

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

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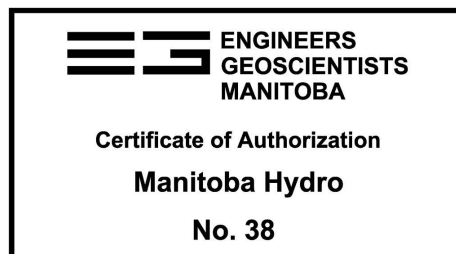
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# Executive Summary

## Introduction

Manitoba Hydro prepared this guide to document a common understanding of compliance with the water regime terms of the McArthur 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.

## McArthur Falls Forebay Water Level

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

## Compliance

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

## Reporting

In the event that the **McArthur 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

McArthur Falls Generating Station is located approximately 120 km northeast of the City of Winnipeg, 15 km north of the Town of Lac du Bonnet and 30 km downstream of the Seven Sisters Generating Station.

Construction of the McArthur Falls Generating Station began in 1952 and was completed in 1955. McArthur Falls is the newest of the six generating stations operating on the Winnipeg River.

Manitoba Hydro currently operates the McArthur Falls Generating Station under a Short-Term Extension of the Final Licence. The Short-Term Extension Licence (STEL) was issued in accordance with the provisions of The Water Power Act on October 1, 2015. The STEL is in effect until September 30, 2020 and the operating terms are identical to those of the final licence issued on November 30, 1965. McArthur Falls Generating Station has a licenced capacity of 59.7 MW (80,000 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 6K. Benchmark 6K is a shank in bedrock located on a rocky point about 750 feet downstream from the powerhouse.

**McArthur 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.

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

## 1.2 Datum

In accordance with Article 4 of the McArthur Falls Final Water Power Act Licence, water level information for the operation of the McArthur 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 McArthur Falls Generating Station.

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

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

Staff monitor the **McArthur 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. McArthur Falls Forebay Water Level**

Article 4 of the McArthur Falls Final Water Power Act Licence places a limit on the **McArthur Falls Forebay Water Level**. A map showing the location of the **McArthur Falls Gauge** is provided in Appendix A. Water levels are largely influenced by the operation of the McArthur Falls Generating Station and local meteorological events. Due to the size of the forebay and location of the **McArthur Falls Gauge**, wind effects on the **McArthur Falls Forebay Water Level** are negligible.

**McArthur 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 McArthur Falls Water Power Act Licensing Requirement

#### Maximum Water Level

Article 4 of the licence stipulates that:

*“The Licensee shall not raise the headwater of its development to an elevation higher than 836.0 feet above mean sea level, Canadian Geodetic Datum, 1929 Adjustment. 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

#### **McArthur Falls Forebay Water Level:**

- a) does not exceed 836.0 feet by more than 0.1 feet; and
- b) does not exceed 836.0 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 **McArthur 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 **McArthur 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 annually to Manitoba Sustainable Development.

## **4. Change Management**

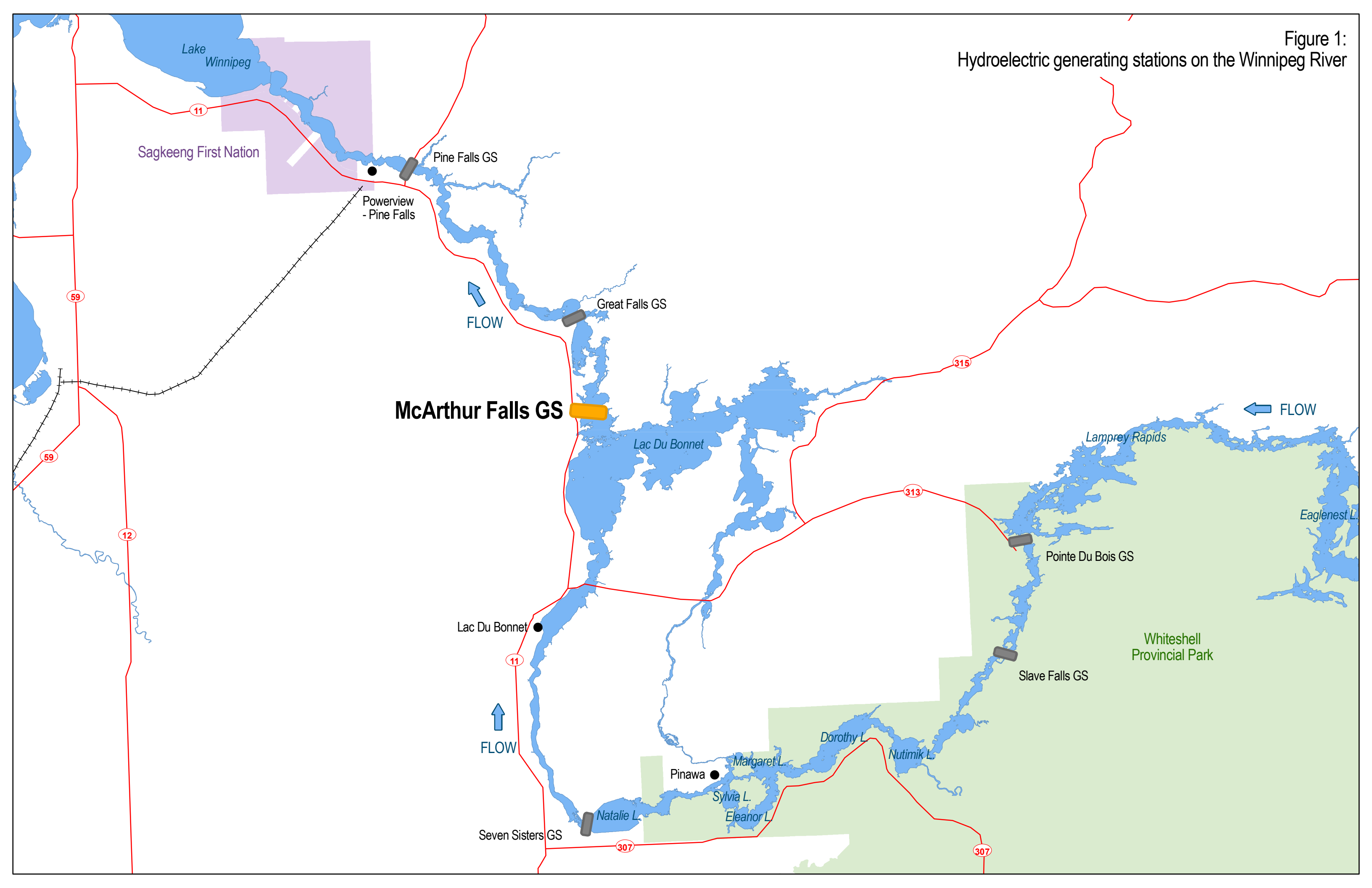
### **4.1 Regular Updates**

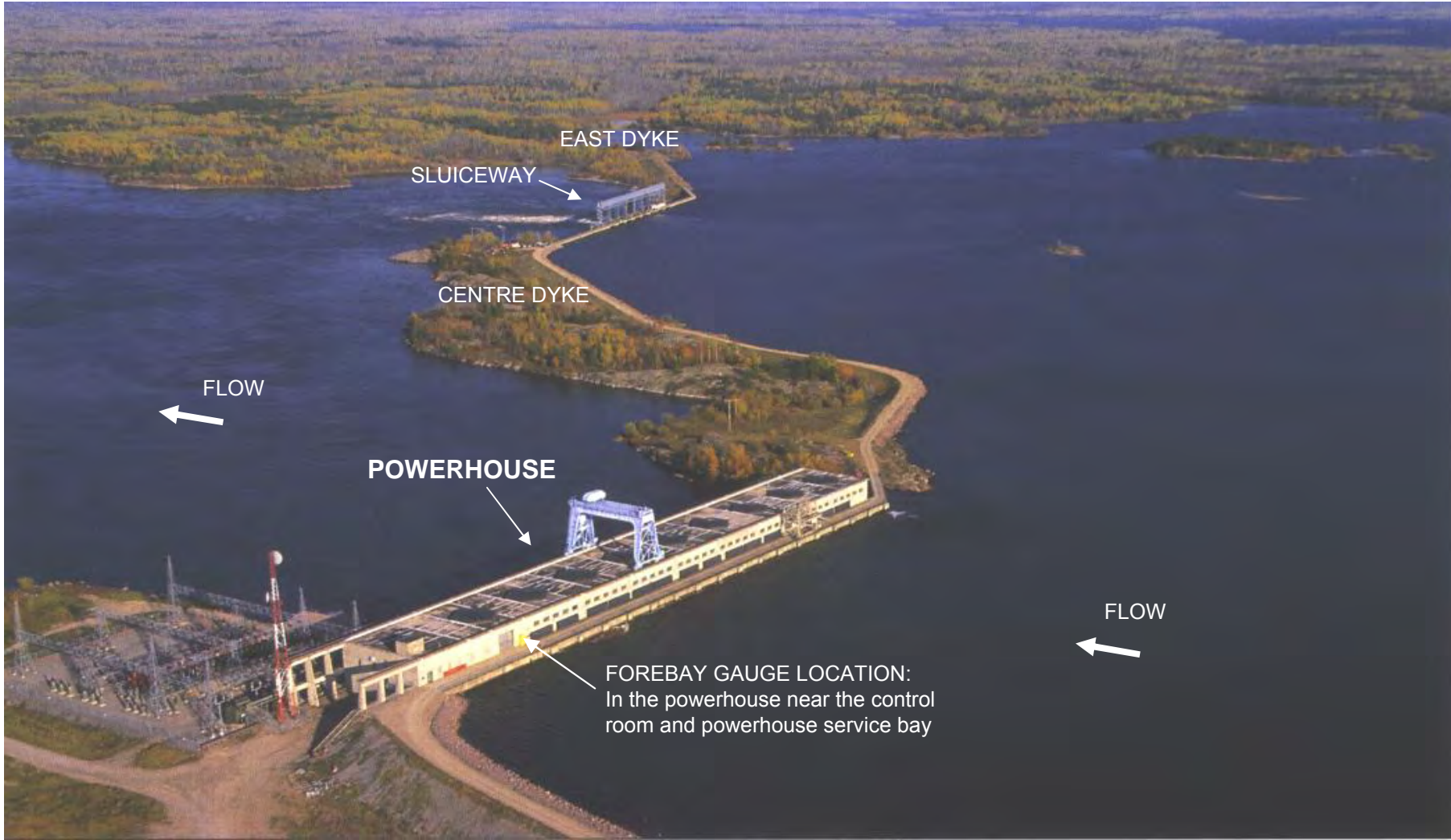
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## **Appendix A**

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

Figure 1:  
Hydroelectric generating stations on the Winnipeg River





|   |   |          |
|---|---|----------|
|  | MANITOBA HYDRO                          |          |
|   | HYDRAULIC OPERATIONS DEPARTMENT         |          |
|   | MCARTHUR FALLS GENERATING STATION       |          |
| DRAWN BY<br>PGC   | FOREBAY WATER LEVEL GAUGE LOCATION      |          |
| YEAR<br>2017  | PROJECT<br>LICENCE IMPLEMENTATION GUIDE | FIGURE 2 |