

# Aquatic Safety Audit Report

Bala North Falls

September 1, 2015

Confidential



LIFESAVING SOCIETY

*The Lifeguarding Experts*

# Aquatic Safety Audit

SaveTheBalaFalls.com retained the Lifesaving Society to undertake a safety audit of the Bala North Falls site in anticipation of the installation of a hydroelectric dam.

An initial meeting was held with Mr. Mitchell Shnier and Mr. Michael Shane, Safety Management Director of the Lifesaving Society.

It was agreed that the purpose of the aquatic audit was to assess the risk associated with the installation of the hydroelectric dam adjacent the Bala North Falls. The safety audit would identify recommendations that might be implemented to minimize the risk of drowning or serious water-related injuries.

It was agreed that the scope of the safety audit would include a site visit and a review of relevant literature regarding the site. This evaluation would report on items that would require attention due to the construction of the proposed generating station.

## The Lifesaving Society

The Lifesaving Society is Canada's lifeguarding expert. The Society is a national, charitable organization working to prevent drowning and water-related injuries through its lifesaving, lifeguarding and leadership training programs, Water Smart® public education, and safety audit services.

The Lifesaving Society is the principal organization in Canada involved in research and development of aquatic lifesaving, lifeguard training, and public education programs. The Lifesaving Society delivers a training progression of awards encompassing water rescue, resuscitation, and emergency care. The Lifesaving Society establishes the standards for the National Lifeguard Service program: the only nationally recognized lifeguard-training program in Canada.

The Lifesaving Society consults government regarding the standards of operation for aquatic facilities and waterfronts. The Lifesaving Society is recognized as the lifeguard experts by the YMCA, Canadian Red Cross Society, municipalities and government. The Lifesaving Society is the only agency recognized by the Ontario Ministry of Health as a certifier of lifeguards.

## Personnel

This report was prepared by Michael Shane, Safety Management Director, Lifesaving Society.

Michael Shane was a Recreation Assistant – City of Mississauga from 1976 to 1981. He was responsible for assisting the City of Mississauga Aquatic Supervisor in the operation of all aspects of aquatics in Mississauga.

From 1981- 1987 Michael Shane was the Aquatic Co-ordinator – City of Brampton from responsible for all aspects of aquatics in Brampton including the staffing, programming and establishment of operating standards for 8 indoor swimming pools, three outdoor pools and one supervised waterfront.

Since 1997 Mr. Shane has been employed by the Lifesaving Society. Michael Shane is the Aquatic Safety Management Services Director of the Lifesaving Society, and is responsible for the Society's safety management service programs in Ontario including:

- Aquatic Safety Audits
- Safety Standards
- Court and Inquest reports
- Regulation Review
- Aquatic Management Training
- Expert witness
- Incident Response
- Research

He is a consultant for Government Regulations governing operation of public pools, wading pools/ spray pads, spas, waterslides, and camps and is the Past President of Parks & Recreation Ontario Aquatics Branch.

Mr. Shane has delivered safety management educational sessions internationally and across Canada over the past fifteen years, including the 1998- 2014 Ontario Parks and Recreational Aquatics Conference, 2007 ILS World Water Safety Conference, Portugal, 2011 ILS Conference in Germany, 2009 RLSS Commonwealth Conference, Alberta, 2005 East Coast Aquatic Conference, Moncton.

He holds the following certifications:

- Canadian Parks and Recreation Association Playground Safety Inspector, 1998
- Basic Training Certificate, International Critical Incident Stress Foundation, 1995
- Lifesaving Society Instructor
- Lifesaving Society Examiner
- National Lifeguard Service Award/ Instructor / Examiner/ Trainer
- Standard First Aid Instructor / Examiner/ Trainer
- Lifesaving Society Distinction
- Aquatic Supervisory Training Instructor/ Trainer
- Aquatic Management Training Instructor/ Trainer
- Aquatic Safety Inspector Trainer
- Aquatic Safety Auditor Trainer
- Aquatic Safety Chief Auditor Trainer
- Lifesaving Society Pool Operator Trainer
- Lifesaving Society BOAT Instructor
- Lifesaving Society SEE Auditor Trainer

Mr. Shane has testified in court in the following cases as an expert witness:

- Fowler v City of Thunder Bay, Ontario, Canada. 1991
- City of Port Colborne, Heaslip & Lockyer, Judge Girard, January 1992
- City of Kenora v Sto. Domingo, Winnipeg, January 2003
- Schweizer v City of Fredericton, New Brunswick, June 2007
- Keenan v Brown, New Brunswick, February 2008

He has prepared numerous reports for the Coroner's Office and testified at Inquests as an expert witness:

- Coroner's Inquest – Variety Village, Ontario. 1994
- Canadian Armed Forces Military Inquest – Canadian Forces Base Trenton, 2000
- Coroner's Inquest – Birds Hill Provincial Park, Manitoba. 2001
- Coroner's Inquest – Port Stanley Beach, Ontario. October 2005
- Coroner's Inquest – Okongo , Boundless Adventure Camp, September 2007
- Inquiry in Didsbury, Alberta – Jordan Neave – February 2008
- Coroner's Inquest- Emun – London, Ontario. January 15, 2009
- Coroner's Inquest- Ilunga- Ottawa, Ontario. May 2011
- Coroner's Inquest- Keenan- Ottawa, December 2012
- Coroner's Inquest- Fang- St. John, New Brunswick, May 2013

He has prepared numerous written reports for legal counsel regarding water related incidents.

Michael Shane has authored or contributed to the following publications:

- Alert, Lifeguarding in Action, 1993
- Canadian Lifesaving Manual, 1994
- Waterfront Safety Guidelines, 1994
- Guide to the Public Pools Regulation, 1996
- Amendment to the Ontario Public Pools Regulation 565/90, 1999
- Safety Inspector Handbook, 1999
- Wading Pool Guidelines, 2001
- Backyard Pool Safety Guidelines, 2001
- Standards Journal, 2001
- Waterfront Safety Guidelines, 2001
- Dragon Boat Event Organizers Safety Procedures Handbook, 2002
- Pool Operations Manual, 2002
- Guide to the Public Pools Regulation, 2004
- Standards Journal 2, 2004
- Guide to the Ontario Public Spas Regulation, 2007
- Waterfront Safety Guidelines, 2007
- Competition Organizers Safety Handbook, June 2007
- Waterfront Safety Guidelines, November 2011

He has prepared over one hundred and fifty hundred Aquatic Safety Audits reports of various facilities across Canada.

# **Aquatic Safety Audit Process**

## **Audit Components**

The audit team followed a process that included:

- A review of relevant literature, including that supplied by Mr. Mitchell Shnier
- On-site tour of: Bracebridge Falls, Wilson's Falls, and Bala North Falls sites on August 6, 2015
- A review of the Lifesaving Society Waterfront Safety Guidelines, November 2011
- A review of the Canadian Dam Association, Guidelines for Public Safety Around Dams, 2011
- A search of the internet for other relevant facts on the site
- The completion of a final report

### **Site Tour**

The safety audit team completed its tour of the Bala North Falls site on Thursday August 6, 2015. During their inspection the auditors examined the facility applying criteria developed by the Lifesaving Society from sources that include:

- Lifesaving Society standards concerning the operation of public waterfront swimming areas
- Canadian Dam Association, Guidelines for Public Safety Around Dams, 2011
- Government of Ontario statutes governing public swimming pools and waterfront operations
- Recommendations from coroners' inquests
- Lifesaving Society research into drowning

Photographs were also taken of the area surrounding and including the Bala North Falls.

## Interviews

Following the site tours, the safety audit team interviewed Mr. Mitchell Shnier and Mr. Sandy Currie. The members of the audit team asked questions of the interviewees, after which they were invited to share additional thoughts with assurances that specific comments would be unattributed.

## Hydroelectric Generating Stations

To generate electricity, a hydroelectric generating station receives water through its intake, this water falls through and rotates a turbine which results in electricity being generated. The water is then discharged through a tailrace.

The two aspects of a hydroelectric generating station which create the most danger for in-water recreation are :

- a) When the station is operating, tons of water per second enter the intake, drawing anything upstream towards it. While there is already a safety boom upstream of this proposed intake, this would be a last resort, as not being able to hang onto it through fatigue or its awkward shape, or through attempts to move oneself towards shore, may result in drowning as the intake would hold people below water level against the trash-rack's grate.
- b) Due to the high volume of water, and its rotation as it passes through the turbine, the water exiting the generating station would be turbulent, aerated, and fast. The result is the water discharged may; have an undertow, not provide the usual buoyancy, disorient, or push people far from shore – which are all known influencers that may lead to drowning.

## The History of Drownings Near Dams

Between 2007 and 2011, 836 drownings occurred in Ontario waters. In these most recent Coroner's data collection years, the average drowning rate in Ontario has increased by 8%. The average water-related fatality rate for 2007-2011 was 1.3 per 100,000 population, up from 1.2 in the previous five-year period. Encouragingly, 2011 was the first in the last seven years in which the Ontario death rate declined below 1.3 per 100,000.

In Canada since 2010 there have been 33 drownings at or adjacent to a dam site. In Ontario, a recent drowning was on the Grand River in 2014 where a 22 year old male drowned after being pulled under by the current after wading into the water near the Caledonia dam.

In 2009 two men drowned at this Bala North Falls site. The non-swimmers had attempted to reach a young girl who was wearing a life jacket but was drifting away due to the current.

In 2008 a 16 year old male drowned at Wilson's Falls (north of Bracebridge), when he attempted to swim through the tailrace discharge of the hydroelectric generating station there.

## The Bala North Falls Site

The Bala North Falls site is located in the Township of Muskoka Lakes, which is in the District Municipality of Muskoka and consists of two dams (each leading to a small waterfalls) which are used to control the water levels of and flows from Lake Muskoka at Bala Bay.

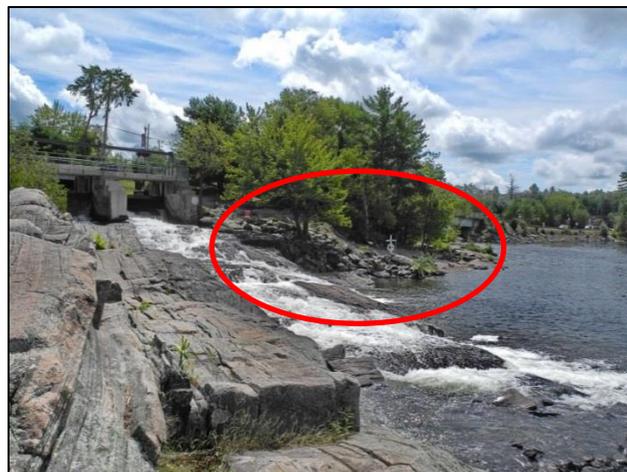
The Bala Falls North dam is located at the top of the Bala North Falls and is the historic natural outlet from Lake Muskoka. It is within the downtown business district of Bala. The proposed hydroelectric generating station would be installed adjacent the current north falls dam, along the south shore of the Bala north falls (see approximate location as highlighted in the photograph below).

This area is frequently used by residents of the area and tourists from outside the area. They come to Bala for this specific purpose to see the falls and wade in the water.

In addition we noted there is a boat rental business's docks and a portage directly adjacent to the upstream safety boom, in-water recreation directly adjacent to where the proposed station's tailrace would be situated, and frequently-used public and private docks in very close proximity both upstream and downstream. All of these are of concern as the sail or stalled engine may result in boats from the upstream dock being drawn to the upstream safety boom, and boats docking at the downstream dock would often travel through the tailrace discharge. People falling out of boats may have difficulty swimming to safety.

Other recreational activities directly upstream and downstream of the proposed generating station include kayaking, canoeing and scuba diving. Strong currents in the area would be of concern to participants in these activities.

The proposed station's intake and tailrace would be significantly closer to this known and long-time swimming, wading, boating, and public and private docks. The result is this proposed generating station would put bathers and boaters at risk.



Highlighting shows location of proposed hydroelectric generating station adjacent to Bala North Falls

# Recommendations

The proposed installation of a hydroelectric generating station adjacent the Bala North Falls dam would create extreme new dangers, to both upstream and downstream in-water recreation. The Lifesaving Society has identified recommendations that will enhance public safety at the Bala North Falls site if such a generating station is installed in this area.

We present our recommendations below, and suggest plans to implement these be presented to government agencies, stakeholders, and the public as part of the design stage for this proposed generating station, and before any construction begins. This would ensure that these plans could actually be implemented in practice, and allow for any required changes to be incorporated in the station's design.

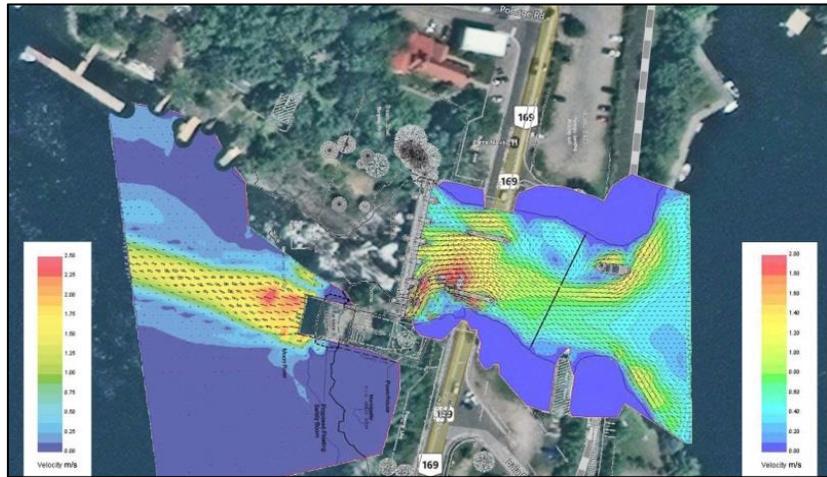
## **1. Restrict public access to the headpond, structure, and tailrace areas of the Bala North Falls.**

These areas of a generating station are not intended for bathing, wading or boating, and would be extremely dangerous.

To ensure the public cannot access these areas steps should be taken to prevent their access. One possible solution to restrict the public from bathing or wading in this area would be to install a series of fenced walkways and observation decks surrounding the Bala North Falls. This would permit safe viewing of the Bala North Falls. Such fencing has been successful at Bracebridge Falls.

In any event, the following should be considered in restricting access:

- Nearby public and private docks, both upstream and downstream, for which fencing would not be possible.
- Multiple land owners, portaging, scuba diving, and many boating activities both upstream and downstream, all of which create many other means of access.
- No breakwater, such as that at the Bracebridge Falls generating station which directs the tailrace discharge water away from the in-water recreational area.



Proposed flow conditions in the area of the North Bala Falls



Examples of fenced walkway systems installed at the Bracebridge Falls

## 2. Provide an on-site operator and warning signals.

The proposed hydroelectric generating station would be remotely- and automatically-controlled. At times the water would appear safe but when the generating station is started, the flow would be dangerously increased. To ensure the public and boaters would be aware of this sudden increase in flow, an on-site operator and warning signal(s) should be provided.

The on-site operator would be required to check and warn the public on a pending increase in flow from the generating station. Placement of an on-site operator should be considered especially during periods

of high public interaction, whereas during other times of the year it may be operated remotely.

Warning signals would be activated prior to the generating station increasing its flow thereby warning the public of this change in flow. Signage advising visitors to the area of the meaning of the signal should also be installed in areas adjacent the falls.

### **3. Install warning signage.**

Signage should be installed in accordance with the Canadian Dam Association, Guidelines for Public Safety Around Dams, 2011. Consideration should be given to enhancing this signage by utilizing ideograms and words. This will improve the likelihood of the messages being understood by all residents and visitors to the area.

In addition “No Swimming” signage should be installed in accordance with the Lifesaving Society Waterfront Safety Guidelines, 2011. This will advise the public that the area surrounding the falls is clearly a No Swimming area. This will enhance the safety of the public visiting the area that may not be aware of the dangerous conditions that are present.

### **4. Install a tailrace safety boom and buoys.**

A tailrace safety boom should be installed to restrict access to the full extent of the tailrace discharge of the proposed generating station. It needs to be confirmed that both the underwater and surface water velocities and turbulence are acceptable to adjacent in-water activities both beside and downstream of this tailrace safety boom.

In addition, warning buoys should also be installed.

The safety boom and buoys should be installed in accordance with the Canadian Dam Association, Guidelines for Public Safety Around Dams, 2011, and any Transport Canada requirements. These should be inspected on a regular basis to ensure they are operating effectively. These devices will warn and restrict access to the dangerous tailrace discharge area.

## **5. Install lifesaving stations in areas adjacent to the Bala North Falls.**

There is a need for these stations to be installed to ensure the public has access to rescue equipment to assist in a water emergency, without having to enter the water or to provide safety separation from the victim if they do enter the water.

Equipment located at each rescue station should include:

- A reaching pole of at least 3m in length
- A buoyant throwing aid attached to line that is at least 6mm in diameter and at least 8m in length.
- Appropriate signage as recommended by the Lifesaving Society Waterfront Safety Guidelines. Signage installed at each lifesaving station should indicate: the purpose of the equipment and warn of the consequences of misuse, no swimming, no diving, location of telephone for emergency use (or other communication device), nearest first aid station or hospital, and report any site deficiencies to: \_\_\_\_\_.

Pictogram signage is most helpful as it bridges all cultural users.

Lifesaving stations should be installed on both shores adjacent both the headpond and tailrace areas. Once construction of the dam and walkways are complete the Lifesaving Society should be consulted for ideal installation location. Samples of lifesaving stations and signage are shown below. These stations should be inspected on a regular basis to ensure the equipment is in place and functioning.



A good example of a lifesaving station holder is shown above at Port Elgin Main Beach, Port Elgin, Ontario. This has helped to both identify their location and reduce the loss from vandalism.

**6. Provide a safety stop mechanism for the intake and outflow of water from the proposed hydroelectric generating station.**

An emergency stop button, telephone, or security monitoring system are some examples of a mechanism that should be put in place to immediately stop the flow of water through this unmanned hydroelectric station. This will ensure that flow will be stopped allowing rescuers to quickly access the area should an emergency occur.

**7. Create a safety plan for emergency situation response.**

As part of the construction approval for this hydroelectric generating station, planning should be completed on response procedures in the event of an emergency. This will ensure equipment, personnel and procedures are available when an emergency occurs. The dam operator should consult with local, provincial and federal response agencies to ensure a coordinated response plan is created.

**8. Provide emergency procedures training for emergency response staff.**

In the event of an emergency at the Bala North Falls, a coordinated effort with the Police, Fire department and other EMS personnel should be provided. To ensure this:

- a) Policy and procedures need to be established. These will lay out in advance the procedures all will follow when an incident occurs and ensure efficient management of these situations.
- b) A boat rescue response procedure should be established for foreseeable incidents that may occur.
- c) Equipment inventory should be taken on current equipment and staff should be trained on all and suggested equipment.
- d) Conduct mock training exercises for EMS personnel.
- e) At a minimum seasonal training should occur with all personnel in simulated responses to a variety of emergency situation. This will better prepare them for an incident should it occur.

**9. Install signage and or barriers to restrict the public from jumping into the water from the train bridge.**

During our inspection we noted that youth were jumping from the train bridge into the river just upstream from the Bala North Falls. When the proposed hydroelectric generating station is operational the flow of water would be significantly increased and this current may draw these bathers into the headpond. Steps should be taken to prevent public access to this bridge.

**10. Notify the public of nearby designated swimming areas.**

There are many visitors to this area and in the summer many are seeking a safe swimming area. The Town should designate a safe swim area in the community (such as that at Jaspen Park), advertise its location and equip it to the standards depicted in the Lifesaving Society Waterfront Safety Guidelines.

**11. Install an emergency telephone within 150 meters of the Bala North Falls.**

In the event of an emergency, Emergency Medical Services (EMS) need to be notified as quickly as possible. To ensure that immediate access to EMS is possible, a publically-available telephone should be installed and maintained adjacent the Bala North Falls.

**12. Implement a public education campaign.**

A public education campaign emphasizing safety around the Bala Falls should be developed. Messages should include but not be limited to: safe practices around dams and hydro-electric generating stations, the purpose and placement of rescue stations, the consequences of equipment vandalism, and emergency protocols. These should be delivered through a variety of community outreach mechanisms (brochures, radio, television, etc.).

### **13. Conduct a follow-up aquatic safety audit to review the final safety plans for the hydroelectric generating station.**

Once the final safety plans are created for the hydroelectric generating station, these plans should be reviewed by the Lifesaving Society. This review will evaluate the procedures, policies, and equipment installation plans for the safety of the public when visiting the Bala Falls area.

## **Summary**

The proposed hydroelectric generating station in Bala would be closer to in-water recreational activities than any other station we are familiar with, yet there do not appear to be any plans to deal with the extremely dangerous situation this may create.

Plans and more information is required, for example:

- While we have made recommendations above, we would require more information to know where the downstream safety boom would need to be located to ensure that in-water recreation would be safe outside of it.
- Similarly, without more details on the upstream safety boom, we do not know if it would allow a person being drawn towards the proposed station's intake to both hold on to prevent themselves from being drawn to the proposed station's intake, and to move themselves along it to shore as self-rescue.
- Without more details of the underwater speeds upstream of the proposed generating station, we do not know at what distances Scuba diving would be safe.
- Without more details of the warning methods used, we do not know whether and at what distances people would be notified, or how people with disabilities (such as a hearing impairment) would be warned.

In whole, this development would create an unusually and extremely dangerous situation, and therefore requires a commensurate level of planning to be presented to agencies, stakeholders, and the public. This process should be started and completed before any construction proceeds, to both ensure it would be practical to implement, and so that any required changes could be incorporated into the design of the proposed station. We would be pleased to review additional information and proposed plans when these become available.