

# Manitoba Hydro Great Falls Generating Station Licence Implementation Guide for Water Levels

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# Executive Summary

## Introduction

Manitoba Hydro prepared this guide to document a common understanding of compliance with the water regime terms of the Great Falls Water Power Act Licence. This document sets out the mutually understood and agreed to:

- 1) Methodology to be used for determining critical water levels;
- 2) Definition of licence compliance; and
- 3) Protocol for reporting.

## Great Falls Forebay Water Level

The **Great Falls Forebay Water Level** is directly measured at the beginning of each hour at the generating station.

## Compliance

Compliance with the Great Falls Water Power Act Licence will be measured against the **Great Falls Forebay Water Level**.

## Reporting

In the event that the **Great Falls Forebay Water Level** is not in compliance with the licence limit, Manitoba Hydro will notify Manitoba Sustainable Development within one week of the incident. A follow-up report on causes contributing to the event and changes to operations, if any are needed to prevent such an event in the future, will be provided to Manitoba Sustainable Development. A record of water levels and licence compliance will also be provided in an annual report.

## Change Management

Proposed revisions to this guide will be drafted by Manitoba Hydro and reviewed by Manitoba Sustainable Development from time to time. Following review and approval of revisions by Manitoba Sustainable Development, a revised copy of this guide will be produced and distributed by Manitoba Hydro.

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# 1. Introduction

Great Falls Generating Station is located approximately 130 km northeast of the City of Winnipeg and 25 km north of the Town of Lac du Bonnet.

The Great Falls Generating Station was constructed in two stages between 1914 and 1928. It is the second largest plant on the Winnipeg River.

Manitoba Hydro operates the Great Falls Generating Station in accordance with the First Renewal Licence for the Development of Water Power at the Great Falls Site on the Winnipeg River. This licence was issued in accordance with the provisions of The Water Power Act on February 10, 1999. The renewal licence is valid until January 1, 2032. Great Falls Generating Station has a licenced capacity of 136 MW (182,300 horsepower).

## 1.1 Definitions

For the purposes of this guide, unless the context otherwise requires, the following terms shall have the respective meanings set out below and grammatical variations of such terms shall have corresponding meanings:

**ASL** means above sea level

**Controlling Benchmark** means Geological Survey of Canada (GS of C) benchmark 5K2. Benchmark 5K2 is a brass cap in bedrock located on the left bank about 1,000 feet downstream from the powerhouse.

**Great Falls Gauge** refers to a float attached to a steel tape that is draped over a pulley connected to a Selsyn (self-synchronous) system that measures the forebay water level.

**Great Falls Forebay Water Level** means the hourly water level as measured by the **Great Falls Gauge**.

## 1.2 Datum

In accordance with Article 5 of the Great Falls First Renewal Water Power Act Licence, water level information for the operation of the Great Falls Project is measured in terms of elevations **ASL**, **GS of C**, Canadian Government Vertical Datum (CGVD) 1928, 1929 Local Adjustment.

## **1.3 Quality Control**

### **1.3.1 Benchmarks**

Vertical control surveys have been performed to establish appropriate local benchmarks around the Great Falls Generating Station.

Great Falls benchmarks were established by level transfer from **Controlling Benchmarks** using spirit levelling methods.

### **1.3.2 Direct Water Level Measurements**

Staff monitor the **Great Falls Gauge** equipment weekly and as necessary to maintain gauge performance. Direct water level measurements are taken during these checks and compared to the level indicated by the water level sensor. Direct water level measurements that differ by more than 0.1 feet are reported and repaired.

### **1.3.3 Gauge Readings**

The forebay gauge consists of a float attached to a steel tape that is draped over a pulley connected to a Selsyn (self-synchronous) system. This system electronically transmits the angular position of the pulley to a receiving device in the control room. The position information is converted to a water level, indicated on a display and also output to the Remote Transmittal Unit for transmission to Manitoba Hydro's System Control Centre.

## **1.4 Quality Assurance Procedure for Water Level Data**

### **Plant Data**

Data is collected on site and signed off by the operating supervisor. Data is then sent to the Energy Operations Planning & Technology Department of Manitoba Hydro, uploaded into a database and checked for errors. Data errors are then corrected or verified by plant operating staff with technical assistance from Energy Operations Planning & Technology staff as needed. Once data has been verified, it may be used for operations planning, studies, model development and reporting.

## **2. Great Falls Forebay Water Level**

Section 5 of the Great Falls Water Power Act Licence places a limit on the **Great Falls Forebay Water Level**. A map showing the location of the **Great Falls Gauge** is provided in Appendix A. Water levels are largely influenced by the operation of the Great Falls Generating Station and local meteorological events. Due to the size of the forebay and location of the **Great Falls Gauge**, wind effects on the **Great Falls Forebay Water Level** are negligible.

**Great Falls Forebay Water Level** measurements are taken continuously and recorded at the beginning of each hour and reported to Manitoba Hydro's System Control Centre.



## 3. Compliance

### 3.1 Great Falls Water Power Act Licensing Requirement

#### Maximum Water Level

Section 5 of the licence stipulates that:

*“The Licensee shall not raise the headwater of the development, as measured at the powerhouse higher than a wind eliminated elevation of 813.6 feet above mean sea level, Canadian Geodetic Datum, 1929 Adjustment (814.0 feet, Winnipeg River Survey Datum). A higher elevation may be created only with prior written permission by the Director and in accordance with Section 72 of the Regulations.”*

The forebay water level shall be in compliance with the limit described above if the hourly

#### Great Falls Forebay Water Level:

- a) does not exceed 813.6 feet by more than 0.1 feet; and
- b) does not exceed 813.6 feet more than two times or for more than two consecutive hours in any 24-hour period.

Based on the accuracy and location of the **Great Falls Gauge**, Manitoba Hydro defines instances where the licence limit is exceeded by 0.1 feet as reportable events.

## 3.2 Reporting

### 3.2.1 Compliance Reporting

In the event that the **Great Falls Forebay Water Level** is not in compliance with the licence limit as described in Section 3.1, notification shall be made to Manitoba Sustainable Development within one week of the incident. A follow-up report on causes contributing to the event and changes to operations, if any are required to prevent such an event in the future, will be provided to Manitoba Sustainable Development.

### 3.2.2 Maintenance and Emergencies

During maintenance and emergencies there may be times when Manitoba Hydro is required to deviate from a licence condition for safety or other purposes. Manitoba Hydro will be considered compliant with the licence as long as:

1. Advanced notification by email is provided to Manitoba Sustainable Development of the upcoming licence deviation together with the reason, a description of the operating plan, details of the expected licence deviation, a summary of impacts to stakeholders, and confirmation that stakeholders will also be notified; and

2. Advanced notification is provided to stakeholders of pertinent impacts to flow and water levels; and
3. Following the work, notification by letter is provided to Manitoba Sustainable Development on the final specifics of the licence deviation.

### **3.2.3 Regular Annual Reporting**

Water levels and licence compliance will be reported within the Annual Water Level and Flows Report provided to Manitoba Sustainable Development.

## **4. Change Management**

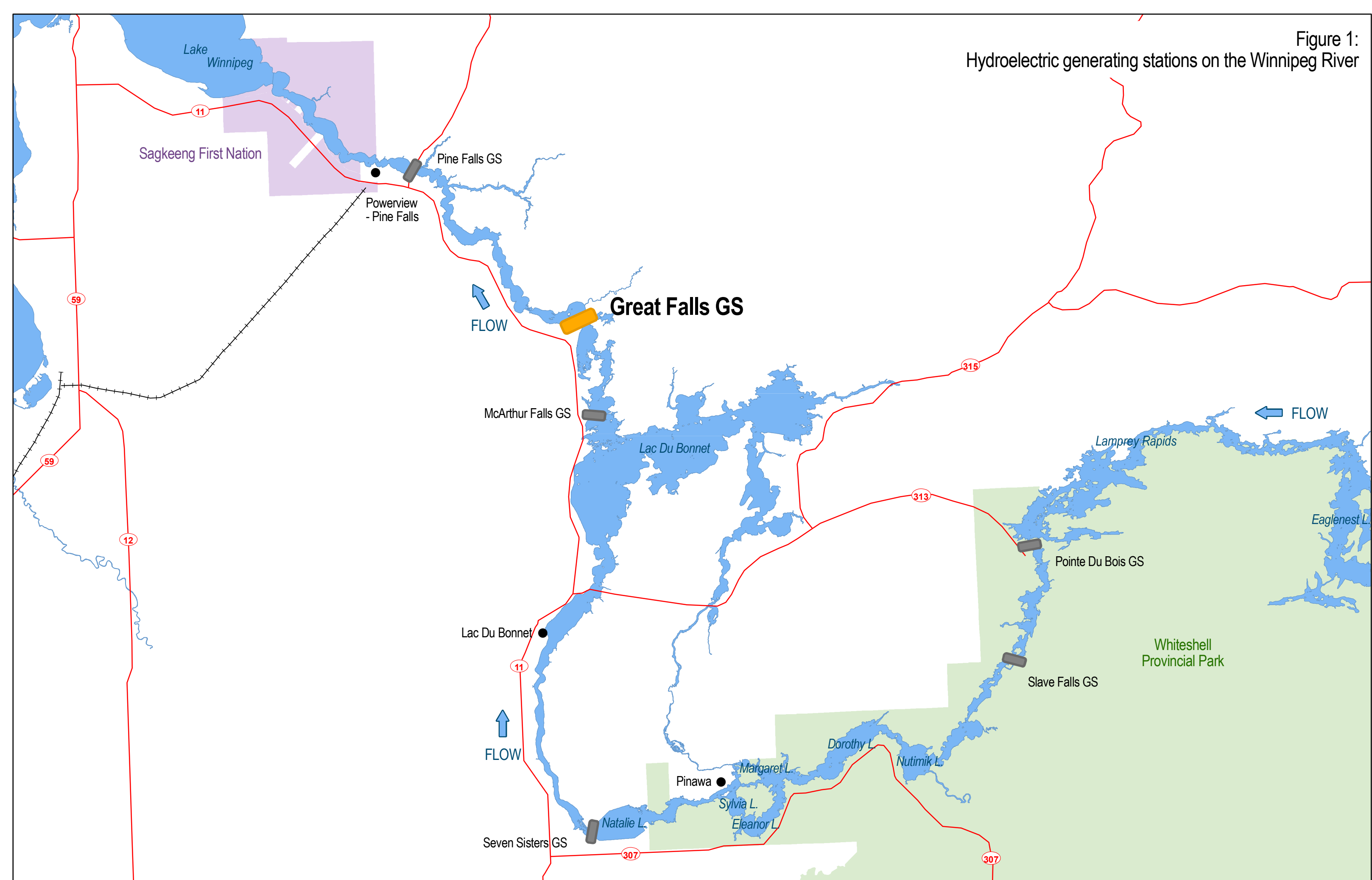
### **4.1 Regular Updates**

Proposed revisions to this Guide will be drafted by Manitoba Hydro and reviewed by Manitoba Sustainable Development from time to time. Following review and approval of revisions by Manitoba Sustainable Development, a revised copy of this Guide will be produced and distributed by Manitoba Hydro.

## **Appendix A**

### **Forebay Water Level Gauge Location**

Figure 1:  
Hydroelectric generating stations on the Winnipeg River





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HYDRAULIC OPERATIONS DEPARTMENT

GREAT FALLS GENERATING STATION

DRAWN BY

PGC

FOREBAY WATER LEVEL GAUGE LOCATION

YEAR

2017

PROJECT

LICENCE IMPLEMENTATION GUIDE

FIGURE 2