Appendix C

Supplementary Existing Environment Information

C1 Acoustic Assessment Report

Acoustic Assessment Report
Swift River Energy Limited – North Bala Small Hydro Project

Table of Contents

1. Introduction

1.1 Project Background

Swift River Energy Limited Partnership (SREL) is proposing to construct a 4.3 MW run-of-river hydroelectric power facility at the south end of the existing North Bala dam on the Moon River in Bala, Ontario (Figure 1). The dam is owned by the Ontario Ministry of Natural Resources (MNR). The site was offered for competitive release under the MNR Waterpower Site Release Policy. The MNR had originally offered a Request for Qualifications for Waterpower Generation Development Opportunities at MNR Dam Structures. Swift River Energy 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 Plan of Development (POD).

The facility will be located adjacent to 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 dam. The facilities will utilize the hydraulic head provided by the existing dam. 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. It is anticipated that the interconnection would consist of an underground cable running approximately 40 m from the proposed powerhouse to an existing hydro pole just south of the intersection of Highway 169 and the original route of Highway 69 (Figure 2). It is intended that power produced by the project will be sold under the terms of a Standard Offer Contract (SOC) with the Ontario Power Authority.

It should be noted that the detailed design of the proposed facilities has not yet commenced, so detailed quantitative information regarding noise sources (e.g., tonal characteristics, directivity pattern, and octave sound power levels), potential noise impacts and required mitigation measures can not yet be provided. It is intended that this preliminary Acoustic Assessment Report will provide preliminary information to the MOE regarding the general noise impacts and commitments made by Swift to ensure that all noise mitigation requirements are met. Detailed noise impact assessment would then occur during the detailed design stage, as a precursor to the eventual application for a Certificate of Approval(s) (Noise) for the facilities under Section 9 of the Environmental Protection Act. Accordingly, this preliminary Acoustic Assessment Report has been prepared having regard to MOE's document entitled "Information to be submitted for Approval of Stationary Sources of Sound" (NPC 233), although it is acknowledged that additional information will be required in subsequent approval stages.

1.2 Proposed Project Overview

1.2.1 Project Components and Structure

The arrangement of the proposed development is based on a gross head of 5.86 m which is provided by the existing dam at the site location. The preliminary concept for the development is described as follows.

1. There will be no dam erection involved in the project since there is an existing MNR-owned dam at the site. This dam is presently operated as a control structure, assisting in the regulation of water levels on Lake Muskoka and the control of flows downstream along Moon River. The

dam is presently operated by the removal and insertion of timber stop logs. The proposed facility will utilize the head created by the existing dam.

2. An approach channel will be created by modifying sections of the bedrock upstream of the existing dam by excavation. This approach channel will lead to the intake of the powerhouse. The intake will be located beside (south of) the dam and will allow water to flow into the powerhouse to enable generation. The intake will be fitted with trashracks.

3. The powerhouse will contain one turbine and its associated generator. The powerhouse will also employ 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 voltage desired for distribution. The placement of the transformer in this room will eliminate the visual impact of a typical external transformer and switchyard. The reinforced concrete powerhouse structure will be founded on bedrock to the southwest of the dam. A short tailrace channel will be excavated to convey the powerhouse flows back into the river.

4. The power generated will be conveyed from the "transformer room" of the powerhouse via an underground cable to an interconnection point on the local distribution line. The final distribution line voltage will be at 44 kV. During construction it is anticipated that the main infrastructure components that will be required are a works yard and a site office.

1.2.2 Construction

Construction of the proposed facilities is scheduled to commence in early 2009 and last for between 12 and 18 months. Construction will involve the erection of a downstream cofferdam with diversion of flows being primarily through the South Bala Dam.

Construction will require some blasting activities, e.g., for the powerhouse foundation, intake and tailrace, and possibly other components. More precise details on blasting requirements will not be available until the detailed engineering phase.

1.2.3 Operation

The proposed hydroelectric plant will be operating 24 hours, 7 days a week. In addition, hydroelectric projects are typically designed for a 50 to 100-year lifespan.

1.2.4 Sound Characteristics of the Sites and Applicable Sound Level Limits

A noise survey was undertaken to characterize the baseline sound environment in the proximity of the development site. Using the MOE acoustical environment classification system as defined in publication LU-131 (MOE, 1997), the closest receptors locations could be classified as a Class 2 area, described as "an area with an acoustical environment that has qualities representative of both Class 1 (urban) and Class 3 (rural) areas, and in which a low ambient sound level, normally occurring only between 23:00 and 07:00 hours in Class 1 Areas, will typically be realized as early as 19:00 hours."

Other 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.

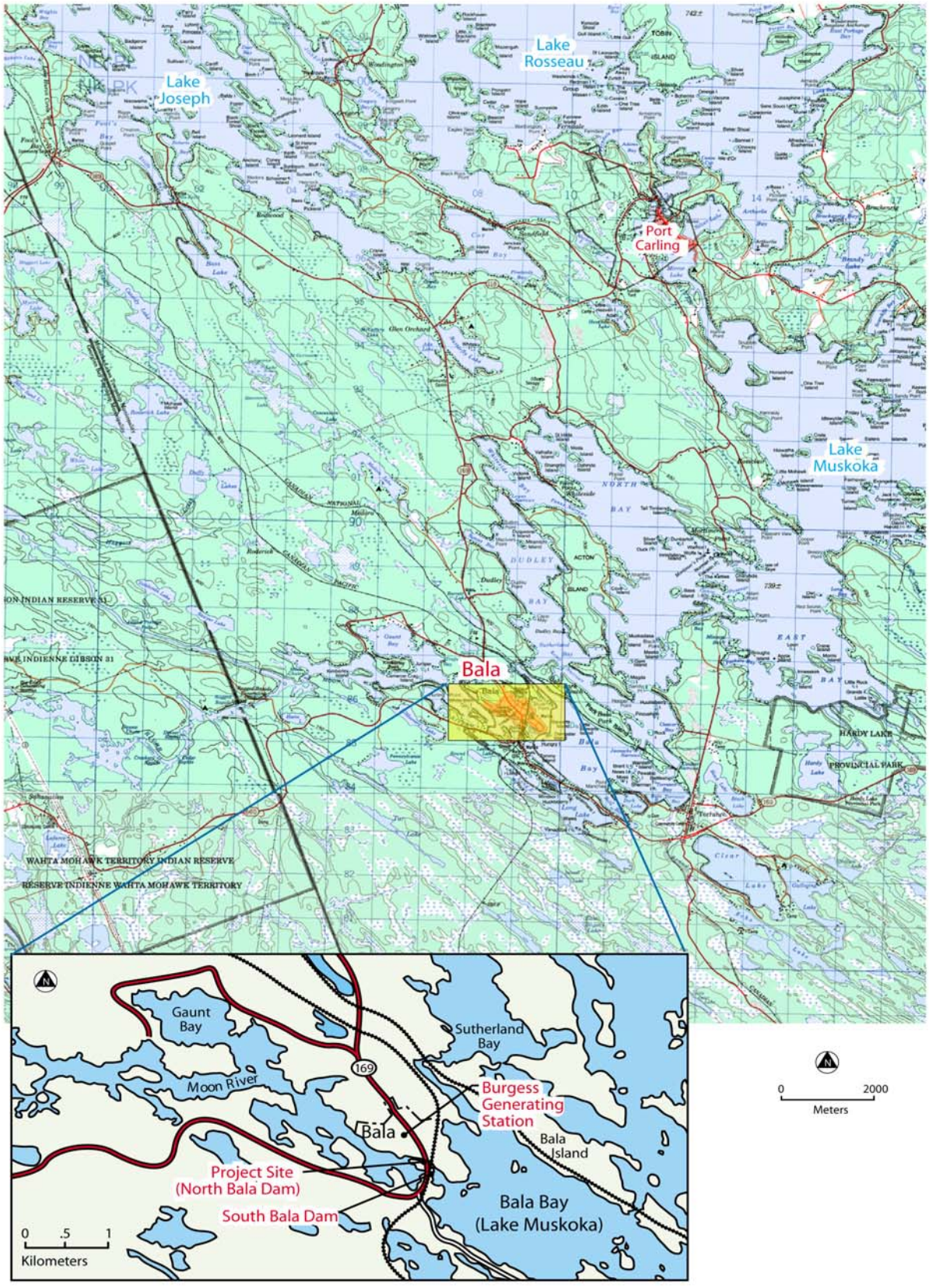

Figure 1
Swift River Energy Limited
North Bala Hydroelectric Project
Project Area

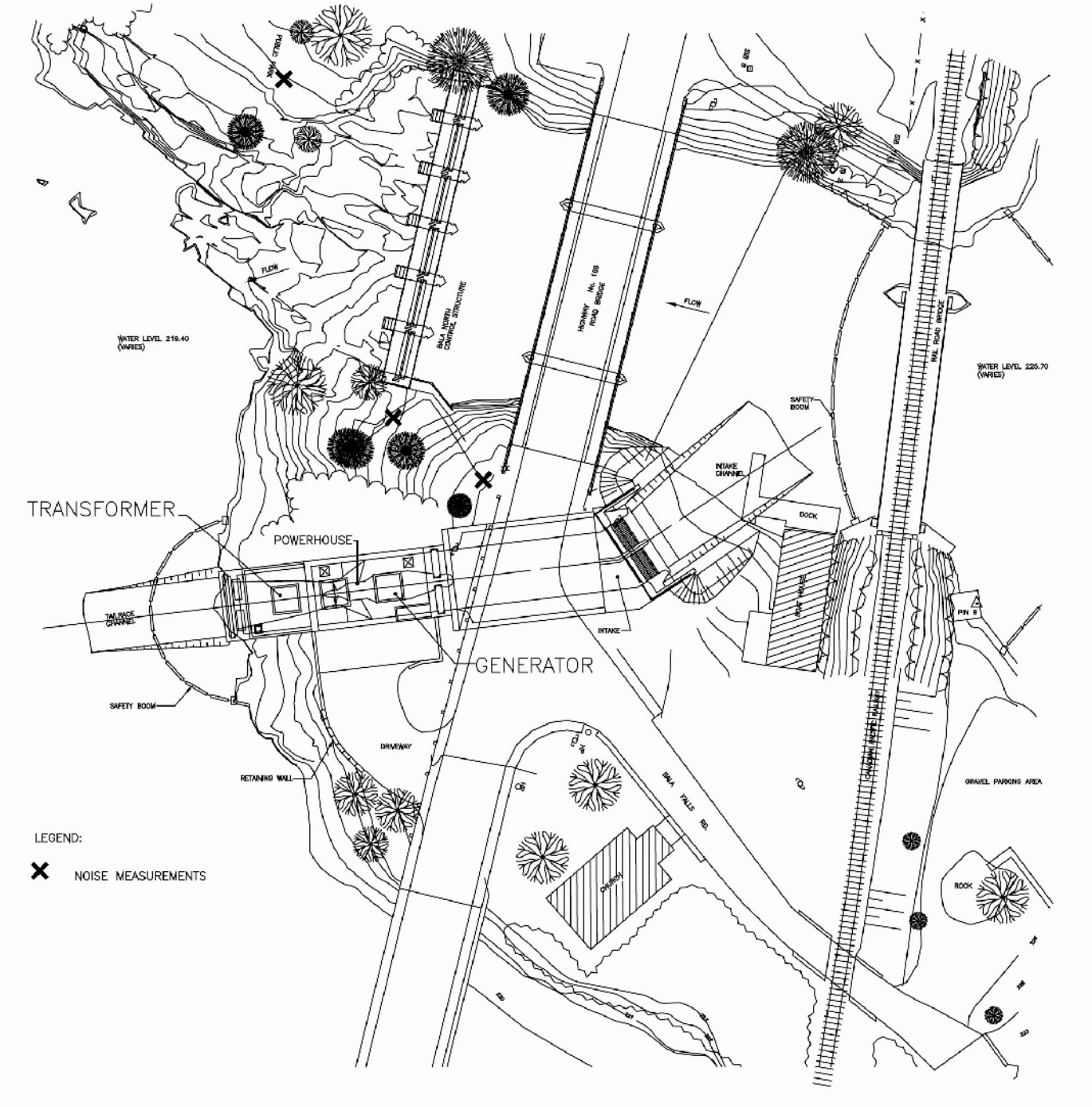

Figure 2
Swift River Energy Ltd.
North Bala Small Hydro Project
General Arrangement/Location of the Noise Sources and Noise Measurement Sites

HATCH energy

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The cottages located along the shoreline of the lake, more than 200 m from the railway and roads, should be categorized as Class 3 areas. The closest buildings to the proposed facility are Burgess Memorial Church (previously a Church, now a commercial building) and Purk's Place Boat House and Marina (commercial building). These will be considered as Class 1 areas due to their location (at the intersection of Highway 169 and Bala Falls Road). These particular PORs are subjected to both noise from the road and nearby railway, as well as the background noise from the falls. MOE Publication NPC-205 indicates that for stationary noise sources located in Class 1, 2 or 3 Areas, the minimum one hour L_{eq}[1] at the closest Points of Reception (POR)[2] should be the least restrictive of either the background sound levels or the values listed in Table 1.1.

Table 1.1
Minimum Values of One Hour L_{eq} by Time of Day

Time of Day	One Hour L_{eq} (dBA)		
	Class 1 Area	Class 2 Area	Class 3 Area
07:00-19:00	50	50	45
19:00-23:00	47	45	40

[1]The guidelines use hourly equivalent sound levels $L_{eq,1h}$ measured in A-weighted decibels, dBA. This is an average sound level over a 1 hour period, A-weighted to give the sound level meter a frequency response analogous to the human ear. L_{eq} is widely used around the world for measuring and assessing community noise.

[2] POR defined as "any point on the premises of a person where sound or vibration originating from other than those premises is received. The POR may be located on any of the following existing or zoned for future use premises: permanent or seasonal residences, hotels/motels, nursing/retirement homes, rental residences, hospitals, campgrounds and noise sensitive buildings such as schools and places of worship (MOE, 2005)

2. Noise Characteristics of the Facility

2.1 Operating Hours

When sufficient water is available, the proposed facility will be operating 24-hours a day, with the exception of necessary maintenance shutdowns. However, depending on flow availability, the potential exists to operate the facility primarily during the peak energy demand periods during the daytime, in which case it may shut down at night if sufficient water is not available for generation. For the purposes of this Acoustic Assessment Report, as a "predictable worst-case" scenario, it has been assumed that the facilities will operate 24 hours per day. Assuming equal power generation levels, no difference would occur in the noise levels generated from the facility during the day or the night.

2.2 Noise Sources

The generating plant will be enclosed within the powerhouse so that noise from the equipment will be substantially reduced by the walls and roof of the enclosure. The only path for the sound to propagate outside of the powerhouse is through the ventilation fan louvers. In addition, noise may be audible outside of the powerhouse when the access doors are open. Protocols will be put in place by Swift to ensure that the powerhouse doors closed at all times, except during maintenance or inspection which, when necessary, will normally be scheduled between 09:00 and 17:00 hours. The ventilation system will have adequate capacity to keep the powerhouse at an acceptable working temperature.

2.2.1 Generator

The generator will use forced air cooling, in which outside air is drawn into the powerhouse enclosure through a ventilation grille, cycled through the generator, and discharged from the powerhouse enclosure back outside. This forced air system is a noise source that has the potential to create a noise nuisance at nearby receptors. At this stage in the facility design, it is assumed that the location of the air inlet grilles and the air discharge is as indicated in Drawing 327078-SK-401.

2.2.2 Transformer

It is currently anticipated that the transformer will be located inside the powerhouse. At this stage in the facility design, there is no engineering data available to specify the transformer that will be required, so no specifications regarding source noise levels from the transformers are available.

2.2.3 Noise Data from Manufacturer

The definitive sound power levels of the generator cooling equipment and the transformer will be obtained from the suppliers, once the supplier and generator/air cooling systems and transformer have been selected during the detailed design process. This source sound power level will then be used to predict the sound pressure level at nearby sensitive receptors to ensure compliance with the sound level limits identified in this report. For the purpose of a preliminary assessment, general noise data will be used to characterize the sound emissions from the generator and transformer (Section 3.2).

2.3 Site Plan identifying All Significant Noise Sources

A drawing detailing the preliminary layout for the proposed hydroelectric facility and other significant noise sources associated with it are provided in Figure 2.

3. Noise Source Summary

3.1 Noise Source Summary Table

Table 3.1 identifies the noise sources within the proposed hydroelectric facility, characterizes the noise emissions from each of the sources and identifies the noise equipment controls that may be required.

Table 3.1
Noise Source Summary Table for Proposed Hydroelectric Power Generation Development

Noise Source	Noise Emissions	Required Noise Control Equipment
Power Generation Facilities		
4.3-MW Axial Flow Bulb-type turbine unit with a rated hydraulic capacity of 96 m^3/s under a rated gross head of 5.86 m	Air intake and exhaust noise	Silencer specified to reduce noise levels below MOE sound level limits.
Station Step-up Transformer (inside the powerhouse)	Magnetostrictive noise	No noise barrier required.

3.2 Source Noise Emission Specifications

The source noise emission specifications will be developed during the detailed design process. However, some estimates are required to evaluate the sound pressure levels at the locations of interest. Table 3.2 shows the estimated noise data for the generator cooling fans, based on general data for Propeller type fans (from the Handbook of Noise Control by C. Harris). The noise data shown in Table 3.2 has not been corrected based on the fan operating conditions (air flow rate, pressure difference), hence representing the worst case scenario.

Table 3.2
Estimated Octave Band Data for Noise Sources

Source	Frequency (Hz)							
	64	**128**	**250**	**500**	**1000**	**2000**	**4000**	**8000**
Generator Fan	96	93	94	92	90	90	88	86

The sound pressure level for an air-cooled dry type transformer is assumed to be 74 dBA, based on the recommendations of the NEMA TR1-1993: Transformers, Regulators and Reactors, for forced air-cooled transformers from 5,001 to 6,667 kVA.

3.3 Source Power/Capacity Ratings

The source power and capacity ratings will be determined during the detailed design process.

3.4 Noise Control Equipment Description and Acoustical Specification

Noise barriers will be used if needed to keep sound at sensitive points of reception within the identified MOE sound level limits, as per Publication NPC-205 (MOE, 1995).

4. Point of Reception Noise Impact Calculations

4.1 Point of Reception (POR) Noise Impact Table

Two potential receptors were located at less than 100 metres from the proposed site (see Figure 3, Table 4.1). Since the exact location of each POR is not know yet, the distance at which the sound emission from the powerhouse will be reduced to 45 and 40 dBA will be calculated in addition to the sound pressure levels based on the estimated distances. When more specific source noise data and the receptor locations become available, the noise impact table will be finalised to show the predicted noise levels at the receptors. If the predicted noise levels are greater than MOE sound level limits, then a noise barrier or silencer will be used to decrease sound levels below the MOE-specified limit. The sound attenuation used in the calculations does not include the contributions of ground absorption, height differences, atmospheric or meteorological factors and attenuation during propagation through foliage. Only the attenuation due to distance from the noise source is considered. The factors mentioned above will contribute to further decrease our estimate of sound pressure levels at the POR.

Some of the potential receptors that have been identified are shown in Table 4.1. The distance from the powerhouse to the receptors has been estimated using aerial pictures and other diagrams.

4.2 Points of Reception (POR) List and Description

Each POR should be characterized as belonging to a specific acoustical environment (i.e. Class 1, 2 or 3) based on the results of the baseline noise survey (Table 4.1). These classifications are then used to set the allowable sound level limits at the nearest POR. For this particular case, the POR may have a maximum measured noise level of 50 dBA from 07:00 to 19:00 hours and 45 dBA between 23:00 and 07:00 hours (Class 2). NPC-205 indicates that higher sound levels are permissible if the background sound levels in the area are higher than the allowable limits. In most cases, background sound levels at the nearest POR, as determined by the noise survey and traffic noise estimates, were found to be in excess of the MOE sound level limits. However, in order to be conservative, the MOE sound level limits, and not the higher background sound levels, have been selected as the target sound levels.

4.3 Acoustic Survey

4.3.1 Procedure Used to Assess Noise Impacts at each POR

In September and November of 2007 and April of 2008, sound level measurements were taken at POR in the vicinity of the proposed power generation facility. The measurement locations are shown in Figure 2. The sound meter, a Larson Davis Model 700, was programmed to run during time intervals from 11 to 20 hours, with a 1 hour interval period.

4.3.2 List of Parameters/Assumptions Used in Calculations

Parameters analyzed in this study included Leq and LMAX, measured during the noise surveys. For the prediction of the noise levels inside the Powerhouse, it was assumed that the generator cooling fans and the transformer were each located in different rooms with no physical communication. This assumption produces a conservative estimate of both the noise levels inside each room and the combined effect of those to determine the noise generated inside the powerhouse.

4.3.3 Results of Acoustic Survey

The results of this study are presented in Appendix B. The noise levels measured were very similar when comparing the three locations. The average Leq observed was relatively steady throughout the observation period, averaging 62.2 dBA for the three locations. The primary sources of this noise are the falls located north of the project area, although some traffic noise coming from Highway 169 also contributes to the measured sound levels, especially at the proposed location for the powerhouse. It is important to note that the background levels observed are well above the sound pressure levels of the typical classes used by the MoE.

Table 4.1 Point of Reception Noise Impact Table

Receptor Number*	Point of Reception	Coordinates	Distance and Direction from Project Site	Existing Sound Environment	MOE Acoustic Class	Predicted Noise Impacts
R-1	Non-Residential (former Church)	E 609200 N 4985291	57 m South-East	Dominated by traffic noise and water flow through the south control structure	Class 1 Area	Noise from powerhouse would be masked by existing sound environment
R-2	Non-residential (Commercial) [Purk's Place (retail)]	E 609226 N 4985333	64 m East	Dominated by traffic and train noise.	Class 2 Area	Noise from powerhouse will be masked by existing sound environment
R-3	House	E 609129 N 4985435	107 m North-West	Houses located on the shore of the lake, occasional traffic noise and train noise.	Class 2 Area	Noise from powerhouse will be masked by existing sound environment
R-4	House	E 609113 N 4985442	120 m North-West	Houses located on the shore of the lake, occasional traffic noise and train noise.	Class 2 Area	Noise from powerhouse will be attenuated by distance from the powerhouse.
R-5	House	E 609077 N 4985452	146 m North-West	Residential area dominated by water noise from the falls and Traffic noise.	Class 2 Area	Noise from powerhouse will be attenuated by distance from the powerhouse.

Receptor locations are shown on Figure 3.

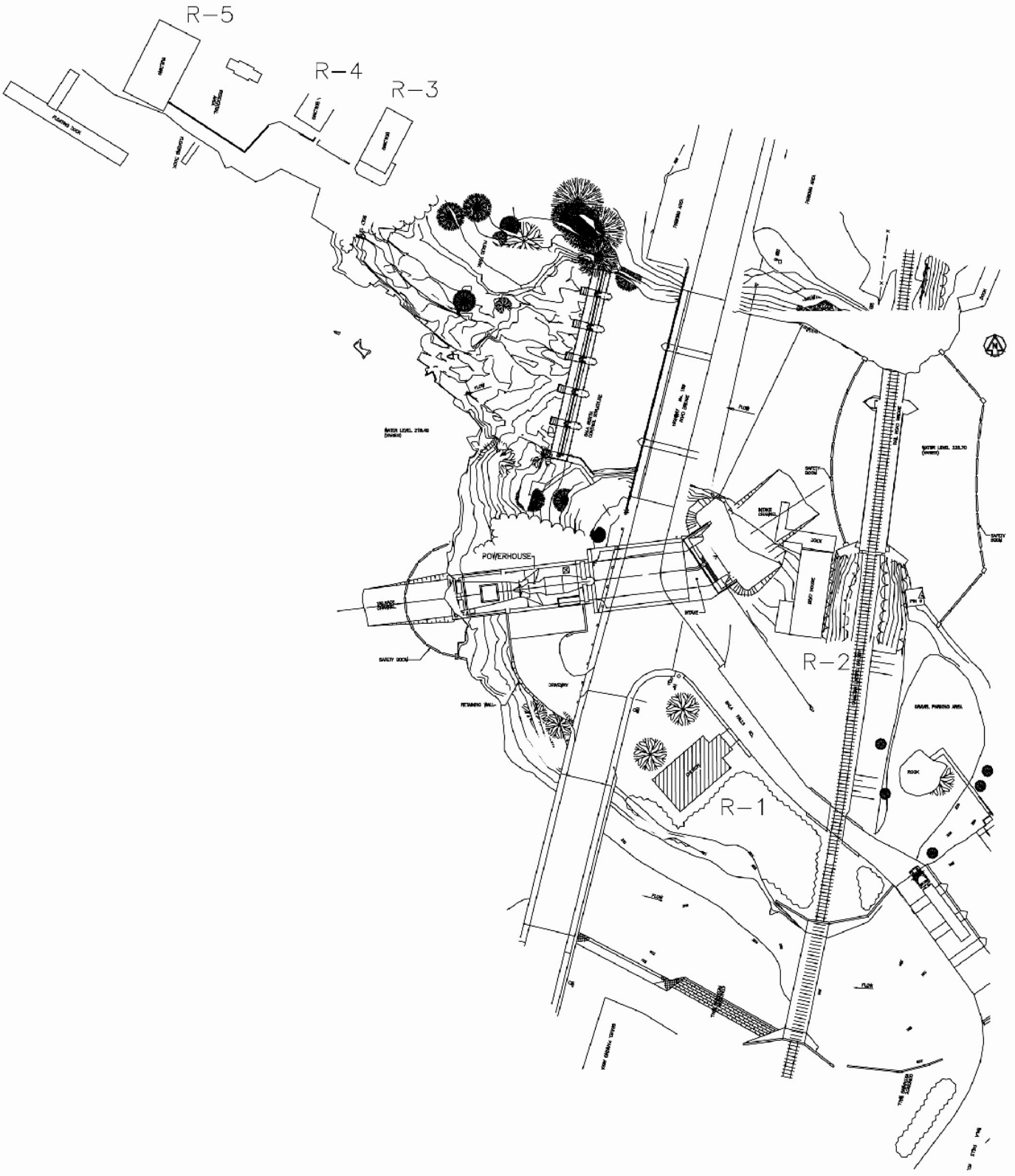

Figure 3
Swift River Energy Ltd.
North Bala Small Hydro Project
Location of the Points of Reception (POR)

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5. Acoustic Assessment Summary

5.1 Acoustic Assessment Summary Table

Table 5.1
Acoustic Assessment Summary Table

Point of Reception	Sound Level at POR	Verified by Acoustic Audit	Performance Limit	Compliance with Performance Limit
R-1	48.6	No	To be determined once engineering data is available	**Yes**
R-2	47.5	No	To be determined once engineering data is available	**Yes**
R-3	43.1	No	To be determined once engineering data is available	**Yes**
R-4	42.1	No	To be determined once engineering data is available	**Yes**
R-5	40.4	No	To be determined once engineering data is available	**Yes**

It is important to note that receptors R-1 and R-2 present sound pressure levels above 45 dBA, which corresponds to the minimum acceptable for Class 2 areas. However, these buildings are not residential, and hence the applicable minimum sound pressure level is 50 dBA (7:00 to 19:00 hours).

5.2 Predictable Worst Case Impacts Operating Scenario

The combined sound pressure level produced by the noise sources inside the powerhouse has been estimated to be 83.7 dBA. For propagation outdoors, the powerhouse was considered an omni-directional source, meaning that the noise is irradiating equally in all directions. In reality, the exhaust fans are oriented in certain directions to mask the powerhouse noise under the background noise produced by the traffic and railway. The fan may be located to minimize the impact on the houses that are along the lakeshore on the west side of the project. On the east side, the houses are located at a greater distance (more than 200 m) from the powerhouse, which will attenuate the sound below the MoE levels.

The predictable worst case impacts operating scenario occurs when the hydroelectric facility is operating at full capacity, 24-hours per day. This represents a worst-case scenario since the night time period is when the background sound levels are at their lowest. The project will be designed so that sound levels at POR meet the MOE sound level limit requirements at this predictable worst case impact operating scenario.

6. Conclusions

Given the existing sound environment, the proposed project should have no discernible impact on the sound environment at all identified points of reception. If required following completion of detailed facility design and acoustic impact assessment, mitigation measures like exterior covers for the louvers can be successfully put in place.

SREL is committed to ensuring that sound levels at the nearest POR of the facility is in accordance with MOE sound level limits, through the implementation and appropriate mitigation, as required.

References

MOE. 1997. Noise Assessment Criteria in Land Use Planning. Publication LU-131. Ontario Ministry of the Environment. 12 pp + Annex.

MOE. 1995. Sound Level Limits for Stationary Sources in Class 1 & 2 Areas (Urban). Publication NPC-205. Ontario Ministry of the Environment. 6 pp. + Annex.

MOE. 1995. Sound Level Limits for Stationary Sources in Class 3 Areas (Rural). Publication NPC-232. Ontario Ministry of the Environment. 8 pp. + Annex.

NEMA. 2000. Standards Publication No. TR 1-1993 (R2000): Transformers, Regulators and Reactors. National Electrical Manufacturers Association. 31 pp.

IEEE. 2006. C57.12.90-2006: Standard Test Code for Liquid-Immersed, Power and Regulating Transformers. pp. 64 to 76.

Harris C. M. 1979. Handbook of Noise Control, Second Edition. McGraw-Hill.

Appendix A
Noise Calculations

ESTIMATION OF NOISE LEVELS – GENERATOR FANS

NORTH BALA PROJECT - GENERATOR COOLING FANS

FAN NOISE DATA

Full Octave Freq (Hz)	Lw (dB)
63	96.0
125	93.0
250	94.0
500	92.0
1000	90.0
2000	90.0
4000	88.0
8000	86.0
Total Lw (dB)	101.2

Energy Absorption Coefficient

2m - Air at 10°C , RH=50% Freq (Hz)	(10^{-3} Np/m)
63	0.0
125	0.1
250	0.2
500	0.5
1000	1.0
2000	2.8
4000	9.8
8000	33.6

Internal Wall Sound Absorption Coefficient (α_d)

Gypsum Board, 1/2" thick Freq (Hz)	α_d
63	0.29
125	0.29
250	0.10
500	0.05
1000	0.04
2000	0.07
4000	0.09
8000	0.09

Total Room Absorption (A)

Full Octave Freq (Hz)	A (m^2)
63	328.6
125	329.1
250	114.3
500	59.1
1000	50.2
2000	93.0
4000	149.9
8000	266.1

Room Constant (R)

Full Octave Freq (Hz)	A (m^2)
63	462.9
125	463.6
250	127.0
500	62.2
1000	52.3
2000	100.0
4000	164.7
8000	292.4

The Fan Noise data was taken from Table 27.1; Specific SPLs produced by Propeller-type fans, Handbook of Noise Control (Harris). The data was not adjusted for operating conditions.

Generating Room Volume
Service Area + Generator Room

17.40	m	Length
15.37	m	Height
9.13	m	Width

2441.7 m^3 = 86228.1 ft^3

Generating Room Surface Area
1133.3 m^2 = 12198.3 ft^2

Speed of Sound
344 m/s Air at STP

Source Sound Power Level Demand (Lw)
85 dB @ 1m

Diffuse-Field Sound Pressure Level (Lp)
Lp = Lw +10*log(4/R) Applicable when using the SI system

DIFFUSE FIELD SOUND PRESSURE

Full Octave Freq (Hz)	Lp (dB)
63	75.4
125	72.4
250	79.0
500	80.1
1000	78.8
2000	76.0
4000	71.9
8000	67.4
Total SPL (dB)	85.7

A-Weighted DIFFUSE FIELD SPL

Full Octave Freq (Hz)	Lp (dBA)
63	49.2
125	56.3
250	70.4
500	76.9
1000	78.8
2000	77.2
4000	72.9
8000	66.3
Total SPL(dBA)	83.3

ESTIMATED INTERIOR NOISE | **83.3 dBA**

ESTIMATION OF NOISE LEVELS – TRANSFORMER

NORTH BALA PROJECT - TRANSFORMER

NEMA Audible Sound Level Dry-Type, Forced Air Cooled

kVA	SPL (dBA)
5,001-6,667	74.0

Based on NEMA TR1-1993 (R2000) Table 0-4

Based on IEEE C57.12.90 (2006), the correspondent Sound Power Level is
88.8 dBA

Energy Absorption Coefficient
2m - Air at 10°C , RH=50%
(10^{-3} Np/m)

at 125 Hz
0.1

Internal Wall Sound Absorption Coefficient (α_d)
Gypsum Board, 1/2" thick
α_d

at 125 Hz
0.29

Total Room Absorption (A)

A (m^2)
111.6

Room Constant (R)

A (m^2)
157.1

Surface Area of Transformer Tank 30 m^2

2	m	Depth
3	m	Length
3	m	Height

Generating Room Volume
Equipment Room

10.5	m	Length
4.57	m	Height
9.57	m	Width

459.2 m^3 = 16217.1 ft^3

Generating Room Surface Area
384.4 m^2 = 4137.8 ft^2

Speed of Sound
344 m/s Air at STP

Source Sound Power Level Demand (Lw)
85 dB @ 1m

Diffuse-Field Sound Pressure Level (Lp)
Lp = Lw +10*log(4/R) Applicable when using the SI system

DIFFUSE FIELD SOUND PRESSURE

Lp (dBA)
72.8
SPL (dBA) 72.8

ESTIMATED INTERIOR NOISE | **72.8 dBA**

SOUND PRESSURE LEVELS AT RECEPTORS – DISTANCES REQUIRED FOR ATTENUATION TO 45 AND 40 dBA.

ESTIMATED TOTAL NOISE LEVELS - POWERHOUSE AND RECEPTORS

Source	Diffuse Field Sound Pressure Level (dBA)
Cooling Fans	**83.3**
Transformer	**72.8**

TOTAL	83.7

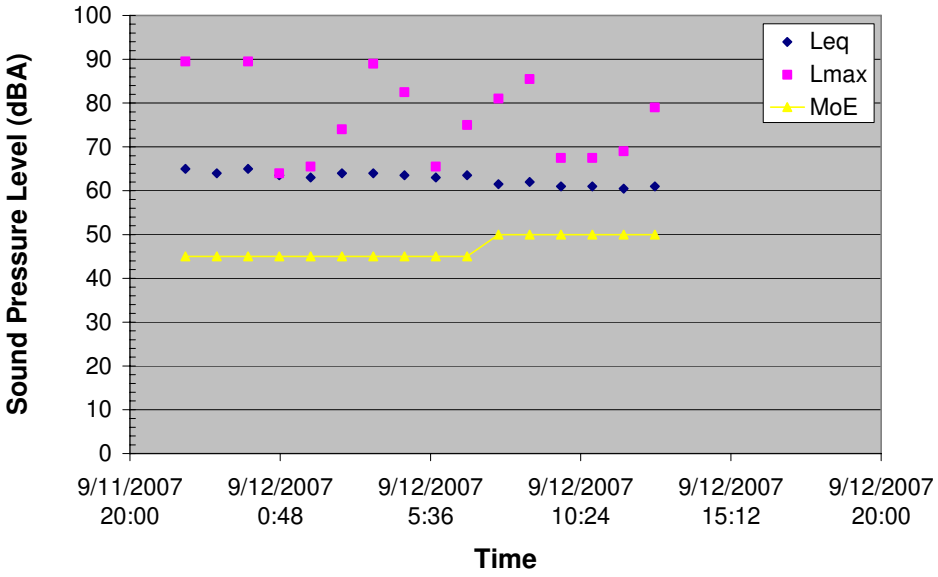
Receptor ID	Distance Powerhouse-Receptors, m (estimated)	Description	Distance Attenuation to Receptor (dB)	SPL at Receptor (dBA)
R-1	57	Church	35.1	48.6
R-2	64	Bait Store	36.1	47.5
R-3	107	House	40.6	43.1
R-4	120	House	41.5	42.1
R-5	146	House	43.3	40.4

Distance Required for reducing SPL to 45dBA
86 m

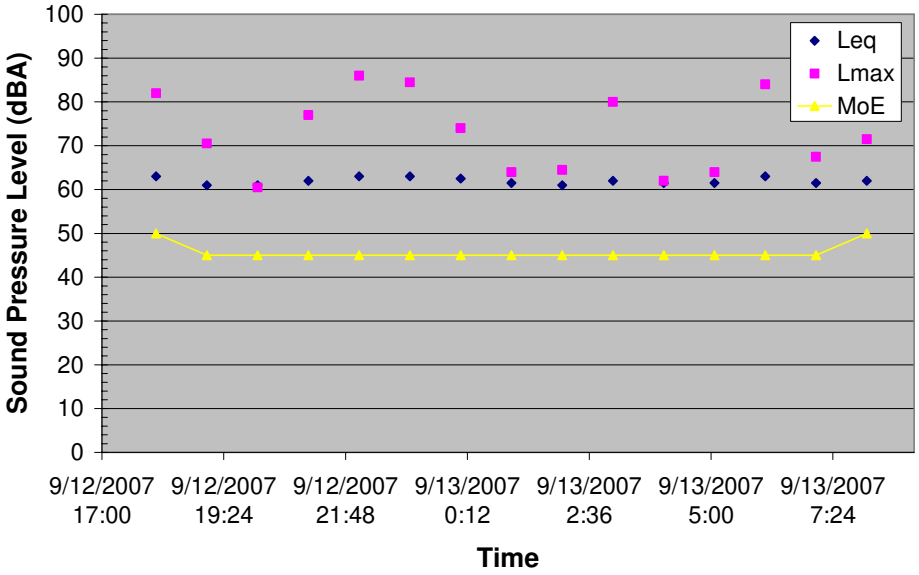
Distance Required for reducing SPL to 40dBA
152 m

Appendix B
Results of Acoustic Survey

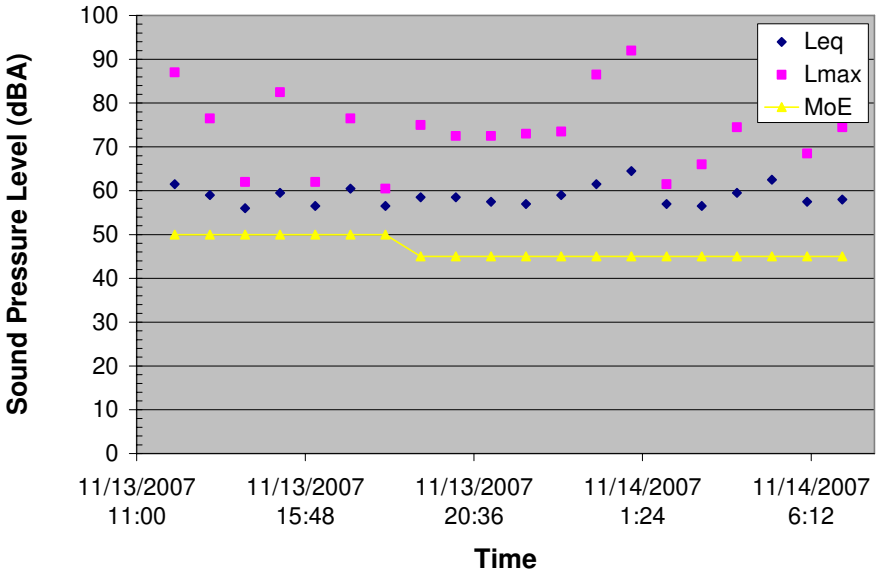
Results of Acoustic Survey - September 11,12/2007 North Side Ahead of Falls



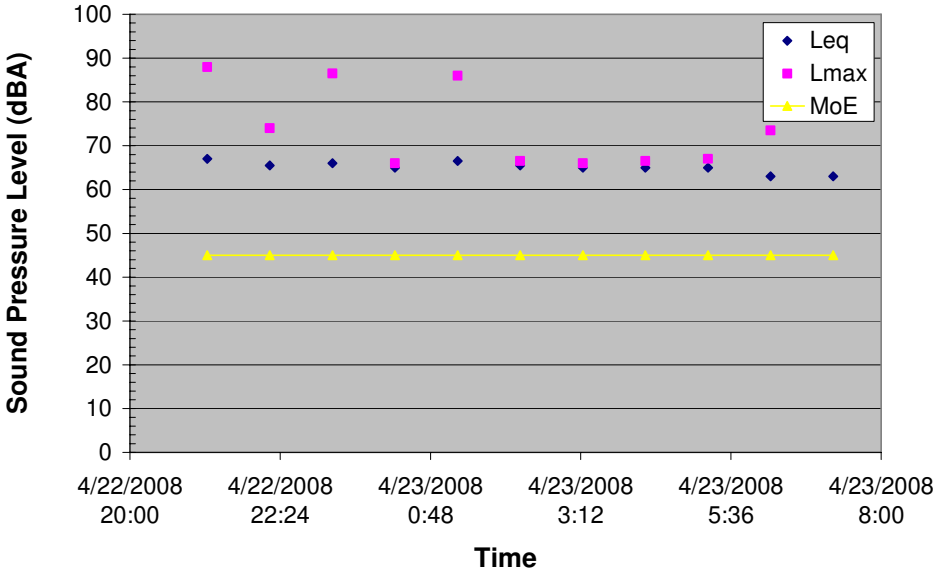
Results of Acoustic Survey - September 12,13/2007 Future Powerhouse Site



Results of Acoustic Survey - November 13,14/2007
North of falls at edge of park



Results of Acoustic Survey - April 22,23/2008
North of falls at edge of park



C2 Surface Water Quality Results

ACCUTEST LABORATORIES - A New Bodycote Company

REPORT OF ANALYSIS

Client: Hatch Ltd.
342 Queen St., P.O. Box 1001
Niagara Falls, ON
L2E 6W1
Attention: Trion Clarke

Niagara Report: N8-0662
Report Number: 2810592
Date: 2008-05-26
Date Submitted: 2008-05-12

Project: 327078

P.O. Number:
Matrix: Water

Chain of Custody Number: 712441

								GUIDELINE		
			LAB ID:	624107	624108			Provincial Water Quality Objectives - MOE 1999		
			Sample Date:	2008-05-08	2008-05-08					
			Sample ID:	USND	DSND					
PARAMETER	UNITS	MRL						TYPE	LIMIT	UNITS
Chloride	mg/L	1		6	6					
Conductivity	uS/cm	5		60	55					
N-NO2 (Nitrite)	mg/L	0.10		<0.10	<0.10					
N-NO3 (Nitrate)	mg/L	0.10		0.21	0.21					
pH				7.16	6.94				6.5-8.5	
Sulphate	mg/L	1		6	6					
TDS (COND - CALC)	mg/L	5		39	36					
Total Kjeldahl Nitrogen	mg/L	0.10		0.31	0.35					
Total Phosphorus	mg/L	0.01		<0.01	0.01			IPWQO	0.02	mg/L
Total Suspended Solids	mg/L	2		<2	7					
Aluminum	mg/L	0.01		0.05	0.12			IPWQO	0.075	mg/L
Barium	mg/L	0.01		0.01	0.02					
Beryllium	mg/L	0.001		<0.001	<0.001			PWQO	0.011	mg/L
Boron	mg/L	0.01		<0.01	<0.01			IPWQO	0.200	mg/L
Cadmium	mg/L	0.0001		<0.0001	<0.0001			PWQO	0.0002	mg/L
Chromium	mg/L	0.001		<0.001	<0.001					
Cobalt	mg/L	0.0002		<0.0002	<0.0002			PWQO	0.0009	mg/L
Copper	mg/L	0.001		<0.001	0.001			PWQO	0.005	mg/L
Iron	mg/L	0.03		0.07	0.12			PWQO	0.30	mg/L
Lead	mg/L	0.001		<0.001	0.001			PWQO	0.005	mg/L
Manganese	mg/L	0.01		<0.01	0.01					
Mercury	mg/L	0.0001		<0.0001	<0.0001			PWQO	0.0002	mg/L
Molybdenum	mg/L	0.005		<0.005	<0.005			IPWQO	0.040	mg/L
Nickel	mg/L	0.005		<0.005	<0.005			PWQO	0.025	mg/L
Silicon	mg/L	0.1		1.8	1.8					
Silver	mg/L	0.0001		<0.0001	<0.0001			PWQO	0.0001	mg/L
Strontium	mg/L	0.001		0.026	0.027					
Thallium	mg/L	0.0001		<0.0001	<0.0001			IPWQO	0.0003	mg/L
Titanium	mg/L	0.01		<0.01	<0.01					
Vanadium	mg/L	0.001		<0.001	<0.001			IPWQO	0.006	mg/L

MRL = Method Reporting Limit INC = Incomplete AO = Aesthetic Objective OG = Operational Guideline MAC = Maximum Allowable Concentration IMAC = Interim Maximum Allowable Concentration

Comment:

APPROVAL:
Ewan McRobbie
Inorganic Lab Supervisor

REPORT OF ANALYSIS

Client: Hatch Ltd.
342 Queen St., P.O. Box 1001
Niagara Falls, ON
L2E 6W1
Attention: Trion Clarke

Niagara Report: N8-0662
Report Number: 2810592
Date: 2008-05-26
Date Submitted: 2008-05-12

Project: 327078

P.O. Number:
Matrix: Water

Chain of Custody Number: 712441

			LAB ID:	624107	624108				GUIDELINE		
			Sample Date:	2008-05-08	2008-05-08				Provincial Water Quality Objectives - MOE 1999		
			Sample ID:	USND	DSND						
PARAMETER	**UNITS**	**MRL**							**TYPE**	**LIMIT**	**UNITS**
Zinc	mg/L	0.01	<0.01	0.01					PWQO	0.030	mg/L

MRL = Method Reporting Limit INC = Incomplete AO = Aesthetic Objective OG = Operational Guideline MAC = Maximum Allowable Concentration IMAC = Interim Maximum Allowable Concentration

Comment:

APPROVAL:
Ewan McRobbie
Inorganic Lab Supervisor

ACCUTEST LABORATORIES LTD

REPORT OF ANALYSIS

Client: **Hatch Ltd.**
342 Queen St., P.O. Box 1001
Niagara Falls, ON
L2E 6W1
Attention: **Trion Clarke**

Niagara Report: N7-1435
Report Number: 2726803
Date: 2007-11-27
Date Submitted: 2007-11-15

Project: 327078

P.O. Number:

Chain of Custody Number: 77317

Matrix: Water

			LAB ID:	587843	587844				GUIDELINE		
			Sample Date:	2007-11-13	2007-11-13				Provincial Water Quality Objectives - MOE 1999		
			Sample ID:	USND	DSND						
PARAMETER	**UNITS**	**MRL**							**TYPE**	**LIMIT**	**UNITS**
Chloride	mg/L	1	7	7							
Conductivity	uS/cm	5	56	55							
N-NO2 (Nitrite)	mg/L	0.10	<0.10	<0.10							
N-NO3 (Nitrate)	mg/L	0.10	<0.10	0.16							
pH			7.19	7.18					AO	6.5-8.5	
Sulphate	mg/L	1	6	6							
TDS (COND - CALC)	mg/L	5	36	36							
Total Kjeldahl Nitrogen	mg/L	0.10	0.24	0.30							
Total Phosphorus	mg/L	0.02	<0.02	<0.02					IPWQO	0.02	mg/L
Total Suspended Solids	mg/L	2	<2	<2							
Aluminum	mg/L	0.01	0.04	0.01					IPWQO	0.075	mg/L
Barium	mg/L	0.01	0.01	0.01							
Beryllium	mg/L	0.001	<0.001	<0.001					PWQO	0.011	mg/L
Boron	mg/L	0.01	<0.01	<0.01					IPWQO	0.200	mg/L
Cadmium	mg/L	0.0001	<0.0001	<0.0001					PWQO	0.0002	mg/L
Chromium	mg/L	0.001	<0.001	<0.001					PWQO	0.0089	mg/L
Cobalt	mg/L	0.0002	<0.0002	<0.0002					PWQO	0.0009	mg/L
Copper	mg/L	0.001	<0.001	<0.001					PWQO	0.005	mg/L
Iron	mg/L	0.03	0.09	0.05					PWQO	0.30	mg/L
Lead	mg/L	0.001	<0.001	<0.001					PWQO	0.005	mg/L
Manganese	mg/L	0.01	0.02	0.02							
Molybdenum	mg/L	0.005	<0.005	<0.005					IPWQO	0.040	mg/L
Nickel	mg/L	0.005	<0.005	<0.005					PWQO	0.025	mg/L
Silicon	mg/L	0.1	1.5	1.6							
Silver	mg/L	0.0001	<0.0001	<0.0001					PWQO	0.0001	mg/L
Strontium	mg/L	0.001	0.031	0.031							
Thallium	mg/L	0.0001	<0.0001	<0.0001					IPWQO	0.0003	mg/L
Titanium	mg/L	0.01	<0.01	<0.01							
Vanadium	mg/L	0.001	<0.001	<0.001					IPWQO	0.006	mg/L
Zinc	mg/L	0.01	<0.01	<0.01					PWQO	0.030	mg/L

MRL = Method Reporting Limit INC = Incomplete AO = Aesthetic Objective OG = Operational Guideline MAC = Maximum Allowable Concentration IMAC = Interim Maximum Allowable Concentration

Comment:

APPROVAL:

Ewan McRobbie
Inorganic Lab Supervisor

ACCUTEST LABORATORIES LTD

REPORT OF ANALYSIS

Client: **Hatch Ltd.**
342 Queen St., P.O. Box 1001
Niagara Falls, ON
L2E 6W1
Attention: **Trion Clarke**

Niagara Report: N7-1124
Report Number: 2721281
Date: 2007-09-21
Date Submitted: 2007-09-14

Project: 327078

P.O. Number:
Matrix: Water

Chain of Custody Number: 69351

			LAB ID:	572053	572054				GUIDELINE		
			Sample Date:	2007-09-12	2007-09-12						
			Sample ID:	US Dam	DS Dam						
PARAMETER	UNITS	MDL							TYPE	LIMIT	UNITS
Chloride	mg/L	1		7	7						
Conductivity	uS/cm	5		56	56						
N-NO2 (Nitrite)	mg/L	0.10		<0.10	<0.10						
N-NO3 (Nitrate)	mg/L	0.10		<0.10	<0.10						
pH				7.20	7.24						
Sulphate	mg/L	1		6	6						
TDS (COND - CALC)	mg/L	5		36	36						
Total Kjeldahl Nitrogen	mg/L	0.10		0.22	0.23						
Total Phosphorus	mg/L	0.02		<0.02	<0.02						
Total Suspended Solids	mg/L	2		7	<2						
Aluminum	mg/L	0.01		<0.01	<0.01						
Barium	mg/L	0.01		0.01	0.01						
Beryllium	mg/L	0.001		<0.001	<0.001						
Boron	mg/L	0.01		<0.01	<0.01						
Cadmium	mg/L	0.0001		<0.0001	<0.0001						
Chromium	mg/L	0.001		0.002	<0.001						
Cobalt	mg/L	0.0002		<0.0002	<0.0002						
Copper	mg/L	0.001		<0.001	<0.001						
Iron	mg/L	0.03		<0.03	<0.03						
Lead	mg/L	0.001		<0.001	<0.001						
Manganese	mg/L	0.01		<0.01	<0.01						
Molybdenum	mg/L	0.005		<0.005	<0.005						
Nickel	mg/L	0.005		<0.005	<0.005						
Silicon	mg/L	0.1		1.4	1.4						
Silver	mg/L	0.0001		<0.0001	<0.0001						
Strontium	mg/L	0.001		0.031	0.031						
Thallium	mg/L	0.0001		<0.0001	<0.0001						
Titanium	mg/L	0.01		<0.01	<0.01						
Vanadium	mg/L	0.001		<0.001	<0.001						
Zinc	mg/L	0.01		<0.01	<0.01						

MDL = Method Detection Limit INC = Incomplete AO = Aesthetic Objective OG = Operational Guideline MAC = Maximum Allowable Concentration IMAC = Interim Maximum Allowable Concentration

Comment:

APPROVAL:
Ewan McRobbie
Inorganic Lab Supervisor

C3 Fish Community Data

Ontario

Ministry of
Natural Resources

Licence to Collect Fish for Scientific Purposes
Report - Part 1

Complete one copy of **Part 1** for each Sampling Program.
Complete **Part 2 - Site Collection Report** for each collection site.

Licence No:	1041389
Date of Issue:	September 10, 2007
Name of Licencee:	Noel Boucher
Organization/Affiliation/ Program (if applicable):	Hatch Energy
Contact: (for Program)	Trion Clarke
Mailing Address	Street Name & No./PO Box/RR#/Gen. Del: 4342 Queen St. P.O. Box 1001
	City/Town/Municipality: Niagara Falls; Province/State: ON; Postal/Zip Code: L2E 6W1
Phone No: 905-374-5200	**Fax No:** 905-374-1157
MNR District(s) where collections occurred:	Parry Sound
Purpose or Objective of Collection(s):	Baseline information collection program for North Bala Hydroelectric Project
Date Report Completed: September 28, 2007	

PLEASE NOTE:
1. A **Part 2 - Site Collection Report** must be prepared for each collection site and attached to **Part 1** of the Report.
2. A **map** must be attached to this report, showing **all** collection site locations (including sites where no fish were caught). A unique site identification # should be used on the map that corresponds to the site number on the **Site Collection Report**.
3. **Length, weight or age data**, if collected, should be attached to the appropriate **Site Collection Report**.

When complete send these forms to the District Office(s) where collections occurred.
Also, for Licences issued by Fisheries Section on a province-wide basis,
please forward a copy (preferably electronically) to:
Fisheries Section, Fish and Wildlife Branch, OMNR,
300 Water Street, PO Box 7000, Peterborough, ON K9J 8M5
[mailto:cheryl.goodchild@mnr.gov.on.ca]

Ontario

Ministry of Natural Resources

Licence to Collect Fish for Scientific Purposes
Part 2 - Site Collection Report

Complete one **Part 2 - Site Collection Report** for each collection site.
Attach Site Collection Reports to **Part 1** of the **Report**.

MNR Office Use:
ARA Code:
File #:

Licence No:	1041389	**Report Prepared By:**	Noel Boucher
Waterbody Name:	Muskoka River	**Township:**	Muskoka Lakes
Lot:	14	**Concession:**	A
Collection Site No.:	1of 4	Complete a report for **each collection site** and indicate location of site on **map**. Attach copy of map to report.	
Site UTM Coordinates:	609156 **E** 4985382 **N**		
Collection Date:	September 12, 2007	**Start Time:** 8:47 **AM X PM** ☐ (check one)	**End Time:** 9:52 **AM X PM** ☐ (check one)

Fish Species Handled or Observed:

Species	Species Code	Adult	YOY Young of Year	No. Caught	No. Kept	No. Live Released
Smallmouth bass	316	☐	X	17	0	17
Rock bass	311	X	☐	5	0	5
Pumpkinseed	313	X	☐	5	0	5
Longnose dace	211	X	☐	6	2	4
Hornyhead chub	192	X	☐	1	1	0
Logperch	342	X	☐	9	1	8
		☐	☐			
		☐	☐			
		☐	☐			
		☐	☐			
		☐	☐			
		☐	☐			
		☐	☐			
		☐	☐			
		☐	☐			
		☐	☐			

Water Temperature: 20.8 °C	**Time of Day:** 9:00 **AM X PM** ☐ (check one)	**Air Temperature:** 14 °C
Type of Gear: Backpack Electrofisher	**Dimensions:** n/a (Mesh Size, Length of Net, etc.)	**Fishing Duration:** 1597 sec
MNR Provincial Inventory Standard Used (FWIN, SLIN, SPIN, ESTN, OSAP, ?): n/a		

OPTIONAL INFORMATION

Secchi Depth: m For Lakes and Large Rivers	**Intermittent** ☐ **Permanent** ☐ (check one)	**Watercress Present YES** ☐ **or NO** ☐ (check one)

Additional Data - Water Quality, Condition of Fish (e.g., Spawning), Habitat Features (e.g., Bank Erosion), Presence of Fish Nests, Presence of Barriers, Other Comments:

Plant Type (Check appropriate boxes):
Submergent ☐ **Floating** ☐ **Emergent** ☐ **None** ☐

Cover (Shore) (Check one box or add to Other):
None ☐ **Sparse** ☐ **Moderate** ☐ **Dense** ☐ **Other**

Cover (In water) (Check one box or add to Other):
None ☐ **Sparse** ☐ **Moderate** ☐ **Dense** ☐ **Other**

North Bala Dam Hydroelectric Project
Electrofishing Results - EF-1

Species	Fork Length (mm)
smallmouth bass	95
smallmouth bass	84
smallmouth bass	86
smallmouth bass	92
smallmouth bass	102
smallmouth bass	73
smallmouth bass	77
smallmouth bass	74
smallmouth bass	82
smallmouth bass	93
smallmouth bass	84
smallmouth bass	77
smallmouth bass	67
smallmouth bass	70
smallmouth bass	77
smallmouth bass	55
smallmouth bass	89
rock bass	136
rock bass	87
rock bass	67
rock bass	47
rock bass	51
pumpkinseed	95
pumpkinseed	92
pumpkinseed	88
pumpkinseed	86
pumpkinseed	87
longnose dace	105
longnose dace	107
longnose dace	57
longnose dace	62
longnose dace	77
longnose dace	57
hornyhead chub	96
logperch	82
logperch	103
logperch	90
logperch	85
logperch	70
logperch	87
logperch	62
logperch	81

Ontario

Ministry of Natural Resources

Licence to Collect Fish for Scientific Purposes
Part 2 - Site Collection Report

Complete one **Part 2 - Site Collection Report** for each collection site.
Attach Site Collection Reports to **Part 1** of the **Report**.

MNR Office Use:
ARA Code:
File #:

Licence No:	1041389	**Report Prepared By:**	Noel Boucher
Waterbody Name:	Muskoka River	**Township:**	Muskoka Lakes
Lot:	14	**Concession:**	A
Collection Site No.:	2of 4	Complete a report for **each collection site** and indicate location of site on **map**. Attach copy of map to report.	
Site UTM Coordinates:	609147 **E** 4985320 **N**		
Collection Date:	September 12, 2007	**Start Time:** 10:22 **AM X PM** ☐ (check one)	**End Time:** 10:56 **AM X PM** ☐ (check one)

Fish Species Handled or Observed:

Species	Species Code	Adult	YOY Young of Year	No. Caught	No. Kept	No. Live Released
Smallmouth bass	316	☐	X	4	0	4
Rock bass	311		X	1	0	1
Pumpkinseed	313	X	☐	4	0	4
Emerald Shiner	196	X	☐	1	1	0
Hornyhead chub	192	X	☐	1	1	0
Logperch	342	X	☐	8	1	7
		☐	☐			
		☐	☐			
		☐	☐			
		☐	☐			
		☐	☐			
		☐	☐			
		☐	☐			
		☐	☐			
		☐	☐			
		☐	☐			

Water Temperature: 20.8 °C	**Time of Day:** 10:30 **AM X PM** ☐ (check one)	**Air Temperature:** 16 °C
Type of Gear: Backpack Electrofisher	**Dimensions:** n/a (Mesh Size, Length of Net, etc.)	**Fishing Duration:** 1060 sec
MNR Provincial Inventory Standard Used (FWIN, SLIN, SPIN, ESTN, OSAP, ?): n/a		

OPTIONAL INFORMATION

Secchi Depth: m For Lakes and Large Rivers	**Intermittent** ☐ **Permanent** ☐ (check one)	**Watercress Present YES** ☐ **or NO** ☐ (check one)

Additional Data - Water Quality, Condition of Fish (e.g., Spawning), Habitat Features (e.g., Bank Erosion), Presence of Fish Nests, Presence of Barriers, Other Comments:

Plant Type (Check appropriate boxes):
Submergent ☐ **Floating** ☐ **Emergent** ☐ **None** ☐

Cover (Shore) (Check one box or add to Other):
None ☐ **Sparse** ☐ **Moderate** ☐ **Dense** ☐ **Other**

Cover (In water) (Check one box or add to Other):
None ☐ **Sparse** ☐ **Moderate** ☐ **Dense** ☐ **Other**

North Bala Dam Hydroelectric Project
Electrofishing Results - EF-2

Species	Fork Length (mm)
smallmouth bass	82
smallmouth bass	81
smallmouth bass	75
smallmouth bass	66
rock bass	38
pumpkinseed	66
pumpkinseed	71
pumpkinseed	67
logperch	84
logperch	91
logperch	84
logperch	80
logperch	63
logperch	91
logperch	70
logperch	62
hornyhead chub	104
emerald shiner	31

Ontario

Ministry of Natural Resources

Licence to Collect Fish for Scientific Purposes
Part 2 - Site Collection Report

Complete one **Part 2 - Site Collection Report** for each collection site. Attach Site Collection Reports to **Part 1** of the **Report**.

MNR Office Use:
ARA Code:
File #:

Licence No:	1041389	**Report Prepared By:**	Noel Boucher
Waterbody Name:	Muskoka River	**Township:**	Muskoka Lakes
Lot:	14	**Concession:**	A
Collection Site No.:	3of 4	Complete a report for **each collection site** and indicate location of site on **map**. Attach copy of map to report.	
Site UTM Coordinates:	609225 **E** 4985252 **N**		
Collection Date:	September 12, 2007	**Start Time:** 11:02 **AM X PM** ☐ (check one)	**End Time:** 11:36 **AM X PM** ☐ (check one)

Fish Species Handled or Observed:

Species	Species Code	Adult	YOY Young of Year	No. Caught	No. Kept	No. Live Released
Smallmouth bass	316	☐	X	5	0	5
Pumpkinseed	313	X	☐	5	0	5
Longnose dace	211	X	☐	1	0	1
Yellow perch	331		X	1	0	1
Logperch	342	X	☐	2	0	2
Largemouth bass	317	☐	X	3	2	1
		☐	☐			
		☐	☐			
		☐	☐			
		☐	☐			
		☐	☐			
		☐	☐			
		☐	☐			
		☐	☐			
		☐	☐			

Water Temperature: 20.8 °C	**Time of Day:** 11:20 **AM X PM** ☐ (check one)	**Air Temperature:** 18 °C
Type of Gear: Backpack Electrofisher	**Dimensions:** n/a (Mesh Size, Length of Net, etc.)	**Fishing Duration:** 764 sec
MNR Provincial Inventory Standard Used (FWIN, SLIN, SPIN, ESTN, OSAP, ?): n/a		

OPTIONAL INFORMATION

Secchi Depth: m For Lakes and Large Rivers	**Intermittent** ☐ **Permanent** ☐ (check one)	**Watercress Present YES** ☐ **or NO** ☐ (check one)

Additional Data - Water Quality, Condition of Fish (e.g., Spawning), Habitat Features (e.g., Bank Erosion), Presence of Fish Nests, Presence of Barriers, Other Comments:

Plant Type (Check appropriate boxes):
Submergent ☐ **Floating** ☐ **Emergent** ☐ **None** ☐

Cover (Shore) (Check one box or add to Other):
None ☐ **Sparse** ☐ **Moderate** ☐ **Dense** ☐ **Other**

Cover (In water) (Check one box or add to Other):
None ☐ **Sparse** ☐ **Moderate** ☐ **Dense** ☐ **Other**

North Bala Dam Hydroelectric Project
Electrofishing Results - EF-3

Species	Fork Length (mm)
smallmouth bass	97
smallmouth bass	93
smallmouth bass	87
smallmouth bass	83
smallmouth bass	65
largemouth bass	71
largemouth bass	81
largemouth bass	42
pumpkinseed	98
pumpkinseed	87
pumpkinseed	81
pumpkinseed	81
pumpkinseed	37
longnose dace	55
logperch	97
logperch	98
yellow perch	62

Ontario

Ministry of Natural Resources

Licence to Collect Fish for Scientific Purposes
Part 2 - Site Collection Report

Complete one **Part 2 - Site Collection Report** for each collection site.
Attach Site Collection Reports to **Part 1** of the **Report**.

MNR Office Use:
ARA Code:
File #:

Licence No:	1041389	**Report Prepared By:**	Noel Boucher
Waterbody Name:	Muskoka River	**Township:**	Muskoka Lakes
Lot:	14	**Concession:**	A
Collection Site No.:	4of 4	Complete a report for **each collection site** and indicate location of site on **map**. Attach copy of map to report.	
Site UTM Coordinates:	609181 **E**	4985360 **N**	

Collection Date: September 12, 2007 **Start Time:** 11:30 **AM** X **PM** ☐ (check one) **End Time:** 11:45 **AM** X **PM** ☐ (check one)

Fish Species Handled or Observed:

Species	Species Code	Adult	YOY Young of Year	No. Caught	No. Kept	No. Live Released
Rock bass	311		X	1	0	1
Pumpkinseed	313	X	☐	1	0	1
		☐	☐			
		☐	☐			
		☐	☐			
		☐	☐			
		☐	☐			
		☐	☐			
		☐	☐			
		☐	☐			
		☐	☐			
		☐	☐			

Water Temperature: 20.8 °C	**Time of Day:** 11:40 **AM** X **PM** ☐ (check one)	**Air Temperature:** 18 °C
Type of Gear: Backpack Electrofisher	**Dimensions:** n/a (Mesh Size, Length of Net, etc.)	**Fishing Duration:** 221 sec
MNR Provincial Inventory Standard Used (FWIN, SLIN, SPIN, ESTN, OSAP, ?): n/a		

OPTIONAL INFORMATION

Secchi Depth: m For Lakes and Large Rivers	**Intermittent** ☐ **Permanent** ☐ (check one)	**Watercress Present YES** ☐ **or NO** ☐ (check one)

Additional Data - Water Quality, Condition of Fish (e.g., Spawning), Habitat Features (e.g., Bank Erosion), Presence of Fish Nests, Presence of Barriers, Other Comments:

Plant Type (Check appropriate boxes):
Submergent ☐ **Floating** ☐ **Emergent** ☐ **None** ☐

Cover (Shore) (Check one box or add to Other):
None ☐ **Sparse** ☐ **Moderate** ☐ **Dense** ☐ **Other**

Cover (In water) (Check one box or add to Other):
None ☐ **Sparse** ☐ **Moderate** ☐ **Dense** ☐ **Other**

North Bala Dam Hydroelectric Project
Electrofishing Results - EF-4

Species	Fork Length (mm)
pumpkinseed	79
rock bass	33

PARKING AREA

IB 2

RAIL ROAD BRIDGE

CC 1

GRAVEL PARKING AREA

ROCK

CONCR RETAIN

BALA FALLS RD. BRIDGE

DOCK

BUILDING

CANADIAN PACIFIC RAILWAY

FLOW

HIGHWAY No. 169 ROAD BRIDGE

EF-4

BALA NORTH CONTROL STRUCTURE

SPILL

IB 3

EL. 227.17

EL. 224.70

CC 4

CC 5

EF-1

FLOW

BALA FALLS RD.

CONCRETE ABUTMENT

EF-3

FLOW

HP

CHURCH

HP

CONCRETE RETAINING WALL

INTERLOCKING BRICKS

EF-3

FLOW

HIGHWAY No. 169

GABION WALL

GRAVEL PARKING AREA

HP

BALA REACH

EF-2

0 10 20 30 40 50 Metres

Scale 1:500

EF-1 Electrofishing Locations

Figure 2.1

Swift River Energy Ltd.

North Bala Hydroelectric Development

Proposed General Arrangement

ACRES

Mar 07, 2008 - 1:58pm Login name: Nadal150287
Drawing Name: R:\18715\Cad\18715-figures 2-1 and 2-2.dwg

C4 Benthic Invertebrate Data

GROUP	FAMILY	TAXON	DSND1	DSND2	DSND3	DSSD1	DSSD2	DSSD3	USND1	USND2	TR1A	TR1B	TR1C	TR2A	TR2C	TR3A	TR3B	TR3C
HIRUDINEA	Erpobdellidae	Erpobdellidae very juvenile							3	2					1			
OLIGOCHAETA	Lumbricidae	Lumbricidae juveniles							1				1					
	Lumbriculidae	Lumbriculus variegatus								9			1	1	1	1	2	2
	Naididae	Nais communis							28		2	1						
		Stylaria lacustris							4			1	1					
	Tubificidae	Immatures with hair chaetae							1									
		Immatures without hair chaetae							16	11		9	34	6	11	3	8	7
ACARI	Hygrobatidae	Hygrobates sp	2				1						1					
	Lebertiidae	Lebertia sp																1
	Sperchontidae	Sperchon sp		1	2	1		1										
AMPHIPODA	Crangoncytidae	Crangonyx sp juv									3	9	3		2	6	16	5
	Gammaridae	Gammarus pseudolimnaeus											1	1		3		1
	Talitridae	Hyalella azteca							8	1	1	2	1	1	1	38	18	22
DECAPODA	Cambaridae	Cambarus bartoni		1														
ISOPODA	Asellidae	Caecidotea intermedius				3	2	1							1	1	3	3
COLEOPTERA	Elmidae	Optioservus sp larvae	2															
		Stenelmis sp larvae								1						18	7	9
		Stenelmis crenata														6		3
	Hydrophilidae	Berosus sp larvae													1			
	Psephenidae	Ectopria sp larvae								2								
DIPTERA	Ceratopogonadae	Ceratopogonidae type IV								1								
		Dasyhelea sp													1			1
	Chironomidae																	
		Cryptochironomus sp										1						
		Dicrotendipes sp												1	1			
		Cardiocladius sp			2	5	9	16										
		Cricotopus sp								1						3	1	1
		Nanocladius sp			1	1												
		Orthocladius sp		1	3		1						1					
		Psectrocladius sp									6	9	4	2		2	2	
		Tvetenia sp	1	1	3		7	5										
	Empididae	Hemerodromia sp		1														

	Simulidae	Simulium vittatum			1	1417	2136	971										
	Tipulidae	Limonia sp				1										6		4
EPHEMEROPTERA	Heptageniidae	Heptagenia sp	1													1	1	
		Stenacron interpunctatum	1															2
TRICHOPTERA	Hydropsychidae	Cheumatopsyche sp	59	262	48	1	8	4										
		Hydropsyche sp1	1	9		1	2	3										
		Hydropsyche sp2	21	112	11	10	8	7										
		Hydropsyche bronta	1															
	Leptoceridae	Mystacides sp juv														1		
	Limnephilidae	Pycnopsyche sp															1	
	Philopotamidae	Chimarra sp	1															
	Polycentropodidae	Neureclipsis sp	26	30	20	41	47	26										
		Polycentropus sp															1	
GASTROPODA	Hydrobiidae	Amnicola limosa				1			2				1	1	8	1	2	4
	Physidae	Physella gyrina							1				1	1				
	Planorbidae	Gyraulus circumstriatus							3							1	1	
BIVALVIA	Sphaeriidae	Musculium transversum								3					1			
		Pisidium sp													12		1	
TURBELLARIA	Planariidae	Planariidae	9	4	7	7	10	18	9	14	23	17	19	22	1	6		3
NEMERTEA	Tetrastemmatidae	Prostoma sp							3				1		1			1
		TOTALS	125	422	98	1489	2231	1052	79	45	35	49	70	36	43	97	64	69
		Sample number 2007/***	735	736	737	738	739	740	741	750	742	743	744	745	746	747	748	749

C5 Resolutions, Township of Muskoka Lakes

Agenda Reference 6.b.

THE CORPORATION OF THE TOWNSHIP OF MUSKOKA LAKES

PLANNING COUNCIL MEETING

DATE: January 5, 2005 **RESOLUTION NUMBER:** PC- 1 -5/01/05

MOVED BY:

SECONDED BY: Nancy Thompson

BE IT RESOLVED THAT : the Township of Muskoka Lakes advise the Ministry of Natural Resources 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 Muskoka River Water Management Plan;

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 Muskoka River Water Management Plan be included on the review team for the proposed development.

RECORDED VOTE:	NAYS	YEAS
COUNCILLOR ELLIS	___	___
COUNCILLOR FAIRFIELD	___	___
COUNCILLOR GOLTZ	___	___
COUNCILLOR GRADY	___	___
COUNCILLOR HARE	___	___
COUNCILLOR MARTIN	___	___
COUNCILLOR NISHIKAWA	___	___
COUNCILLOR THOMPSON	___	___
COUNCILLOR WALLACE	___	___
MAYOR PRYKE	___	___
TOTALS	___	___

MOTION REFERRED	[ ]
MOTION TABLED	[ ]
MOTION DEFEATED	[ ]
MOTION CARRIED	[✓]

Susan Pryke
MAYOR

Agenda Reference 9.a.7.

COUNCIL MEETING

DATE: 8 July 2008 **RESOLUTION NUMBER: C-29-08/07/08**

MOVED BY: Councillor Patricia Arney

SECONDED BY: Councillor Elizabeth Denyar

BE IT RESOLVED THAT the Council of the Township of Muskoka Lakes, concurs "in principle", 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.

RECORDED VOTE:	**NAYS**	**YEAS**
COUNCILLOR ARNEY		
COUNCILLOR DAVIDSON		
COUNCILLOR DENYAR		
COUNCILLOR ELLIS		
COUNCILLOR GRADY		
COUNCILLOR HARE		
COUNCILLOR MARTIN		
COUNCILLOR THOMPSON		
COUNCILLOR WALLACE		
MAYOR PRYKE		
TOTALS		

MOTION DEFEATED [ ]

MOTION CARRIED [✓]

Susan Pryke
MAYOR

Agenda Reference 10b.

COUNCIL MEETING

DATE: 21 Oct 2008 **RESOLUTION NUMBER: C- 14 -21/10/08**

MOVED BY: **Mary Grady**

SECONDED BY: **Brian Hare**

BE IT 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 take 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.

RECORDED VOTE:	**NAYS**	**YEAS**
COUNCILLOR ARNEY		
COUNCILLOR DAVIDSON		
COUNCILLOR DENYAR		
COUNCILLOR ELLIS		
COUNCILLOR GRADY		
COUNCILLOR HARE		
COUNCILLOR MARTIN		
COUNCILLOR THOMPSON		
COUNCILLOR WALLACE		
MAYOR PRYKE		
TOTALS		

MOTION DEFEATED [ ]
MOTION CARRIED [X]

SUSAN PRYKE
MAYOR

C6 Motions, District of Muskoka

THE DISTRICT MUNICIPALITY OF MUSKOKA

ENGINEERING AND PUBLIC WORKS COMMITTEE

MEETING NO. PW-10-2008

PLACE:	Council Chamber, District Administration Building
TIME:	9:00 a.m.
DATE:	August 13, 2008
PRESENT:	Committee Chair L. Braid; District Chair G. Adams; Members B. Boivin; B. Colhoun; S. Martin
ABSENT:	G. Smith; B. Thompson
OFFICIALS PRESENT:	J. Green, Chief Administrative Officer; T. White, Commissioner of Engineering & Public Works
OTHERS PRESENT:	District Councillors M. Casey, D. Coates, S. Pryke and N. Thompson; J. Patterson and others, re:- realignment of Muskoka Road No. 27; G. Bache, Director of Environmental Services; J. Delaney, Manager of Waste Management; S. Donald, Director of Budgets & Financial Planning; S. Yeoman, Deputy Clerk

CALL TO ORDER

Committee Chair Braid called the meeting to order at 9:07 a.m.

DECLARATION OF PECUNIARY INTERESTS

None were declared at this time.

DELEGATIONS

a) Muskoka Road No. 27 (Ferndale Road) Realignment

Committee Chair Braid introduced Mr. John Patterson who advised that he was attending the meeting on behalf of Muskoka Lakes Golf and Country Club to request support of the proposed realignment of Muskoka Road No. 27. He advised that permission to proceed with the project, subject to certain terms and conditions, has been received from the Ministry of Natural Resources.

Permission was requested and granted to bring the matter forward for the consideration of Committee at this time.

79-81 b) Proposed Realignment of Muskoka Road No. 27 (Ferndale Road)
Township of Muskoka Lakes
Report No. PW-10-2008-5

Mr. White presented his report. He advised that the recommendation shown on the agenda had been revised to include an additional condition that all of the work required to upgrade the existing Muskoka Road No. 27 north of the realignment is to be completed to the satisfaction of the Public Works Superintendent of the Township of Muskoka Lakes.

Moved by S. Martin and seconded by B. Boivin *R86/2008*

THAT subject to the following conditions, the proposal of the Muskoka Lakes Golf and Country Club (MLGCC) to realign a portion of Muskoka Road No. 27 (Ferndale Road) as indicated in the plan attached to this resolution be endorsed, and the realigned section of road be assumed into Muskoka's District Road system:

1) *All work required to realign the road is to be completed to the satisfaction of the Commissioner of Engineering and Public Works;*

2) *All work required to upgrade the existing Muskoka Road No. 27 north of the realignment to be completed to the satisfaction of the Public Works Superintendent of the Township of Muskoka Lakes;*

3) *All costs associated with the realignment, including but not necessarily limited to environmental assessment, design, construction, property, project management and legal costs, are to be borne by the MLGCC;*

4) *The acquisition and transfer to Muskoka of all property interests required for the new road allowance are to be completed to the satisfaction of the District Solicitor; and*

5) *To ensure compliance with the preceding conditions, the MLGCC is to enter into an agreement with Muskoka, the terms of which are to be satisfactory to the District Solicitor and the Commissioner of Engineering and Public Works.*

Carried.

AWARD OF TENDERS

82-83 a) Tender No. 08-316-314
Resurfacing on Muskoka Road No. 117
Township of Lake of Bays
Report No. PW-10-2008-1

Mr. White highlighted the report of the Director of Contract and Engineering Services. In response to questions from Councillors Martin and Boivin, Mr. White advised that this project would be financed entirely from the 2008 Municipal Road and Bridge Infrastructure Investment (MRBII) funding provided by the Province. He further noted that three drainage projects previously earmarked for completion using MRBII funding had been deemed ineligible and will be postponed until such time as they can be completed using municipal funding, which will likely be in 2009.

Moved by S. Martin and seconded by B. Boivin *R87/2008*

THAT Tender No. 08-316-314 for resurfacing on Muskoka Road No. 117 in the Township of Lake of Bays be awarded to Fowler Construction Company Limited, in the amount of $1,903,870.85, which is included in the 2008 capital budget;

AND THAT the 2008 Capital Budget and Forecast for projects 316.314 and 316.315 be amended from $1,400,000 and $390,000 to $1,550,000 and $435,000 respectively;

AND FURTHER THAT savings in the Municipal Road and Bridge Infrastructure Investment funding, from not proceeding with the three projects outlined under the Financial section of Report NO. PW-10-2008-1, be used to finance the budget amendment.

Carried.

TRANSPORTATION

84-85 a) Muskoka Road No. 169 – Parking Restrictions
Bala Cranberry Festival 2008
Report No. PW-10-2008-2

Moved by S. Martin and seconded by B. Colhoun *R88/2008*

THAT a by-law be prepared creating a no parking tow-away zone along both sides of Muskoka Road No. 169 from North Burgess Avenue to Grey Street, and along the East Side of Muskoka Road No. 169

only, from the North entrance to Bala Falls to Windsor Drive commencing at 8:00 a.m. on October 17, 2008 and terminating at 6:00 p.m. on October 19, 2008, during the Bala Cranberry Festival.

Carried.

86-90 b) Dorset Bridge Closure – Muskoka Road No. 39
Township of Lake of Bays
Report No. PW-10-2008-3

Mr. White advised that temporary closure of the Dorset bridge does not present a problem as an alternate route to divert vehicular traffic is readily available.

Moved by B. Boivin and seconded by S. Martin *R89/2008*

THAT the Dorset bridge located on Muskoka Road No. 39, be temporarily closed on Sunday, September 14, 2008 between the hours of 9:00 a.m. and 12:30 p.m. to accommodate the Subaru Ironman 70.3 Muskoka event.

Carried.

91-94 c) Proposed Hydroelectric Generation Facility
Muskoka Road No. 169, South Side of Bala Falls North Dam
Report No. PW-1-2008-4

The report of the Director of Roads and Waste Management with regard to a proposal by Swift River Energy to construct a hydroelectric generating facility on property owned by The District Municipality of Muskoka was presented by Mr. White.

In response to Councillor Boivin's question, Mr. White advised that financial considerations with regard to the public property will be discussed in closed session at a future meeting.

Moved by S. Martin and seconded by B. Boivin *R90/2008*

THAT The District Municipality of Muskoka agrees "in principle" with the proposal by Swift River Energy to construct a Hydroelectric Generating Facility on property owned by The District Municipality of Muskoka, located on the south side of the Bala Falls North Dam, subject to the successful completion of the Environmental Screening process and reaching a satisfactory agreement with The District Municipality of Muskoka regarding the use of District owned lands.

Carried.

THE DISTRICT MUNICIPALITY OF MUSKOKA

LEGAL DEPARTMENT
70 PINE STREET, BRACEBRIDGE, ONTARIO P1L 1N3
Telephone (705) 645-2231 FAX (705) 645-5319 - 1-800-461-4210 (705 area code)
www.muskoka.on.ca

TO: Chair and Members
Muskoka District Council

FROM: David G. Royston
District Solicitor

DATE: October 8, 2008

SUBJECT: Bala North Falls – Muskoka Road No. 169 – Swift River Energy Ltd. – Our File: DR-169-014

REPORT NO.: 17(2008)-2

RECOMMENDATIONS

None. For information only.

ORIGIN

Ongoing matter.

ANALYSIS

Attached is a copy of a draft resolution that may be considered by Council under "New Business" on Monday, October 14, 2008 if Council, after having the opportunity to a site visit as well as receiving a presentation from Swift River Energy Ltd., wishes to deal with the matter. The attached resolution is more explanatory than the one previously tabled by Council. As the extent of the changes is significant, introduction of a new resolution is preferred over attempting to amend the tabled resolution.

Under the Muskoka District Council procedure by-law, resolutions that are tabled and not taken up from the table within six (6) months automatically expire. Accordingly, if Council considers the attached resolution, the tabled resolution may remain on the table and be permitted to automatically expire.

Respectfully submitted,

DGR:sb
Encl.

David G. Royston,
District Solicitor

WHEREAS the Province of Ontario is the owner of the Bala Falls Dam and a parcel of land immediately south of the Bala North Falls (the Crown Land site);

AND WHEREAS the Province of Ontario in 2004, in accordance with its Competitive Site Release Program, identified and released the Crown Land site for the purposes of developing the site as a small generation facility;

AND WHEREAS the Province requested proposals for the development of the small generation facility on the Crown Land site and Swift River Energy Ltd. was the successful proponent;

AND WHEREAS The District Municipality of Muskoka (Muskoka) is the owner of a parcel of land (the Muskoka District site) immediately south of the Crown Land site;

AND WHEREAS Swift River Energy Ltd. is investigating the possibility of using the Muskoka District site as a possible alternative to the Crown Land site to address public concerns;

AND WHEREAS development of either the Crown Land site or the Muskoka District site require certain environmental assessments as well as compliance with the Muskoka River Water Management Plan;

AND WHEREAS the environmental approval processes require the identification of possible alternative sites to the Crown Land site for the proposed facility;

AND WHEREAS use of the Muskoka District site in lieu of the Crown Land site may be of assistance in reducing the impacts of the proposed facility, preserve public access to the Bala North Falls, result in improvements to the park system in Bala as well as establish a modest tourist attraction;

AND WHEREAS a refusal by Muskoka to consider the use of the Muskoka District site as an alternative site will indirectly result in confirming the Province's selection of the Crown Land site as the ultimate and preferred site for the facility;

THEREFORE BE IT RESOLVED THAT:

1) The District Municipality of Muskoka advise Swift River Energy Ltd. 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.

C7 Stage I and 2 Archaeological Assessments

Stage 1 Archaeological Assessment

North Bala Hydroelectric Development,
Town of Bala, Ontario

Submitted to:

Hatch Energy
4342 Queen Street, 5th Floor
PO Box 1001
Niagara Falls, Ontario, L2E 6W1
Tel.: 905-374-5200

Prepared by:

Archaeological Services Inc.
528 Bathurst Street
Toronto, Ontario M5S 2P9
Tel.: (416) 966-1069
Fax: (416) 966-9723
Email: asitoronto@rogers.ca
Website: www.iasi.to

ASI File 08EA-121
Archaeological Licence P264
MCL PIF P264-042-2008

June 2008 (revised October 2008)

ARCHAEOLOGICAL SERVICES INC.
ENVIRONMENTAL ASSESSMENT DIVISION

PROJECT PERSONNEL

Senior Project Manager:	Robert Pihl, MA, CAHP [MCL licence P057] Partner and Senior Archaeologist, Manager, Environmental Assessment Division
Project Director (licence):	Katie Bryant, MA [MCL licence P264] Staff Archaeologist
Project Manager:	Caitlin Pearce, Hon. BA [MCL licence R303] Staff Archaeologist
Project Administrator:	Andrew Douglas, BA Research Archaeologist
Field Director:	Peter Carruthers, MA, CAHP [MCL licence P163] Senior Associate
Report Writer and Graphics:	Caitlin Pearce Peter Carruthers
Historical Research:	Brian Narhi, MA Project Historian
Report Reviewer:	Peter Carruthers Robert Pihl,

Stage 1 Archaeological Assessment

North Bala Hydroelectric Development, Town of Bala, Ontario

1.0 INTRODUCTION

Archaeological Services Inc. (ASI) was contracted by Hatch Energy, Mississauga, on behalf of Swift River Energy Limited, to conduct a Stage 1 Archaeological Assessment for the Redevelopment of the North Bala Falls Hydroelectric site in Bala, Ontario (Figure 1). Swift River Energy is pursuing the development of a run-of-the-river hydroelectric generating station on approximately 0.07 ha of Crown lands adjacent to Bala's North Dam. These lands were the site of a power generating station built by the Bala Light and Power Company in 1924 (later acquired by Ontario Hydro), until it was demolished in 1972.

Permission to access the study area and to carry out the activities necessary for the completion of the Stage 1 archaeological assessment was granted to ASI by Hatch Energy on April 15, 2008.

This report presents the results of the Stage 1 background research and field review and makes several recommendations.

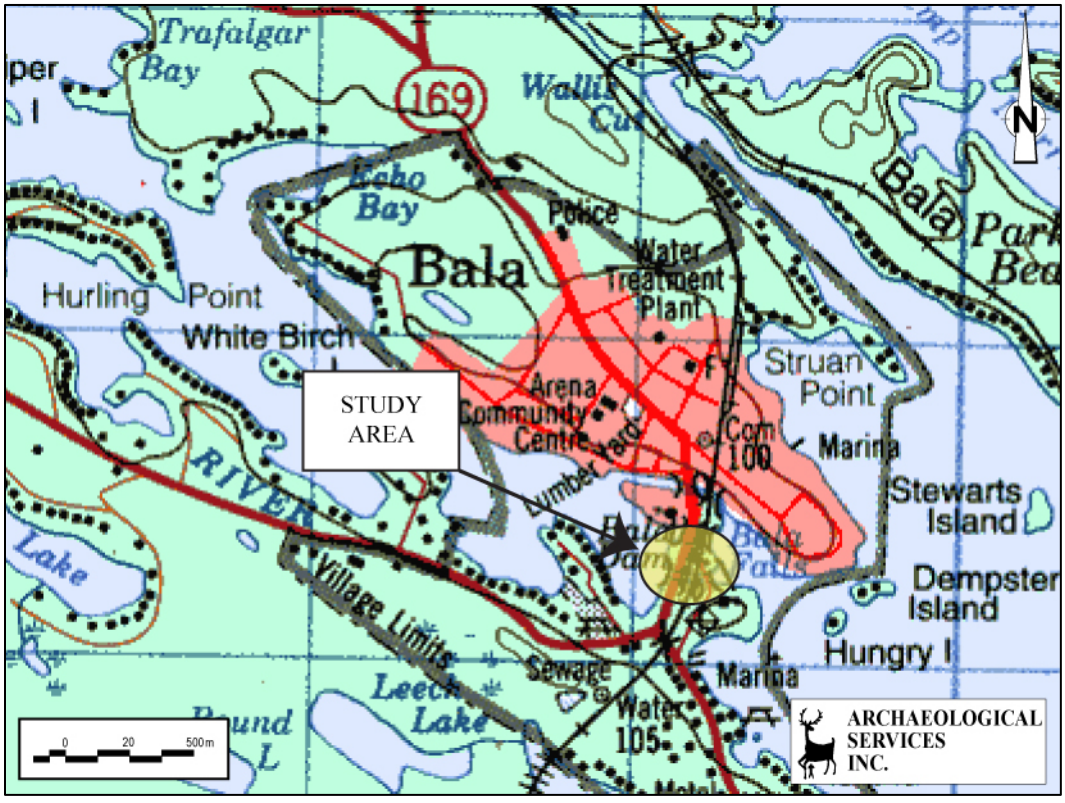


Figure 1: Location of the study area [NTS Sheet 31 E/04, Lake Joseph]

2.0 STAGE 1 BACKGROUND RESEARCH

The Stage 1 archaeological assessment of the study area was conducted in accordance with the Ontario Heritage Act (2005) and the Ontario Ministry of Culture's (MCL) draft *Standards and Guidelines for Consultant Archaeologists* (MCL 2006). A Stage 1 archaeological assessment involves research to describe the known and potential archaeological resources within the vicinity of a study area. Such an assessment incorporates a review of previous archaeological research, physiography, and land use history. Background research was completed to identify any archaeological sites in the study area and to assess their archaeological potential.

2.1 Previous Archaeological Research

In order that an inventory of archaeological resources could be compiled for the study area, three sources of information were consulted: registered archaeological site records kept by the Ontario Ministry of Culture; published and unpublished documentary sources; and the files of ASI.

In Ontario, information concerning archaeological sites is stored in the Ontario Archaeological Sites Database (OASD) maintained by the Ontario Ministry of Culture. This database contains archaeological sites registered according to the Borden system. Under the Borden system, Canada has been divided into grid blocks based on latitude and longitude. A Borden block is approximately 13 km east to west, and approximately 18.5 km north to south. Each Borden block is referenced by a four-letter designator, and sites within a block are numbered sequentially as they are found. The study area under review is located in Borden block *BgGv*.

According to the OASD (email communication, Robert von Bitter, MCL Data Coordinator, May 2, 2008), there are two previously registered archaeological sites within 2 km of the study area (Table 1). Neither of these sites are registered within 100 m of the study area.

Table 1: Registered Archaeological Sites within 2 km of the study area

Borden #	Name	Cultural Affiliation	Site Type	Researcher
BgGv-1	Whitehead	Aboriginal - Undetermined	Lithic Scatter	L. Jackson, 1975
BgGv-5	Jewitt	Aboriginal – Middle Archaic	Isolated Find	ASI, 1993

2.2 Physiography and Assessment of Aboriginal Archaeological Potential

The study area is located within the Georgian Bay Fringe physiographic region (Putnam and Chapman, 1984: 214). The region extends along the east shore of Georgian Bay and is characterized by shallow soil with outcropping rock knobs and ridges. The thin till cover was removed from the rock outcrops by the wave action within glacial Lake Algonquin. Local vegetation is a mix of red oak, maple, birch, and ash white pine, red pine, hemlock and other conifers. Soils are Monteagle sandy loam (Hoffman *et al*. 1964).

Potable water is the single most important resource necessary for any extended human occupation or settlement. Since water sources have remained relatively stable in southwestern Ontario after the Pleistocene era, proximity to water can be regarded as a useful index for the evaluation of archaeological site potential. Indeed, distance from water has been one of the most commonly used variables for predictive modeling of site location. The many lakes of the Muskoka region would have been important

foci, and Aboriginal peoples would have been attracted to this area, especially during the spring and fall, by the abundance of fish, as well as by other important aquatic resources such s migratory species.

The Ministry of Culture's draft *Standards and Guidelines for Consultant Archaeologists* (MCL 2006: Unit 1c 5-7, 10) stipulates that undisturbed land within 300 m of a primary water source (lakeshore, river, large creek, etc.), undisturbed land within 200 m of a secondary water source (stream, spring, marsh, swamp, etc.), as well as undisturbed land within 300 m of an ancient water source (as indicated by remnant beaches, shorecliffs, terraces, abandoned river channel features, etc.), are considered to have archaeological potential. 'Disturbance' is a relative term depending on the history of the landscape as activities like agriculture and logging do not necessarily destroy archaeological remains and certain industrial uses have heritage significance in their own right.

In the Canadian Shield in general, there is an abundance of water as attested to by the extensive wetlands, rivers, smaller streams and lakes. Therefore, distance from water alone is not a useful predictive index. One must take into account other environmental and cultural factors in addition to potable water to predict the location of sites.

In order to develop a model that is relevant to the sub-boreal nature of the Canadian Shield in the study area, it is necessary to examine the existing Aboriginal site database as well as ethnographic or historic descriptions of native land use.

The wealth of recent historical information available from such regions as the Temagami District and archaeological site potential models such as one developed for the District Municipality of Muskoka (ASI 1994) can be used to augment the Aboriginal model. By testing these models in different areas of the Canadian Shield, their utility and versatility can be assessed. The basic pattern of settlement, which has been identified historically, ethnographically and archaeologically in the nearby Temagami (ASI, *et al.* 1991) and Muskoka (ASI 1994) districts, involves the later spring/early summer occupation of a main settlement by the band or several bands to exploit the rich fishery of the larger lakes and to engage in economic and social interaction. These settlements may have been located at or near the mouths of the major rivers draining into large lakes. During the fall, the larger band would separate into smaller family or extended family groups for the purposes of hunting, fishing, gathering and trapping. At this time, smaller camps would be established along trap lines, in good hunting locations and at locations where fall spawning whitefish and lake trout could be procured. In early spring, family groups moved to the maple bush for sap collection. In addition to the primary camps and settlements, small special-purpose sites were occupied including camps associated with portages and overland travel, quarry sites, kill sites, plant collecting camps, fishing camps. Another important site type relates to spiritual activities. Sites of this type include pictographs, vision quest locations and spiritual landscape features.

Lakes and large rivers are probably the most important foci of settlement. Generally, lakes over 25 hectares, such as Muskoka Lake, are likely to be suitable for extended occupation as the presence of a reliable fishery is a necessary prerequisite to settlement, and Lake Muskoka is assumed to be a natural feature (i.e. not solely the product of artificial water levels created by damming). While the general shoreline of a lake has moderate to high potential, certain shoreline features enhance the potential for archaeological sites. These include points of land, islands, river mouths and narrows. A higher potential rating can also be given to secondary features such as rapids, falls, portages, and river mouths or confluences along rivers that drain to, or from, lakes greater than 25 ha.

Wetland areas have the potential for sites related to hunting and plant collecting. Camps associated with wetlands would be located on well-drained locations adjacent to the wetland. These may be situated on ridges that extend into wetland areas.

For the purposes of this assessment, any areas within 200 m of the secondary watercourse or 300 m of the lakeshore, and which are further characterized by an elevated setting with improved drainage and some level terrain were deemed to constitute areas of archaeological site potential for the presence of pre-contact or contact period Aboriginal activity, provided that they have not been completely altered by the modern use of the property.

The study area includes a number of attributes that are associated with the presence of archaeological potential: lake front, creek and creek mouth, elevated vantage points, well drained locale adjacent to land suitable for a portage route between lakes. Therefore, depending on the degree of previous land disturbance, it may be concluded that there is potential for the recovery of pre-contact archaeological remains within the study area.

2.4 Assessment of Historic Archaeological Potential

The *1879 Guide Book & Atlas of Muskoka and Parry Sound Districts* was reviewed to determine the potential for the presence of nineteenth century archaeological remains within the study area (Figure 2a and 2b).

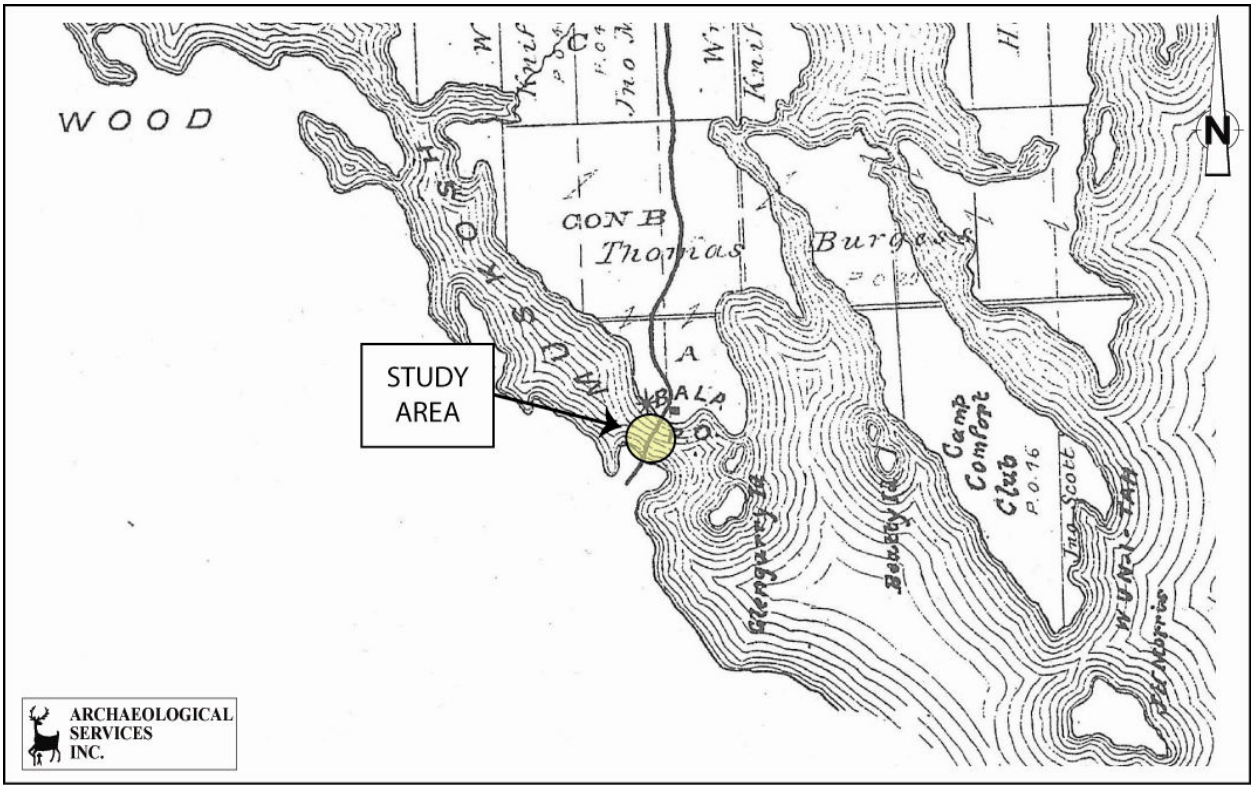


Figure 2a: The study area overlaid on the historic map of the Township of Medora, as found in the 1879 *Guide Book & Atlas of Muskoka and Parry Sound Districts.*

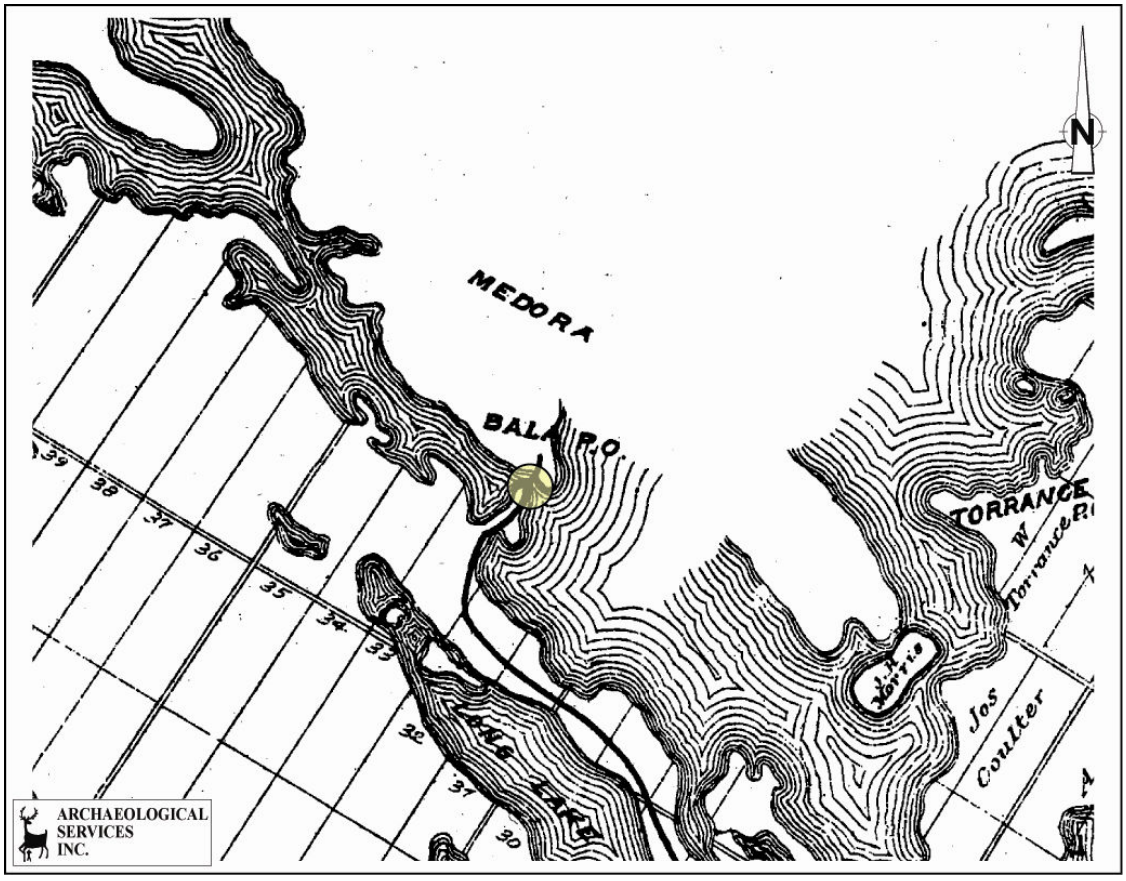


Figure 2b: The study area overlaid on the historic map of the Township of Wood as found in the 1879 *Guide Book & Atlas of Muskoka and Parry Sound Districts.*

The study area is located on the border of the former Townships of Medora and Wood, along the Muskoka River. The lands adjacent to the proposed North Bala Hydroelectric Development are on part of Lots 14 and 15, Concession "A" in Medora Township, and part of Lot 33, Concessions 6 and 7 in Wood Township. The Bala Post Office is the only feature illustrated, and it falls just north of the study area. It should be noted, however, that not all features of interest were mapped systematically in the Ontario series of historical atlases, given that they were financed by subscription, and subscribers were given preference with regard to the level of detail provided on the maps. Moreover, not every feature of interest would have been within the scope of the 1879 *Atlas.*

For a detailed historical overview of the study area, see Appendix A.

For the Euro-Canadian period, the majority of such early nineteenth century land uses such as posts, depots or farmsteads (*i.e.*, those which are arguably the most potentially significant resources and whose locations are sometimes recorded on nineteenth century maps) are likely to be captured by the basic proximity to the water model outlined in Section 2.2, since these occupations were subject to similar environmental constraints. An added factor, however, is the development of the network of colonization, resource extraction and concession roads, and railways through the course of the nineteenth and early 20th centuries. These transportation routes frequently influenced the siting of farmsteads, industries and

businesses. Accordingly, lands within 100 metres of an early settlement route or water power site are also considered to have potential for the presence of Euro-Canadian archaeological remains.

Bala is a community built on three islands where Lake Muskoka flows over a break in slope into the Muskosh or Moon River. The most northerly of the channels, called Mill Creek, was the site of a timber dam and water power saw mill run by the Burgess family between 1878 and 1910. By 1892, the Shaws were generating hydro electric power in Bracebridge and in 1917, the Bala Electric Light and Power Company followed suit with a 245 kilowatt plant in Bala. After purchase by Ontario Hydro in 1929 it was called Bala Generating Station No. 1 (Plate No. 1). In 1924 second plant was built to the south of the village between the two main waterfalls. Purchased by Ontario Hydro from the Burgess family in 1929, the second plant was called Bala Generating Station No. 2 and was located in the study area (Figure 3).

Therefore, depending on the degree of evolving land disturbance, it may be concluded that there is potential for the recovery for historic cultural and industrial remains in the study area.

3.0 FIELD REVIEW

A field review of the study area was conducted by Mr. Peter Carruthers (P163), ASI, on May 7, 2008, in order to assess archaeological site potential and to determine the degree to which development and landscape alteration may have affected that potential. Weather conditions during the field assessment were cool, overcast and 10°C with light rain. Field observations have been generalized on a map of the study area (Figure 3). Associated photography can be found in Section 6.0.

Besides the mills and power facilities, various other alterations have occurred adjacent to the study area. These include the church, the marina/boathouse and store (Plates 5,7,8,9,10), possibly buildings no longer present, the dams and control structures (Plate 2), the CPR with associated bridges (Plate 3), Highway 169 and associated bridges (Plates 4 , 16), Bala Falls Road (Plates 2, 7), the decommissioning and demolition of the Bala No. 2 Power Station in 1924 with its upstream and downstream works (Plates 11, 12,13,) and the grading and filling of the gravel parking area adjacent to the boathouse/store (Plates 7 and 8). All of these contribute to the Bala story to some significant degree or another. Due to the extent of previous disturbances, portions of the study area no longer have archaeological potential and further archaeological assessment is not required (Figure 3: areas marked in yellow).

Where there is excessive natural or artificial slope, archaeological potential is reduced or non-existent. Where the slope is artificial it may or may not have cultural significance (Plates 3, 4, 5, 11, 12, 14, 15). No further assessment is required on slopes with no archaeological potential (Figure 3: areas marked in pink).

Archaeological potential is present in the parkette east of the Canadian Pacific Railway (Plate 3 and 6). This will not be impacted by the project and no further work is required (Figure 3: areas marked in hatched green).

Two historic structures are located adjacent to the proposed construction impact area (Figure 3: areas marked in purple). The Bala Presbyterian Church (Plates 10, 11) and Purk's Place Boat House and Marina (Plates 5, 8 and 9) are significant heritage resources and are worthy of preservation.

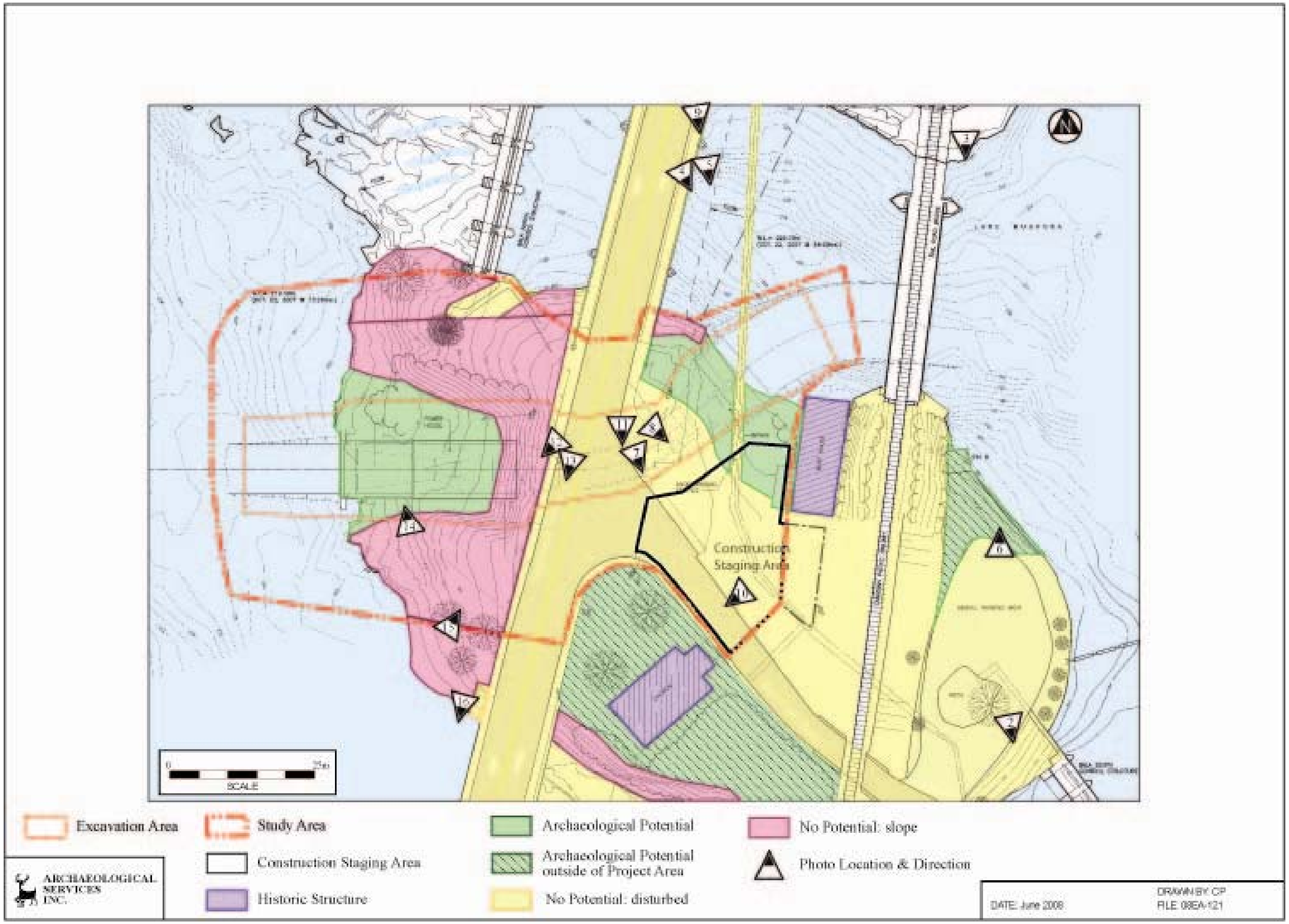


Figure 3: North Bala Hydroelecctric Development—Results of Stage 1 Archaeological Assessment

Purk's Place Boat House has been listed by the Muskoka Heritage Committee as being significant. Formerly serving as Hurling, Hamill, Adams, Cunningham and Purkis' boat works and livery, the establishment has been purveying "boats and bait at least since 1908." It has long been a landmark near a favourite local swimming hole and on a portage in use for centuries. There is a photo in the Bala Museum showing a building on the site in 1897, prior to CPR construction. Because of the significance of this frame building and its proximity to the construction site and potential vulnerability due to damage, a mitigation plan for this site should be developed and approved prior to project commencement.

The land around Purk's Place Boat House and Marina, and between the building and Highway 169, has been variably impacted over time and exhibits varying degrees of potential (Plates 5, 8 and 9). The project proposes to blast an intake channel from the headpond near the railway bridge to the new power station site. Stage 2 testing should be carried out here where appropriate (Figure 3: areas marked in green).

The gravelled parking lot adjacent to Bala Falls Road has been filled on bedrock and levelled for ease of access to and from the road surface. This parking lot will be used for project staging. No further assessment is required in this area (Plate 7 and 8).

The Bala Presbyterian Church, also known as the Burgess Memorial Church, is designated under Part IV of the *Ontario Heritage Act*. The church grounds have archaeological potential but will not be impacted by the project (Figure 3: Area marked in hatched green). No additional assessment is required here but the comments about blast impact apply to the building.

Although the proposed project is not intended to directly impact these buildings, any blasting, vibration, water flow or encroachment could seriously damage these two historic structures. These and all other nearby structures should be effectively buffered and protected from the effects of blast, shock and vibration during construction. An effective protection strategy should be developed and implemented, and mitigation measures must be confirmed in advance.

Local plaques by Ontario Hydro and others suggest that hydro power generation in Bala was important. The property west of the intersection with Bala Falls Road and Highway 169 is characterized by a steep drop into a 25 x 25 m excavation into bedrock whose base lies approx 8 m below the level of the highway. It opens to the west just above the waterline (Plates 12, 13, 14). The excavation provided the foundation hole for the Bala generation Station No. 2. This building was demolished in the early 1970's. Water entered the station along a flume or penstock originating at the south end of the dam. The water exited the turbines to the west into a forebay which was also blasted into the bedrock. When the plant was decommissioned and demolished, the "various channels were filled and sealed"; the site experienced "levelling and dressing" (See Appendix A for historical overview). In cases like this, machinery and other remnants may have been buried in place or placed in deeper water. Indications of such a possibility may result from a Stage 2 examination of the former power station site.

4.0 SUMMARY AND CONCLUSIONS

The Stage 1 Archaeological Assessment for the North Bala Hydroelectric Development, in the Town of Bala, revealed that no sites have been registered within 100 m of the study area, but two have been registered within a 1 km radius. Additionally, a review of the general physiography and local nineteenth century land use of the study area suggested that it has generalized potential for the identification of Aboriginal and Euro-Canadian archaeological sites. There are two buildings adjacent to the project area

that have local and/or provincial heritage significance: Purk's Place Boat House, and Bala Presbyterian Church.

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The field review determined that, although portions of the study area have been extensively disturbed, there are several areas that have archaeological potential.

In light of these results, the following recommendations are made:

1. A Stage 2 archaeological assessment should be conducted on land determined to have archaeological potential (Figure 3: areas marked in green) 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;

2. As Bala Presbyterian 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;

3. Two other areas (Figure 3: marked hatched in green and yellow) have archaeological potential but will but will only require Stage 2 test pitting if project impacts are unavoidable; and

4. The balance of the study area (Figure 3: areas marked in yellow) does not require additional assessment, and it can be cleared of further archaeological concern.

The above recommendations are subject to Ministry of Culture approval, and it is an offence to alter any archaeological site without Ministry of Culture concurrence. No grading or other activities that may result in the destruction or disturbance of an archaeological site are permitted until notice of Ministry of Culture approval has been received.

The following Ministry of Culture conditions also apply:

- Should deeply buried archaeological remains be found during construction activities, the Heritage Operations Unit of the Ontario Ministry of Culture should be notified immediately; and

- In the event that human remains are encountered during construction, the proponent should immediately contact both the Ministry of Culture, and the Registrar or Deputy Registrar of the Cemeteries Regulation Unit of the Ministry of Government Services, Consumer Protection Branch at (416) 326-8404 or toll-free at 1-800-889-9768.

The documentation and artifacts related to the archaeological assessment of this project will be curated by Archaeological Services Inc. until such a time that arrangements for their ultimate transfer to Her Majesty the Queen in right of Ontario, or other public institution, can be made to the satisfaction of the project owner, the Ontario Ministry of Culture, and any other legitimate interest groups.

5.0 REFERENCES CITED

Archaeological Services Inc., Algonquin Associates and Unterman McPhail Cuming Associates
1994 A Heritage Study of the Temagami Comprehensive Planning Area. Report on file, Ontario Ministry of Natural Resources, Sudbury District.

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1984 The Physiography of Southern Ontario. Second Edition. Toronto: University of Toronto Press.

Hoffman, D.W., B.C. Matthews and R.E. Wicklund
1989 Soil Associations of Southern Ontario, Report No. 30 of the Ontario Soil Survey. Canada Department of Agriculture, Ottawa, and Ontario Department of Agriculture, Toronto. Map.

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Ministry of Culture
2006 Standards and Guidelines for Consultant Archaeologists (final draft). Cultural Programs Branch, Archaeology and Planning Unit, Toronto.

6.0 PHOTOGRAPHY

Plate 1: Bala Generating Station No.1 on Mill Creek. Built in 1917, it is still in service today.

Plate 2: Dam and Bala Falls Rd. bridge over South Bala Falls.

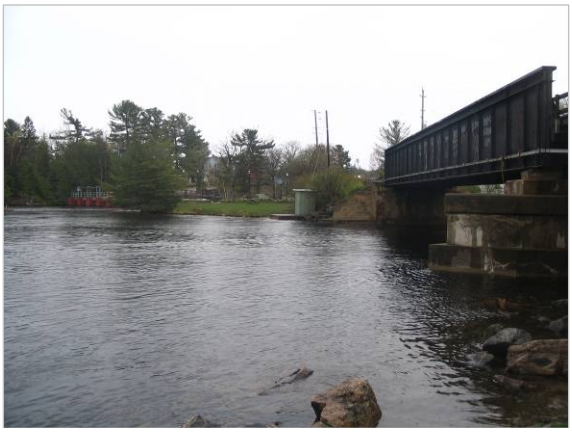

Plate 3: 1908 CPR bridge over North Bala Falls channel. Note small parkette just east of rail embankment.

Plate 4: Highway 169 bridge over North Bala Falls channel showing an area of potential near trees on left.

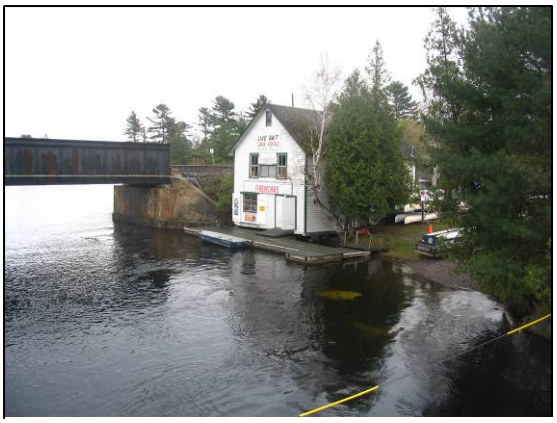

Plate 5: Archaeological potential occurs between the boathouse and the highway. The boat house may predate 1908.

Plate 6: View north across channel into Bala Bay from which flows Mill Creek.

Plate 9: Land between boathouse and 169 has potential. Excavation passes across between trees and under highway.

Plate 8: View to west toward boat house. Potential exists around structure.

Plate 7: Proposed construction staging area beside Bala Falls Road and across from Burgess Church. Note grade difference

Plate 10: Northeast elevation of designated site, Bala Presbyterian church.

Plate 11: View south on 169 and downslope into site of Bala No. 2 foundation . Level ground at bottom has potential for industrial remains.

Plate 12: View of proposed power station location. Water intake will pass under highway at this point.

Plate 13: View to northwest showing drilling rig on "dressed and levelled site" of 1924 Bala No. 2 power station.

Plate 14: View towards 169. Diminished archaeological potential exists on artificial or natural slopes.

Plate 15: View across channel of South Bala Falls with rock filled road bed covering a granite point extending out from the shore.

APPENDIX A

Historical Overview of the North Bala Hydroelectric Development,
Part Lots 14 and 15 Concession "A," Medora Township
Part Lot 33 Concessions 6 and 7, Wood Township,
Muskoka Lakes Township**.**

The study area is situated at the end of Bala Bay on Lake Muskoka. This is near the point where the intersection of Highway 169 and the Bala Falls Road crosses the Muskoka River. The study area is located in the present day Muskoka Lakes Township, but historically it would have been at the junction of two townships called Wood and Medora. The lands adjacent to the proposed North Bala Hydroelectric Development are part Lots 14 and 15, Concession "A", in Medora Township, and part Lot 33, in Concessions 6 and 7, in Wood Township.

Administrative History

The land which contains the study area comprises part of a larger tract which was acquired from the Ojibway, as well as from those natives who inhabited the territory along the French River and Lake Nipissing, under the terms of the "Robinson Treaty." This purchase was negotiated on behalf of the government by William Benjamin Robinson at Sault Ste. Marie in early September 1850. The consideration paid for this tract of land was a down payment of £2000, and a "further perpetual annuity" of £600 (Murray 1963:117-119).

During the earliest period, this area simply comprised part of an "unorganized territory," parts of which would have fallen within the administrative jurisdictions of Simcoe and Victoria Counties. By 1868, Muskoka had been provisionally elevated to independent County or District status. Muskoka was finally separated from Simcoe County in 1879 (Crossby 1873:26; Sutton 1967:1; Armstrong 1985:140; Jonasson 2006).

The earliest land purchase in the district, which comprised Muskoka Township, was made by the British from the Chippawa Indians in early November 1818 (*Indian Treaties* 1891 vol. 1 p. 43).

Township Surveys

The lands within the study area were explored by Alexander Shirreff in 1829. He wrote a report of his expedition which was published in 1831. He referred to "a fine sixteen or twenty feet high, with a heavy body of water" at the outlet of "the large Muskoka lake" (Murray 1963:70-71).

This was followed by another survey in 1853, undertaken by J.W. Bridgland, who extended the "Bell line" from South Falls to Georgian Bay. His report was unfavourable, and he stated that in his opinion "the region [was] destitute of everything to make settlement desirable" (Sutton 1967:1).

In the summer of 1860, the Commissioner of Crown Lands issued instructions to J.S. Dennis to undertake an exploratory survey of parts of the Muskoka District. Part of the purpose of this survey was to determine the best possible route for the northerly extension of the Muskoka Road (Murray 1963:177).

The base-line survey of Medora Township was made by surveyor S. James in 1865 (MNR, *Field Notebook #2384*). The interior lots within Medora Township were actually surveyed by Thomas Byrne in 1869 (MNR, *Field Notes #1468*). The soil was found to be tolerably good, a mixture of sandy loam, vegetable soil and clay. Parts of the township were hilly. The timber consisted of a mixture of hardwood and pine, with good stands of hemlock, black ash, cedar, tamarack, black birch, maple, beech, ironwood and basswood (Kirkwood & Murphy 1878:98-99; Page 1879:31).

Part of Wood Township was first surveyed by A.B. Scott in 1870-71, and the remaining portions of the township were surveyed by James K. McLean in 1877 (MNR, *Field Notes* #1519 and #1886). Part of the township contained "excellent land" which was a sandy loam and nearly entirely taken up by squatters. The land was timbered with beech, maple, birch, basswood and some pine. The remainder of the township was "much broken and very rocky, and almost totally unfit for agricultural purposes." It was noted that a recent fire had then destroyed much of the valuable timber between Hardy's Lake and the Township of Muskoka. The most devastated part was located between the easterly limit of this township up to the vicinity of Lot 10 in the 9th and 10th Concessions: "what is left is of a stunted character" (Kirkwood & Murphy 1878:99-100; Page 1879:31).

Township History

Medora Township is said to have been named in 1869, after ***Calcina Medora Buell*** (d. 1875). She was the daughter of Norton Buell of Brockville, and the wife of a Toronto lawyer named Alexander Cameron. She was also the niece of Stephen Richards who was Commissioner of Crown Lands between 1867 and 1871. It was contained within the jurisdiction of the Muskoka Land Agency (Kirkwood & Murphy 1878:98-99; Gardiner 1899:430; Boyer 1970:85; Rayburn 1997:217).

Wood Township is said to have been named in 1870, after the ***Hon. Edmund Burke Wood*** (1817-1882). Wood was appointed the County Clerk and Clerk of the Crown for Brant Township in 1853. He represented South Brant in parliament both federally and provincially starting in 1863. He served as the treasurer of Ontario between 1867 and 1871, and chief justice of Manitoba from 1874 until his death. It is said that Wood had just one arm, and a loud voice that earned him the nickname "Big Thunder." Wood Township was contained within the jurisdiction of the Muskoka Land Agency (Kirkwood & Murphy 1878:99-100; Gardiner 1899:425-426; Rayburn 1997:379).

The first available census return for Wood Township in 1871 recorded a total population of ninety inhabitants, with nineteen occupied dwellings. The ethnic mix of the township comprised settlers from Ireland (42%), Scotland (26%), England (25%), Wales (2%) and Scandinavia (1%). A small percentage of inhabitants (4%) did not disclose their ethnic origins. The religious affiliations for these settlers included the various branches of Methodism as well as that of the Presbyterian Church (Pope 1873:30-31, 144-145, 280-281).

Medora was joined for administrative purposes with Humphrey during the early 1870s. In 1871, for example, both townships were enumerated in one schedule for the census. At that time these two townships contained a united population of 582, with 120 inhabited dwelling houses and another two under construction. The total population of Wood Township was just 90 inhabitants. Wood contained a mere nineteen inhabited dwelling houses (1871:30-31).

These two townships were once joined for administrative purposes as the United Townships of Wood and Medora. This union was dissolved on January 1, 1971, and was succeeded by the Township of Muskoka Lakes (Mika 1977:121).

The first available census return for the United Townships of Humphrey and Medora in 1871 recorded a total population of 582 inhabitants, with 120 occupied dwellings. The ethnic mix of the township comprised settlers from England (40%), Ireland (31%), Scotland (20%), as well as those of French (4%), German (2%), "African" (2%) and Dutch (1%) descent. The religious affiliations for these settlers included the various branches of Methodism as well as that of the Presbyterian Church (Pope 1873:30-31, 144-145, 280-281).

The railway was extended across Medora Township in 1907, when the Canadian Pacific Railway constructed the Sudbury to Kleinburg branch line (Plan O18-22). The right-of-way for this branch through Wood Township was surveyed by A.L. McNaughton (Plan N15-4).

Land Use History.[1]

In 1868, the government of the Province of Ontario passed legislation known as the "Free Grants Act" in an effort to assist in the settlement of the undeveloped portions of Ontario. This act provided for the free grant of 100 acres of land to each prospective settler, who was aged at least 18 years or more. The head of a household with minor children was entitled to a free grant of 200 acres, with the option to purchase additional lands at the rate of fifty cents per acre. It was required that the 200 acre lots be adjoining, or sufficiently close that they could be managed as one farm. Before the grantee could obtain the Crown Patent for his land, settlement duties had to be fulfilled. This included the clearance and planting of at least fifteen acres of land, of which two acres had to be cultivated annually for the first five years. The construction of a dwelling house measuring at least 16x20 feet was required, which had to be occupied for the first five years after location. The settlement duties were not as stringent on a purchased lot, which simply required cultivation if it was held in conjunction with a Free Grant lot. Any pine trees found growing on the land, or mineral deposits remained the property of the Crown (Kirkwood & Murphy 1878: 53-54, 268-272; Page 1879:41-42).

The Free Grant lands within the Townships of Wood and Medora fell within the jurisdiction of the Muskoka Crown Lands Agency, which was managed by Mr. C.W. Lount of Bracebridge (Kirkwood & Murphy 1878:55).

It was noted that cereal grains were especially productive in Muskoka, particularly wheat, oats, barley, rye, corn and buckwheat. Other abundant crops included peas, beans, corn, turnips, cabbages, hay and potatoes (Kirkwood & Murphy 1878:64, 66).

Lot 14 Concession "A," Medora Township

[1] It has not been possible to produce a detailed land use history for the township lots adjacent to the study area, since the Archives of Ontario does not possess any *Abstract Index Books* for Medora or Wood Townships. A partial set of Copy Books for deeds is available at the Archives on microfilm, but these would be cumbersome and time-consuming to work with and would only produce a limited amount of land titles history.

A map of Medora Township produced in 1879 showed that this lot was owned by ***Thomas Burgess***. The lot was traversed by what was then called the "Musquosh Road," and it contained a mill structure (Page 1879:55).

Lot 15 Concession "A," Medora Township

This land appears to have been occupied by ***Thomas Burgess, Sr***. as early as 1868.

Burgess (ca. 1824-1902) was a native of Scotland who had initially settled in King Township (York County). During the 1860s, he relocated to Bentinck in Gray County, and then to Saugeen in Bruce County where he farmed and engaged in the lumber business. He was married to Margaret McTaggart (b. ca. 1831). They had a family of six children, four sons and two daughters, who were born between 1862 and 1870. Burgess settled in Medora Township, where he became a successful merchant and saw-miller. He served as the first postmaster for Bala, and was a long-standing Reeve for the United Townships of Medora and Wood. Burgess acted as an agent on behalf of the Watha Indian band for a number of years. He was a philanthropic minded individual, who donated land for the use of the Presbyterian Church in 1892 (Sutton 1967:3).

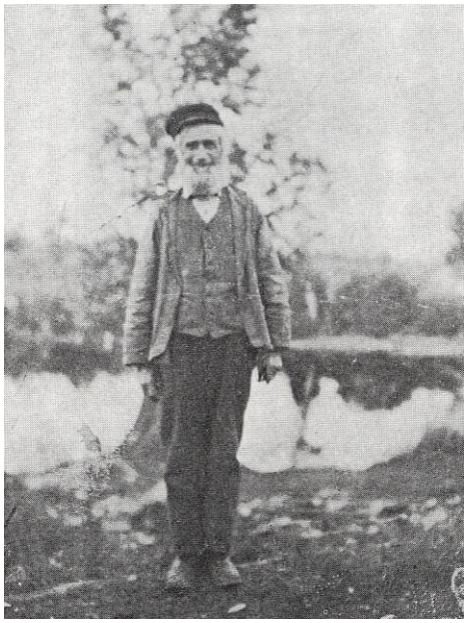

Figure 1: Thomas Burgess, Sr. (1824-1902), photographed in October 1898.

In 1871, Burgess appears to have been engaged in some farming activities. The census for that year indicated that he had cleared at least twenty-five acres of land, upon which he grew hay and potatoes. His farm contained a team of working oxen, milch cows, "horned cattle" and pigs. Additional farm products included butter and cured pork (*1871 Medora census*, division e p. 28).

A map of Medora Township produced in 1879 showed that this lot was owned by ***Thomas Burgess***. A small part of the lot was traversed by what was then called the "Musquosh Road," and it contained another structure which appears to have been a private residence (Page 1879:55).

Lot 33 Concession 6, Wood Township

This land appears to have been vacant in 1871, since the decennial census for that year did not record any owners or tenants for this particular lot. A map of Wood Township produced in 1879 did not show the name of any land owner for this lot, nor did it indicate the existence of any structures (Page 1879:51).

Lot 33 Concession 7, Wood Township

This land appears to have been vacant in 1871, since the decennial census for that year did not record any owners or tenants for this particular lot. A map of Wood Township produced in 1879 did not show the name of any land owner for this lot, nor did it indicate the existence of any structures (Page 1879:51).

Muskoka Road

The Muskoka Road had been located and constructed to a point near Gravenhurst by the late 1850s. The Muskoka Road formed one of several "settlement" or "colonization roads," which were intended to facilitate the development of what was then considered to be the "northern" parts of Canada West (or Ontario), including settlement and lumbering.

> To develop this large forested country the Commissioner of Crown Lands of that time, instructed J.S. Dennis to make exploration surveys throughout the districts, and if the exploration surveys reached a country suitable for farming settlement, then roads were to be opened to be based on those survey lines with outlets on suitable Georgian Bay harbors (Murray 1963:172).

In May 1860, the government issued instructions to Mr. Dennis for "the location and extension of the Muskoka Road north-eastward to the north branch of the Muskoka River with a suitable bridge crossing over the Muskoka River, starting from the end of the located road at the Falls on the south branch…thence easterly and northerly north of the Muskoka River to the surveyed line of the Bobcaygeon Road." This exploration survey commenced in July 1860. One of the members of this crew was Vernon B. Wadsworth, a student under Mr. Dennis, who later penned his reminiscences of the surveys which he took part in between 1860 and 1864 (Murray 1963:173).

Due to the conditions of the country, which was "very rocky and swampy and totally unfit for settlement," it was determined that the mouth of the Musquosh River "be abandoned as a shipping port for the Muskoka District." Improvements to these roads, such as planking, were not completed until the early 1870s (Murray 1963:lxviii-lxxi, 177; Mason 1974:3-4).

This road was eventually constructed north through the townships of Wood and Medora, and linked to the Lake Joseph Road at Butterfly Lake near the village of Glen Orchard.

Town of Bala

The first settler within the Town of Bala was Thomas Burgess, who arrived here in 1868. He constructed a sawmill at the rapids on the Musquosh River.[2] The settlement was first known as Musquosh Falls (Figure 2), and then Muskoka. In 1871, it was re-named "Bala" after Bala Lake in Wales where Burgess had temporarily resided. Some of the early families who located here included: Board, Carr, Clements, Currie, Guy, Hamill, Hurling, Jackson, May, Moore, Spencer and Sutton. Several of the early families around Bala engaged in farming and lumbering in order to sustain themselves. Another seasonal occupation was tourism, and some of the early settlers acted as guides. Boat liveries, hotels and summer

Figure 2: Early lithographed view of the Musquosh River Falls at Bala (1879).

cottages began to appear on the landscape during the early twentieth century (Sutton 1967; Boyer 1970:84).

The first plan of subdivision for the town of Bala was surveyed for Thomas Burgess sometime prior to 1890. The community developed and was mainly centred around Lot 15 Concession "A" in Medora. Burgess sold the first town lots to Alexander Burns in November 1890. This was followed by the sale of other lots to Mrs. Euphemia Jackson in February 1893, and to Mrs. Mary Margaret May in October 1895. These early land sales within the town ranged in price between $30 and $75 (*Medora Deeds Copy Book*, instrument numbers 617, 651 and 856).

Bala was incorporated as a town in 1914, with Dr. A.M. Burgess elected as the first mayor. At that time it was believed to have been Canada's smallest incorporated town (Sutton 1967:17; Mika 1977:121; Rayburn 1997:21; Scott 1997:18).

The post office was established here on June 1, 1870, with Thomas Burgess appointed as the first postmaster. He served as post-master until his resignation in May 1900. In 1873, Bala was noted as a post

[2] The river which flows out of Bala Bay, now known as the Muskoka River, was originally known as the Musquosh River. This river divides near Bala into two streams, the more northerly of which is known as the Moon River.

office village which contained a population of approximately thirty inhabitants (Crossby 1873:26; Rayburn 1997:21; (www.archivia.ca).
The community once contained a school, hotel, post office, general store and blacksmith shop. Bala had three churches, the Presbyterian (1893), Anglican (1920) and Baptist.[3]

Bala was incorporated with other municipal bodies as part of the Township of Muskoka Lakes in 1971, at which time the population was estimated to number around 550 (Mika 1977:121; Scott 1997:18).
Railway extensions which were proposed during the late 1860s, initially by-passed Bala. The Northern Railway constructed its line of tracks to Gravenhurst, and then along the east side of Lake Muskoka. By 1879, the Whitby and Port Perry Railway proposed the construction of a line of track from Parry Harbour south to Lake Simcoe. This proposed right-of-way passed well to the west of Bala, through the southwest corner of Medora Township before cutting diagonally across Wood Township. The right-of-way for the CPR branch line, between Sudbury and Kleinburg, was surveyed and constructed between ca. 1905 and 1907 (Sutton 1967:24-25).

A number of steamboats operated in the vicinity of Bala during the late nineteenth and early twentieth centuries. One was called the "Lady-of-the-Lake," operated by Arthur Lowe during the 1870s or 1880s. In the 1890s, a steamer was imported from Lake Simcoe by Mr. M.S. Hurling. This ship, known as the "Siesta," was rechristened as the "Gypsy." Other steamers that plied the lakes between Bala and Bracebridge were the "Wasp," the "Florence Main" and, most renowned of all, the "City of Bala" which was constructed during the 1890s (Sutton 1967:22-23).

Bala Light and Power Company

At the death of Thomas Burgess in 1902, the old sawmill site was taken over by his son, Thomas Jr., who operated the business for several years. In 1916, another son, Dr. Alexander Burgess, formed the Bala Electric Light and Power Company. The principal shareholders were the heirs of the Burgess estate. The company purchased the mill stream and the old sawmill site, where a small power generating plant, known as Bala Generating Station No. 1, was built in 1917 (Tweedsmuir History of Bala; Biggar 1991).

This structure housed two 160 hp William Hamilton Francis type horizontal shaft turbines with a total capacity of 320 hp. There were also two generators, one - 125kVA, 140 rpm. and another 150 kVA, 500 rpm: Canadian General Electric. 8-phase, 60 Hz, 2800 V. They were directly connected to the turbine (Biggar 1991).

The Department of Public Works owned and operated the two dams in the town of Bala. These dams controlled the outflow from Lake Muskoka and established a head of 5.8 m (19 ft) between the water surface elevations of the lake and the Muskoka River downstream. The site included a small head pond canal which connected the plant to Lake Muskoka. There was also a small dam at the generating station (Biggar 1991).[4]

[3] The Presbyterian (now United) Church at Bala was constructed in 1893, with the first minister being the Rev. Donald McKay. This church was destroyed by fire in March 1934. Reconstruction started immediately, with the new corner stone being laid in October of the same year. The new church was largely completed by December 1934, and fully furnished by May of 1935 (*Tweedsmuir History of Bala*).
[4] Plans for one of the dams at Bala exists, undated, but attributed to the period ca. 1870-1890. Plans are also extant for a later dam, constructed in 1909 (Archives of Ontario, RG15-13-3-0-44 and RG15-55-1 box 7).

By July 1924, a second generating station (Bala No. 2) was under construction.

A photograph dated 1924, and found in the John Boyd collection, was inscribed "At Bala Falls, Muskoka, a new power plant is under construction. This diver has to work in the swirling waters—a very dangerous job. Great care is taken by the three men who get him into his suit to see that everything is safe" (*Boyd collection*, Archives of Ontario, C7-3 accession 19062, container b117491).

The station was supplied by an intake flume connected to the south pier of the dam which was owned by the Ontario Department of Public Works. The operating head was about 6 m (19 ft). There was one 400 hp, William Hamilton, propeller type vertical shaft, 277 rpm. Also, one 312.5 kVA Canadian General Electric, 3 phase, 60 Hz, 2800 V generator, directly connected to the turbine (Biggar 1991).

Another photograph in this same collection was inscribed "A modest power plant at Bala, Muskoka, which supplies light and power to Bala, Port Carling, and other adjacent places with a radial of 15 miles. It gets power from the waters of Lake Muskoka as they flow to the Georgian Bay" (*Boyd collection*, Archives of Ontario, C7-3 accession 17605, container b117485).

A photograph taken in the 1920s or 30s showed that Bala No. 1 was a simple, one story, flat roofed, rectangular shaped building of concrete construction. This station was capable of producing 245 kilowatts of hydro-electric power, which provided the community with its first electric lighting.

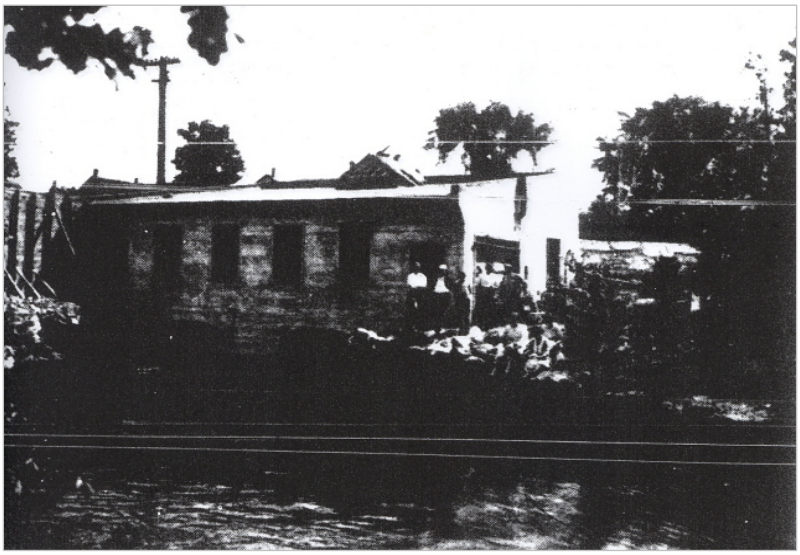

Figure 3: Hydro generating station No. 1 at Bala, ca. 1920s (*Tweedsmuir History*).

Both generating stations were eventually acquired by Ontario Hydro in 1929. They served about 99 customers around the Bala area in 1930. The surrounding neighbourhood was known as "Bala Rural Power District" or the "Bala Rural Operating Area."

This station was retired from use in April 1957, due to the high operating costs and repair needs. The buildings and dams were transferred to the town of Bala in 1962. The generation of hydro-electric power

here was later commemorated by a historical plaque which was unveiled by the Bala Chamber of Commerce and the Town of Bala on August 23, 1963.

Studies in 1960 showed that it was not economical to rehabilitate the plant or to redevelop the site. It was proposed in 1972 to carry out the work required to make the structure permanently safe for the public and to leave the site in a neat and tidy condition. The work involved the sealing and filling of the intake channel, demolition of the powerhouse superstructure and leveling and dressing the site. Ownership of the site was reverted to the Crown (*Tweedsmuir History of Bala;* Biggar 1991.)

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STAGE 2 ARCHAEOLOGICAL ASSESSMENT OF NORTH BALA HYDROELECTRIC DEVELOPMENT, PART OF LOTS 14 and 15, CONCESSION A of GEOGRAPHIC MEDORA TOWNSHIP and PART OF LOT 33, CONCESSIONS 6 and 7 of GEOGRAPHIC WOOD TOWNSHIP, NOW IN THE TOWNSHIP OF MUSKOKA LAKES, MUSKOKA DISTRICT MUNICIPALITY

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PIF #: P-121-065-2007

December 10, 2008

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1.0 INTRODUCTION

A contract to carry out a Stage 2 archaeological heritage resource assessment of the North Bala Hydroelectric Development (Town of Bala, Ontario) was awarded to *Advance Archaeology* by *Swift River Energy Ltd.* on October 22, 2007 (PIF #: P121-065-2007). A Stage 1 archaeological assessment of the subject property, plus adjacent lands beyond the project's area of impact, has been carried out [ASI 2008; PIF#: P264-042-2008]; one of the recommendations made in that report (which is discussed further in Section 2.1) was for a Stage 2 archaeological assessment of the subject property. Figure 1 shows the location of the subject property in the Town of Bala, on part of Lots 14 and 15, Concession A of geographic Medora Township and part of Lot 33, Concessions 6 and 7 of geographic Wood Township, now in the Township of Muskoka Lakes, Muskoka District Municipality. It is at the intersection of Highway 169 and Bala Falls Road, and its boundaries are shown on Figure 2. The proposed project would involve the construction of a run-of-the-river hydroelectric generating station to the south of the existing Bala North Dam; a site plan for this proposed development is shown in Figure 2, below.

Permission to enter the property for the purpose of conducting a Stage 2 archaeological assessment was granted by the proponent and landowners. The Project Director was Donna Morrison, and the report was prepared by Donna Morrison with maps by *Hatch Energy* and Dale Bateman. The field director was Lawrence Jackson and field crew included Pierre Stewart, Marika Atfield, and Kris Martin. Fieldwork took place on November 6, 2008 under unseasonably warm weather and excellent visibility and soil conditions.

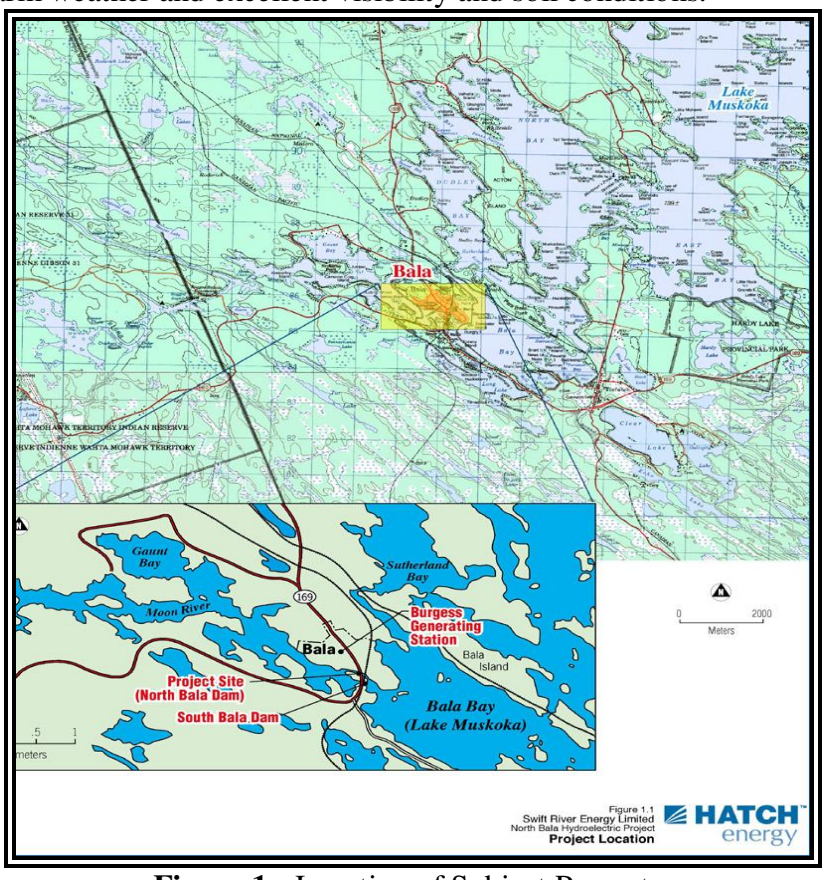

Figure 1: Location of Subject Property.

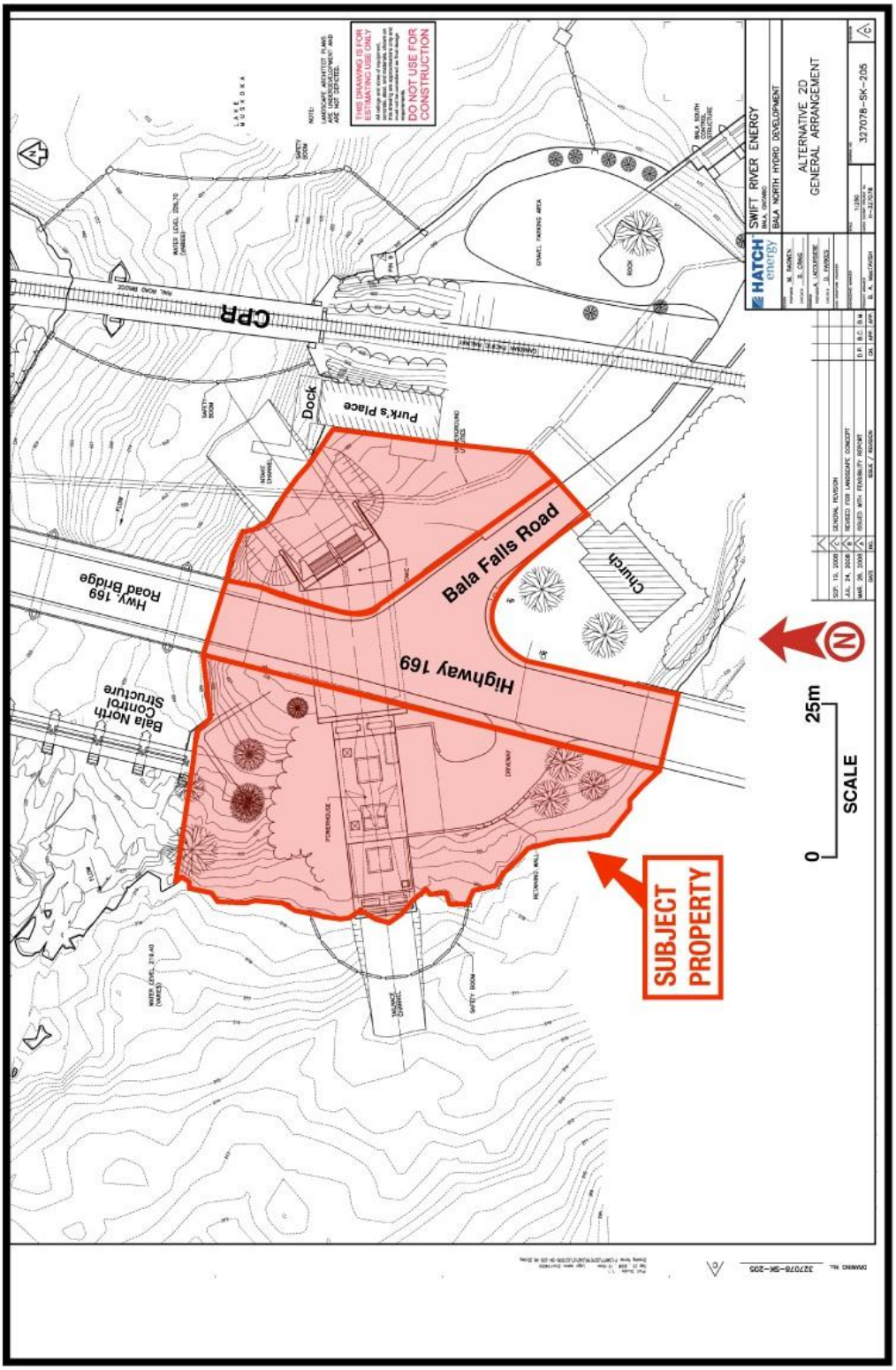

Figure 2: Plan of Subject Property.

2.0 STAGE 2 ASSESSMENT

2.1 Zones of Archaeological Potential and Stage 2 Fieldwork Methodology Used

Since the Stage 1 assessment [ASI 2008] had determined that there was generalized potential for the presence of archaeological sites or cultural heritage resources on parts of the subject property, a Stage 2 archaeological assessment was required. This Stage 2 assessment was carried out by *Advance Archaeology* in accordance with the Technical Guidelines used by the *Ontario Ministry of Culture* (OMCTR 1993; OMCzCR 1998; OMCL 2006) so that, if present, any archaeological resources on the subject property would be properly identified.

The first steps in a Stage 2 assessment are to confirm the various zones of archaeological potential that were identified during the Stage 1 assessment and to determine the fieldwork methodology that is appropriate to each of these zones. The Stage 1 assessment [ASI 2008] had determined that large sections of the subject property were either too steep or were extensively disturbed and therefore had low archaeological potential. The boundaries of these low-potential zones were confirmed during the Stage 2 assessment and they were exempt from fieldwork; they are discussed further in Section 2.2 (Special Conditions), below, and are shown in orange and purple on Figure 3, below. In addition to the low-potential zones, two zones with moderate-to-high archaeological potential were identified on the subject property (shown in green on Figure 3). Those zones included a small, relatively flat, grassy section adjacent to the river on the east side of Highway 169 (see Plates 1 and 2), and a rocky, wooded section on the west side of Highway 169 (see Plates 3, 4, and 5) that lies to the south of the North Bala Dam and the Bala falls on the site of the former Bala No. 2 power station that had been built in 1924 and demolished in 1972. The zone on the east side of Highway 169 was considered to have archaeological potential mainly due to its proximity to the river (especially as a portage route) and to an adjacent early-20th century frame building (*Purk's Place* – see Plate 1) that is listed as significant by the Muskoka Heritage Committee; the zone on the west side of the highway was thought to have the potential for the presence of buried industrial heritage resources relating to the former power station once located on that site [ASI 2008].

All Stage 2 fieldwork consisted of hand-excavation of shovel tests, since the subject property was less than 1 hectare in size, had never been used agriculturally, and would have been impossible to assess by pedestrian survey. Normally, the testing interval used for high potential zones is 5m; however, due to the small size of the subject property and the possible risk of missing any buried cultural heritage resources by using a 5m interval, it was determined that 2.5-metre intervals should be employed in all zones determined to have archaeological potential. The high-potential zones consisted of two small areas on either side of Highway 169 (one on the east side and one on the west side) at its intersection with Bala Falls Road (see Figure 3). The first area, on the west side of the highway, was approximately 25m by 30m in size, while the second area, on the east side of the highway, was approximately 25m by 20m in size. All shovel tests were excavated to sterile subsoil (where present) or bedrock, and all soil was screened through 6mm (¼-inch) mesh rocker screens. All shovel tests were carefully backfilled.

Figure 3 shows the zones of archaeological potential and the Stage 2 fieldwork methodology used on the subject property. Plates 1 to 5 show the ground conditions and Stage 2 shovel testing in progress. The results of the Stage 2 assessment are discussed in Section 2.3.

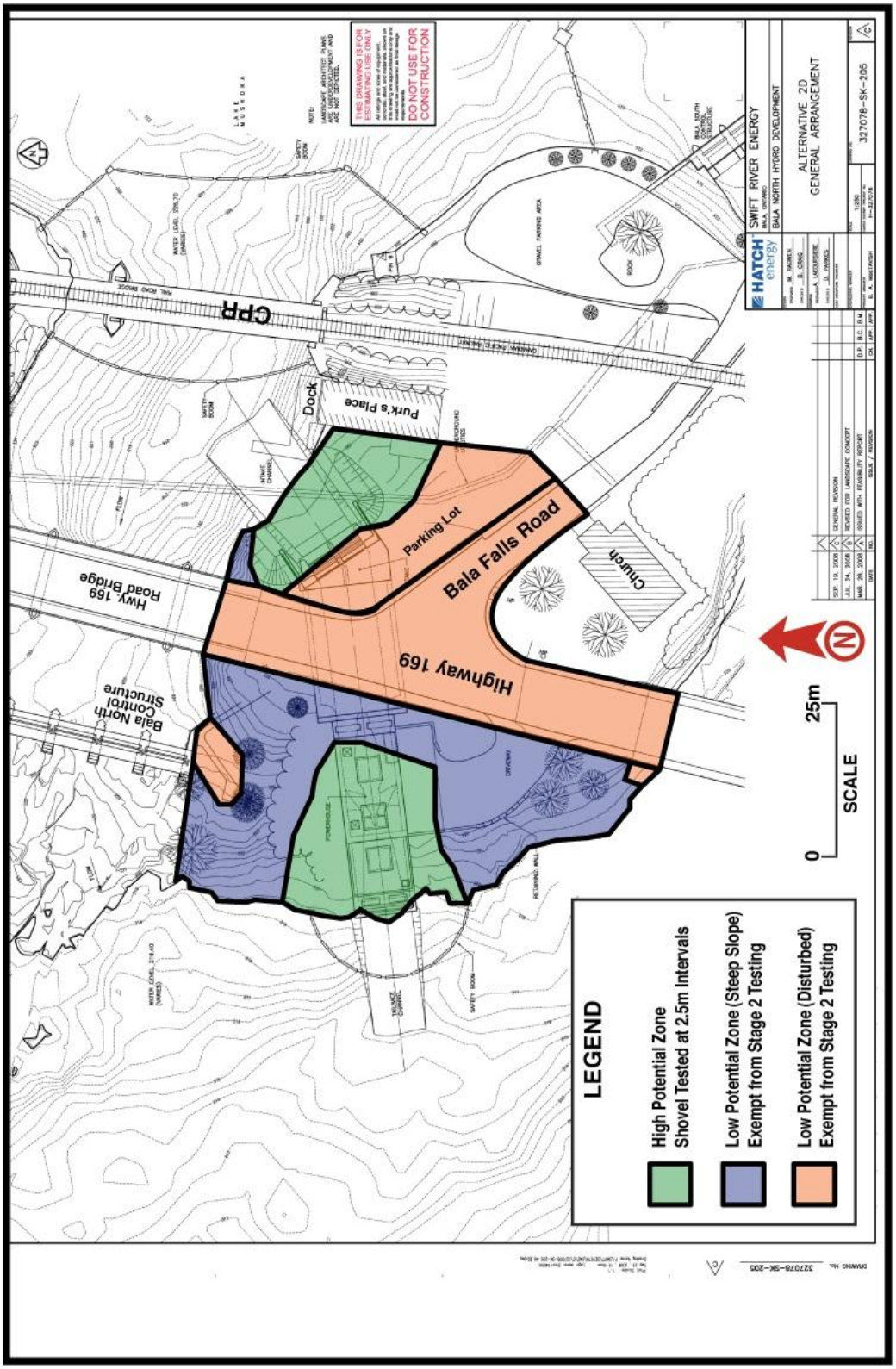

Figure 3: Zones of Potential and Stage 2 Fieldwork Methodology Used.

Plate 1: View to East of Shovel Testing on Eastern Edge of Subject Property. Note *Purk's Place* (white frame building) in Background.

Plate 2: View to Northwest of Shovel Testing on East Side of Highway 169.

Plate 3: View to East of Shovel Testing on West Side of Highway 169 on Former Site of the Bala No. 2 Power Station.

Plate 4: View to South of Shovel Testing on West Side of Highway 169 on Former Site of the Bala No. 2 Power Station.

2.2 Special Conditions on the Subject Property

About 65% of the subject property was exempt from Stage 2 shovel testing due to low archaeological potential. Two areas on the west side of Highway 169 were exempt due to the steepness of the hill slopes (see purple zones on Figure 3, above, and Plates 4 and 5). The remainder of the exempted special condition zones consisted of areas that had experienced extensive disturbance of the original soil horizons, including the road beds for Highway 169 and Bala Falls Road; a disturbed area adjacent to the existing North Bala Dam; and a gravel parking lot beside *Purk's Place* that had been infilled and graded (see Plates 1 and 2, and orange zones on Figure 3). Although there had been similar or worse disturbances to the site of the former generating station (resulting from the construction, demolition and subsequent infilling and grading of the site), it was still considered to have the potential for the presence of significant buried industrial components and was not exempt from Stage 2 testing.

Plate 5: View to Southeast of Former Site of Bala No. 2 Power Station.

2.3 Results of the Stage 2 Assessment

Despite the use of intensive 2.5m shovel-testing intervals (which is a much closer interval than the normally-used 5m testing interval for high-potential zones) in both of the zones with archaeological potential, nothing of archaeological significance dating to either the historic or precontact time periods was encountered during the Stage 2 assessment. No artifacts were recovered, and no structural remains, industrial remains, or any other cultural heritage resources were discovered. No indications of the presence of deeply-buried industrial remnants were noted on the former site of the Bala No. 2 Power Station. Almost all of the Stage 2 shovel tests within the high potential zones showed signs of disturbed soil conditions, although there appeared to be somewhat less disturbance on the east side of Highway 169, in comparison with the extremely high degree of disturbance at the former site of the generating station on the west side of Highway 169.

3.0 CONCLUSIONS

3.1 Summary

Based on the recommendations of a Stage 1 archaeological assessment of the subject property [ASI 2008], which were confirmed during reconnaissance carried out by *Advance Archaeology,* Stage 2 fieldwork was carried out in all sections of the subject property that had archaeological potential. The majority of the subject property, however, was determined to be of low archaeological potential and was exempt from Stage 2 fieldwork due to either the presence of very steep hill slopes on the west side of Highway 169, or extensive prior soil disturbance and infilling in the roadbeds and a parking lot, for example (see Figure 3, above).

In the two zones with high archaeological potential, Stage 2 shovel testing was carried out at 2.5m intervals in order to identify any cultural heritage resources (such as Aboriginal and Euro-Canadian artifacts, or industrial components of the former Bala No. 2 Power Station), if present. Nevertheless, despite the use of intensive 2.5m shovel-testing intervals, nothing of archaeological significance dating to either the historic or precontact time periods was encountered during the Stage 2 assessment. No artifacts were recovered and no structural remains, industrial remains, or any other cultural heritage resources were discovered or indicated.

3.2 Recommendations

Based on the results of the Stage 2 assessment, we offer the following two recommendations. Please also read the Development Caution in Section 3.3, below.

1. Since nothing of archaeological or cultural heritage significance, dating to either the historic or precontact 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.

2. 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.

3.3 Development Caution

There is always the possibility that *deeply buried* heritage resources or human burials can exist on site and were not identified during a standard archaeological assessment. Therefore, if deeply buried archaeological resources, either historic or precontact, are encountered on the subject property during construction, the proponent must stop work immediately and contact Mr.

Andrew Hinshelwood of the Heritage Operations Unit of the *Ontario Ministry of Culture* at (807) 475-1632.

If human remains are encountered anywhere on the subject property during construction, the proponent must stop work immediately and contact the Registrar (Mr. Michael D'Mello) or Deputy Registrar of the Cemeteries Regulation Unit of the *Ontario Ministry of Government Services, Consumer Protections Branch* at (416) 326-8404, as well as the Heritage Operations Unit, as above. Please also contact the archaeological consultant at (905) 342-3250.

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