HATCH™

Swift River Energy Limited

Environmental Screening/ Review Report

Volume 1 - Main Report

North Bala Small Hydro Project

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Glossary of Abbreviations

AAQC	Ambient Air Quality Criteria
ABA	acid base accounting
AR	Applicant of Record
ARD	Acid Rock Drainage
AQI	Air Quality Index
BAA	Bala Aquatic Association
BFCA	Bala Falls Community Association
BMP	Best Management Practice
BMZ	Best Management Zone
CEAA	Canadian Environmental Assessment Act
CEA Agency	Canadian Environmental Assessment Agency
CofA	Certificate of Approval
CFIP	Community Fisheries Involvement Program
CPR	Canadian Pacific Railway
CPUE	catch per unit effort
CSA	Canadian Standards Association
DFO	Fisheries and Oceans Canada
FPM	Fine Particulate Matter
EA	environmental assessment
ESTN	end of spring trap netting
FEAC	federal environmental assessment coordinator
HADD	harmful alteration, disruption or destruction
ICC	Incremental Consequence Category
INAC	Indian and Northern Affairs Canada
L/d	litres per day
L/min	litres per minute
LRIA	Lakes and Rivers Improvement Act
MLA	Muskoka Lakes Association
MLCC	Muskoka Lakes Chamber of Commerce
MOE	Ministry of the Environment
MOL	Ministry of Labour
MNR	Ministry of Natural Resources
MRPOA	Moon River Property Owners Association

MRWMP	Muskoka River Water Management Plan
MSDS	Material Safety Data Sheets
NBCC	National Building Code of Canada
NOZ	normal operating zone
NRCan	Natural Resources Canada
NWPA	Navigable Water Protection Act
OP	Official Plan
OPA	Ontario Power Authority
OPG	Ontario Power Generation
OPSS	Ontario Provincial Standard Specifications
OWRA	Ontario Water Resources Act
PIC	Public Information Centre
POD	Plan of Development
POR	Points of Reception
ppb	parts per billion
PTTW	Permit to Take Water
PWQO	Provincial Water Quality Objectives
RA	Responsible Authority
REA	Renewable Energy Approval
Sa	spectral-acceleration
SAC	Standing Advisory Committee
SAR	Species at Risk
SARA	Species at Risk Act
SC	Steering Committee
SOP	Standard Offer Program
SREL	Swift River Energy Limited
TOL	target operating level
TSS	total suspended solids
UNESCO	United Nations Educational, Scientific and Cultural Organization
VEC	volatile environmental component
WMP	water management plan
WSC	Water Survey of Canada
YOY	young of year

1 Introduction

1. Introduction

Swift River Energy Limited Partnership (SREL) is proposing to construct a 4.3-MW hydroelectric power facility approximately 25 m south of the existing North Bala Dam on the Moon River in the village of Bala, Ontario (Figure 1.1). The North Bala Dam, along with the neighbouring South Bala Dam is owned by the Ontario Ministry of Natural Resources (MNR).

This document addresses the following processes and requirements:

- an environmental screening under Ontario Regulation 116/01 as prescribed in the Guide to Environmental Assessment for Electricity Projects published by the Ministry of Environment (MOE) (MOE, 2001)
- a screening level environmental assessment (EA) under the Canadian Environmental Assessment Act (CEAA) [required due to the need for federal approvals; i.e., under the Fisheries Act and Navigable Waters Protection Act (NWPA), prior to project construction]
- provision of information required to assist in the assessment of an application for an amendment to the Muskoka River Water Management Plan (MRWMP) as required under the Water Management Planning Guidelines for Waterpower (MNR, 2002).

1.1 Project Background

The North Bala Dam project site was offered for competitive release under the MNR Waterpower Site Release Policy. The MNR originally offered a Request for Qualifications for Waterpower Generation Development Opportunities at MNR Dam Structures. The MNR Request for Proposals documentation referred to the site offer as MNR-DAM-RFP-01-05 North Bala Dam (included as Appendix A1). SREL met the requisite criteria and submitted a Plan of Development (POD) in July 2005. SREL was named as the Applicant of Record (AR) following assessment of their POD. Criteria considered in the assessment of the submitted POD included the financial capabilities of the proponent to fund the proposed project. The award of AR status gave SREL the leave to undertake an environmental assessment of the proposed project and to seek the requisite permits and approvals.

SREL subsequently retained Hatch Energy (Hatch) to undertake detailed feasibility studies aimed at identifying a preferred design and mode of operation. Hatch was also retained to undertake the environmental screening.

1.2 Project Description and Components

The facility will be located approximately 25 m south of the existing North Bala Dam in the village of Bala, in the Township of Muskoka Lakes. The development will consist of the excavation of an approach channel, the installation of an intake leading to a powerhouse and a tailrace returning water to the Moon River immediately downstream of the dam (Figure 1.2). The arrangement of the proposed development is based on a gross head of approximately 6.2 m, which is provided by the existing dam at the site. There will be no structural changes made to the dam as part of the project.

A 44-kV line will convey power from the transformer station to an interconnection point. The interconnection will consist of an underground cable running approximately 40 m from the proposed powerhouse to an existing 44-kV hydro line just south of the intersection of Muskoka Road 169 and the original route of Highway 69 (Figure 1.2).

Power produced by the project will be sold under the terms of a power purchase agreement with the Ontario Power Authority (OPA).

Figure 1.2 displays the general layout of the facility. The components of the development are described in the following subsections.

1.2.1 Dams

No new dam construction will be involved in the development of the proposed facility. The two dams associated with the project will be the existing MNR-owned North Bala and South Bala Dams. The facility will utilize the head provided by these two dams. Both dams are presently operated as control structures, and are the main means of regulating the water levels on Lake Muskoka and controlling of flows downstream along Moon River. Both dams are presently operated by the removal and replacement of timber stop logs. The South Bala Dam is operated as the main flow passage structure, with log manipulation being dictated by inflows into Lake Muskoka. The operation of the North Bala Dam is presently limited mainly to the removal of logs to allow passage of the spring freshet, with their subsequent replacement.

Passing of flows in excess of the turbine capacity (spilling) will be accomplished primarily through stop-log operation of the South Bala Dam, with the North Bala Dam being operated only as required. SREL will operate both the North and South dams upon completion of the facility.

1.2.2 Water Conveyance and Powerhouse

An approximately 30-m long approach channel will be created by modifying sections of the bedrock upstream of the existing North Dam by blasting. This approach channel will lead to the intake of the powerhouse. The intake will be located southeast of the dam east of Muskoka Road 169 and will allow water to flow into the approach channel and the powerhouse for generation. The intake will be fitted with trashracks.

From the intake channel, water will flow along an approximately 22-m long approach channel crossing beneath Muskoka Road 169 and into the powerhouse located on the western side of the highway.

The reinforced concrete powerhouse, founded on bedrock approximately 30 m south of the North Dam, will contain one 4.3-MW turbine or two 2.15-MW units. The powerhouse will also have a draft tube for flows exiting the turbine and a room above which will contain electrical components such as switchgear and a power transformer. The switchgear and a transformer will convert the generated power to a 44-kV voltage desired for distribution. The placement of the transformer in this room will eliminate the visual impact of a typical external transformer and switchyard. A short tailrace channel (approximately 20 m) will be excavated and blasted to convey the powerhouse flows into the Moon River below the dam.

1.2.3 Electrical Interconnection and Distribution

The power generated will be conveyed from the transformer room inside the powerhouse via an underground cable to an interconnection point on the existing local line along Muskoka Road 169 approximately 40 m from the powerhouse. The final distribution line voltage will be at 44 kV.

1.2.4 Other Infrastructure

Other infrastructure components will include a works yard/site office (Figure 1.2). A temporary cofferdam will be erected in the vicinity of the tailrace to facilitate construction activities in the dry. There will be three separate small works areas. These will be located on land presently serving as a

parking lot (Figure 1.2) on land in the vicinity of the intake and in the vicinity of the tailrace area, within the confines of a temporary cofferdam. Existing roads and specifically Muskoka Road 169, which runs through Bala at the project site, will provide direct site access.

1.3 Project Location and Study Area

The project will be located in the village of Bala, Township of Muskoka Lakes, District Municipality of Muskoka, Ontario with access via Muskoka Road 169 (Figure 1.1). The geographic coordinates are

- Latitude: 45º 00′ 52.12″ N
- Longitude: 79º 36′ 48.07″ W.

The project will occupy both Crown land owned by the province of Ontario and adjacent municipal lands owned by the District Municipality of Muskoka (see Section 2.2.4.2 – Land Tenure). Surrounding land is owned by municipal or private interests. The railway corridor upstream of the project site is owned by Canadian Pacific Railway (CPR). There is a boat rental establishment (Purk's Place) immediately upstream of the North Bala Dam and adjacent to the intake site. The land occupied by Purk's Place is owned by CPR.

The Muskoka River watershed is located in central Ontario's lake district and is part of the southern Lake Huron/Georgian Bay drainage basin (Acres, 2006). In its upper reaches, the Muskoka River watershed has two main branches: the North and South branches. The North Branch originates in Algonquin Park and receives input from numerous tributaries prior to emptying into Fairy Lake. Outflow from Fairy Lake forms the North Branch of the Muskoka River which converges with the South Branch just south of the Town of Bracebridge. The South Branch of the Muskoka River receives flow from a number of waterways which finally empty into Lake of Bays. Outflow from Lake of Bays is referred to as South Muskoka River after passing through the Town of Baysville. This South Branch eventually converges with the North Branch of the Muskoka River south of Bracebridge.

The converged Muskoka River eventually flows into Lake Muskoka, the largest lake in the watershed. Muskoka Lake also receives inflow from Lake Rosseau and Lake Joseph, with the three collectively known as the "Muskoka Lakes" (Acres, 2006). Outflow from Lake Muskoka passes through the dams in Bala, including the North Bala Dam, where the proposed project is located. The Muskoka River eventually flows into Georgian Bay.

1.3.1 Lake Muskoka

Lake Muskoka is the largest lake within the Muskoka River watershed, with a surface area of 89 km^2 and average depth of 15.5 m. Its maximum depth is 67 m. Its shores have numerous seasonal and permanent residences as well as businesses mainly associated with tourism or recreation. There are over 1800 boathouses and 3700 docks along the 285.3-km long shoreline of Lake Muskoka (Acres, 2006). The water levels in Lake Muskoka are regulated under the MRWMP and controlled by the operations of the North and South Bala dams, both presently owned and operated by the MNR. The normal range of annual water level fluctuation is 1.15 m, between elevations 224.6 and 225.75 m above sea level. Details of the existing management of Lake Muskoka water levels are discussed in Section 9. The proposed facility will operate in accordance with the existing water management plan in relation to Lake Muskoka levels and flows into the downstream Bala reach of the Moon River.

1.3.2 North Bala Dam

The North Bala Dam is located on the brink of Bala Falls. The falls is a popular recreational site, particularly during summer when low flows allow people to walk or sit along the rocks of the falls. The area immediately abutting the falls to the north is fitted with benches for recreational sightseeing and picnicking. Interpretive plaques are placed on the northern shore of the falls. North Bala Dam and the neighbouring South Bala Dam control flows from Lake Muskoka downstream into the Moon Chute and Bala Reach of the Moon River (Figure 1.1). Details of the existing water management along the river reach downstream of the Bala dams are presented in Section 9.

The area adjacent to the North Bala Dam previously housed a small hydroelectric generating station (2.3 kV) built in 1924 by Bala Electric Company. It was purchased by the Hydro Electric Power Commission of Ontario in 1929 and supplied power to the Town of Bala until 1957. It was demolished in 1972. The intake, powerhouse and tailrace areas were in-filled, and are evident by the in-fill material which differs from the surrounding natural rock in the area.

1.3.3 South Bala Dam

The South Bala Dam is an eight stop-log bay concrete dam located approximately 150 m south of the North Bala Dam and is the same height (4 m) as the North Dam. It is approximately 24 m in length. This dam controls flow through the man-made south channel from Lake Muskoka into the Moon River.

Together, the Bala Dams control the upstream Lake Muskoka water levels, the Muskoka River up to Bracebridge Falls and the Indian River to the Port Carling Dam.

1.3.4 Burgess Dam and Burgess Generating Station

The Burgess Dam which is integrated with a small hydroelectric generating station (Burgess Generating Station) is located at the most northerly outlet from Lake Muskoka, a narrow channel approximately 300 m north of the North Bala Dam (Figure 1.1). This generating station is owned by Algonquin Power. The allocated maximum flow to the Burgess Generating Station is 4 m^3/s and there is no spilling capacity. As a result, all flood flows passing from Lake Muskoka are routed through the North and South Bala Dams. Downstream of Bala, the river forks into the Moon and Musquash Rivers after approximately 5 km (Acres, 2006).

1.3.5 Study Area

The local study area encompasses Bala, Lake Muskoka and the downstream Bala Reach (Moon River). The broader study area for the environmental screening extends downstream in the Lower Muskoka River (Moon River and Musquash River) to Georgian Bay in order to assess any cumulative impacts on Ontario Power Generation's (OPG) downstream generating stations (Figure 1.1).

1.4 Purpose and Need

The objectives of the project are to

- produce environmentally sustainable hydroelectric power through the use of one or two units with an installed capacity of 4.3 MW
- connect to and utilize the existing distribution grid to deliver power generated by the project to satisfy the growing demand

- sell the generated power to the OPA.

Power demand in Ontario has increased steadily and substantially over the last decade and projections indicate that it will continue to increase significantly into the foreseeable future. Recent energy use statistics indicate that the province does not have enough generation capacity to meet the demands of its residents during certain times of the year, particularly the summer and winter peaks. Importation of electricity from outside markets is required to meet the demand during those periods.

The Ontario government has taken action to encourage the development of privately funded renewable energy sources, such as small hydro and wind generation, through the restructuring of the electricity sector. The Standard Offer Program (SOP) was issued in September 2006 by the Ontario Power Authority (OPA). The fundamental objective of the program was to remove barriers that have effectively prevented smaller renewable energy projects from proceeding (OPA, 2006). It is integral to the provincial government's target of having 2700 MW of electrical power generated by new renewable energy sources in Ontario by 2010.

On May 14, 2009 the Green Energy Act, proposed by the Ontario government was passed. The Act will modify the process and requirements for environmental/municipal approvals for renewable energy developments in Ontario with the intent to streamline and expedite the process. Generally, the Act requires that all renewable energy projects, must obtain a Renewable Energy Approval (REA). The power purchase method outlined in the Green Energy Act (tariff for power produced) will replace the current SOP for new projects. All projects currently following Ontario's Environmental Screening Process or Class Environmental Assessment process (for waterpower projects) which have not published a notice of commencement by a prescribed date (not yet specified) will be required to transfer into the REA process.

1.5 Project Alternatives Considered

The final selection of a design and mode of operation for a hydroelectric facility was contingent on finding an arrangement that provides the optimum balance of power generation, capital and recurrent expenses, revenue and environmental considerations. The following options were examined and rejected prior to selection of the preferred scheme described in Section 1.2.

1.5.1 Facility Layout Options

The facility layout refers to the orientation of the essential components of the proposed facility i.e., the approach channel, intake, powerhouse, and tailrace.

1.5.1.1 Layout Alternative 1

Alternative 1 is presented as a close-coupled unit. This original design (Drawing 327078-SK-101 in Appendix A2) was proposed as part of the site release program application (Plan of Development). The proposed design links the powerhouse and intake to the south abutment of the North Dam. The intake would be constructed along the south upstream shore of the North Channel, tying into the south abutment of the North Bala Dam.

Because of the low head at the site, the powerhouse would be designed to house a "pit-type" propeller turbine. The arrangement of the powerhouse allows for emergency closure gates immediately upstream of the powerhouse with a dewatering bulkhead at the draft tube access. A service area would be provided directly above the turbine to house some of the mechanical equipment. The electrical equipment would be located in a separate room above the draft tube.

This room would facilitate the step-up transformer either within the room or on the roof. The roof levels are intended to be tiered with public access to the upstream roof area. The lower roof could be used for some components of the powerhouse.

The location of the powerhouse would remove any access to the falls from the south bank of the dam. The tailrace of the powerhouse would be located in close proximity to the falls which could cause safety issues and public concern. Furthermore, the location of the intake would be between the North Bala Dam and the highway bridge. This is not an optimum location from a hydraulic standpoint and head losses would be incurred. Approach area excavations near and below the road bridge to improve the hydraulics would be difficult and could threaten the bridge or dam. The advantage of this scenario is the minimal excavation required due to the small footprint of the development. Furthermore, since this option does not cross the Muskoka Road 169 bridge, there would be no requirement for road closures.

Alternative 1 was presented during the Public Information Centre (PIC) of 2007. However strong public sentiment, in combination with the technical considerations discussed above determined that the powerhouse should be shifted farther to the south, away from the dam as described in Section 1.2. Public concerns expressed during stakeholder consultation included access to the Bala Falls area, and aesthetic preservation of the Bala Falls and surrounding parkland. By moving the project away from the North Channel, these concerns are better addressed. The potential occupation of lands owned by the District Municipality of Muskoka, the Town of Bala and Crown land by the project, as an alternative, represents amicable mitigation of some major public concerns expressed during the initial PIC.

Due to the difficulties noted above, this layout alternative was not considered further.

1.5.1.2 Layout Alternative 2 – Intake Upstream of Muskoka Road 169 Bridge

Alternative 2 involves relocating the intake to the south shore area between the Muskoka Road 169 road bridge and the rail bridge. This intake location offers better approach conditions with better flow patterns since there would no longer be an influence/constriction from the highway bridge piers. Relocating the intake upstream of the highway bridge allows the powerhouse to be moved farther to the south, thereby allaying some public concerns. The powerhouse in this alternative is of similar configuration to that described in Alternative 1. For all the options under Alternative 2, as noted below, the powerhouse was positioned in such a manner to ensure public access to the scenic falls from the south bank. In addition, the flows released downstream from the powerhouse are directed away from the falls to enhance public safety.

Several variations for Alternative 2 were investigated. The objectives were to minimize costs, potential disruptions to road traffic and the impact on surrounding structures while maximizing energy output. For all of the variations on Alternative 2 the powerhouse configuration and dimensions remained constant with minor variations to the orientation. The primary changes impacted the intake and the conveyance channel. The following is a brief description of each option.

Layout Alternative 2A – Cut and Cover, Pressurized Culvert

A pressurized box culvert would be used for the conveyance of the flow between the North Channel and the powerhouse (Drawing 327078-SK-201 in Appendix A2). The box culvert would be installed using a cut and cover construction approach. The invert of the box culvert would be maintained at a relatively constant elevation between the intake and powerhouse. This approach requires a

cofferdam in the North Channel and significant excavation to develop the approach within the North Channel. Aside from the significant excavation efforts, the box culvert sections could be precast allowing for relatively quick installation, thus reducing the required time for construction under the highway. Once installed, the box culvert would be backfilled, the road properly reinstated and the area landscaped.

The intake structure would be located on the south bank of the North Channel. The size of the intake structure would facilitate emergency closure gates within the structure or alternatively, gates could be installed along the upstream face of the powerhouse.

Due to the cut and cover methodology used, the road traffic would have to be temporarily diverted during construction. The use of a temporary 2-lane Bailey Bridge would be incorporated into the construction sequencing to facilitate traffic with only minor disruptions for the installation and removal of the bridge.

Layout Alternative 2B – Short Tunnel

This alternative is similar to Alternative 2A in terms of layout (Drawing 327078-SK-201 in Appendix A2). However, instead of using a cut and cover construction approach, this alternative utilizes a short tunnel under the highway. The primary advantage to the tunnelling approach is the elimination of the requirement for a temporary bridge over the highway. The cost savings involved in removing this traffic management requirement however, would be replaced and exceeded by the high costs of tunnelling.

Layout Alternative 2C – Shallow Intake, Open Channel

Unlike Alternatives 2A and 2B, this alternative uses an open channel as part of the conveyance from the North Channel to the powerhouse (Drawing 327078-SK-203 in Appendix A2). The invert of the channel would deepen toward the upstream face of the powerhouse. To ensure that proper flow velocities are maintained and head losses minimized, the width of the intake would be increased. The size of the intake occupies a large section of the south bank of the North Channel between the highway bridge and Purk's Place. There would still be a requirement for an upstream cofferdam to construct the intake. For this layout, there would be only one position for the intake due to its size. In addition, to maintain a proper location for the powerhouse, a sharp bend would be required within the conveyance channel to provide alignment with the powerhouse.

Due to the size of the intake, the optimum location for an upstream gate is either on the east side of the roadway where the channel is narrow, or the upstream face of the powerhouse. The shallow depth of the channel along the east side of the road does not permit the storage of the gates at this location within gate slots. This dictates that the gates could not be used as emergency closure gates.

1.5.1.3 Layout Alternative 3 – Long Tunnel Construction, Upstream Intake

Alternative 3 is similar in design to Alternative 2B by using a tunnel approach to construction (Drawing 327078-SK-301 in Appendix A2). The intake structure for this alternative however would be located on the east side of the railway within Lake Muskoka. This would provide several improvements to the general layout and likely permit the installed capacity to be increased toward 5 MW. Similar to Alternative 2B, the aspect of tunnelling removes the requirements to impede traffic along Muskoka Road 169.

Increased costs are expected due to the cost of tunnelling efforts and the physical length of the tunnel. Additional costs would be incurred from third party involvement when working with CPR for tunnelling under the railway right-of-way.

This scheme was the most expensive considered. This scheme would have a considerable impact on capital costs, rendering the project economically non-viable.

1.5.2 Operational Alternatives

1.5.2.1 Peaking Operation Option

Operation of the proposed plant as a peaking facility in an effort to maximize its energy-generating capabilities were initially considered. This mode of operation would have entailed operating "run of river" when flows were at or above the rated plant flow of 96 m^3/s. When flows diminished to below the rated flow, there would be ponding followed by operation at flows up to 79 m^3/s. This would lead to plant shutdowns and restarts, and daily fluctuations in flows and levels along the Bala Reach, and on the Go Home Lake downstream of Bala, during low flow periods. These fluctuations may potentially have had an impact on available flows to downstream generating stations and pose problems related to boating and other aquatic activities along the Bala Reach and on Go Home Lake. In an effort to minimize potential environmental impacts, SREL, following consultation with the MNR and OPG, decided to operate the plant as a run-of-river facility.

1.6 Regulatory Requirements

The Project is subject to an environmental screening under the MOE Electricity Projects Regulation (O. Reg. 116/01), and the CEAA. It is also subject to Ontario's Water Management Planning Guidelines for Waterpower (MNR, 2002) as part of the environmental screening. The following sections outline the requirements of each. This document has been prepared to address the requirements of all three processes.

1.6.1 Ontario Environmental Assessment Act

The project is subject to the Electricity Projects Regulation (O. Reg.116/01) under the Ontario Environmental Assessment Act. Since the project has a capacity greater than 2 MW, the project is defined as a Category B project which is subject to an environmental screening according to the Guide to Environmental Assessment Requirements for Electricity Projects (MOE, 2001).

1.6.2 MNR's Water Management Planning Guidelines for Waterpower

MNR has the authority under Section 23.1(1) of the Lakes and Rivers Improvement Act (LRIA) to request that a water management plan be prepared following MNR's Water Management Planning Guidelines for Waterpower (MNR, 2002).

Recent information from MNR indicates that the requirements of water management planning can be met largely through the environmental screening process for individual waterpower facilities and Section 14 or 16 engineering approvals under the LRIA. MNR has further indicated that water management plans (or amendments) may be included as a chapter in an environmental screening/review report "to minimize repetition in data collection, consultation and reporting and to prevent delays after the construction of the facility" (MNR, 2007).

1.6.3 Canadian Environmental Assessment Act

A screening level EA under CEAA can be triggered by a number of project-related factors including the provision of federal funding, the use of or potential effect on federal lands or properties, and/or the need for federal permits/approvals. For the North Bala project, a CEAA screening is required under Section 5 of the CEAA because Fisheries and Oceans Canada (DFO) will issue a permit or license under subsection 35(2) of the Fisheries Act [authorization for the harmful alteration, disruption or destruction (HADD) of fish habitat]. A Notice of Commencement was posted on the CEAA Registry on April 7, 2009 (Reference # 09-01-46531).

CEAA may also be triggered as a result of the need for the federal approval that is listed on the Law List Regulations of CEAA:

- Subject to the application of recent revisions to the NWPA, if approval is required for any aspect of the project, this would be a trigger for federal environmental assessment.
- The project proponent has also applied for federal funds under Natural Resources Canada (NRCan) ecoENERGY Renewable Power Program. If federal funds are to be disbursed this would be an additional trigger.

The CEAA screening evaluates project features in much the same manner as the provincial process, and includes an evaluation of cumulative effects, alternatives to the project, an assessment of the potential effects of adverse environmental conditions (i.e., drought, flood, fire, etc) on the project, and the environmental effects of accidents and/or malfunctions.

The required federal approvals listed above are issued by Fisheries and Oceans Canada (DFO) and Transport Canada (Marine). Consequently, these two agencies were named as the responsible authorities (RAs) under CEAA, with the DFO being the lead agency. Expert advice is also being provided by Environment Canada and NRCan. Since the project is undergoing coordinated environmental assessments according to two different jurisdictions (provincial and federal), the Canadian Environmental Assessment Agency (CEA Agency) is serving as federal environmental assessment coordinator (FEAC) for the federal EA.

1.7 Scope of the Environmental Screening

The scope of the project includes

- activities to be undertaken during construction of the project as described in Section 5.1
- the operation of the facility as described in detail in Section 9.

The scope of the assessment defines the factors considered in this ESR. These included

- the purpose of the project
- comments from the public, First Nations and agencies that are received from review(s) of the project
- the environmental effects of the project, including the environmental effects of malfunctions and accidents and any cumulative effects (in combination with other projects and activities)
- the measures that would mitigate any adverse effects to the environment

- the effects on the project caused by the environment
- the existence and significance of the net residual effects after mitigation measures have been taken into consideration
- proposed monitoring and follow-up programs
- summary of advantages and disadvantages of the project.

Alternatives for the project and for operating the facilities were also included in the scope of the environmental screening.

Environmental components examined in the assessment process covered both the biophysical and socioeconomic environments. These are listed in Table 1.1.

Table 1.1 Environmental Components

Category	Environmental Component
Geophysical Environment	• Physiography and Topography • Soils • Geology • Groundwater
Aquatic Environment	• Aquatic Habitats and Biota • Surface Hydrology • Surface Water/Quality
Terrestrial Environment	• Vegetation • Wildlife • Species at Risk • Parks and Significant Natural Areas
Atmospheric Environment	• Air Quality • Noise
Social/Socioeconomic Environment	• Public Use and Access • Safety • Traffic • Noise and Vibration • Aesthetics • Tourism and Recreation • Local Business • Employment and Economy • Existing Infrastructure • Waste Management • Cultural/Heritage Resources and Archaeological Sites • Resources Used for Traditional Purposes by Aboriginal Persons

1.8 Methodology of Environmental Assessment

The EA followed MOE's "Guide to Environmental Assessment Requirements for Electricity Projects (2001", while incorporating the requirements of the federal (CEAA) screening process.

The following steps outline the methodology for the environmental assessment:

1. Identification of the temporal and spatial boundaries based on the project-environment interactions and therefore the potential to affect the environmental components.

2. Background data collection, identification of data gaps and the design and implementation of baseline studies to fill data gaps on the natural and socioeconomic features and conditions of the study area.

   Data was collected from the following sources:

   - field investigations
   - local government agencies
   - input from the local community
   - published sources (e.g., MNR Natural Heritage Information Centre)
   - existing documentation such as the MRWMP.

3. Consideration of public, First Nations and agency issues and comments as a result of consultation.
4. Identification of the effects that are likely to occur on the environmental components (or VECs) as result of implementing the Project based on information obtained on the existing conditions. This includes completing the Screening Criteria Checklist.
5. Determination of the likely environmental effects from malfunctions and accidents (such as spills and fires).
6. Determination of cumulative environmental effects that the Project may have taking into consideration the combination of other past, present and future projects and activities within spatial and temporal boundaries identified that would have overlapping residual effects.
7. Identification of the effects of the environment on the project (such as flooding and severe weather).
8. Development of mitigation measures to eliminate, alleviate or avoid the adverse effects where possible.
9. Determination of any residual effects and their significance and importance.
10. Design of a monitoring and follow-up program to assess predicted effects and the effectiveness of mitigation measures.
11. Summary of the advantages and disadvantages of the project.

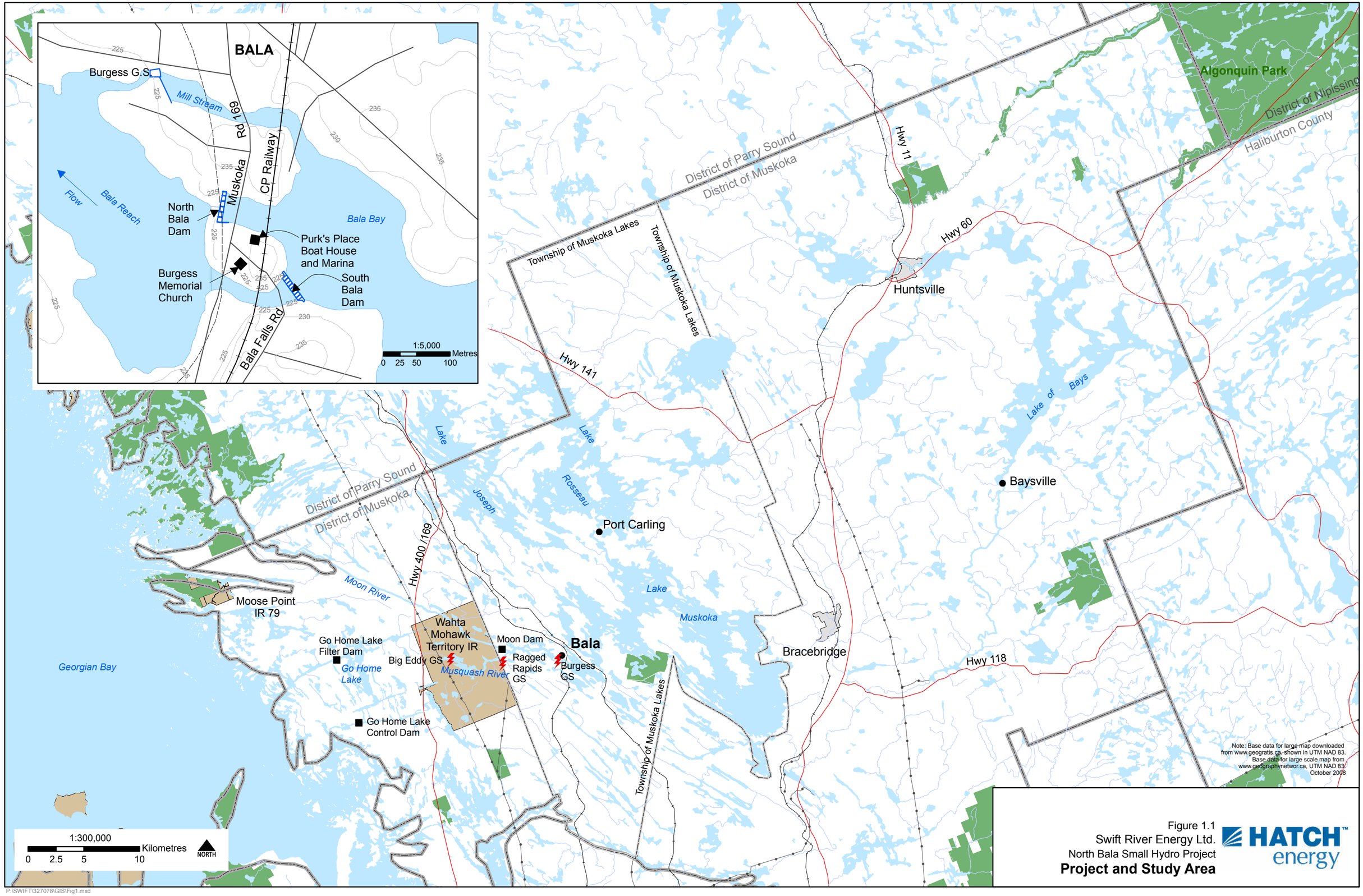
1.8.1 Screening Criteria Checklist

A copy of the MOE Screening Criteria table completed for the project is provided in Appendix B.

As outlined in MOE's Guide to Environmental Assessment Requirements for Electricity Projects a completed Screening Criteria Checklist is required. The Screening Criteria Checklist involves answering a series of questions to identify the potential for any negative effects on the environment; thereby assisting in scoping the assessment through determining the potential interactions with various environmental components. It also assists in the scope of the assessment by determining any potential for negative effects to the environmental components.

1.8.2 Significance of Residual Effects

A determination of whether the residual effects are likely to be realized after mitigation and a determination of the significance of the residual effects is required. The determination of the significance of the residual effects is based on CEA Agency's "*Determining Whether a Project is Likely to Cause Significant Environmental Effects* (1994)" and the MOE's "*Guide to Environmental Assessment Requirements for Electricity Projects* (2001)". More details are provided in Section 5.5.



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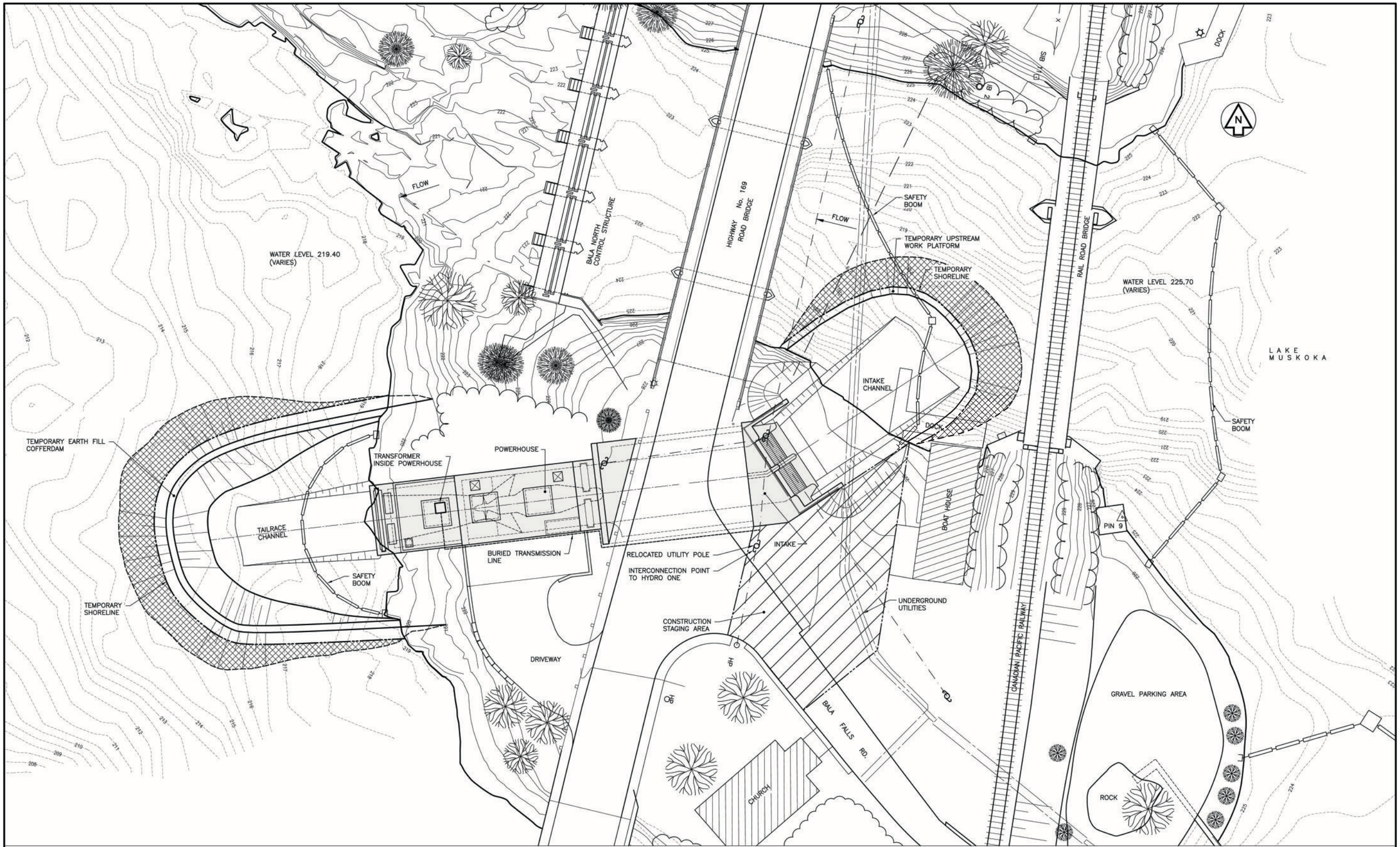

0 5 10 15 20 25 METRES
1:250

ALL DIMENSIONS ARE IN MILLIMETRES.
ALL ELEVATIONS ARE IN METRES.

Figure 1.2

Swift River Energy Ltd.

North Bala Small Hydro Project

Project Arrangement

HATCH energy

2 Existing Environment

2. Existing Environment

2.1 Natural Environment

2.1.1 Climate

The climate of the Muskoka area is continental with a moderating influence due to the proximity of Georgian Bay. Winters are cool and summers are warm and it is one of the wetter areas in the province. The closest long-term weather station to the study area is located at Muskoka Airport, which is situated approximately 25 km east of Bala. Climate 'normals' were recorded at this site from 1971 to 2000 (Environment Canada, 2004).

January is typically the coldest month with a daily average temperature of -10.4°C and a daily minimum temperature of -15.9°C. The extreme cold value on record is -41.5°C, and the coldest wind chill on record was -50.7°C, both of which were recorded in February 1979. Average daily temperatures are typically below 0°C from December to March. July is typically the warmest month with a daily average temperature of 18.5°C and a daily maximum temperature of 24.7°C. The hottest day on record was 35°C, recorded in July 1944, with the highest humidex temperature of 44.9°C being recorded in September 1959.

The average annual precipitation is 1098.6 mm, with 808.6 mm (73.6%) falling as rainfall and 333.9 mm (26.4%) falling as snowfall. Snowfall typically occurs between October and May. November typically has the highest amount of precipitation (112.2 mm) with 65.6% of this amount being rainfall. The highest amounts of rainfall occur in September (111.2 mm). February is typically the driest month (62.9 mm) with 83.9% of this amount being snowfall. Snow is typically on the ground between November and May with average snow depth being highest in February (42 cm) (Environment Canada, 2004).

2.1.2 Air Quality

In Ontario, the primary parameters used to measure air quality, through the Air Quality Index (AQI), include sulphur dioxide (SO_2), ozone (O_3), nitrogen dioxide (NO_2), total reduced sulphur compounds, carbon monoxide (CO) and fine particulate matter (FPM). Several of these parameters, including O_3 and FPM are measured by the MOE at one long-term AQI monitoring station in Dorset, which is located approximately 70 km northeast of the study area. This is the closest air quality monitoring station known to be in proximity of the study area. Air quality data from this station is likely representative of small towns in the relatively rural parts of the Muskoka River watershed. The data from this station has been provided in this Environmental Screening/Review as the best information known to be available to characterize general air quality conditions in the study area.

At the MOE Dorset air quality monitoring station between April 18 and December 31, 2008, there were no instances of Very Poor air quality. There were 2 days with poor air quality (April 18 and 19), due mainly to ground-level ozone, and 43 days with moderate air quality. Air quality was rated as Good for 166 days and Very Good for 35 days (MOE, 2009).

Ground level ozone, commonly referred to as smog, is formed from the reaction of oxides of nitrogen (NOx) with hydrocarbons in air in the presence of sunlight. In 2007, the mean ozone concentration at the Dorset station was 29.9 parts per billion (ppb), the 90th percentile value was 46 ppb, and the maximum 1-hour concentration was 96 ppb and the maximum 24-hour concentration was 65 ppb (MOE, 2008). For comparison, the Ontario Ambient Air Quality Criteria

(AAQC) for ozone is 80 ppb over a 1-hour period. The recommended Canada-wide standard for ozone, to be achieved by 2010, is 65 ppb, averaged over an 8-hour period.

Particulate matter in the air includes aerosols, smoke, fumes, dust, ash and pollen. FPM ($PM_{2.5}$) is particulate matter that is 2.5 microns in diameter and smaller. $PM_{2.5}$ in Ontario is largely made up of sulphate and nitrate particles, elemental and organic carbon and soil. The annual mean fine particulate matter ($PM_{2.5}$) concentration at the MOE Dorset air quality monitoring station in 2007 was 5.0 $\mu g/m^3$, the 90th percentile value was 12 $\mu g/m^3$ and a 1-hour maximum of 48 $\mu g/m^3$ and a 24-hour maximum of 33 $\mu g/m^3$ (MOE, 2008). For comparison, the recommended Canada-wide standard for $PM_{2.5}$, to be achieved by 2010, is 30 $\mu g/m^3$ averaged over a 24-hour period. This level was exceeded two times in 2007 at the MOE Dorset station (MOE, 2008).

There are no known point sources of other contaminants, including SO_2, CO and NO_x, within the project area. Concentrations of these contaminants are anticipated to be relatively low in the project study area, with the possible exception of higher concentrations due to periodic air mass movement into the study area from urban centers such as southern Ontario.

2.1.3 Existing Sound Levels

The project will be sited in a Class 2 urban area as defined by the MOE 2005 publication *Sound Level Limits for Stationary Sources in Class 1 and 2 Areas (Urban).* A Class 2 Area is one where the urban hum constitutes much of the background noise during the day, but there is little or no traffic at night. A low ambient sound level will typically be realized as early as 19:00 hours in such an area.

Characteristics which may indicate the presence of a Class 2 Area include

- absence of urban hum between 19:00 and 23:00 hours
- evening background sound level defined by natural environment and infrequent human activity
- no clearly audible sound from stationary sources other than from those under impact assessment.

The ambient sound levels obtained in the vicinity of the project site ranged from 56 to 67 dBA. An Acoustic Assessment Report is included as Appendix C1 and provides additional details regarding sound levels.

2.1.4 Topography, Physiography and Geology

Topographic relief of the region surrounding the project site is rolling and gentle with altitude changes limited to about 15 m, the area having undergone significant erosion during the last ice age. Glacial debris was deposited during and after the passing of the ice, leaving a thin mantle of overburden on the bedrock surface.

The study area is located within the physiographic region known as the Georgian Bay Fringe (Chapman and Putnam, 1984). The area is characterized by very shallow soil and exposed bedrock knobs and ridges. The area was formerly covered by glacial Lake Algonquin, and the exposed bedrock is partly due to washing by waves prior to recession of the glacial lake.

The Muskoka River watershed is situated on the Canadian Shield with bedrock formations from the middle and late Precambrian age. Bedrock in the study area is composed of clastic metasediments with conglomerate, greywacke, arkose, calcareous sandstone and siltstone, shale and derived metamorphic rocks (Freeman, 1979).

Site-specific bedrock conditions were determined during the 2008 geotechnical drilling investigation in the study area. Bedrock was encountered at a depth of between 0.14 m to 1.06 m at four locations along the proposed intake alignment and at the powerhouse. The bedrock encountered was granitic gneiss consisting mainly of quartz, feldspar and hornblende. The bedrock is very strong, fresh to faintly weathered, with closely to moderately spaced discontinuities. Some lengths of rock drilled had widely spaced discontinuities.

The quaternary geology is comprised predominantly of exposed bedrock or bedrock covered by a discontinuous thin layer of drift (Barnett et al., 1991) consisting of ground moraines of glacial silt till. The overburden in the vicinity of the North and South Bala dams has been disturbed considerably by construction of the Muskoka Road 169 road and bridges, housing and commercial developments, and the former powerhouse on site and buried utility services. Overburden found during the drilling investigation consisted of gravel and sand.

2.1.5 Groundwater Resources

A geotechnical investigation was undertaken in the project area in May 2008. The investigation involved the drilling of four boreholes. The groundwater table was located 1.94 m below the ground surface on either side of Muskoka Road 169 along the proposed intake channel route. The groundwater table was located 1.04 m below the ground surface at the proposed intake location. Artesian groundwater conditions were encountered at depth between 10.12 m and 11.97 m in the borehole at the proposed powerhouse location, meaning that groundwater flowed upward through the borehole, once this depth was reached. This artesian condition is likely due to the groundwater table being several meters higher at the proposed intake location, which creates a head differential between the two areas. It is likely that a fracture in the rock is allowing groundwater to migrate downstream to the proposed powerhouse location, and the pressure due to the head difference forces it upward through the borehole.

2.1.6 Surface Water Resources

The Muskoka River watershed is located in central Ontario's lake district and is part of the southern Lake Huron drainage basin. The watershed encompasses an area of 510,000 ha (5100 km^2) and includes about 78,000 ha of lakes (17% of the watershed). The watershed has three main subwatersheds, being the North Branch Muskoka River, the South Branch Muskoka River, and the Lower Watershed. The river descends approximately 345 m from its headwaters to its outlet, over a distance of approximately 210 km. The two headwater branches (the North and South Branch rivers) arise on the western slope of the Algonquin dome within Algonquin Provincial Park. They flow in a southwesterly direction until they converge near Bracebridge, and then continue through Lake Muskoka and other interconnected lakes and rivers to Georgian Bay.

Lake Muskoka, which is the largest lake in the watershed, outlets to the upper Moon River (also known as the Bala Reach) at the Town of Bala, through three separate water control structures, being the North and South Bala Dams and the Burgess Dam, which houses the Burgess Generating Station. Downstream from Bala, the lower Muskoka River watershed is dominated by Musquash and Moon Rivers, both of which flow in a generally western direction before draining into Georgian Bay (Figure 1.1).

2.1.6.1 Hydrology

Monthly flow data for the lower Muskoka River below the Bala dams was obtained from Water Survey of Canada (WSC) flow gauge identified as Station No. 02EB006. This gauge combines the flow data from the WSC gauges on the Moon River at Muskoka Road 169 (02EB011) and the

Muskoka (Musquash) River at Muskoka Road 169 (02EB012), and the data therefore can be used as an approximation of the outflow from Lake Muskoka. The drainage area at the gauging location is 4770 km^2 and most of its drainage area consists of natural lakes, the largest being Muskoka Lake. The drainage area to the control dams (Bala North and Bala South) is 4683 km^2 (Acres, 2006), therefore, a pro-rating factor of 0.98 was applied to obtain flows at the proposed hydroelectric plant site.

A plot of the annual average flows at the WSC Gauge site 02EB006 is shown in Figure 2.1. The mean annual flow for the period 1938 to 2005 is 77.7 m^3/s. The highest mean monthly flow (165 m^3/s) occurs in April and the lowest mean monthly flow typically occurs in August (23.1 m^3/s).

The flow period of record (1960 to 2005) provides flow conditions that occurred prior to implementation of the MRWMP. Following implementation of that plan, most lake trout lakes in the watershed implemented a reduced winter drawdown in order to protect eggs and fry. Accordingly, existing average winter flows may be lower than indicated in Table 2.1.

Table 2.1 Lower Muskoka River Reach (Below Bala Dams, Station 02EB006) Monthly and Annual Discharges (m^3/s) for 1960 to 2005

Month	Mean Monthly Flow (m^3/s)	Maximum Monthly Flow (m^3/s)	Minimum Monthly Flow (m^3/s)
January	83.3	182.0	37.3
February	83.3	147.0	35.4
March	109.9	210.0	36.0
April	165.0	317.0	53.6
May	114.1	290.0	8.1
June	50.9	128.0	6.8
July	33.5	171.0	4.2
August	23.1	72.8	4.9
September	39.0	196.0	5.4
October	57.0	176.0	18.7
November	80.9	231.0	19.4
December	92.9	240.0	43.5
Annual	*77.7*	*119.0*	*43.5*

The mean daily flow variation at the gauge site is shown in Figure 2.2. The wide daily fluctuations illustrated in Figure 2.2 are likely due to responses to the operations of power generating stations, which are located upstream of the Muskoka (Musquash) River gauge.

It is evident from the moving means data curves (Figure 2.1) that the 1938 to 1966 (28 years) period was drier than average while the period 1967 to 1995 (28 years) was wetter than the long term average. The latter is borne out by the higher average annual flows for this period. This phenomenon is a typical characteristic of rivers/streams in the northeastern United States and Canada that has been documented in published research. More recently (1997 to 2005), annual flows have migrated to values just below the mean and may reflect the onset of a drier than average period. In order to simulate the energy that would be generated from the proposed North Bala hydro project, the hydrology sequence covering the years 1960 to 2005 was adopted in the power and energy model. This sequence covers a dry period at the beginning followed by a wetter than average period and then a dry period.

The high degree of natural lake storage present in this basin causes the river flow at the site to be fairly attenuated, i.e., without high peaks and low troughs throughout the year.

The flow duration curve at the gauge location is shown in Figure 2.3. This curve is derived from reduced daily flow record extending from 1960 to 2005.

The Dam Safety Assessment of North Bala and South Bala Dams performed in 2000 by Acres International for MNR, utilized the hydrologic model HYMO to determine flood flows. The method of analysis was selected over a frequency analysis because the Muskoka Lake watershed is fairly regulated. Since both of the Bala dams are classified as Low Incremental Consequence Category (ICC) structures (Acres, 2000), their Inflow Design Flood (IDF) corresponds to the 1:100-yr spring flood which was determined to be 470 m^3/s; 218 m^3/s at the North Dam, and 252 m^3/s at the South Dam (Acres, 2000).

The minimum annual flow records were identified from the 46 years of daily record. Minimum flows for various return periods are summarized in Table 2.2. The mean annual minimum flow is 5.6 m^3/s, with the lowest recorded daily flow record being 0.139 m^3/s occurring in April of 1963. The lowest annual flows occurred primarily in the months of June, July, August and September with lesser occurrences in April, October, and November. These low flow values represent likely a short-term phenomena occurring during periodic drought events and are not representative of average summer low flow periods. The MRWMP indicates that the historical summer median weekly flow from Lake Muskoka is approximately 30 m^3/s.

Table 2.2 Minimum Daily Flows at 02EB006

Return Period (yrs)	Minimum Flow (m^3/s)
1.25	8.82
2	4.27
5	1.61
10	0.84
20	0.45
50	0.20
100	0.111

A record of daily flows (based on log settings and water levels) through the North and South Bala dams between 1982 and 1999 was maintained by MNR. The historical average weekly flows through the dams based on this data are depicted in Figure 2.4. Average flows through both dams reach the maximum peaks during April when the spring freshet occurs. The maximum average flow of 108.3 m^3/s at the North Dam occurred in the second week of April while at the South Dam the maximum flow of 146 m^3/s occurred in the third week of April. Minimum average flows at both dams occurred in the fourth week of August.

Based on the data low flows below 10 m^3/s consistently occur at the North Bala Dam between early May and late October. This is due to the closure of the North Dam by stop logs between late April/early May (immediately following the freshet) and late October when the stop logs are removed prior to winter lake drawdown. During this closure, the only flow through the North Dam is from leakage between the stop logs.

Reduced flows due to stop-log placement and lower inflows also occur at the South Dam following the freshet. However, the low flows do not continue for as long as those at the North Dam. This is because the South Dam stop logs are manipulated as required to pass any short-term increased inflows to Lake Muskoka that may occur.

Both dams are operated to facilitate a lake winter drawdown. Average flows at both dams are fairly constant throughout winter.

The frequencies of weekly average historical flows through both dams during the months of April and May are presented in Tables 2.3 to 2.6 below. These months are of interest due to the occurrence of walleye spawning between late April and early May, depending on the prevailing water temperature.

When all weeks in April are considered, the flow through the North Dam exceeded 96 m^3/s (rated flow of the proposed plant) more than 51% of the time. Flood flows between 100 m^3/s and 200 m^3/s occurred approximately 40% of the time, with extreme flood flows above 200 m^3/s occurring approximately 7% of the time (Table 2.3).

Table 2.3 Historical Flow Frequencies at North Bala Dam During April

Flow (m^3/s)	Relative Flow Frequency (All weeks in April) (%)	Relative Flow Frequency (Week 1) (%)	Relative Flow Frequency (Week 2) (%)	Relative Flow Frequency (Week 3) (%)	Relative Flow Frequency (Week 4) (%)
0 *	12.5	5.6	11.1	16.7	16.7
0-10	16.7	0.0	11.1	22.2	33.3
10-20	5.6	11.1	5.6	0.0	5.6
20-30	1.4	0.0	0.0	5.6	0.0
30-40	4.2	5.6	5.6	0.0	5.6
40-80	2.8	0.0	0.0	0.0	11.1
80-120	18.1	33.3	22.2	16.7	0.0
120-160	16.7	27.8	16.7	16.7	5.6
160-200	15.3	11.1	16.7	16.7	16.7
>200	6.9	5.6	11.1	5.6	5.6
	100.0	100.0	100.0	100.0	100.0

* Flow of 0 m^3/s represents occasions where the only flow passing through dams is due to leakage.

For each of the first three weeks in April, the historical flow through the North Bala Dam averaged 100 m^3/s or more at least 50% of the time. However, for the fourth week of April, lowered flows below 10 m^3/s occurred 50% of the time. The lowered flows in the last week correspond with the closure of the dam with the abatement of the freshet, which typically occurs in late April.

The historical records show that the South Bala Dam also passes high flows throughout April. However, unlike the North Dam, high flows above 100 m^3/s occur more than 55% of the time in the last week of April. This reflects the fact that after the closure of the North Dam, all flow at the tail end of the freshet are passed through the South Dam (Table 2.4).

Table 2.4 Historical Flow Frequencies at South Bala Dam During April

Flow (m^3/s)	Relative Flow Frequency (All weeks in April) (%)	Relative Flow Frequency (Week 1) (%)	Relative Flow Frequency (Week 2) (%)	Relative Flow Frequency (Week 3) (%)	Relative Flow Frequency (Week 4) (%)
0 *	0.0	0.0	0.0	0.0	0.0
0-10	5.6	0.0	0.0	5.6	5.6
10-20	9.7	0.0	5.6	5.6	5.6
20-30	6.9	0.0	0.0	5.6	5.6
30-40	2.8	0.0	0.0	0.0	0.0
40-80	20.8	11.1	5.6	11.1	11.1
80-120	19.4	38.9	22.2	22.2	22.2
120-160	13.9	11.1	27.8	22.2	22.2
160-200	11.1	33.3	22.2	16.7	16.7
>200	9.7	5.6	16.7	11.1	11.1
	100.0	100.0	100.0	100.0	100.0

* Flow of 0 m^3/s represents occasions where the only flow passing through dams is due to leakage.

When all weeks in May are considered, there was no flow except leakage through the North Dam 23.3% of the time with flows between 0 and 10 m^3/s occurring 54.4% of the time. This indicates that low flows (10 m^3/s or lower) typically occur at the North Bala Dam 77.8% of the time during the month of May. Flows of 30 m^3/s or less occurred 90% of the time. Flood flows between 100 m^3/s and 200 m^3/s occurred only 3.3% of the time, with extreme floods (over 200 m^3/s) also occurring only 3.3% of the time (Table 2.5).

Table 2.5 Historical Flow Frequencies at North Bala Dam During May

Flow (m^3/s)	Relative Flow Frequency (All weeks in May) (%)	Relative Flow Frequency (Week 1) (%)	Relative Flow Frequency (Week 2) (%)	Relative Flow Frequency (Week 3) (%)	Relative Flow Frequency (Week 4) (%)	Relative Flow Frequency (Week 5) (%)
0 *	23.3	22.2	33.3	22.2	22.2	16.7
0-10	54.4	44.4	50.0	61.1	61.1	55.6
10-20	7.8	11.1	0.0	0.0	5.6	22.2
20-30	4.4	0.0	5.6	11.1	5.6	0.0
30-40	1.1	0.0	0.0	0.0	5.6	0.0
40-80	1.1	0.0	0.0	0.0	0.0	5.6
80-120	0.0	0.0	0.0	0.0	0.0	0.0
120-160	1.1	5.6	0.0	0.0	0.0	0.0
160-200	3.3	5.6	5.6	5.6	0.0	0.0
>200	3.3	11.1	5.6	0.0	0.0	0.0
	100.0	100.0	100.0	100.0	100.0	100.0

For each week in May, the historical flow through the North Bala Dam averaged 10 m^3/s or less at least 66.7% of the time. In fact, for three of the five weeks in May, the North Dam averaged 10 m^3/s or less 83.3% of the time (Table 2.5).

The historical records show that the South Bala Dam is never closed, but rather passes some flow throughout the month of May. When all weeks in May are considered, flows above 20 m^3/s occurred 80% of the time at the South Bala Dam. Flows greater than 70 m^3/s occurred more than 50% of the time. Flood flows between 100 and 200 occurred approximately 39% of the time, with extreme floods (over 200 m^3/s) occurring 6.7% of the time (Table 2.6).

Table 2.6 Historical Flow Frequencies at South Bala Dam During May

Flow (m^3/s)	Relative Flow Frequency (All weeks in May) (%0	Relative Flow Frequency (Week 1) (%)	Relative Flow Frequency (Week 2) (%)	Relative Flow Frequency (Week 3) (%)	Relative Flow Frequency (Week 4) (%)	Relative Flow Frequency (Week 5) (%)
0 *	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
0-10	8.9%	5.6%	5.6%	5.6%	16.7%	11.1%
10-20	11.1%	5.6%	5.6%	22.2%	11.1%	11.1%
20-30	6.7%	11.1%	11.1%	0.0%	5.6%	5.6%
30-40	4.4%	0.0%	0.0%	11.1%	5.6%	5.6%
40-80	20.0%	22.2%	27.8%	22.2%	5.6%	22.2%
80-120	21.1%	22.2%	27.8%	5.6%	27.8%	22.2%
120-160	11.1%	16.7%	5.6%	11.1%	11.1%	11.1%
160-200	10.0%	5.6%	11.1%	11.1%	16.7%	5.6%
>200	6.7%	11.1%	5.6%	11.1%	0.0%	5.6%
	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

*Flow of 0 m^3/s represents occasions where the only flow passing through dams is due to leakage.

2.1.6.2 Surface Water Quality

Surface water samples were collected at one location upstream from the North Bala Dam and one location downstream from the North Bala Dam in September and November 2007 and May 2008. The results of the analysis are summarized in Table 2.7 and complete copies of the laboratory results are provided in Appendix C2.

All parameters were found to have levels well below the respective Provincial Water Quality Objectives (PWQO).

Conductivity was lower in May 2008 than in September and November 2007. Conductivity is a measure of the resistance of a solution to electrical flow and is an indication of, and closely proportional to, the concentration of the major salinity ions (K, Na, Ca, Mg, SO_4, Cl, HCO_3 and CO_3) in the water. The lower results in May 2008 are mostly likely a result of a high percentage of the surface water in the river being supplied by low conductivity snow melt and rainfall, as opposed to higher conductivity groundwater inputs.

Table 2.7 Summary of Water Chemistry Results – 2007/2008

Parameter	Units	MDL	Upstream of Dam			Downstream of Dam			PWQO*
			Sept 2007	Nov 2007	May 2008	Sept 2007	Nov 2007	May 2008	
pH (field)		-	7.87	7.48	7.48	7.51	7.90	7.41	6.5 – 8.5
pH (laboratory)		-	7.20	7.19	7.16	7.24	7.18	6.94	6.5 – 8.5
Water Temperature	°C	-	20.8	9.0	6.6	20.0	9.3	6.6	
Dissolved Oxygen	mg/L	-	7.96	n/a	12.53	7.94	n/a	12.74	4.0
Conductivity	µS/cm	5	56	56	40	56	55	41	
Total Dissolved Solids	mg/L	5	36	36	39	36	36	36	
Total Suspended Solids	mg/L	2	7	<2	<2	<2	<2	7	
Turbidity (field)	NTU	-	2.55	1.45	n/a	2.53	1.69	n/a	
Total Phosphorus	mg/L	0.02	<0.02	<0.02	<0.01	<0.02	<0.02	0.01	0.020 – lakes 0.030 – rivers
Nitrite	mg/L	0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	
Nitrate	mg/L	0.10	<0.10	<0.10	0.21	<0.10	0.16	0.21	
Total Kjeldahl Nitrogen	mg/L	0.10	0.22	0.24	0.31	0.23	0.30	0.35	
Sulphate	mg/L	1	6	6	6	6	6	6	
Chloride	mg/L	1	7	7	6	7	7	6	
Aluminum	mg/L	0.01	<0.01	0.04	0.05	<0.01	0.01		0.075
Barium	mg/L	0.01	0.01	0.01	0.01	0.01	0.01	0.02	
Beryllium	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.011
Boron	mg/L	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.2
Cadmium	mg/L	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0002
Chromium	mg/L	0.001	0.002	<0.001	<0.001	<0.001	<0.001	<0.001	
Cobalt	mg/L	0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0009
Copper	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.005
Iron	mg/L	0.03	<0.03	0.09	0.07	<0.03	0.05	0.12	0.3
Lead	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.001	0.005
Manganese	mg/L	0.01	<0.01	0.02	<0.01	<0.01	0.02	0.01	
Mercury	mg/L	0.0001			<0.0001			<0.0001	0.0002
Molybdenum	mg/L	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.04
Nickel	mg/L	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.025
Silicon	mg/L	0.1	1.4	1.5	1.8	1.4	1.6	1.8	
Silver	mg/L	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0001
Strontium	mg/L	0.001	0.031	0.031	0.026	0.031	0.031	0.027	
Thallium	mg/L	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0003
Titanium	mg/L	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	
Vanadium	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.006
Zinc	mg/L	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	0.03

*Provincial Water Quality Objectives (MOE, 1999)

Total suspended solids (TSS) were below the method detection limit (i.e., < 2 mg/L) except in September 2007 upstream from the North Dam and in May 2008 downstream from the North Dam. TSS is comprised of mineral particles (e.g., clay, silt, sand) and organic particles (e.g., leaf litter) suspended in the water column (Environment Canada, 2002). High TSS upstream from the North Dam in September 2007 is most likely due to sampling error whereby the channel bed substrate was disturbed by the sampler and captured in the water sample. High TSS downstream from the North Dam in May 2008 may be due to erosion at the water's edge resulting in higher TSS concentrations in the shallow nearshore area. Erosion of the sand bank was occurring due to high water levels at the time of sampling.

Nutrient concentrations (nitrogenous compounds including nitrate and total Kjeldahl nitrogen and total phosphorus) were typically somewhat higher in May 2008 compared to the summer and fall sampling periods in 2007. Higher nutrient concentrations in spring may be due to increased nutrient inputs associated with terrestrial runoff from snowmelt and rainfall.

In addition to the above, surface water data from nine MOE surface water quality monitoring sites in the Muskoka River watershed between the years 1984 and 1995 were reviewed. General observations from the data were as follows:

- general physical/chemical parameters including alkalinity, conductivity, pH, chloride ion, and turbidity are reflective of the watershed's location in Ontario and on the Canadian Shield (low alkalinity, conductivity and turbidity, good pH level given the low buffering capacity of the water)
- concentrations of arsenic, nickel and zinc were generally at or below applicable guidelines, although individual samples were occasionally over the limit
- copper and lead were marginally over the guidelines at most sampling sites during most sampling years, although no clear trend was apparent
- iron values were generally below guidelines with the exception of one station in the upper watershed and several yearly maximums in the Moon and Musquash Rivers
- mean phenol concentrations were below the applicable guidelines but at most sampling stations, and yearly maximums slightly exceeded provincial guidelines (Acres International Limited and Acres & Associated Environmental Limited, 2003).

2.1.7 Vegetation

The Muskoka River watershed is part of the Great Lakes-St. Lawrence Forest Region, with the study area being located in the Georgian Bay subsection of this region (Rowe, 1972). The predominant forest trees in this section include sugar maple, beech, basswood, yellow birch, eastern hemlock, eastern white pine, red maple and white ash, which together form mixed stands in upland areas. Jack pine, trembling aspen, red oak, white birch, white spruce and black spruce communities are often found on thin soiled rocky shores (Rowe, 1972).

Vegetation communities within the study area are highly disturbed due to surrounding development including parkland, Muskoka Road 169 and adjacent commercial and residential buildings. A small treed area is present along the shoreline between the north and south falls outflow channels (Vegetation Community A - Figure 2.5), in the area of the proposed powerhouse. A tree/shrub

inventory was undertaken in May 2008 to document the species and abundance within the small area. The results are summarized in Table 2.8.

Table 2.8 Tree/Shrub Inventory Results

Species		Number	
Common Name	**Scientific Name**	**Mature**	**Sapling**
White pine	*Pinus strobus*	7	14
Red pine	*Pinus resinosa*	0	2
Sugar maple	*Acer saccharum*	2	2
Red maple	*Acer rubrum*	4	0
White ash	*Fraxinus americana*	16	0
Staghorn sumac	*Rhus typhina*	5	0
Red oak	*Quercus rubra*	5	0
White birch	*Betula papyrifera*	8	1
Willow	*Salix sp.*	1	0
Largetooth aspen	*Populus grandidentata*	3	18
White elm	*Ulmus Americana*	3	0

The overstorey is dominated by large white pine and red oak and the understorey is dominated by smaller white ash and white birch. Largetooth aspen and white pine are the most prominent sapling trees in the area. Shrubs, including willow and staghorn sumac are present in higher numbers in the southern portion of the area where the overstory is more sparse.

Several eastern white cedar trees and ash trees are present in the very small vegetated patch at the proposed intake location. The remainder of the intake area consists of manicured lawn.

The park on the north side of the North Bala Dam (Vegetation Community B - Figure 2.5) consists of manicured lawn with a number of large white pine trees. Several small trees and shrubs exist on the periphery of the park adjacent to the rock outcrops of the river, including staghorn sumac, red oak, small white pine and poplar species.

2.1.8 Significant Natural Areas

Several areas in the Muskoka River watershed support remnants of Atlantic Coastal Plain Flora. Atlantic Coastal Plain species are those that occur most abundantly on the coastal plain from approximately Cape Cod south to Florida, and along the Gulf Coast to Texas, with limited distribution elsewhere. The MNR (2008) lists Atlantic Coastal Plain shallow marsh habitat as Vulnerable. Coastal plain species are plants of wetland habitats in areas with extensive sandy shorelines, which today are increasingly threatened by shoreline development, shoreline alteration and recreational use. This shoreline vegetation type is sensitive to water level changes and, in fact, it benefits from fluctuating water levels, which help to prevent shrub growth (Reid and Holland, 1997). Twenty-three species of plants, many of which are rare, threatened or endangered, have been identified as characteristic coastal plain flora in the Muskoka area (Keddy and Sharp, 1989). No Atlantic Coastal Plain species are known to exist within the project area; two sites are 4 to 7 km downstream as noted below and in Figure 2.6.

The Gaunt Bay and Upper Moon River Atlantic Coastal Plain Flora Life Science Site is located approximately 4 km downstream from North Bala Dam (Figure 2.6). The 2-ha area has a good representation of Atlantic Coastal Plain Flora, with 15 species being recorded along an undeveloped stretch of shoreline on the north side of the river. The shallow shoreline, fluctuating water levels and

sand and clay substrate are ideal conditions for this vegetation community type (MNR, 1998a; Reid and Bergsma, 1994; in MNR, 1998a).

The Musquash River Atlantic Coastal Plain Flora Life Science Site is located approximately 7 km downstream from North Bala Dam (Figure 2.6). The two areas associated with this Life Science Site (i.e., around Ragged Rapids Generating Station and Big Eddy Generating Station on the Musquash River) both support Atlantic Coastal Plain Flora species (MNR, 1998b; Reid and Bergsma, 1994; in MNR, 1998b).

The Moon River Conservation Reserve, which was regulated in June 2006, is located on the shore of the Moon River, approximately 16 km downstream from Bala (Figure 2.6). The site contains a variety of habitats including steep rocky slopes and low cliffs adjacent to the Moon River with upland sugar maple and hemlock forests on shallow sandy soils or bare bedrock. The site provides habitat for the nationally threatened eastern massasauga rattlesnake (*Sistrurus catenatus*) and the nationally vulnerable eastern hognose snake (*Heterodon platirhinos*). Uses of the area include hunting, trapping and snowmobiling and there area several recreational camps and one trappers cabin in the area (MNR, 2006b).

The Lower Moon River Conservation Reserve is located on the shore of the Moon River, approximately 20 km downstream from Bala (Figure 2.6). The site contains diverse habitat and fauna typical of the Georgian Bay landscape, and protects habitat for nationally and provincially rare species of plants. The area is also used for canoeing and hunting and there is a recreation camp in the area. The site has also been designated as a Muskoka Heritage area (MNR, 2006c).

The lower portion of the Muskoka River watershed is also part of the Georgian Bay Biosphere Reserve, which is one of the 13 World Biosphere Sites in Canada, as designated by the United Nations Educational, Scientific and Cultural Organization (UNESCO). The Biosphere Reserve extends from the Severn River in the south to the French River in the north and from the waters of Georgian Bay, inland to approximately the location of Highway 400/69 (Figure 2.5). The Biosphere Reserve recognizes the east coast of Georgian Bay, which is considered to be the world's largest archipelago, as well as home to over 100 species of rare plants and animals. The intent of a Biosphere Reserve is to

- contribute to the conservation of landscapes, ecosystems, species and genetic variation
- to foster economic and human development which is socio-culturally and ecologically sustainable
- to provide support for research, monitoring, education and information exchange related to local, national and global issues of conservation and development (Georgian Bay Biosphere Reserve Inc., Undated).

Several other protected areas are shown in Figure 2.5, although these are located outside of the project study area. This includes The Massassauga Provincial Park, O'Donnell Point Provincial Park, Six Mile Lake Provincial Park, Gibson River Provincial Park and Awenda Provincial Park.

2.1.9 Terrestrial Wildlife

The most common mammals utilizing the study area are likely those small mammals tolerant of urban and semi-urban habitats. Based on species range maps (Dobbyn, 1994) and habitat preferences (MNR, 2000), this could potentially include species such as masked shrew (*Sorex*

cinereus), smoky shrew (*Sorex fumeus*), northern short tailed shrew (*Blarina brevicauda*), hairy tailed mole (*Parascalops breweri*), star nosed mole (*Condylura cristata*), little brown bat (*Myotis lucifuga*), northern long-eared bat (*Myotis septentrionalis*), big brown bat (*Eptesicus fuscus*), eastern cottontail (*Sylvilagus floridanus*), eastern chipmunk (*Tamia striatus*), woodchuck (*Marmota monax*), gray squirrel (*Sciurus carolinensis*), red squirrel (*Tamiasciurus hudsonicus*), beaver (*Castor canadensis*), white footed mouse (*Peromyscus leucopus*), deer mouse (*Peromyscus maniculatus*), meadow vole (*Microtus pennsylvanicus*), muskrat (*Ondatra zibethicus*), raccoon (*Procyon lotor*), mink (*Mustela vison*) and striped skunk (*Mephitis mephitis*).

Beaver were observed in the Burgess Generating Station tailrace in May 2008 and evidence of beaver presence (cut trees) was observed in the proposed powerhouse area.

Although the Muskoka region does not lie within a major migratory flyway, many migratory waterfowl species are found in the watershed. Some of the more common species include mallard duck (*Anas platyrhynchos*), black duck (*Anas rubripes*), great blue heron (*Ardea herodius*), Canada goose (*Branta canadensis*), and common loon (*Gavia immer*). Loons were observed in the Bala Reach in May 2008.

A number of reptiles (i.e., snakes and turtles) and amphibian (i.e., frogs and salamanders) are present in the Muskoka River watershed. However, given the general lack of suitable terrestrial and wetland habitat within the study area, populations in the vicinity are likely limited to very common species such as American toad (*Bufo americanus*). MNR (2007a) notes that the Moon and Musquash Rivers downstream from the Bala Reach have populations of reptile and amphibian species at risk including Eastern Massassauga Rattlesnake, eastern hog-nosed snake, eastern foxsnake, Blanding's turtle, map turtle, musk turtle and five-lined skink.

2.1.10 Aquatic Habitat

General aquatic habitat features within the project area are depicted in Figure 2.7. In general, the areas upstream and downstream from the North and South Bala Dams (i.e., Lake Muskoka and Bala Reach) are essentially lacustrine in nature, characterized by deep water with relatively low flow velocities. The areas immediately downstream from each of the dams are riverine in nature, being predominantly rapids flowing over exposed bedrock and a variety of other rocky substrates. Specific aquatic habitat areas are discussed in more detail in the following sections.

Proposed Intake Area

The proposed intake area is situated on the south side of the channel between the Muskoka Road 169 and CPR bridges (Figure 1.2), approximately 40 m upstream from the North Bala Dam. The river channel in this area constitutes the primary outflow of Lake Muskoka. It consists of an approximately 120-m long by 50-m wide flow channel leading from Bala Bay. During low flow periods, water velocity in the channel is very slow, although during high flow periods such as that observed during May 2008, velocity in the channel is around 0.5 m/s. Water depth under the Muskoka Road 169 bridge was greater than 1.5 m in the centre of the channel. Water depth progressively increases in an upstream direction toward Bala Bay and reaches a maximum depth of approximately 8 m in a deep hole between the Muskoka Road 169 and CPR bridges.

The bank in the area of the proposed intake is approximately 20 m long on the south side of the channel upstream from the Muskoka Road 169 bridge. The bank consists of mowed grass, (associated with the lawn of the adjacent commercial development), to the water's edge. The shoreline consists predominantly of an approximately 4-m wide band of gravel fill, likely dumped to

form a boat launch. Adjacent areas are dominated by a mix of rocky substrates underlain by sand. Beyond this narrow band of gravel, substrate in the remainder of the area consists predominantly of scattered boulders and cobbles over bedrock, which forms 70% of the substrate composition, by surface area. Pumpkinseed and rock bass were captured along the south shore of the channel upstream from the North Bala Dam in September 2007. Rainbow smelt were observed off the Purk's Place dock in April 2008. The area likely provides seasonal residence and foraging habitat for these and other small species and may provide some foraging habitat for larger fish that may move in from Bala Bay (e.g., northern pike, walleye, smallmouth bass). Benthic invertebrates also reside in the area upstream from North Bala Dam (see Section 2.1.12), although invertebrate density is lower than in the rapids downstream from the North and South Dams. The area does not appear to provide any specific spawning or nursery habitat for game species.

The northern bank of the channel upstream from North Bala Dam (downstream of Muskoka Road 169) consists of a narrow band of emergent vegetation (sedges and cattails) over substrate of sand (80%) and gravel (20%) with some cobble and boulder closer to the North Bala Dam. The bank is vegetated with shrubs, several ash trees and two larger white pines. The narrow littoral zone transitions relatively quickly into the cobble and boulder over sand habitat through the majority of the channel cross section in this area.

There are two concrete piers associated with the Muskoka Road 169 bridge in the water just downstream of the proposed intake location.

The MNR has identified a narrow band along the shorelines of this channel from Bala Bay downstream to just below the rail bridge (i.e., immediately upstream of the proposed intake area) as Type 2 fish habitat (MNR, 2007b) (Figure 2.7), locations are

> "habitats that are moderately sensitive to the potential impacts of development and although important to fish populations, do not limit the productivity of fish either directly or indirectly. These habitats are usually abundant and another habitat component is the limiting factor in fish production." (MNR, Undated).

The shoreline area between the North and South Dams primarily consists of a shallow littoral zone band with a mix of rocky substrates including cobble, boulder and gravel over sand. Shorelines are predominantly parkland consisting of grass lawns, although several larger overhanging trees are present. This area does provide habitat for fish and benthic invertebrates but is likely similar to shoreline habitat throughout Bala Bay and does not appear to provide critical spawning or nursery habitat. No walleye were observed in the area during the walleye spawning period in May 2008.

Downstream from North Bala Dam

The reach between the North Bala Dam and the base of Bala Falls is approximately 25 m long. Wetted width varies depending on flow rate, with the normal high flow width being approximately 30 m wide and the low flow width being approximately 10 to 15 m wide. Flow in the reach downstream from the dam during low flow periods is predominantly due to leakage through several of the bays of the dam. Accordingly, there are several flow channels through the reach, which converge near the base of the reach before emptying into the tailwater. The majority of the reach downstream from the dam is characterized by exposed bedrock due to scouring afforded by high velocity flows that occur during high flow periods. Gradient through the majority of this reach is relatively high and there are several small to medium size rapid topographic elevation changes that create barriers to upstream movement during low flow periods. The North Bala Dam creates a barrier to farther upstream fish movement during all flow periods.

Fish and benthic invertebrate habitat within the bedrock dominated higher gradient reach immediately downstream from the dam is relatively limited due to lack of cover opportunities, shallow flow depth, high velocity flow and several barriers to movement. Some specialized benthic invertebrates may be able to colonize bedrock dominated areas and small areas of accumulated cobble, but overall productivity is likely limited within this reach.

The downstream end of the falls reach is characterized by a variety of flow, velocity, water depth and substrate conditions, which provide a variety of habitat niches for a relatively productive fish community (see Section 2.1.11) and benthic invertebrate community (see Section 2.1.12). Flow at the base of the rapids creates a higher velocity flow environment, with substrate in some places, scoured to bedrock. In other areas the higher velocities maintain a relatively clean bed of cobble, boulder and gravel. Walleye spawning habitat enhancement works were conducted at the site in 1997/98 to improve the availability of rocky spawning areas (see Section 2.1.10.1). These rocky areas create good habitat conditions for small fish (see Section 2.10) and benthic invertebrates (see Section 2.1.12). During the low flow period in September 2007, the most productive rocky habitat on the north side of the falls was composed of approximately 50% cobble and 50% boulder with water depths ranging from 0.20 to 0.40 m and flow velocities in the order of 0.10 to 0.40 m/s. Boulder dominated areas and gravel dominated areas also exist in this location. Benthic invertebrates reside in the area due to the variety of rocky and fast water habitat conditions and likely constitute the main forage base for the abundant small fish in the area. Based on the presence of relatively abundant young of the year (YOY) smallmouth bass in the rocky areas, it is likely that this area provides nursery and foraging habitat for the young of this species. Other fish such as longnose dace likely reside in the rocky higher flow velocity environments on a year-round basis as they are adapted to this type of habitat (Scott and Crossman, 1998). As will be discussed in the Section 2.1.10.1, the rocky habitats in this area are primarily the result of habitat enhancement work aimed at providing walleye spawning habitat.

Shorelines in this area are dominated by exposed bedrock, as is the channel bed beyond the limit of the walleye spawning enhancement area on the north shore. Bedrock predominates on the southern shore of the river at the tail end of the rapids. The shallow features downstream from the end of the rapids/falls persist for a distance of approximately 10 to 25 m before dropping off into deeper (i.e., >2 m), slower moving waters.

The MNR has identified the entire area downstream from the North Bala Dam as Type 1 habitat (MNR, 2007b) (see Figure 2.6), based on the spawning, nursery and foraging opportunities it provides, although based on site observations, the most productive habitat is likely the cobble/boulder dominated area on the north shore. Type 1 habitat is defined as

> "rare or highly sensitive to the potential impacts of development or limit fish productivity either directly or indirectly in a specified water body or portion of a water body. Where these habitats are limiting, productivity would be expected to diminish if they are harmed. Examples of Type 1 habitats include spawning, nursery, rearing, shelter, refuge and highly productive food supply areas of fish species important to local commercial, recreational or subsistence fisheries." (MNR, undated).

Downstream from South Bala Dam

The channel downstream from the South Bala Dam is approximately 140 m long and 15 to 25 m wide depending on flow rates. The channel flows under the Bala Falls Road bridge approximately 15 m downstream from the South Bala Dam. The area between the dam and bridge is relatively low

gradient and consists entirely of bedrock. The channel drops approximately 1.5 m after flowing under the Bala Falls Road bridge over a high gradient bedrock outcrop. Exposed bedrock dominates the substrate in the 40-m long reach between the road bridge and the CPR train bridge, although there is a large (approximately 15 m by 10 m) accumulation of boulder (80%) and cobble (20%) over bedrock. The area may provide some habitat for small fish and benthic invertebrates but upstream movement to the area is not possible during low flow periods due to a bedrock ridge located downstream from the patch.

The remainder of the channel consists of a relatively straight reach from the rail bridge, under the Muskoka Road 169 bridge (which spans the channel with no instream structures) to the more lacustrine portion of the Bala Reach. The north shore is dominated by a bedrock terrace, which is exposed during low flow periods and submerged during high flow periods. The southern shore consists of a concrete retaining wall and primarily boulder-sized riprap around the Muskoka Road 169 bridge abutment. The instream portion of the channel consists predominantly of large boulders (~1 m in diameter) over bedrock with some cobble in the interstices of the boulders. Average water depth during the late summer period is >1 m, although there is one pool that is >1.5 m during low flow periods. During high flow periods the reach consists almost entirely of high velocity whitewater flow. There are several areas of accumulated cobble and boulder on the north shore ranging in composition from 30 to 50% cobble and 50 to 70% boulder. These areas were found to be providing habitat for a variety of fish species including YOY smallmouth bass, largemouth bass and yellow perch in September 2007 (Section 2.1.11). They also provide habitat for benthic invertebrates (Section 2.1.12). YOY fish are likely attracted to the area as nursery habitat due to the presence of benthic invertebrate and baitfish forage, cover (boulders and deeper pool) and variety of flow niche conditions. The channel between the south dam and outflow beneath Muskoka Road 169 bridge does not appear suitable to provide walleye spawning habitat given the very high flow velocities encountered during the spring freshet.

Shoreline between Bala Dams

The area between the channels downstream from the North and South Bala Dams consists of approximately 80 m of shoreline, characterized by a range of substrates and a relatively narrow littoral zone band (4 to 10 m in width) bordered by deeper water (>2 m). Substrates present in the shallow areas along shore include exposed bedrock, gravel and sand beach and accumulations of cobble and boulder. Some of the area is comprised of fill installed when the former powerhouse and tailrace channel, which cut through this area, was decommissioned. Aquatic vegetation, including submerged pondweed (*Potamogeton* sp.) and emergent pipewort (*Eriocaulon aquaticum*) is scattered in several areas of accumulated sand and fine sediments. The area is essentially lacustrine in nature during low flow portions of the year, with very little velocity resulting from flow in the Bala Reach, and predominantly current movement due to wave action on the shoreline. However, during higher flow periods, the area experiences some flow velocity due to riverine flow from the North and South Dams. The area provides residence and foraging habitat for a variety of small and juvenile fish, as they forage and hide among the rocks and aquatic vegetation. YOY smallmouth bass were utilizing the area in September 2007. The area also provides habitat for benthic invertebrates (see Section 2.1.11). Game fish may forage in the area on a periodic basis.

A small portion of the area on the north shore near the outflow from the South Dam channel downstream of Muskoka Road 169 consists of cobble, installed in 1997 and 1998 to provide enhanced spawning habitat for walleye (see Section 2.1.10.1). During low flow periods this area is not subject to higher velocity flow conditions but does provide habitat for benthic invertebrates and small fish.

Offshore Area in Proposed Tailrace

Aquatic habitat in the offshore area in the proposed tailrace and cofferdam area was assessed in May 2008 using an underwater camera to determine substrate and aquatic habitat features. The area is approximately 4 to 5 m deep during normal high water conditions. Flow velocity is present in the area during higher water periods when flow from the North and South dams converge adjacent to this area. During lower flow periods (such as those observed during September 2007), little velocity is observed in this area.

The narrow littoral band described above typically transitions to deeper water at a relatively steep bedrock drop off (approximately 1 m high) through the majority of the tailrace area. Substrate in the area is dominated by bedrock (average of 40% surficial area coverage), cobble (30%), boulder (10%) and gravel (20%). Some scattered logs and wood chips were observed on the bottom in areas of lower flow velocity.

The area likely provides residence and foraging habitat for the range of fish species known to be present in the Bala Reach. Areas with gravel bordered by woody debris, boulders or bedrock drop offs may provide spawning habitat for smallmouth bass, although this habitat type appears relatively abundant within the study area. Benthic invertebrates also likely reside in the area. No aquatic vegetation was observed.

Burgess Generating Station Tailrace (Old Mill Stream)

The Burgess Generating Station (Figure 2.8) discharges to an approximately 8-m wide channel, locally known at the Old Mill Stream, which flows for approximately 80 m before emptying into the north side of the Bala Reach approximately 240 m downstream from the base of the North Bala Falls. The channel is dominated by rocky substrate including cobble and gravel over bedrock, and forms a riffle during low flow periods and a moderate flowing run during high flow periods when the Bala Reach water level backs up into the tailrace channel. In spring of 2008, at a flow rate of approximately 330 m^3/s in the river, the Bala Reach water level backed up almost to the base of Burgess Generating Station. Water depth at the outflow of Burgess Generating Station was approximately 3 m with the bed rapidly rising downstream from the generating station outflow.

Walleye spawning habitat enhancements were conducted at the mouth of the tailrace channel in 1997 and 1998 (see Section 2.1.10.1). Substrate throughout the remainder of the channel consists of gravel and sand with some scattered cobble and boulder. Shorelines are a mix of overhanging vegetation including grasses and shrubs, with some riparian tree cover, with manicured lawn being predominant around the Burgess Generating Station. There are some overhanging banks that provide additional cover for fish. A local angler indicated that a variety of fish species including walleye, rainbow trout and lake trout forage in the channel at times throughout the year[1]. Walleye and rainbow smelt also spawn in and around the mouth of the channel (Section 2.1.11.1).

2.1.10.1 Walleye Spawning Habitat

Esplen (1998a) noted that the area downstream from Bala Falls and the mouth of the Old Mill Stream downstream from Burgess Generating Station had historically been walleye spawning areas, although by 1996, the suitability of these sites had decreased due to spawning substrate being washed away or otherwise damaged. In order to remedy this situation and improve walleye spawning habitat in the

[1] MNR (2009) indicated that rainbow trout and lake trout are not known to inhabit Bala Reach; therefore, this could be a misidentification by the angler. However, MNR also noted that lake trout could potentially move downstream from Lake Muskoka, but that such fish would usually be stocked individuals.

area, the Moon River Ratepayers Association and Moon River Conservation Club, in cooperation with the MNR, initiated a spawning habitat enhancement program under the Community Fisheries Involvement Program (CFIP). In September 1997, 39.8 tons of round river stone were placed at three sites in the study area including near the base of the north falls, at the base of the south falls flow channel and at the mouth of Old Mill Stream, as shown in Figures 2.7 and 2.10 (Esplen, 1998a). In September 1998, an additional 49.5 tons of rounded river stone were added to these three locations to further enhance walleye spawning habitat (Esplen, 1998b).

The MNR currently considers the areas at the base of the North Bala Dam and on the Old Mill Stream downstream from Burgess Generating Station to be Type 1 fish habitat, the boundaries of which are shown in Figures 2.6 and 2.7 (MNR, 2007b).

These walleye spawning areas were investigated during the low flow period in September 2007 and then again during the spring of 2008 during walleye spawning investigations. Habitat characteristics, including substrate, water depth and flow velocities at these three sites are summarized in Table 2.9.

Table 2.9 Habitat Characteristics in Walleye Spawning Areas

Site	Substrate	September 2007 (m^3/s)		April 23, 2008 (m^3/s)		May 7, 2008 (m^3/s)	
		Water Depth (m)	Flow Velocity (m/s)	Water Depth (m)	Flow Velocity (m/s)	Water Depth (m)	Flow Velocity (m/s)
North Falls	Cobble 40-60% Boulder 30-60% Gravel 10%	0.30-0.40	0.10-0.20	1.4-1.65	0.35-1.5	1.07-1.50	0.13-0.94
South Falls	Cobble 30-50% Boulder 70-50%	1-1.5	0.05	1.0 - 2.2	0.4-1.4	0.87-1.7	0.18-0.33
Burgess GS Tailrace	Cobble 0-95% Gravel 0-60% Bedrock 0-100%	n/a	n/a	0.5-1.0	0.30-1.47	0.5-1.0	0.30-1.47
Old Mill Stream Mouth	Boulder 0-15% Cobble 15-100% Gravel 0-40%	n/a	n/a	n/a	n/a	0.55-1.78	0.20-0.97

2.1.10.2 Habitat Farther Downstream

Bala Reach runs for approximately 5.3 km downstream from Bala before splitting into two branches, being the Moon River and the Musquash River downstream from the Moon Chutes, which is a narrow constriction in the river channel that controls water levels within the Bala Reach. The Moon River flows northwest, past Moon Dam en route to Georgian Bay. The Musquash River flows through two hydroelectric stations (Ragged Rapids and Big Eddy), both owned by OPG, through Go Home Lake and the Go Home Lake Dam (owned by MNR) en route to Georgian Bay.

Walleye are known to spawn at Moon Falls on the Moon River, approximately 30 km downstream from the North Bala Dam. This site was historically important for the Georgian Bay walleye population, supporting an estimated 30,000 spawning walleye around 1970 (EGBSC et al., 2007). However, a significant decline in the walleye population occurred over subsequent years, with the population reaching an estimated low of 1200 fish in 2005

(Gonder, in press; cited in EGBSC et al., 2007). Potential factors contributing to the decline in the walleye population potentially include impacts due to historical log driving, harvesting due to sport, commercial and First Nations fisheries, effects due to the flow regime (e.g., dewatering of incubating eggs), potential impacts of past stockings (e.g., decreases in genetic diversity), effects due to invasive species and low levels of suitable spawning habitat (EGBSC et al., 2007).

A comprehensive rehabilitation plan is currently in development in order to rehabilitate the Moon River walleye population. The plan consists of seven main components including regulation of the flow regime, enhancement of spawning habitat, stocking of walleye, collaboration with First Nations regarding their harvest, review of sport and commercial fisheries harvest regulations, increased enforcement and monitoring and assessment (EGBSC et al., 2007). The timeframe for plan implementation was identified as the period from 2007 to 2011.

Provision of suitable flow for walleye spawning and incubation below Moon Falls was one of the factors considered during the preparation of the MRWMP. The WMP, which came into effect in April 2006, specifies that a minimum flow of 14 m^3/s is to be maintained through the Moon River Dam by OPG during the spawning and incubation period (April 15 to June 1) to ensure that adequate flow is maintained for walleye spawning and to ensure that incubating eggs and fry are not dewatered. During this period, the dams at Bala are operated to ensure that provision of this minimum flow through the Moon River Dam is possible, while also ensuring adequate flow for power generation at Musquash River (MNR, 2007a).

MNR (2007a) also indicated that "when watershed conditions permit, the Bala Dams are currently operated during the spring freshet in a manner to prevent large flow increases (in excess of OPG plant capacities) from being released and diverted down the Moon River during the walleye reproductive schedule. Large flow fluctuations in Moon River can negatively impact spawning and egg/fry survival."

2.1.11 Fish Species

2.1.11.1 Bala Reach

Historical Information

MNR (1999) indicated that prior to 1960, the Bala Reach sustained a good recreational walleye fishery. Walleye were stocked in the reach from 1943 to 1954. However, the quality of the fishery began to decline in the 1960's, with a 1972 report by the MOE indicating that the pesticide DDT, which affects fry survival, was the primary cause of the collapse of fish stocks in the larger Muskoka Lakes (MNR, 1999). Since Bala Reach is immediately downstream of Lake Muskoka, it was thought that DDT was primarily to blame for the decrease in walleye stocks in the area[2].

A netting assessment conducted in the Bala Reach in 1980 found fish species including rainbow smelt (*Osmerus mordax*), white sucker (*Catostomus commersonii*), brown bullhead (*Ictalurus nebulosus*), rock bass (*Ambloplites rupestris*), pumpkinseed (*Lepomis gibbosus*), smallmouth bass (*Micropterus dolomieui*) and yellow perch (*Perca flavescens*) (MNR, 1999). No walleye were captured during this assessment.

[2] DDT is now found in very low levels in various fish species in the Muskoka Lakes, and the Lake Muskoka walleye population showed signs of strong recovery at the end of the 1990's (MNR, 1999).

In 1997, 50 adult walleye were transferred from Go Home Lake to the Bala Reach (Esplen, 1998a) in order to supplement the adult population of the reach. The Go Home Lake walleye population is thought to be a native, self-sustaining population since the lake has never been stocked with walleye (MNR, 1999).

As indicated in Section 2.1.10.1, the primary spawning locations for walleye in the Bala Reach were historically thought to be at the base of Bala Falls and at the mouth of the Old Mill Stream downstream from Burgess Generating Station (Esplen, 1998a). In 1997 and 1998, walleye spawning habitat was enhanced in the area in an attempt to improve reproductive conditions for this species (Esplen, 1998a; Esplen, 1998b), as discussed in Section 2.1.10.1. However, less than four walleye were observed in the enhanced spawning areas in the springs of 1998 and 1999 (MNR, 1999; Esplen, 1998a).

In the fall of 2000, MNR stocked 10,000 walleye fingerlings into the Bala Reach in order to rehabilitate the remnant native walleye population (Taylor, 2004; MNR, 1999; Esplen, 1998a). Fingerlings were fin clipped to facilitate future identification.

Trap Netting - 2004

MNR conducted an End of Spring Trap Netting (ESTN) study in Bala Reach in 2004 in order to determine the status of the walleye population and assess the success of past walleye stocking (Taylor, 2004). Table 2.10 provides a summary of the results of the ESTN assessment.

Table 2.10 Summary of Bala Reach ESTN, 2004 (Taylor, 2004)

Common Name	Scientific Name	Number Caught	Length Range (mm)	Age Range
Northern pike	*Esox lucius*	50	525 to 975	2 to 10
White sucker	*Catostomus commersonii*	6		
Brown bullhead	*Ictalurus nebulosus*	28		
Rock bass	*Ambloplites rupestris*	589		
Pumpkinseed	*Lepomis gibbosus*	9		
Smallmouth bass	*Micropterus dolomieui*	129	213 to 463	3 to 13
Largemouth Bass	*Micropterus salmoides*	2		
Black crappie	*Pomoxis nigromaculatus*	1		
Walleye	*Sander vitreus*	21	300 to 660	2 to 7

Taylor (2004) indicated that 62% of the walleye captured were 3-yr old fish and these were likely the progeny of the adult fish transferred from Go Home Lake to Bala Reach in 1997. Of the five 4-yr old fish captured, two were from the 2000 stocking conducted by MNR, based on the presence of a ventral fin clip. The walleye that were captured appeared to be in good condition and had good growth rates. However, based on comparison with the results of other ESTN surveys of walleye lakes in southern Ontario, the Bala Reach population would be considered to be very small in size.

Electrofishing - 2007

Hatch Energy conducted an electrofishing survey in the study area in September 2007. Backpack electrofishing was conducted in four areas including the base of the north falls, the shoreline between the north and south falls, in the channel downstream from the south falls and in the area

upstream from the North Bala Dam (Figure 2.10). The results are summarized in Table 2.11, and raw data is provided in Appendix C3.

Table 2.11 Summary of Electrofishing Results – September 2007

Common Name	Scientific Name	Downstream from North Dam		Shoreline Between Dams		Downstream from South Dam		Upstream from North Dam		Overall CPUE
		No.	CPUE	No.	CPUE	No.	CPUE	No.	CPUE	
Hornyhead chub	*Nocomis bigguttatus*	1	0.063	1	0.094	0	n/a	0	n/a	0.055
Emerald shiner	*Notropis atherinoides*	0	n/a	1	0.094	0	n/a	0	n/a	0.027
Longnose dace	*Rhinicthys cataractae*	6	0.377	0	n/a	1	0.131	0	n/a	0.192
Rock bass	*Ambloplites rupestris*	5	0.313	1	0.094	0	n/a	1	0.452	0.192
Pumpkinseed	*Lepomis gibbosus*	5	0.313	4	0.377	5	0.654	1	0.452	0.412
Smallmouth bass	*Micropterus dolomieui*	17	1.064	4	0.377	5	0.654	0	n/a	0.714
Largemouth bass	*Micropterus salmoides*	0	n/a	0	n/a	3	0.393	0	n/a	0.082
Logperch	*Percina caprodes*	9	0.564	8	0.755	2	0.262	0	n/a	0.522
Yellow perch	*Perca flavescens*	0	n/a	0	n/a	1	0.131	0	n/a	0.027
	Species Richness		6		6		6		2	9
	Total	43	2.692	19	1.190	17	2.225	2	0.905	2.224

CPUE – Catch Per Unit Effort defined as number of fish caught per 100 seconds of shocking

The area downstream from the North Bala Dam had the highest CPUE of all the sampling locations (CPUE – 2.692), followed by the area downstream from the South Bala Dam (CPUE – 2.225), the area along the shoreline between the dams (CPUE – 1.190) and the small area at the proposed intake location upstream from the North Bala Dam (CPUE – 0.905). The area downstream from North Bala Dam is likely most productive due to the range of habitat conditions found (based on range and type of substrate and range of water depths and flow velocities) and associated cover and foraging opportunities for small fish and benthic invertebrates, which likely form much of the forage base for small fish in this area. The lacustrine like habitats along the shoreline and upstream from the North Dam, typically had lower habitat heterogeneity also had correspondingly lower CPUE.

Smallmouth bass were the most abundant species captured during the study (CPUE – 0.714) followed by Logperch (CPUE – 0.522) and pumpkinseed (CPUE – 0.412). Smallmouth bass were locally dominant downstream from the North Bala Dam and in the channel downstream from the South Bala Dam, although no bass were collected upstream from the North Bala Dam. Pumpkinseed was the most widely distributed species, being collected at each of the four sampling sites.

Yellow perch and largemouth bass were only captured in the channel downstream from the South Bala Dam and emerald shiner was only captured in lacustrine littoral zone habitat on the shoreline of the island between the two dams. Longnose dace was locally abundant in the fast water rocky habitats at the base of the North Bala Dam but was not present in lacustrine like habitats elsewhere.

The Muskoka River is outside of the normal range of hornyhead chub (Scholten, pers. comm. 2007a), although the range of this species has widened in Ontario due to unintentional baitfish introductions (Eakins, 2007).

Other Information

A local angler was interviewed by Hatch Energy field personnel in April 2008. The angler indicated that walleye were residing in the Burgess Generating Station tailrace at the time and that rainbow

trout (*Onchorynchus mykiss*) were also present in the tailrace, utilizing undercut banks and overhanging trees and shrubs for cover. The angler indicated that rainbow smelt come up the tailrace to spawn in the early spring. He has also observed lake trout (*Salvelinus namaycush*) within the Burgess Generating Station tailrace.

Walleye Spawning Surveys – 2007

Walleye spawning surveys were conducted by a local citizen from April 26 to May 8, 2007 in the area downstream from the North and South Bala Dams and at the mouth of Old Mill Stream downstream from Burgess Generating Station. The maximum number of walleye observed in the area in one night was 34 on April 27, 2007. Numbers then decreased until May 6, 2007, when 24 walleye were observed in the area. Only one walleye was observed in the Old Mill Stream throughout the duration of the observations. The majority of the walleye observed were found on the north shore of the river downstream from the base of the North Bala Falls, although fish were also observed at the mouth of channel downstream from South Bala Falls (Hiebert, 2007).

Walleye Spawning Surveys – 2008

Walleye spawning surveys were conducted in the study area by Hatch Energy in spring 2008. Surveys initially commenced on April 22/23 but were then suspended until May 5, due to low water temperatures. Surveys began again on May 5 and ran until May 9. During that time, water temperature ranged from 6.1°C to 6.8°C. Results of the spawning survey are summarized in the following sections.

Night Lighting - Night lighting was undertaken on the nights of April 22 and May 5 to 8, utilizing high power spotlights in an attempt to view walleye in shallow spawning locations. Lighting typically commenced at the onset of darkness (~21:30 hours) and continued until all sites were surveyed twice (typically around 00:30 hours). Sites surveyed included the channels downstream from the north and south dams, the shoreline between the north and south channels, the Burgess Generating Station tailrace (from the generating station to the bridge) and at the mouth of the Old Mill Stream (from the mouth to the bridge). The results are summarized in Table 2.12.

Table 2.12 Night Lighting Results

Date	Location	Species	Number	Water Temperature
April 23	North Channel	No fish	0	4.6
	Shoreline	No fish	0	
	South Channel	No fish	0	
	Old Mill Stream Mouth to Bridge	Rainbow smelt	~100	
	Burgess GS to Bridge	Rainbow smelt	~1000's	
		Walleye	1	
May 5	North Channel	Walleye	1	6.1
	Shoreline	No fish	0	
	South Channel	No fish	0	
	Old Mill Stream mouth to bridge	Walleye	2	
		White sucker	1	
	Burgess GS to Bridge	Walleye	23	
		White sucker	5	

Date	Location	Species	Number	Water Temperature
May 6	North Channel	Walleye	1	6.3
	Shoreline	No fish	0	
	South Channel	Walleye	1	
	Old Mill Stream mouth to bridge	Walleye	4	
	Burgess GS to Bridge	Walleye	15	
		White sucker	3	
May 7	North Channel	Walleye	1	6.7
	Shoreline	No fish	0	
	South Channel	Walleye	2	
	Old Mill Stream mouth to bridge	Walleye	3	
	Burgess GS to Bridge	Walleye	22	
		White sucker	5	
	Town Dock	No fish	0	
May 8	North Channel	Walleye	1	6.8
	Shoreline	No fish	0	
	South Channel	Walleye	1	
	Old Mill Stream mouth to bridge	Walleye	2	
	Burgess GS to Bridge	Walleye	12	
		White sucker	15	
	Town Dock	Walleye	1	

Night lighting was also conducted by a local citizen on eight occasions between April 29 and May 24, 2008. The results are summarized in Table 2.13.

Table 2.13 Night Lighting Results (April 29 to May 24, 2008) (Hiebert, 2008)

	Number of Walleye Observed					
Date	Downstream of North Dam	Federal Dock	Downstream of South Dam (Right)	Downstream of South Dam (Left)	Mouth of Old Mill Stream	Burgess GS Tailrace
April 29	0	0	0	0	0	0
May 9	0	n/a	0	1	n/a	13
May 10	0	n/a	0	1	n/a	15
May 16	0	n/a	0	1	0	16
May 17	0	1	0	0	n/a	n/a
May 18	0	1	0	0	0	1
May 23	11	0	0	2	n/a	n/a
May 24	11	0	0	2	n/a	n/a

Egg Collection - Egg collection mats, consisting of furnace filter wrapped around concrete blocks, were deployed at four locations within the study area including downstream from the Burgess Generating Station and within the walleye spawning habitat creation areas downstream from the north and south dams and at the mouth of the Old Mill Stream. Table 2.14 summarizes the results of the egg collections.

Table 2.14 Egg Collection Results

Location	Deployed	Checked	Number of Eggs/Species
North Dam	May 5 – 17:55	May 6 – 09:25	0
	May 6 – 17:40	May 7 – 13:27	0
	May 7 – 13:30	May 8 – 12:15	0
	May 8 – 12:20	May 9 – 08:05	4 - walleye
South Dam	May 6 – 17:47	May 7 – 13:19	0
	May 7 – 13:24	May 8 – 11:10	0
	May 8 – 11:20	May 9 – 08:00	0
Old Mill Stream Mouth	May 6 – 17:32	May 7 – 13:33	3 – white sucker
	May 7 – 13:40	May 8 – 11:25	4 – white sucker 1 - walleye
	May 8 – 11:35	May 9 – 08:15	1 – white sucker 1 - walleye
Burgess GS	May 6 – 16:55	May 7 – 12:50	0
	May 7 – 12:55	May 8 – 10:50	0
	May 8 – 11:00	May 9 – 08:50	2 – white sucker

Walleye eggs were collected downstream from the North Dam and at the mouth of the Old Mill Stream, both of which were areas of previous spawning habitat enhancement. White sucker eggs were collected in the Burgess Generating Station tailrace and at the Old Mill Stream mouth.

Fish Capture **-** Fish capture was attempted using small mesh hoop nets and angling. Results are summarized in Table 2.15 (hoop nets) and Table 2.16 (angling).

Table 2.15 2008 Hoop Net Results

Location	Date/Time Deployed	Date/Time Checked	Species	Number
Downstream from South Channel	April 23 / 18:40	April 24 / 08:30	No fish	0
Downstream from North Channel	April 23 / 19:40	April 24 / 08:40	No fish	0
Old Mill Stream Mouth	May 5 / 19:20	May 6 / 09:15	Rainbow smelt	7

Hoop netting was discontinued after May 6 due to the difficulties in setting the net in areas with current and lack of suitable water depths in low current habitat elsewhere.

Table 2.16 2008 Angling Results

Date	Time	Species	Number
April 24	09:00 – 09:50	No fish	0
May 6	10:00 – 11:00	No fish	0
	20:00 – 21:15	No fish	0
May 8	20:15 – 21:00	No fish	0

Habitat Assessment - The suitability of potential walleye spawning areas was assessed by measuring habitat variables including water depth, flow velocity and assessing substrate conditions. Underwater video was taken at several locations to document substrate conditions, although the video has not yet been analyzed. Habitat assessment results are summarized in Table 2.17.

Table 2.17 2008 Potential Walleye Spawning Habitat Assessment Results

Location	Date	Average Water Depth (m)	Average Flow Velocity (m)	Substrate Composition
Habitat area below North Dam	April 24	1.65	0.42	Boulder 30-60% Cobble 40-70%
	May 7	1.25	0.45	
Burgess GS Tailrace	May 7	0.78	1.00	Cobble 0-90% Gravel 0-60% Bedrock 0-100%
Old Mill Stream Mouth	May 7	1.21	0.49	Boulder 30-80% Cobble 20-70%
Old Mill Stream mouth to bridge	May 7	0.96	0.94	Boulder 0-40% Cobble 20-80% Gravel 0-60%
Habitat Area below South Dam	May 7	1.11	0.20	Boulder 50-90% Cobble 10-50%

Suitable conditions for walleye spawning were found in the Burgess Generating Station tailrace, in the Old Mill Stream from the mouth upstream to the bridge and at points within the created habitat area downstream from the North Bala Dam. However, it appeared as though high tailwater levels downstream from the dam resulted in low flow velocity conditions in the walleye habitat enhancement areas downstream from both the South and North Dams. This may have limited the suitability of these areas for walleye spawning, although walleye were observed in low numbers at both sites and walleye eggs were captured in the area downstream from the North Dam.

Summary

Walleye were observed during night lighting activities conducted by Hatch Energy in the Burgess Generating Station tailrace, at the mouth of the Old Mill Stream and in the habitat enhancement areas downstream from the North and South dams. The Burgess Generating Station tailrace had the highest relative abundance of walleye, with up to 23 fish being observed at one time. White sucker were also observed in the highest numbers in the Burgess Generating Station tailrace. Hiebert (2008) observed up to 11 walleye in the area downstream from the North Dam on May 23 and 24 at an approximate water temperature of 9°C, well after walleye had appeared to leave the spawning grounds at the Burgess Generating Station tailrace.

White sucker eggs were captured in the Burgess Generating Station tailrace, white sucker and walleye eggs were captured at the mouth of the Old Mill Stream and walleye eggs were captured in the habitat enhancement area downstream from the North Dam.

Habitat assessment confirmed that suitable spawning conditions for walleye were present in the Burgess Generating Station tailrace channel, at the mouth of the Old Mill Stream and at spots in the habitat enhancement area at the base of the North Dam. High tailwater levels in early May 2008 resulted in low flow velocities throughout the habitat enhancement areas at the bases of the South and North Dams, with very high flow velocities being observed within the main channels. This may have limited the suitability of these habitats during the assessment period. Lower tailwater levels during late May might have created more suitable habitat conditions with respect to water depth and flow velocity over the walleye spawning habitat enhancement area at the North Falls, thereby resulting in late spawning walleye utilizing this area as opposed to the Burgess Generating Station, which was favoured by early spawning walleye. Acres & Associated Environmental Limited and Acres International Limited (2003) noted that the spawning run from Lake Muskoka is often protracted and can last up to a month, and a similar situation may be occurring in the Bala Reach.

Based on the information collected during the survey, the Burgess Generating Station tailrace appears to be the most important walleye spawning location within the study area, although spawning is likely occurring to a lesser degree at the habitat enhancement areas at the North and South dams at the mouth of the Old Mill Stream. High water levels during the spawning period in 2008 may have limited the suitability of these other locations during the early spawning period, resulting in the majority of fish spawning in the Burgess Generating Station tailrace channel at the beginning of May, while later spawning fish utilized spawning habitat at the base of the North Falls at the end of May.

2.1.11.2 Lake Muskoka

Lake Muskoka is the largest lake in the Muskoka River watershed with an overall surface area of 12,018 ha. The lake is deep (up to 67 m) and has over 400 km of shoreline. The fish community of the lake consists of lake trout (*Salvelinus namaycush*), lake whitefish (*Coregonus clupeaformis*), lake herring (*Coregonus artedii*), rainbow smelt, northern pike, white sucker, brown bullhead, rock bass, pumpkinseed, black crappie, smallmouth bass, largemouth bass, walleye, yellow perch and a variety of baitfish (Acres & Associated Environmental Limited and Acres International Limited, 2003).

The lake trout population appears to be maintained predominantly by stocking of hatchery fish, with only limited natural reproduction occurring (Acres & Associated Environmental Limited and Acres International Limited, 2003). As discussed in Section 2.1.11.1, use of pesticides, including DDT, has been implicated as a potential cause of the decline of the Lake Muskoka lake trout population (MNR, 1999).

2.1.11.3 Moon River

A trap netting survey was conducted in the Moon River downstream from Moon Falls in April and May 2007, in order to assess the walleye spawning population at the site. Fish species captured during a total of 24 netting nights at two locations included walleye (N = 444), northern pike (N = 16), brown bullhead (N = 66), smallmouth bass (N = 7), white sucker (N = 4), muskellunge (*Esox maskinongy*) (N = 1), lake whitefish (N = 1), bowfin (*Amia calva*) (N = 1), largemouth bass (N = 1), rock bass (N = 1) and lake sturgeon (*Ascipenser fulvescens*) (N = 1) (McIntyre, 2007).

2.1.11.4 Fish Species Reproductive Ecology

The following sections provide basic reproductive ecology information (e.g., spawning, nursery) for several of the fish species that make use of the study area. This information was used as a basis for assessing the suitability of existing habitat in the study area and determining potential impacts due to habitat alterations as a result of the project.

Walleye

Walleye spawning activity typically occurs shortly after ice break-up (3 to 4ºC) when water temperatures are between 6 and 11ºC. This typically corresponds to late-April to mid-May in the Muskoka area, although this can vary in response to annual changes in weather and flow conditions. Males move to the spawning grounds first, with spawning taking place at night in groups of 1 to 2 females and up to 6 males (Scott and Crossman, 1998). Several authors have noted that walleye will stage or rest in deep pools downstream of spawning areas during daylight hours, moving to preferred spawning locations at night (Golder Associates, 2006). Eggs are demersal, adhesive prior to water hardening (Auer, 1982), and are broadcast over the substrate in areas with good circulation. Fertilized eggs fall into cracks and crevices to incubate. Preferred velocity range for eggs is noted to be 1 to 2 m/s (Kerr et al., 1997). Corbett and Poules (1986) noted that walleye in fast water areas utilized quiet border water areas that ensured egg placement on selected substrate. Golder (2006) also noted that walleye may avoid swift water that would carry their eggs downstream, favouring more moderate velocities <1 m/s. Finucan (2004) noted from studies in the Timmins and Gogama area that walleye prefer to spawn in areas where stream velocities range from 0.39 to 0.63 m/s and in water depths of 40 to 96 cm.

Spawning grounds are the rocky areas in white water at the base of impassable falls and/or dams in rivers, or boulder to coarse gravel, sand and fine gravel shoals in lakes. Spawning over mats of flooded vegetation has also been reported (Scott and Crossman, 1998). Other substrates reported in the literature include 2.5 to 15 cm gravel and rubble (McMahon et al., 1984). Preferred water depth ranges from 0.5 to 3 m in lakes and is often less than 1 m in rivers (Auer, 1982; Newbury and Gaboury, 1993).

Eggs hatch within 12 to 18 days at 12ºC (8 to 11 days at 15ºC) into larvae that are 5.8 to 8.7 mm in length (Auer, 1982). Larva require dissolved oxygen ≥ 5 mg/L (McMahon et al., 1984) and prefer velocities of 0.2 to 1.0 m/s, depths of 0.3 to 0.9 m and substrate diameters of 2 to 250 mm, and riffle gradient of 2.5% (Newbury and Gaboury, 1993).

Northern Pike

Northern pike typically spawn immediately after the ice melts, once water temperatures in the shallows have reached 8 to 12ºC, usually in densely vegetated floodplain areas (Scott and Crossman, 1998). Optimal spawning substrate consists of flooded vegetation, with sedges and grasses in moderately dense hummock beds. This provides ideal conditions to trap the adhesive eggs following deposition from the female, and suspend them above the anoxic conditions that often develop near the substrate of these areas (Casselman and Lewis, 1996). Northern pike generally require water depths of 0.20 to 0.45 m over spawning substrate to provide suitable egg deposition conditions (Inskip, 1982).

Spawning may last for several days, or even weeks, with females depositing their adhesive eggs over strands of vegetation in the water column. The egg incubation period is dependant on water temperatures and can range from 12 to 17 days at water temperatures of 8 to 10ºC, respectively (Inskip, 1982). Upon hatching, larval pike remain attached to the vegetation for 4 to 14 days, with

movement out of their natal areas occurring 18 to 24 days after hatching (Scott and Crossman, 1973). Under these conditions, water levels would need to be maintained at the water level that is present during the spawning event for at least 25 to 30 days to allow sufficient time for incubation and early fry development. After that, the young pike would be capable of moving out of the spawning/ incubation area as water levels decline, and would require an additional 20 to 25 days for that to occur. A hydrologic connection between the spawning site and rest of the waterbody would need to be maintained to ensure that young do not become stranded and/or isolated in the spawning area.

Smallmouth Bass

Smallmouth bass typically spawn between late spring and early summer (late May to early July) between water temperatures of 13 to 20°C, although most egg deposition takes place at a water temperature of between 16.1ºC and 18.3ºC. Male bass construct nests ranging from 0.30 to 1.80 m on a sandy or gravelly bottom, typically in close proximity to cover such as large rocks or logs. Nests are built in water ranging from 0.6 to 6.0 m deep. Bass exhibit a tendency to return to the same spawning area year after year, and may, at times, return to the same nest. Spawning typically occurs over a 6 to 10 day period, with the demersal eggs being deposited in the nest and adhering to clean stones. Male bass then guard the eggs and fan the nest to prevent build up of fine sediment during the egg incubation period, which usually lasts 4 to 10 days after spawning. Male bass will continue to guard the young after they hatch with the larval fish remaining relatively sessile within the nest for a period of 12 days before they absorb their yolk sac and begin to leave the nest. Males guard the fry for an additional 5 to 7 days before all the young leave the nest (Scott and Crossman, 1998). Flow velocity at the spawning site must be low enough that eggs and young are not washed out of the nest.

Young bass commence foraging on plankton until they reach a size of about 20 mm in length, after which time they switch to benthic invertebrates. By the time they reach a length of 50 mm, crayfish and small bait fish likely form the bulk of the diet. Adults forage primarily on crayfish (making up 60 to 90% of the diet in areas they are abundant), other fish (10 to 30%) and insects (Scott and Crossman, 1998).

Rainbow Smelt

Rainbow smelt are a cold water member of the salmonid family, reaching an average length of 180 mm and maximum length of approximately 300 mm. Rainbow smelt are extremely sensitive to temperature change and light intensity, rising to the water surface only when suitable conditions exist, such as under thick ice and snow conditions, or during nocturnal hours. Like most salmonids, rainbow smelt are anadromous, traveling up freshwater rivers and streams to spawn on gravel shorelines usually in water $<$60 cm deep. Temperature is the primary determinant of spawning times. Spawning typically occurs shortly after ice out, as temperature reaches 4.4ºC, with thousands of mature smelt covering spawning areas for approximately 10 days. Eggs will begin to hatch 3 weeks after fertilization, at which time they measure approximately 6 mm in diameter. The fry begin feeding and grow rapidly, reaching maturity after 2 to 3 growing seasons, at which time they return to the spawning areas (Becker, 1983). Known to feed on primarily invertebrates, studies have shown that up to 10% of their diet includes fish, with the majority of that occurring during winter months. In lakes where smelt and other salmonid species are present, there is a significant relationship between the two.

2.1.12 Benthic Invertebrates

Benthic invertebrate collections were completed in the study area in November 2007 by Hatch Energy. Triplicate samples were collected using a Hess sampler in shallow water. The objective of

the study was to assess the composition and relative density of the benthic invertebrate community throughout the study area. Benthic invertebrate sampling locations are shown in Figure 2.11. Table 2.18 identifies the habitat conditions at the sampling locations.

Table 2.18 Benthic Sampling Location and Habitat Descriptions

Sampling Location	Substrate	Water Depth (m)	Flow Velocity (m/s)
DSND-1a	C60 B30 G10	0.40	0.10
DSND-1b	C50 B40 G10	0.40	0.15
DSND-1c	B60 C40 G10	0.40	0.20
TR-1a	G80 S20	0.35	0.00
TR-1b	G80 S20	0.35	0.00
TR-1c	G80 S20	0.35	0.00
TR-2a	S70 G30	0.40	0.00
TR-2b	S70 G30	0.40	0.00
TR-2c	S80 G20	0.40	0.00
TR-3a	G60 C10 S30	0.40	0.00
TR-3b	G60 C10 S30	0.40	0.00
TR-3c	G60 C30 S10	0.40	0.00
USND-1a	G30 S50 C20	0.40	0.00
USND-1b	G30 S50 C20	0.40	0.00
USND-1c	G30 S50 C20	0.40	0.00
DSSD-1a	B50 C40 G10	0.40	0.25
DSSD-1b	B50 C40 G10	0.35	0.30
DSSD-1c	B50 C40 G10	0.20	0.50

Tables 2.19 and 2.20 summarize the results of the benthic invertebrate investigations. Raw data is included in Appendix C4.

Table 2.19 Benthic Invertebrate Abundance Results

Group	Family	Number					
		D/S North Dam	D/S South Dam	U/S North Dam	Shore 1	Shore 2	Shore 3
Hirudinea	Erpobdellidae	0	0	5	0	1	0
Oligochaeta	Lumbricidae	0	0	1	1	0	0
	Lumbriculidae	0	0	9	1	2	5
	Naididae	0	0	32	5	0	0
	Tubificidae	0	0	28	43	17	18
Acari	Hygrobatidae	2	1	0	0	0	0
	Lebertiidae	0	0	0	0	0	1
	Sperchontidae	3	2	0	0	0	0
Amphipoda	Crangoncytidae	0	0	0	15	2	27
	Gammaridae	0	0	0	1	1	4
	Talitridae	0	0	9	4	2	78
Decapoda	Cambaridae	1	0	0	0	0	0

Group	Family	Number					
		D/S North Dam	D/S South Dam	U/S North Dam	Shore 1	Shore 2	Shore 3
Isopoda	Asellidae	0	6	0	0	1	7
Coleoptera	Elmidae	2	0	1	0	0	43
	Hydrophillidae	0	0	0	0	1	0
	Psephenidae	0	0	2	0	0	0
Diptera	Ceratopogonidae	0	0	1	0	1	1
	Chironomidae	12	45	1	21	4	9
	Empididae	1	0	0	0	0	0
	Simulidae	1	4524	0	0	0	0
	Tipulidae	0	1	0	0	0	10
Ephemeroptera	Heptageniidae	2	0	0	0	0	4
Trichoptera	Hydropsychidae	524	44	0	0	0	0
	Leptoceridae	0	0	0	0	0	1
	Limnephilidae	0	0	0	0	0	1
	Philopotamidae	1	0	0	0	0	0
	Polycentropodidae	76	114	0	0	0	0
Gastropoda	Hydrobiidae	0	1	2	1	9	7
	Physidae	0	0	1	1	1	0
	Planorbidae	0	0	3	0	0	2
Bivalvia	Sphaeridae	0	0	3	0	13	1
Turbellaria	Planariidae	20	35	23	59	23	9
Nemertea	Tetrastemmatidae	0	0	3	1	1	1
Total		**645**	**4772**	**124**	**154**	**79**	**230**
% of Total		**10.7**	**79.5**	**2.1**	**2.6**	**1.3**	**3.8**
Family Richness		**12**	**10**	**16**	**12**	**15**	**19**

Table 2.20 Benthic Invertebrate Percent Composition by Sampling Location

Group	Family	Number					
		D/S North Dam	D/S South Dam	U/S North Dam	Shore 1	Shore 2	Shore 3
Hirudinea	Erpobdellidae	0	0	4.0	0	1.3	0
Oligochaeta	Lumbricidae	0	0	0.8	0.6	0	0
	Lumbriculidae	0	0	7.3	0.6	2.5	2.2
	Naididae	0	0	25.8	3.2	0	0
	Tubificidae	0	0	22.6	27.9	21.5	7.8
Acari	Hygrobatidae	0.3	0.02	0	0	0	0
	Lebertiidae	0	0	0	0	0	0.4
	Sperchontidae	0.5	0.04	0	0	0	0
Amphipoda	Crangoncytidae	0	0	0	9.7	2.5	11.7
	Gammaridae	0	0	0	0.6	1.3	1.7
	Talitridae	0	0	7.3	2.6	2.5	33.9
Decapoda	Cambaridae	0.2	0	0	0	0	0
Isopoda	Asellidae	0	0.1	0	0	1.3	3.0
Coleoptera	Elmidae	0.3	0	0.8	0	0	18.7
	Hydrophillidae	0	0	0	0	1.3	0
	Psephenidae	0	0	1.6	0	0	0
Diptera	Ceratopogonidae	0	0	0.8	0	1.3	0.4
	Chironomidae	1.9	0.9	0.8	13.6	5.1	3.9
	Empididae	0.2	0	0	0	0	0
	Simulidae	0.2	94.8	0	0	0	0
	Tipulidae	0	0.02	0	0	0	4.3
Ephemeroptera	Heptageniidae	0.3	0	0	0	0	1.7
Trichoptera	Hydropsychidae	81.2	0.9	0	0	0	0
	Leptoceridae	0	0	0	0	0	0.4
	Limnephilidae	0	0	0	0	0	0.4
	Philopotamidae	0.2	0	0	0	0	0
	Polycentropodidae	11.8	2.4	0	0	0	0
Gastropoda	Hydrobiidae	0	0.02	1.6	0.6	11.4	3.0
	Physidae	0	0	0.8	0.6	1.3	0
	Planorbidae	0	0	2.4	0	0	0.9
Bivalvia	Sphaeridae	0	0	2.4	0	16.5	0.4
Turbellaria	Planariidae	3.1	0.7	18.5	38.3	29.1	3.9
Nemertea	Tetrastemmatidae	0	0	2.4	0.6	1.3	0.4

Downstream from North Dam

The area sampled downstream from the North Dam had the second highest overall number of benthic invertebrates (N = 645) but the second lowest family richness (N = 12). Dipterans (caddisflies) had the highest relative abundance at this site, accounting for 93.2% of the overall sample. Hydropsychidae (common net-spinner caddisflies) accounted for 81.2% of the overall sample and Polycentropodidae (tube-making and trumpet net caddisflies) accounted for 11.8% of the overall samples. Hydrosychids were found at densities up to 3046/m^2 in this area. Hydrosychids are filters/feeders who construct retreats out of tiny stones or plant material in relatively swift flowing water. The species constructs a small silk net near the mouth of the retreat to captures drifting algae,

detritus and small animal plankton (life history summarized by Holomuzki et al., 1999). They are restricted to flowing waters of stream and rivers and are commonly found around cobble and bedrock (Bouchard Jr., 2004). Several authors (as summarized in Lomond and Colbo, 2000) have noted that filter feeders such as net spinning caddisflies and blackflies (Simulidae) often dominate the benthic fauna at lake outlet sites.

Keast and Webb (1966; cited in Scott and Crossman, 1998) found that Trichoptera larvae were present in 35% of rock bass stomachs for fish between 70 and 120 mm in length. Rock bass had the third highest abundance in the sampling area downstream from the North Dam in September 2007. It is highly likely that they were foraging on the relatively abundant caddisflies in the area.

Downstream from South Dam

The area sampled downstream from the South Dam had the highest overall number of benthic invertebrates (N = 4772) and the lowest family richness (N = 10). Members of Simulidae family (blackflies) had the highest relative abundance at this site, accounting for 94.8% of the overall sample in this area. Blackfly larvae were collected at a density of up to 24,835/m^2, although the area of suitable habitat they were collected in was relatively small (approximately 15 m^2). Hydropsychidae accounted for 0.9% of the overall sample and Polycentropodidae accounted for 2.4% of the overall samples. Blackfly larvae are primarily known as suspension filter feeders, primarily those populations living in lake outlet areas and along boulder cascades, but the species is also known to implement collecting and grazing feeding strategies (Miller et al., 1998). Blackfly larvae utilize hooks at the terminal end of the abdomen to attach themselves to solid substrate in areas of current (Bouchard Jr., 2004). Several authors (as summarized in Lomond and Colbo, 2000) have noted that filter feeders such as net spinning caddisflies and blackflies often dominate the benthic fauna at lake outlet sites.

Reed (1959; cited in Scott and Crossman, 1998) reported that nearly 90% of the gut contents of a large sample of longnose dace from Pennsylvania contained blackfly, midge and mayfly larvae. One longnose dace was captured in the area downstream from the South Dam in September 2007, so it is likely that blackfly larvae constitute an important forage item for this species.

Upstream from North Dam

The area sampled upstream from the North Dam had the second lowest overall number of benthic invertebrates (N = 124) and the second highest family richness (N = 16). Members of Oligochaeta group (aquatic worms) had the highest relative abundance at this site, accounting for 56.5% of the overall sample in this area, with the most common family being the Naididae family. Oligochaetes commonly live is soft sediments in lakes, ponds and marshes but can be found in a wide variety of habitats including coarse substrates in flowing water environments (Bouchard Jr., 2004). This habitat description would be consistent with the sampling location given the high percentage of sand present (50%). Flatworms (Turbellaria: Planariidae) accounted for 18.5% of the overall sample. Flatworms are commonly found on rocks in slowly flowing water but are present in a variety of lentic and lotic habitats (Bouchard Jr., 2004). Cobble and gravel accounted for 50% of the substrate within this sample area, therefore the habitat present is consistent with the description of typical flatworm habitat preferences. No Ephemeroptera, Trichoptera or Plecoptera species were collected at this sampling location.

Shoreline 1

The first area sampled between the outlets of the North Dam and South Dam had the third lowest overall number of benthic invertebrates (N = 154) and the second lowest family richness (N = 12).

This area was dominated by gravel with a lesser component of sand. Flatworms (Turbellaria: Planariidae) had the highest relative abundance at this site, accounting for 38.3% of the overall sample in this area,. As noted previously, flatworms are commonly found on rocks in slowly flowing water but are present in a variety of lentic and lotic habitats (Bouchard Jr., 2004). The predominance of gravel with some wave washing is consistent with the preferred habitat of this family. Oligochaetes (aquatic worms) accounted for 32.3% of the sample, with Tubificid worms being the most common. Some species of Tubificidae are indicators of organic pollution, although identification to genus was not possible due to the immature nature of the instars collected in October 2007. The habitat present at this sampling location (i.e., high percentage of sand) is consistent with the description of typical Oligochaete habitat preferences.

Non-biting midges (Diptera:Chironomidae) were the third most abundant benthic family. This family is the most abundant and diverse group of benthic invertebrates and are found in nearly every type of habitat including rocks and soft sediments (Bouchard Jr., 2004). Chironomid larvae are among the primary food items of Logperch (Scott and Crossman, 1998), which were captured in the vicinity of this sampling location in September 2007.

No Ephemeroptera, Trichoptera or Plecoptera species were collected at this sampling location.

Shoreline 2

The second area sampled between the outlets of the North Dam and South Dam had the lowest overall number of benthic invertebrates (N = 79) and the third highest family richness (N = 15). This area was dominated by sand (70 to 80% by areal composition) with a lesser component of gravel (20 to 30%). Flatworms (Turbellaria: Planariidae) had the highest relative abundance at this site, accounting for 29.1% of the overall sample in this area. As noted previously, flatworms are commonly found on rocks in slowly flowing water but are present in a variety of lentic and lotic habitats (Bouchard Jr., 2004). Oligochaetes (aquatic worms) accounted for 23.5% of the sample, with Tubificid worms being the most common. Some species of Tubificidae are indicators of organic pollution, although identification to genus was not possible due to the immature nature of the instars collected in October 2007. The habitat present at this sampling location (i.e., high percentage of sand) is consistent with the description of typical Oligochaete habitat preferences.

Freshwater clams (Bivalvia: Sphaeriidae) and aquatic snails (Gastropoda:Chironomidae) accounted for 16.5% and 11.4% of the sample, respectively. These two families can be found in nearly every type of habitat including rocks and soft sediments (Bouchard Jr., 2004). Clams are a filter feeding collecting family, while snails employ a grazing foraging strategy. Snails are one of the primary foods of hornyhead chub (Scott and Crossman, 1998), which were captured in this area in September 2007.

No Ephemeroptera, Trichoptera or Plecoptera species were collected at this sampling location.

Shoreline 3

The third area sampled between the outlets of the North Dam and South Dam had the third highest overall number of benthic invertebrates (N = 230) and the highest family richness (N = 19). This area consisted of a mix of gravel (60%), cobble (10-30%) and sand (10 to 30%) and had no visible current during the October 2007 sampling period.

Amphipods (scuds and side-swimmers) had the highest relative abundance at this site, accounting for 47.3% of the overall sample in this area, with Talitridae (also known as Hyalellidae) accounting for

33.9% of the overall sample. Amphipods are crustaceans and reside in a variety of habitats including shallow margins of stream and lakes (Bouchard Jr., 2004). The family often constitutes an important food source for fish and other invertebrate predators (Bouchard Jr., 2004), with Scott and Crossman (1998) noting that amphipods have been found in a range of fish species known to inhabit the study area including rock bass, pumpkinseed and logperch.

Aquatic beetles (Coleoptera) had the second highest abundance of any group at this site (18.7%) with elmidae (riffle beetles) being the only family observed. Riffle beetles were observed in very low abundance upstream and downstream from North Bala, but were not observed in the channel downstream from South Bala Dam. This family occurs in swift areas of streams and along wave washed shores of lakes (Bouchard Jr., 2004).

Summary

Benthic invertebrates were found throughout the range of shallow habitats within the project study area. The channel downstream from the South Dam had the highest density of invertebrates by a wide margin, with blackfly larvae accounting for 94.8% of the invertebrates at this site. The area downstream from the North Dam had the second highest density of benthic invertebrates. These two areas also had the highest relative abundance of fish during surveys conducted in September 2007. Many of the invertebrate families captured at these sites are known to be common forage constituents for the fish species captured in the study area. Sand and gravel dominated habitats along the shoreline between the two dams had the lowest density of invertebrates, but the species captured in these areas are also known to be forage items for local fish species. Benthic invertebrates within the study area likely form an important link in the food chain, foraging on smaller prey items and organic detritus and in turn, being an important source of forage for the local fish community.

2.1.13 Species at Risk

The Species at Risk (SAR) Search Tool (http://www.sararegistry.gc.ca/sar/index/map_e.cfm#targ3) was used to identify species on Schedule 1 of the federal Species at Risk Act (SARA) whose range coincides with the project study area. Based on the results of this search, a total of 11 species potentially reside in the general area, where suitable habitat conditions are present. In addition, The Atlas of the Breeding Birds of Ontario (2001-2005) (Cadman et al., eds. 2007) and the Atlas of the Mammals of Ontario (Dobbyn, 1994) were used to identify species on the Ontario Endangered Species Act, whose range coincides with the study area. The habitat preferences of the designated species, as well as the federal and provincial species at risk designations are documented in Table 2.21.

Given the habitat preferences noted in Table 2.21, it is unlikely that critical habitat for any of these species in present in the proposed facility area (i.e., in the immediate vicinity of the intake, powerhouse and tailrace, or any construction work area). However, several of these species may reside in more undisturbed areas adjacent to the Bala Reach or Moon River downstream from the project site. Least bittern, blandings turtle, northern map turtle, spotted turtle, stinkpot, eastern ribbonsnake, Massassauga and branched bartonia may interact with these watercourses and hence, have the potential to be affected by changes in water level and flow.

Table 2.21 Habitat Preferences of Species at Risk whose Range Includes the North Bala Hydroelectric Project Study Area

Common Name	Scientific Name	Habitat Preferences (Source – MNR, 2000)	Species at Risk Designations	
			Federal[1]	Provincial[2]
Cerulean warbler	*Dendroica cerulea*	Area sensitive, prefers large undisturbed forest tracts of mature deciduous forest and swamps with large trees. They feed heavily on insects and are found in highest densities in deciduous riparian areas.	Schedule 1 – Special Concern	Special Concern
Golden-winged warbler	*Vermivora Chrysoptera*	Early successional habitat including meadows with shrubs and low trees, bordered by low woodland and low swamps – requires >10 ha of habitat	Schedule 1 – Threatened	Special Concern
Least bittern	*Ixobrychus exilis*	It inhabits freshwater wetlands and waterbodies with thick emergent vegetation.	Schedule 1 – Threatened	Threatened
Bald eagle	*Haliaeetus leucocephalus*	Large areas of deciduous or mixed woods around lakes and rivers; nest in trees between 50 and 200 m from shore.	Not at Risk	Endangered
Red-headed woodpecker	*Melanerpes erythrocephalus*	Variety of habitats, require 4 ha of suitable area with cavity trees for nesting	Schedule 3 – Special Concern	Special Concern
Blandings turtle	*Emydoidea blandingii*	Inhabits warm water streams, lakes, rivers and wetlands of abundant vegetation and soft muddy bottoms. In summer, they move frequently from aquatic habitat to upland habitat. Species hibernates in bogs.	Schedule 1 – Threatened	Threatened
Northern map turtle	*Graptemys geographica*	Resides in both flowing and still large water bodies, although prefers slow moving water with muddy bottoms.	Schedule 1 – Special Concern	Special Concern
Spotted turtle	*Clemmys guttata*	Prefers shallow ponds, marshes, beaver ponds, bogs and wet woodlands with plenty of aquatic vegetation	Schedule 1 – Endangered	Endangered
Stinkpot	*Sternotherus odorata*	Prefers shallow, slow moving water where the can forage along the bottle for mollusks and insects, walking rather then swimming along lake bottoms.	Schedule 1 – Threatened	Threatened
Eastern ribbonsnake	*Thamnophis sauritis*	They inhabit wetlands and riparian areas of lakes, streams and rivers; rarely more then a few meters away from the water.	Schedule 1 – Special Concern	Special Concern
Massassaug a rattlesnake	*Sistrurus catenatus*	Spends the summer months on rocky outcrops retreating back to the low wetlands during the fall and spring months.	Schedule 1 – Threatened	Threatened
Milksnake	*Lampropeltis triangulum*	Occurs in a variety of habitats including old farm fields and buildings, meadows, forests and river valleys.	Schedule 1 – Special Concern	Special Concern
Monarch butterfly	*Danaus plexippus*	Range throughout Ontario wherever milkweed is present for larval development	Schedule 1 – Special Concern	Special Concern
Branched bartonia	*Bartonia paniculata*	Isolated to a small area along the eastern shore of Georgian Bay, and grows in peat soils in sphagnum bogs.	Schedule 1 – Threatened	Threatened

Species at Risk Designations

1 Species at Risk Act (SARA) – Schedule 1
2 Ontario Endangered Species Act – Species at Risk in Ontario List (ON. Reg. 230/08).

MNR noted that margined madtom (*Noturus insignis*) have been captured in Lake Muskoka and at South Falls on the Muskoka River upstream from Lake Muskoka (Scholten, pers. comm. 2007b). The species has also been captured in Lakes Rosseau and Joseph in the Muskoka River watershed (Phelps and Francis, 2002). Margined madtom was originally identified as Threatened in Canada in 1989, but was relisted as Data Deficient in 2002 based on the fact that it is currently unknown if the species is native, introduced or a combination thereof (COSEWIC, 2002). Consequently, it is not currently listed under any of the schedules of the federal SARA. The species is also identified as being Data Deficient in Ontario's SAR List (MNR, 2006a). No margined madtom were captured in the study area during the September 2007 electrofishing survey. Goodchild (1990; cited in Phelps and Francis, 2002) indicated that the species prefers clear streams in moderate gradient riffles over substrates of boulder, rubble and cobble. However, Phelps and Francis (2002) reported that the margined madtom captured in the Muskoka area were found in area with little to no current and over

gravel/sand or boulder/sand substrate. No margined madtom were captured in the study area during the electrofishing study conducted in September 2007 (see Section 2.1.9.1).

2.2 Socioeconomic Environment

Information used to characterize the socioeconomic environment has been obtained from various sources including government and local documents and websites (e.g., Statistics Canada, Bala Cranberry Festival), agency correspondence, literature review and field observations. Information obtained at PIC's (Open Houses) was also incorporated into this section.

2.2.1 Municipal Profile

2.2.1.1 Township of Muskoka Lakes

The Town of Bala is located within the Township of Muskoka Lakes, which is an amalgamation of various former municipalities which include the Town of Bala, Township of Cardwell, United Townships of Medora and Wood, a portion of the Township of Monck, the Village of Port Carling, the Township of Watt, and the Village of Windermere. These municipalities were amalgamated in 1971.

2.2.1.2 District of Muskoka

The District of Muskoka is a regional government established in 1971 that is responsible for regional planning, social assistance programs, district roads, provision of police and ambulance service, district-wide emergency preparedness, lake system health, water and sewer systems, and solid waste. It is comprised of six lower tier municipalities which include

- Town of Bracebridge
- Township of Georgian Bay
- Town of Gravenhurst
- Town of Huntsville
- Township of Lake of Bays
- Township of Muskoka Lakes.

2.2.2 First Nations

The Wahta Mohawk First Nation is located approximately 9.5 km northwest of the project area (Figure 1.1) and the Moose Deer Point First Nation is located approximately 31 km northwest of the project area (Figure 1.1). There are no First Nation reserves within the project area. There are no Comprehensive Claims or Specific Claims pertinent to the project area.

While the project footprint was at one time part of a traditional area for these First Nations, it is now located in downtown Bala. Downstream along the Moon River is assumed to continue to be of importance to the Wahta Mohawk First Nation as a traditional area for hunting, fishing, trapping, travel, drinking water, cleaning and other traditional uses.

Based on information available from the Indian and Northern Affairs Canada (INAC) website, the Wahta Mohawks relocated to Ontario from Oka, Quebec in the late 19th Century, due to a dispute

with the Seminary of St. Sulpice over the ownership of certain lands at Lake of Two Mountains. In 1881, the government of Canada agreed to establish a 26,000-acres (10,000-ha) reserve for the Wahta Mohawks and arranged to purchase that land from the provincial Crown in the District of Muskoka. However, due to a dispute between the two levels of government, 11,000 acres (4000 ha) were returned to the province in 1918 without the consent of the Wahta Mohawks (INAC website).

In a land claim submitted to the federal and provincial governments, the Wahta Mohawks claimed that approximately 11,000 acres (4000 ha) of land were severed from their reserve in 1918 without their consent or knowledge, thus reducing their promised land base by 40%. The area claimed by the First Nation is a "C" shaped parcel of land, located to the north, west and south of the Wahta Mohawk Territory (the Gibson Reserve) (Figure 1.1), in the east-central portion of the Township of Georgian Bay. The settlement ratified by First Nation members in 2003 provides for the return of much of this land (INAC website).

2.2.3 Land Use Policies and Zoning By-laws

2.2.3.1 Official Plan –Muskoka Planning Area

The Official Plan (OP) for the Muskoka Planning Area was prepared by the District of Muskoka, Planning and Economic Development Department (2007).

The OP has planning principles to guide a strategic vision of economic, social and environmental health with a focus on protection of the natural environment – in particular, forested areas. The vision for preservation is balanced with a vision for growth and development.

Of particular interest in the OP within the context of this assessment are planning objectives related to the environment and resources. Section B addresses these topics, stating that the objective concerning the environment is to manage land use and development in a way that maintains the quality of the natural and cultural heritage of Muskoka. Concerning resources, the stated objective is to encourage the wise and proper management of renewable and non-renewable resources.

The OP also addresses private development on Crown land and states that Crown land that has been released for private development will conform to the policies of this Plan, local policy and zoning by-laws.

The OP also dictates that proposed new developments within the district should address the following issues to the satisfaction of the district and as appropriate for the site:

- water quality
- protection of shorelines
- impact on Heritage Areas and Provincially significant wetlands
- access as it relates to district facilities.

The OP also states that "It is envisioned that the tourism and recreation industry will continue to form the basis of the economy in Muskoka. As such, development will occur in an aesthetically pleasing manner and in a fashion that will protect the quality of the natural and cultural environment."

2.2.3.2 *Official Plan – Township of Muskoka Lakes*

The project area is designated within the Township of Muskoka Lakes OP as `Core Commercial' land. Development policies and directives for this area are provided within the township's OP, of which the following sections are applicable:

- C8.1.4 – The shoreline area in front of commercial uses that abut the waterfront should be enhanced and upgraded, and, where feasible, designed to provide public access.
- C8.2.1 – Lands designated Core Commercial are intended to function as the primary retail and service commercial centre as well as the focus for administrative, cultural and recreational activity for the community.
- C8.2.7 – The buildings containing commercial uses shall be designed and any lighting or signs so arranged as to blend in with the desired character of adjacent uses.

In addition, Section F2.1 speaks to the implementation of Electric Power Facilities stating:

> "All existing electric power facilities and the development of any new electric power facilities, including all work as defined in the Power Corporation Act, such as transmission lines, transformer stations and distribution stations, shall be permitted within all land use designations throughout the Township of Muskoka Lakes provided that such development satisfies the provisions of the [Ontario Environmental] Assessment Act [R.S.O. 1990], including regulations made under the Act, and any relevant statutes (The Corporation of the Township of Muskoka Lakes, 2006)."

Township By-law 87-87 implemented the OP for the District of Muskoka and the OP for the Township of Muskoka Lakes. It regulates the use of all land and buildings in the township. This by-law also prohibits the use of land or the erection or use of buildings not specifically authorized.

2.2.3.3 *Resolutions by the Township of Muskoka Lakes*

Three resolutions pertinent to the development of the Bala Falls Small Hydro Project have been carried by the Township of Muskoka Lakes.

A Resolution was carried by the Township of Muskoka Lakes (# PC-7-5/01/05) on January 5, 2005 stating

> "the Township of Muskoka Lakes advise the MNR that any potential development at the Bala North Dam operates in accordance with the operating ranges of Lake Muskoka and Bala Reach as specified in the MRWMP;
>
> and further that any potential facility also consider the need for scenic flows, public access for traditional uses and continuity of business in local area;
>
> and further that a member of the Public Advisory Committee for the MRWMP be included on the review team for the proposed development."

On July 8, 2008 a resolution was carried by the Township of Muskoka Lakes (C-29_08/07/08) which stated

"BE IT RESOLVED THAT the Council of the Township of Muskoka Lakes, concurs "in principal", that the District Municipality of Muskoka consider the use of the District owned lands, located on the south side of the Bala Falls North Dam, by Swift River Energy, as part of a new hydroelectric generating facility, all subject to further public input and successful completion of the required Environmental Screening".

On October 21, 2008 the Township of Muskoka Lakes carried an additional resolution (Resolution Number: C-14-21/10/08). This motion resolved that

"the council of the Township of Muskoka Lakes recommends to the Ministry of Natural Resources, and Swift River Energy that the environmental screening for the hydro project at the North Bala Falls include

1 - the heritage value of the North Bala Falls and any related heritage impact the hydro generation station may have on the falls. And that

2 - the environmental screening process takes into consideration the potential impact that the proposed construction may have on Bala's economy, including its important winter economy by addressing safe snowmobile movement around the construction site, by investigating alternative water crossings of Bala Bay."

A copy of each of the above resolutions is included in Appendix C5.

2.2.3.4 Motion Carried by the District of Muskoka

Two Motions pertinent to the Project were carried by the District Municipality of Muskoka.

The District Municipality of Muskoka carried a motion (R90/2008) to agree "in principle" with the proposal by SREL to construct the project on property owned by the District on August 13, 2008. This agreement is subject to the following two conditions: "successful completion of the Environmental Screening process; and a satisfactory agreement with the District Municipality of Muskoka regarding the use of District owned lands".

A second favourable motion (Report No.: 17(2008)-2) was carried by Council on October 14, 2008. It was resolved that

"1 - The District Municipality of Muskoka advise Swift River Energy Limited and the Province of Ontario that use of the District site as an alternative to the presently selected Crown Land site will be considered by Muskoka District Council, subject to the conditions in Section 2 of this resolution.

2 - The consideration in Section 1 is conditional upon:

(i) the Muskoka District site being identified in the ongoing environmental approval process as a preferred alternative to the presently selected Crown Land site;

(ii) compliance with all applicable approvals by the proponent; and

(iii) on completion of 2 (i) and (ii), an agreement satisfactory to Muskoka."

A copy of each motion is included as Appendix C6.

2.2.4 Local Land Use and Tenure

2.2.4.1 Local Land Use

The shorelines of Lake Muskoka and Moon River are used mainly for seasonal residences. A variety of activities occur within the vicinity of the proposed project site. These include a range of recreational activities such as aquatic sports (boating, fishing, swimming) and snowmobiling. In addition, a number of local businesses, including Purk's Place Boat House and Marina (Figure 2.5), which provides docking and boat rental in the vicinity of the proposed intake, operate within a kilometre of the project site.

2.2.4.2 Land Tenure

Figure 2.12 illustrates the ownership of lands on which the project is proposed. Lands associated with the project include those owned by

- the District Municipality of Muskoka
- the Crown (Province of Ontario)
- the Town of Bala/Township of Muskoka Lakes.

2.2.5 Population and Economic Profile

Information for the Township of Muskoka Lakes presented below is based on Statistics Canada's most recent (2006) census data.

2.2.5.1 Population Characteristics

The Township of Muskoka Lakes has an area of 781.55 km^2 and the population density in 2006 was 8.3 persons/km^2. Based on the 2006 census, the population was 6467 representing a 7% increase from 5 years earlier in 2001 (Statistics Canada, 2007).

Table 2.22 provides census information for the Township of Muskoka Lakes and the Province of Ontario.

According to the 2006 census, and based on the total Aboriginal and non-Aboriginal identity population of 6467, 175 or 2.7% identified themselves as Aboriginal. Aboriginal population within the province represent 2.0% of Ontario's population (based on a total Aboriginal and non-Aboriginal identity population of 12,028,900 people) (Statistics Canada, 2007).

Seasonal Residents

As provided within the 2007 Township of Muskoka Lakes: Population, Demographic and Economic Report the seasonal and permanent populations for 2006 have been estimated. The number of households has been provided by the District of Muskoka, 2006, while the persons per household were provided by the 2004 Second Home Study, September 2005, prepared by the District of Muskoka.

Table 2.22 Population Characteristics for the Township of Muskoka Lakes and the Province of Ontario, 2006

Census Data	Township of Muskoka Lakes	Ontario
Population Counts		
Population in 2006	6467	12,160,282
Population in 2001	6042	11,410,046
Population Change 2001 to 2006 (%)	7.0	6.6
Age Characteristics		
Median Age of the Population	47.4	39.0
Percentage of the population aged 15 years and older	84.9	81.8

Source: Statistics Canada, 2007.

According to the Township's report, seasonal households in the Township are 6,748 while persons per household are 3.72. The estimated seasonal population is therefore 25,103. Permanent households are known to be 2550 with persons per household – 2.45. The permanent population is 6250 as provided by the District of Muskoka. Total households within the Township are 9298, an estimated 73% of which is seasonal. Of the total population (31,353), 80% is estimated to be seasonal (Jones Consulting Group Ltd., 2007).

By comparison, the District of Muskoka seasonal households number 20,618, while persons per household are 3.70 resulting in an estimated seasonal population of 76,287. Permanent households are known to be 21,506 with 2.57 persons per household. The permanent population is also known to be 55,200 as provided by the District of Muskoka. Total households within the District are 42,124, an estimated 49% of which is seasonal. Of the total population (131,487), 58% is estimated to be seasonal (Jones Consulting Group Ltd., 2007).

According to the 2004 second home study the majority of seasonal residents in the District travel to Muskoka from the Golden Horseshoe (GTA and Hamilton-Niagara) (Jones Consulting Group Ltd. 2007). In total, 72.4% of the seasonal residents who responded indicated their permanent residence to be located within the Golden Horseshoe area. Fewer than 6% of respondents permanently lived outside Ontario, and 4.1% are from the United States (District of Muskoka, 2005).

2.2.5.2 Property Values

The District Municipality of Muskoka Community Profile indicates that the average price of a three-bedroom home in Muskoka Lakes Township from January 1, 2003 to September 11, 2003 was $391,900 for waterfront residential and $140,313 non-waterfront residential. Vacant lots of waterfront residential property were priced at $316,692, while non-waterfront residential properties were priced at $58,076 (District Municipality of Muskoka, 2005).

The average value of a dwelling in Muskoka Lakes in 2001 was $215,561 while the average rent in 2001 was $567.00.

2.2.5.3 *Education and Earnings*

Table 2.23 provides statistical information on the highest levels of schooling according to the 2006 census.

Table 2.23 Selected Post-Secondary Educational Attainment Data for the Township of Muskoka Lakes and the Province of Ontario, 2006

Census Data – Educational Attainment	Township of Muskoka Lakes	Province of Ontario
Total population 15 years and over	5,495	9,819,420
Apprenticeship or trades certificate or diploma	645	785,115
College, CEGEP or non-university certificate or diploma	1,160	1,804,775
University certificate or diploma below the bachelor level	215	405,270
University certificate, diploma or degree	950	2,012,060
Total population aged 15-24	695	1,624,835
Apprenticeship or trades certificate or diploma	20	37,475
College, CEGEP or non-university certificate or diploma	60	160,140
University certificate or diploma below the bachelor level	10	33,875
University certificate, diploma or degree	15	118,030
Total population aged 25-34	440	1,529,590
Apprenticeship or trades certificate or diploma	60	91,525
College, CEGEP or non-university certificate or diploma	160	372,355
University certificate or diploma below the bachelor level	0	68,800
University certificate, diploma or degree	55	499,935
Total population aged 35-64	3,055	5,108,740
Apprenticeship or trades certificate or diploma	380	489,605
College, CEGEP or non-university certificate or diploma	635	1,089,270
University certificate or diploma below the bachelor level	115	241,150
University certificate, diploma or degree	655	1,225,490

Source: Statistics Canada, 2007.

Earnings

Median earnings in 2005 as provided by Statistics Canada for persons 15 years and over with earnings, (3,990 people) were $22,885. For those working full time all year (1,915 people) average earnings were $39,085 (Statistics Canada, 2007).

2.2.5.4 Employment and Industry

Major employers within the Township of Muskoka Lakes include the following:

- Clevland's House, 200 employees
- Port Carling IGA, 110 employees
- Loon Call Property Maintenance, 89 (seasonal) employees
- Township of Muskoka Lakes, 60 employees
- Muskoka Lumber, 55 employees
- Glen Orchard Public School, 25 employees
- Watt Public School, 17 employees.

Provided tourism in the township continues to attract year-round visitors, it is anticipated that employment will increase as well. The township is currently involved in a business retention and expansion program, which is a 3-yr plan in partnership with the Muskoka Community Futures Development Corp. One of the main objectives of the program is the stimulation of year-round tourism/economic activity.

Labour force indicators for the Township of Muskoka Lakes described the participation rate as 65.6% in 2006; the employment rate was recorded to be 63.2% and the unemployment rate as 3.6%. By comparison, the provincial participation rate was 67.1% in 2006, while the employment rate was 62.8% and unemployment rate was 6.4% (Statistics Canada, 2007). According to Statistics Canada (2007), the Township of Muskoka Lakes has an experienced labour force totalling 3,595 people. Table 2.24 provides the total experienced labour force by industry percentages in comparison with the province of Ontario.

Table 2.24 Total Experienced Labour Force by Industry for the Township of Muskoka Lakes, 2006

Industrial Classification	Total Employed, Township of Muskoka Lakes	Total Employed, Ontario
Agricultural and Other Resource Based Industries	90	190,000
Construction	635	384,775
Manufacturing	230	899,670
Wholesale Trade	65	307,465
Retail Trade	520	720,235
Finance and Real Estate	185	442,610
Health care and social services	290	611,740
Educational services	170	433,485
Business Services	625	1,274,345
Other Services	775	1,209,390

Source: Statistics Canada, 2007.

Economic Development

The Township of Muskoka Lakes: Economic Development Strategy was prepared by the Township's Economic Development Committee in January 2008, in consultation with six citizen task forces reporting on infrastructure, affordable housing, labour force issues, services, government processes

and promoting year-round business. Based on the findings of the six task forces, and analysis of a Business Retention and Expansion survey completed by 46 local businesses, the Economic Development Committee presented a total of 44 goals as a major component of the Economic Development Strategy for the Township.

Goals of the Economic Development Strategy of particular relevance to the proposed North Bala Small Hydro Project include the following:

- **GOAL 2:** Support Township Council in its efforts to enhance streetscapes and waterfronts in Bala and Port Carling to make these urban centres safer, more pedestrian friendly and welcoming to visitors and retail shoppers. Ensure that hazards to accessibility are identified and addressed first and foremost in the revitalization plans for urban areas. The streetscape revitalization project is a process that will require 5 or more years to complete. The Economic Development Committee supports any options that would allow partnering of the municipality with federal or provincial agencies, or the private sector in aspects of the master plans related to heritage, environmental best practices and accessibility.
- **GOAL 6:** Advocate for a reliable hydroelectric energy supply and support hydro companies in their efforts to improve service and keep power corridors clear of trees (2008).

Based on a recent survey completed within the Township of Muskoka, one of the key issues pertinent to local businesses is energy supply. Energy supply as a concern ranked fourth after labour (85%), public transit (81%) and seasonality (80%) (Corporation of the Township of Muskoka Lakes, 2008).

2.2.5.5 Local Businesses

In close proximity to the Project (within 50 m) there are two local businesses, which are identified in Figure 2.4:

- Purk's Place Boat House and Marina – established in 1908, it is located upstream of the proposed development on the southern shore between the Muskoka Road 169 Road bridge and the CPR bridge. Goods and services available include live bait, fishing tackle, fishing licenses, and boat and canoe rental.
- Burgess Memorial Bala Presbyterian Stone Church (currently referred to as "The Stone Church" by owner) – located southeast of Bala Falls, the Stone Church was built in 1926 by the town founder, Thomas Burgess. The building was designated under the Ontario Heritage Act in 1974. The building is currently used as a retail antique store.

2.2.5.6 Businesses Located within the Town of Bala

The Muskoka Lakes Chamber of Commerce Member Directory provides an on-line listing of approximately 100 businesses within the community of Bala. These are presented in Table 2.25.

Table 2.25 Businesses and Services Located within the Community of Bala

Type of Business	Establishment	Type of Business	Establishment
Accommodation	• Bala Bay Inn • Bala Woodlands Tent and Trailer Park • Bala-Hy Motel and Cottages • Bellhaven Bed and Breakfast • Dudley's Inn • Footprints Bed and Breakfast • Greenestone • Gullwing Lake Resort Inc. • House on the Hill Bed and Breakfast • Lodge Dining Room • Trafalger Bay Cottages	**Financial, Insurance, Mortgage Related and Professional Services**	• Allan Turnbull C.A. • Anna Mallin, Barrister and Solicitor • BDO Dunwoody Financial Advisors – SR and ED • Brad Burgess, Chartered Accountant • Financial Recovery Management Corp • Hummingbird Office Services • L.A. Services • TD Canada Trust
Agriculture/Cranberries	• Bala Summer Market • Iroquois Cranberry Growers • Johnston's Cranberry Marsh	**Government, Community and Education Organizations**	• Bala Communities in Bloom • Bala Guild of Arts and Crafts • Bala Park Cottage Association • Bala Sports Centre • Blissymbolics Learning Centre – Muskoka • Business Self-Help Office • National Research Council Canada • The Royal Canadian Legion
Arts, Antiques and Galleries	• Christine Marshall Wildlife Gallery • Damery Fine Art • Iroquois Artisans • Moonview Gallery • Muskoka Inspirations in Watercolour • Studio of Lynn Norris	**Health and Wellness**	• Active Turtle
Automotive and Recreational Vehicle	• Bala Tire and Battery	**Home, Garden, Landscaping and Related Services**	• Bala Garden Centre • Bedrock Landscapes • Cottage Caretakers • Loon CALL Inc. Muskoka Concierge Services • Pratt Lawn Care • Scott and Associates, Interior Design • Water's Edge Landscaping • White Glove Window Cleaning
Boats, Marinas and Water Sports	• Bala Cove Marina • Purk's Place • Sun and Ski, Mastercraft	**Kids and Family**	• Balacade • Johnston's Cranberry Marsh Children's Programs
Business, General Services and Media	• Bala Court Storage • Bala Laundromat • Hawk 98.3 FM • Indigiinet Corporation • Marg Couture Consulting • Roger's Disc Jockey Service • Taylor Made of Muskoka • Wide Eye Distribution	**Real Estate, Brokers and Rental Properties**	• Bala Manor • Bala Pines Shopping Centre and Office Complex • Bob McTavish, Real Estate Broker • Commercial and Cottage Rentals • Lor-val Plaza • Portage Landing • Re/Max Lake Country Realty Inc. Brokerage • Royal LePage Lakes of Muskoka – Bala
Construction, Design and Supply Services	• Bill Hillier Painting and Decorating • Butte Dakota Designs • Concrete Builders of Canada • Dectec and Aluminum Railing Systems by Turner Waterproofing • Design and Renovation • Ed Voisin Carpentry • Generation Custom Builders	**Shopping and Retail**	• Bala Freshmart • Bala General Store • Bala Shoppe • Cabin Crafts and Such • Don's Bakery • Muskoka Emporium Saturday Afternoons Home Store Bala

Type of Business	Establishment	Type of Business	Establishment
	• Moon River Painting • Muskoka Floating Docks • Muskoka Lumber and Building Supplies Centre • Muskoka Rural Electric • Pengilly's Hardware and Supply • Superior Propane • Ted Smith Construction of Bala Ltd. • Weismiller Tim-Br Mart • Westerby Exteriors of Muskoka		• Scotty's Summer Shop • The Cottage Butcher • Wahta Convenience Store • The Stone Church
Dining, Food, Beverage, Catering, Water and Wine	• Bala Chippers Fish and Chips • Bala Falls Pub • Bee Jay's Grill • Cassie's • Cranberry Café and Pizza • Docktails • Eat, Drink and Be Merry • Hungry Wolf Restaurant • Ice Dreams Soda Shop • Mill Stream Deli and Café • Moon River Lookout • Muskoka Lakes Winery • Pizza Nova • The Lodge • Wahta Springs	**Spas and Beauty**	• Cranberry Cove Muskoka Spa • Firm Roots Hair Studio
Entertainment, Attractions and Event Planning	• Bala's Museum With Memories of Lucy Maud Montgomery • Bala Cranberry Festival • Balacade • Kee to Bala • Paradigm Events in Muskoka • Theatre Thoughts Ltd.	**Sports and Leisure**	• Bala Youth Boxing Club • Beaver Run Golf Course

2.2.5.7 Tourist Attractions within the Community of Bala

Major tourist attractions located within the community of Bala are described in the following sections.

Bala Cranberry Festival

Bala's annual cranberry festival celebrates the harvest at two of the major cranberry bogs in Canada and attracts up to 25,000 people. Located within the Township of Muskoka Lakes is Johnston's Cranberry Marsh on Medora Lake Road, just north of Bala and the Iroquois Cranberry Marsh, on Muskoka Road 169 north of Muskoka Road 38. These bogs are toured by countless visitors during festival time. Held annually on the weekend after Thanksgiving, the Bala cranberry festival celebrates the harvest, traditions and taste of the cranberry. Concerts, markets, cooking shows, tours, exhibits, vendors, pancake breakfasts, BBQs and entertainment contribute to the fun and festivities. Venues include the Bala Community Centre, Sports Arena, Johnston's Cranberry Marsh, Shield parking lot, the Kee to Bala, Maple Avenue Stage and others.

Bala Antique and Nostalgia Show Sale

The Antique and Nostalgia Show Sale occurs twice a year (July 1st weekend and the weekend before Thanksgiving). These shows present approximately 40 dealers of antiques, collectables, furniture,

decorative accessories, folk-art, tools, dolls, silver, china and glassware's. There has also been jewellery, along with carpets and rugs.

Bala's Museum with Memories of Lucy Maud Montgomery
Bala's Museum opened in 1992 after being restored to the tourist home visited by Lucy Maud Montgomery in 1922. The museum now celebrates the life and writings of the author. The museum is known as one of the best Lucy Maud Montgomery museums in all of Canada.

Bala Bay Regatta
The Bala Aquatic Association Regatta is held annually on the Civic Holiday in August, and is organized by the Bala Aquatic Association (BAA). The BAA was incorporated in 1909 and remains 100% voluntary. The Regatta takes place from the town dock and into Bala Bay (see Figure 2.4 for these locations). There are swimming and boating events (canoe and skiff). There were 52 events in total during the 2007 Regatta (according to the BAA website). This year (2009) marks the 100th anniversary of the event which draws over 100 participants. The 1st annual Regatta was held in 1910. The BAA website is located at: http://www.balaaquatic.org/

The Kee to Bala
Dunn's Pavilion was built in 1942 and boasted the slogan "Where All Muskoka Dances". Gerry Patrick Dunn built the pavilion which was a tremendous success featuring dancing six nights every week and featured numerous major international Big Band attractions throughout the summer. The name of the venue was changed in the 1960's, and continues as a venue for musical guests.

Bala Summer Market
The Bala Summer Market is held on Mondays from June until September. Market goods include: baked goods, flowers, fruit, handmade crafts and toys, honey, jams, maple syrup, plants, smoked meats, vegetables, and woodcrafts.

Bala Craft and Gift Fair
The Bala Craft and Gift Fair offer many diverse vendors offering handmade crafts, woodwork, and baked goods.

Bala Santa Claus Parade
The Bala Santa Claus Parade takes place in November, and concludes with an opportunity to visit Santa in the Community Centre and skating in the arena.

2.2.5.8 Local Tourism Profile

Jones Consulting Group Ltd. provided information on tourism within the District of Muskoka within their document: Muskoka Lakes – Population, Demographic and Economic Report (2007). Within the report, the following points reflect the tourism profile within the District:

- overnight visitors were mostly from Ontario, especially the Toronto area, followed by the US (5%) and other countries (2%)
- overnight visitors staying in commercial lodgings were mostly from Ontario (77%), followed by the US (18%), and other countries (5%)

- the majority of overnight visitors to Muskoka stayed in private homes or cottages
- of the overnight visitors, 75% were travelling in adult-only parties (usually two) and the remaining 24% were with at least one child, 15 years of age or younger
- the average age of a visitor was 38 years old
- most visitors are active and want more than accommodation for the full recreational experience (Jones Consulting Group Ltd, 2007).

Expenditures by visitors to Muskoka District totalled $290,262,504 in 2003 which included lodging, food/beverages, transportation, entertainment and retail. Of this total, $231,212,660 (79.7%) was spent by visitors from within Ontario. Visitors from other provinces within Canada spent $4,792,596 (1.7%). Visitors from the US and other countries spent $43,305,296 (14.9%) and $10,951,952 (3.8%) respectively. The average, overnight visitor spent $58/night (including visitors from Ontario). Average daily room rates in 2003 were approximately $161.00 (Jones Consulting Group, 2007).

Historical statistics regarding total visits to the District of Muskoka are provided in Table 2.26.

Table 2.26 Total Person Visits by Length of Stay and Main Purpose for the District of Muskoka

Year	1998	1999	2000	2001	2002	2003
Total Visits	2,586,093	2,655,382	2,596,358	2,207,914	2,569,252	2,190,700
Same Day Visits	677,348	773,001	817,768	615,282	704,301	566,357
Overnight Visits	1,908,745	1,882,381	1,778,589	1,592,632	1,864,951	1,624,342
Overnight Pleasure Visits	1,274,816	1,279,203	1,320,183	1,119,519	1,479,434	1,269,425
Overnight Visits with Friends/ Relatives	493,666	479,890	383,309	386,964	259,100	272,225
Overnight Business Visits	47,468	40,852	26,951	36,718	39,210	26,739
Other Overnight	92,793	82,435	48,144	49,430	87,205	55,952

Jones Consulting Group Ltd., 2007.

Both domestic and international person visits to Muskoka District by place of origin are presented in Table 2.27.

Table 2.27 Domestic and International Person Visits to Muskoka District by Place of Origin

Year	1998	1999	2000	2001	2002	2003
Total Visits from Canada	2,441,116	2,511,134	2,472,615	2,059,341	2,440,033	2,072,137
Total Visits from US	92,830	83,363	75,774	98,549	89,937	87,530
Total Visits from Other Countries	52,146	60,884	47,967	50,023	39,281	31,031

Jones Consulting Group, 2007

Within the District of Muskoka, 60 (or 49%) of the 122 tourist resort commercial accommodation properties are located within the Township of Muskoka Lakes. This has been attributed to the

location of the largest lakes (Muskoka, Rosseau and Joseph) in the District being located within this Township.

2.2.5.9 International Tourism Profile

The Ministry of Tourism provides statistical information on international travel to Muskoka District.

According to statistical data for 2006, international visitors to Muskoka District participated in the following activities:

- shopping (78%)
- visiting friends/relatives (69%)
- any outdoor/sports activity (67%)
- sightseeing (62%)
- boating (45%)
- national/provincial nature parks (44%)
- historic sites (31%)
- museums/art galleries (19%)
- festivals/fairs (19%)
- fishing (17%).

Total spending by international visitors in 2006 totalled $43,302,324 in Muskoka District on tourism related expenditures and categories which can be further broken down into the following categories:

- accommodation (35% or $15,225,041)
- retail/other (18% or $7,589,593)
- recreation/entertainment (14% or $6,151,252)
- food/beverage at restaurants and bars (14% or $5,890,208)
- vehicle operations (7% or $3,151,008)
- food and beverages at stores (7% or $3,126,616)
- vehicle rental (3% or 1,417,722)
- public transport (1% or $429,519)
- local transport (1% or $321,366) (Ministry of Tourism, 2008).

Average overnight spending by international visitors was approximately $66/person/night. The economic impact of the total international visitor spending within Muskoka District in 2006 ($43,302,324) translated into $33,265,000 of GDP in the District municipality, $19,082,000 in labour income and approximately 560 jobs (Ministry of Tourism, 2008).

2.2.5.10 Recreation

Lake Muskoka (upstream of North Bala Dam) and Moon River (downstream of North Bala Dam) are popular boating, swimming, scuba diving and recreational fishing areas. The land alongside the falls is used for recreation and a number of benches are provided for public use. Many of these recreational uses take place at the base of Bala Falls. Additional details are described below.

Snowmobiling

There are numerous snowmobile trails in the area connecting the Township of Muskoka Lakes to Gravenhurst, Bracebridge, Huntsville, and Parry Sound. Trail C102D, a major link travels through Bala via Bala Falls Road and the Muskoka Road 169 Bridge adjacent to the North Dam. The Muskoka Lakes Snow Trails Association is the local snowmobiling authority in the Bala area. The C102D snowmobile trail is part of the larger Muskoka Snowmobile Region.

Scuba Diving

Scuba divers reportedly practise below the base of Bala Falls, and there is an area in Lake Muskoka, upstream of the North Bala Dam which also is popular among divers and referred to as Divers' Point.

Public Docks

The Bala town dock is located north of the North Channel on the Lake Muskoka (east) side of the CPR line and is identified in Figure 2.4. In total, there are 14 public docks on Lake Muskoka, 7 having boat launch ramps, 6 having parking available. On Moon River, there is one public dock and launch ramp, located just downstream of North Channel.

Portaging

Historically, canoeists have portaged around Bala Falls from the south shore of the north channel by taking out at the docks at Purk's Place Boat House and Marina, or the public docks described above, and traveling west, crossing Muskoka Road 169 and inputting on the south shore at the base of Bala Falls. This is an unmarked portage route.

Sport Fishing

Known to occur throughout the Muskoka River Watershed, sport fishing is also popular on the water, and along the shorelines in the vicinity of the project. Lake Muskoka, being the largest lake in the Muskoka region, consists of the following sport species: lake trout, lake whitefish, walleye, northern pike, largemouth and smallmouth bass. Other species include: rainbow smelt, lake herring, yellow perch, rock bass, pumpkinseed, black crappie, brown bullhead, white sucker, and an assortment of minnow species. Within Bala Reach (downstream of the north dam) the fish community is a coolwater complex, dominated by smallmouth bass and northern pike.

National, Provincial and Municipal Parks

The nearest Provincial Parks in the vicinity of the community of Bala are Hardy Lake Provincial Park located approximately 8 km east; Six Mile Lake Provincial Park, approximately 20 km southwest of Bala; Massassauga Provincial Park, located approximately 30 km northwest of Bala; and Gibson River Provincial Park, located approximately 10 km southwest of Bala. In addition, Algonquin Provincial Park, located approximately 70 km northeast of Bala (Figure 1.1).

Georgian Bay Islands National Park is located approximately 25 km southwest of Bala.

Local municipal parks in the vicinity of Bala include

- Jaspen Park
- Bala Park
- Sunset Park
- Wahta Park
- Archdekin Park
- Hanna Park
- Baycliff Park.

The Township of Muskoka Lakes Sports Park is also located in Bala and has a soccer field and tennis courts.

2.2.6 Cultural Resources/Heritage and Archaeological Sites

2.2.6.1 Historical Context

The town of Bala was founded in 1868 by Thomas Burgess, for whom the Burgess Generating Station is named. Thomas Burgess was the town's first settler and named the town after Bala, Wales.

In the early 1900s steam ships which traveled the lakes connected with the railroad in Bala at Bala's Government Wharf. Vacationers, travellers and other summer passengers from nearby southern Ontario would travel to Bala to meet ships during this time. Steam ships were very important in the area. Well known ships included the City of Bala, the RMS Segwun, the Cherokee, and the Islander. Following the increase in automobile accessibility, the Bala area became even more popular, given its close proximity to southern Ontario. This led to a decrease in the number of ship and rail passengers.

A small hydroelectric generating station (2.3 kV) was built at the North Bala Dam in 1924 by Bala Electric Company. It was purchased by the Hydro Electric Power Commission of Ontario in 1929, and supplied power to the Town of Bala until 1957. It was demolished in 1972, and the intake, powerhouse and tailrace areas were in-filled.

Further information on Bala's history is provided within Appendix A of the Stage 1 Archaeological Assessment (see Appendix C7).

2.2.6.2 Archaeological and Historical Sites including Local Cultural Sites

Stage One Archaeological Assessment

A Stage One Archaeological Assessment was completed for the proposed North Bala Hydroelectric Project in June 2008 by Archaeological Services Inc. in accordance with the Ontario Heritage Act (2005) and the Ontario Ministry of Culture's draft Standards and Guidelines for Consultant Archaeologists (2006). A Stage I archaeological assessment is a study which determines, through research by a licensed archaeologist, the potential and known archaeological resources within the vicinity of a proposed development. The assessment considers previous archaeological research in the area, physiographic and land use history to identify any archaeological sites and their archaeological potential.

Sources of information consulted in this assessment included registered archaeological site records kept by the Ontario Ministry of Culture, published and unpublished documentary sources, and the files of Archaeological Services Inc. A field review was also conducted on May 7, 2008 in order to assess archaeological potential of the site and to determine the degree to which development and landscape alteration of the site over the past Century may have affected that potential.

Two historic structures are located within or adjacent to the proposed project area. These are the Bala Presbyterian Church and Purk's Place Boat House and Marina (Figure 2.4). The archaeological assessment found that these are "significant heritage resources and are worthy of preservation". The Stone Church is designated under Part IV of the Ontario Heritage Act. The building which currently houses Purk's Place Boat House and Marina is listed by the Muskoka Heritage Committee as being significant, with photographs documenting its existence in 1897.

The Stage I archaeological assessment concluded that no archaeological sites have been registered within 100 m of the study area. Two sites have been registered in a 1 km radius. The assessment also concluded that "the general physiography and local nineteenth century land use of the study area suggest that it has a generalized potential for the identification of Aboriginal and Euro-Canadian archaeological sites. There are two historic buildings on or adjacent to the project area".

The field review determined that "although extensive portions of the area have been extensively disturbed, there are several areas that have archaeological potential". The archaeologist made the following recommendations in consideration of these results:

- A Stage 2 archaeological assessment should be conducted on land determined to have archaeological potential and likely to experience impact. This work will be conducted in accordance with the Ministry of Culture's draft Standards and Guidelines for Consultant Archaeologists (MCL 2006), in order to identify any archaeological remains that may be present.
- Although it is unlikely that the Stone Church and Purk's Place Boat House and Marina may experience the effects of shock or vibration from blasting, a mitigation plan should be developed and approved showing how such impacts will be avoided.

The report also identified areas which would merit a Stage 2 if the project was likely to unavoidably affect these areas.

A complete copy of Archaeological Services Inc.'s Stage 1 Archaeological Assessment is provided in Appendix C7.

Stage Two Archaeological Assessment

A Stage Two Archaeological Assessment of the North Bala Hydroelectric Development was completed for part of Lots 14 and 15, Concession A of Geographic Medora Township and Part of Lot 33, Concession 6 and 7 of Geographic Wood Township, now in the Township of Muskoka Lakes, Muskoka District Municipality by Advance Archaeology of Port Hope, Ontario. This assessment was completed on October 22, 2008 as recommended by Archaeological Services Inc in their Stage One Assessment of the Project area (see above).

The Stage One assessment had determined that there was some general potential for the presence of archaeological sites or cultural heritage resources on parts of the subject property, therefore a Stage Two assessment was carried out in accordance with the Technical Guidelines used by the

Ontario Ministry of Culture and therefore, if present, all archaeological resources would be properly identified. Fieldwork consisted of hand-excavation of shovel tests at intervals of 2.5 m in all zones determined to have archaeological potential.

During the course of the Stage Two Archaeological Assessment the shovel-testing revealed no artifacts of significance dating to either the historic or pre-contact time periods. No cultural heritage resources were discovered including structural or industrial remains from the Bala No. 2 Power Station, and there were "no indications of the presence of deeply-buried industrial remnants were noted on the former site of the Bala No. 2 Power Station" (Advance Archaeology, 2008).

The archaeologist made the following recommendations in consideration of these results:

- since nothing of archaeological or cultural heritage significance, dating to either the historic or pre-contact time periods, was discovered on the subject property during the Stage 2 assessment, our recommendation is for complete clearance of the archaeological condition on the subject property
- no construction operations, earth-moving activities, or blasting may take place until the Ministry of Culture has issued a signed letter of clearance of the archaeological condition for the subject property (Advance Archaeology, 2008).

A copy of Advance Archaeology's Stage 2 Archaeological Assessment is provided in Appendix C7.

Cultural Heritage Landscape Assessment of the Bala Falls

A Cultural Heritage Landscape Assessment of the Bala Falls was complete by Historica Research Ltd. as required by resolution of the Township of Muskoka Lakes dated October 21, 2008 (see Section 2.2.3.3). The study, completed in November 2008, followed the guidelines of the Ministry of Culture as per the document Heritage Resources in the Land Use Planning Process Infosheet #5: Heritage Impact Assessments.

This Heritage Assessment evaluated the local historical resources, focusing on

- the North and South Falls or Bala Falls as they are known today
- the Mill Stream generating station which has produced hydroelectric power since it commencement in 1917
- the North Dam, built in 1958 as a replacement for the original dam, constructed in 1909
- the steel bridge over the north channel, built in 1955 as a replacement for the original bridge of 1906
- the South Channel, created by blasting in 1875 and corresponding bridge constructed in 1965
- Purk's Place Boat House and Marina
- Burgess Memorial Bala Presbyterian Stone Church
- the CPR, and its three corresponding bridges.

An evaluation of these features, prompted Historica Research Ltd. to propose the following conclusion based on their Cultural Heritage Landscape Assessment of the Bala Falls:

> "The area of the Bala Falls extending from the park on the south shore of the Muskoka River to the park on the north side is a distinct cultural heritage landscape of water management, power generation, tourism, and transportation" (2009).

Based on this evaluation Historica Research Inc. made the following recommendations:

- **Design of Powerhouse and Intake** – The powerhouse and intake structure should be designed such that they are visually sympathetic to the cultural heritage landscape of the Bala Falls.
- **Bala Falls Interpretation** - Interpretive plaques should be designed and installed.
- **Deposit Copies of Report** – Copies of this report and all other relevant documentation produced by this undertaking should be deposited with the: Muskoka Lakes Library branches at Bala and Port Carling; Muskoka Lakes Museum, Port Carling; Bala Museum; the Swift River Energy web site (Historica Research Ltd., 2008).

A copy of Historica Research Ltd.'s report is included as Appendix C8.

2.2.7 Infrastructure

2.2.7.1 Transportation Network

Roadways

Major roadways providing access to the township include three major highways (11, 69, and 141). Within the District, Muskoka Road 169 is the main access east to Gravenhurst, to Highway 11 north and south and also west to MacTier and Highways 69 and 400 (north and south). Muskoka Road 7 is a major north-south access route to Rosseau Village and Parry Sound. Muskoka Road 118 is the main access south to Bracebridge and Highway 11 (north and south). Brackenrig Road (Muskoka Road 25) represents a major north-south route to Utterson, Port Sydney and Huntsville.

Air

The Muskoka Airport is operated by the District Municipality of Muskoka, and is located on Highway 11 (between Gravenhurst and Bracebridge). This airport has the longest runway between Toronto and North Bay, situated on 558 acres.

Rail

Passenger rail transportation in the vicinity of Bala is available in Gravenhurst and Huntsville and is provided by Ontario Northland Rail. In addition, the CPR freight line crosses Lake Muskoka by way of a bridge approximately 20 m upstream of the proposed intake site.

2.2.7.2 Municipal Services

Waste management and sewage within Bala are managed by the District of Muskoka, while the township is responsible for the municipal water supply. There are three underground municipal utility lines which cross the North Channel, within the Project area. There is a 50-mm diameter low pressure forcemain, a 150-mm diameter forcemain and a 350-mm diameter water main.

The Township of Muskoka Lakes has a community based police station in Port Carling, with a satellite office in Bala. There are 10 fully equipped fire stations located within the Township of Muskoka Lakes, one of these being in Bala. The closest ambulance service is in Port Carling and the closest hospital is in Bracebridge.

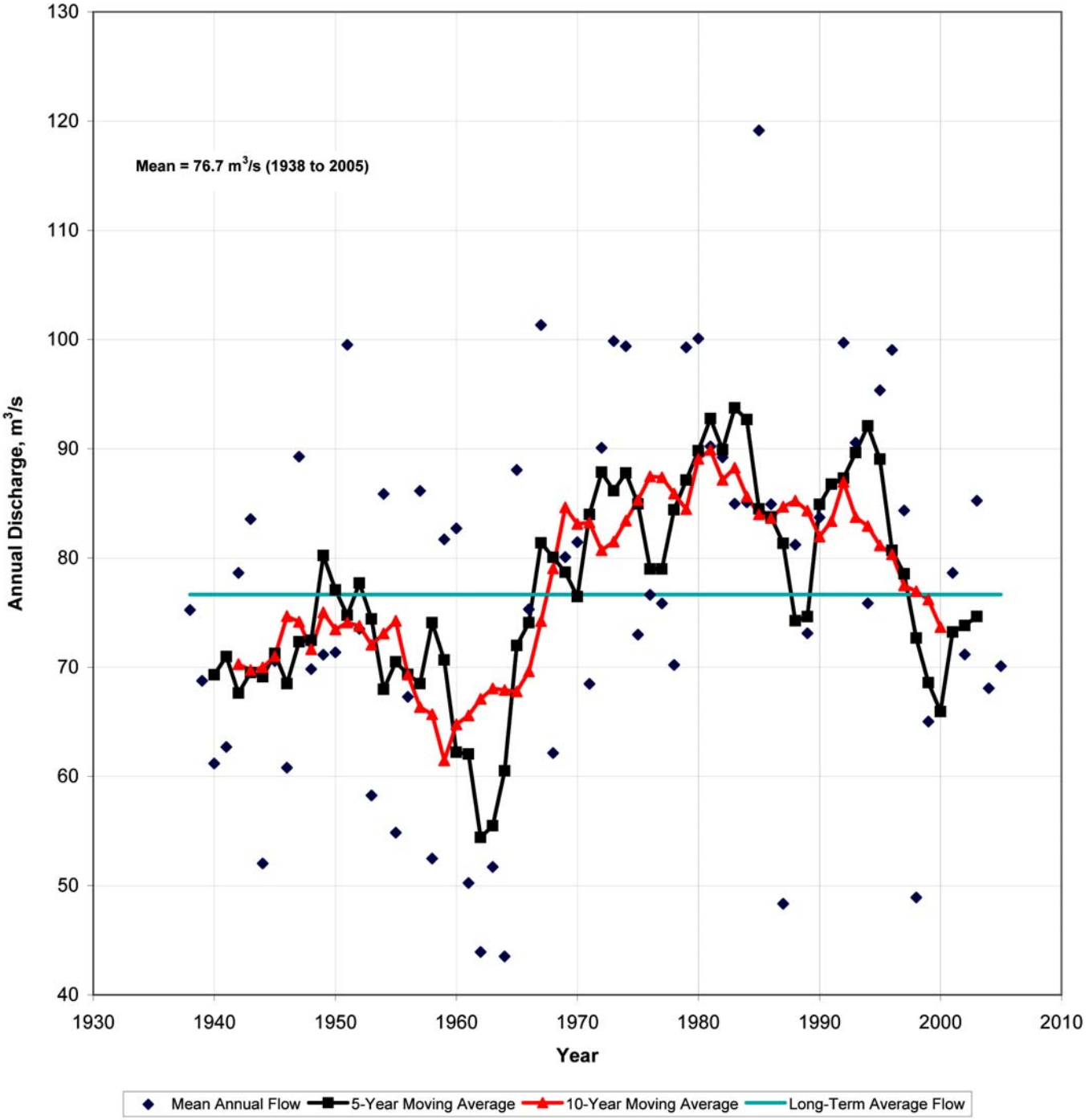

Figure 2.1
Swift River Energy Ltd.
North Bala Small Hydro Project
Historical Annual Average Flow (1938 to 2005)
- Moon River 5.5 km Downstream from Bala

HATCH energy

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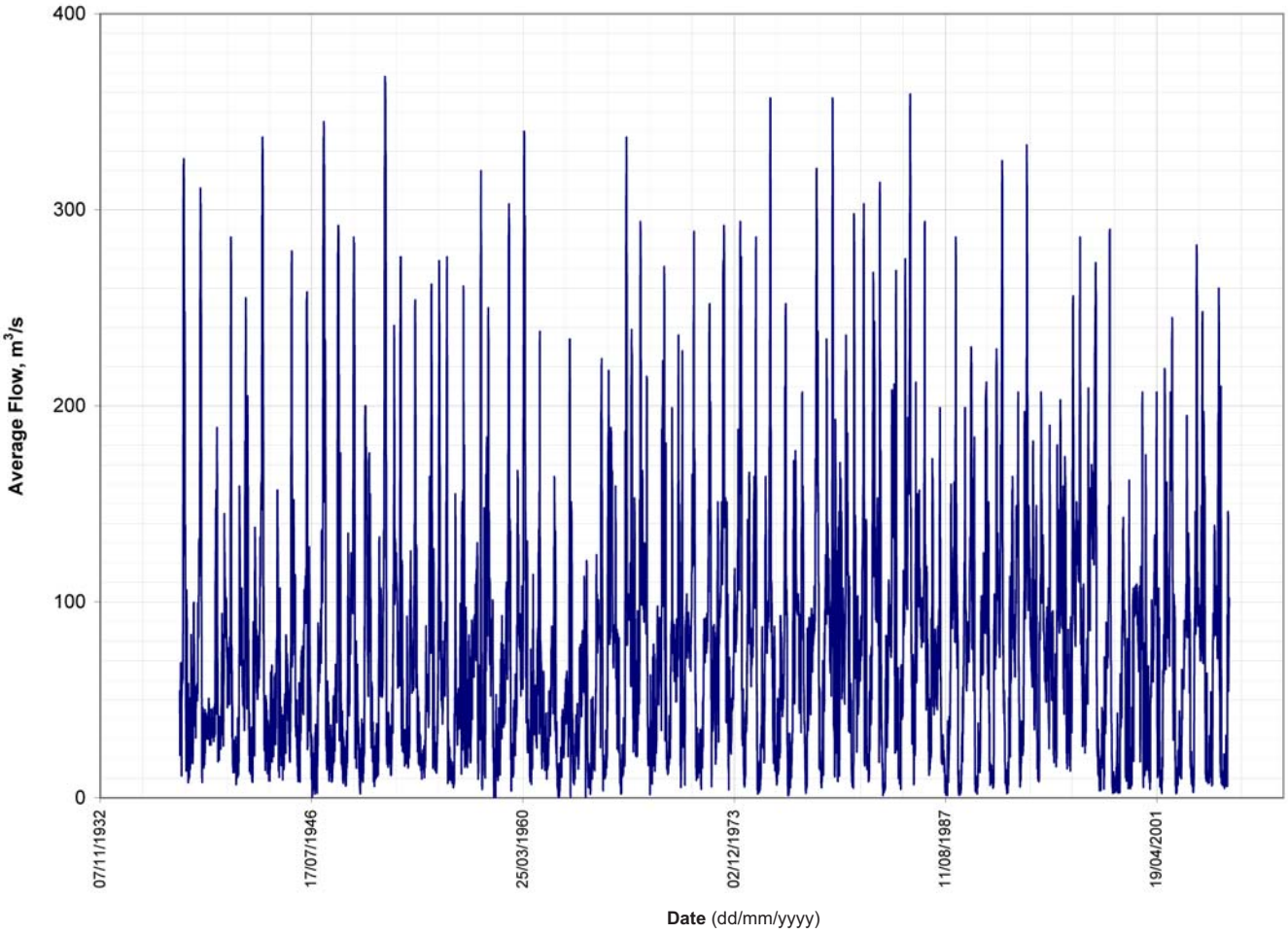

Figure 2.2
Swift River Energy Ltd.
North Bala Small Hydro Project
Historical Daily Average Flows (1938 to 2005)
- Moon River 5.5 km Downstream from Bala

HATCH energy

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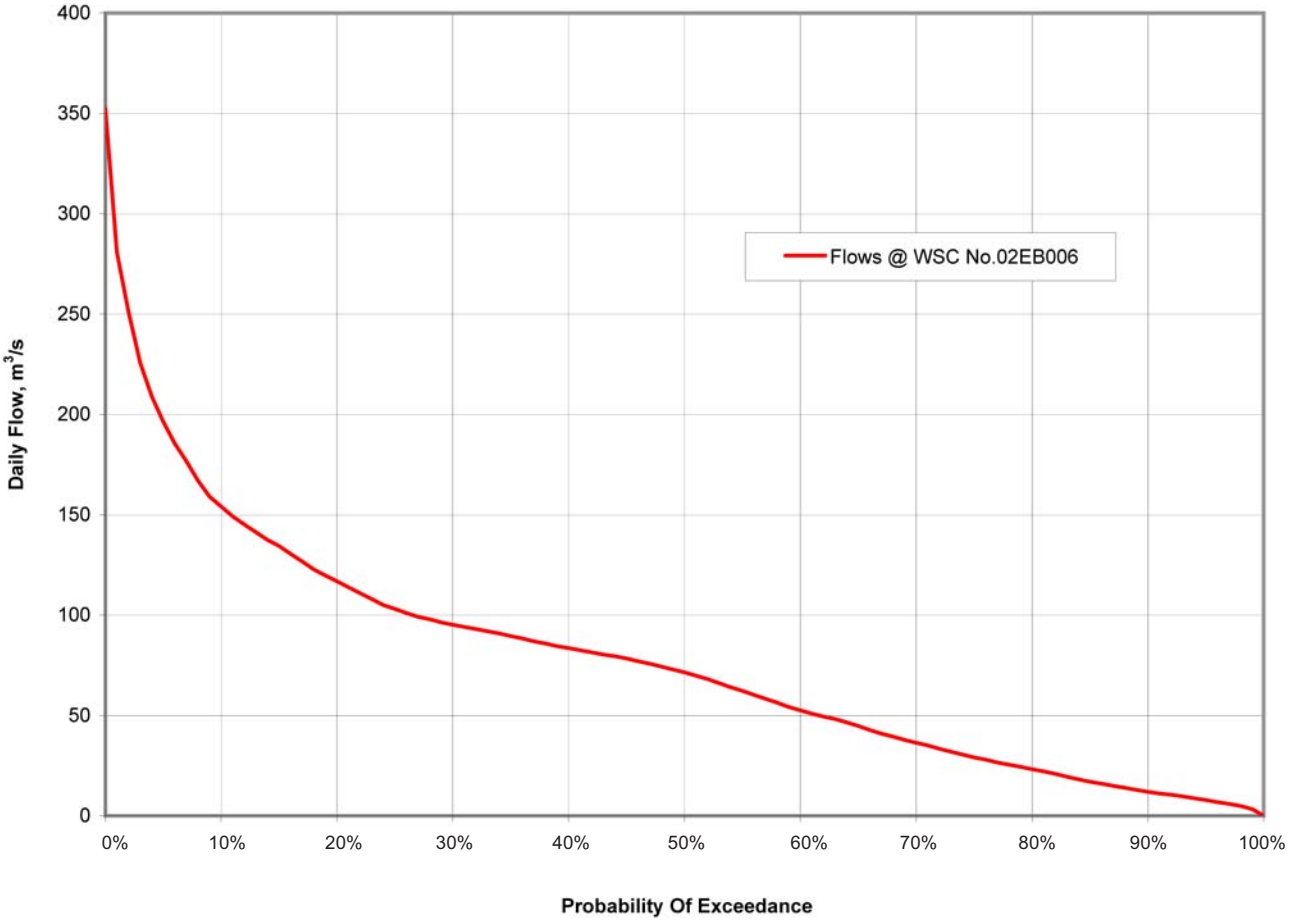

Figure 2.3
Swift River Energy Ltd.
North Bala Small Hydro Project
Daily Annual Flow Duration Curve (1962-2005)
- Moon River 5.5 km Downstream from Bala

HATCH energy

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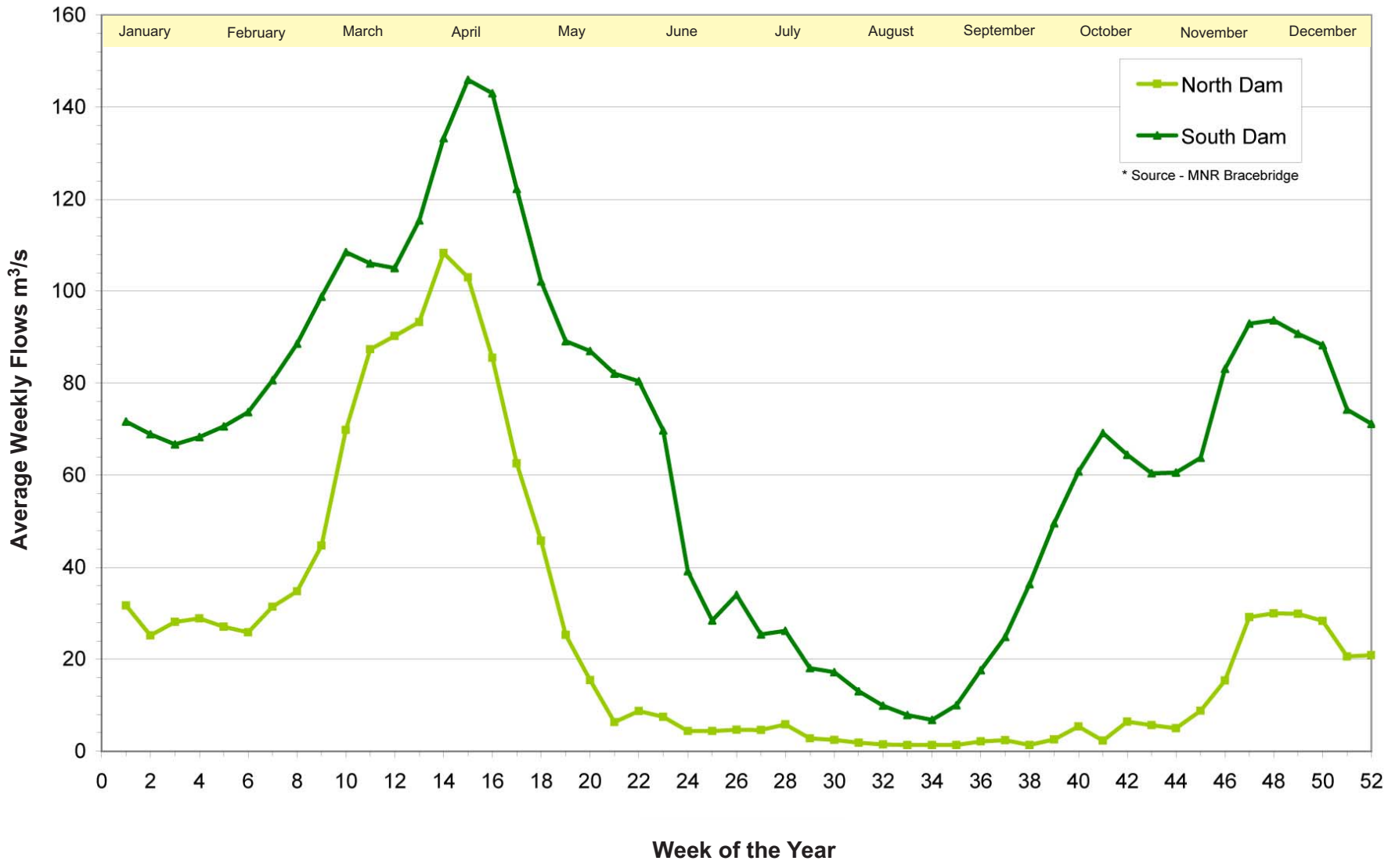

Figure 2.4
Swift River Energy Ltd.
North Bala Small Hydro Project
Average Weekly Historical Flows at North and South Bala Dams for the Period 1982 to 1999

HATCH energy

Legend

Vegetation Communities in the Study Area

Figure 2.5
Swift River Energy Ltd.
North Bala Small Hydro Project
Natural and Social Environment

HATCH energy

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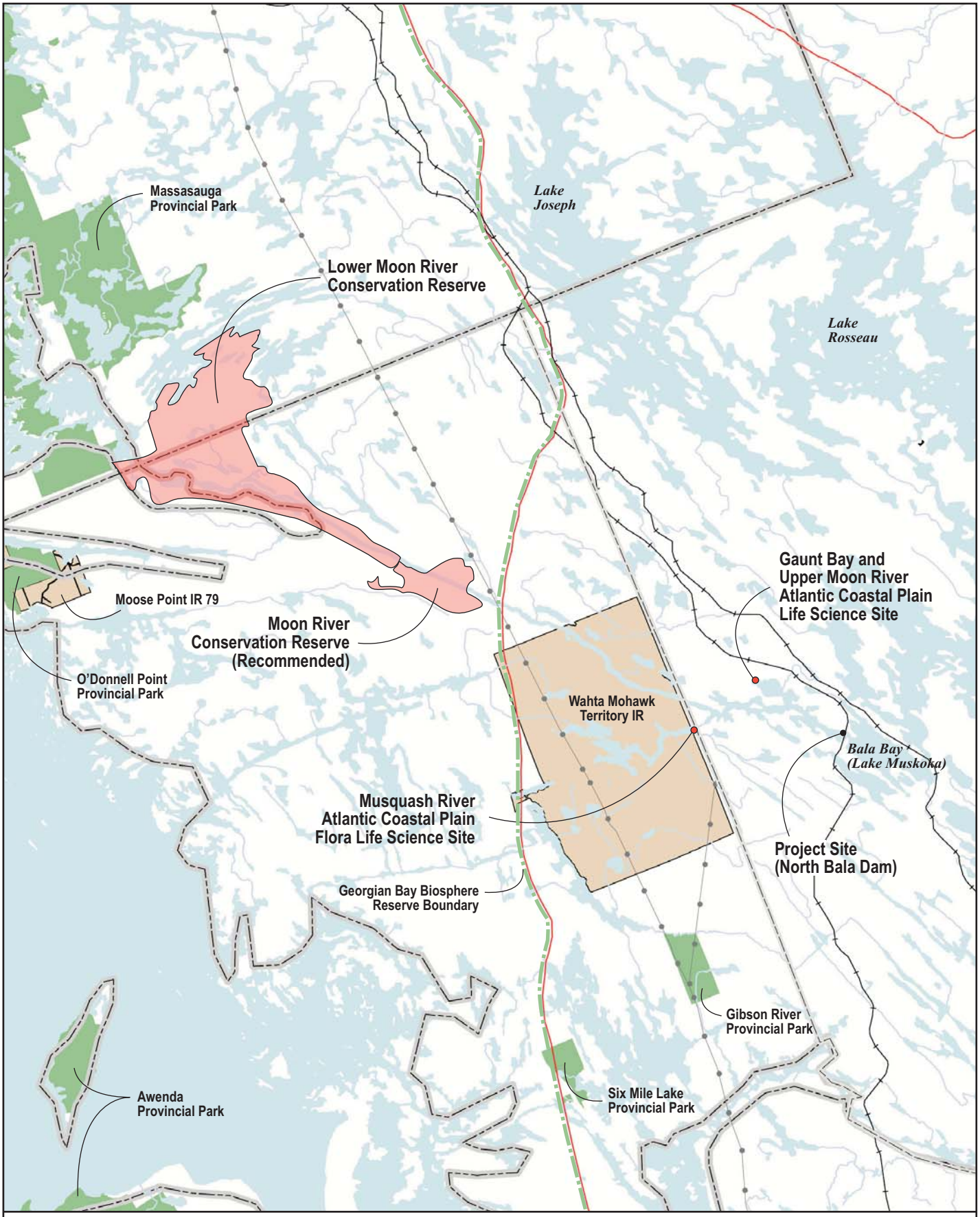

Figure 2.6
Swift River Energy Limited
North Bala Small Hydro Project
Significant Natural Areas

HATCH energy

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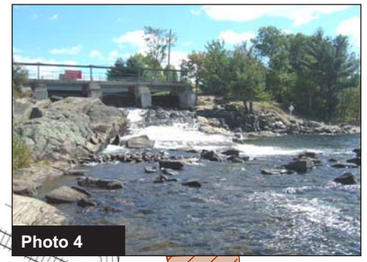

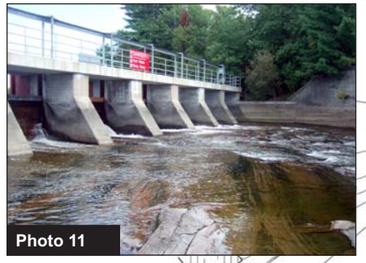

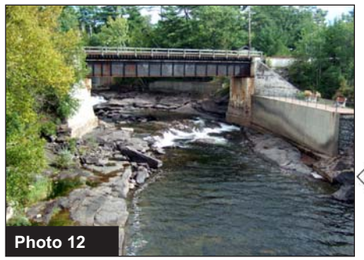

Legend

Bedrock	Cobble
Boulders	Sand
Gravel	Pool
Submergent Vegetation	Photo Locations
Emergent Vegetation	

MNR Aquatic Habitat Types

Type 1
Type 2

Substrate Composition

B_{r20} - 20% Bedrock	C_{20} - 20% Cobble
B_{20} - 20% Boulder	S_{20} - 20% Sand
G_{20} - 20% Gravel	

0 50
Metres

Figure 2.7
Swift River Energy Ltd.
North Bala Small Hydro Project
Aquatic Habitat Features

HATCH energy

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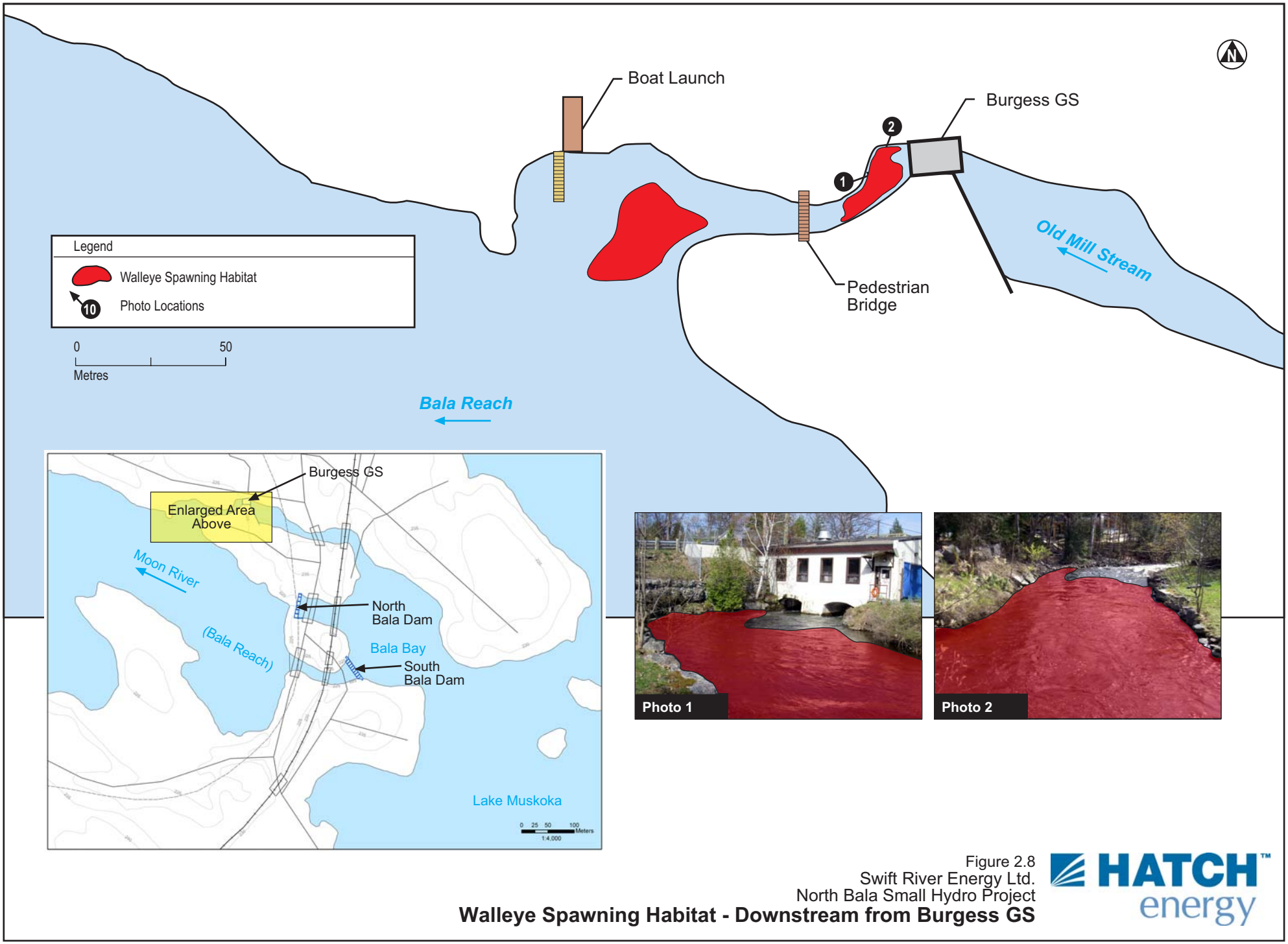

Figure 2.8
Swift River Energy Ltd.
North Bala Small Hydro Project

Walleye Spawning Habitat - Downstream from Burgess GS

HATCH energy

Legend

Walleye Spawning Habitat

Photo Locations

0 50

Metres

Photo 1

Spawning habitat downstream from North Dam (September 2007).

Photo 2

Spawning habitat downstream from North Dam (May 2008).

Photo 3

Spawning habitat on north side of channel downstream from South Dam (May 2008).

Photo 4

Spawning habitat on south side of channel downstream from South Dam (May 2008).

Figure 2.9
Swift River Energy Ltd.
North Bala Small Hydro Project
Walleye Spawning Habitat - Downstream from Bala Dams

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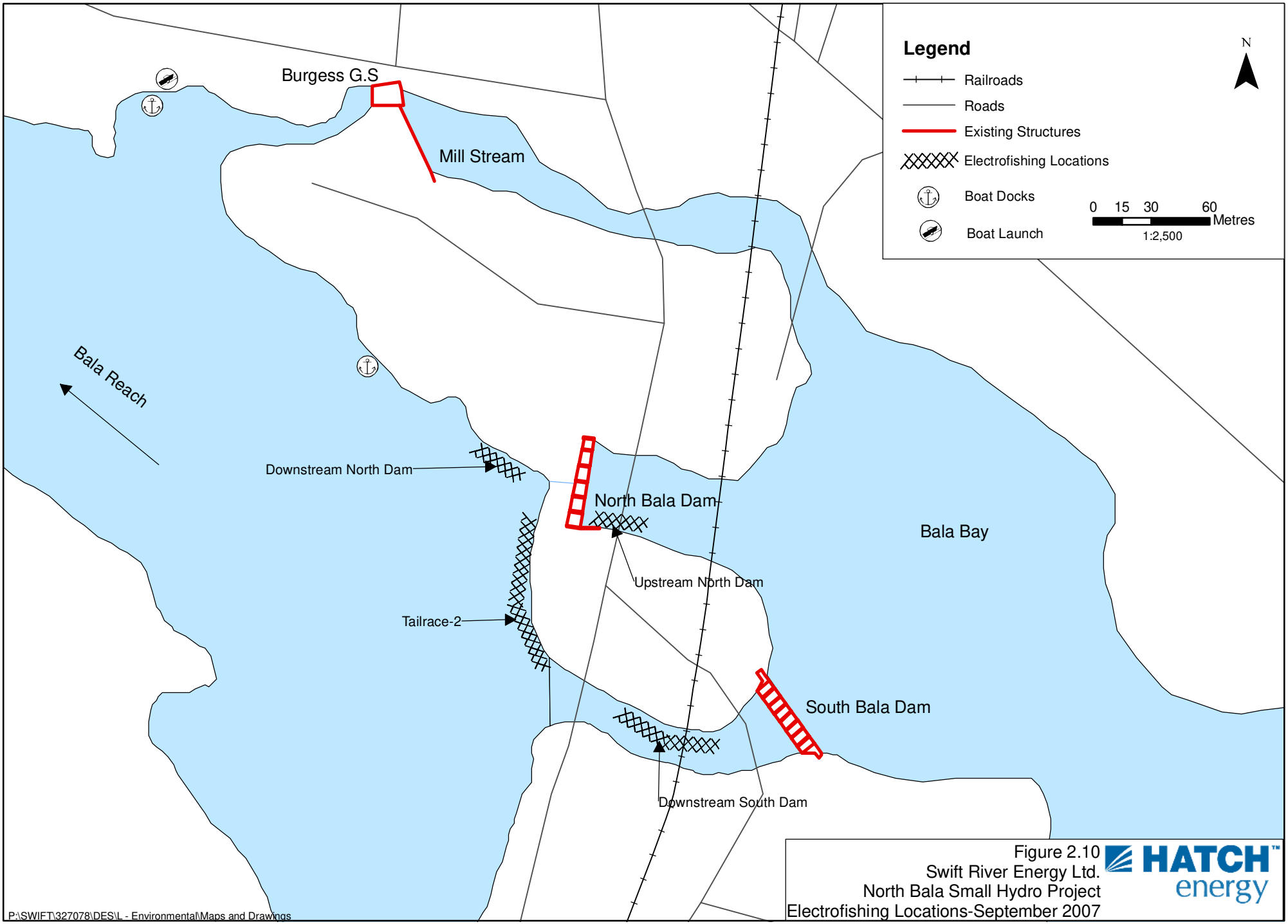

Figure 2.10
Swift River Energy Ltd.
North Bala Small Hydro Project
Electrofishing Locations-September 2007

HATCH energy

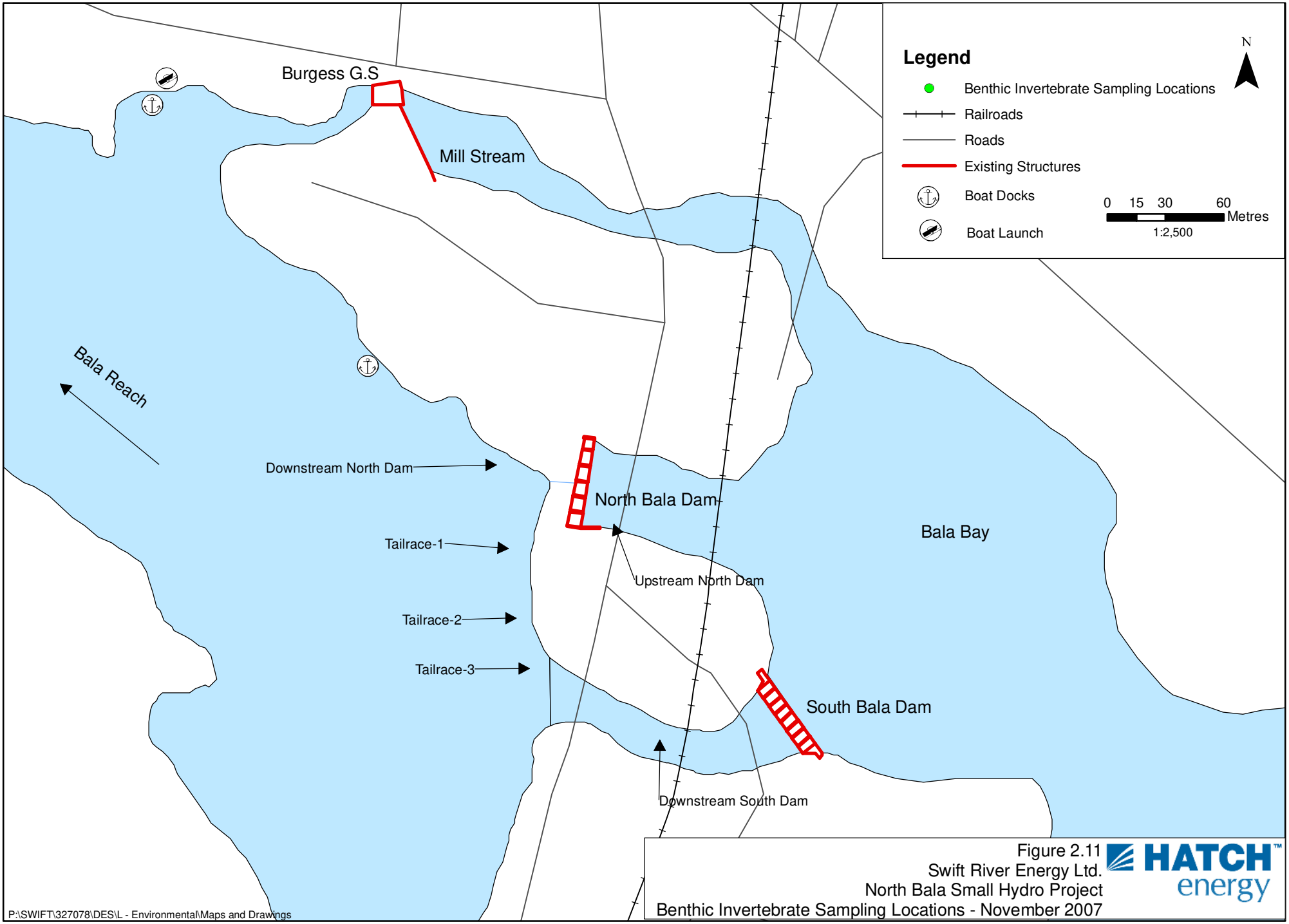

Figure 2.11
Swift River Energy Ltd.
North Bala Small Hydro Project
Benthic Invertebrate Sampling Locations - November 2007

HATCH energy

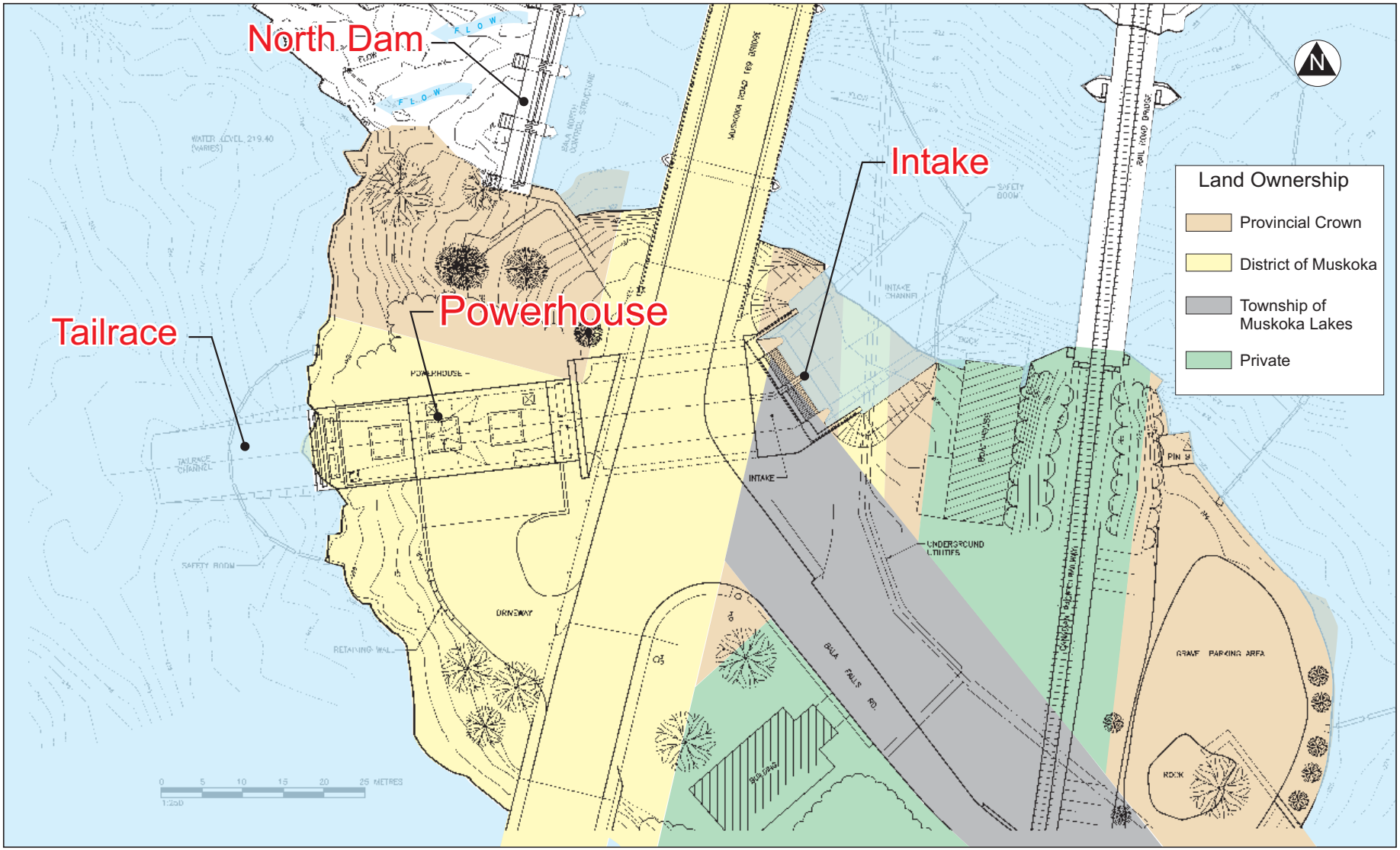

Figure 2.12
Swift River Energy Ltd.
North Bala Small Hydro Project
Land Tenure

HATCH energy

3 Agency, Public and First Nation Consultation

3. Agency, Public and First Nation Consultation

3.1 Provincial and Federal Consultation Guidelines

The Guide to Environmental Assessment Requirements for Electricity Projects prepared by the Environmental Assessment and Approvals Branch of the MOE recommends that a consultation plan include various elements such as

- identifying potentially affected stakeholders
- describing how the project may affect the environment
- providing appropriate notification to identified stakeholders as prescribed in the environmental screening process
- informing the public where, when and how they can be involved
- identifying public concerns and issues related to the project
- addressing public concerns and issues raised during the program
- documenting how public input is taken into account in the screening process and in the project planning and development (MOE, 2001).

The Guide offers additional recommendations regarding consultation with members of the public, stating the following:

> "Public consultation should be commenced early in the screening process and continued throughout the process as necessary. The proponent is required to maintain a record and mailing list of all participants in the consultation process, a record of public concerns and issues and a record of how any concerns and issues have been addressed during the Screening or Environmental Review stages (MOE, 2001)."

In June 2007, MOE released the "Code of Practice – Consultation in Ontario's Environmental Assessment Process". The Code of Practice outlines the MOE's expectations regarding appropriate consultation and provides information for the development and implementation of a consultation plan.

The Guideline on Assessing the Need for and Level of Public Participation in Screenings under CEAA states that "the public should have an opportunity to have a say in decisions that affect their lives through a meaningful public participation process". For a public participation program to be meaningful, it should exhibit [specific elements]" (CEAA, 2006). These are listed as early notification, accessible information, shared knowledge, sensitivity to community values, reasonable timing, appropriate levels of participation, adaptive processes and transparent results.

The consultation program undertaken applied the above recommendations and requirements in engaging members of the public, agency stakeholders and First Nations during the environmental assessment of the Project.

3.2 Community Engagement and Stakeholder Consultations

Since first being awarded the rights to develop a hydroelectric facility at Bala Falls, SREL and its consultant have been engaged in a broad-based, multi-faceted and proactive effort to inform the community and potential stakeholders about the project, and, to solicit comments. Their efforts at community outreach to project neighbours, community groups, the broader Bala and Muskoka communities, other potential stakeholders (municipal, provincial and federal authorities), and, First Nations, have included

- the use of widely distributed local newspapers to post mandatory and open house notices
- the use of mail and special door-to-door delivery services to distribute project updates
- holding widely advertised Pubic Information Centres (PIC) (open houses)
- obtaining the support of local interest groups to distribute (via email) project update information to their widely dispersed members
- seeking out and responding to numerous opportunities to meet with individuals, community groups and their representatives
- the development of a comprehensive and regularly updated project website.

The following sections detail the efforts of SREL and its consultant to engage the community and potential stakeholders in what has become a phased consultation process that followed the publication of two Notices of Commencement of a Screening:

- Phase One consultations covered a period from the point March 2006 through July 2008. During this period, SREL built awareness of the Project through (a) Two Notices of Commencement (see Section 3.3.1), (b) solicitation of stakeholder comments, and (c) through studies and assessments during the latter portion of this Phase (January to June, 2008) to determine the feasibility of altering the original project's design and layout to address comments and concerns that had been raised.
- Phase Two consultations began with the announcement and release of a revised plan for the Bala Falls project in August 2008 and continued through to preparation of this Environmental Screening Report.
- Phase Three consultations are expected to commence with the 30-day public review of this Report and will continue through project construction and the operating life of the project.

3.3 Notice of Commencement of a Screening

Under the MOE Guide to Environmental Assessment Requirements for Electricity Projects (March 2001), there are two mandatory public notifications that the proponent must circulate during the course of an Environmental Screening. These are a "Notice of Commencement of an Environmental Screening" and a "Notice of Completion of an Environmental Screening". Outlined below in this section are details regarding distribution of the Notice of Commencement.

3.3.1 Newspaper Publication

Shortly after the award of the Applicant of Record status from MNR, giving SREL the right to pursue the environmental assessment and seek approvals for a hydroelectric generating station at Bala's North Dam, SREL's consultant published a Notice of Commencement in Bala area newspapers:

- Gravenhurst Banner: March 8, 2006 (circulation: 7,000)
- Bracebridge Examiner: March 8, 2006 (circulation: 7,000)
- Muskoka Today: March 9, 2006 (circulation: 12,500).

Due to administrative delays in initiating the screening process, SREL opted to post a second Notice of Commencement in Bala area newspapers with MNR's encouragement:

- Gravenhurst Banner: August 8, 2007 (circulation: 7,000)
- Bracebridge Examiner: August 8, 2007 (circulation: 7,000)
- Muskoka Today: August 9, 2007 (circulation: 12,500).

3.3.2 Additional Distribution to community Groups and Neighbours

In addition to publishing the 2007 Notice of Commencement in local area newspapers, the Notice, along with a cover letter, was sent to the following nearby and adjacent landowner/occupants and interest groups:

Neighbouring Landowner/Occupants

- Algonquin Power (owner/operator of Burgess Power Station)
- Bracebridge Generation Ltd.
- The Stone Church (formerly Burgess Memorial Church)
- Hydro One Networks Inc.
- Ontario Power Generation Inc. (including Evergreen Energy)
- Purk's Place Boat House and Marina.

Community Groups

- Eastern Georgian Bay Stewardship Council
- Federation of Ontario Cottagers' Association
- Federation of Ontario Naturalists
- Georgian Bay Association
- Go Home Lake Cottage Owners Association
- Moon River Property Owners Association
- Muskoka Heritage Foundation
- Muskoka Lakes Association
- Muskoka Lakes Chamber of Commerce
- Muskoka Lakes Snow Trail Association
- Muskoka Ratepayers Association

- Muskoka River Water Management Plan Standing Advisory Committee
- Muskoka Watershed Council
- Township of Muskoka Lakes Ratepayers Association.

A copy of each of the 2006 and 2007 Notices of Commencement and corresponding Stakeholder Letter are included in Appendixes D1 and D2 respectively. A copy of the December 5, 2007 Stakeholder Letter is included in Appendix D3.

3.3.3 Distribution to Federal, Provincial and Municipal Government Agencies

SREL's consultant also distributed copies of the 2006 and 2007 Notices of Commencement to municipal, provincial and federal agencies.

Table 3.1 List of Government Agencies

Federal Government
Canadian Environmental Assessment Agency
Department of Fisheries and Oceans
Environment Canada
Indian and Northern Affairs Canada
Natural Resources Canada
Transport Canada
Tony Clement, MP (Parry Sound-Muskoka)
Provincial Government
Ministry of Culture
Ministry of Environment
Ministry of Natural Resources
Norm Miller, MPP (Parry Sound-Muskoka)
Municipal Governments
District Municipality of Muskoka
Corporation of the Township of Muskoka Lakes
Town of Bracebridge

First Nations

SREL's consultant also distributed copies of the 2007 Notice of Commencement to the Wahta Mohawk First Nation and the Moose Deer Point First Nation.

3.4 Phase One Consultations (March 2006 – June 2008)

Following the distribution of Notices of Commencement in March, 2006 and early August, 2007, numerous other consultations occurred during Phase One as outlined below.

3.4.1 Public Information Centre (PIC) 1 (August 29, 2007)

Stakeholders and the public were notified of the August 29, 2007 Public Information Centre (PIC) organized by SREL's consultant by the following means:

Newspaper Advertisements

- the Gravenhurst Banner August 15, 2007 (circulation: 7,000)
- the Bracebridge Examiner August 15, 2007 (circulation: 7,000)
- Muskoka Today August 22, 2007 (circulation: 12,500).

Letters including a copy of the newspaper advertisement were mailed to a number of parties in order to coincide with newspaper publication. Recipients of mailed notices included

- adjacent and nearby property owners and occupants
- municipal, provincial and federal agencies (see Table 3.1)
- Wahta Mohawk First Nation.

See Appendix D4 for a copy of the notice and letter.

3.4.1.1 Structure and Organization

The PIC was held at the Bala Community Centre, Maple Street, Bala, Ontario between 6:00 p.m. and 9:00 p.m. Attendees were invited to peruse the poster display, with representatives of SREL and its project development team being available to answer questions. They were encouraged to complete an exit questionnaire before leaving. The display included text and depictions of

- information on SREL and its project partner (Bracebridge Generation)
- background on the Environmental Screening process including a preliminary timetable for public/regulatory review and approvals
- a description of the project
- Contact information for SREL and its environmental consultant contact information, including means for staying informed of Project developments.

Copies of the display panels and comment sheet are included in Appendix D5.

3.4.1.2 Findings

A total of 140 people signed in at the PIC. Of these, 97 completed and submitted comment sheets.

The most frequently cited issues raised were concerns regarding the aesthetic impact the facility might have on the surrounding landscape (59) followed by the impact of the facility on water level fluctuations/flow (39). Other concerns included potential impacts on the local economy during construction, and interference with access to and recreational uses of the project site. Table 3.2 summarizes the issues raised by people who attended PIC 1.

Table 3.2 Issues Raised by the Public and Proposed Resolution, 2007 PIC

Issue	No. of Respondents Raising the Issue	Relevant Section(s) of Environmental Screening Report
Aesthetics/Signage	59	5.3.6 and 6.3.5
Water Level Fluctuation/Flows	39	6.2.2.
Flooding	2	6.2.2.
Negative Effects to the Environment	5	5 and 6
Fish and Fish Habitat (Including the newly constructed Pickerel spawning bed)	12	5.2.8 and 6.2.5
Tourism/Economic Impacts	18	5.3. 7; 5.3.9; 6.3.6 and 6.3.7.
Change/Loss of Recreational Use	14	5.3.7.2 and 6.3.6
Loss of Access by the Public	14	5.3.1 and 6.3.1 and Figures 5.4 and 6.5
Negative Effects to the Mill Stream	2	5.3.10
Relocation of the Lions Club Life Ring	1	1.2
Negative Effects to Property Values	5	6.3.6.3.
Safety	9	5.3.2; 5.3.3; and 6.3.2.
Noise Level Increase	11	6.3.4 and Appendix C1
Negative Effects to the Sewage Treatment Plant	1	6.2.4
Disruption to the Community During Construction	5	5.3.4; Figure 5.1
Project is Not Viable/ Cost Effective	8	1.4
Public Consultation Process/Method	10	3

3.4.2 Community Groups and Neighbours Outreach

In addition to the widely advertised August 29th PIC, SREL sought out and responded to numerous opportunities to forge open lines of communications with community groups, nearby and adjacent landowners and occupants in an effort to foster better understanding of the proposed project and to solicit questions and concerns.

A meeting was held with the members of the Moon River Property Owners Association at its Annual General Meeting (September 1, 2007), and SREL began discussions with nearby and adjacent landowner/occupants, including

- Purk's Place Boat House and Marina
- The Stone Church (formerly Burgess Memorial Church)
- Ontario Power Generation Inc.
- Hydro One Networks Inc

- Algonquin Power
- Township of Muskoka Lakes
- District of Muskoka.

Through the Phase One Consultations and community outreach efforts, it was clear the community had a number of concerns about the proposed project. Concerns included the following:

- Impacts of the proposed station design and layout on
  - traditional access to the North Dam's waterfall (Sections 5.3.1, 6.3.1 and 6.3.6.1)
  - the current natural beauty of the site (Section 5.3.6 and 6.3.5)
- The potential impacts of altering the seasonal flows over Bala's North and South dams on:
  - local fish habitats (Sections 5.2.7, 5.2.8 and 6.2.5)
  - cottagers' access to their docks (Section 6.3.6.2)
  - the aesthetics of the waterfalls (Section 6.3.5)
- The potential impacts of construction on
  - the seasonal local economy (Victoria Day – Cranberry Festival) (Sections 5.3.8 and 5.3.9)
  - use of an important snowmobile route that crosses through the proposed construction site on Bala Falls Road (Section 5.3.7.2).

In the case of the two most immediate neighbours, Purk's Place Boat House & Marina and The Stone Church, these owner/occupants also expressed concern about the impacts construction and construction-related activities on the integrity of their respective buildings and their access to them (Sections 5.3.8 and 6.3.1).

Appendix D6 provides a summary of the comments received through the Phase One Consultations with members of the public as well as industry/stakeholder groups.

3.4.3 Regulatory Agencies Consultation

3.4.3.1 Municipal: Township of Muskoka Lakes & District of Muskoka

For the most part, the Township and District voiced the same concerns expressed by their respective constituents for the potential short- and long-term impacts this project on the local environment. Numerous meetings and discussions were held with municipal officials (staff and elected) to discuss these concerns and explain project details, as they developed.

The Township and District encouraged SREL to devise a design and layout that was more in keeping with a vision the Township of Muskoka Lakes had for the development of this site and its surrounding area based on public meetings held in 2002. (See Appendix D7 for drawing of Bala Strategic Plan, May 2002 provided by the Township of Muskoka Lakes.)

On March 16, 2006, John A. Cosgrove, CAO – Treasurer of the Corporation of the Township of Muskoka Lakes contacted SREL to forward comments from the Office of the Mayor (dated January 12, 2005) which would represent the comments of the township. The mayor included a council resolution (# PC-7-5/01/05) with these comments dated January 5, 2005.

On September 26, 2007 SREL sent a letter to the Muskoka District Solicitor as a follow-up to a telephone conversation to propose a meeting to discuss alternative plans for the Project in response to public concern for Layout Alternative 1, presented at the PIC. On November 16, 2007 SREL met with the Muskoka District Solicitor and the District Director of Roads and Waste Management to discuss the use of District lands for the Project.

See Appendix D8 for a summary of the meetings and correspondence with the Township and District during Phase One Consultations.

3.4.3.2 Provincial Agency Consultations

SREL and it environmental consultant corresponded with provincial agencies to determine their interests/concerns with respect to this project.

The following summarizes the concerns raised by particular provincial authorities through the Phase One Consultations.

Ministry of Natural Resources

Consultation with the MNR revealed the following to be key concerns during Phase One Consultations. The relevant section of this ESR where these issues have been addressed is also provided:

- Reproductive success and recruitment of various fish species (Sections 5.2.7, 5.2.8 and 6.2.5)
- Negative effects to fish populations, riparian and littoral habitat (Sections 5.2.7, 5.2.8 and 6.2.5)
- Impacts to walleye and pike spawning (Sections 5.2.7, 5.2.8 and 6.2.5)
- Exposure of incubating lake trout eggs and fry (Sections 5.2.7, 5.2.8 and 6.2.5)
- Negative impacts to species at risk (Sections 5.2.11 and 6.2.7)
- Vulnerability of flora to changing flows and levels (Section 6.2.6)
- Impacts to the Lower Moon River Conservation Reserve, and Moon River Conservation Reserve (Section 9)
- Negative impacts to boating and recreational and commercial navigation (Sections 5.3.7, 5.3.8, and 6.3.6)
- Negative effects to vehicle and pedestrian traffic (Sections 5.3.4 and 6.3.3)
- Potential impacts to north shore residents and shoreline structures as a result of higher flows through the North Dam and that generated by the Project (Section 6.3.6.3)
- Significance of the North Bala Dam as a visual attractant and component of tourism (Sections 5.3.6 and 6.3.5)

- Impacts to residents' shoreline use and enjoyment due to high and low water events (Sections 6.3.6.2 and 6.3.6.3)
- Negative effects to Go Home Lake water levels (Section 6.2.2)
- Creation of a potential safety hazard due to increased flows and velocities (Section 6.3.2)
- Negative impacts to adjacent municipal and private property (Sections 6.3.6.3 and 9)
- Potential impacts to Wahta First Nation Reserve (Sections 5.3.13 and 6.3.9)
- Impacts to the generating stations belonging to OPG and Algonquin Power (Sections 5.3.10 and 6.3.8.1).

Ministry of the Environment
During the environmental assessment process, the MOE requested the following issues be considered. The relevant sections of the ESR where these have been addressed are noted:

- Consultation with Aboriginal communities (Section 3.5.7)
- Noise impacts (Sections 5.3.5 and 6.3.4)
- Spill containment and waste fluids (Sections 5.2.6.2, 6.5 and 8.6)
- Sewage and water services (Sections 5.1.9 and 5.1.10)
- Surface water quality (Sections 5.2.6 and 6.2.4)
- Excavated material (Section 5.1.4)
- Near shore construction and dredging (Section 5.1)
- Blasting (Section 5.1.4)
- Dust (Sections 5.2.3 and 6.2.1)
- C of A Air (Section 11)
- Waste disposal (Section 5.1.10)
- Decommissioning (Section 6.6)
- Emerald Ash Borer infestation (Section 5.2.9).

See Appendix D9 for a summary of the discussions and correspondence with provincial authorities during Phase One Consultations.

3.4.3.3 Federal Agency Consultations

As the environmental screening also needs to satisfy federal requirements, SREL and its environmental consultant contacted appropriate federal agencies in order to determine their interests/concerns with respect to this project. See Appendix D10 for a summary of the discussions and correspondence with federal authorities.

The following summarizes the concerns raised by federal agencies through Phase One Consultations.

Transport Canada
The concerns expressed by TC during Phase One Consultations in their response to the Notice of Commencement dated September 18, 2007 included the following:

- North Bala dam requirement for approval pursuant to the NWPA (Section 11)
- Proposed location of booms or other structures (Figure 1.2)
- Potential impact of project on existing navigational uses (Sections 5.3.7, 5.3.8, and 6.3.6).

Department of Fisheries and Oceans
During Phase One Consultations DFO noted their interest in having the following areas of potential impact addressed:

- downstream fish habitat (Sections 5.2.8 and 6.2.5)
- fish spawning areas (Sections 5.2.8 and 6.2.5)
- potential fisheries impacts (Sections 5.2.7, 5.2.8 and 6.2.5)
- river flows during the operation of the hydroelectric generating station. (Sections 6.2.2 and 9).

Indian and Northern Affairs Canada
In response to the Notice of Commencement INAC requested that the proponent make efforts to identify and notify all potentially interested First Nation communities (see Sections 3.3.4, 3.4.4 and 3.5.7).

3.4.4 First Nations
Neither the Wahta Mohawk First Nation or Moose Deer Point First Nation responded to the initial contacts during the Phase One Consultations. However, follow up was carried out during Phase Two consultations (see Section 3.5.7).

3.4.5 Project Website Launched (November 2007)
A project website www.balafalls.ca was developed and launched by SREL as a means of providing the public with the latest information concerning project developments. The site included

- A description of the project (as envisioned at that point in time)
- Bala's History
- Frequently Asked Questions
- Who We Are
- Our Commitment to the Community
- The Approvals Process
- Notices and Links (including PIC display material)
- Contact Us.

To ensure all potential stakeholders were aware of this new website, SREL undertook a broad-based community outreach effort to notify the community of this newly established website. This included

- mailing 1500 letters to all those with "P0C 1A0" postal code (Bala and surrounding area)
- mailing 80 letters to those who provided contact information at the 2007 PIC
- mailing approximately 25 letters to all municipal, provincial and federal government agencies.

In an effort to reach Bala's business and seasonal residents, SREL obtained the support and cooperation of the Moon River Property Owners Association, the Muskoka Lakes Association and Muskoka Lakes Chamber of Commerce to electronically distribute a copy of the above-mentioned letter to their respective members (approximately 3500). A copy of the letter can be found in Appendix D11.

In addition to providing a general project update and summary, these letters identified a toll free number for people to contact SREL to get answers to their questions.

3.5 Phase Two Consultations (July 2008 – ESR Release)

Phase Two Consultations comprised three overlapping efforts to build community-awareness for SREL's "new plan" for its Bala Falls project, a dramatically revised design. The Plan, while working with the engineering and environmental site constraints, responded to most of the community's concerns.

Phase Two Consultations began with a focussed and concerted effort to engage neighbours with SREL's new plan, followed by a series of ever-widening communications and public forums to present and solicit the community's comments.

These community outreach initiatives are described in the following sections. A summary of Consultation with Public and Stakeholders is provided in Appendix D12.

3.5.1 SREL's New Plan for Bala Falls (July/August 2008)

After several months of reviewing public and stakeholder comments, and, assessing the feasibility of various siting and design options raised in the Phase One Consultation, SREL undertook a series of meetings and discussions with the community and community representatives to present a "new plan" that responded to the concerns raised in the community-wide Phase One Consultations. Specifically, the "new plan" entailed

- preserving traditional access to the North Dam's waterfall by moving the powerhouse complex more than 35 m from its previous locations abutting the shoreline of the North Dam's waterfall
- minimizing the visual impacts of the power station complex by burying most of the equipment and facilities below grade, and proposing an extensive landscape plan to restore the site and surrounding area in a manner sensitive to the area's rugged landscape and municipal visions for this area

- reconfiguring the projected water use profile of the facility to better balance the aesthetic needs for flows over the Bala's North Dam and the protection of fish habitat and aesthetics at Bala's South Dam
- revising the project construction approach to reduce the disturbance to the local economy and the off-season traffic flows
- proposing a local advisory committee, comprising neighbours and community representatives, to work with SREL in finalizing a suitable landscape plan to guide restoration of the site, post construction.

3.5.1.1 Meeting with Community Representatives (August 9, 2008)

Before launching a community-wide notice of SREL's "new plan" for Bala Falls, SREL held a meeting with a small group of community representatives to solicit reactions to the new proposed plan. The meeting included a Township of Muskoka Lakes representative, four Moon River Property Owners Association representatives and a Bala resident. Two representatives from the Bala Bay – Lake Muskoka area and a Township of Muskoka Lakes staff person were also invited but were unable to attend. The meeting also included discussion and review of the material proposed for the second, upcoming PIC.

There was general support for the efforts SREL had taken to respond to community concerns about the design and layout previously proposed. Specifically, the plan to move the project more than 35 m from the base of the North Dam's waterfall, and, to reduce the profile of the powerhouse structure to minimize the visual impacts of the proposed facility, were positively received. Nevertheless, the rationale for developing such a scenic site was questioned. Other questions and concerns raised pertained to

- the location of the safety booms (Figure 1.2)
- the added risks the new intake location might pose to those jumping off the CPR bridge (Section 6.3.2)
- the implications the new design had for the continued operations of Purk's Boat House and Marina (Section 5.3.8)
- the extent of excavation that would be required to build the facility's intake and powerhouse. (Section 5.1.2).

3.5.2 Community-Wide Fact Sheet

SREL prepared a fact sheet explaining the new, revised project design and distributed it (August 5, 2008), by special door-to-door delivery services, to approximately 900 residence in the area immediately surrounding Bala's falls. This fact sheet highlighted the measures SREL was proposing to address the community's concerns about the preliminary design presented at PIC 1. Under the new plan

- the powerhouse would be moved more than 35 m away from the edge of the north dam's waterfall in order to preserve the traditional use and access to the waterfall
- a significant portion of the station structures would be buried below grade to minimize impacts to the site and surrounding area's visual aesthetics

- the proposed construction schedule was reorganized to minimize/avoid traffic disturbances during the summer tourist season
- extensive landscaping would be undertaken to preserve the site's traditional character and scenic beauty.

A map illustrating the area where the fact sheet was distributed and a copy of the fact sheet are included as Appendix D13.

3.5.3 Public Information Centre 2 (August 13, 2008)

3.5.3.1 Notice

Stakeholders and the public were notified of the August 13, 2008 Public Information Centre (PIC 2) by the following means.

Advertisement

- the Gravenhurst Banner August 6 & 13, 2008 (circulation: 7,000)
- the Bracebridge Examiner August 6 & 13, 2008 (circulation: 7,000)
- Muskoka Today August 22, 2008 (circulation: 12,500)
- Muskoka Sun August 22, 2008 (circulation 15,000)
- The Muskokan August 22, 2008 (circulation 24,000).

Letters including a copy of the newspaper advertisement were mailed on or about August 14, 2008 to

- adjacent and nearby property owners and occupants
- Wahta Mohawk and Moose Deer Point First Nations
- municipal, provincial and federal agencies (see Table 3.1).

Appendix D14 contains copies of the newspaper notices as well as the letters of notification.

3.5.3.2 Structure and Organization

The PIC was held at the Bala Community Centre, Maple Street, Bala, Ontario between 4:00 p.m. and 9:00 p.m. The PIC was organized with display boards and representatives from SREL and its project development team were available to answer questions. Attendees were invited to peruse the materials, and they were encouraged to complete an exit questionnaire before leaving. The display included

- information on SREL and its project partner
- background on the Environmental Screening process including a preliminary timetable for public/regulatory review and approvals

- a description of the project (including graphics that showed the predicted water level changes in relation to the MRWMP)
- Contact information for SREL and its environmental consultant, including means for staying informed of Project developments.

A copy of the display panels, comment sheet and a tabulation of comment sheet responses are included in Appendix D15.

3.5.3.3 Findings

A total of 159 people signed in at the PIC. Of these, 77 completed and submitted comment sheets.

Table 3.3 summarizes the issues raised by people who attended PIC 2.

Table 3.3 Issues Raised by the Public and Proposed Resolution, 2008 PIC

Issue	No. of Respondents Raising the Issue	Relevant Section(s) of Environmental Screening Report
Water Level Fluctuation/Flows	4	6.2.2
Flooding	1	6.2.2
Fish and Fish Habitat (Including the newly constructed Pickerel spawning bed)	2	5.2.8 and 6.2.5
Tourism/Economic Impacts	3	5.3.7 and 6.3.6. 5.3.9 and 6.3.7
Aesthetics/Preference for Natural Rehabilitation Following Construction	13	5.3.6 and 6.3.5; Figure 6.6
Public Consultation Process/Methods	7	Section 3
Change/Loss of Recreational Use	4	5.3.7.2 and 6.3.6
Traffic Disruption within the Community During Construction	3	5.3.4; Figure 5.1
Safety/ Concern for those Jumping from CPR Bridge	3	5.3.2; 5.3.3; 6.3.2
Impacts to Purk's Place	3	5.3.8 and 6.3.1
View of the Powerhouse from the Water	3	6.3.5.3
Revenue Sharing with/ Compensation for the Community of Bala	2	Figure 6.6
Noise Impacts	2	6.3.4; Appendix C1 – Acoustic Assessment Report.
Project is Not Viable/Cost Effective	1	1.4
Impact to Cranberry Festival	1	5.3.7 and 6.3.6
First Nation Consultation	1	3.7
Wheelchair Accessibility	1	6.3.1
Information on the Transmission Line	1	1.2.3
Availability of the Environmental Screening Report for Public Review	1	3.1.2
Snowmobile Traffic	1	5.3.7.2

Issue	No. of Respondents Raising the Issue	Relevant Section(s) of Environmental Screening Report
Intake/Tailrace Boom Information	1	6.3.1
Negative Effects to Heritage Buildings (Purk's Place and Burgess Memorial Church)	1	5.3.12

While some people remained fundamentally opposed to any power development at Bala's North Dam, there was appreciation for SREL's effort to respond to previously expressed concerns by proposing to move the site away from the north dam's waterfall and substantially burying the facility. Nevertheless, there was concern regarding the artist's rendering that depicted a substantial "sunset deck" overtop of the powerhouse which was out of step with the community's desire to preserve the site's "undeveloped" character. (See revised artist's rendering in Appendix D15.)

3.5.4 Additional Project Information (October 2008)

In an effort to correct misconceptions about the proposed development, SREL distributed a fact sheet containing a list of questions and answers. This two-sided 8 x 14" factsheet was distributed, by special door-to-door delivery services, on October 11, 2008, to approximately 900 residents in the surrounding of Bala's falls.

SREL also had the Q&A fact sheet published in the local area newspapers (see Table 3.4) in order to reach Bala's wider community.

Table 3.4 Newspaper Q&A Fact Sheet

Newspaper	Date of Insertion	Circulation (approximate)
Muskoka Weekender	Friday, Oct.10, 2008	26,000
Bracebridge Examiner	Wednesday, Oct.15, 2008	7,000
Gravenhurst Banner	Wednesday, Oct. 15, 2008	7,000
Muskoka Sun	Thursday, Oct 16, 2008	15,000
Muskoka Today	Thursday, Oct. 16, 2008	12,500

For a copy of the Question & Answer Fact Sheet, see Appendix D16.

3.5.5 Follow-Up Meetings/Discussions with Neighbours & Community Groups (July 2008 to February 2009)

In an effort similar to that undertaken in follow-up to PIC 1, SREL also engaged neighbours and other stakeholders to explain the details of its revised plan for the proposed North Bala development, to solicit comments and reactions to it, and, to assess whether and to what extent the design and features of the "new" facility could practicably be altered to address any remaining concerns.

The following describes the nature and scope of discussions with the project's neighbours and community groups.

3.5.5.1 Neighbours

Purk's Place Boat House and Marina (PPBH&M)
After an initial meeting in Phase One on May 7, 2008 SREL held another meeting with PPBH&M on August 13, 2008 prior to the PIC 2, concerning the potential short- and long-term impacts SREL's proposed facility would have on the continued operation of this business. SREL also discussed with PPBH&M possible compensation for the construction period and options for relocating the dock.

It was clear to SREL that given the proposed location of the power station's intake, the requirement for a construction laydown area, and the likely placement of a safety boom upstream of the proposed facility that sustaining this business would require the relocation of PPBH&M's boat docks. Possible relocation of the docks to Crown land at Diver's Point was discussed. However, a review by MNR of the safety and liability issues associated with the placement of a dock at this point led to the dismissal of this relocation option.

See Appendix D17 for a summary of consultation with the owner of PPBH&M during Phase Two Consultations).

The owner of PPBH&M and SREL will need to negotiate mutually acceptable mitigation and/or compensation for any negative effects to this business as a result of the Project.

The Stone Church (formerly Burgess Memorial Church) Owner/Occupant
A number of meetings and phone conversations were held with the owners of the Stone Church (see Appendix D18).

While the owners understood the reasons for moving the project's proposed location away from the North Dam's waterfall, they were concerned about the loss of available parking to support a business they were planning at the Stone Church. Also, the owners were concerned about the broad effects of the planned flow reductions at Bala's South Dam on the fish habitat in this dam's tailrace and on the general character and ambience they currently enjoyed from their property abutting the South Dam's outfall. Also, now that the project site is closer to their property (a designated heritage site), they are concerned about the potential impacts of construction activities, i.e., noise and vibration, on the integrity of their century-old building (see Section 5.3.12.1).

In follow-up to the questions and concerns raised by The Stone Church owners, SREL committed to determining what measures were, or could be adopted to mitigate effects to this century-old building by construction activities, and, that the character of the South Dam's waterfall, including its associated fish habitat, would be protected, to the extent possible. A commitment was made to do a condition survey of The Stone Church, before any construction activities commenced and to provide designated parking for its customers. This was detailed in a memorandum to the church's owners on September 17, 2008.

Algonquin Power
Algonquin Power has received all letters and notices apprising the company of project developments. In accordance with its water rights, Algonquin Power is satisfied that SREL's proposed operating regime for its Bala Falls project will not compromise Algonquin Power's Burgess Falls operations.

Ontario Power Generation Inc. (OPG)
OPG are power station operators downstream of the proposed development site. Under the MRWMP, existing operators must be in agreement with the operations of new proposed plants. From the project's conception, SREL recognized the importance of coordinating its proposed facility's operations with the water rights and requirements of OPG's Ragged Rapids and Big Eddy hydroelectric facilities located downstream. To this end, extensive discussions were held with OPG to discuss the implications of the proposed facility on water levels and flows from the plant and along the Bala Reach. As the plant will be operated as a run-of-river plant within the flow requirements of the MRWMP, no adverse impact is anticipated to OPG's operations.

Please see Section 9 for plant operational details and its relation to the MRWMP. See Appendix D12 for a summary of consultation with stakeholders during Phase Two Consultations.

Hydro One Networks Inc. (HONI)
HONI has received all letters and notices apprising the company of project developments. Through the requirement to obtain a Connection Impact Agreement, SREL has confirmed that HONI's nearby distribution system is capable of receiving the proposed facility's electricity production. HONI's final approval for the interconnection will be required before the facility can go into service.

Canadian Pacific Rail
After initial phone conversations with CP Rail, SREL met with CP Rail real estate and structural representatives on August 4, 2009. It was noted that SREL was discussing mitigation and compensation for the loss of navigational rights directly with CP Rail's tenant Purk's Place. Concerns expressed with respect to increased scour around the rail bridge abutments and pier from the increased flow through the north channel during the operations phase of the Project. It was agreed that CP Rail would conduct an underwater survey of the structure to determine if upgrades would be necessary. SREL indicated that it would like to be present during the survey. In addition, CP Rail expressed concern that there would be reduced access to its structure with the relocation of the boom. Future maintenance, however, should be able to be coordinated with the Project operators to try and schedule during low flow periods. Safety procedures required for future maintenance should not be significantly different than those utilized currently with the existing boom location. Finally, CP Rail requested that the Contractor incorporate standard specifications for blasting work near rail structures. SREL agreed to enforce this request.

3.5.5.2 Community Groups

Moon River Property Owners Association (MRPOA)
Discussions with and presentations to the MRPOA have proven extremely useful in helping SREL understand its members' concerns. Numerous meetings and discussions were held with its members and its executive (Appendix D12 provides a record of consultation with stakeholders during Phase Two Consultations).

In various meetings and discussions with the MRPOA and its representatives, concerns were expressed about

- the project's potential short- and long-term impacts, i.e., traffic and economic disruption to the local economy during construction (Sections 5 and 6)

- the project's potential impacts on the traditional character, access and public safety of the area surrounding the North Dam's waterfall (Sections 5.3.1, 5.3.2, 5.3.6, 6.3.1, 6.3.2 and 6.3.5)
- the timing and extent of the required road closures during construction (Section 5.3.4)
- construction and road closure impacts on the snowmobile trail that follows the Bala Falls Road to Muskoka Road 169 (Section 5.3.7.2)
- whether the operating regime of the proposed power stations would improve or exacerbate the water level fluctuations and flooding being experienced by downstream cottagers (Section 6.3.6.2).

Muskoka Lakes Association (MLA)
The MLA has been part of SREL's communications outreach program from the outset of this project's development. The MLA has been provided with notices of public meetings and project development updates throughout the course of this project's public consultations and community outreach program.

Through meetings with MLA's executive on January 12, 2009 and June 12, 2009, SREL answered a broad range of questions assembled from its members. Minutes from these meetings were posted on MLA's website for the public.

Bala Falls Community Association (BFCA)/Save the Bala Falls (SBF)
These two community-based groups have expressed concern with development at Bala's North Dam. Topics and concerns raised (on associated websites and in public pronouncements) include

- concern about the visual impacts associated with
  - the view looking upstream from Bala Reach (Sections 5.3.6 and 6.3.5)
  - the placement of safety booms upstream and downstream of facility (Figure 1.2)
  - the unsightliness of security fences and safety signage. (Section 5.3.6)
- willingness to consider power development around Bala's South dam, however propose that all profits go to the local community (Section 3.5.6.1)
- disruption to traffic, tourism, recreation and the environment. (Sections 5.3.4, 5.3.7 5.2 and 6.2).

A meeting with representatives from these groups, and a concerned neighbour was held on May 27, 2009 to discuss their idea of moving the project to the South Dam, as well as other safety and aesthetic concerns.

Muskoka Lakes Chamber of Commerce (MLCC)
SREL recognizes the seasonal nature of Bala's economy and engaged the MLCC early in the consultation process.

SREL met with the MLCC's executive (October 6, 2008) in order to explain the project and to address their questions and concerns. The MLCC's primary concerns were with the potential short- and long-term impacts the proposed facility might have on Bala's heavily tourism-dependent economy.

Specifically, the MLCC raised questions about the construction period, the associated road closures and dust that might be associated with this work, and, the impacts this work would have on Bala's tourism-dependent local economy (see Sections 5.2.3, 5.3.4 and 5.3.9).

3.5.6 Agency Consultation

3.5.6.1 Meetings/Discussions with Municipal Authorities

Township of Muskoka Lakes/District of Muskoka
From the project's inception, SREL has sought out and responded to numerous requests to meet with municipal officials (staff and elected). (See Appendix D19 for a summary of correspondence with the Township during Phase Two Consultations.)

While both the Township and the District expressed significant concerns with the design and layout proposed by SREL in the Phase One Consultations, both levels of government support in principle the "new plan" that relocated the facility more than 35 m from the edge of the North Dam's waterfall.

The following section provides a brief summary of the key consultation with the Township and District during 2008.

Corporation of the Township of Muskoka Lakes:
In spring 2008 *in-camera* meetings were held with Mayor Susan Pryke and council members. Layout Alternative 1 was discussed and input from the municipality was incorporated into Layout Alternative 2 (see Section 1.5 for Layout Alternative details).

On July 8, 2008 The Township of Muskoka Lakes carried a resolution (C-29-08/07/08) stating "in principle" that the District Municipality of Muskoka consider the use of District owned lands. On October 21, 2008 the Township of Muskoka Lakes carried an additional resolution (Resolution Number: C-14-21/10/08) that the consideration of the heritage value of the Bala Falls and effect to Bala's economy, in particular snowmobile travel be included in the environmental assessment process (see Sections 2.2.6.2, 5.3.9, 5.3.7.2 and 6.3.7). Details regarding these resolutions are provided in Section 2.2.3 and copies have been included in Appendix C5.

A subsequent resolution passed by the Township requested a heritage study be completed by SREL as part of the environmental screening process. (A copy of the Cultural Heritage Landscape Assessment of the Bala Falls is included as Appendix C8.)

District of Muskoka
The District Municipality of Muskoka carried a motion to agree "in principle" with the proposal by SREL to construct the project on property owned by the District on August 13, 2008. This agreement is subject to the following two conditions; "successful completion of the Environmental Screening process; and a satisfactory agreement with the District Municipality of Muskoka regarding the use of District owned lands".

SREL presented an outline of the project and answered questions from councillors during an open District Council Meeting on October 14, 2008.

A second motion was carried by Council on October 14, 2008. It stated that after having had the opportunity to visit the site and receive a presentation from SREL, the District of Muskoka would consider the use of District lands as an alternative to the previously selected Crown land site.

Details regarding these motions are provided in Section 2.2.3 and a copy of each motion is included in Appendix C6.

Prior to the 2008 PIC, SREL sent an invitation to the Muskoka District Solicitor along with details regarding the intended use of District lands, and the extent of public notification activities to be undertaken (letter dated: July 21, 2008).

SREL conducted site tours for District Council members on October 14, 2008 to review the proposed project plans *in situ*. Numerous questions and queries seeking clarification of the proposed project's design and operating characteristics were addressed.

SREL made a presentation to the District Municipality of Muskoka on October 14, 2008. The following topics were discussed at that time:

- Project Overview
- Renewable Energy Benefits
- Two Siting Options
- Project Timing
- Avoiding/Mitigating Impacts.

A copy of the material presented during this meeting is included as Appendix D20.

Development at South Bala Dam instead of North Bala Dam

The question as to why SREL had not proposed a hydro development at the South Bala Dam instead of at the North Bala Dam was initially raised by some members of the public and subsequently by some members of the DMM council.

The following section outlines the various factors considered in relation to development in the south channel and shows why this was not pursued further by SREL.

Applicant of Record (AR) Award

Firstly, the MNR in its competitive site release process invited bids to take advantage of opportunities for the development of hydroelectric generation at the North Bala Dam (MNR – Dam-RFP-01-05). In response, SREL submitted its proposal to develop the named available site, the North Bala Dam. In a letter dated August 5, 2005, the MNR, Parry Sound office notified SREL that it had been named Applicant of Record for the North Bala Dam site. On August 31, 2005, MNR published a public notice on the internet using its extranet https://extranet.mnr.gov.on.ca/waterpower/rfp_dams.html. This notice clearly indicated that the AR had been identified for the retrofitting of the North Bala Dam for hydroelectric generation. A copy of this notice is in Appendix A1. These various documents verify that the North Dam was the one offered for development. It is based on this fact that SREL proposed the development at the North Bala Dam.

Despite the fact that the South Dam was not made available for development, SREL responded to public queries by undertaking a high-level examination of the suggested development at the South Bala Dam.

It was found that a hydroelectric project at the South Dam would need to be constructed in one of three ways:

- **Design A**

  The first design option would be to integrate the intake and powerhouse into the north end of the existing south dam. Such a design could be accommodated on Crown land in the area. However, this design was found to be not feasible due to the following three major issues:

  1. This option would require the intake/powerhouse to be integrated into as many as three of the existing dam sluices. During construction, these sluices would not be available for water passage. Therefore, the dam's flood protection capability would be considerably reduced, increasing the potential for upstream flooding. Bala Bay properties would be at risk with the additional danger of all three Bala dams being overtopped in the event of extreme flood conditions. A diversion channel would be required to be placed somewhere on the island in order to reduce the risk. There is no immediately suitable location at present for such a diversion channel. SREL considers such a flooding/overtopping risk during construction as being unacceptably high.
  2. If flow during construction were to be very low, allowing the completion of the plant, the long-term operation would pose water passage problems. While operating, the plant would replace the three removed sluices as a passage for flood waters. However, there may be occurrences requiring the shutdown of the plant including closure of the intake. During such a plant shutdown, the flood capacity of the Bala dams would again be reduced significantly, increasing the risk of flooding of Bala Bay (as well as the rest of Lake Muskoka) in an extreme weather event. In order to counter this risk, the remaining sluices in the North and/or South Dam would have to be expanded by in-stream blasting in order to improve the flow capacity. The cost of doing this would be prohibitive to a project of this size. The time required to undertake this expansion work also extend the construction period.
  3. The existing South Bala dam is almost 100 years old. It is anticipated that extensive structural upgrades would be required for the South Bala dam to be able to accommodate any project involving integration. It is possible that the entire dam would likely require replacement. The cost of such an undertaking would be prohibitive to a project of the size proposed, rendering it non-viable. The construction period would also be lengthened considerably

- **Design B**

  The second design option could be considered as an alternative to attempting structural changes to the existing old dam and/or reducing its existing flood capacity. This design would involve the construction of an intake in the vicinity of Diver's Point upstream of the South Dam along with a conveyance structure such as a tunnel or penstock to carry plant flows to a powerhouse. The powerhouse could, theoretically, be constructed anywhere downstream of the South Dam. Discharged flows would be released either into the south channel or directly into the

downstream Moon River. The available Crown land upstream of the South Bala dam would be able to accommodate the intake for this design.

The main issues with this option are as follows.

1. The water upstream of the South Dam is shallow and considerable rock excavation extending some distance upstream would be required in order to minimize head losses.
2. The presence of an intake at Diver's Point would require a much larger boom than is currently situated at the South Dam as approach the intake itself would need protected by the boom. No further recreational use of this area would be possible with this option.
3. The powerhouse would need to be constructed downstream of the dam. The Crown land upstream of the bridge is not large enough to accommodate a powerhouse. Extensive upgrades to the existing dam abutments and extensive in-stream blasting to allow the construction of a powerhouse and the utilization of the full hydraulic head of the site would be required. The land downstream of the bridge is privately owned on highway land. Therefore, the powerhouse would still need to be constructed east of the highway. The most likely site would be just south of the proposed North Bala location. The same aesthetic issues regarding the view of the powerhouse from Moon River would be present with this option. However, since there is not a natural valley at the south end of the island, it would be much more difficult to bury. The amount of rock would also increase the amount of blasting that would be required.
4. The conveyance structure (pipe or tunnel) would need to go under a live rail line and two roads (Bala Falls Road and Highway 169). Therefore, in addition to the same road closure issues associated with the North Bala option, there would be the potential impact on a live railway line.
5. This option would still require visible structures to both Bala Bay and the Moon River as well as excessively more disruption to roads and railways. The costs associated with this option would be significantly higher and the aesthetic issues would be comparable to the proposed North Bala option. In fact, the potential impacts to two roads plus a rail line as opposed to just the one road for the North Bala project actually renders this option more problematic in addition to being more expensive.

- **Design C**

The third option (raised by a member of the public) proposed the use of kinetic, or river, turbines. These small turbines require minimal infrastructure and very little head to operate, depending on just the flow at the point of placement for generation. By virtue of their design, these turbines cannot utilize head and are therefore severely limited in the generation capacity. However, since power generated from a turbine is a function of both flow and head, by significantly reducing the head by putting it downstream of the dam, the power produced would be significantly reduced. It is estimated that these river turbines would produce 100 kW to 400 kW as opposed to the current project size of 4 MW, representing a reduction of at least 90%. This is significantly different from the 4000- to 5000-kW plant proposal through which led to SREL's selection as Applicant of Record.

3.5.6.2 *Meetings/Discussions with Provincial Agencies*

Dialogue was maintained with various provincial ministries during the course of the environmental screening. These included the Ministry of the Environment (MOE), Ministry of Culture and the Ministry of Natural Resources (MNR). The majority of discussions ensued between SREL and the MNR, as the MNR has responsibility for site release and Crown land disposition in addition to being the owner of the two Bala dams. The following section summarizes the concerns raised by MNR through the Phase Two Consultations. Please see Appendix D21 for a summary of correspondence with provincial agencies during this phase.

Ministry of Natural Resources

In a meeting with MNR and OPG on September 16, 2008, SREL was provided information regarding the current management of the river system requiring the coordination of MNR and OPG. Main issues discussed at this meeting and through subsequent dialogue with MNR included

- requirement for SREL to ensure that the MRWMP high flow trigger for the Bala Reach was not exceeded by plant operation
- requirement to ensure that Go Home Lake levels were not changed from the historical existing expected conditions
- requirement that additional operation of the Go Home dam by MNR did not result from the operations of the proposed project
- requirement that the plant operate so as to maintain Lake Muskoka levels within a Best Management band within the normal operating zone (NOZ) described in the MRWMP.

The MRWMP is addressed in Section 9.

3.5.6.3 *Meetings/Discussions with Federal Agencies*

Dialogue was maintained with appropriate federal agencies throughout the environmental screening process. The Canadian Environmental Assessment Agency (CEAA) coordinated the federal agencies' involvement in the process. Transport Canada and Fisheries and Oceans Canada (DFO) were identified as the lead federal agencies. The following summarizes the concerns raised by these agencies through the Phase Two Consultations. Please see Appendix D22 for a summary of correspondence with federal agencies during this phase.

Transport Canada

Transport Canada participated in a number of conference calls and following review of project information provided, noted their concerns and/or requested consideration of the following items during the course of the environmental assessment:

- navigational safety issues within the areas upstream of the proposed plant intake (Sections 5.3.1 and 6.3.1)
- existing issues with Purk's Place facility that would limit safe water access (Section 5.3.8)
- rescue procedures or considerations for persons or vessels caught in the intake (Section 5.3.2)

- discussion within the ESR regarding the placement of upstream and downstream safety booms (Section 6.3.2)
- potential impact on use of island as a portage route past the Bala dams (Section 6.3.6.1)
- application of the Navigational Water Protection Act (NWPA) to the project (Section 11).

Department of Fisheries and Oceans
DFO expressed concern about existing habitat downstream of both dams and the potential impacts that may occur due to project activities, particularly during operation. Of particular concern was the potential loss of walleye spawning habitat (including some enhanced areas) on the north side downstream of the North Bala falls through reduced flow resulting from diversion.

Following extensive dialogue with DFO and conducting of field studies, operational procedures aimed at ensuring the provision of suitable spawning conditions within the identified areas were agreed upon by DFO and SREL. These procedures are detailed in Section 6.2.5.

3.5.7 First Nations

First Nations contacted during the environmental screening of the project were the Wahta Mohawk and Moose Deer Point First Nations. These First Nations were contacted to advise them of the project and to give them the opportunity to participate in the environmental screening process.

In follow-up to initial correspondence, SREL talked with Blaine Edward, Chief of the Wahta Mohawk's. Although he expressed some concern regarding potential impacts of the project on the Moon River's water levels and potential impacts on fish, he did not feel a meeting to discuss these matters further, was needed.

Further to initial correspondence sent to Moose Deer Point First Nation during the environmental screening process, HE contacted the First Nation on October 15, 2008. A representative of the Moose Deer Point First Nation Band Office confirmed that Chief Barron King had received the letter of August 7, 2008 and stated that Moose Deer Point "had no issues regarding the project".

Appendix D23 provides a summary of the First Nations and related contacts. Copies of written correspondence and records of telephone conversations are also provided in Appendix D23.

3.6 Summary of Consultation Findings (Issues) and Relevant Report Sections

Table 3.5 represents a consolidation of stakeholder concerns (i.e., the public, interest groups (named), nearby/adjacent landowner/occupants, municipal, provincial, and federal agencies, and First Nations) by category, along with references to those sections of the ESR where those concerns are addressed.

Table 3.5 Summary of Consultation Findings (Issues) and Relevant Report Sections

Issue	Raised By	Relevant Report Section
Construction Zone/ Project Location and Tenure	Ministry of Environment Transport Canada Public/Stakeholders Communities in Bloom	Figures 1.1; 1.2; 2.11 and 5.4

Issue	Raised By	Relevant Report Section
Public Consultation Process	Public/Stakeholders	3
Hydroelectric Development at the South Dam	Public/Stakeholders District Municipality of Muskoka	3.5.6.1.3
Identification of/ Consultation with Potentially Interested First Nation Communities	Indian and Northern Affairs Canada Ministry of Environment Public/Stakeholders	3.5.7
Blasting, Rock Excavation and Disposal	Ministry of Environment Owners – The Stone Church Public/Stakeholders	5.1.4
Construction Schedule	Public/Stakeholders	5.1
Effects to Sewage and Water Services	Ministry of Environment Public/Stakeholders	5.1.9 and 5.1.10
Effects to Air Quality	Ministry of Environment	5.2.3 and 6.2.1
Impacts to Water Quality	District Municipality of Muskoka Ministry of the Environment	5.2.6 and 6.2.4
Protection of/Impacts to Fish and Fish Habitat	District Municipality of Muskoka Fisheries and Oceans Canada Ministry of Natural Resources Public/Stakeholders Purk's Place Owners – The Stone Church	5.2.7; 5.2.8 and 6.2.5
Emerald Ash Borer	Ministry of Environment	5.2.9
Effects to Vegetation	Ministry of Natural Resources Public/Stakeholders	5.2.9 and 6.2.6
Effects to Species at Risk	Ministry of Natural Resources	5.2.11 and 6.2.7
Change in Public Access	Public/Stakeholders Purk's Place The Stone Church Muskoka Lakes Ratepayers Association	5.3.1 and 6.3.1
Risk to Public Safety	Public/Stakeholders Ministry of Natural Resources	5.3.2 and 6.3.2
Effects to Local Traffic	District Municipality of Muskoka Public/Stakeholders Ministry of Natural Resources	5.3.4 and 6.3.3
Emergency Response During Construction	Public/Stakeholders	5.3.4.1
Effects Related to Noise Emissions	Ministry of Environment Public/Stakeholders	5.3.5 and 6.3.4

Issue	Raised By	Relevant Report Section
Change in Aesthetics	Township of Muskoka Lakes Public/Stakeholders Owners – The Stone Church Ministry of Natural Resources Public/Stakeholders Muskoka Lakes Association	5.3.6 and 6.3.5
Effects to Tourism	Purk's Place Owner - The Stone Church Ministry of Natural Resources Public/Stakeholders Muskoka Lakes Ratepayers Association	5.3.7 and 6.3.6
Change to/Loss of Recreational and Navigational Use	Public/Stakeholders Purk's Place Ministry of Natural Resources Transport Canada Muskoka Lakes Snow Trails Association	5.3.7 and 6.3.6
Effects to the Town Docks	Public/Stakeholders	5.3.7.2 and 6.3.6.1
Effects to Purk's Place Boat House and Marina	Public/Stakeholders Purk's Place	5.3.8
Effects to The Stone Church	Owners – The Stone Church	5.3.8 and 5.3.12
Effects to the Local Economy	Public/Stakeholders	5.3.8; 5.3.9 and 6.3.7
Employment during Construction	Public/Stakeholders	5.3.9
Effects to Mill Stream	Public/Stakeholders	5.3.10
Waste Disposal	Ministry of Environment	5.3.11
Effects to Heritage Buildings (Purk's Place and the Stone Church)	Public/Stakeholders	5.3.12
Impacts to Wahta First Nation Reserve	Ministry of Natural Resources Ministry of the Environment	5.3.13 and 6.3.9
Changes in Water Levels/Flows and Flooding	Township of Muskoka Lakes District Municipality of Muskoka Public/Stakeholders Ministry of Natural Resources Fisheries and Oceans Canada Muskoka Lakes Ratepayers Association Muskoka Lakes Association	6.2.2
Changes to the Operation of the South Dam	Public/Stakeholders	6.2.2
Accidental Spills	Ministry of Environment	6.2.4.3
Effects to the Existing Portage Trail	Purk's Place Transport Canada	6.3.6.1
Effects to Property Values/Shoreline Residents	Public/Stakeholders Ministry of Natural Resources	6.3.6.3

Issue	Raised By	Relevant Report Section
Decommissioning	Ministry of Environment	6.6
Proposed Operating Regime	Fisheries and Oceans Canada Ontario Power Generation Ministry of Natural Resources Public/Stakeholders	9
Requirement for a Certificate of Approval (Air)	Ministry of Environment	11
Approval under the NWPA	Transport Canada	11
Effects to CP Rail Bridge Abutments and Pier	CP Rail	3.5.5.1 and 6.3.8.3

3.7 Notice of Completion

A "Notice of Completion" of the environmental screening process will be published to inform the general public that the screening report has been prepared and is available for public and agency review. The notice will state the length of the review period and describe the process by which written comments may be submitted for the proponent's consideration. The process by which elevation requests may be conducted will also be described.