Halifax Regional Water Commission

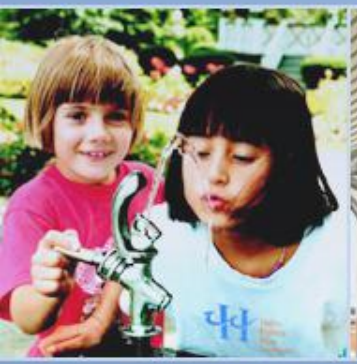
Emergency Repairs at the Lake Major Dam Fish Ladder

ARC2016

November 9, 2016

John Eisnor, P.Eng.

Operations Engineer, Water Services Department



Dam Management at Halifax Water

- **Halifax Water owns and operates six dams as part of the water supply system**
- **Follow Canadian Dam Association's (CDA) *Dam Safety Guidelines***
  - Complete dam safety reviews (DSR) every seven years
  - Routine dam inspection program
  - Emergency Preparedness Plans and Inundation Mapping

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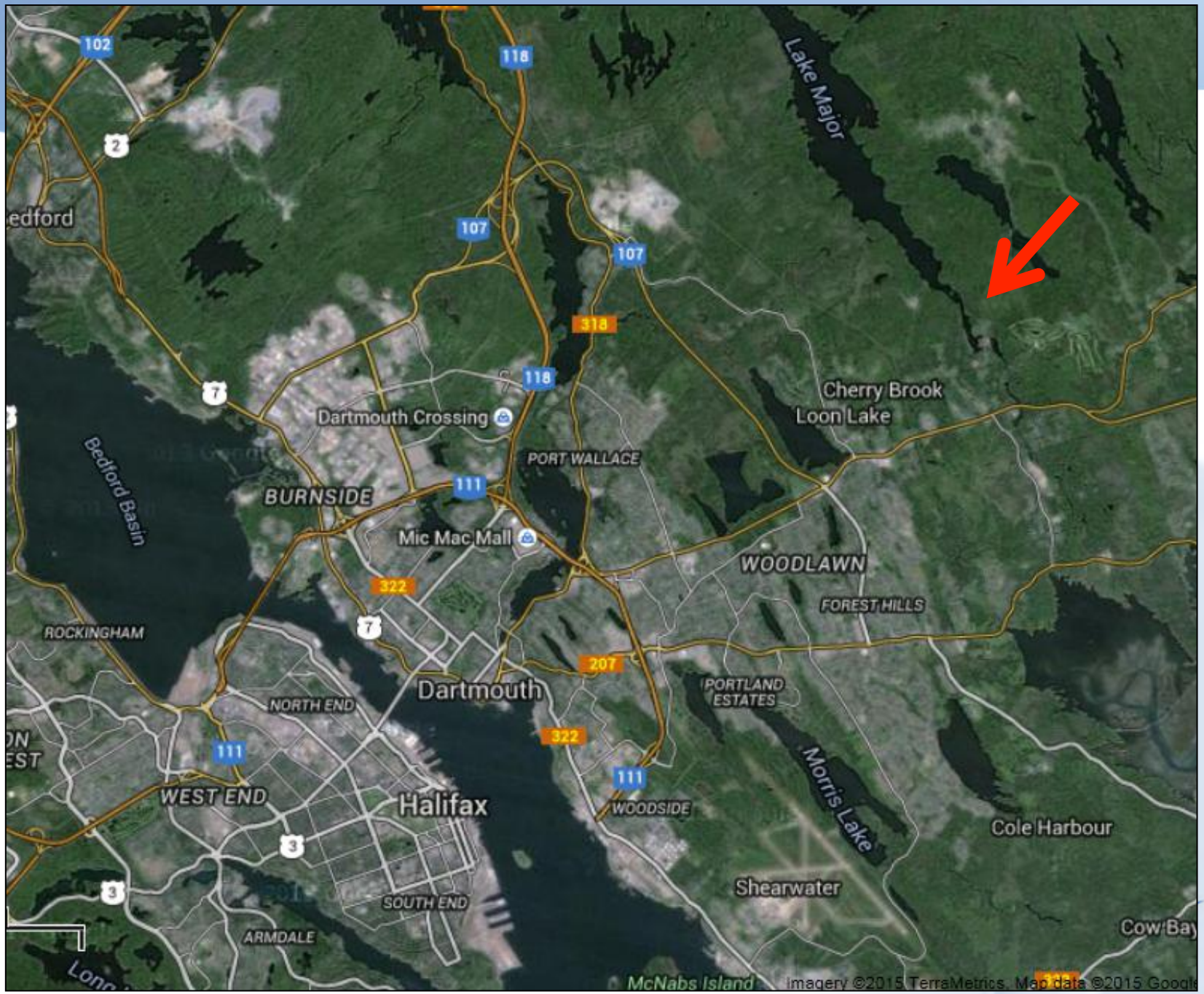

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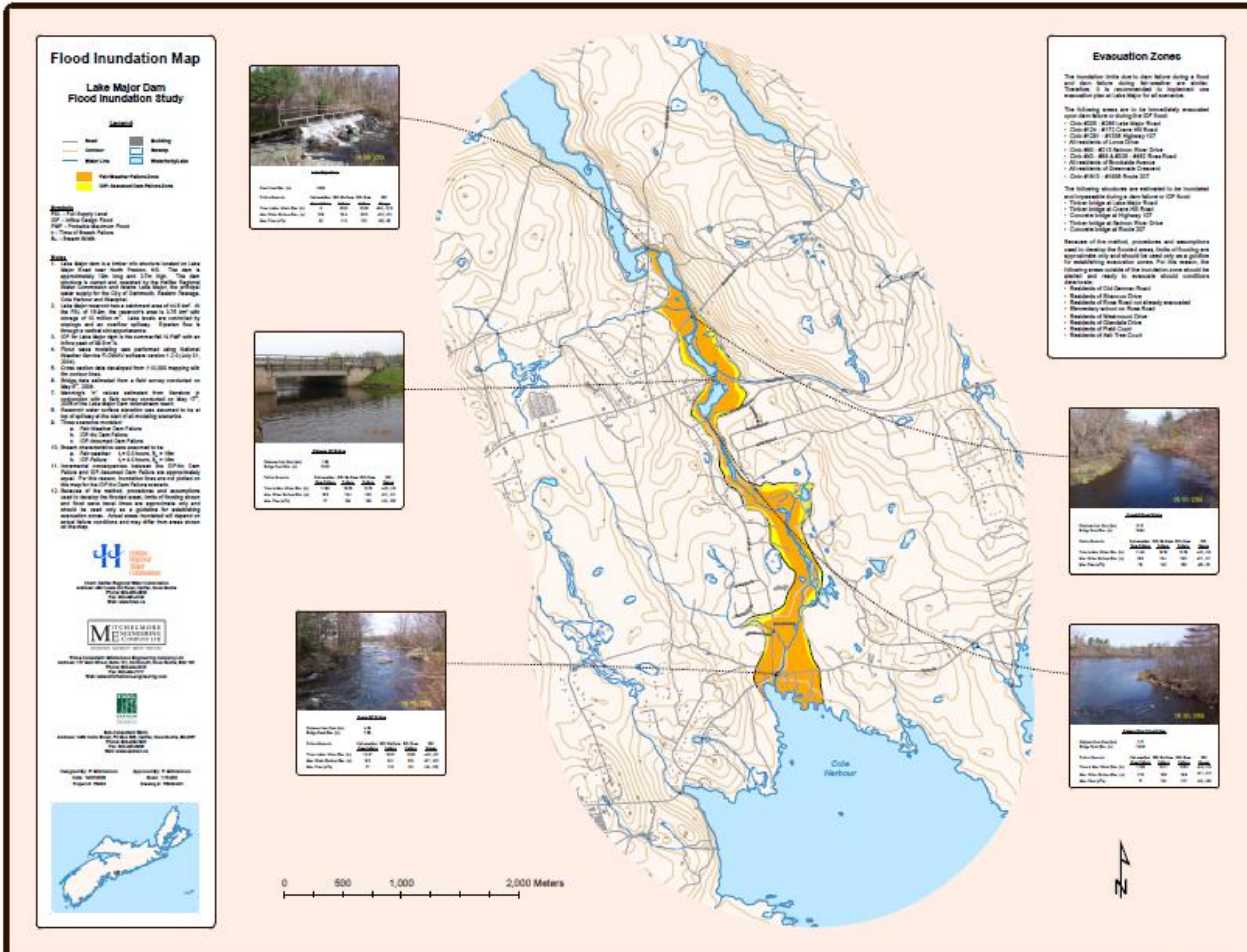
September 1, 2011


September 1, 2011


Flood Inundation Map
Lake Major Dam
Flood Inundation Study
Legend
Evacuation Zones
Cole Harbour
0
500
1,000
2,000 Meters
N

Design of a New Dam

- **2012 DSR recommended replacing the dam as soon as possible**
  - Rotting timber
  - Leakage
  - Deteriorating fish ladder
- **Conceptual design started in August 2014**
- **Detailed design started in October 2016**
- **Anticipated construction of a new dam is the 2017 construction season**

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Stabilizing the Existing Dam

- **Completed a Probable Failure Mode Analysis (PFMA) of the dam in August 2014**
- **PFMA report recommended to reinforce/rebuild the fish ladder**
  - Initial design work started in November 2014 began
  - Planned to meet with NSE and DFO

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December 11, 2014

107 mm rain fell in a 48 hour period (Halifax Intl Airport)


December 11, 2014


December 11, 2014


December 11, 2014


December 11, 2014


January 15, 2015


January 15, 2015


January 15, 2015


January 15, 2015


January 16, 2015
2015/01/16

Emergency Response Coordination – January 16

- Halifax Water advises Halifax's Emergency Operations Centre (EOC) of the risks and consequences of the repair operation before noon
- Initial meeting at 1:00 PM to discuss the situation and the merits of an evacuation
- Second meeting at 4:00 PM to make a decision on evacuation
- A press conference was held at 5:30 PM so that we could make the suppertime newscast

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Planned Emergency Measures

- 135 homes in and around the inundation zone to be evacuated
- Three bridges in the inundation zone would be closed
- Two bridges would remain open with police on stand-by
- Comfort centres established on both sides of the river
- Halifax Water staff were on standby to activate the Lake Lamont Emergency Supply and the bridge line to bring water from Halifax

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January 17, 2015
2015/01/17


January 17, 2015
Bobcat


January 17, 2015


January 17, 2015
KOBELCO

Ongoing Operation of Dam

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Nova Scotia drought unusual, catches people unprepared

'People aren't as familiar with managing through drought situations'

By Rachel Ward, CBC News Posted: Sep 18, 2016 7:47 AM AT | Last Updated: Sep 18, 2016 7:47 AM AT

CANADA September 16, 2016 3:29 pm Updated: September 16, 2016 4:58 pm

Drought reaches 1,000 families in southwestern Nova Scotia

By Natasha Pace
Reporter Global News

News / Halifax

Halifax Water implements mandatory water restrictions over critically low levels

CBC news | Nova Scotia

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Windsor residents ordered to conserve water to avoid 'critical' shortage

Order affects thousands of people in Hants County as conditions 'worsen on a daily basis.'

By Paul Palmeter, CBC News Posted: Sep 16, 2016 6:05 PM AT | Last Updated: Sep 16, 2016 6:05 PM AT

The water level at Mill Lake, which serves as Windsor's water supply, has dropped by more than 60 centimetres since the spring. (Paul Palmeter/CBC)

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Drought Timeline

- **July 12 – 19.00 m**
  - Highest level of the summer
- **August 11 – 18.82 m**
  - Activated siphons
- **August 20 – 18.78 m**
  - Lake stops spilling
- **September 6 – 18.56 m**
  - Siphons stop working – Out of compliance
- **September 19 – 18.42 m**
  - Water restrictions enacted
- **October 9 – 18.28 m**
  - Historic low water level
- **October 10 – 18.29 m**
  - 90 mm of rain
- **October 21 – 18.58 m**
  - 68 mm of rain
- **October 24 – 18.89 m**
  - Water restrictions lifted
  - Dam is spilling
  - In compliance
- **October 28 – 19.05 m**
  - 37 mm of rain
- **November 8 – 19.16 m**

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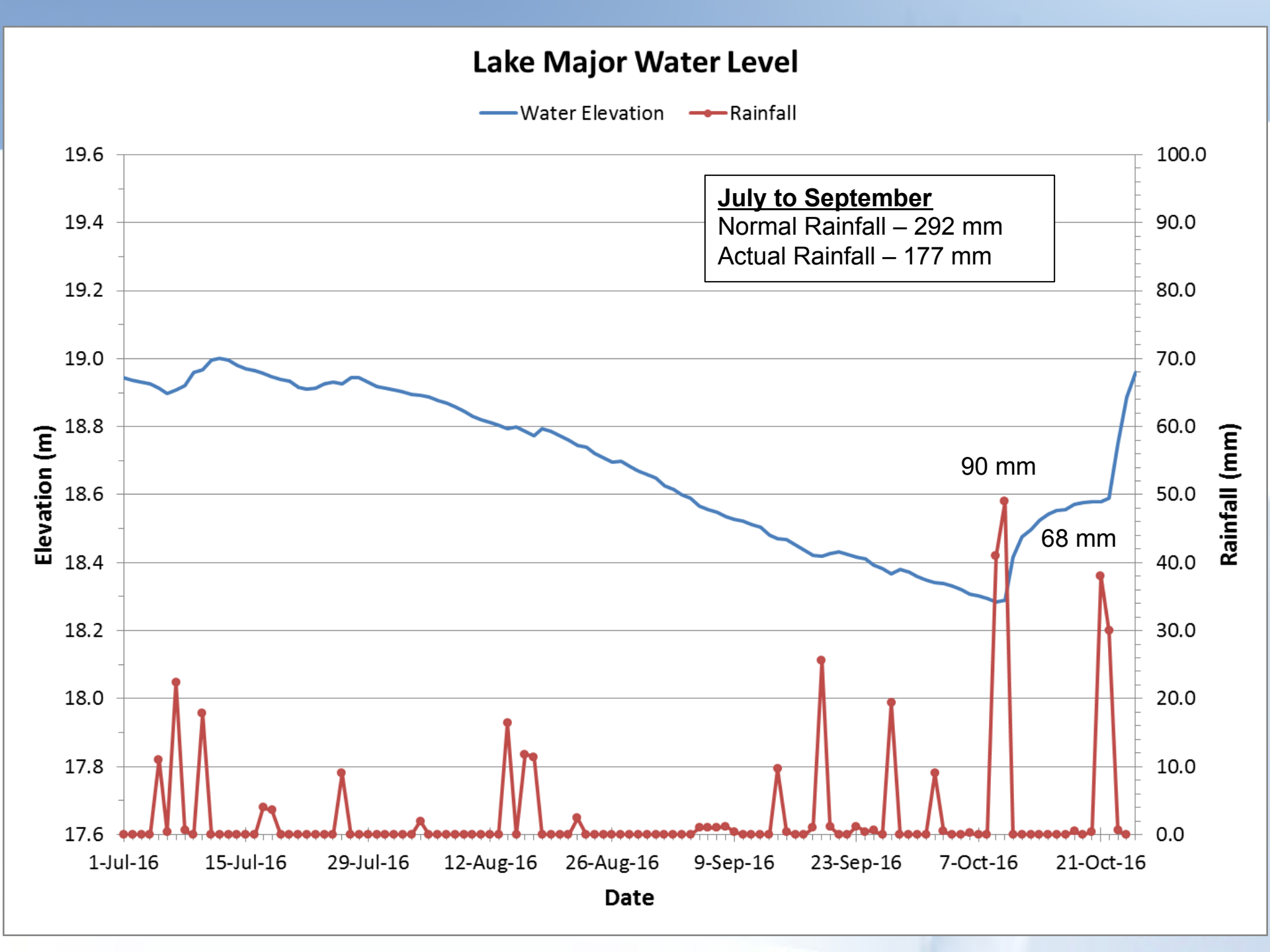
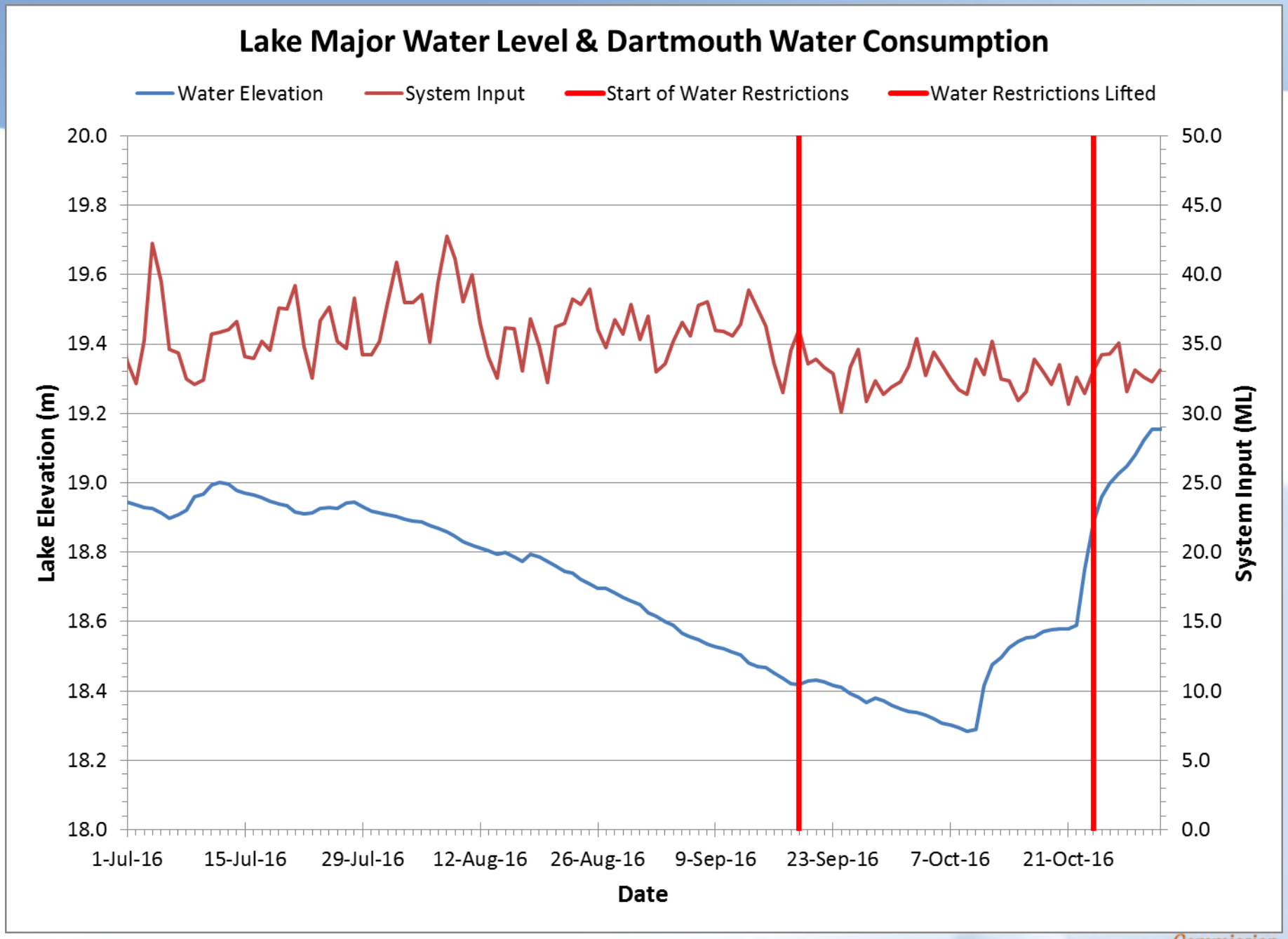

Lake Major Water Level
Water Elevation
Rainfall
July to September
Normal Rainfall – 292 mm
Actual Rainfall – 177 mm
90 mm
68 mm
Elevation (m)
Rainfall (mm)
Date
19.6
19.4
19.2
19.0
18.8
18.6
18.4
18.2
18.0
17.8
17.6
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
1-Jul-16
15-Jul-16
29-Jul-16
12-Aug-16
26-Aug-16
9-Sep-16
23-Sep-16
7-Oct-16
21-Oct-16


Lake Major Water Level & Dartmouth Water Consumption
Water Elevation
System Input
Start of Water Restrictions
Water Restrictions Lifted
Lake Elevation (m)
System Input (ML)
20.0
19.8
19.6
19.4
19.2
19.0
18.8
18.6
18.4
18.2
18.0
50.0
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
1-Jul-16
15-Jul-16
29-Jul-16
12-Aug-16
26-Aug-16
9-Sep-16
23-Sep-16
7-Oct-16
21-Oct-16
Date

Halifax Water

Questions or Comments?