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2017 05 11

R. Matthews, P.Geo.  
Manager, Water Use Licensing  
Manitoba Sustainable Development  
200 Saulteaux Crescent  
Winnipeg MB R3J 3W3

Dear Mr. Matthews:

**2016 WUSKWATIM ANNUAL WATER LEVELS REPORT**

On behalf of the Wuskwatim Power Limited Partnership, enclosed is the annual Wuskwatim Water Levels Report. The report contains information on data collection, verification, and reporting related to the Water Power Act and Environment Act licenses, as well as a summary of deviations from licence conditions during the year.

If you have any questions or require additional information, please call me at 204-360-3018.

Yours truly,

Original signed by, *Wesley Penner*

W.V. Penner, P. Eng.  
Manager  
Hydraulic Operations Department

MJD/sl/00184-07310-0172\_00  
Att.

c: L.E. Midford, Chair of the general partner of Wuskwatim Power Limited Partnership

Hydraulic Operations Department, Manitoba Hydro  
On behalf of: Wuskwatim Power Limited Partnership

**WATER POWER ACT & ENVIRONMENT ACT LICENCES  
2016 ANNUAL WATER LEVELS REPORT FOR  
WUSKWATIM GENERATING STATION**



Original signed by: Mario Duenas



2017 05 11

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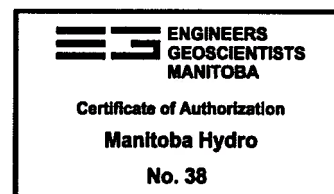
PREPARED BY: Original signed by: Mario Duenas  
M.J. DUENAS

REVIEWED BY: Original signed by: Brian Giesbrecht  
B.W. GIESBRECHT

APPROVED BY: Original signed by: Wes Penner  
W.V. PENNER

DATE: 2017-05-11

REPORT NO: WP&O 17-04





## **EXECUTIVE SUMMARY**

Manitoba Hydro operates the Wuskwatim GS on behalf of Wuskwatim Power Limited Partnership in accordance with the Water Power Act and Environment Act licences issued by the Province of Manitoba. These licences constrain the water level on Wuskwatim Lake, and the rate of change in water level on Birch Tree Lake.

Environment Act Licence No. 2699 for Wuskwatim GS requires an annual water level report for each calendar year. This report addresses all water level constraints imposed by both the Water Power Act and Environment Act licences. The report contains information on data collection, validation, and reporting, as well as a summary of licence limit exceedances during the year.

Monthly compliance reports recorded five Birch Tree Lake licence limit exceedances during 2016. Investigation into these events concluded that two of the Birch Tree Lake events were not attributable to Wuskwatim operations. The reasons for the occurrence of these events were explained in Sections 5.2, 5.3 and Appendix I.

In summary, water levels deviated outside the licence limits as follows.

<b>Location</b>	<b>Constraint</b>	<b>Variable</b>	<b>Exceedances Attributed to Wuskwatim Operations</b>	<b>Number of Readings</b>	<b>% Compliance</b>
Wuskwatim Lake	Max Elevation	Mean Daily Water Level	0	366	100 %
Wuskwatim Lake	Max Elevation	Hourly Water Level	0	8784	100 %
Birch Tree Lake	Water Level Variation	Mean Daily Water Level	3	366	99.18 %

Refinements to operations continue in order to reduce the number of licence limit exceedances on Wuskwatim and Birch Tree lakes.



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## **1.0 INTRODUCTION**

### **1.1 Background**

Wuskwatim Power Limited Partnership (WPLP) is a legal entity involving Nisichawayasihk Cree Nation (NCN) and Manitoba Hydro, which developed and now owns the Wuskwatim Generating Station (GS). Manitoba Hydro operates the station as part of the Manitoba power grid on behalf of WPLP.

WPLP received licences under *The Water Power Act* and *The Environment Act* for the development of the Wuskwatim GS. The Interim Water Power Act licence stipulates a maximum and minimum allowable water level on Wuskwatim Lake. Environment Act Licence No. 2699 stipulates a maximum and minimum water level on Wuskwatim Lake, a maximum daily change in water level on Birch Tree Lake, as well as monthly and annual reporting requirements. This report fulfills the annual reporting requirement of Environment Act Licence No. 2699.

Manitoba Hydro prepared the Wuskwatim GS Licence Implementation Guide for Water Levels ([http://www.gov.mb.ca/sd/waterstewardship/licensing/pdf/implementation\\_guide.pdf](http://www.gov.mb.ca/sd/waterstewardship/licensing/pdf/implementation_guide.pdf)) to establish and document the water regime terms specified by the Wuskwatim licences. The guide was reviewed and approved by the Province of Manitoba. The Licence Implementation Guide forms the basis for content of this report and provides the following details:

- calculation methodology to be used for determining critical levels,
- protocol for reporting to meet licence requirements, and
- manner in which compliance will be defined and assessed

### **1.2 Objective**

This report documents Wuskwatim GS licence compliance by summarizing the Water Power Act and Environment Act licence requirements and providing the relevant water level data for the 2016 reporting period. In the case of any licence limit exceedance, this report provides the reason for the exceedance, actions taken to prevent such an event from occurring in the future, and proof of regulator notification.

### **1.3 Outline**

Section 1.0 contains the introduction to the report, including background information on licence and reporting requirements, objective and outline of the report. Following the introduction is section 2.0, which provides the Wuskwatim GS project location and description. Section 3.0 summarizes the water level data collection process including data transfer, storage and validation. Section 4.0 includes information about data sources, definition of compliance, and compliance reporting. Section 5.0 describes the data analysis used to prepare this report, includes a summary table of deviations from licence constraints during the 2016 calendar year, and provides reasons for any licence deviations. Section 6.0 summarizes major system upgrades



or changes during the 2016 calendar year, and finally Section 7.0 provides conclusions and closure to the report.

Appendix I provides copies of relevant correspondence with Manitoba Sustainable Development related to licence limit exceedances.

The enclosed CD contains final water level data for Wuskwatim Lake and Birch Tree Lake used in the preparation of this report.

## **2.0 WUSKWATIM GENERATING STATION**

### **2.1 Project Location**

The Wuskwatim Generating Station is located on the Burntwood River, in the Nelson House Resource Management Area, approximately 56 km southwest of Thompson, 35 km southeast of Nelson House, or approximately 830 km north by road from Winnipeg. The geographical location of the station is shown in Figure 1. A photograph of the station is shown in Figure 2. A general arrangement of the site is shown in Figure 3.

### **2.2 Project Description**

The Wuskwatim Generating Station consists of a 3-unit powerhouse with a nameplate capacity of 209 MW, gravity dams and embankment structures, and a 3-bay spillway with heated gates. Tables 1 and 2 summarize the operating parameters and construction specifications of the Wuskwatim Generating Station.

*Table 1: Construction Specifications and Operating Parameters of the Wuskwatim Generating Station*

Construction Period	2006 to 2012
Licensed Capacity	210 MW
2016 Generation	1,427 million kW-h
Waterfall Drop (head)	21.4 m
Maximum Licence Forebay Elevation	234.0 m
Minimum Licence Forebay Elevation	233.75 m

*Table 2: Principal Structures for the Wuskwatim Generating Station*

<b>Powerhouse</b>	Number of Units	3
	Length	75 m
	Discharge Capacity (at full gate)	1,100 m <sup>3</sup> /s
	Power Production	3 units @ 69.7 MW/unit TOTAL = 209 MW
<b>Spillway</b>	Number of Bays	3

<b>Dams</b>	Total Length	43.0 m
	Discharge Capacity (Wuskwatim L. @ 234.0 m)	2,310 m <sup>3</sup> /s
	Material	Impervious fill and granular fill
	Crest Elevation	236.69 – 237.80 m

The reservoir at Wuskwatim Generating Station has a total area of 88.41 km<sup>2</sup> and a fetch length of approximately 1.88 km. There is typically a 0.1 m drop between the reservoir level on Wuskwatim Lake and the forebay level of the station. The reservoir normal maximum water level is 234.0 m while the forebay normal maximum water level is 233.9 m. The incremental flooded area due to the project is 0.37 sq. km allowing the majority of the reservoir and forebay to be contained by natural river banks and minimizing the need for dykes.

Inflow to Wuskwatim is largely dependent on the Churchill River Diversion, as controlled by the Notigi Control Structure. The generating station operates in a daily cycling mode within the allowed 0.25 m water level range on Wuskwatim Lake.

The operators and maintenance personnel of the Wuskwatim Generating Station are located on site. Support and technical services are located in the nearby city of Thompson.

### **3.0 DATA COLLECTION**

#### **3.1 Water Level Gauges**

Hydraulic Operations staff compiled data from three remote water level gauges located on Wuskwatim Lake, and two remote water level gauges located on Birch Tree Lake to evaluate licence compliance for the 2016 reporting period. The locations of the water level gauges as well as the gauge description sheets are contained in the Appendix A of the Licence Implementation Guide ([http://www.gov.mb.ca/sd/waterstewardship/licensing/pdf/implementation\\_guide.pdf](http://www.gov.mb.ca/sd/waterstewardship/licensing/pdf/implementation_guide.pdf)). Manitoba Hydro uses the recorded water level data to measure compliance with the licence conditions as they apply to hourly and mean daily water levels (with wind and wave effects eliminated) on Wuskwatim Lake, and daily average water level changes on Birch Tree Lake.

#### **3.2 Data Transmission and Storage**

Manitoba Hydro remote gauges on Wuskwatim and Birch Tree lakes use pressure transducers and data loggers to record, store and transmit water level data to satellites operated by the National Oceanic and Atmospheric Administration (NOAA). Manitoba Hydro retrieves the data from internet data sources offered by NOAA and United States Geological Survey as well as directly from the loggers during a site visit. In all cases, Manitoba Hydro uses the OpenDCS Toolkit, an auto-collection software that decodes and sends the data to two databases: HyDams and HyTime that are accessible to interested parties within Manitoba Hydro.

Water level data is collected and published according to the procedures and Quality Control Assurance processes established by Water Survey of Canada. Near real-time data is available but it is not recognized as official. Final data, or published data is generated through several levels of reviews to verify compliance with applicable standards and includes recognition of the impact of other related environmental and contextual factors.

Figure 4 shows the data transmission and storage process for remote gauge water level data used in the preparation of this report.

## **4.0 WATER POWER ACT AND ENVIRONMENT ACT DATA REPORTING**

### **4.1 Monitoring & Reporting Process**

As required by Clause 33 of Environment Act Licence No. 2699, an annual water level report for each calendar year, must be provided to Manitoba Sustainable Development. This report uses final data only from the required water level gauges based on three levels of internal review. It also contains any compliance reports issued in the 2016 reporting period. Due to the quality assurance processing time, this report is issued by June 1 of the following year.

### **4.2 Data Sources**

The water level data used in preparing this report was obtained from the Manitoba Hydro hydrometric database which contains water level data of various time steps including real-time (5-minute interval), hourly, daily average and mean daily (with wind and wave effects eliminated) data. Hourly water level and flow data from Wuskwatim can be used in determining the operational impact of the project on Birch Tree Lake in case the Birch Tree Lake daily change in water level exceeds the licence limit.

### **4.3 Compliance**

Section 4.2 of the Wuskwatim Interim Water Power Act licence states that:

*The Licensee shall not raise the headwaters of its development above an elevation of 234.0 metres ASL as measured on Wuskwatim Lake, except as ordered by the Minister under Clause 72(b) of the Water Power Regulation or as fixed by the Minister under Clause 72(c) of the Water Power Regulation.*

Clause 30(a) of Environment Act Licence No. 2699 states that the Licensee shall operate the Development within the following parameters:

*Maintain the mean daily water level on Wuskwatim Lake (wind and wave effects eliminated) between 233.75 meters and 234.0 meters Above Sea Level (ASL), as determined by measurements from a minimum of three water level monitoring stations on Wuskwatim Lake.*

Clause 30(b) of Environment Act Licence No. 2699 states that the Licensee shall operate the Development within the following parameters:

*Maintain mean daily water levels on Birch Tree Lake such that the daily water level variations shall be less than 0.10 meters and 0.15 meters in open water and winter conditions (wind and wave effects eliminated) respectively. Any exceptions to these fluctuations shall be reported within one week to Manitoba Sustainable Development.*

#### **4.4 Compliance Reporting**

Compliance for Wuskwatim GS has been defined, and agreed upon with Manitoba Sustainable Development using the maximum and minimum water level limits stated by the Water Power Act and Environment Act licences. More precisely the Wuskwatim Lake water level shall be in compliance with the upper limit defined by both licences if:

1. The Wuskwatim Mean Daily Water Level (with wind and wave effects eliminated) does not exceed 234.0 meters, and
2. The Wuskwatim Hourly Water Level does not exceed 234.1 meters more than two times for two consecutive hours each time in any 24 hour period.

Furthermore, the Wuskwatim Lake water level is in compliance with the lower limit defined by both licences if:

1. The Wuskwatim Mean Daily Water Level (with wind and wave effects eliminated) does not recede below 233.75 meters, and
2. The Wuskwatim Hourly Water Level does not recede below 233.65 meters more than two times for two consecutive hours each time in any 24 hour period.

For the purpose of licence compliance at Birch Tree Lake, open water will refer to the period from May 1 to October 31 and winter will refer to the period from November 1 to April 30. The Birch Tree Lake Daily Change in water level is in compliance when:

1. The Birch Tree Lake Daily Change is below these seasonal limits, or
2. The Birch Tree Lake Daily Change is above these seasonal limits but the change attributable to Wuskwatim Generating Station is below these seasonal limits.

In the event that the Wuskwatim Lake or Birch Tree Lake water levels are not in compliance with the licence limits as described above, notification will be made to Manitoba Sustainable Development within one week of the incident. A follow up compliance report on causes contributing to the event and changes to operations, if any will also be provided.

WPLP publishes monthly and annual compliance reports on its web site at [www.wuskwatim.ca](http://www.wuskwatim.ca).

## **5.0 SUMMARY OF FINDINGS**

### **5.1 Data Analysis**

Water level data was analyzed to prepare charts outlining water conditions at Wuskwatim Lake and Birch Tree Lake during the 2016 reporting period. All readings were evaluated against licence limits to identify violations based on the definition of licence compliance given in Section 4.4.

Wuskwatim Lake Hourly Water Level, Wuskwatim Lake Mean Daily Water Level, and Birch Tree Lake Daily Water Level Change is shown in Figure 5, 6, and 7 respectively, for the 2016 reporting period.

### **5.2 Licence Exceedances**

During the 2016 reporting period, there were five recorded instances of water levels outside of the licence limits. The maximum number of possible instances was calculated as the sum of instances pertaining to each licence constraint and was based on the station operating from January 1 to December 31. Each licence constraint yields the following number of possible instances:

- Maximum/Minimum Mean Daily Water Level on Wuskwatim Lake – 366 days of possible instances,
- Maximum/Minimum Hourly Water Level on Wuskwatim Lake – 366 days \* 24 hours = 8784 possible instances, and
- Maximum Daily Water Level Change on Birch Tree Lake – 366 days

Table 3 shows a breakdown of licence limit exceedances for Wuskwatim Lake and Birch Tree Lake for the 2016 reporting period. The Hydraulic Operations Department investigated the incidents to determine the reasons for their occurrence. Copies of correspondence notifying Manitoba Sustainable Development of these events, except the October 4, 2016 exceedance at Birch Tree Lake, are included in Appendix I of this report.

Raw data showed that the Birch Tree Lake daily change was exactly 0.10 m on October 4, 2016. Once the raw data was reviewed and finalized, this change was found to be 0.11 m. Investigation showed that declining inflows from upstream caused water levels along the Burntwood River to drop. To stop the decline on Wuskwatim lake, the cycling pattern was adjusted to reduce the overall flow. This flow reduction in addition to the declining river flows cause the Birch Tree Lake level to drop more than the licence limit of 0.10 m.

*Table 3: Wuskwatim Generating Station, Water Power Act and Environment Act Licences: Summary of Events for the reporting period of 2016*

Date	Location	Constraint	Variable
May 5, 2016	Birch Tree Lake	Water Level Variation	Mean Daily Water Level
May 6, 2016	Birch Tree Lake	Water Level Variation	Mean Daily Water Level
July 6, 2016*	Birch Tree Lake	Water Level Variation	Mean Daily Water Level
July 29, 2016*	Birch Tree Lake	Water Level Variation	Mean Daily Water Level
October 4, 2016	Birch Tree Lake	Water Level Variation	Mean Daily Water Level

*\*exceedance not attributable to Wuskwatim operation*

### 5.3 Licence Exceedances Explanation

The table below provides a brief explanation of the exceedances at Wuskwatim and Birch Tree lakes. These are further explained in detail in the correspondence included in Appendix I.

*Table 4: Summary of Events and Explanation for the reporting period of 2016*

Date	Location	Constraint	Explanation
May 5, 2016	Birch Tree Lake	Water Level Variation	Change in cycling due to declining inflows from upstream of Wuskwatim Lake
May 6, 2016	Birch Tree Lake	Water Level Variation	Change in cycling due to declining inflows from upstream of Wuskwatim Lake
July 6, 2016*	Birch Tree Lake	Water Level Variation	Load transfer to Wuskwatim GS due to outages at Long Spruce and Kettle GS
July 29, 2016*	Birch Tree Lake	Water Level Variation	Increased local inflow due to rainfall event
October 4, 2016	Birch Tree Lake	Water Level Variation	Change in cycling due to declining inflows from upstream of Wuskwatim Lake

*\*exceedance not attributable to Wuskwatim operation*

Manitoba Hydro continues to investigate refinements of the operations to reduce the number of future licence limit exceedances on Wuskwatim and Birch Tree Lakes.

## 6.0 MAJOR SYSTEM UPGRADES/CHANGES

Maintenance and construction activities that occurred during the 2016 calendar year include:

- No major events to report

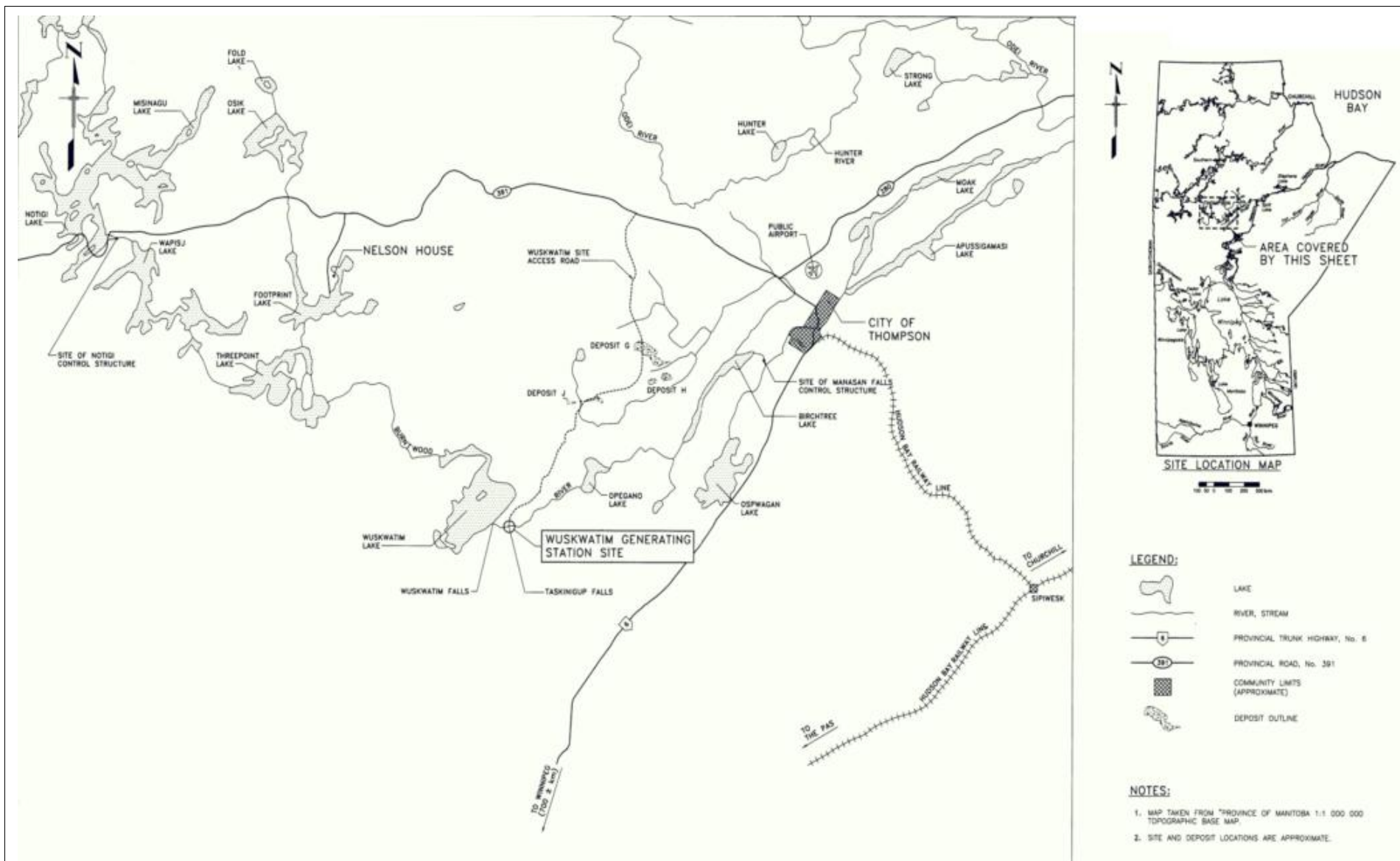
## 7.0 **CONCLUSIONS & CLOSURE**


During the January 1 to December 31, 2016 reporting period, there were three events when water levels deviated from the Water Power Act and Environment Act licence limits. Water levels were in compliance with the licences as follows:

<b>Location</b>	<b>Constraint</b>	<b>Variable</b>	<b>Exceedances Attributed to Wuskwatim Operations</b>	<b>Number of Readings</b>	<b>% Compliance</b>
Wuskwatim Lake	Max Elevation	Mean Daily Water Level	0	366	100 %
Wuskwatim Lake	Max Elevation	Hourly Water Level	0	8784	100 %
Birch Tree Lake	Water Level Variation	Mean Daily Water Level	3	366	99.18 %

Refinements to operations continue to reduce the number of future licence limit exceedances on Wuskwatim and Birch Tree lakes.

Manitoba Hydro continues to operate the Wuskwatim Generating Station in accordance with the Interim Licence under the Water Power Act for the development of water power at the Wuskwatim Site on the Burntwood River and Environment Act Licence No. 2699.



	MANITOBA HYDRO		
	HYDRAULIC OPERATIONS DEPARTMENT		
	WUSKWATIM GENERATING STATION		
DRAWN BY	LOCATION MAP		
YEAR	2017	PROJECT	ANNUAL WATER LEVEL REPORT
			FIGURE 1








	MANITOBA HYDRO		
	HYDRAULIC OPERATIONS DEPARTMENT		
	WUSKWATIM GENERATING STATION		
DRAWN BY MJD	PHOTOGRAPH OF GENERATING STATION		
YEAR 2017	PROJECT ANNUAL WATER LEVEL REPORT	FIGURE 2	

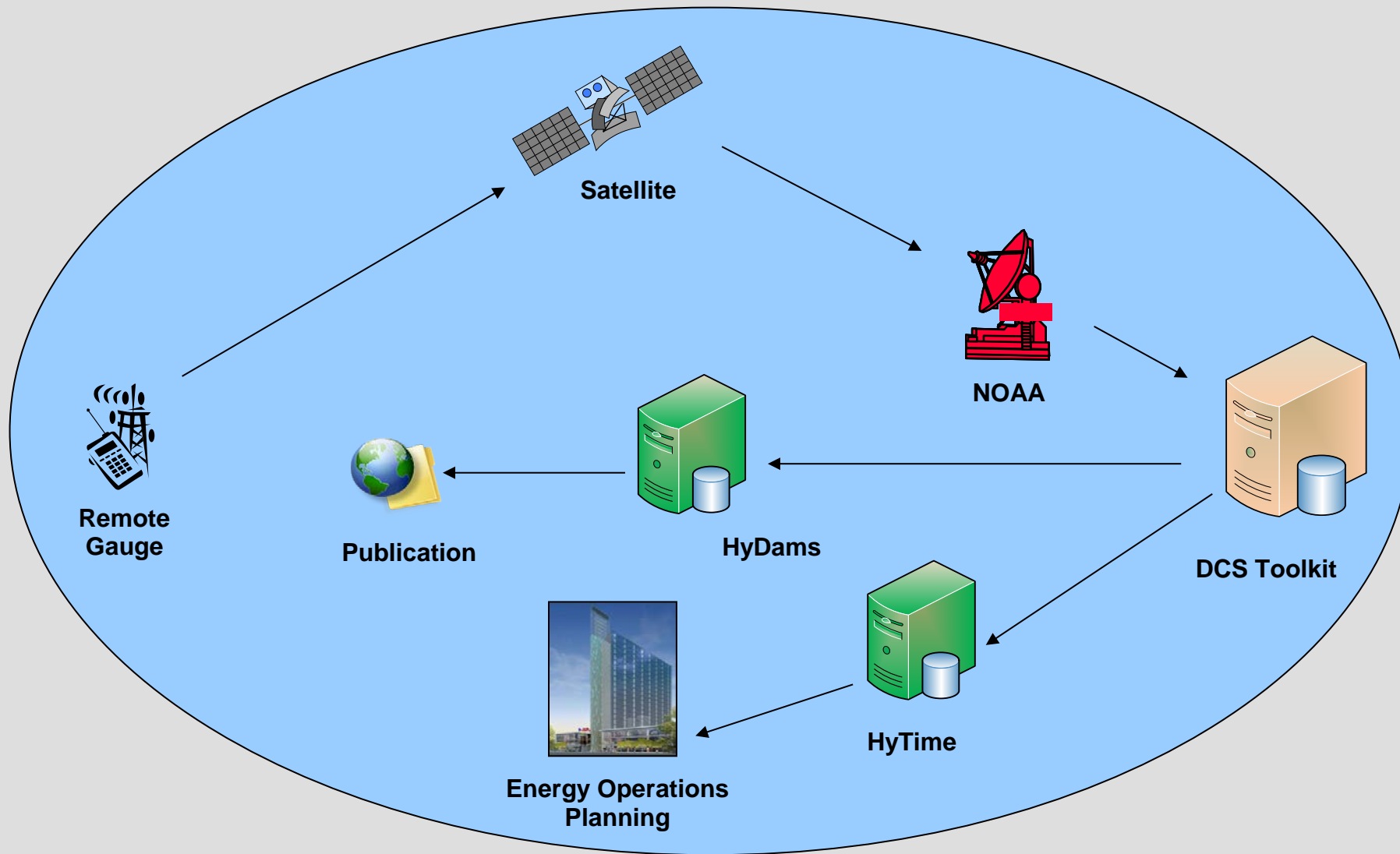





FIGURE 3



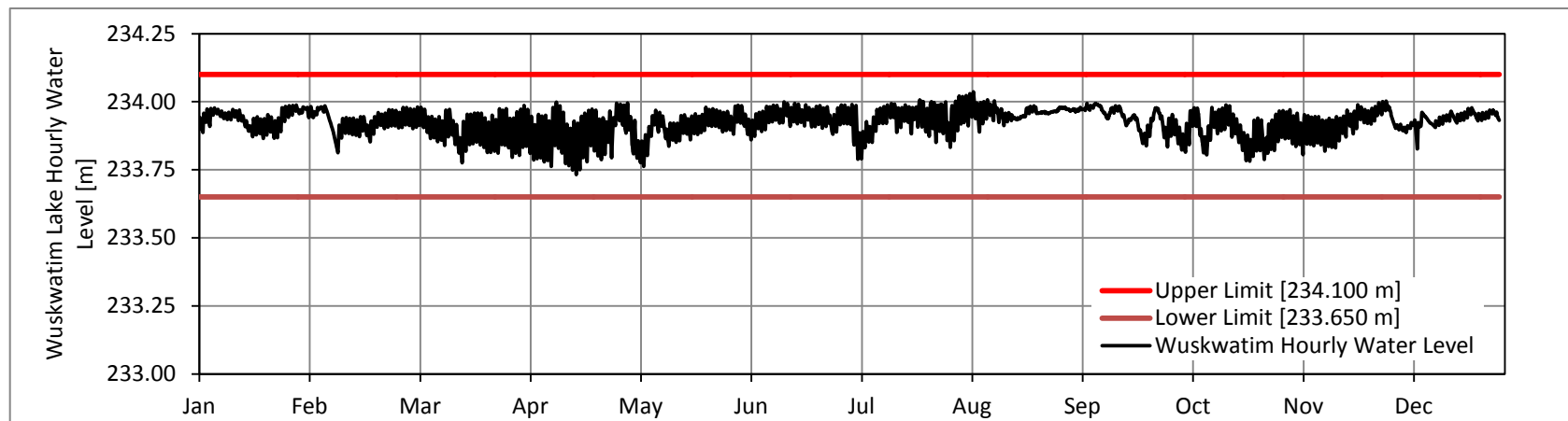
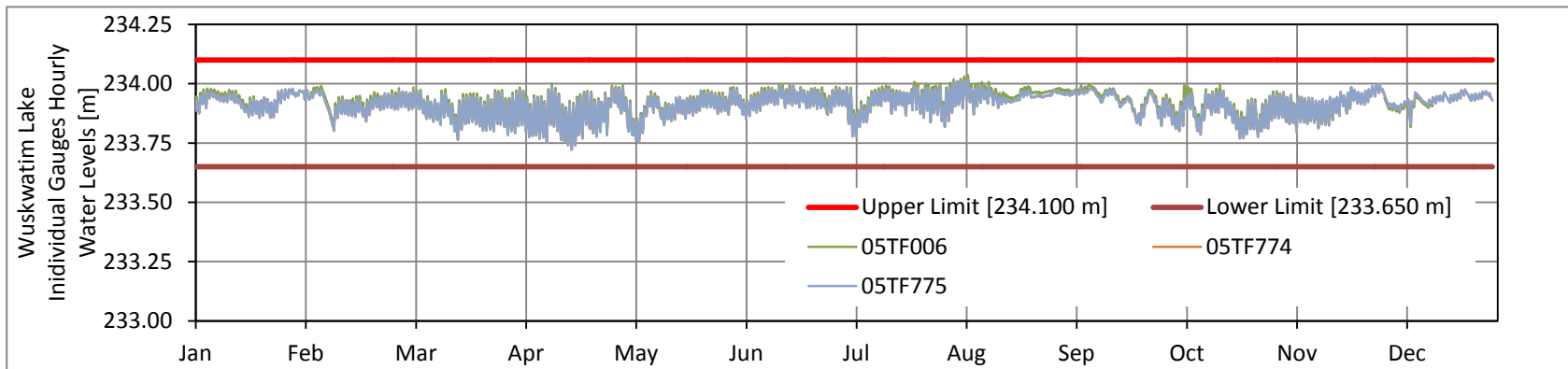




	MANITOBA HYDRO	
	HYDRAULIC OPERATIONS DEPARTMENT	
	HYDROLOGIC DATA ACQUISITION AND MANAGEMENT SYSTEM	
	REMOTE DATA PROCESS MAP	
YEAR	2016	PROJECT ANNUAL WATER LEVEL REPORT
		FIGURE 4




## Wuskwatim Generating Station - Wuskwatim Lake Hourly Water Levels Compliance Report for 2016



### Note:

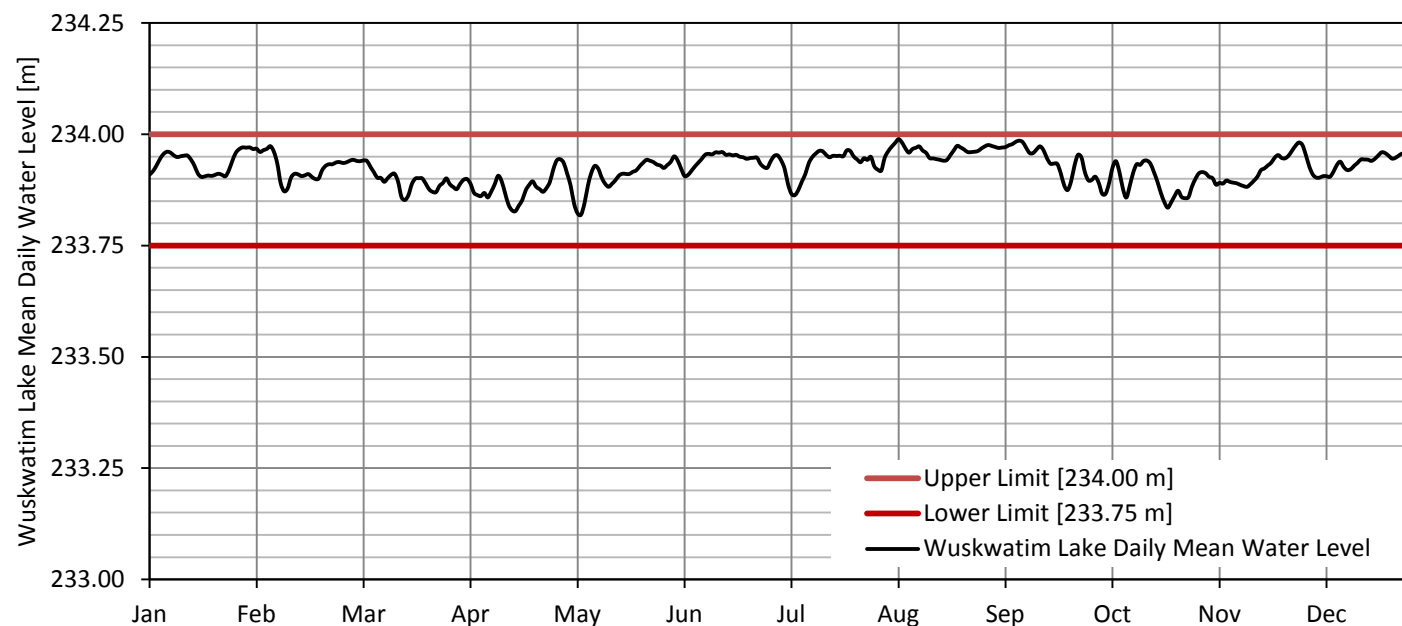
Wuskwatim Hourly Water Level is calculated using Wuskwatim Lake gauges 05TF006, 05TF774 & 05TF775.

	MANITOBA HYDRO	
	HYDRAULIC OPERATIONS DEPT.	
	WUSKWATIM GENERATING STATION	
DRAWN BY MJD	WUSKWATIM LAKE HOURLY WL (2016)	
YEAR 2017	PROJECT ANNUAL WATER LEVEL REPORT	FIGURE 5






# **Wuskwatim Generating Station - Wuskwatim Lake Mean Daily Water Level Compliance Report for 2016**

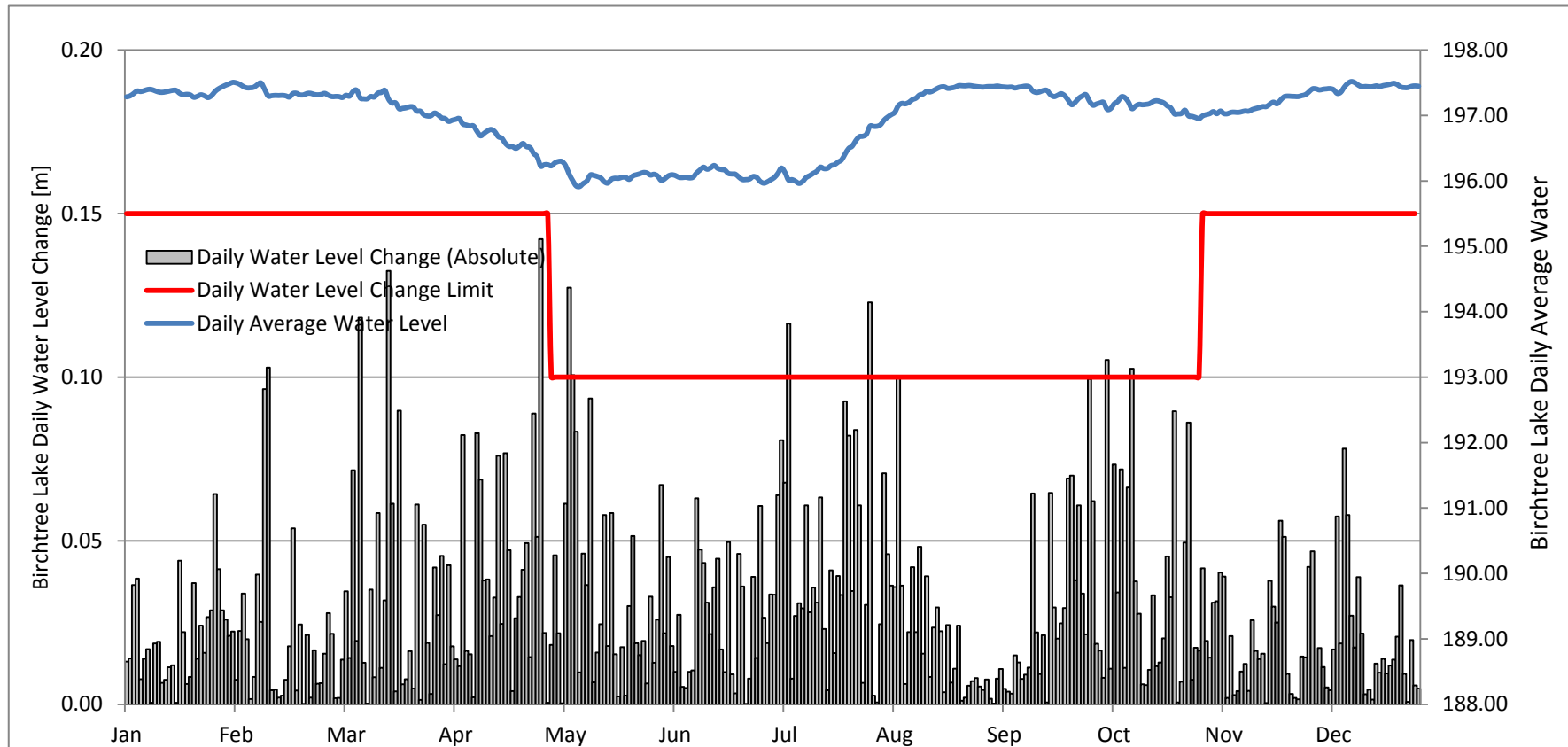


Note:  
Wuskwatim Lake Mean Daily Water Level is calculated using Wuskwatim Lake gauges 05TF006, 05TF774 & 05TF775.

	MANITOBA HYDRO	
	HYDRAULIC OPERATIONS DEPT.	
	WUSKWATIM GENERATING STATION	
DRAWN BY MJD	WUSKWATIM LAKE MEAN DAILY WL (2016)	
YEAR 2017	PROJECT ANNUAL WATER LEVEL REPORT	FIGURE 6




# **Wuskwatim Generating Station - Birchtree Lake Daily Water Level Change Compliance Report for 2016**



## **Note:**

The Birchtree Lake Daily Water Level Change is calculated using Birchtree Lake gauges 05TG701 & 05TG746.

The daily water level change limit is equal to 0.1 m in open water conditions (May 1 to October 31) and 0.15 m in winter conditions

	MANITOBA HYDRO	
	HYDRAULIC OPERATIONS DEPT.	
	WUSKWATIM GENERATING STATION	
DRAWN BY MJD	BIRCHTREE LAKE DAILY WL CHANGE (2016)	
YEAR 2017	PROJECT ANNUAL WATER LEVEL REPORT	FIGURE 7



**APPENDIX I**  
**CORRESPONDENCE WITH MANITOBA SUSTAINABLE**  
**DEVELOPMENT**





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2016 05 12

Mr. R. Matthews, P.Geo.  
Manager, Water Use Licensing  
Department of Sustainable Development  
200 Saulteaux Crescent  
Winnipeg MB R3J 3W3

Dear Mr. Matthews:

**WUSKWATIM GENERATING STATION - BIRCH TREE LAKE ENVIRONMENT ACT LICENCE -  
MEAN DAILY WATER LEVEL VARIATION ABOVE LICENCE LIMIT**

On May 5 and 6, 2016, the mean daily water level variations on Birch Tree Lake were above the licence limit specified in clause 30 (b) of *The Environment Act* Licence No. 2699.

The Birch Tree Lake daily water level changes were 0.113 and 0.107 on May 5 and 6 respectively (Figure 1). Clause 30(b) of *The Environment Act* Licence No. 2699 limits mean daily water level variations on Birch Tree Lake to 0.10 metres under open water conditions. Hydraulic Operations Department is investigating the incident and we will advise you of the outcome.

If you have any questions about this matter, please call me at (204) 360-3018.

Yours truly,

Original signed by; *Wesley Penner*

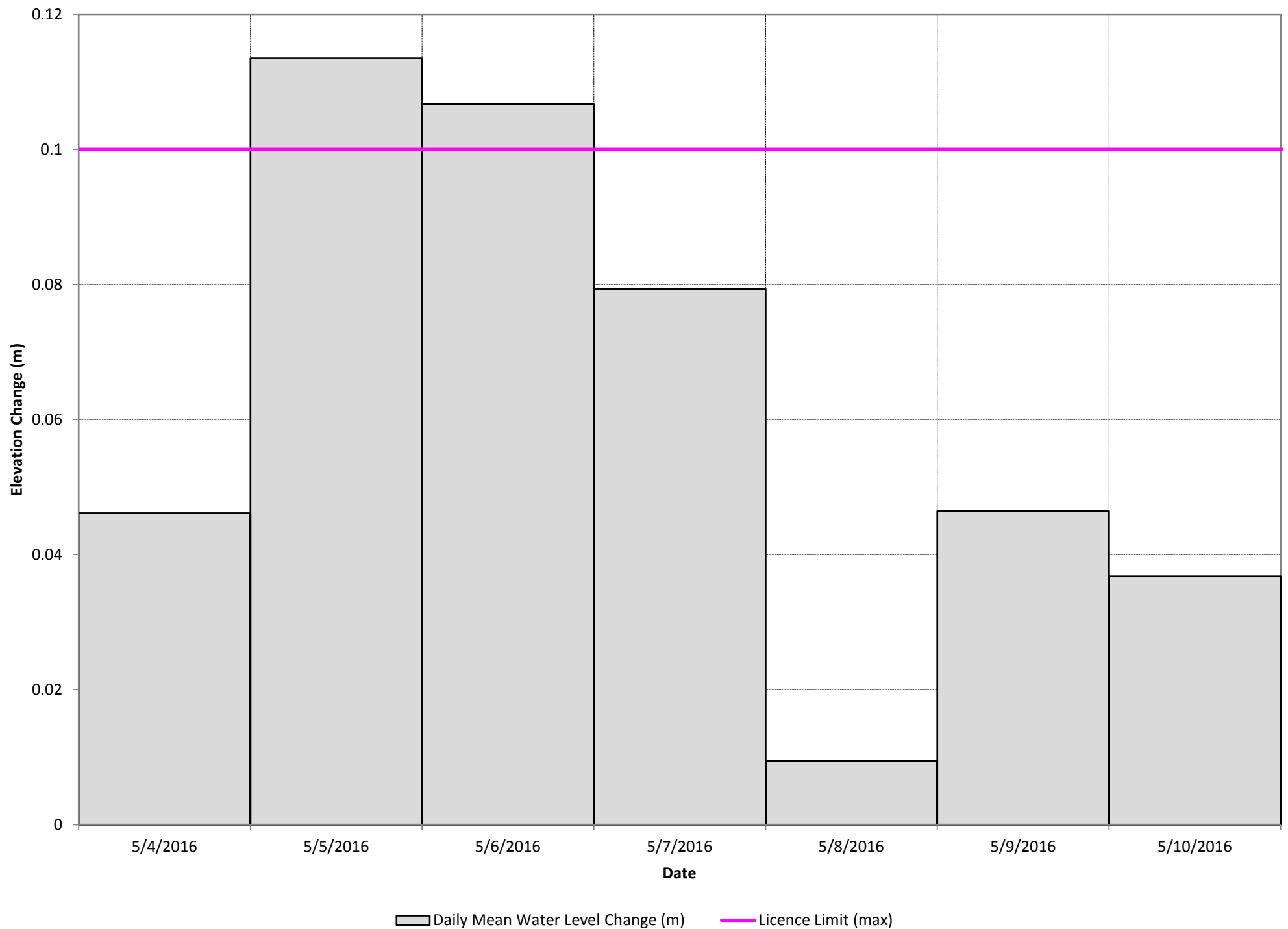
W.V. Penner, P. Eng.  
Manager  
Hydraulic Operations Department

MJD/sl/00184-07311-0050\_00  
Att.





**Figure 1: Birchtree Lake Daily Water Level Change -- 7 Day Elevation Licence Compliance**







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2017 02 17

R. Matthews, P.Geo.  
Manager, Water Use Licensing  
Manitoba Sustainable Development  
200 Saulteaux Crescent  
Winnipeg MB R3J 3W3

Dear Mr. Matthews:

**WUSKWATIM GENERATING STATION - ENVIRONMENT ACT LICENCE - BIRCH TREE LAKE -  
MEAN DAILY WATER LEVEL VARIATION ABOVE LICENCE LIMIT**

The mean daily water level variations on Birchtree Lake were above the licence limit specified in clause 30 (b) of *The Environment Act* Licence No. 2699 as described below. This letter supplements our May 12, 2016 report regarding this incident.

The Birch Tree Lake daily water level changes were 0.113 and 0.107 metres (m) on May 5 and 6 respectively (Figure 1). The licence limits mean daily water level variations on Birch Tree Lake to 0.10 m under open water conditions.

Declining inflows from upstream caused the water level at Wuskwatim Lake to drop (Figure 2). To stop the decline, the cycling pattern was adjusted to reduce overall outflow. This flow reduction caused the Birch Tree lake level to drop and exceeded the mean daily water level variation on the dates mentioned above.

If you have any questions about this matter, please call me at 204-360-3018.

Yours truly,

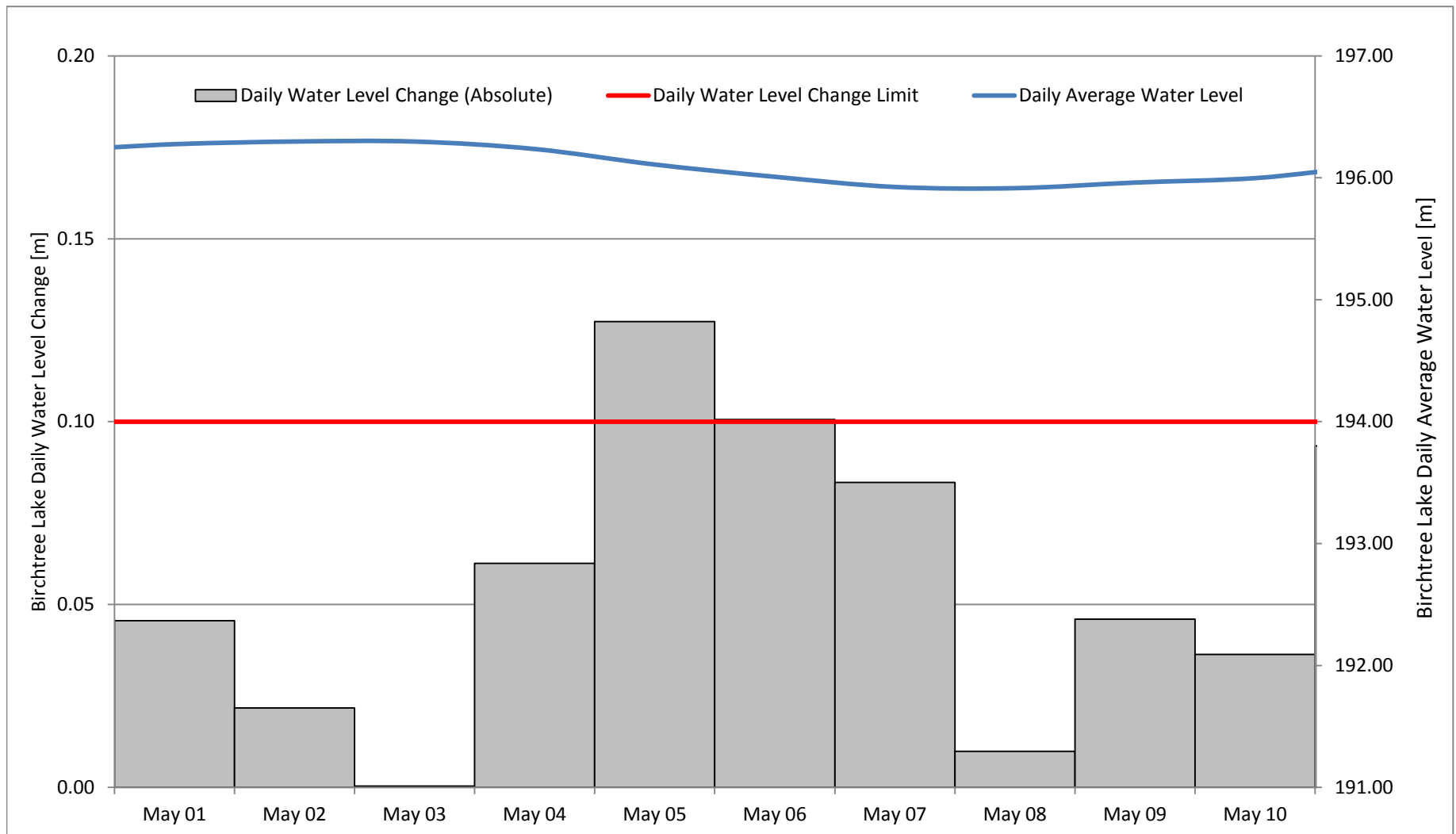
Original signed by, *Wesley Penner*

W.V. Penner, P. Eng.  
Manager  
Hydraulic Operations Department

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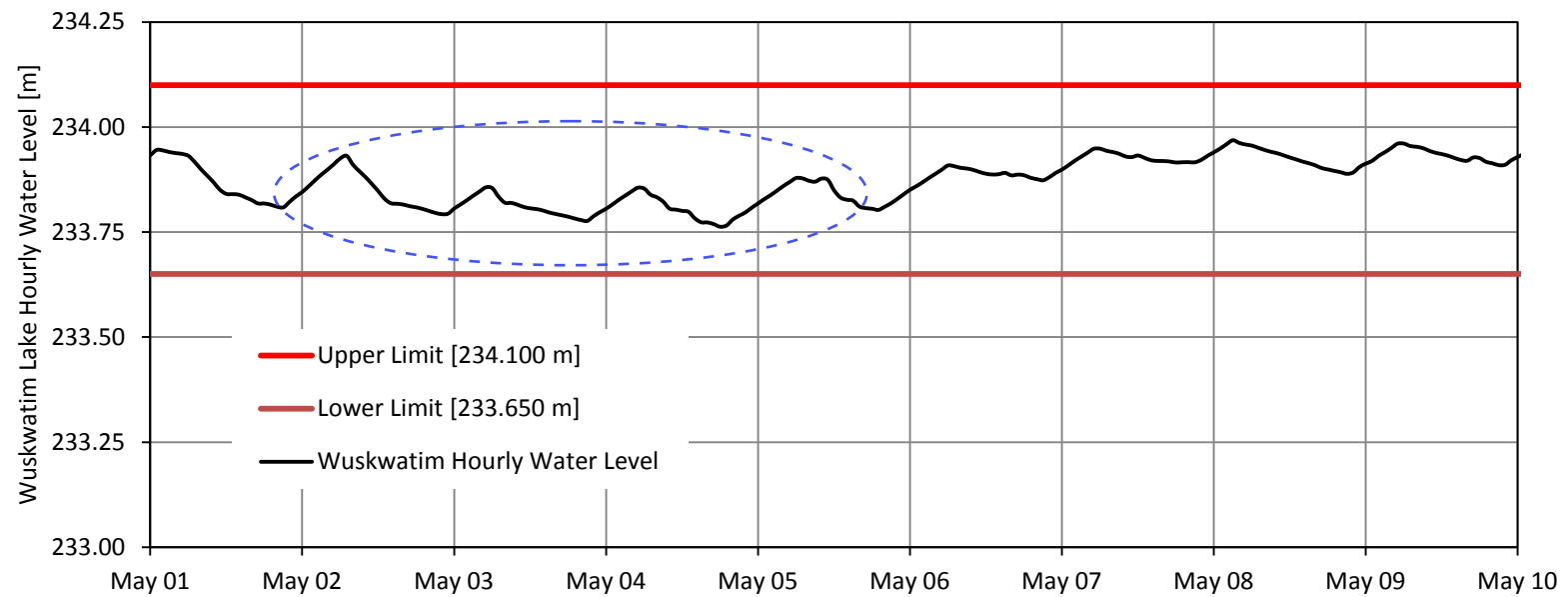
**Figure 1: Wuskwatim Generating Station - Birchtree Lake Daily Water Level Change May 2016**



Note: The Birchtree Lake Daily Water Level Change is calculated using Birchtree Lake gauges 05TG701 & 05TG746  
The daily water level change limit is equal to 0.1 m in open water conditions (May 1 to October 31) and 0.15 m in winter conditions (November 1 to April 30)



Figure 2: Wuskwatim Generating Station - Wuskwatim Lake Hourly Water Levels May 2016









360 Portage Ave (16) • Winnipeg Manitoba Canada • R3C 0G8  
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wpenner@hydro.mb.ca

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2016 07 19

R. Matthews, P.Geo.  
Manager, Water Use Licensing  
Department of Sustainable Development  
200 Saulteaux Crescent  
Winnipeg MB R3J 3W3

Dear Mr. Matthews:

**WUSKWATIM GENERATING STATION - ENVIRONMENT ACT LICENCE - BIRCH TREE LAKE  
MEAN DAILY WATER LEVEL VARIATION ABOVE LICENCE LIMIT**

On July 06, 2016, the mean daily water level variation on Birch Tree Lake was above the licence limit specified in clause 30 (b) of *The Environment Act* Licence No. 2699.

The Birch Tree Lake daily water level change was 0.116 m on July 06, 2016 (Figure 1). Clause 30(b) of *The Environment Act* Licence No. 2699 limits mean daily water level variations on Birch Tree Lake to 0.10 metres under open water conditions. Hydraulic Operations Department is investigating the incident and we will advise you of the outcome.

If you have any questions about this matter, please call me at (204) 360-3018.

Yours truly,

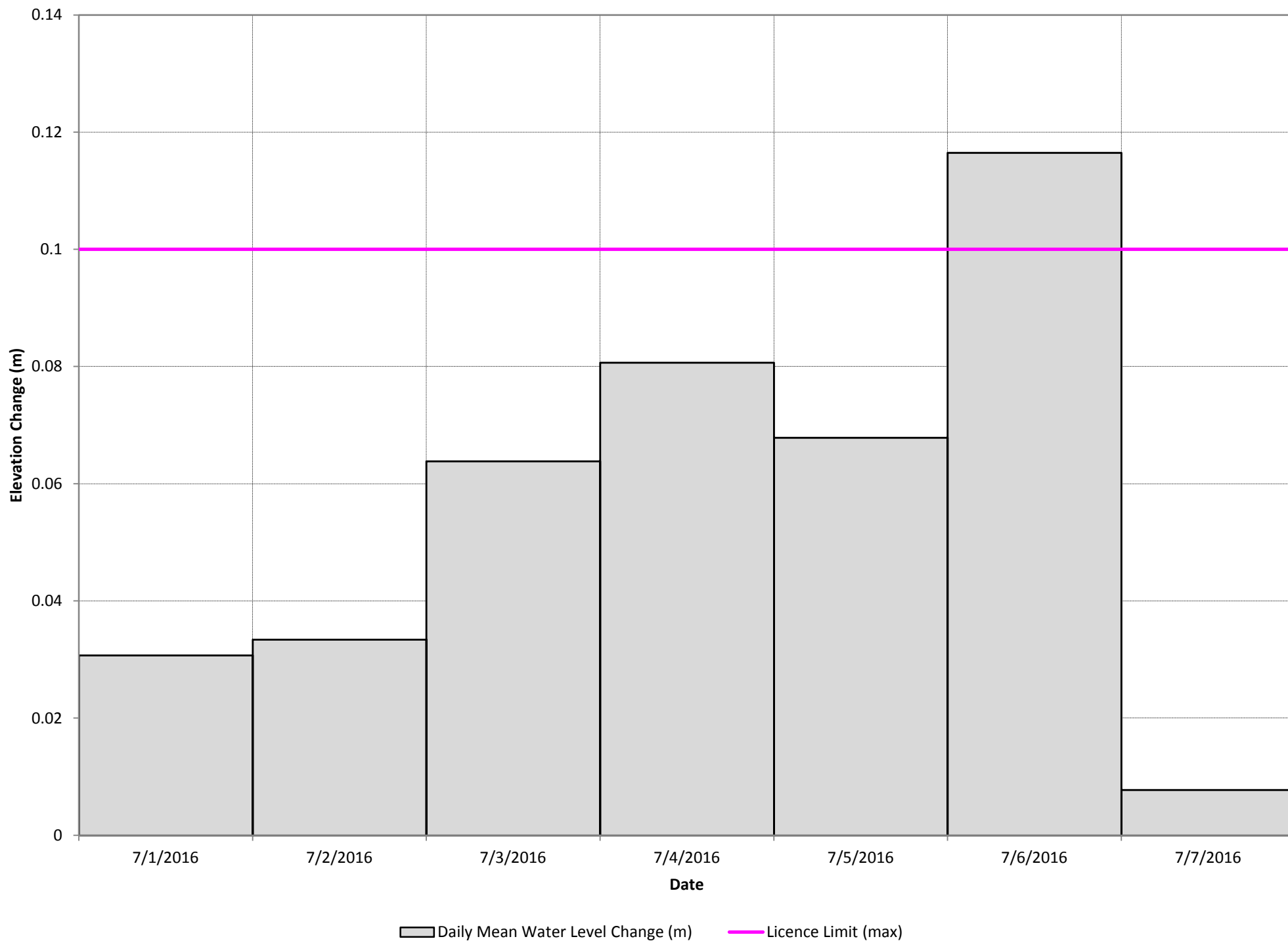
Original signed by, *Wesley Penner*

W.V. Penner, P. Eng.  
Manager  
Hydraulic Operations Department

MJD/sl/00184-07311-0052\_00  
Encl.



**Figure 1: Birchtree Lake Daily Water Level Change --7 Day Elevation Licence Compliance**





2017 02 17

R. Matthews, P.Geo.  
Manager, Water Use Licensing  
Manitoba Sustainable Development  
200 Saulteaux Crescent  
Winnipeg MB R3J 3W3

Dear Mr. Matthews:

**WUSKWATIM GENERATING STATION - ENVIRONMENT ACT LICENCE - BIRCH TREE LAKE -  
MEAN DAILY WATER LEVEL VARIATION ABOVE LICENCE LIMIT**

Mean daily water level variation on Birchtree Lake was above the licence limit specified in clause 30 (b) of *The Environment Act* Licence No. 2699 as described below. This letter supplements our July 11, 2016 report regarding this incident.

The Birch Tree Lake daily water level change was 0.116 metres (m) on July 06, 2016 (Figure 1). The licence limits mean daily water level variations on Birch Tree Lake to 0.10 metres under open water conditions. This exceedance was caused by unusual operation of Wuskwatim Generating Station to accommodate the outages at Long Spruce and Kettle Generating Stations.

On July 3, one unit at Long Spruce GS and two units at Kettle GS were forced out of service due to a faulty breaker. The outages prompted the transmission system operator to transfer the load to Unit 3 of Wuskwatim GS. This changed the cycling pattern at Wuskwatim from two units to three units running during the day. The increased station outflow elevated the Birch Tree Lake water level on July 4 and 5 and it declined on July 6 when Wuskwatim returned to its previous cycling operation. This operation caused the water level daily variation exceedance on July 6 as stated above. The July 6 exceedance is not considered a licence violation because of the emergency nature of the incident.

Wuskwatim Lake hourly and mean daily water level was maintained within the licence limit during this period (Figure 2 and 3).

If you have any questions about this matter, please call me at 204-360-3018.

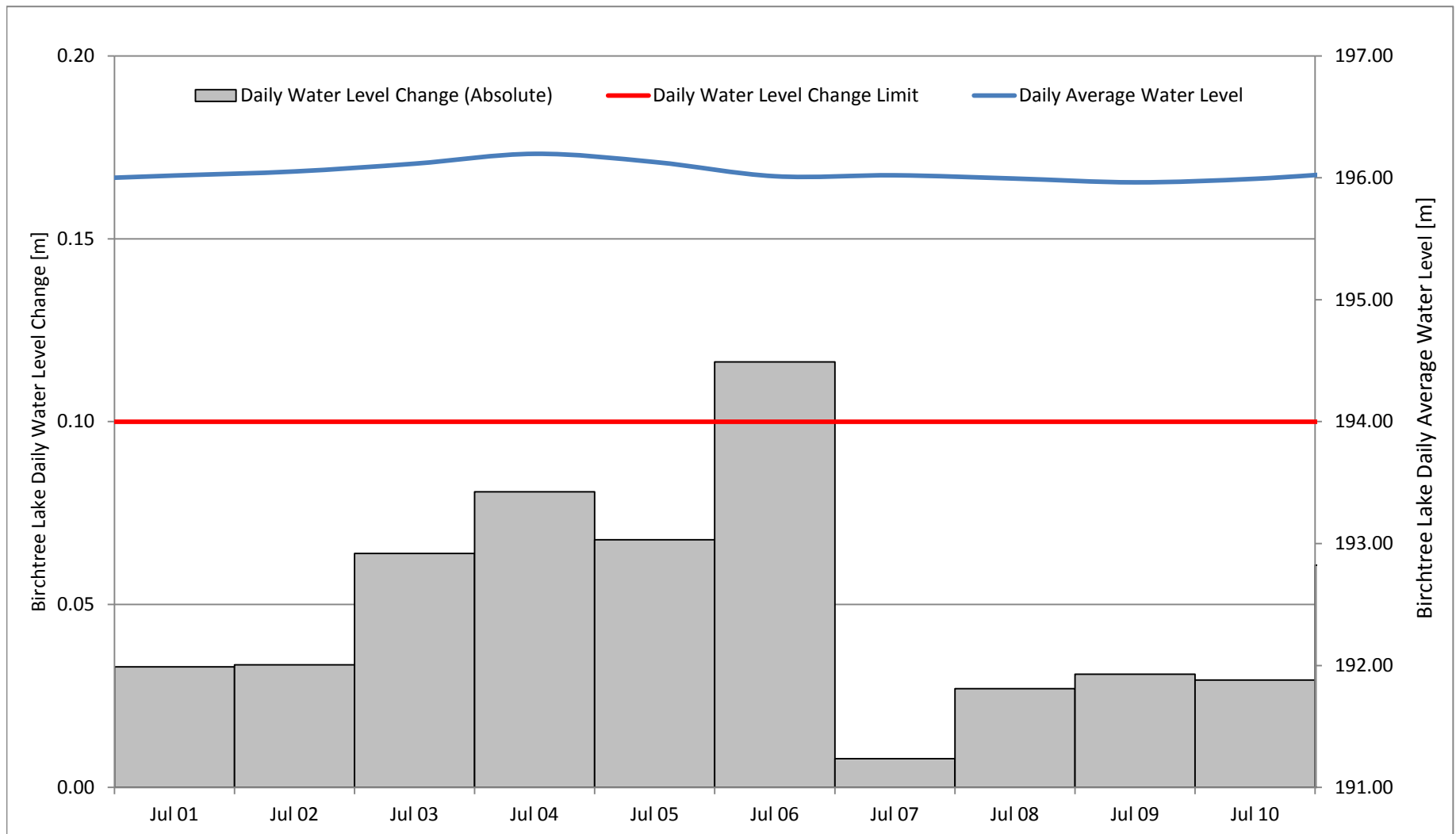
Yours truly,

Original signed by, *Wesley Penner*

W.V. Penner, P. Eng.  
Manager  
Hydraulic Operations Department

MJD/sl/00184-07311-0057\_00  
Att.

**Figure 1: Wuskwatim Generating Station - Birchtree Lake Daily Water Level Change July 2016**



Note: The Birchtree Lake Daily Water Level Change is calculated using Birchtree Lake gauges 05TG701 & 05TG746  
The daily water level change limit is equal to 0.1 m in open water conditions (May 1 to October 31) and 0.15 m in winter conditions (November 1 to April 30)





Figure 2: Wuskwatim Generating Station - Wuskwatim Lake Hourly Water Levels July 2016

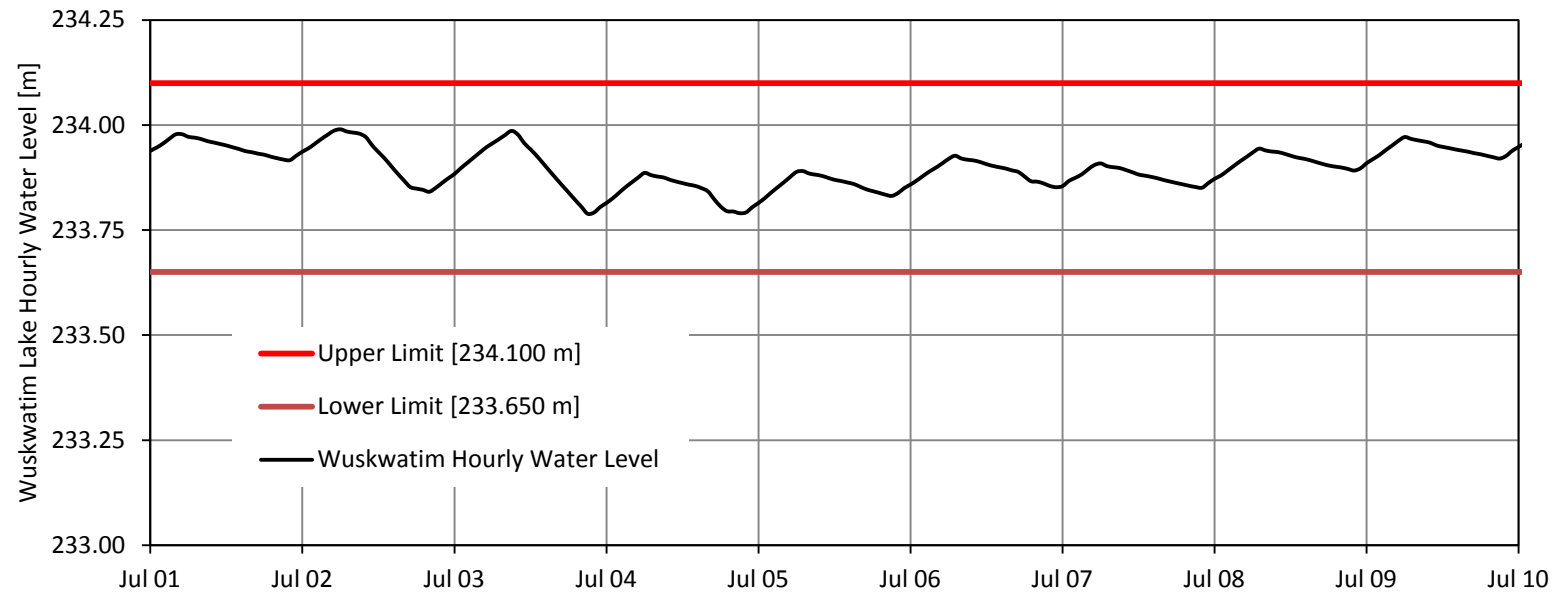
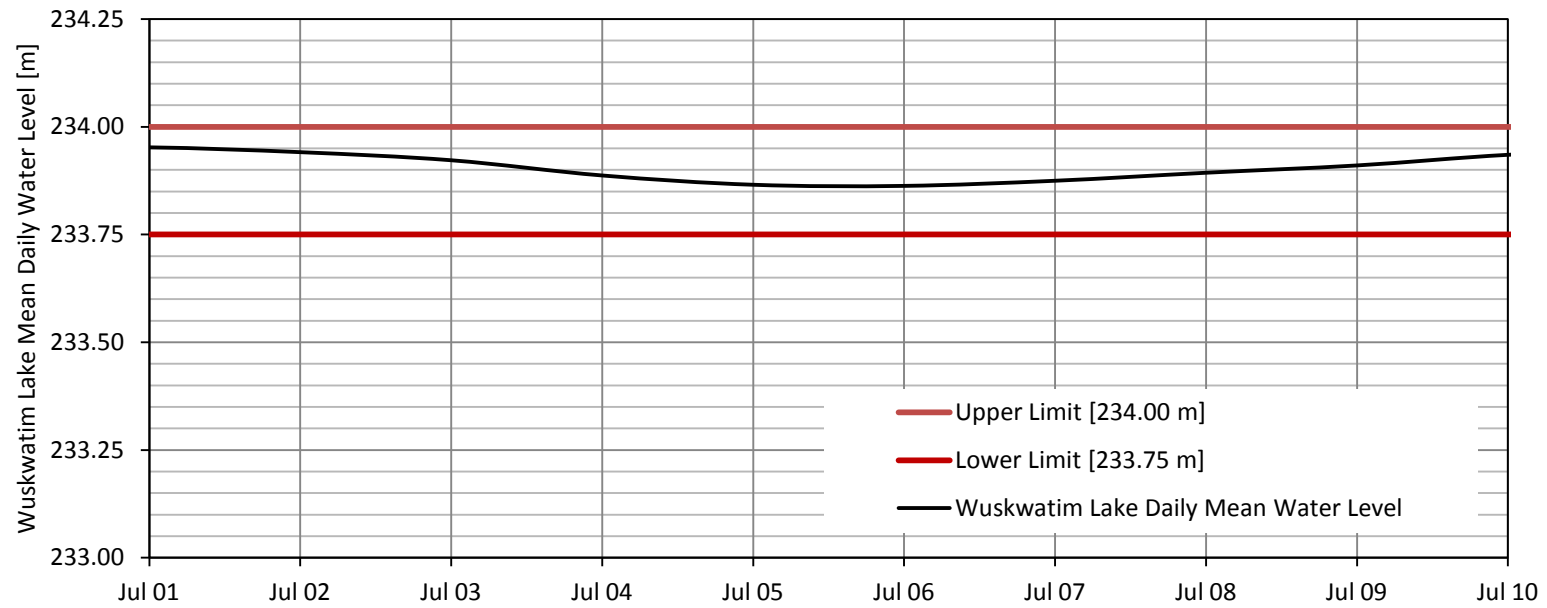




Figure 3: Wuskwatim Generating Station - Wuskwatim Lake Mean Daily Water Level







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2016 08 03

R. Matthews, P.Geo.  
Manager, Water Use Licensing  
Department of Sustainable Development  
200 Saulteaux Crescent  
Winnipeg MB R3J 3W3

Dear Mr. Matthews:

**WUSKWATIM GENERATING STATION - ENVIRONMENT ACT LICENCE - BIRCH TREE LAKE  
MEAN DAILY WATER LEVEL VARIATION ABOVE LICENCE LIMIT**

On July 29, 2016, the mean daily water level variation on Birch Tree Lake was above the licence limit specified in clause 30 (b) of *The Environment Act* Licence No. 2699.

The Birch Tree Lake daily water level change was 0.12 m on July 29, 2016 (Figure 1). Clause 30(b) of *The Environment Act* Licence No. 2699 limits mean daily water level variations on Birch Tree Lake to 0.10 metres under open water conditions. Hydraulic Operations Department is investigating the incident and we will advise you of the outcome.

If you have any questions about this matter, please call me at (204) 360-3018.

Yours truly,

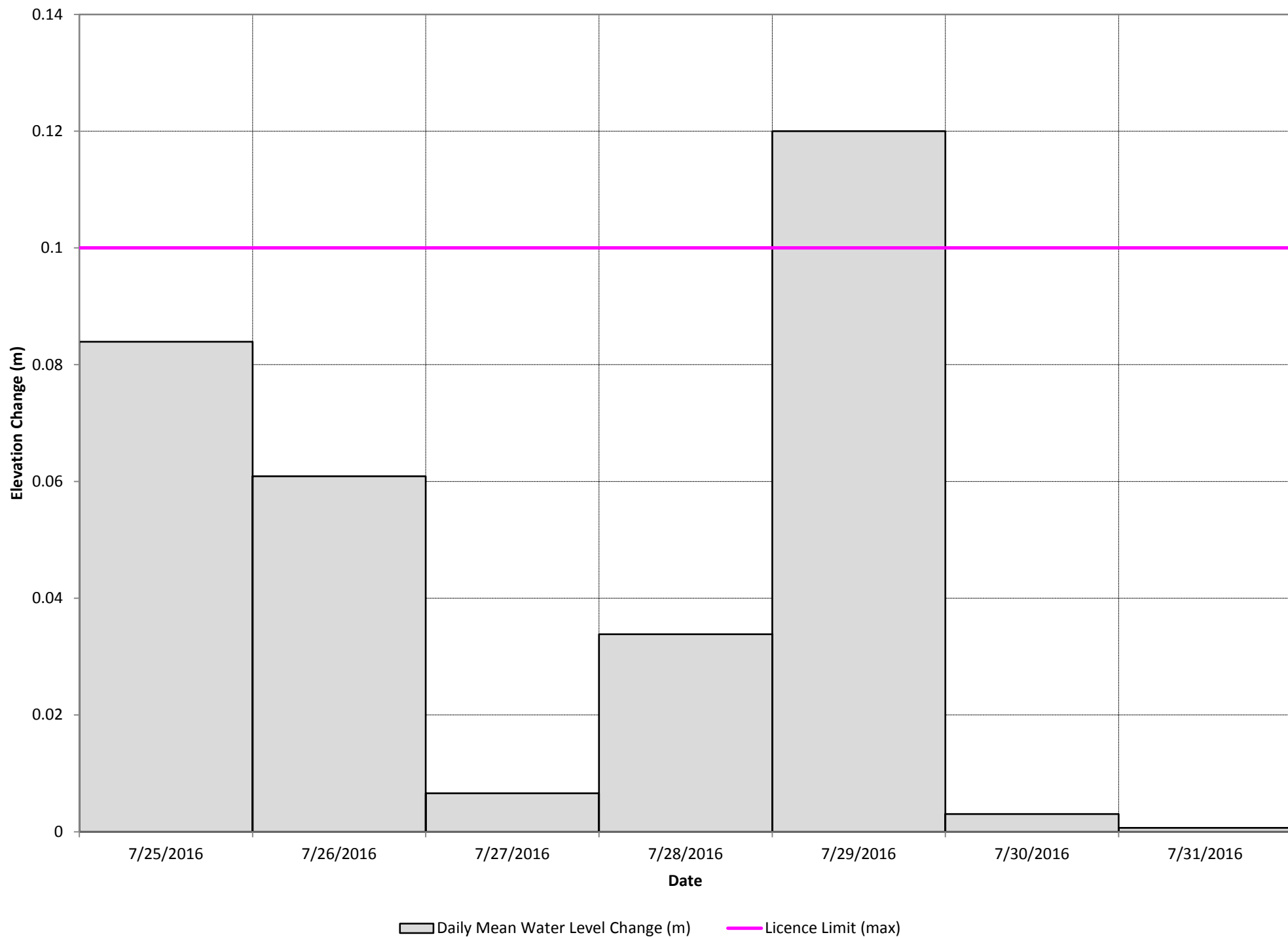
Original signed by; *Wesley Penner*

W.V. Penner, P. Eng.  
Manager  
Hydraulic Operations Department

MJD/sl/00184-07311-0054\_00



**Figure 1: Birchtree Lake Daily Water Level Change -- 7 Day Elevation Licence Compliance**







2017 02 24

R. Matthews, P.Geo.  
Manager, Water Use Licensing  
Manitoba Sustainable Development  
200 Saulteaux Crescent  
Winnipeg MB R3J 3W3

Dear Mr. Matthews:

**WUSKWATIM GENERATING STATION - ENVIRONMENT ACT LICENCE - BIRCH TREE LAKE  
MEAN DAILY WATER LEVEL VARIATION ABOVE LICENCE LIMIT**

On July 29, 2016, the mean daily water level variation on Birch Tree Lake was above the licence limit specified in clause 30 (b) of *The Environment Act* Licence No. 2699 (Licence). This letter supplements our August 3, 2016 report regarding these incidents.

The Birch Tree Lake daily water level change was 0.12 metres (m) on July 29, 2016 (Figure 1). The licence limits mean daily water level variations on Birch Tree Lake to 0.10 m under open water conditions. The July 29 incident occurred during a significant regional rainfall event.

Twenty millimetres of rainfall from July 28 to 29 increased the local inflow and elevated the Birch Tree Lake water level. Neither Wuskwatim tailrace nor Opegano Lake demonstrated similar water level rises at this time. The increased local inflow to Birch Tree Lake caused the mean daily water level variation as stated above. For this reason, the July 29 incident is not considered a licence violation.

If you have any questions about this matter, please call me at 204-360-3018

Yours truly,

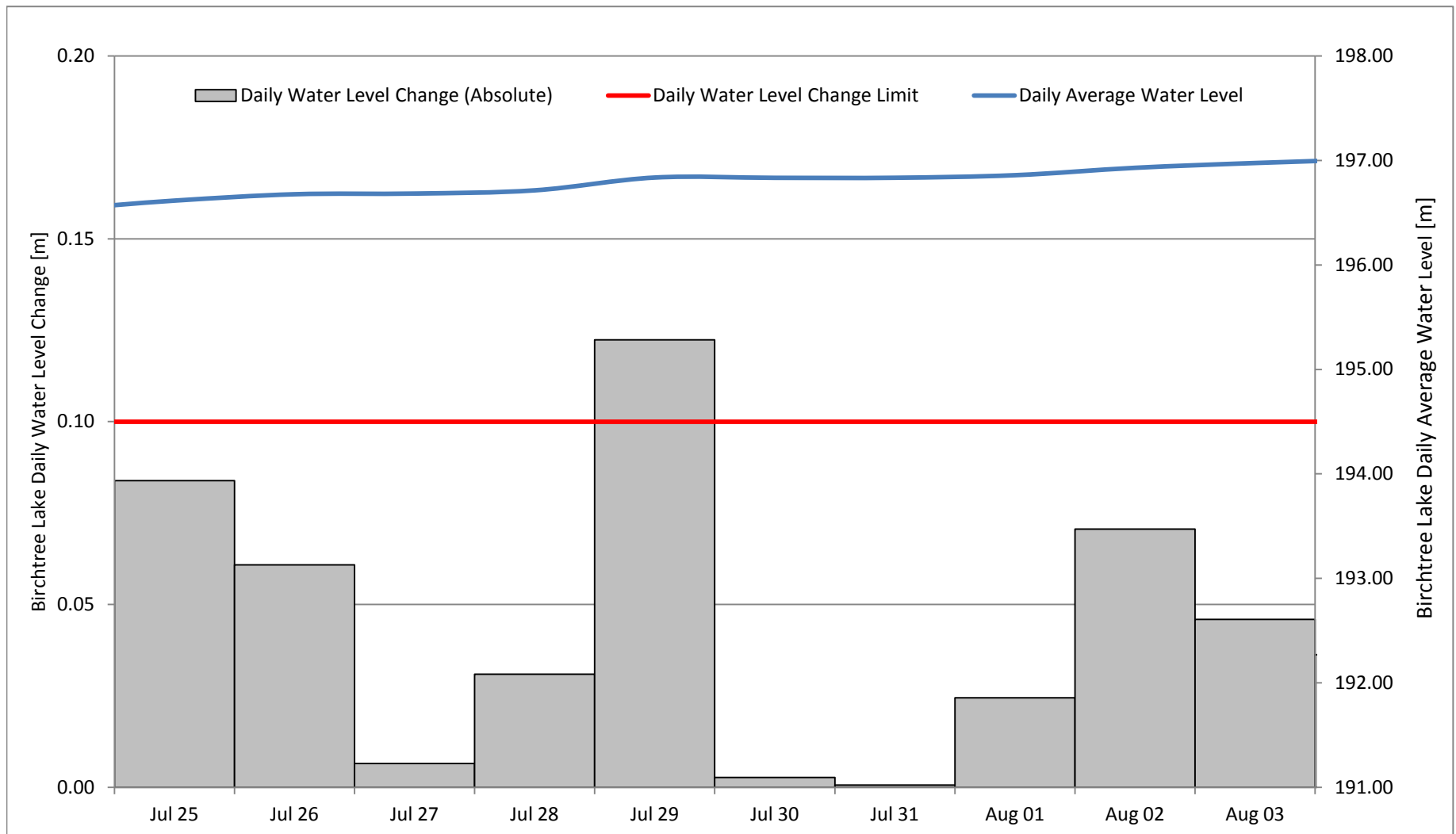
Original signed by, *Wesley Penner*

W.V. Penner, P. Eng.  
Manager  
Hydraulic Operations Department

MJD/sl/00184-07311-0058\_00  
Att.



**Figure 1: Wuskwatim Generating Station - Birchtree Lake Daily Water Level Change July 2016**



Note: The Birchtree Lake Daily Water Level Change is calculated using Birchtree Lake gauges 05TG701 & 05TG746  
The daily water level change limit is equal to 0.1 m in open water conditions (May 1 to October 31) and 0.15 m in winter conditions (November 1 to April 30)

