM	S4B	N5B,N5M	G5	Secure				iNaturalist record export 2020	47.47607925	-53.06593698
Bombus borealis	Northern Amber Bumble Bee	Apidae	inaturalist user: salmonskyview		8	4	2018	S4S5		N5	G4G5	Undetermined				iNaturalist record export 2020	47.459205	-53.08793
Falco columbarius	Merlin	Falconidae	Bill Winsor	1	7	17	2004	S4S5B, SUM	S5B	N5B,N5N, N5	G5	Secure				Nf.Birds, Data Entry by WD Summer Student, 2012	47.468213	-53.07525
Pandion haliaetus	Osprey	Accipitridae	Bill Winsor	2	7	17	2004	S4S5B, SUM	S4B	N5B,N5N, N5	G5	Secure				Nf.Birds, Data Entry by WD Summer Student, 2012	47.47022	-53.08242
Falco columbarius	Merlin	Falconidae	Judith Blakeley	2	5	22	2004	S4S5B, SUM	S5B	N5B,N5N, N5	G5	Secure				Nf.Birds, Data Entry by WD Summer Student, 2012	47.44391	-53.156645
Colias philodice	Clouded Sulphur	Pieridae	inaturalist user: salmonskyview		8	4	2018	S5	S4	N5	G5	Secure				iNaturalist record export 2020	47.459205	-53.08793
Colias philodice	Clouded Sulphur	Pieridae	inaturalist user: nadaci		8	21	2018	S5	S4	N5	G5	Secure				iNaturalist record export 2020	47.48430107	-53.05455369
Turdus migratorius	American Robin	Turdidae	iNaturalist user: nadaci		8	2	2017	S5B,S5M	S5B	N5B,N4N5N,	G5	Secure				iNaturalist record export 2018	47.47256603	-53.06187795
Gallinula galeata	Common Gallinule	Rallidae	Todd Boland, Anne Hughes		1	14	2020	SNA								nf.birds, Jan 14, 2020	47.42732753	-53.14490549
Bonasa umbellus	Ruffed Grouse	Phasianidae	iNaturalist user: nadaci		6	12	2016	SNR	SNA	N5	G5	Secure				iNaturalist record export 2018	47.47274631	-53.06269759
Bombus vagans subsp. bolsteri		Apidae	inaturalist user: nadaci		9	3	2018	SNR								iNaturalist record export 2020	47.47256873	-53.06187948

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Appendix B: Detailed Flora Observations

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GNAME	GCOMNAME	OBSERVER	MONTH	DAY	YEAR	SRANK 2010	SRANK 2015	NRANK	GRANK	FAMILY	SYNAME	SOURCES	LAT	LONG
Platanthera X andrewsii	Andrew's bog orchid	Maunder, John E.	8	10	1968	S3S5		NNR	GNA	Orchidaceae	Platanthera lacera var. terrae-novae; Platanthera lacera x Platanthera psycodes; Habenaria x andrewsii	Herbarium Data Entry, NFM, The Rooms Herbarium, St. John's	47.435207	-53.090908
Aronia Ã— prunifolia	purple chokeberry	Maunder, John E.	10	10	1978	S3S5		NNR	G4G5Q	Rosaceae	Pyrus floribunda; Aronia atropurpurea; A. floribunda; A. prunifolia; Mespilus prunifolia; Pyrus arbutifolia var. atropurpurea; Aronia arbutifolia var. atropurpurea; Sorbus arbutifolia var. atropurpurea	Herbarium Data Entry, NFM, The Rooms Herbarium, St. John's	47.432897	-53.09203
Dichanthelium acuminatum var. fasciculatum	Western Witchgrass	Day, Robin T.	9	22	1996	SNA	S2S3	N5	G5T5	Poaceae	Panicum dichotomum; Dichanthelium acuminatum var. implicatum; Dichanthelium lanuginosum; Panicum acuminatum; Panicum languinosum; Panicum languinosum var. fasciculatum; P. lanuginosum var. implicatum; Dichanthelium lanuginosum var. fasciculaturm; Panicum	Herbarium Data Entry, NFM, The Rooms Herbarium, St. John's		
Pinus strobus	White Pine	Maunder, John E.	10	10	1978	S3	S3	N5	G5	Pinaceae	Pinus chiapensis; P. strobus var. chiapensis; Strobus strobus; Pinus strobus forma prostrata; P. strobus var. prostrata;	Herbarium Data Entry, NFM, The Rooms Herbarium, St. John's		
Xyris montana	Northern Yellow-Eyed-Grass	Maunder, John E.	9	30	1996	S3	S3	N4N5	G5	Xyridaceae	Xyris flexuosa Muhlenberg. var. pusilla A. Gray, Manual ed. 5, 548. 1867; X. papillosa Fassett	Herbarium Data Entry, NFM, The Rooms Herbarium, St. John's		
Ilex verticillata	Black Holly	Maunder, John E.	8	10	1968	S3	S3	N5	G5	Aquifoliaceae	Prinos verticillata; Ilex bronxensis; I. fastigiata; I. verticillata forma chrysocarpa; I. verticillata forma tenuifolia; I. verticillata var. fastigiata; I. verticillata var. tenuifolia	Herbarium Data Entry, NFM, The Rooms Herbarium, St. John's		
Ilex verticillata	Black Holly	Maunder, John E.	10	10	1978	S3	S3	N5	G5	Aquifoliaceae	Prinos verticillata; Ilex bronxensis; I. fastigiata; I. verticillata forma chrysocarpa; I. verticillata forma tenuifolia; I. verticillata var. fastigiata; I. verticillata var. tenuifolia	Herbarium Data Entry, NFM, The Rooms Herbarium, St. John's		
Ilex verticillata	Black Holly	Maunder, John E.	9	30	1996	S3	S3	N5	G5	Aquifoliaceae	Prinos verticillata; Ilex bronxensis; I. fastigiata; I. verticillata forma chrysocarpa; I. verticillata forma tenuifolia; I. verticillata var. fastigiata; I. verticillata var. tenuifolia	Herbarium Data Entry, NFM, The Rooms Herbarium, St. John's		
Ramalina farinacea	Dotted Line Lichen	McCarthy, John	12	4	2008	SNR	S3	N5	G5	Ramalinaceae		John McCarthy Lichen Studies		
Brachyelytrum aristosum	Northern Shorthusk	Day, Robin T.	9	22	1996		S3S4	N5	G5	Poaceae		Herbarium Data Entry, NFM, The Rooms Herbarium, St. John's		
Gaylussacia bigeloviana	Dwarf Huckleberry	Maunder, John E.	9	30	1996	S4	S3S4	N5	G5T4T5	Ericaceae		Herbarium Data Entry, NFM, The Rooms Herbarium, St. John's		
Bartonia paniculata	Twining Bartonia	Maunder, John E.	9	30	1996	S3S4	S3S4	N4N5	G5	Gentianaceae	Centaurella paniculata; Bartonia iodandra; B. iodandra var. sabulonensis; B. paniculata subsp. iocandra; B. paniculata var. iodandra; B. paniculata var. sabulonensis; B. paniculata var. intermedia; B. virginica var. sabulonensis; B. lanceolata; B. virgin	Herbarium Data Entry, NFM, The Rooms Herbarium, St. John's		
Pyrola americana	American Wintergreen	Maunder, John E.	8	10	1968	S3S4	S3S4	N5	G5	Pyrolaceae	Pyrola rotundifolia var. americana; P. rotundifolia subsp. americana; P. asarifolia subsp. americana; P. obovata; P. rotundifolia	Herbarium Data Entry, NFM, The Rooms Herbarium, St. John's		
Juncus stygius subsp. americanus	American moor rush	Watts, Isobel	8	10	1968	S3S4	S3S4	NNR	G5T5	Juncaceae	Juncus stygius subsp. americanus;	Herbarium Data Entry, NFM, The Rooms Herbarium, St. John's		
Diervilla lonicera	Northern Bush-honeysuckle	Maunder, John E.	9	30	1996	S3S4	S3S4	N5	G5	Caprifoliaceae	Diervilla diervilla; Lonicera diervilla	Herbarium Data Entry, NFM, The Rooms Herbarium, St. John's		
Gaylussacia bigeloviana	Dwarf Huckleberry	Maunder, John E.	10	10	1978	S4	S3S4	N5	G5T4T5	Ericaceae		Herbarium Data Entry, NFM, The Rooms Herbarium, St. John's		
Gaylussacia bigeloviana	Dwarf Huckleberry	Maunder, John E.	10	10	1978	S4	S3S4	N5	G5T4T5	Ericaceae		Herbarium Data Entry, NFM, The Rooms Herbarium, St. John's		
Gaylussacia bigeloviana	Dwarf Huckleberry	Maunder, John E.	8	10	1968	S4	S3S4	N5	G5T4T5	Ericaceae		Herbarium Data Entry, NFM, The Rooms Herbarium, St. John's		

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GNAME	GCOMNAME	OBSERVER	MONTH	DAY	YEAR	SRANK 2010	SRANK 2015	NRANK	GRANK	FAMILY	SYNAME	SOURCES	LAT	LONG
Galium tinctorium	Stiff Marsh Bedstraw	Maunder, John E.	9	30	1996	S3S4	S3S4	N5	G5	Rubiaceae	Galium tinctorium subsp. tinctorium; Asperula tinctoria; Galium claytonii; G. obtusum var. floridanum; G. tinctorium subsp. floridanum; G. tinctorium var. diversifolium; G. tinctorium var. floridanum; G. trifidum subsp. tinctorium; G. trifidum var. tinct	Herbarium Data Entry, NFM, The Rooms Herbarium, St. John's		
Juncus tenuis	Slender Rush	Day, Robin T.	9	22	1996	S3S4	S4	N5	G5	Juncaceae	Juncus bicornis; J. bicornis var. williamsii ; J. macer; J. macer forma williamsii; J. macer var. williamsii; J. tenuis var. bicornis; J. tenuis var. multicornis; J. macer; J. tenuis var. multicornis; J. tenuis var. anthelatus; J. tenuis williamsii	Herbarium Data Entry, NFM, The Rooms Herbarium, St. John's	47.470111	-53.071773
Juncus pelocarpus	Brown-Fruited Rush	Day, Robin T.	9	22	1996	S4	S4	N5	G5	Juncaceae	Juncus abortivus; J. pelocarpus var. crassicaudex crassicaudex; J. pelocarpus var. sabulonensis;	Herbarium Data Entry, NFM, The Rooms Herbarium, St. John's	47.470111	-53.071773
Juncus pelocarpus	Brown-Fruited Rush	Maunder, John E.	9	30	1996	S4	S4	N5	G5	Juncaceae	Juncus abortivus; J. pelocarpus var. crassicaudex crassicaudex; J. pelocarpus var. sabulonensis;	Herbarium Data Entry, NFM, The Rooms Herbarium, St. John's	47.434474	-53.090352
Hypericum canadense	Canadian St. John's-Wort	Maunder, John E.	9	30	1996	S5	S4	N5	G5	Clusiaceae	Hypericum canadense var. galiiforme; H. canadense var. magninsulare	Herbarium Data Entry, NFM, The Rooms Herbarium, St. John's	47.434474	-53.090352
Hypericum canadense	Canadian St. John's-Wort	Maunder, John E.	9	30	1996	S5	S4	N5	G5	Clusiaceae	Hypericum canadense var. galiiforme; H. canadense var. magninsulare	Herbarium Data Entry, NFM, The Rooms Herbarium, St. John's	47.434474	-53.090352
Juncus pelocarpus	Brown-Fruited Rush	Maunder, John E.	9	30	1996	S4	S4	N5	G5	Juncaceae	Juncus abortivus; J. pelocarpus var. crassicaudex crassicaudex; J. pelocarpus var. sabulonensis;	Herbarium Data Entry, NFM, The Rooms Herbarium, St. John's	47.449272	-53.092122
Cypripedium acaule	Pink Lady's-Slipper	iNaturalist user: nadaci	7	3	2017	S4	S4	N5	G5	Orchidaceae	Fissipes acaulis; Cypripedium acaule forma albiflorum	iNaturalist data download, May 2020	47.472477	-53.061558
Osmunda regalis var. spectabilis	Royal Fern	Maunder, John E.	8	10	1968	S4	S4S5	N5	G5T5	Osmundaceae	Osmunda spectabilis; O. regalis forma nana; O. regalis forma anomala; O. regalis subvar. anomala; O. regalis var. pumila;	Herbarium Data Entry, NFM, The Rooms Herbarium, St. John's	47.435796	-53.089285
Spiranthes romanzoffiana	Hooded Ladies'-Tresses	Maunder, John E.	8	10	1968	S4S5	S4S5	N5	G5	Orchidaceae	Gyrostachys stricta; Ibidium strictum; Spiranthes stricta; Gyrostachys romanzoffiana; Triorchis stricta;	Herbarium Data Entry, NFM, The Rooms Herbarium, St. John's	47.435207	-53.090908
Platanthera psycodes	Small Purple Fringed Orchid	Maunder, John E.	8	10	1968	S3S5	S4S5	N5	G5	Orchidaceae	Orchis psycodes; Habenaria psycodes; Blephariglottis psycodes;	Herbarium Data Entry, NFM, The Rooms Herbarium, St. John's	47.435207	-53.090908
Juncus canadensis	Canada Rush	Day, Robin T.	9	22	1996	S4	S4S5	N5	G5	Juncaceae	Juncus canadensis var. longicaudatus; J. canadensis var. sparsiflorus; J. longicaudatus; J. polycephalus var. paradoxus; J. canadensis var. longicaudatus; J. canadensis var. euroauster	Herbarium Data Entry, NFM, The Rooms Herbarium, St. John's	47.470111	-53.071773
Juncus canadensis	Canada Rush	Maunder, John E.	9	30	1996	S4	S4S5	N5	G5	Juncaceae	Juncus canadensis var. longicaudatus; J. canadensis var. sparsiflorus; J. longicaudatus; J. polycephalus var. paradoxus; J. canadensis var. longicaudatus; J. canadensis var. euroauster	Herbarium Data Entry, NFM, The Rooms Herbarium, St. John's	47.434474	-53.090352
Rhynchospora alba	White Beakrush	Maunder, John E.	9	30	1996	S3S5	S4S5	N5	G5	Cyperaceae	Schoenus albus; Dichromena alba; Phaeocephalum album; Rhynchospora luguillensis; Triodon albus;	Herbarium Data Entry, NFM, The Rooms Herbarium, St. John's	47.434474	-53.090352
Populus tremuloides	Quaking Aspen	Andrews, S.E.	7	2	1967	S4S5	S4S5	N5	G5	Salicaceae	Populus tremuloides forma reniformis	Herbarium Data Entry, NFM, The Rooms Herbarium, St. John's	47.466532	-53.047614
Rosa nitida	Shining Rose	Maunder, John E.	7	2	1967	S4S5	S4S5	N5	G5	Rosaceae		Herbarium Data Entry, NFM, The Rooms Herbarium, St. John's	47.469894	-53.047173
Vaccinium macrocarpon	Large Cranberry	Maunder, John E.	8	10	1968	S5	S4S5	N5	G5	Ericaceae	Oxycoccus macrocarpus; O. palustris macrocarpus; Vaccinium oxycoccus var. oblongifolius	Herbarium Data Entry, NFM, The Rooms Herbarium, St. John's	47.435207	-53.090908
Drosera intermedia	Spoon-Leaved Sundew	Maunder, John E.	9	30	1996	S4S5	S4S5	N5	G5	Droseraceae	Drosera americana; D. intermedia forma natens; D. longifolia	Herbarium Data Entry, NFM, The Rooms Herbarium, St. John's	47.432708	-53.091696
Juniperus communis var. depressa	Dwarf Juniper	Andrews, S.E.	7	2	1967	S4S5	S5	N5	G5T5	Cupressaceae		Herbarium Data Entry, NFM, The Rooms Herbarium, St. John's	47.466532	-53.047614
Dryopteris intermedia	Glandular Wood Fern	Maunder, John E.	7	2	1967	S5	S5	N5	G5	Dryopteridaceae	Aspidium intermedium; Dryopteris austriaca var. intermedia; D. spinulosa var. intermedia; D. spinulosa var. concordiana	Herbarium Data Entry, NFM, The Rooms Herbarium, St. John's	47.469351	-53.047058

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GNAME	GCOMNAME	OBSERVER	MONTH	DAY	YEAR	SRANK 2010	SRANK 2015	NRANK	GRANK	FAMILY	SYNAME	SOURCES	LAT	LONG
Juncus brevicaudatus	Narrow-Panicled Rush	Maunder, John E.	8	30	1996	S5	S5	N5	G5	Juncaceae	Juncus canadensis var. brevicaudatus; J. canadensis var. coarctatus; J. canadensis var. kuntzei; J. coarctatus; J. kuntzei;	Herbarium Data Entry, NFM, The Rooms Herbarium, St. John's	47.434799	-53.088995
Juncus brevicaudatus	Narrow-Panicled Rush	Maunder, John E.	9	30	1996	S5	S5	N5	G5	Juncaceae	Juncus canadensis var. brevicaudatus; J. canadensis var. coarctatus; J. canadensis var. kuntzei; J. coarctatus; J. kuntzei;	Herbarium Data Entry, NFM, The Rooms Herbarium, St. John's	47.449272	-53.092122
Linnaea borealis subsp. borealis	twinflower, longtube twinflower	Andrews, S.E.	7	2	1967	SNR	S5	N5	G5T5	Caprifoliaceae	Linnaea borealis subsp. americana?; Linnaea borealis var. longiflora; Linnaea americana; Linnaea borealis var. americana;	Herbarium Data Entry, NFM, The Rooms Herbarium, St. John's	47.466532	-53.047614
Sisyrinchium montanum	Strict Blue-Eyed-Grass	Maunder, John E.	7	2	1967	S5	S5	N5	G5	Iridaceae	Sisyrinchium angustifolium; S. bermudiana; S. bermudiana var. crebrum; S. montanum subsp. crebrum; S. montanum var. crebrum; S. strictum;	Herbarium Data Entry, NFM, The Rooms Herbarium, St. John's	47.469894	-53.047173
Platanthera clavellata	Club-Spur Orchid	Maunder, John E.	8	10	1968	S5	S5	N5	G5	Orchidaceae	Orchis clavellata; Habenaria clavellata; H. clavellata var. ophioglossoides; Gymnadeniopsis clavellata; Habenaria clavellata var. wrightii; Orchis tridentata	Herbarium Data Entry, NFM, The Rooms Herbarium, St. John's	47.435207	-53.090908
Salix humilis var. humilis	Tall Prairie Willow	Day, Robin T.	9	22	1996	S5	S5	N5	G5T5	Salicaceae	Salix humilis var. keweenawensis; S. conifera; S. humilis var. angustifolia; S. humilis var. grandifolia; S. humilis var. hyporhysa; S. humilis var. rigidiuscula; S. muehlenbergiana var. angustifolia; S. muehlenbergiana var. grandifolia; S. tristis var.	Herbarium Data Entry, NFM, The Rooms Herbarium, St. John's	47.456101	-53.065336
Utricularia cornuta	Horned Bladderwort	Watts, Isobel	8	10	1968	S5	S5	N5	G5	Lentibulariaceae	Stomoisia cornuta;	Herbarium Data Entry, NFM, The Rooms Herbarium, St. John's	47.422154	-53.104765
Vaccinium angustifolium	Late Lowbush Blueberry	Andrews, S.E.	7	2	1967	S5	S5	N5	G5	Ericaceae	Vaccinium angustifolium forma nigrum; V. angustifolium var. hypolasium; V. angustifolium var. integrifolium; V. angustifolium var. laevifolium; V. angustifolium var. nigrum; V. lamarckii; V. pensylvanicum; V. pensylvanicum var. angustifolium; V. pensylva	Herbarium Data Entry, NFM, The Rooms Herbarium, St. John's	47.466532	-53.047614
Lysimachia terrestris	Swamp Loosestrife	Maunder, John E.	9	30	1996	S5	S5	N5	G5	Primulaceae	Lysimachia terrestris var. ovata; Viscum terrestre; Lysimachia terrestris forma florifera; Lysimachia bulbifera	Herbarium Data Entry, NFM, The Rooms Herbarium, St. John's	47.461761	-53.087944
Kalmia angustifolia	Sheep-Laurel	iNaturalist user: susann	5	27	2018	S5	S5	N5	G5	Ericaceae	Kalmia angustifolia var. angustifolia forma candida; K. angustifolia var. candida; K. angustifolia Î± rubra; K. angustifolia var. rubra	iNaturalist data download, May 2020	47.434444	-53.147221
Sanguisorba canadensis	Canada Burnet	iNaturalist user: simonryder-burbidge	8	28	2019	S3S5	S5	N5	G5	Rosaceae	Sanguisorba canadensis subsp. canadensis; S. canadensis subsp. latifolia; S. canadensis var. latifolia; S. stichensis; S. stipulata	iNaturalist data download, May 2020	47.477662	-53.061383
Anaphalis margaritacea	Pearly Everlasting	iNaturalist user: ajsibb	8	12	2019	S5	S5	N5	G5	Asteraceae	Gnaphalium margaritaceum Linnaeus, Sp. Pl. 2: 850. 1753; Anaphalis margaritacea var. occidentalis Greene; A. margaritacea var. subalpina (A. Gray) A. Gray	iNaturalist data download, May 2020	47.476482	-53.064502
Sanguisorba canadensis	Canada Burnet	iNaturalist user: ajsibb	8	12	2019	S3S5	S5	N5	G5	Rosaceae	Sanguisorba canadensis subsp. canadensis; S. canadensis subsp. latifolia; S. canadensis var. latifolia; S. stichensis; S. stipulata	iNaturalist data download, May 2020	47.476321	-53.065236
Rhinanthus minor subsp. minor	common yellowrattle	Maunder, John E.	8	10	1968	SNA	SNA	N3N5	G5T5	Scrophulariaceae	Alectorolophus crista-galli subsp. stenophyllus; A. minor; A. minor var. fallax; A. stenophyllus; Rhinanthus crista-galli; R. crista-galli var. fallax; R. kyrollae; R. minor subsp. stenophyllus; R. minor var. stenophyllus; R. stenophyllus; R. borealis su	Herbarium Data Entry, NFM, The Rooms Herbarium, St. John's	47.435207	-53.090908
Juncus bulbosus	Bulbous Rush	Maunder, John E.	9	22	1996	SNA	SNA	N1N2	G5?	Juncaceae	Juncus kockii; J. supinus;	Herbarium Data Entry, NFM, The Rooms Herbarium, St. John's	47.457226	-53.065326
Juncus bulbosus	Bulbous Rush	Maunder, John E.	9	30	1996	SNA	SNA	N1N2	G5?	Juncaceae	Juncus kockii; J. supinus;	Herbarium Data Entry, NFM, The Rooms Herbarium, St. John's	47.434474	-53.090352
Plantago major	Nipple-Seed Plantain	Maunder, John E.	9	30	1996	SNA	SNA	NNA	G5	Plantaginaceae	Plantago bracteata; P. intermedia; P. major forma bracteata; P. major forma ramosa; P. major var. intermedia; P. major var. pilgeri; P. asiatica; P. halophila; P. major var. asiatica; P. major var. pachyphylla; P. major va.scopulorum	Herbarium Data Entry, NFM, The Rooms Herbarium, St. John's	47.449272	-53.092122

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GNAME	GCOMNAME	OBSERVER	MONTH	DAY	YEAR	SRANK 2010	SRANK 2015	NRANK	GRANK	FAMILY	SYNAME	SOURCES	LAT	LONG
Juncus bulbosus	Bulbous Rush	Maunder, John E.	9	30	1996	SNA	SNA	N1N2	G5?	Juncaceae	Juncus kockii; J. supinus;	Herbarium Data Entry, NFM, The Rooms Herbarium, St. John's	47.450349	-53.092009
Trifolium pratense	Red Clover	Maunder, John E.	7	2	1967	SNA	SNA	NNA	GNR	Fabaceae	Trifolium pratense var. frigidum; T. pratense var. sativum;	Herbarium Data Entry, NFM, The Rooms Herbarium, St. John's	47.469894	-53.047173
Rumex crispus	Curly Dock	Maunder, John E.	9	30	1996	SNA	SNA	NNA	GNR	Polygonaceae	Lapathum crispum;	Herbarium Data Entry, NFM, The Rooms Herbarium, St. John's	47.432773	-53.090685
Persicaria hydropiper	common smartweed, waterpepper	Maunder, John E.	9	30	1996	SNA	SNA	NNA	GNR	Polygonaceae	Polygonum hydropiper;	Herbarium Data Entry, NFM, The Rooms Herbarium, St. John's	47.461149	-53.088627
Persicaria maculosa	lady's-thumb, redshank	Maunder, John E.	9	30	1996	SNA	SNA	NNA	G3G5	Polygonaceae	Polygonum persicaria; Persicaria fusiformis; P. vulgaris; Polygonum fusiforme; P. persicaria var. ruderale; P. puritanorum; Persicaria persicaria; Polygonum ruderale; Persicaria maculata; P. ruderalis; P. ruderalis var. vulgaris; Polygonum dubium; P. fus	Herbarium Data Entry, NFM, The Rooms Herbarium, St. John's	47.461149	-53.088627
Rumex crispus	Curly Dock	Maunder, John E.	9	30	1996	SNA	SNA	NNA	GNR	Polygonaceae	Lapathum crispum;	Herbarium Data Entry, NFM, The Rooms Herbarium, St. John's	47.461149	-53.088627
Lupinus polyphyllus	Lupine	iNaturalist user: susann	5	17	2018	SNA	SNA	N4	G5	Fabaceae		iNaturalist data download, May 2020	47.434444	-53.149445
Cirsium vulgare	Bull Thistle	iNaturalist user: nadaci	8	21	2018	SNA	SNA	NNA	GNR	Asteraceae	Carduus vulgaris; C. lanceolatus; C. lanceolatum	iNaturalist data download, May 2020	47.480062	-53.054656
Cirsium arvense	Creeping Thistle	iNaturalist user: salmonskyview	8	4	2018	SNA	SNA	NNA	G5	Asteraceae	Serratula arvensis ; Breea arvensis ; Carduus arvensis ; Cirsium arvense var. argenteum ; C. arvense var. horridum ; C. arvense var. integrifolium; C. arvense forma albiflorum;	iNaturalist data download, May 2020	47.459205	-53.08793
Linaria repens	Striped Toadflax	iNaturalist user: simonryder-burbidge	8	28	2019	SNA	SNA	NNA	GNR	Plantaginaceae	Antirrhinum repens;	iNaturalist data download, May 2020	47.478272	-53.060739
Linaria repens	Striped Toadflax	iNaturalist user: simonryder-burbidge	8	28	2019	SNA	SNA	NNA	GNR	Plantaginaceae	Antirrhinum repens;	iNaturalist data download, May 2020	47.476478	-53.064605
Linaria repens	Striped Toadflax	iNaturalist user: simonryder-burbidge	8	28	2019	SNA	SNA	NNA	GNR	Plantaginaceae	Antirrhinum repens;	iNaturalist data download, May 2020	47.478272	-53.060739
Achillea millefolium	Common Yarrow	iNaturalist user: ajsibb	8	12	2019	S3S4	SNA	N5	G5	Asteraceae	Achillea alpicola; A. arenicola; A. borealis subsp. arenicola; A. borealis subsp. californica; A. californica; A. gigantea; A. lanulosa; A. lanulosa subsp. alpicola; A. laxiflora; A. megacephala; A. millefolium var. alpicola ; A. millefolium var. arenic	iNaturalist data download, May 2020	47.476449	-53.06448
Vicia cracca	Tufted Vetch	iNaturalist user: ajsibb	8	12	2019		SNA	NNA	GNR	Fabaceae		iNaturalist data download, May 2020	47.476454	-53.064478
Trifolium pratense	Red Clover	iNaturalist user: ajsibb	8	12	2019	SNA	SNA	NNA	GNR	Fabaceae	Trifolium pratense var. frigidum; T. pratense var. sativum;	iNaturalist data download, May 2020	47.476421	-53.064627
Phleum pratense	Meadow Timothy	iNaturalist user: ajsibb	8	12	2019	SNA	SNA	NNA	GNR	Poaceae	Phemum nodosum; P. nodosum var. pratense; P. pratense var. nodosum;	iNaturalist data download, May 2020	47.476439	-53.064478
Rubus canadensis	Smooth Blackberry	Maunder, John E.	9	30	1996	SNR	SU	N5	G5	Rosaceae	Rubus argutus var. randii; Rubus elegantulus; R. kennedyanus; R. millspaughii; R. besseyi; R. canadensis var. imus; R. forestalis; R. illustris; R. irregularis; R. laetabilis; R. randii; R. ulterior; R. villosus var. randii	Herbarium Data Entry, NFM, The Rooms Herbarium, St. John's	47.432773	-53.090685

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