

# **GUIDE TO SURFACE WATER WITHDRAWAL APPROVALS**

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# GUIDE TO SURFACE WATER WITHDRAWAL APPROVALS

## 1 INTRODUCTION

### 1.1 Background

Under the *Environment Act*, the Activities Designation Regulations (Division I) require a water withdrawal approval (“Water Approval”) if a water withdrawal from a surface water course exceeds 23,000 litres per day. In order to obtain a withdrawal approval, a completed application form and supporting documentation must be submitted to Nova Scotia Environment and Labour (NSEL).

“Watercourse” within the meaning of the Environment Act is

- (i) “ *the bed and shore of every river, stream, lake, creek, pond, spring, lagoon or other natural body of water, and the water therein, within the jurisdiction of the Province, whether it contains water or not, and*
- (ii) *all ground water*”.

The purpose of this guide is to describe the recommended submission requirements, supporting documentation and the criteria used by NSEL to evaluate surface water withdrawal applications.

Hydrology reports must be completed to the satisfaction of NSEL and must clearly evaluate the potential effects of the proposed withdrawal on existing water users and the environment. The report must be prepared by, or under the direction of, a registered professional engineer licensed to practice in Nova Scotia, a qualified hydrologist and other qualified persons. In this guide, a "qualified hydrologist" is a person with hydrology training and experience.

### 1.2 Approach to Surface Water Allocation

In allocating water withdrawals, NSEL endeavours to ensure that water resources are developed in a sustainable manner. In other words, water resources are to be developed and used in a manner that can be maintained indefinitely without causing unacceptable environmental, economic or social consequences. Surface water withdrawal approvals are one of the primary mechanisms used by NSEL to ensure that water resource development is sustainable. Information provided in the hydrology report, is used to support the allocation decision.

The following guiding principles are used in allocating surface water withdrawals:

1. Withdrawals from the watercourse must be sustainable (i.e., can be maintained indefinitely without causing unacceptable environmental, economic or social consequences).
2. New water withdrawals should not cause any significant adverse effects to existing water users or the watercourse. Note that existing users are not required to modify operations to accommodate new withdrawals.
3. Water allocations are based on a “first-come, first-served” basis. Priority is given to existing withdrawal approvals over new applications.
4. Water allocations are based on the applicant’s current water needs, rather than potential future needs. The applicant must demonstrate the need for the volume of water requested. In other words, the applicant cannot typically reserve water for future use beyond the expiry date of the approval; up to 10 years under the *Approvals Procedure Regulations*.

## **2 APPLICATION REQUIREMENTS**

The application and supporting documentation must include, at a minimum, the information described in the following sections. A submission checklist of the minimum requirements is presented in Appendix A. The checklist in Appendix A must be completed and submitted with the application. Reports are to be submitted in electronic format and hard copy.

### **2.1 Description of Site and Water Supply Details**

#### **2.1.1 Site Description**

A description of the water withdrawal site is required, including, but not limited to:

- site location plan to scale; include UTM coordinates (NAD 83) and civic address
- PID number and name of property owner(s)
- PID number of adjacent properties, and owners’ names
- right-of-way agreements or permission from affected third parties or appropriate authorities where works affect highways, roads, utilities, or lands

- municipal land use zoning in effect for subject property and neighbouring properties
- actual current uses of the subject property and neighbouring properties.

Engineering drawings of the intake must be provided. If it is an existing intake, the report must indicate if it meets DFO (federal Department of Fisheries and Oceans) requirements for intake screens. Provide “as built” engineering drawings if available. If a new intake is proposed which entails alteration of the bed or banks of the watercourse during installation, a separate Watercourse Alteration Approval is required.

### **2.1.2 Description of Surface Water Supply Source**

Information about the watershed in which the withdrawal site is located, should include:

- location of the withdrawal site within the watershed, and drainage area in hectares or square kilometers to that point (provide 1:10,000 scale map)
- the total watershed area, in hectares or sq. km.
- description of the watercourse (e.g., length and width of river, surface area and depth of lake)
- description of the existing fisheries resource in the watercourse
- description of existing recreational water uses
- description of land uses in the watershed (e.g., % of forest cover)
- history of any flooding at the site
- identifiable water withdrawals upstream and downstream of the site, and any history of interference with those withdrawals from past withdrawal at the site

### **2.1.3 Description of Proposed Surface Water Withdrawal**

The applicant must provide a description of the intended beneficial use of the water, and water requirements to support that use. Potential effects of the proposed withdrawal rates are outlined in section 2.3.

Provide details of the method by which water will be withdrawn, including engineering drawings or sketches of the intake works. If water is taken by pumping, provide pump specifications. Details of the proposed water withdrawal rates from the watercourse must include the duration of the water withdrawal, the maximum daily rate and the average withdrawal rate, the average and maximum number of hours per day water will be taken, and the average and maximum number of pumping days per year.

If the withdrawal is seasonal, the months of the year to which the withdrawal applies must be identified.

Applications requesting use of water for generating hydroelectric power must specify the number of turbines and total horsepower rating.

If the application relates to an amendment of an existing Water Approval, discuss the reason for the change in withdrawal rate (i.e., changes to the activity, or amendments, additions, or deletions).

Current water needs should be presented separately from water needs projected within the next 10 year period (i.e., the duration of a water withdrawal approval). Justification must be provided for projected needs. If water requirements increase in the future, a new or amended approval can be requested.

#### **2.1.4 Description of Previous or Existing Withdrawal Approvals**

If the application relates to the renewal of an existing Water Approval, a description is required of existing and previous approvals related to the subject site, along with an assessment of any surface water monitoring data, quantity or quality, collected as part of the existing or previous approvals.

### **2.2 Watercourse Assessment**

#### **2.2.1 Water Quantity Assessment**

The hydrology report must contain a description and assessment of water availability from the watercourse at the point of withdrawal relative to the amount of water required by the applicant. Flow duration analyses must be supported by hydrometric data (stream gauging) available from the Water Survey Branch of Environment Canada, and precipitation records, extrapolating as necessary data from gauged watersheds to the site in question.

Seven day and 60 day low flow analyses are required, based on the one in fifty year drought return calculations.

Indicate whether storage reservoirs or impoundments are to be used, and provide storage capacity and operational details of the reservoirs or impoundments.

Note that impoundments where the designed storage capacity exceeds the mean volume of the natural water body by 10,000,000 cu. metres or more, and transfer of water from one drainage basin (greater than 1 sq. km. in area) to another, are subject to the *Environmental Assessment Regulations* under the Environment Act.

### **2.2.2 Fish Habitat Requirements**

The Department of Fisheries and Oceans (DFO) administers Canada's *Fisheries Act*, which pertains to fish habitat protection and fish passage at dams, among other things. Fish habitat protection related to water withdrawals from rivers and lakes may include restrictions on withdrawals, or withdrawal rates, to retain water for fish survival. DFO has also established requirements for screens on water intakes, and works with applicants to establish operating procedures for dams and fishways to accommodate upstream and downstream fish migration at important times of year. Information on fish species present and assessment of fish habitat in the watercourse is therefore important and necessary. The applicant should contact DFO at the earliest time since DFO may have data available, or will direct the applicant on what information is required and how it should be collected.

Every water withdrawal application and application for a dam received by NSEL is forwarded to DFO for review and comment, and conditions set by DFO may be incorporated in the NSEL Water Approval. It is possible that some proposals may have to be evaluated under terms of the *Canadian Environmental Assessment Act*, which is separate from NSEL review of applications.

It is also possible that proposals may require approval under the *Navigable Waters Protection Act* also administered by DFO (Coast Guard). For example, any part of a dam or intake works that affect navigation are subject to the NWPA review process.

Refer also to section 2.3.4.

### **2.2.3 Lakes**

The information requirements of section 2.2.1 and 2.2.2 are applicable whether the withdrawal is from a river or lake. The volume of water available in a lake must be calculated to determine sustainable yield of the source and the potential impact on the lake from the proposed withdrawal [refer to section 2.3]. In some cases this may require depth soundings below the ordinary high water mark of the lake. NSEL would not expect this level of effort when withdrawal is from lakes greater than 100 hectares in surface area unless the lake is shallow or a very large volume of water is being applied for, or unless the information is required by an approvals administrator. In

other cases, such as relatively small or intermittent withdrawals, approvals administrators may waive the requirement.

Seasonal variation in lake levels, evaporation rates and precipitation rates must be taken into account, as well as pumping rates associated with other Water Approvals.

### **2.3 Evaluation of Potential Effects**

The evaluation of potential effects includes an assessment of the sustainable yield, fish habitat requirements, and in some cases, water quality effects. In addition, any other site-specific considerations which have potential to impact on recreational use of watercourses, existing licensed withdrawals or the environment should also be included in the evaluation.

There are many methods available to evaluate potential effects, including field measurements and computer modelling. Where possible, evaluate potential effects using quantitative hydrology. Larger withdrawals are more likely to warrant the use of numerical groundwater or hydrologic models. If models are used, the modelling process must be documented in the hydrology report with a description of the model, assumptions and a justification for the input data used.

#### **2.3.1 Sustainable Yield**

A water balance (water budget) must be prepared to assess whether the proposed rate of water withdrawal can be sustained particularly during periods of seasonal low flow, taking into account the maximum cumulative withdrawal rates. The amount of water available for allocation is based on flow-duration curves constructed from long term stream flow data, usually the 95 percent exceedance frequency. This, however, is subject to fisheries maintenance flow requirements. Refer to section 2.3.4.

If there is historical monitoring data available for the withdrawal site (e.g., water levels, pumping rates, water quality, hydrometric data), it should be evaluated to assess how the watercourse has responded historically to pumping. A watershed modeling assessment may also be undertaken using hydrometric data from gauged watersheds to extrapolate long term trends pertaining to water quantity in ungauged watersheds.

#### **2.3.2 Impact on Other Users**

Sustainable yield analyses need to take into account water allocated to other users of the water resource, including recreational uses. Although NSEL may issue an approval for more than one



user of a watercourse or water resource, existing Approval holders will not be expected to reduce or alter their withdrawal to suit the needs of a new request for withdrawal from the same watercourse.

### **2.3.3 Water Quality (Lakes)**

Large amounts of water drawn on a continuous basis from natural ponds or small lakes may impact water quality and affect existing uses of such water bodies. In addition to calculations to determine sustainable yield of the water resource, an approvals administrator may request that a study be carried out to determine background water quality and predicted impacts from the proposed withdrawal.

In such cases the applicant will be required to conduct a source water characterization or baseline water quality study of the pond or lake based on an acceptable water quality sampling program.

The baseline water quality program may include the parameters that are normally part of a rapid chemical analysis package (RCAP) at accredited labs. Chlorophyll-a and low level nutrients including total phosphorous and total nitrogen should be analyzed, as well as doing a full metal scan. Additional parameters may be required, depending on site-specific details. For example, if the site is near a gasoline service station, an analysis for petroleum hydrocarbons may be necessary.

The applicant should confer with NSEL to confirm appropriate parameters and determine that the water sampling locations, sampling frequency, and analytical detection limits are acceptable. The background water quality data and predicted values should be compared in relation to the Canadian Council of Ministers of the Environment (CCME) Water Quality Guidelines for relevant water uses, or any applicable provincial water quality objectives.

### **2.3.4 DFO Requirements**

The sustainable yield analysis must take into account a fisheries “maintenance flow” requirement, unless the requirement is waived by DFO. For more complete information, the applicant should contact the Habitat Management Branch of DFO at 902-426-6027. If the withdrawal site is located in a watershed that drains to the Northumberland Strait/Gulf of St. Lawrence, along northern mainland Nova Scotia and the western side of Cape Breton, call the Gulf Region Area Office of DFO in Antigonish at 902-863-5670.

## **2.4 Monitoring and Contingency Plans**

### **2.4.1 Monitoring Plan**

Applicants may be required, as a condition of approval, to prepare a long-term plan to monitor stream flow in order to assess and evaluate the impacts of the water withdrawal on water resources, for example, large water withdrawals or withdrawals in sensitive settings. The department usually requires approval holders to record daily average and maximum water withdrawal rates or volumes and report them to NSEL, annually or as required by the approval.

### **2.4.2 Contingency Plan**

Applicants may be requested to prepare a contingency plan for mitigation of any unexpected adverse effects, again, in cases involving large withdrawals or sensitive environments. The plan would address water level effects and any other relevant adverse effects, specifying the circumstance(s) that will trigger the implementation of the contingency plan.

## **2.5 Other Requirements (for some types of withdrawals)**

NSEL may require additional information, depending on the nature of the withdrawal application. Large water withdrawals and withdrawals located in a sensitive setting (i.e., adjacent to a significant wetland), and dams built to provide storage capacity to augment the withdrawal requirements, are examples of more complex applications.

### **2.5.1 Dams**

The design of large dams must be carried out by a qualified person and be in compliance with the Canadian Dam Association Guidelines. An emergency preparedness plan (EPP), compiled under the CDA Guidelines, will also be required regarding the safe operation and maintenance of the dam structures. First time applicants are required to submit information and engineering drawings signifying that the design and EPP were prepared by qualified persons in compliance with CDA Guidelines. Approval Holders applying for renewal of Water Approvals involving dams are required to submit an evaluation of existing structures using the CDA Guidelines. Engineering drawings will be required to support changes or modifications to existing structures necessitated by the CDA Guidelines.

NSEL requires proof that the owner of a dam either owns lands to be flooded, or overflowed, as a result of the dam impoundment, or has the consent of the landowner(s) to do so. This consent,

referred to as “flowage rights”, must be submitted as part of the application, or before NSEL will issue approval. Consent is also required if the impoundment will affect Crown lands.

In addition to NSEL approval, dams require approval from DFO, which has authority over fish passage and navigation. Refer to section, 2.2.2 and 2.3.4.

## **2.5.2 Public Consultation**

If the water withdrawal has potential to be the focus of public concern, then it is recommended that the applicant consult with stakeholders to identify and address those concerns prior to applying for a water withdrawal approval. Otherwise, the consultation may be required later, delaying review of an application because of section 7(3) of the Approvals Procedure Regulations which states:

“Before approving an application, the Minister or Administrator may require that the applicant provide a consultative process in the area where the activity or the proposed activity is or will be located.”

The process presented in Appendix B is in place with respect to Water Approvals for hydroelectric power, which are complex in nature, involving entire watersheds and various types of water resource management issues.

## **2.6 Supporting Data and Figures**

Accurate data and figures mentioned in this guide submitted in support of an application will help to quicken the review process. Site location maps, property plans, watershed maps serve to provide a regional and local context for the proposed water withdrawal, in relation to other licensed withdrawal sites, for example.

Engineering drawings of dams and fishways are required by other review agencies such as DFO and must be in compliance with professional standards and other acceptable guidelines. Refer to Appendix A on how to obtain more information on such subjects, and where to obtain data necessary for preparing flow duration curves.

Applicants are encouraged to contact NSEL district offices to discuss watershed information requirements or other data requirements needed to submit a completed application in accordance with the Approvals Procedure Regulations.

**APPENDIX A**

**SUBMISSION CHECKLIST**

**FOR**

**SURFACE WATER WITHDRAWAL**

**APPLICATIONS**

**Nova Scotia Environment and Labour**  
**Submission Checklist for Surface Water Withdrawal Applications**

<b>General Requirements - To be completed and submitted with the application.</b>			
Task	Sub-Task	Included in Hydrology Report? (✓ = Yes)	Report Page No.
Site Description	Land Ownership	<input type="checkbox"/>	Page No. ___
	Water Intake Description	<input type="checkbox"/>	Page No. ___
	Intended Water Use	<input type="checkbox"/>	Page No. ___
	Zoning Details & Current Land Uses	<input type="checkbox"/>	Page No. ___
	Existing and Previous Withdrawal Approvals	<input type="checkbox"/>	Page No. ___
Description of Surface Water Supply Source	Watercourse Description	<input type="checkbox"/>	Page No. ___
	Watershed Information	<input type="checkbox"/>	Page No. ___
	Local Surface Water Features	<input type="checkbox"/>	Page No. ___
	Existing Uses	<input type="checkbox"/>	Page No. ___
	Historical Details	<input type="checkbox"/>	Page No. ___
Water Withdrawal Details	Rate and Duration of Withdrawal	<input type="checkbox"/>	Page No. ___
	Current & Projected Needs	<input type="checkbox"/>	Page No. ___
Evaluation of Potential Impacts	Impact on Other Users	<input type="checkbox"/>	Page No. ___
	Fisheries Assessment & Maintenance Flows	<input type="checkbox"/>	Page No. ___
	Water Quality Effects	<input type="checkbox"/>	Page No. ___
Other Information (may be required for certain types of withdrawals)	Dam Assessment & EPP	<input type="checkbox"/>	Page No. ___
	Flowage Rights	<input type="checkbox"/>	Page No. ___
	Monitoring Plans	<input type="checkbox"/>	Page No. ___
	Public Consultation	<input type="checkbox"/>	Page No. ___
	Mitigation and Contingency Plans	<input type="checkbox"/>	Page No. ___
Supporting Figures and Data	Site Location Map & UTM Coordinates	<input type="checkbox"/>	Page No. ___
	Site Plan & PID numbers	<input type="checkbox"/>	Page No. ___
	Aerial Photos	<input type="checkbox"/>	Page No. ___
	Engineering Drawings of Intake and Screens, Dam & Fishway	<input type="checkbox"/>	Page No. ___
	Flow-Duration Curves	<input type="checkbox"/>	Page No. ___
	Water Quality Data	<input type="checkbox"/>	Page No. ___
	Water Level Data, Lake Bathymetry	<input type="checkbox"/>	Page No. ___
	Hydrometric Analyses	<input type="checkbox"/>	Page No. ___

<b>Notes on General Requirements</b>
Contact NSEL for further information on any of the following references in the Guide:
<ul style="list-style-type: none"><li>• Canadian Dam Association Guidelines</li><li>• CCME Water Quality Guidelines</li><li>• Provincial Water Quality Objectives</li></ul>
Information on Fish Habitat Assessments is available from Fisheries and Oceans Canada; 1-902-426-6027 or 1-902-863-5670.
Hydrometric data is available from Water Survey of Canada, Environment Canada at 1-902-426-4819.

**APPENDIX B**

**GENERIC HYDRO SYSTEM APPROVAL**

**RENEWAL PROCESS**

**GENERIC HYDRO SYSTEM APPROVAL RENEWAL PROCESS**

<b>ACTION</b>	<b>RESPONSIBLE PARTY</b>	<b>RECOMMENDED DEADLINES BEFORE RENEWALS</b>
<b>Appoint Renewal Committee - Identify Government Agencies with interest in renewal</b>	<b>NSEL</b>	<b>20 months prior to renewal date</b>
<b>Identify Stakeholders</b>	<b>NSEL and Proponent</b>	<b>20 months prior to renewal date</b>
<b>Preliminary Consultation with Approval Holder, Committee &amp; Public/Stakeholders</b>	<b>NSEL</b>	<b>20 months prior to renewal date</b>
<b>Review Existing Information &amp; Data on System</b>	<b>NSEL and Proponent</b>	<b>20 months prior to renewal date</b>
<b>Identify Key Issues</b>	<b>NSEL and Proponent</b>	<b>18 months</b>
<b>Establish Terms of Reference for Environmental Studies required by NSEL to be undertaken by the Proponent</b>	<b>NSEL/Committee and Proponent</b>	<b>18 months</b>
<b>Complete Field Work for Studies</b>	<b>Proponent</b>	<b>12 months</b>
<b>Detailed Consultation with Stakeholders</b>	<b>NSEL and Proponent</b>	<b>6 months</b>
<b>Submission of Draft Renewal Report</b>	<b>Proponent</b>	<b>5 months</b>
<b>Review of Draft by Committee &amp; Comments</b>	<b>NSEL</b>	<b>4 months</b>
<b>Revisions to Draft Report</b>	<b>Proponent</b>	<b>4 months</b>
<b>Submission of Final report &amp; Application for Renewal</b>	<b>Proponent</b>	<b>90 days</b>
<b>Formal Public Consultation &amp; Review of Report by Key Stakeholders</b>	<b>Proponent</b>	<b>60 days</b>
<b>Review of Final Report &amp; Application</b>	<b>NSEL and Committee</b>	<b>60 days</b>
<b>Decision, and Terms/Conditions of License Renewal</b>	<b>NSEL</b>	<b>0 days</b>