North Bay-Mattawa Conservation Authority
Members Meeting for August 14, 2024
at 4:00 pm IN PERSON
NBMCA's Natural Classroom, 15 Janey Avenue, North Bay, Ontario
AMENDED AGENDA

Procedural Matters

1. Acknowledgement of Indigenous Traditional and Treaty Lands
2. Approval of the Agenda
3. Declaration of Pecuniary Interest
4. Delegations
5. Adoption of Previous Minutes from June 26, 2024
6. Correspondence

Presentations

7. Parks Creek Backflood Control Structure Hydrological Capacity Study – EXP Presentation via MSTeams **(Report #1)**

Business Reports

8. Section 28 Permits **(Report #2)**
9. Mid Year and Quarterly Financial Statements **(Report #3)**
10. Board Expense and Minimum Levy **(Report #4)**
11. Ski Hill Capital **(Report #5)**
12. Ski Hill Operating Agreement **(Report #6)**
13. Landsdowne Floodplain Mapping **(Report #7)**
14. CA Act Deliverables: Update report **(Report #8)**
15. Updated Personnel Policy – **(Report #9)**

Other Business

16. New Business
17. Closed Session of Committee of the Whole to discuss property matters
18. Adjournment

Contact: Rebecca Morrow, Human Resources Coordinator/Executive Assistant/Deputy CAO
North Bay-Mattawa Conservation Authority
Email: rebecca.morrow@nbmca.ca

NORTH BAY-MATTAWA CONSERVATION AUTHORITY
MINUTES
of the

SEVENTH meeting of the North Bay-Mattawa Conservation Authority held at 4:00 p.m. on August 14, 2024 in the NBMCA's Natural Classroom, 15 Janey Avenue, North Bay Ontario.

MEMBERS PRESENT:

Bonfield, Township of	-	Steve Featherstone
Callander, Municipality of	-	Grant McMartin
Chisholm, Township of	-	Nunzio Scarfone
East Ferris, Municipality of	-	Steve Trahan
Mattawa, Town of	-	Loren Mick
Mattawan, Municipality of	-	Michelle Lahaye
North Bay, City of	-	Peter Chirico
North Bay, City of	-	Lana Mitchell
Powassan, Municipality of	-	Dave Britton

MEMBER(S) ABSENT:

Calvin, Township of	-	Bill Moreton
North Bay, City of	-	Chris Mayne
Papineau–Cameron, Township of	-	Shelley Belanger

ALSO PRESENT:

Robin Allen, Interim CAO - Secretary Treasurer
Rebecca Morrow, Human Resources Coordinator/Executive Assistant/Deputy CAO
Kevin Taylor, Senior Manager, Planning & Water Resources
Aaron Lougheed, Manager, Finance
Githan Kattera, Water Resources Coordinator/Regulations Officer
Hannah Wolfram, Regulations Officer
Angela Mills, Water Resources Specialist
Amanda Savage, Building Official, On-Site Sewage System Inspector
Mauricio Del Olmo Gil, EXP
Bradley Legault, EXP
Steven Kacan, EXP

1. Acknowledgement of Indigenous Traditional and Treaty Lands

Michelle Lahaye read a statement acknowledging Indigenous and Treaty Lands.

2. Approval of the Agenda

After discussion the following resolution was presented:

Resolution No.87-24, Trahan-Featherstone
THAT the agenda be approved as amended.

Carried Unanimously

3. Declaration of Pecuniary Interest
None declared.

4. Delegations
None

5. Adoption of Previous Minutes of June 26, 2024
After discussion the following resolution was presented:

Resolution No. 88-24, Mick-Chirico
THAT the minutes of the meeting held June 26, 2024 be adopted as amended.

Carried Unanimously

6. Correspondence
None

7. Parks Creek Backflood Control Structure Hydrological Capacity Study

Githan Kattera presented his report on the Parks Creek Backflood Control Structure. After Githans presentation, Maurico Del Olmo Gil, Bradley Legault and Steven Kacan of EXP presented a slide presentation on the Parks Creek Backflood Control Structure Hydrological Capacity Study.
After discussion the members thanked Githan and EXP for their prestations and the following resolution was presented:

Resolution No. 89-24, Trahan-McMartin
THAT Parks Creek Backflood Control Structure Capacity Study update members report is received and appended to the minutes of this meeting.

Carried Unanimously

8. Section 28 Permits
Githan Kattera presented the report to the Members. After discussion, the Members thanked Githan and the following resolution was presented:

Resolution No. 90-24, Scarfone-Mitchell
THAT the Prohibited Activities, Exemptions and Permits report is received and appended to the minutes of this meeting.

Carried Unanimously

9. Mid Year and Quarterly Financial Statements

Aaron Lougheed presented the Mid Year and Quarterly Financial Statements. After discussion the members thanked Aaron and the following resolution was presented:

Resolution No. 91-24, Chirico-Britton

THAT the Budget Status Report at June 30, 2024 be approved by the members of the Board of Directors and appended to the minutes of this meeting.

Carried Unanimously

10. Board Expense and Minimum Levy

Aaron Lougheed presented the Board Expense and Minimum Levy report. After discussion the members thanked Aaron and the following resolution was presented:

Resolution No. 92-24, Trahan-Mick

THAT the Members related Per Diems and Mileage be deferred and assessed by the Executive Committee & report to the next meeting.

Carried Unanimously

11. Ski Hill Capital

Aaron Lougheed presented the Ski Hill Capital. After discussion the members thanked Aaron and the following resolution was presented**:**

Resolution No. 93-24, Mick-Mitchell

THAT the staff report 'Laurentian Ski Hill Capital Reserve Request' is received and appended to the minutes of this meeting;

AND THAT the Members approve the Laurentian Ski Hill and Snowboarding Club's request for $2,904.10 from the NBMCA's Ski Hill capital reserve**.**

Carried Unanimously

12. Ski Hill Operating Agreement

Aaron Lougheed presented the Ski Hill Operating Agreement. After discussion the members

thanked Aaron and the following resolution was presented:

Resolution No. 94-24, McMartin-Featherstone

THAT the agreement made as of the 14th day of September 2021 between Laurentian Ski Hill Snowboarding Club and North Bay-Mattawa Conservation Authority be extended for a period through the 2024/2025 operating season upon similar resolution from the Board of the Laurentian Ski Hill Snowboarding Club.

Carried Unanimously

13. Landsdowne Floodplain Mapping

Githan Kattera presented the Landsdowne Floodplain Mapping report to the Members. After discussion, the Members thanked Githan and the following resolution was presented:

Resolution No. 95-24, Trahan-Mick

THAT Floodplain Mapping Projects update members report is received and appended to the minutes of this meeting; and
THAT staff are directed to proceed with public consultation on draft floodplain mapping for Chippewa Creek, Parks Creek, Jessups Creek, and Lansdowne Creek.

Carried Unanimously

14. CA Act Deliverables: Update Report

Kevin Taylor presented the CA Act Deliverables Update Report. After discussion, the Members thanked Kevin and the following resolution was presented:

Resolution No. 96-24, Britton-Chirico

THAT the C.A. Act Deliverables Interim Report is received and appended to the minutes of this meeting.

Carried Unanimously

15. Updated Personnel Policy

Rebecca Morrow presented the Updated Personnel Policy Report. After discussion, the Members thanked Rebecca and the following resolution was presented:

Resolution No. 97-24, Mitchell-Trahan

THAT the Workplace Violence and Harassment Policy is approved and appended to the minutes of this meeting;
AND THAT the Personnel Policy be updated to include the updated Workplace Violence and Harassment Policy;
AND THAT this report be approved and appended to the minutes of this meeting.

Carried Unanimously

16. New Business

None presented.

17. Closed session of Committee of the Whole

After discussion, the following resolutions were presented:

Resolution No. 98-24, Scarfone-Britton

THAT the meeting move into a closed session of "Committee of the Whole" to discuss property matters at 5:30 pm.

Carried Unanimously

Resolution No. 99-24, Mitchell-Britton

THAT Ski Ridge Estates report is received and appended to the minutes of this meeting.

Carried Unanimously

Resolution No. 100-24, Chirico-Mitchell

THAT the meeting move out of a closed session of "Committee of the Whole" and back into an open meeting at 5:43 pm.

Carried Unanimously

18. Adjournment (5:43 p.m.)
As there was no new business, the following resolution was presented:

Resolution No. 101-23, Scarfone-Mitchell

THAT the meeting be adjourned, and the next meeting be held at 4:00pm on September 11, 2024 or the call of the Chair.

Carried Unanimously

Michelle Lahaye, Chair

Robin Allen, Interim Chief Administrative Officer, Secretary Treasurer

Report #1
08-14-2024

NORTH BAY - MATTAWA CONSERVATION AUTHORITY

TO: The Chairperson and Members of the Board of Directors,
North Bay-Mattawa Conservation Authority

ORIGIN: Githan Kattera, Water Resources Coordinator/Regulations Officer

DATE: August 01, 2024

SUBJECT: Parks Creek Backflood Control Structure
Capacity Study

Background:

The North Bay-Mattawa Conservation Authority (NBMCA) has engaged EXP Services Inc. (EXP) to conduct a thorough review of the hydrological characteristics of the Parks Creek Backflood Control Structure and the associated subcatchment area. The purpose of this review is to produce a comprehensive report on the current operational capacity of the Parks Creek Backflood Control Structure, considering both existing infrastructure and potential new temporary or permanent infrastructure for various extraordinary conditions and scenarios.

The Parks Creek Backflood Control Structure, located in Eva Wardlaw Conservation Area near Lakeshore Drive and Marshall Avenue in North Bay, Ontario, is designed to prevent high water levels in Lake Nipissing from backflowing into Parks Creek. This structure helps protect over 564 properties from lowland flooding, basement flooding, and overloading the municipal stormwater system. Even at low lake levels, high flows in Parks Creek can cause downstream overbank conditions due to backflow created by the creek's flat streambed gradient and low flow velocities. Designed by Totten Sims Hubicki, the structure was constructed by Cecchetto and Sons of Sudbury, Ontario, during the fall and winter of 1994-1995.

Analysis:

Parks Creek has existing floodplain mapping, and the updated floodplain mapping is currently in its final stages. The consulting firm used this data to identify the hydrological and hydraulic functions of Parks Creek. The Parks Creek back-flood control structure operates using stop logs in three bays to prevent high water levels in Lake Nipissing from causing basement flooding and storm sewer system surcharges in the Parks Creek area. The stop logs need to be placed at an elevation of 196.0 meters, with a maximum elevation of 197.45 meters. Each pump has a capacity of 0.6 cubic meters per second.

NORTH BAY - MATTAWA CONSERVATION AUTHORITY

Data used:

Meteorological Data - Historic short duration Intensity-Duration-Frequency (I-D-F) rainfall data was obtained from Environment Canada (EC) for "North Bay A" Station ID: ON 6085700 (data 1964 to 2016). Latest

Long Duration Rain plus Snowmelt Events (30 days) - Historic long duration (1 to 30 day) rain-on-snowmelt I-D-F data was obtained from EC for "North Bay A" Station ID: ON 6085700
(data 1939 to 2013).

Climate Normals - Climate normal are three-decade averages of climatological variables such as temperature and precipitation. Based on historical data obtained from Environment Canada Climate Normals for "North Bay A" from 1981-2010, the average total annual precipitation for the data set is 1,044.7 mm, with approximately 241.9 mm (23%) falling as snow (water equivalent).

Lake Evaporation - Mean Lake evaporation records were acquired from meteorological stations in Amos Station ID: 7090120 (north of North Bay), and Mont Laurier Station ID: 7035160 (south of North Bay) both in Quebec, as well as the Mean Annual Lake Evaporation from the Hydrological Atlas of Canada.

Impacts of Climate Change - Precipitation events used to design hydraulic structures should be adjusted for the projected impacts of climate change. While extreme precipitation projections aren't available for North Bay Airport, the IDF_CC Tool (version 6.5) by Western University and the Institute for Catastrophic Loss Reduction provides projected Intensity-Duration-Frequency (IDF) values for the station (ID: ON 6085700) using a Generalized Extreme Value (GEV) distribution.

Results:

During the spring of 2019, an estimated 3.4 million m^3 of water flowed through the Parks Creek Backflood Control Structure over 30 days, averaging 1.3 m^3/s. Given the installed pump capacity of 0.6 m^3/s, additional auxiliary pumps likely had to be rented to manage the water levels upstream, as the existing pumps would have been overwhelmed by the inflow.

In conclusion, it is estimated that the proposed additional pump capacity at the Parks Creek Backflood Control Structure should be at least 0.6 to 0.7 m^3/s, resulting in a total installed pump capacity of 1.2 to 1.3 m^3/s.

NORTH BAY - MATTAWA CONSERVATION AUTHORITY

Recommendations:

Based on the results, it is recommended that the Parks Creek Backflood Control Structure increase its pumping capacity by an additional 0.6 to 0.7 m^3/s, resulting in a total installed pump capacity of 1.2 to 1.3 m^3/s. This enhancement is necessary to ensure safe operation and meet peak requirements during certain low to moderate extraordinary precipitation events. The following section outlines various potential options that the NBMCA could consider to upgrade the operation of the Parks Creek Backflood Control Structure and reduce the risk of flooding during specific upset conditions.

Recommended Resolution:

THAT Parks Creek Backflood Control Structure Capacity Study Update members report is received and appended to the minutes ofthis meeting; and

Submitted by:

Githan Kattera	Water Resources Coordinator/Regulations Officer

Reviewed by:

Kevin Taylor	Senior Manager Planning & Water Resources
Robin Allen	Interim CAO-Secretary Treasurer/CBCO, Chief Building Official - OSS Manager
Rebecca Morrow	HR Coordinator/Executive Assistant/Deputy CAO

Figure 1 - Parks Creek Back Flood Control Structure

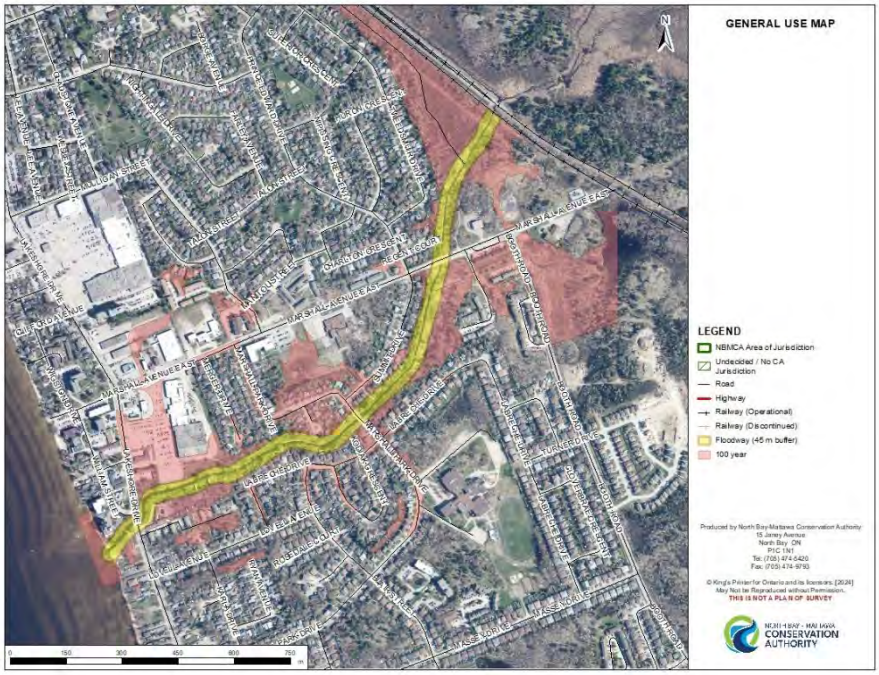

Figure 2 - Parks Creek Floodplain Mapping

Parks Creek Backflood Control Structure Review

North Bay-Mattawa Conservation Authority

Type of Document:
Final Report

Project Name:
Parks Creek Backflood Control Structure Capacity Study
North Bay, Ontario

Project Number:
SUD-23009099-A0

Prepared By:
EXP Services Inc.
885 Regent Street
Sudbury, Ontario, P3E 5M4
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Prepared For:
North Bay-Mattawa Conservation Authority
15 Janey Ave.,
North Bay, ON, P1C 1N1

Date Submitted:
June 24th, 2024

Table of Contents

List of Tables

List of Figures

List of Drawings

List of Appendices

1 Introduction

EXP Services Inc. (EXP) has been retained by the North Bay-Mattawa Conservation Authority (NBMCA), to conduct a detailed review of the hydrological characteristics for the Parks Creek Backflood Control Structure, and associated subcatchment area. The intention of this review is to produce a comprehensive report on the current operational capacity of the Parks Creek Backflood Control Structure utilizing existing, as well as potential temporary or permanent new infrastructure for different extraordinary conditions and scenarios.

2 Background

The Parks Creek Backflood Control Structure is located in Eva Warlaw Conservation Area near Lakeshore Drive and Marshall Avenue at the mouth of Parks Creek, which is a tributary to Lake Nipissing in North Bay, Ontario, as shown on Drawing 1. The intention of this structure is to minimize that high water levels in Lake Nipissing backflow into Parks Creek and impact over 564 properties from lowland flooding, basement flooding, and overcharging the municipal stormwater system. High flows in Parks Creek can also create downstream overbank conditions, even at low lake levels, due to the back flow in the creek created by a flat streambed gradient, and very low flow velocities.

In 1991, the NBMCA retained Totten Sims Hubicki Associates to undertake an Environmental Assessment for flood damage reduction alternatives within the Parks Creek subwatershed. The selection of a preferred alternative was conducted within the limits outlined in the "Class Environmental Assessment for Water Management Structures," prepared by the Conservation Authorities of Ontario in 1986 and 1991. The Parks Creek Backflood Control Structure was a recommendation in the 1992 Totten Sims Hubicki "Environmental Study Report – Parks Creek Watershed Flood Damage Reduction Study". The structure was designed by Totten Sims Hubicki, with construction being undertaken by Cecchetto and Sons of Sudbury, Ontario during the fall and winter of 1994-1995.

The Parks Creek Backflood Control Structure concept is threefold. Firstly, the use of stoplogs in three bays to prevent high water levels in Lake Nippising from causing basement flooding and storm sewer system surcharges in the Parks Creek locale. Secondly, the utilization of electric pumps when stoplogs are placed to quickly dewater the Parks Creek floodplain following major watershed runoff event(s). Lastly, to provide for the discharge of normal creek flows around the structure into Lake Nipissing when backflood control operations are underway. Furthermore, while the dam is close and backflood operations are underway, the adjacent Eva Wardlaw Conservation area is closed to the public.

The layout of the Parks Creek Backflood Control Structure entails three bays of 3.1 meter wide each spanning the creek bed with manually operated installable/removable galvanized steel stop logs. The concrete bank abutments are situated on either side of the creek, and two intermediate concrete piers are founded on the creek bed. Based on the As-built drawings, the bottom of the structure is situated at elevation 194.5 m while the crest/top of the structure is at 197.8 m (height of 3.3 m). A galvanized metal grate deck complete with handrails spans the entirety of the structure to provide a working platform and to store the stoplogs when the dam is not in use. Each side of the deck has approaches with gates to restrict public access to the structure. A boom is also installed upstream of the dam to stop debris accumulation, and to restrict any boats or paddlers from reaching the dam by the creek.

The south side of the structure contains a pump chamber with two (2) 30 HP submersible pumps, each having an approximate duty point of 0.3 m^3/s @ 5.66 m TDH. The pump chamber is activated/opened to transfer water from upstream of the dam structure to the downstream side of the dam structure when the stop logs are in place via the two (2) existing by-pass pumps. Water enters the pump chamber by a manually operated sluice gate on the upstream portion of the dam (normally open). The water then is pumped from the chamber to an outlet energy dissipation structure on the top and downstream sides of the dam.

During high springtime water levels on Lake Nipissing and/or extraordinary storm events in the fall, the NBMCA gradually closes the stoplogs on the outside bays, leaving only the centre bay available for discharge. In conditions when the two existing by-pass pumps are to be working at full capacity, the NBMCA may temporarily install up to three additional (rented) large portable diesel pumps to increase the pump capacity and be able to transfer flows to the downstream side of the structure.

3 Parks Creek Subwatershed Delineation

Subcatchment delineation within the Parks Creek subwatershed was completed using a combination of received Lake Nipissing 2020 LiDAR Digital Terrain Model (DTM) information, the PCSWMM model built-in functions, and information provided by the City of North Bay. The total drainage area of the Parks Creek subwatershed is approximately 1,327 ha (13.27 km²) and the subwatershed delineation used for this present study is shown on Drawing 2.

The delineation of subwatersheds was initially completed in PCSWMM based on relatively small subcatchment areas. These small, highly discretized subcatchments were then combined based on the overall drainage patterns and geometric layout of the area to form a reasonable number of subcatchments with an acceptable size for the overall subwatershed hydrologic modelling. The overall subcatchment shapes were selected based on the geometric constraints found in each subcatchment. The upper subcatchments in the Circle Lake and Twin Lakes areas are bounded in the south by Highway 17 East, whereas the intermediate subcatchments are bounded by Highway 17 East in the north, and Highway 11 in the south. The lower portion of the subwatershed is bounded by highway 11 in the north, with the CN Rail tracks splitting the rural subcatchment areas to the north from the urban areas to the south down to the discharge of Parks Creek into Lake Nipissing where the control structure is located.

Care has been taken to properly model other important elements throughout the Parks Creek subwatershed, such as natural lakes/wetlands or storage areas, and man-made reservoirs/control structures. The potential routing and attenuation of flows on several medium-sized lakes and their corresponding outlet structures (e.g., culverts) was also taken into consideration. Stage-storage-area relationships for the following lakes and water bodies were developed and the first two most important ones can be found in Appendix A.

- Highway 17 East Culvert and upstream lakes (i.e., Twinline Lakes, Depensier Lake, McLean Lake and Circle Lake)
- Highway 11 Culvert and Pasmore Lake
- Marsh area between Highway 17 east and CN Rail tracks.

It is important to note that these stage relationships were developed based on the available LiDAR information. Therefore, only above water information is available, and the true depths of the lake bottoms are unknown. Bottom elevations used in this study for each of these elements were arbitrarily selected below known water elevations. Initial conditions at each of these elements were set based on best-known “normal conditions”, together with assumed outlet elevations and geometries from site visits when possible or inferred based on the same LiDAR data.

4 Hydrologic Characterization

Each subcatchment area has been divided into two main land use types for their hydrological use (i.e., impervious and pervious portions). Impervious percentage is comprised of permanent water bodies, infrastructure, and clear exposed bare bedrock outcrops, while the rest of the subcatchment is considered pervious land. Table 1 below shows a summary of the Parks Creek subwatershed characterization and the total area.

Table 1. Parks Creek Subwatershed Characterization

Subwatershed	Total Catchment Area (ha)	Waterbodies and Creeks	Infrastructure	Total Impervious Area (ha)	Natural Ground (Woodland & Forests) (ha)
Parks Creek	1,327.0	61.6	223.9	285.5	1,041.5

5 Meteorological Data

Historic short duration Intensity-Duration-Frequency (I-D-F) rainfall data was obtained from Environment Canada (EC) for “North Bay A” Station ID: ON 6085700 (data 1964 to 2016). Latest data published on 31 October 2022. Rainfall depths for available durations and return periods are provided in Table 2.

Table 2. Rainfall Depths for North Bay A (ON 6085700)

Duration (min)	Duration (h)	2 Year (mm)	5 Year (mm)	10 Year (mm)	25 Year (mm)	50 Year (mm)	100 Year (mm)
5	0.08	7.9	10.8	12.8	15.3	17.1	18.9
10	0.17	11.4	15.3	17.9	21.1	23.5	25.9
15	0.25	14.0	18.6	21.6	25.5	28.3	31.2
30	0.50	18.5	24.0	27.7	32.3	35.7	39.1
60	1	23.1	30.7	35.8	42.3	47.0	51.8
120	2	28.4	37.8	44.0	51.8	57.7	63.5
360	6	39.8	51.4	59.1	68.8	76.0	83.2
720	12	47.4	60.1	68.6	79.3	87.2	95.0
1,440	24	54.2	68.3	77.7	89.6	98.4	107.1

For these short duration rainfall events it is recommended to assign a Soil Conservation Service (SCS) Type II rainfall temporal distribution, which is a symmetrical and highly peaked distribution.

5.1 Long Duration Rain plus Snowmelt Events (30 days)

Historic long duration (1 to 30 day) rain-on-snowmelt I-D-F data was obtained from EC for "North Bay A" Station ID: ON 6085700 (data 1939 to 2013). Latest data published on 27 January 2016. As a reference, the 1:25-year 30-day rain-on-snowmelt event (assumed to happen in the Spring) is equivalent to 378.2 mm of precipitation depth based on the Engineering Climate Services Unit snowmelt Model 1.

The 30-day rain-on-snowmelt events were assigned a symmetrical or "balanced" distribution, putting the most severe single day event in the center of the event, with the second and third most severe days on either side, and continuing to fill in the 30-day distribution in this way. This creates a conservative temporal distribution of the 30-day rain plus snowmelt data that also contains the peak rain plus snowmelt depths for all durations less than 30 days. Figure 1 below shows the suggested hyetograph distribution of the 1:25-year event for the North Bay area.

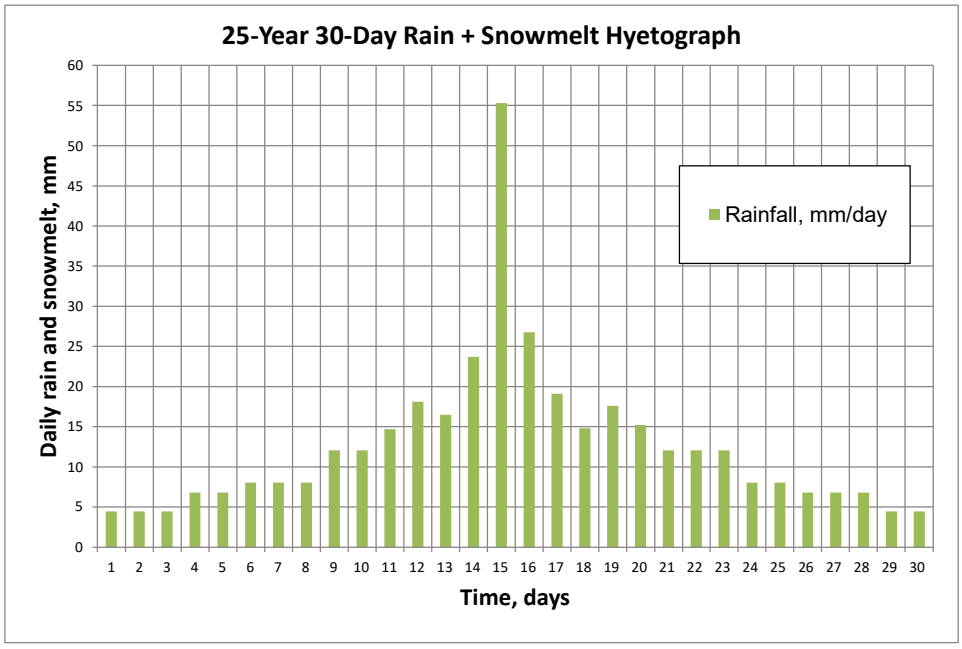


Figure 1. Hyetograph for the 25-Year 30-Day Rain + Snowmelt

5.2 Regulatory Event

In Northern Ontario, including the North Bay area, the regional regulatory event is the Timmins Storm, a historical storm that occurred in September of 1961 with 193 mm of precipitation occurring over a 12-hour period.

5.3 Climate Normals

Climate normal are three-decade averages of climatological variables such as temperature and precipitation. Based on historical data obtained from Environment Canada Climate Normals for "North Bay A" from 1981-2010, the average total annual precipitation for the data set is 1,044.7 mm, with approximately 241.9 mm (23%) falling as snow (water equivalent). Table 3 and Figure 2 below show the North Bay monthly precipitation distribution on an average year. Average runoff volumes can be better estimated using the concept of available precipitation, consisting of rainfall plus snowmelt (as water equivalent), as shown in this table and figure. This concept is essential for the simulation of conservative runoff during the spring months. It is assumed that during the winter months, precipitation as snow does not typically result in runoff, rather it accumulates in snowpack. The water equivalent accumulated in the snowpack becomes available during the spring, when concentrated runoff events occur due to snowmelt and potential additional rainfall.

Table 3. Average Monthly Precipitation for the North Bay Area

Parameter	Average Monthly Totals												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Mean Precipitation (mm)[1]	68.9	57.1	64.6	71.6	96.3	98.3	99.4	90.6	115.4	106.6	98.1	77.8	1044.7
Mean Rainfall (mm)	19.3	11.8	31.8	56.3	92.8	98.3	99.4	90.6	115.2	99.1	65.5	22.7	802.8
Mean Snowfall/Change in Snowpack (mm)	49.6	45.3	32.8	15.3	3.5	0.0	0.0	0.0	0.2	7.5	32.6	55.1	241.9
Cumulative Snowpack (mm)[2]	145.0	190.3	223.1	238.4	241.9	0.0	0.0	0.0	0.2	7.7	40.3	95.4	
Snowmelt (mm)[3]	0.0	0.0	60.5	133.0	48.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	241.9
Rainfall + Snowmelt (mm)	19.3	11.8	92.3	189.3	141.2	98.3	99.4	90.6	115.2	99.1	65.5	22.7	1044.7

Notes:

1. *Precipitation data obtained based on data from Environment Canada "Climate Normals" for "North Bay A", Ontario (Environment Canada, 2024).*
2. *Cumulative snowpack calculated as the total snowfall from September to March.*
3. *Snowmelt assumed to happen between mid March to mid May.*
4. *Precipitation data from 2011 to present was not yet available from Environment Canada at the time of this analysis.*

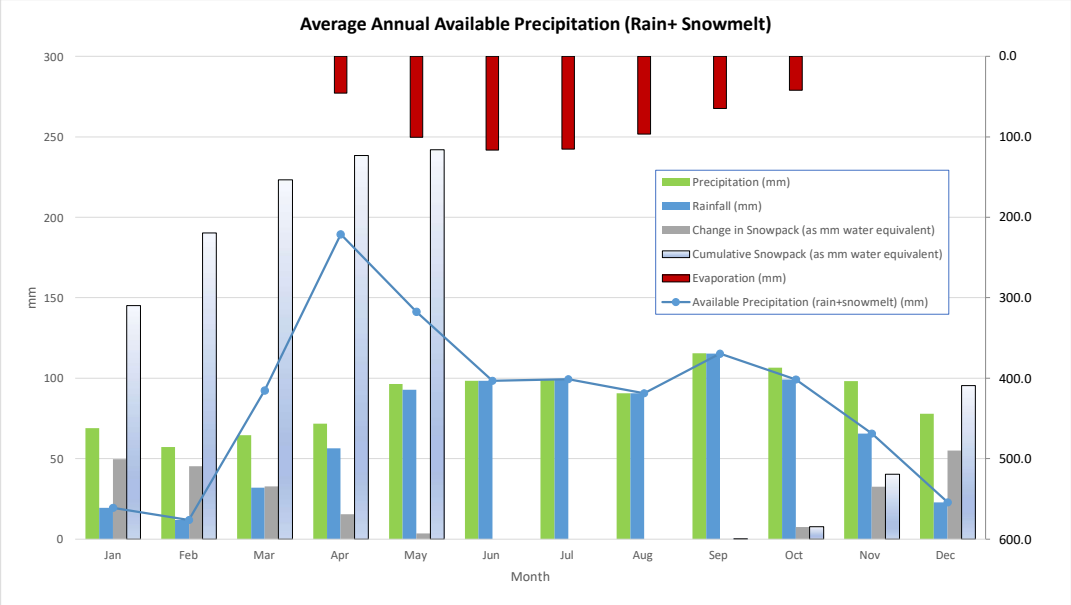


Figure 2. Average Monthly Precipitation and Snowpack Cumulation Distribution

A Gumbel distribution method was applied to the total annual precipitation data at the "North Bay A" station collected from 1940 to 2023 (84 years) to determine the 5-year, 10-year, 50-year, 70-year, 100-year, and 150-year "wet" maximum precipitation years for the project site. The results of the Gumbel distribution for the above "wet" maximum precipitations were found to be 1112.6 mm (5-year wet), 1193.6 mm (10-year wet), 1372.0 mm (50-year wet), 1408.0 mm (70-year wet), 1447.0 mm (100-year wet), and 1491.4 mm (150-year wet).

5.4 Lake Evaporation

Mean lake evaporation records were acquired from meteorological stations in Amos Station ID: 7090120 (north of North Bay), and Mont Laurier Station ID: 7035160 (south of North Bay) both in Quebec, as well as the Mean Annual Lake Evaporation from the Hydrological Atlas of Canada. Correction factors were applied to account for the latitude distance from these meteorological stations to the Parks Creek site. The total mean annual lake evaporation for the area is 581.4 mm as it is presented in Table 4 below, and also shown on Figure 2 above.

Table 4. Average Monthly Lake Evaporation for the North Bay Area

	April	May	June	July	August	September	October	Total Evaporation (mm)
Evaporation (mm)	45.6	100.4	116.4	115.3	96.7	64.8	42.2	581.4

5.5 Impacts of Climate Change

Precipitation events used to design hydraulic structures, or so in this case, to determine the total flow reporting to the control structure, should be adjusted to account for the projected impacts of climate change. Extreme precipitation event climate change projections are not published for the North Bay Airport; however, the IDF_CC Tool, version 6.5 developed by Western University and the Institute for Catastrophic Loss Reduction publishes projected Intensity-Duration-Frequency (I-D-F) values for the North Bay Airport station under Climate Change (ID: ON 6085700) using a Generalized Extreme Value (GEV) distribution. Table 5 below presents the projected rainfall depths for available durations and return periods based on the suggested climate change I-D-F values using the CMIP6 global climate model (currently in use by the Intergovernmental Panel on Climate Change) and the moderate SSP2.45 emissions scenario.

Table 5. Projected Rainfall Depths for North Bay A under Climate Change (ON 6085700)

Duration (min)	Duration (h)	2 Year (mm)	5 Year (mm)	10 Year (mm)	25 Year (mm)	50 Year (mm)	100 Year (mm)
5	0.08	7.97	11.16	13.49	16.53	18.86	21.66
10	0.17	11.91	16.23	18.97	22.32	24.73	27.06
15	0.25	14.60	19.47	22.62	26.43	29.22	32.55
30	0.50	19.05	25.12	29.35	34.56	38.53	42.96
60	1	23.66	32.29	38.25	45.73	51.46	57.43
120	2	29.38	40.06	47.09	55.54	61.74	69.23
360	6	41.42	54.72	63.12	73.46	79.69	87.96
720	12	49.11	63.36	72.55	84.051	92.48	102.35
1440	24	56.10	71.61	81.80	94.43	103.78	115.09

6 Calibration

In order to calibrate the Parks Creek model, the adjacent subwatershed of the La Vase River was selected because it shares similar subcatchment characteristics to the Parks Creek subwatershed (i.e., shape, size, land uses, location, etc.). In addition, La Vase River subwatershed contains a flow meter station (No. 02DD013) that has measured 49 years of flow data passing through this location (1974 to 2022). This is enough data that it is fair to assume that it has recorded wet, dry, and average years throughout the series of years. The La Vase River flow data was acquired and sorted, and it is presented in Appendix B.

Similar to the Parks Creek subwatershed, La Vase River subwatershed was divided into two main land use types for their hydrological use during this calibration exercise. Table 6 below shows a summary of the La Vase River subwatershed characterization and the total areas.

Table 6. La Vase River Subwatershed Characterization

Subwatershed	Total Catchment Area (ha)	Waterbodies and Creeks (ha)	Infrastructure (ha)	Total Impervious Area (ha)	Natural Ground (Woodland & Forests) (ha)
Parks Creek	6,945.5	90.3	298.7	388.9	6,556.6

Using the known average flows throughout the year passing through the La Vase River monitoring station No. 02DD013 (Appendix B) and the Climate Normals within the area of interest with the estimated monthly available precipitation on an average year (rain plus snowmelt) from Section 5.3 above, EXP was able to estimate an average Pervious Runoff Coefficient (RC) representative for each month of the year for the La Vase River subwatershed by comparing and matching the total runoff volumes per month passing through this station (i.e., data records vs estimated by EXP), as shown on Figure 3 and Table 7 below.

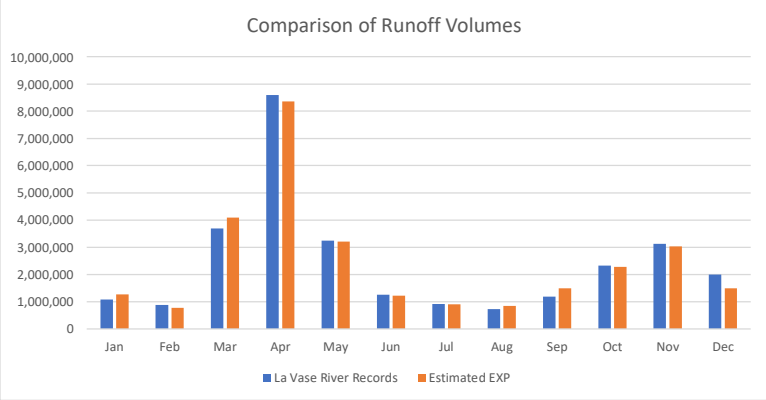


Figure 3. Comparison of Runoff Volumes for the La Vase River Subwatershed

Table 7. Comparison of Runoff Volumes for the La Vase River Subwatershed and Runoff Coefficients Estimation

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
# of Days	31	28	31	30	31	30	31	31	30	31	30	31
Average Flows at La Vase River Station (m^3/s)	0.41	0.36	1.38	3.32	1.21	0.49	0.34	0.27	0.46	0.87	1.20	0.75
Volume at La Vase River Station (m^3)	**1,085,094**	**876,574**	**3,696,862**	**8,598,312**	**3,245,495**	**1,257,120**	**916,013**	**725,792**	**1,190,469**	**2,321,517**	**3,121,956**	**2,001,992**
Impervious RC	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Estimated Pervious RC (Natural Ground)	**0.95**	**0.95**	**0.62**	**0.62**	**0.3**	**0.15**	**0.1**	**0.1**	**0.15**	**0.3**	**0.65**	**0.95**
Weighted RC for the La Vase River Subwatershed	0.95	0.95	0.64	0.64	0.34	0.19	0.15	0.15	0.19	0.34	0.67	0.95
Estimated Runoff for the La Vase River Subwatershed (m^3)	1,273,457	778,591	4,091,993	8,396,623	3,298,623	1,329,983	1,019,005	928,791	1,558,637	2,315,438	3,033,475	1,497,797
Minus Lake Evaporation	-	-	-	41,173	90,689	105,099	104,124	87,330	58,509	38,067	-	-
Estimated Net Runoff for the La Vase River Subwatershed (m^3)	**1,273,457**	**778,591**	**4,091,993**	**8,355,450**	**3,207,934**	**1,224,883**	**914,881**	**841,461**	**1,500,128**	**2,277,371**	**3,033,475**	**1,497,797**

During EXP's site visit and subsequent meetings, it was understood that the spring of 2019 was remembered as one of the most critical conditions ever experienced at the Parks Creek Backflood Control Structure by the NBMCA staff. Review of all available data (i.e., historical precipitation data in the North Bay area, flows at the La Vase River Station, Lake Nipissing water levels, etc.) confirmed that the events that took place in the spring of 2019 indeed appeared to be the most critical on records. As a reference and presented in Appendix B, April of 2019 recorded 6.45 m^3/s through the La Vase River Station. Also, it is important to note that water levels in Lake Nipissing during that same period of time appeared to be one the highest on records at elevation 196.6 m which, according to the Operational Manual, suggest that operation of the Parks Creek Backflood Control Structure had to be undergoing with the addition of auxiliary/rented pumps working at full capacity.

With all the information presented in this Section and in Appendix B, it can be estimated that in the spring of 2019 were approximately 377.9 mm of precipitation (more likely comprising rain on top of snowmelt) available in the North Bay Area (estimated from La Vase River flows and now known RCs). It is important to note that this actual event is equivalent to the statistics provided by EC for the "North Bay A" station for a 1:25-year 30-day rain-on-snowmelt event (assumed to also happen in the Spring) as presented in Section 5.1.

7 Preliminary Hydrological Results

Knowing the estimated available precipitation in the spring of 2019, and the Parks Creek subwatershed parameters used before (i.e., total area, impervious percentage, weighted runoff coefficient, potential lake evaporation, etc.), it can be estimated that through the Parks Creek Backflood Controls Structure could have passed approximately 3.4 millions of m^3 of water in one month period (30 days) that spring. This volume of water converted on an average flow throughout that same period of time can be translated into 1.3 m^3/s. As mentioned before, water levels in Lake Nipissing during that same period of time appeared to be one the highest on records at elevation 196.6 m which, according to the Operational Manual, suggest that operation of the Parks Creek Backflood Control Structure had to be undergoing. With the estimated average flow that could have passed through the Parks Creek Backflood Control Structure during the spring of 2019, it is also fair to assumed that additional auxiliary pumps had to be rented to help control the water levels upstream within the creek as the current installed pump capacity of 0.6 m^3/s must have been already overwhelmed and not been able to keep up with the constant inflows coming down Parks Creek.

It is then assumed and concluded that, during the spring of 2019, NBMCA must have rented additional pumps with an additional capacity of around 0.6-0.7 m^3/s to help the existing pumps already working at full capacity and probably not being able to maintain low water levels upstream within the creek. As EXP's preliminary conclusion, it is estimated that the proposed additional installed pump capacity at the Parks Creek Backflood Control Structure should be at a minimum in the order of 0.6 to 0.7 m^3/s (for a total installed pump capacity of 1.2 to 1.3 m^3/s).

8 Software Validation

In order to validate the above preliminary results, EXP developed a detailed subwatershed hydrotechnical model with the use of PCSWMM. The PCSWMM modelling platform is a dynamic hydrologic and hydraulic analysis software package that employs the EPA SWMM algorithm and numerical engine as its base. It is used for single event or long-term (continuous) simulation of runoff quantity from primarily urban areas. The runoff component of this software operates on a collection of subcatchment areas that receive precipitation and generate runoff. The routing portion transports this runoff through hydraulic systems comprised of channels, storages, culverts, weirs, etc.

Once again, in order to calibrate the PCSWMM model, EXP looked into simulate a continuous model of an extraordinary historical event with precipitation and runoff flow data records from the La Vase River Station. The month of October was selected for this analysis as rainfall events are highly peaked (fall storms), and since it can be assumed that generally most of the precipitation available in this month every year is generated by sole rainfall, which produces immediate runoff (typically there is little to no snow accumulation in the ground around this time of year). As it can be seen in Appendix B, October of 2001 contained the largest monthly average flow of all the Octobers in the data set. It was also observed that Lake Nipissing water levels in October 2001 were higher than normal at approximately 196.4 m. With an average flow of 2.83 m^3/s passing through the La Vase River Station on October of 2001, it can be estimated that through this station could have passed approximately 7.6 millions of m^3 of water on the entire month of October.

Furthermore, based on the historical precipitation records in the North Bay Area, it is known that in October 2001 a total of 190.2 mm of rain felt on the ground and become runoff. With this data, and the known RCs for the studied subcatchments (i.e., within Parks Creek and La Vase River), EXP compared the estimated runoff volumes at the La Vase River Station and at the Parks Creek Backflood Control Structure generated from the PCSWMM model and the volumes estimated from the data records. During this calibration exercise, parameters within the PCSWMM model were adjusted accordingly in order to successfully match the estimated records and finally set a calibrated model.

With this calibrated model, EXP ran different short and long storm events to evaluate the performance of the Parks Creek Backflood Control Structure with the existing and with the new proposed additional pumping capacity. Although the model showed that with the proposed additional pumping capacity larger than normal precipitation events would be able to better be managed by this structure, for other much higher events under extraordinary conditions (such as 1:25-yr to 1:100-yr events either short rainfall events and 30-day rain plus snowmelt, and the Regulatory Timmins Storm event) the proposed additional pumping capacity appeared not to be sufficient. Based on preliminary results from the PCSWMM model, these larger events have shown requirements for a total pumping installed capacity up to 3.0 – 4.0 m^3/s which it becomes simply non realistically feasible to construct. As the required pumping capacity increases, the real-estate and size of equipment needed to handle these sorts of flows will start to increase exponentially. For example, the existing structure was designed to handle roughly 50% of what is currently estimated to be the ideal pumping capacity of 1.2 m^3/s. Therefore, to meet this new proposed capacity, it would take at a minimum something of the existing infrastructure size to satisfy the expected hydraulic conditions. If the decision is to look at options to have enough capacity for up to 3.0 – 4.0 m^3/s, then something roughly 6x the size is needed or a completely different solution altogether. Note that in the case of sizing pumps, cost of material increases exponentially as the required output increases.

9 Proposed Modifications to Parks Creek Backflood Control Structure

Based on the results presented above, it is concluded that the Parks Creek Backflood Control Structure should increase its pumping installed capacity with an additional 0.6 to 0.7 m^3/s (for a total installed pump capacity of 1.2 to 1.3 m^3/s) to satisfy the safe operation and peak requirements of this structure during certain low to moderate extraordinary precipitation events. This section provides different potential options that the NBMCA could pursue to upgrade the operation of the Parks Creek Backflood Control Structure and help minimize the risk of flooding during certain upset conditions.

9.1 Option 1: Do Nothing

This option includes maintaining the current "status-quo," with no upgrades to the backflood control structure and pumps. There would be no installation of additional pumps, standard annual maintenance of the existing pumping system will still be required, and continuing to rent additional pumps when extra pumping capacity is necessary. Potential refurnishing of the existing pumps will likely be required in the medium term (see Section 13 below). There are no construction costs associated with this Option 1. Only current maintenance costs will continue and are considered to be low for this option.

However, with this option the NBMCA's needs and objectives with the backflood control structure won't be addressed if nothing is done. Doing nothing will result in potential flooding during certain extraordinary events in the vicinity of the backflood control structure and upstream reaches. In addition, the NBMCA will still be paying for pump rentals as required and will need to be vigilant to ensure pump rentals are available in time and quickly transported and installed on site in order to be operational at the time of the storm.

9.2 Option 2: Semi-Permanent Installation

This semi-permanent option includes the installation of one (1) semi-permanent single diesel pump to reach the total target capacity of 1.2 m^3/s - 1.3 m^3/s to handle certain low to moderate extraordinary precipitation events, with minor modifications to the existing backflood control structure. To be consistent with all Options here presented, no modifications to the existing pumps are expected; therefore, potential refurnishing of the existing pumps will likely be required in the medium term (see Section 13 below). It is proposed that this new installation will rest on the concrete slab in the vicinity of the existing wet well. An intake hole for the additional pump will be cored into the top of the existing wet well slab in the vicinity of the existing manhole or adjacent to the existing structure. This option can be conceptually seen on Drawing 3 and will minimize the number

of required modifications to the existing backflood control structure. Hence, construction costs are considered low for this option. The highest cost is assumed to be the procurement of the required additional pumping equipment.

Standard annual maintenance of all pumps (the new pump and the two existing pumps) will still be required and annual costs are considered moderate for this option.

Basically, this new pump will replace the need of renting additional pumps for certain low to moderate extraordinary precipitation events with a relatively low initial/capital cost. The benefits of this option include that the additional on-site pumping capacity would be readily available. The construction, engineering, and permitting costs of this option would be the lowest of all the options that propose modification to the backflood control structure.

9.3 Option 3: Permanent Installation

This option includes the installation of permanent submergible pumps (e.g., two pumps similar to what currently exits on site) to reach the total target capacity of 1.2 m^3/s - 1.3 m^3/s to handle certain low to moderate extraordinary precipitation events. However, for this option this additional capacity will be achieved with major modifications to the backflood control structure. To be consistent with all Options here presented, no modifications to the existing pumps are expected; therefore, potential refurnishing of the existing pumps will likely be required in the medium term (see Section 13 below). This new installation will include the construction of an additional wet well either adjacent or expanding the existing wet well, or on the opposite (north) side of the structure. This option can be conceptually seen on Drawing 4 and, due to the modifications and additions to the backflood control structure, the construction costs are expected to be considerably higher than Option 2, including the procurement of the required submergible pumps.

Standard annual maintenance of all pumps (the two new pumps, and the two existing pumps) will be required and annual costs are considered to be the same as for the existing pumps.

Similar to Option 2 above, these new pumps and new wet well will replace the need of renting additional pumps for certain low to moderate extraordinary precipitation events with a higher initial/capital cost than Option 2. Also, the benefits of this option include that the additional on-site pumping capacity would be readily available. Furthermore, these new permanent submergible pumps could be then wired into a PLC (Programmable Logic Controller) and operated via SCADA (Supervisory Control and Data Acquisition) system. The system can add an ultrasonic transducer in order to record creek water levels and the pumps would operate based on pre-defined setpoints made by the operator. This provides additional risk mitigation compared to Option 2, since the pump activation conditions would be pre-determined, and operation of all pumps would be more efficient. Construction, engineering, and permitting costs would be greater than those found in Option 2.

9.4 Option 4: The "Cadillac"

This option ("the Cadillac") includes the addition of four (4) single diesel pumps with similar pumping capacity of the pump proposed in Option 2 to reach the total target capacity of 3.0 m^3/s to handle certain higher and unprecedent/unlikely extreme precipitation events. Major modifications are expected for this option. To be consistent with all Options here presented, no modifications to the existing pumps are expected; therefore, potential refurnishing of the existing pumps will likely be required in the medium term (see Section 13 below). In this option, one (1) of the proposed new pumps will sit in similar position to the installation of the pump in Option 2, while the other three (3) proposed new pumps will be located on the opposite (north) side of the structure. For the three pumps on the north side of the structure, a new intake and discharge structure will be required to be built in order to handle the proposed inflows and mitigate any potential erosion and damage to the nearby discharge environment when in use. This option can be conceptually seen on Drawing 5 and, due to the modifications and additions to the backflood control structure, the construction costs are expected to be considerably high (similar to the civil works for Option 3). However, this option is considered to have an exponential increase on costs for the procurement and installation of the required pumps. Standard annual maintenance of all pumps (the four new pumps, and the two existing pumps) will be required and annual costs are considered to be the highest of all options.

The overall benefit of this option will be to have extra additional on-site pumping capacity for high and unlikely extraordinary precipitation events mitigating even more the risk of flooding in the area. This new total capacity will be only capitalized during

unprecedented extreme weather events, while the large majority of the time will be only sitting on standby. Construction, engineering, and permitting costs would be the greatest of all options.

10 Preliminary Cost Analysis

A preliminary cost analysis for each proposed option presented above has been conducted to help NBMCA identify a preferred upgrade alternative. Some technical assumptions were made for all options (not including Option 1).

The preliminary cost estimate includes an item for contractor indirects which accounts for bonding, supervision, mobilization, demobilization, and any additional unknown project costs that would not have otherwise been a part of the cost estimate. Contractor indirects have been applied to the total construction costs in the following cost estimates.

Construction projects are typically executed with a 5% - 10% contingency to account for unknowns that can arise during construction. For instance, excavating material and running into a bedrock outcrop that will need to be removed in order to move forward with construction. A contingency of 5% - 10% would be appropriate if this was a tender-ready Class A cost estimate; however, since this cost estimate is Class D, a contingency of 30% was selected to provide a more conservative value for the cost estimate. The contingency has been applied to construction costs, procurement costs, and contractor indirects.

The item for Engineering represents the total cost for the engineering that would be required to design the structure and appurtenances. In general, engineering fee's can run at roughly 10% of the overall construction cost (civil, structural, mechanical, electrical, indirects and the contingency). We have selected 15% to provide a more conservative numerical value for the engineering fee's, as there are a lot of unknowns structurally, mechanically, and electrically.

The preliminary cost estimates below are a Class D cost estimate due to many construction and engineering unknowns. All construction costs presented below are in 2024 Canadian dollars, excluding HST, unless otherwise noted.

10.1 Option 1: Do Nothing

The preliminary cost estimate to continue with this option includes the associated annual costs that the NBMCA has already been incurring to keeping the backflood control structure functioning as intended. The cost estimation also includes necessary maintenance costs to the existing pumping system in the upcoming years, and potential additional costs for renting necessary single pumps during upset conditions. The breakdown of the estimated costs for this option can be seen in Table 8 below.

Table 8. Preliminary Cost Estimate for Option 1: Do Nothing

Annual Operating and Maintenance Cost				
Item	Qty	Unit	Unit Cost	Cost
Additional Pump Rental (One Occurrence)	100%	L.S	$ 60,404.50	$ 60,404.50
Existing Pump Maintenance	100%	L.S.	$ 10,000.00	$ 10,000.00
			Total (excl. HST)	$ 70,404.50

*Cost is per year and can vary depending on use.

10.2 Option 2: Semi-Permanent Installation

The preliminary cost estimate for this option includes the necessary modifications to the existing wet well to install one (1) semi-permanent single diesel pump to reach the total target capacity of 1.2 m^3/s - 1.3 m^3/s to handle certain low to moderate extraordinary precipitation events. Extra costs associated for this option include acquiring diesel fuel to keep the pump running, and additional maintenance costs, as well as minor engineering fees to ensure the diesel pump will function optimally. The breakdown of estimated costs for this option can be seen in Table 9 below.

Table 9. Preliminary Cost Estimate for Option 2: Semi-Permanent Installation

Construction and Engineering Costs				
Item	Qty	Unit	Unit Cost	Cost
Construction Costs	100%	L.S	$ 100,000.00	$ 100,000.00
Procure Semi-Permanent Diesel Pump	100%	L.S.	$ 500,000.00	$ 500,000.00
Contractor Indirects (20%)	100%	L.S.	$ 120,000.00	$120,000.00
Contingency (30%)	100%	L.S.	$ 216,000.00	$ 216,000.00
			Subtotal	**$ 936,000.00**
			Engineering (15%)	**$ 140,400.00**
			Construction and Engineering Cost Total (excl. HST)	**$ 1,076,400**

Annual Operating and Maintenance Cost				
Item	Qty	Unit	Unit Cost	Cost
Existing Pump Maintenance	100%	L.S	$ 10,000.00	$ 10,000.00
Proposed Pump Maintenance	100%	L.S.	$ 12,000.00	$ 12,000.00
Diesel Fuel	100%	L.S.	$ 1,000.00	$ 1,000.00
		Annual Operating and Maintenance Cost Total (excl. HST)		**$ 23,000.00**

*Cost is per year and can vary depending on use

*Estimated based on previous project with similar scope

10.3 Option 3: Permanent Installation

The preliminary cost estimate for this option includes the construction of a new wet well that will house the installation of permanent submergible pumps (e.g., two pumps similar to what currently exits on site) to reach the total target capacity of 1.2 m^3/s - 1.3 m^3/s to handle certain low to moderate extraordinary precipitation events. The pumps will be integrated into a SCADA & PLC system that will automatically operate the pumps based on pre-defined water elevations or flow depths within the creek. With this automatization, this option provides additional risk mitigation compared to those outlined in Option 2. Extra costs associated for this option include structural and mechanical engineering design for the wet well and pumps, electrical engineering design to provide PLC and SCADA automatization, construction costs for the proposed wet well, procurement and installation of the proposed additional pumps, and all necessary permits for construction. In addition, a higher cost has been carried to account for a Municipal Class (MC) Environmental Assessment (EA), since the existing footprint of the backflood control structure would increase, resulting in potential environmental impacts.

Overall, this option has higher initial/capital cost than Option 2 since the pumps would be housed in a wet well and would have a functioning SCADA/PLC system to automate the pump on and pump off timers. However, the annual maintenance costs are expected to be lower than Option 2. The breakdown of the estimated costs for this option can be seen in Table 10 below.

Table 10. Preliminary Cost Estimate for Option 3: Permanent Installation

Construction and Engineering Costs				
Item	Qty	Unit	Unit Cost	Cost
Construction Costs (Civil, Structural for the New Wet Well)	100%	L.S	$ 750,000.00	$ 750,000.00
Mechanical/Electrical Construction	100%	L.S.	$ 150,000.00	$ 150,000.00
Instrumentation and SCADA (Materials & Programming)	100%	L.S.	$ 150,000.00	$ 150,000.00
Procure Permanent Submersible Pumps with Rail and Safety Chains	100%	L.S.	$ 750,00.00	$ 750,000.00
Contractor Indirects (20%)	100%	L.S.	$ 360,000.00	$ 360,000.00
Permitting MC-EA	100%	L.S.	$30,000.00	$30,000.00
Contingency (30%)	100%	L.S.	$ 540,000.00	$ 648,000.00
			Subtotal	**$ 2,838,000.00**
			Engineering (15%)	**$ 425,700.00**
			Construction and Engineering Cost Total (excl. HST)	**$ 3,263,700.00**
Annual Operating and Maintenance Cost				
Item	Qty	Unit	Unit Cost	Cost
Existing Pump Maintenance	100%	L.S.	$ 10,000.00	$ 10,000.00
Proposed Pump Maintenance	100%	L.S.	$ 10,000.00	$ 10,000.00
			Annual Operating and Maintenance Cost Total (excl. HST)	**$ 20,000.00**

*Cost is per year and can vary depending on use

*Estimated based on previous project with similar scope

10.4 Option 4: The "Cadillac"

The preliminary cost estimate for this option includes major modifications to the existing arrangement in order to add four (4) single diesel pumps with similar pumping capacity of the pump proposed in Option 2 to reach the total target capacity of 3.0 m^3/s to handle certain higher and unprecedent/unlikely extreme precipitation events. This option is considered to have an exponential increase on initial/capital cost mostly due to the procurement of the required pumps. Extra costs associated to this option include: structural, mechanical and electrical engineering design for the new slab to hold the pumps and new intake and discharge structure, higher procurement cost as well as more costly annual maintenance to all new pumps. In addition, a higher

cost has been carried to account for a Municipal Class EA, since the existing footprint of the backflood control structure would increase, resulting in potential environmental impacts.

This option will be by far the most expensive and time/permitting consuming, but also provides the most flood risk mitigation to unprecedent/unlikely high extraordinary precipitation events. The breakdown of estimated costs for this option can be seen in Table 11 below.

Table 11. Preliminary Cost Estimate for Option 4: The "Cadillac"

Construction and Engineering Costs				
Item	Qty	Unit	Unit Cost	Cost
Construction Costs (Installation of Diesel Pumps, New Intake and Discharge Structure))	100%	L.S	$ 1,000,000.00	$ 1,000,000.00
Procure Permanent Diesel Pump	100%	L.S.	$ 2,000,000.00	$ 2,000,000.00
Contractor Indirects (20%)	100%	L.S.	$ 600,000.00	$ 600,000.00
Permitting	100%	L.S.	$ 40,000.00	$40,000.00
Contingency (30%)	100%	L.S.	$ 444,000.00	$ 1,080,000.00
			Subtotal	**$ 4,720,000.00**
			Engineering (15%)	**$ 708,000.00**
			Construction and Engineering Cost Total (excl. HST)	**$ 5,428,000.00**
Annual Operating and Maintenance Cost				
Item	Qty	Unit	Unit Cost	Cost
Existing Pump Maintenance	100%	L.S.	$ 10,000.00	$ 10,000.00
Proposed Pump Maintenance	100%	L.S.	$ 48,000.00	$ 48,000.00
			Annual Operating and Maintenance Cost Total (excl. HST)	**$ 58,000.00**

*Cost is per year and can vary depending on use

*Estimated based on previous project with similar scope

11 Comparative Evaluation

11.1 Inflation

To accurately estimate the total cost of each of the above options, inflation rates were applied to the re-occurring annual costs such as existing pump maintenance, new pump maintenance, and other associated costs like diesel fuel, and pump rentals when applicable.

Historical inflation rates (from Statistics Canada) were analyzed to determine an estimated project average inflation rate to apply to all future costs in order to obtain a present-day equivalent value. Historical inflation rates from Statistics Canada in the last 13 years are shown in Table 12.

Table 12. Historic Interest Rates 2010 - 2023

Year	Canada	Ontario
2010	1.84	2.46
2011	2.92	3.09
2012	1.50	1.42
2013	0.90	0.99
2014	1.95	2.36
2015	1.12	1.19
2016	1.42	1.81
2017	1.56	1.70
2018	2.30	2.35
2019	1.95	1.85
2020	0.74	0.65
2021	3.36	3.47
2022	6.78	6.78
2023	3.90	3.90
Average	2.30	2.43

Furthermore, after analyzing recent trends, an average inflation rate of 3.50% was selected to account for the higher inflation values found in the last two years and that are expected to continue for a few more years.

11.2 20-Year Life Cycle Analysis

Table 13 below is the summary of the 20-year life cycle analysis which projects the associated costs for each option over a 20-year period. The cost of routine maintenance and operation will increase from inflation. The purpose of Table 13 below is to outline the expected overall cost for each option over a period of 20 years in a present-day equivalent value. The construction and engineering costs are not subject to inflation based on the assumption that design for a selected option, and its associated construction timeline would be within a year of the submission of this document.

Table 13. 20 Year Life-Cycle Cost

Item (Excluding HST)	**Options**			
	1: Do Nothing	**2: Semi-Permanent**	**3: Permanent**	**3: The "Cadillac"**
Construction & Engineering Costs	-	$1,076,400.00	$3,263,700.00	$5,428,000.00
Operating & Maintenance Costs	$2,131,107.00	$696,198.00	$605,389.00	$1,755,629
20-Year Total*	**$2,131,107.00**	**$1,772,598.00**	**$3,869,089**	**$7,183,629**
Comments				
Pro's	No initial/capital costs with no immediate investment. No requirements for additional design or engineering.	The lowest initial/capital cost. Provides additional pumping capacity (1.2 m^3/s -1.3 m^3/s) to protect against flooding during certain low to moderate extraordinary precipitation events.	Provides additional pumping capacity (1.2 m^3/s -1.3 m^3/s) to protect against flooding during certain low to moderate extraordinary precipitation events. Pumping system is automated through a PLC and SCADA system.	Provides additional pumping capacity (up to 3.0 m^3/s) to handle certain higher and unprecedent/unlikely extreme precipitation events.
Con's	No readily available additional pumping capacity at the backflood control structure. Must rely on pumps rental availability. Higher 20-year costs (due to pumps rental) than Option 2.	System is not automated and will require more monitoring than Option 3. Does not provide protection against flooding during certain higher and unprecedent/unlikely extreme precipitation events.	Much higher capital costs than Option 2. Does not provide protection against flooding during certain higher and unprecedent/unlikely extreme precipitation events.	This option is the most expensive overall. Majority of the equipment will be only sitting on standby. This option ultimately does not provide complete risk mitigation to all possible extraordinary and extreme precipitation events.

*Inflation rate of 3.5% each year.

*Prices exclude HST

12 Operation Management Review including Ice Management

Regardless of the selection of a preferred option from above, EXP conducted a review of the current operation procedures established for the Parks Creek Backflow Control Structure within the Operational Manual provided by the NBMCA. In summary, the normal summer level in Lake Nippising is below elevation 196.0 m. When the lake level increases to 196.1 m, six stop logs should be placed in each of the two outside bays. When the lake level increases to elevation 196.2 m (known as the "Flood Damage Threshold Elevation"), all three bays of the structure are closed with 7 stoplogs to give a constant sill level of 196.4 m across the structure. Pumps will then be activated to draw the Parks Creek channel water elevation down as low as possible.

The Operation Manual establishes that the above procedures will undoubtedly go through refinements over time, as operation experience is gained. The NBMCA has requested as part of this study to review the above operation procedures and threshold elevations. With the use of the PCSWMM Model developed by EXP for the Parks Creek subwatershed, a series of different scenarios were simulated, assuming critical elevations in Lake Nippising and potential precipitation return periods within the Parks Creek subwatershed only, and results plotted in the following Figure 4. The following assumptions are given:

- The Parks Creek Backflood Control Structure is fully open during the entire simulation.
- The return periods presented in this graph correspond to the probability of rainfall intensity within the Parks Creek subwatershed only produced by microclimates in the study area. These are unrelated to the potential return periods associated with water levels in Lake Nippising given in the Operational Manual developed by Totten Sims Hubicki in 1994. Lake Nippising is a man-made operated lake which water levels are the product of set operation procedures.
- These synthetic short duration rainfall events used in this graph have been taken from Table 2 and have been assigned with a SCS Type II rainfall temporal distribution as recommended, which is a symmetrical and highly peaked distribution.
- During the development of this table, it was determined that the Parks Creek subwatershed is more susceptible to highly peaked short duration rainfall events than long duration (24 hours to 30 days) rain-on-snowmelt events.
- Based on the known prone flooding areas within the Parks Creek subwatershed, this graph has referred to the critical elevations found at the crossing on Marshall Park Dr. (i.e., top of culvert and top of road shown in Figure 4). Inundation maps provided suggest that private properties could be affected once this crossing is fully surcharged.

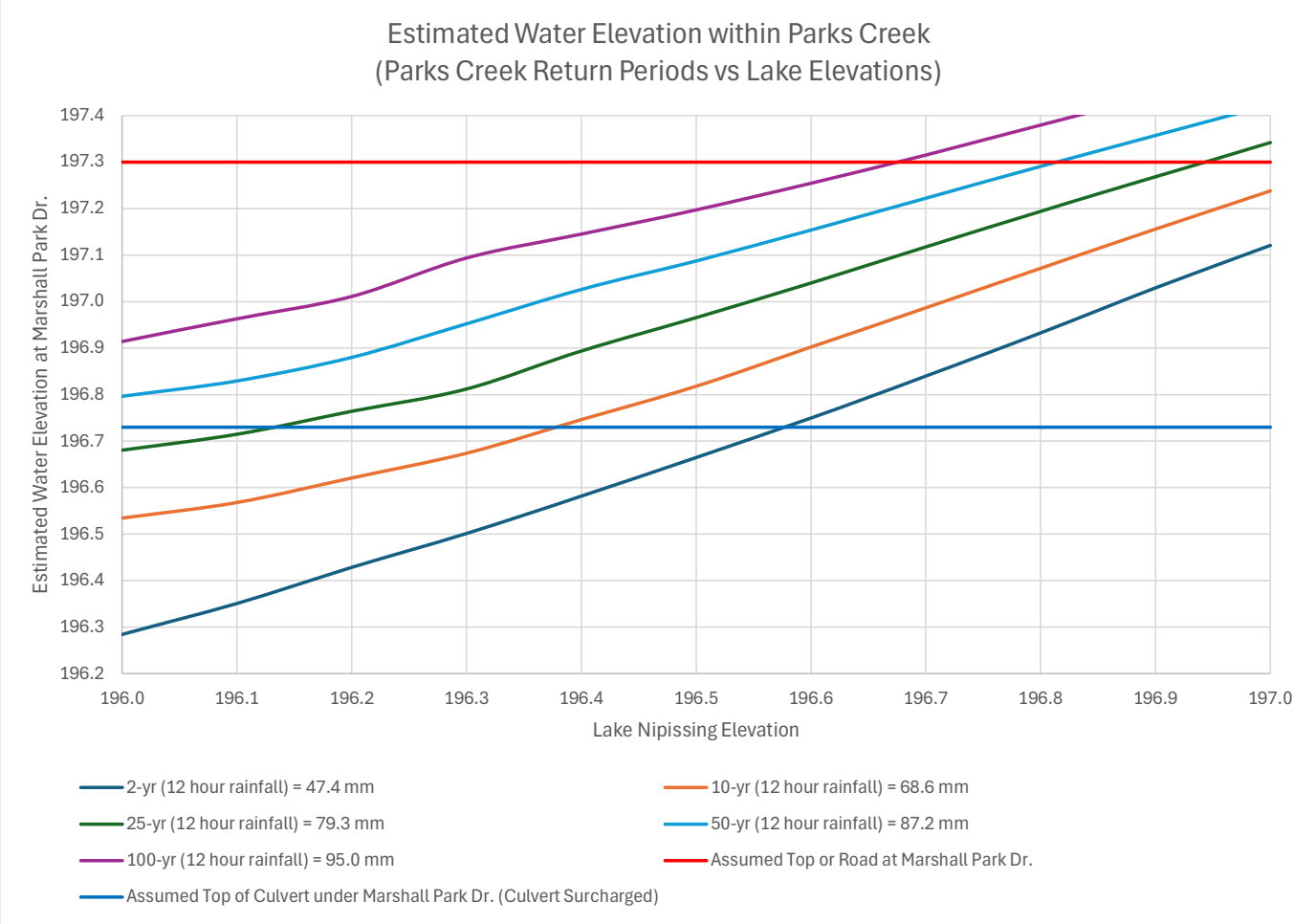


Figure 4. Estimated Water Elevations within Parks Creek

As it can be seen in this graph, rather than setting a Flood Damage Threshold Elevation to close the Parks Creek Backflood Control Structure, the NBMCA should use this graph to understand the performance of the creek, first without the use of the control structure, then during different upset conditions vs different water levels in Lake Nippising, and make decisions based on actual meteorological conditions at the site and their tolerance to the risk of flooding. For example, it appears that the creek channel can tolerate up to a 10-year rainfall events (12 hours=68.6 mm) with Lake Nippising water levels as high as 196.4 m resulting in minimum surcharging at the referenced crossing.

The above can be particularly useful in the spring when Lake Nippising is being operated at higher than normal elevations and the stoplogs can not be placed on the structure due to ice build-up on the sills of the bays and log guides. In that case, it is ultimately recommended to carefully cut/remove ice build-up throughout the backflood control structure openings and intake structure in order to first accommodate excess local runoff in the spring with the structure fully open, and then be able to close the structure and start pumping water if heavy rain and snowmelt is observed on the radar. The use of bubblers or aerators along the structure to maintain it free of ice build-up during the winter months is also a common recommended practice and should be analyzed by the NBMCA if it is cost effective.

13 Asset Management Plan

Finally, based on the EXP site visit, the overall condition of the Parks Creek Backflood Control Structure was considered mostly to be in good condition with localized areas of fair to poor, but no major visible concrete deficiencies. Due to the age of the structure (built in 1994-30 years), the concrete shows signs of the effects of continued exposure to repeated freeze-thaw cycles particularly around the water line. Other areas of the structure show signs of moisture and vegetation throughout but this was not flagged as a concern, although it should be periodically cleaned and maintained. No visible map cracking associated with Alkali-Aggregate Reaction (AAR) was noted on the visible faces of the structure. The steel components of the structure appear to be in good condition, and with minor localized surface rust and corrosion on the galvanized steel hand railing and grating.

As no major cracks were observed throughout the structure, the condition of the concrete and steel are visibly good, the structure appears to be functioning as intended, and the life expectancy of a standard concrete structure such as this one is between 50 to 100 years depending on the use and exposure, a detailed structural condition assessment is not recommended at this time. A detailed condition assessment, as per the National Building Code (NBC) Structural Commentary L, and the Ontario Structure Inspection Manual (OSIM), would be very costly for the NBMCA and at this time would not bring much more additional information regarding the current condition of the structure.

The mechanical equipment shows signs of aging and depreciation. Xylem currently has an annual service contract to inspect these pumps. The most recent inspection sheet from Xylem is included in Appendix C. According to this inspection report, the pumps were in good condition with no immediate concerns. The wear rings and impeller were in good condition, there were no signs of oil leaks, and the electrical equipment was intact. The pumps were installed around 1998-1999, making them approximately 25-26 years old. Despite their age, these pumps have been recently rebuilt (Stator, Impeller, Bearings and Seals) and appear to be capable of providing additional years of service. However, it is recommended to continue annual inspections and to assess whether these pumps should be replaced in the medium term. While the typical service life of a pump is 15-25 years, it can be extended with proper maintenance. Given their age and the recent rebuilt, in the upcoming years proactive replacement should be considered to mitigate the risk of malfunction in the long term.

14 Closing Remarks

We trust that the information provided in this report is sufficient to achieve the project objectives. Should you have any questions, please do not hesitate to contact this office.

Yours truly,

EXP Services Inc.

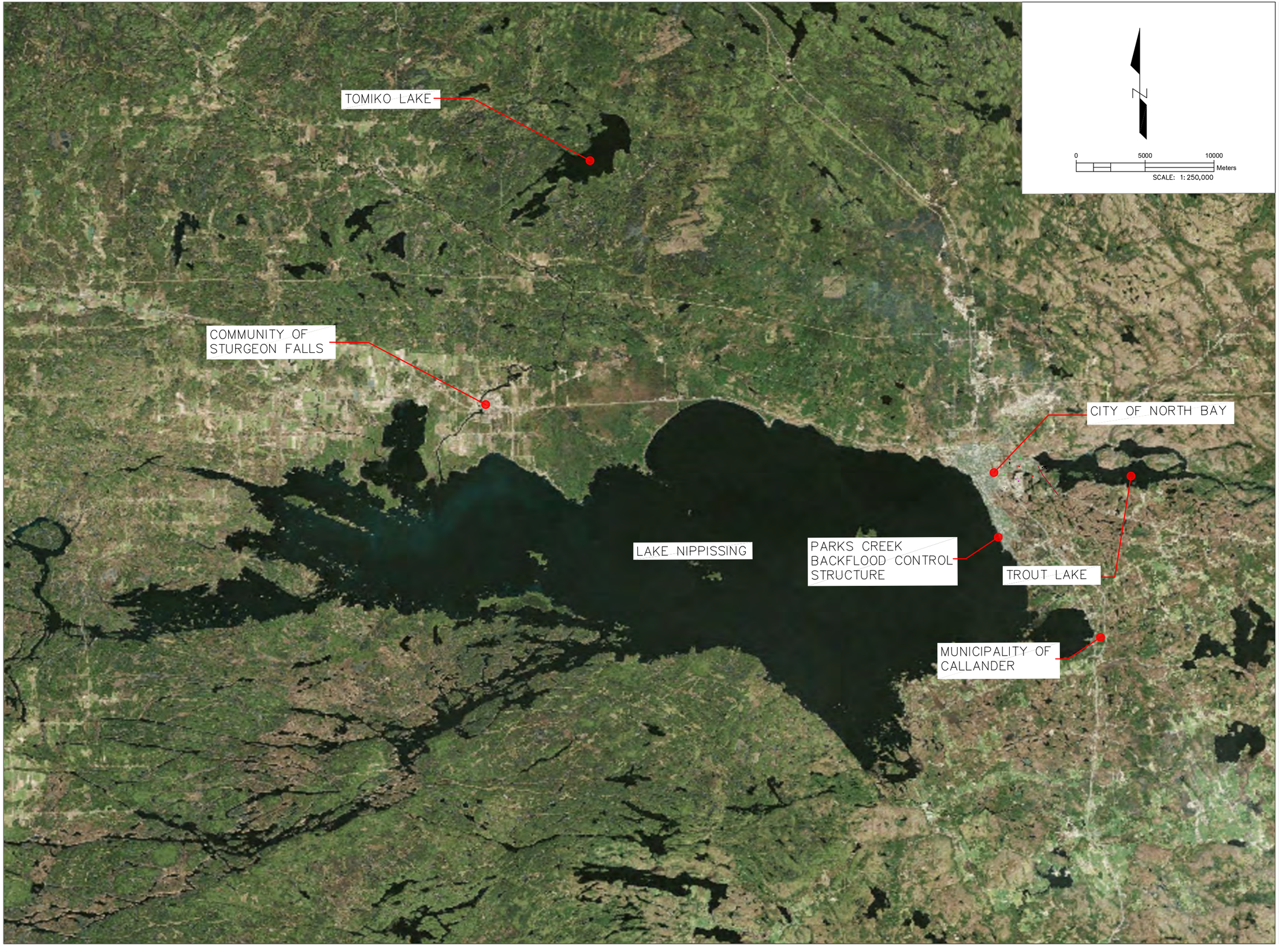
Mauricio Del Olmo Gil, M.Eng., P.Eng. Water Resources Engineer, Earth & Environmental Services, Northeastern Ontario	Steven Kacan, P.Eng. Civil Engineer, Earth & Environmental Services, Northeastern Ontario	Bradley Legault, P.Eng, LEED GA Mechanical Coordinator Infrastructure Northeastern Ontario

Limitations

The evaluations, observations, conclusions, and recommendations presented in this report are based on information provided to EXP, information collected during our site visits, from existing reports, as well as public information. The recommendations made in this report are in accordance with our present understanding of the study objectives. This work has been undertaken in accordance with normally accepted engineering practices and assumptions. No other warranty is expressed or implied.

The information given in this report is provided solely to our client and it is applicable only to the project described in the text. Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. EXP accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

The information contained herein in no way reflects on the environmental aspects of the project, unless otherwise stated.



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No.	Revision	By:	Date
0	ISSUED FOR CLIENT REVIEW	M.D.O.G	2024.04.12

ISSUED FOR CLIENT REVIEW

Professional Seal(s)

Drawn By: S.D.K	Scale: 1:250,000
Checked By: M.D.O.G	Date: 2024-04-12
Approved By: M.D.O.G	Date: 2024-04-12
Date Printed: 2023-04-12	
File Name: PARKS CREEK FIGURES.DWG	

Project Title

PARKS CREEK BACKFLOOD CONTROL STRUCTURE
NORTH BAY-MATTAWA CONSERVATION AUTHORITY

Dwg. Title

PARKS CREEK GENERAL SITE LOCATION

Project No. SUD-23009099-A0

Dwg. No. DRAWING 1

Rev. No. 0

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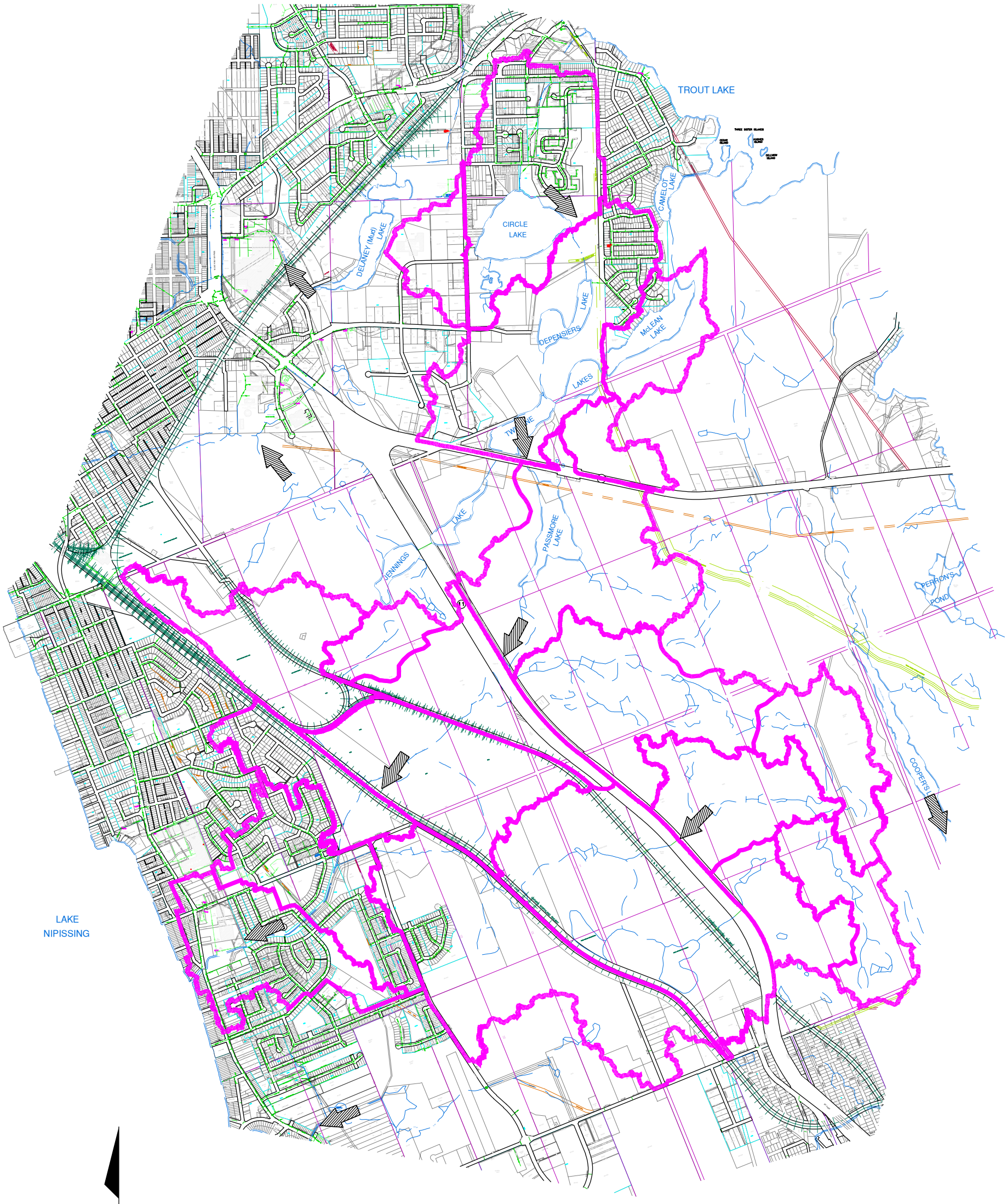

LEGEND

CATCHMENT AREA

FLOW DIRECTION

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CLIENT: NORTH BAY - MATTAWA CONSERVATION AUTHORITY	TITLE: PARKS CREEK BACKFLOOD CONTROL STRUCTURE PARKS CREEK WATERSHED MAP		
PROJECT: PARKS CREEK BACKFLOOD CONTROL STRUCTURE			
PROJECT NO.: SUD-23009099-A0	DATE: 15/12/2023	SCALE: 1:25,000	DWG NO.: DRAWING 2

Apr 12, 2024 - 2:09pm \\exp\data\SUD\SUD-23009099-A0\60 Execution\65 Drawings\Parks Creek Watershed.dwg

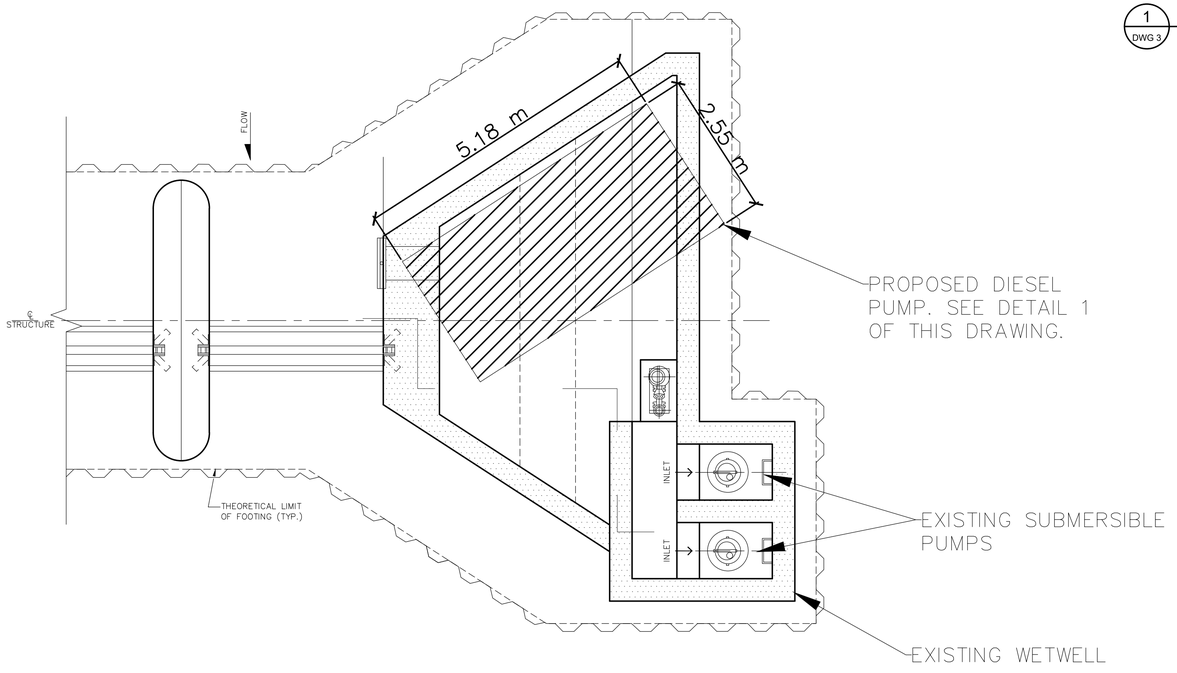
High Volume, Medium-Head and Large Solids-Handling Capabilities

- Handle raw sewage, sludges and liquids with solids up to 3 inches
- Automatic priming from dry to 28 feet
- Electric motor for long lasting durability where refueling is impractical
- Cast steel impeller

OPTIONS INCLUDE

- 316 or CD4MCu stainless steel pump-end construction for high and low pH applications
- Highway trailer or skid mount

1 DWG 3 GODWIN ELECTRIC DRI-PRIME CD SERIES



PROPOSED LAYOUT FOR OPTION 2

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Checked By: M.D.O.G.	Date: 2024-04-12
Approved By: M.D.O.G.	Date: 2024-04-12
Date Printed: 2024-04-12	
File Name: BACKFLOOD CONTROL STRUCTURE OPTION DETAILS.DWG	

Project Title

PARKS CREEK BACKFLOOD CONTROL STRUCTURE

NORTH BAY-MATTAWA CONSERVATION AUTHORITY

Dwg. Title

BACKFLOOD CONTROL STRUCTURE OPTION 2

Project No.

SUD-23009099-A0

Dwg. No.	Rev. No.
DRAWING 3	0

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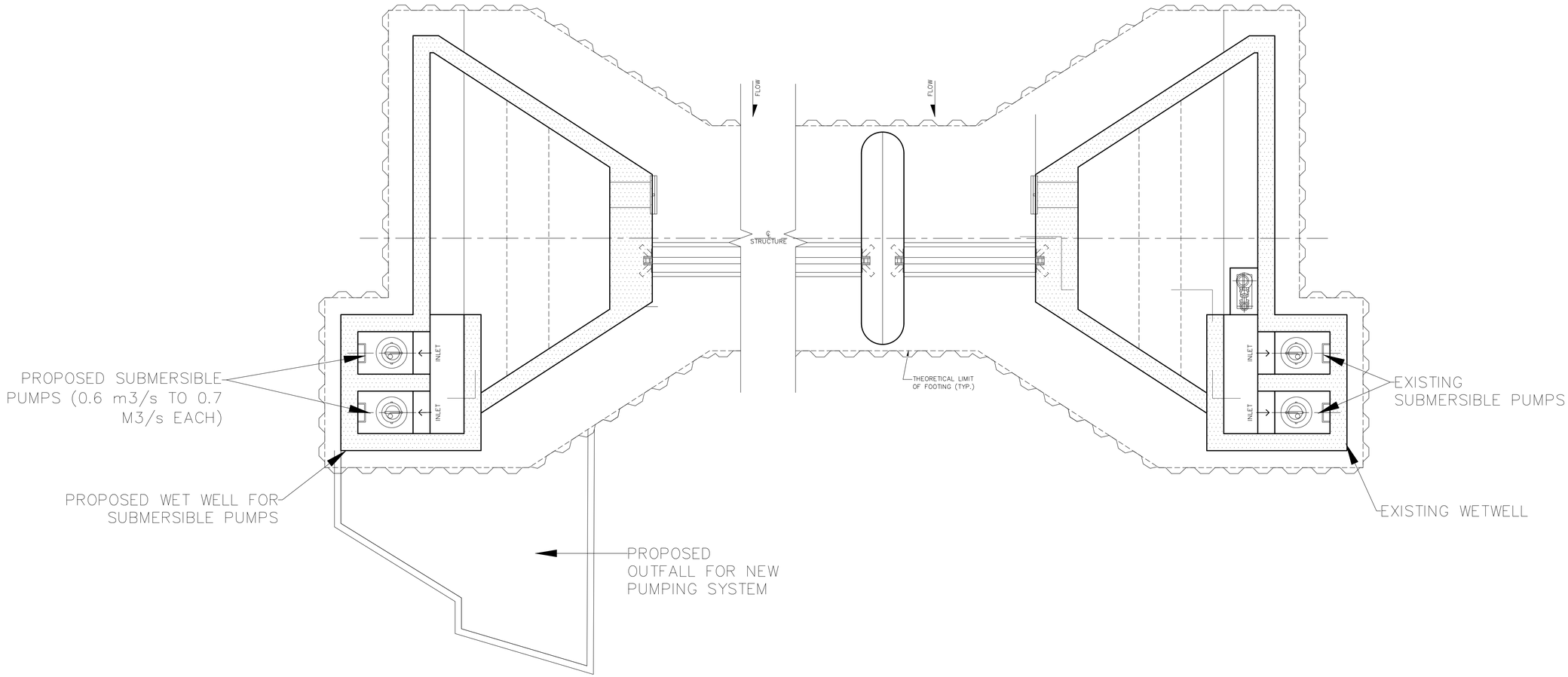

PROPOSED LAYOUT FOR OPTION 3

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Approved By: M.D.O.G.	Date: 2024-04-12
Date Printed: 2024-04-12	

File Name: BACKFLOOD CONTROL STRUCTURE OPTION DETAILS.DWG

Project Title

PARKS CREEK BACKFLOOD CONTROL STRUCTURE

NORTH BAY-MATTAWA CONSERVATION AUTHORITY

Dwg. Title

BACKFLOOD CONTROL STRUCTURE OPTION 3

Project No. SUD-23009099-A0

Dwg. No. DRAWING 4

Rev. No. 0

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High Volume, Medium-Head and Large Solids-Handling Capabilities

- Handle raw sewage, sludges and liquids with solids up to 5 inches
- Automatic priming from dry to 28 feet
- Electric motor for long lasting durability where refueling is impractical
- Cast steel impeller

OPTIONS INCLUDE

- 316 or CD4MCu stainless steel pump-end construction for high and low pH applications
- Highway trailer or skid mount

1 DWG 5 GODWIN ELECTRIC DRI-PRIME CD SERIES

PROPOSED LAYOUT FOR OPTION 4

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Date Printed: 2024-04-12	

File Name: BACKFLOOD CONTROL STRUCTURE OPTION DETAILS.DWG

Project Title

PARKS CREEK BACKFLOOD CONTROL STRUCTURE

NORTH BAY-MATTAWA CONSERVATION AUTHORITY

Dwg. Title

BACKFLOOD CONTROL STRUCTURE OPTION 4

Project No. SUD-23009099-A0

Dwg. No. DRAWING 5

Rev. No. 0

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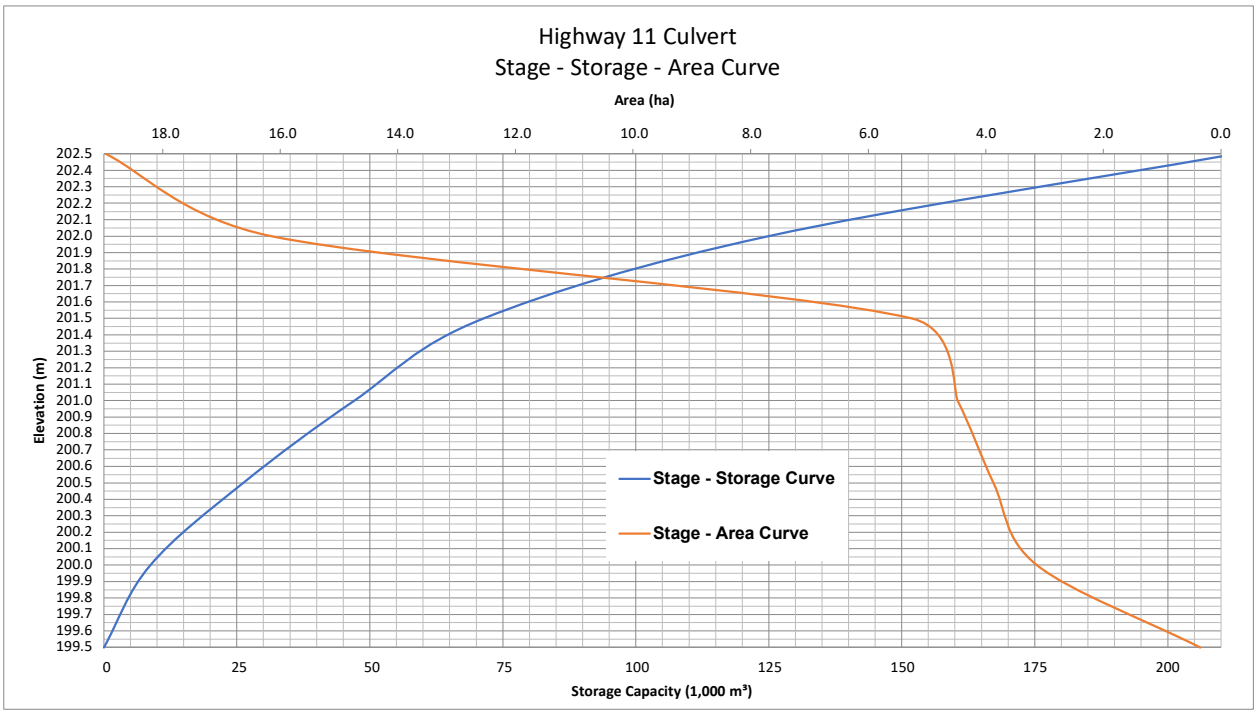
Appendix A – Stage-Storage-Area Curves


Highway 17 East Culvert
Stage - Storage - Area Curve
Area (ha)
80.0 75.0 70.0 65.0 60.0 55.0 50.0 45.0 40.0 35.0 30.0 25.0 20.0 15.0 10.0 5.0 0.0
Elevation (m)
204.0 203.9 203.8 203.7 203.6 203.5 203.4 203.3 203.2 203.1 203.0 202.9 202.8 202.7 202.6 202.5 202.4 202.3 202.2 202.1 202.0
0 50 100 150 200 250 300 350 400 450 500 550 600 650 700 750 800
Storage Capacity (1,000 m³)
Stage - Storage Curve
Stage - Area Curve


Highway 11 Culvert
Stage - Storage - Area Curve
Area (ha)
18.0 16.0 14.0 12.0 10.0 8.0 6.0 4.0 2.0 0.0
Elevation (m)
202.5 202.4 202.3 202.2 202.1 202.0 201.9 201.8 201.7 201.6 201.5 201.4 201.3 201.2 201.1 201.0 200.9 200.8 200.7 200.6 200.5 200.4 200.3 200.2 200.1 200.0 199.9 199.8 199.7 199.6 199.5
0 25 50 75 100 125 150 175 200
Storage Capacity (1,000 m³)
Stage - Storage Curve
Stage - Area Curve

Appendix B – Monthly Mean Flows at La Vase River Station (1974 – 2022)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1974			1.23	3.83	1.54	0.591	0.127	0.215	0.536	0.678	2.03	0.377
1975	0.279	0.208	0.56	4.03	1.11	0.434	0.084	0.061	0.068	0.334	0.62	1.13
1976	0.127	0.127	3.32	2.68	2.1	0.182	0.254	0.089	0.113	0.193	0.361	0.22
1977	0.131	0.111	2.51	3.27	0.277	0.131	0.167	0.383	1.12	0.811	1.06	0.685
1978	0.262	0.175	0.139	4.19	0.797	0.139	0.16	0.548	1.05	1.2	0.732	0.418
1979	0.312	0.301	2.61	4.98	1.39	0.394	0.111	0.292	0.725	0.994	1.8	0.966
1980	0.379	0.113	1.23	4.65	0.817	0.587	0.869	0.578	2.39	2.49	1.28	0.568
1981	0.196	2.05	1.54	2.86	1.33	0.943	0.25	0.157	1.45	1.63	0.813	0.472
1982	0.198	0.16	0.546	4.33	0.468	0.262	0.081	0.079	0.456	1.02	1.33	2.48
1983	0.523	0.213	2.11	2.31	2.84	0.721	0.078	0.086	0.901	1.65	1.08	0.514
1984	0.254	1.5	0.733	2.47	1.08	1.14	0.852	0.482	0.558	0.652	1.9	1.04
1985	0.477	0.422	1.34	5.82	0.88	0.259	1.12	0.147	0.113	0.348	0.981	0.583
1986	0.204	0.178	2.04	3.21	1.25	0.622	0.502	0.424	0.246	0.725	0.68	0.36
1987	0.221	0.176	2.04	1.81	0.454	0.425	0.097	0.103	0.069	0.256	0.525	0.515
1988	0.239	0.535	0.837	3.64	0.745	0.082	0.055	1.56	0.581	1.51	1.92	0.438
1989	0.156	0.196	1.79	2.94	1.48	0.579	0.114	0.028	0.049	0.222	1.15	0.173
1990	0.52	0.448	2.42	2.05	2.06	0.512	0.251	0.166	0.57	1.67	2.92	0.825
1991	0.161	0.175	1.8	3.5	0.676	0.107	0.043	0.035	0.076	1.11	1.15	0.868
1992	0.283	0.095	0.469	4.11	1.15	0.109	0.141	0.12	1.17	0.996	2.16	0.39
1993	0.291	0.09	0.506	2.24	0.907	0.855	0.095	0.047	0.303	1.5	1.31	0.484
1994	0.111	0.337	0.431	2.2	1.67	0.866	1.05	0.553	0.226	0.616	1.63	0.57
1995	0.72	0.14	1.59	1.85	2.31	0.29	0.942	0.2	0.343	0.859	2.25	0.348
1996	0.537	0.368	0.735	4.97	1.52	0.239	0.347	0.272	0.16	0.256	0.986	0.988
1997	0.849	0.624	0.629	5.42	1.96	0.133	0.134	0.05	0.361	0.188	0.424	0.211
1998	0.25	0.157	1.9	3.27	0.155	0.117	0.057	0.033	0.085	0.116	0.466	0.71
1999	0.333	0.457	0.584	1.4	0.405	0.406	1.06	0.45	0.249	1.62	1.98	1.69
2000	0.221	0.888	1.47	1.24	1.26	0.759	0.478	0.587	0.436	0.423	1.22	0.459
2001	0.147	0.274	0.494	4.2	0.96	0.246	0.087	0.671	1.24	2.83	2.28	1.6

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2002	0.445	0.374	1.24	4.55	1.54	1.58	0.078	0.039	0.081	0.185	0.705	0.37
2003	0.237	0.124	1.69	2.2	0.999	0.743	0.161	0.229	0.085	0.444	1.85	0.484
2004	0.413	0.184	1.61	3.13	2.76	0.328	0.921	0.063	0.059	0.115	0.561	0.47
2005	0.94	0.219	0.222	4.3	0.33	0.1	0.045	0.061	0.085	0.237	1.27	0.738
2006	0.524	0.357	1.44	4.14	0.577	0.173	0.418	0.096	0.302	1.94	1.43	1.73
2007	0.947	0.167	1.61	2.18	0.726	1	0.416	0.148	0.099	0.43	0.859	0.47
2008	1.78	0.541	0.396	3.79	1.38	1.64	0.371	2.21	0.469	0.537	0.779	1.33
2009	0.673	0.435	1.74	3.42	1.19	0.864	0.641	0.138	0.055	0.556	1.22	0.66
2010	0.314	0.169	1.38	1.03	0.459	0.216	0.078	0.076	0.861	0.762	1.31	1.03
2011	0.667	0.327	1.07	3.68	0.715	0.754	0.479	0.032	0.043	0.264	0.611	1.27
2012	0.342	0.248	3.22	1.08	0.232	0.168	0.04	0.084	0.208	0.94		
2013	-	-	-	-	-	-	-	0.062	0.301	0.764	1.65	0.326
2014	0.266	0.148	0.165	4.21	1.93	0.458	0.609	0.159	0.939	1.84	1.84	0.824
2015	0.319	0.153	0.173	4.22	1.27	0.363	0.039	0.011	0.01	0.073	0.907	1.2
2016	0.641	0.454	2.89	3.75	0.698	0.104	0.068	0.138	0.046	0.086	0.17	0.523
2017	0.4	0.759	0.98	4.23	2.18	0.682	1.1	0.687	0.705	0.783	1.19	0.879
2018	0.589	0.459	0.253	2.39	2.09	0.217	0.011	0.135	0.207	0.851	0.997	0.544
2019	0.285	0.712	1.08	6.45	2.74	0.462	0.022	0.007	0.095	1.04	1.26	0.489
2020	0.299	0.189	2.32	2.89	0.797	0.482	0.058	0.184	1.17	1.33	0.97	0.802
2021	0.397	0.233	2.51	0.888	0.569	0.186	1.12	0.146	0.869	1.75	0.841	1.09
2022	0.182	0.26	2.66	3.23	1.39	0.63	0.135	0.157	0.172	0.647	0.356	0.567

Flow (m^3/s)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Minimum	0.11	0.09	0.14	0.89	0.16	0.08	0.01	0.01	0.01	0.07	0.17	0.17
Maximum	1.78	2.05	3.32	6.45	2.84	1.64	1.12	2.21	2.39	2.83	2.92	2.48
Average	0.41	0.36	1.38	3.32	1.21	0.49	0.34	0.27	0.46	0.87	1.20	0.75

Appendix C – Mechanical Equipment Inspection Sheet

Sewage Lift Station Inspection

Xylem

1086 Elisabella Street • SUDBURY • Ontario • P3A 5K2 • Ph. # 705 560-2141

Date: August 30th, 2023 | Flygt Rep. Signature: Andru Booth

Customer: North Bay Mattawa Conservation | Signature: _____

Customer#: 510045 | QUOTE# R23-36-0131

Station Address : Lake Shore | SVMX# WO-00218993

Station Type: FRP _____ STEEL _____ CONCRETE *

Control Type: S _____ D * T _____

	Pump #1 Parks Creek				Pump #2 Parks Creek				Pump #3 Oak Street				Pump #4			
Serial Number	9440006				9440005				2230233				Ready 8			
Model	3201.180-6121				3201.180-6121				3085.060-0194							
Voltage	600				600				230				120			
RPM	855				855				1710							
Hp or KW	30HP/22KW				30HP/22KW				2.4HP/1.8KW							
Impeller #	823				823				463				In Good Working Order			
Max. Hours	1931				1732				N/A							
Hours									N/A				Float is Good			
Amps Reading	23.5 / 25 / 25.5				24.5 / 25 / 24				8.2							
Insul. Test	300MΩ				1000MΩ				1200MΩ							
Oil	OK				OK											
Stator Casing Removed	Yes		No	✓	Yes		No	✓	Yes		No	✓	Yes		No	✓
Inspection Plug	Yes	✓	No		Yes	✓	No		Yes	✓	No		Yes	N/A	No	
Wear Rings	Good				Good				Good				N/A			
Impeller Condition	Good				Good				Good				Good			
Junction Box	OK				OK				OK							
Cable # & Cond.	OK				OK				OK				OK			
Mon.																

Cond of floats: Start / Stop and High Level are all good

General Condition – Control Panel: Good

General Condition of Pumps: Good

Pump # taken for repair: N/A Reason: _____

Recommendation to customer: Everything looks good. There was no visible damage to the two pumps at Oak Street. Please see attached pictures in email.

Water Available: Yes: ✓ No: _____

Parts used: No parts used

NORTH BAY - MATTAWA CONSERVATION AUTHORITY

TO: The Chairperson and Members
of the Board of Directors,
North Bay-Mattawa Conservation Authority

ORIGIN: Githan Kattera, Regulations Officer/Water Resources Coordinator

DATE: August 02, 2024

SUBJECT: Report on O. Reg. 41/24: Prohibited Activities, Exemptions and Permits (Ontario Regulation 41/24)

Background:

Section 28 of the *Conservation Authorities Act* empowers each Conservation Authority to prevent the loss of life and property due to flooding and erosion, and to conserve and enhance natural resources. On April 1, 2024, the *Conservation Authorities Act* was amended, and Ontario Regulation 41/24 (Prohibited Activities, Exemptions and Permits) was enacted. This regulation continues to be used as the tool by which the NBMCA manages issues related to development in natural hazard areas, including areas with floodplains, wetlands and steep slopes. Within this regulation, an Authority may issue a permit to a person to engage in an activity specified in the permit that would otherwise be prohibited by section 28, if, in the opinion of the authority,

(a) The activity is not likely to affect the control of flooding, erosion, dynamic beaches or unstable soil or bedrock;
(b) The activity is not likely to create conditions or circumstances that, in the event of a natural hazard, might jeopardize the health or safety of persons or result in the damage or destruction of property; and
(c) Any other requirements that may be prescribed by the regulations are met. 2017, c. 23, Sched. 4, s. 25; 2022, c. 21. Sched.2, s. 9 (1)

On March 28, 2024, the Chief Administrative Officer, Secretary-Treasurer received a delegation from the Board of Directors to issue permits under the amended Ontario Regulation 41/24.

As such, this Board Report is being presented to the NBMCA Board of Directors for information purposes.

Analysis:

Since the approval of the previous minutes, the Conservation Authority has issued seventeen new permits and five legal inquiries. Additionally, a few properties have been classified as exemptions under Ontario Regulation 41/24. A formal email has been sent to the respective applicants, indicating that a permit is not required and that an email confirmation from our office will suffice. A table summarizing the details of these permits is attached to this report.

Among the newly issued permits, there are six large projects, including the TC Pipeline project and newly proposed dwellings, ten standard projects, such as shoreline protections and garages, and one small project.

Recommendation:

THAT the members receive and approve the Prohibited Activities, Exemptions and Permits report as presented.

Recommended Resolution:

THAT the Prohibited Activities, Exemptions and Permits report is received and appended to the minutes of this meeting.

_____ _____

Githan Kattera, Regulations Officer/ Water Resources Coordinator

File No.	Name of Applicant	Municipality	Legal Description/ Address	Name of Regulated Features	Nature of Work	Date Complete Application Received	Development, Interference with Wetlands, and Alterations to Shorelines and Watercourses Permit No./Date of Issuance
RNB-24-23	Paulo Marques	North Bay	Lot 38 75 Mariah St	Wetlands	To replace existing retaining wall	June 27, 2024	**#37-24** July 5, 2024
RNB-24-22	Adam Newton	North Bay	Lot 38 73 Mariah St	Wetlands	To replace existing retaining wall and grading	June 27, 2024	**#38-24** July 5, 2024
RNB-24-35	City of North Bay	North Bay	Gormanville Rd to Cartier St	Lake Nipissing	New storm tie in on McKeown Ave to include new structures, pipe and rip rap placement	July 10, 2024	**#39-24** July 24, 2024
RNB-24-33	Tc – Energy (Sites 01, 02)	North Bay	Lot 1, Conc C 46.321787,-79.257309 46.32117,-79.257136 Widdifield Township	Wetlands	Wooden power pole installation	June 27, 24	**#40-24** July 24, 2024
RNB-24-32	Paul Courchesne	North Bay	Lot 29, Plan M-454 60 Tweedsmuir Dr	Parks Creek wetland	Construction of detached garage	June 28, 2024	**#41-24** July 24, 2024
RNB-24-34	Mary Bossert	North Bay	Lot 64&65, Plan 82 864 Amelia St	Chippewa Creek floodplain	Building a deck	June 18, 2024	**#42-24** June 24, 2024
RNB-24-31	Mark Truchon	North Bay	Lot 36, Conc 15, Parcel 9310	Jessups Creek wetland	Dumping fill and grading	July 8, 2022	**#43-24** July 24, 2024

			264 Birches Rd				
REF-24-11	Taylor Aiken	East Ferris	Lot 12, Conc 4, Part 8, Plan 36R4817, Parcel 15390 6 Roy Rd	Lake Nosbonsing	Remove old structure and construct a new one	July 15, 2024	**#44-24** July 26, 2024
RCHI-24-02	Allen David Thomas	Chisholm	243 Greenpoint Rd	Wasi Lake	Grading and construction of retaining walls	June16, 2023	**#45-24** July 26, 2024
RMATT-24-05	Mark Wilkins	Mattawa	25 389 Neault Rd, Papineau-Cameron	Mattawa River	Replacing existing retaining wall	July16, 2024	**#46-24** July 26, 2024
RNB-24-37	Nathaniel Lachance	North Bay	Lot Broken 16, Conc D, Part 13, Plan 36R8626, Parcel 18799 Lot 13 Circle Lake Rd	Circle Lake	Construct a dwelling	July 16, 2024	**#47-24** July 26, 2024
RNB-24-29	Kerry Caruso	North Bay	535 Regal Rd	Trout Lake	To replace exciting dock and Crib	July 16, 2024	**#48-24** July 26,2024
RMATT-24-04	Stephen Galka	Mattawa	391 Mattawan St	Mattawa River	Pour concrete foundation and erect pre-fab metal structure	July 9, 2024	**#49-24** August 1, 2024
RNB-24-36	Frank Castiglione	North Bay	613 Banner St	Lake Nipissing	Construct a retaining wall	July 18, 2024	**#50-24** August 1, 2024
RNB-24-38	Ashish Pokhrel	North Bay	Lot 12, Plan 36M715 33 Kentreta Dr	Lake Nipissing	Addition to existing house	July 12, 2024	**#51-24** August 1, 2024

RNB-24-42	Paul Trussler	North Bay	Conc C, Pt 12, Plan 36 797 Anita Ave	Trout Lake	Reinstall geothermal lake loop	July 24, 2024	**#52-24** August 1, 2024
RNB-24-41	Tc-Energy (Site 03)	North Bay	26, 27 n/a. Site 1 (GWD 14690): 46.27795, -79.37138. Site 2 (GWD 15050): 46.27636,	Wetlands	Investigative digs to ensure integrity of existing natural gas pipeline	July 26, 2024	**#53-24** August 1, 2024
RL5-NB-24	Mark Ranger	North Bay	660 Peninsula Road	-	Legal Inquiries	July 10, 2024	July 18,2024
RL6-NB-24	Bay builders	North Bay	241 Regal Road	-	Legal Inquiries	July 16, 2024	July 23,2024
RL1-EF-24	Natalia	East Ferris	119B Lanche Road	-	Legal Inquiries	July 16, 2024	July 23,2024
RL1 – CL-24	Commercial department (Rachel Melia)	Calvin	412 Moreau Road, Calvin, Ontario P0H 2E0	-	Legal Inquiries	July 30,2024	Aug 02,2024
RL1-MAT-24	Cassels Brock & Blackwell LLP	Mattawa	327 Main Street		Legal Inquiries	July 30,2024	Aug 02,2024

NORTH BAY - MATTAWA CONSERVATION AUTHORITY

TO: The Chairperson and Members of the Board of Directors,
North Bay-Mattawa Conservation Authority

ORIGIN: Aaron Lougheed, Manager, Finance

DATE: August 14, 2024

SUBJECT: Budget vs Actual for the period January 1, 2024 through June 30, 2024

ANALYSIS: Budget Vs Actual

The Ministry of Natural Resources and Forestry (MNRF) is expected to maintain Conservation Authorities Act Section 39 transfer payment funding in the amount of $133,490.00 for the 2024-25 fiscal year. This transfer payment has not yet been received.

Category One Programs (Mandatory)

Corporate Services Operations – Income and expenses are slightly above budget for the first 6 months of 2024, but a close watch should be paid to legal expenses (350% of budget).

Corporate Services Capital – Income for the capital budget of corporate services is non-existent, this is due to there being no deferred revenue for this program. Recommended that no capital projects move forward until funding has been secured.

Planning and Regulations - Planning and regulations fees are low for this time of year (25% of budget) and expenses should be monitored to ensure no cost overruns associated with this program.

Water Resources Management Operations – Revenues expected to exceed budget, along with expenses, due to the operations of parks creek, total cost recovery for this operation exceeded $105,000. No concerns with the program at this time.

Water Resources Management Capital – Revenues are below budgeted figures as there are no WECI projects planned for fiscal 2024. Expenses are far below budgeted at 11%.

Source Water Protection – Some transfer payments have been received with more likely, expenses are on track with budget and there are no concerns at this time.

On-Site Sewage System Program – Revenue targets are not expected to be in line with budget (currently 33%) and expenses will need to be monitored closely to ensure no cost overruns within the program.

Land and Properties Operations – Revenue likely to be lower than expected at year end due to unavailable deferred amounts, however, expenses for the program are running below budget. No concerns currently.

Lands and Properties Capital – Revenue and Expenses on target. No concerns currently.

Category Two Projects (Non-Mandatory Municipality Delegated)
Watershed Municipal Programs – Revenues and Expenses are in line with the budget. No concerns currently.

Category Three Projects (Non-Mandatory NBMCA Recommended)
Watershed Support Programs Operations – Primary activity within this program is the Mattawa River Canoe Race. Current projected income for the program is $11,933.

Watershed Support Programs Capital – Revenues are on target, no expenses to date in this program. No concerns currently.

Ski Hill Operations – Funding has been received and passed through to the Ski Hill for Operations. No concerns currently.

Ski Hill Capital – Greater than expected expenses for capital repairs to NBMCA owned assets on the Ski Hill, revenues not expected to meet budgeted amounts. With a significant reserve for capital expenses there are no concerns currently.

RECOMMENDED RESOLUTIONS:
THAT the Budget Status Report at June 30, 2024 be approved by the members of the Board of Directors and appended to the minutes of this meeting,

_____

Aaron Lougheed
Manager, Finance

Reviewed by
Robin Allen
Interim CAO and Secretary Treasurer

NORTH BAY-MATTAWA CONSERVATION AUTHORITY
Profit Loss Budget vs. Actual
For the 6 Months Ended June 30, 2023

	Jan - Jun 2024	Budget	Variance	% of Budget
Income				
3100 · Corporate Services	612,370	1,081,110	-468,740	56.64%
9700 · Corporate Services Capital	0	174,985	-174,985	0.0%
3500 · Planning and Regulations	204,671	341,052	-136,381	60.01%
3600 · Water Resources Management	556,318	626,067	-69,749	88.86%
8300 · Source Water Protection	72,773	160,753	-87,980	45.27%
3200 · On-site Sewage System Program	433,597	1,211,200	-777,603	35.8%
6100 · Watershed Support Programs	44,384	64,086	-19,702	69.26%
6200 · Watershed Support Programs Capital	9,500	9,500	0	100.0%
6400 · Watershed Municipal Programs	23,197	23,197	0	100.0%
7000 · Lands & Properties	503,312	579,711	-76,399	86.82%
8600 · Lands & Properties Capital	261,485	261,485	0	100.0%
109-00 ·WRM Capital	252,374	522,000	-269,626	48.35%
112-00 · LSHSC CAPITAL	65,000	65,000	0	100.0%
114-00 · LSHSC OPERATING	185,010	85,000	100,010	217.66%
Total Income	**3,223,992**	**5,205,146**	**-1,981,154**	**61.94%**
Expense				
3100 · Corporate Services	607,228	1,081,110	473,882	56.17%
9700 · Corporate Services Capital	5,608	174,985	169,377	3.21%
3500 · Planning and Regulations	212,244	341,052	128,808	62.23%
3600 · Water Resources Management	340,827	626,067	285,240	54.44%
8300 · Source Water Protection	73,765	160,753	86,988	45.89%
3200 · On-site Sewage System Program	573,514	1,211,200	637,686	47.35%
6100 · Watershed Support Programs	32,450	64,086	31,636	50.64%
6200 · Watershed Support Programs Capital	0	9,500	9,500	0.0%
6400 · Watershed Municipal Programs	17,651	23,197	5,546	76.09%
7000 · Lands & Properties	261,871	579,711	317,840	45.17%
8600 · Lands & Properties Capital	151,102	261,485	110,383	57.79%
109-00 · WRM Capital	58,245	522,000	463,755	11.16%
112-00 · LSHSC CAPTIAL	78,666	65,000	-13,666	121.02%
114-00 · LSHSC OPERATING	172,510	85,000	-87,510	202.95%
Total Expense	**2,585,681**	**5,205,146**	**-2,619,465**	**49.68%**
Net Ordinary Income	**638,311**	**0**	**638,311**	

NBMCA
Profit Loss Budget Vs. Actual
Corporate Services

	Jan - Jun 24	Budget	$ Over Budget	% of Budget
Ordinary Income/Expense				
Income				
3116 · Administrative Overhead	396,757.50	793,515.00	(396,757.50)	50.0%
3109 · Internal Rent Rev	27,731.00	55,462.00	(27,731.00)	50.0%
3101 · A-Transfer Pay'ts MNR	0.00	16,020.00	(16,020.00)	0.0%
3104 · A-General Levy	143,442.00	143,441.00	1.00	100.0%
3106 · A-Fees	0.00	1,000.00	(1,000.00)	0.0%
3107 · A-Donations	87.47	2,000.00	(1,912.53)	4.37%
3110 · A-Property Rental Rev External	6,061.00	50,776.00	(44,715.00)	11.94%
3113 · A-Other Revenue	2,624.88			
3114 · A-Interest Earned	35,665.81	18,896.00	16,769.81	188.75%
Total Income	612,369.66	1,081,110.00	(468,740.34)	56.64%
Gross Profit	612,369.66	1,081,110.00	(468,740.34)	56.64%
Expense				
3191 · Mortgage Principal Repayment	9,079.55	18,715.00	(9,635.45)	48.52%
3199 · Bad Debts	73.62			
3130 · A-Wages Salaried	305,947.48	712,245.00	(406,297.52)	42.96%
3138 · A-Per Diem	1,160.00	11,500.00	(10,340.00)	10.09%
3139 · A-Members Mileage	1,016.26	5,500.00	(4,483.74)	18.48%
3140 · A-Members Expenses	933.00	2,000.00	(1,067.00)	46.65%
3141 · A-Staff Mileage & Expenses	5,735.95	4,700.00	1,035.95	122.04%
3142 · A-StaffCertification & Training	5,561.36	8,850.00	(3,288.64)	62.84%
3143 · A-Telephone	3,559.61	9,270.00	(5,710.39)	38.4%
3145 · A-Insurance	30,465.00	30,465.00	0.00	100.0%
3146 · A-Gas	11,302.84	16,500.00	(5,197.16)	68.5%
3147 · A-Repairs & Maintenance	0.00	2,000.00	(2,000.00)	0.0%
3148 · A-Office Supplies	818.92	8,000.00	(7,181.08)	10.24%
3149 · A-Postage	564.40	545.00	19.40	103.56%
3150 · A-Equipment Purchases	0.00	250.00	(250.00)	0.0%
3151 · A-Equipment Rental	578.53	2,460.00	(1,881.47)	23.52%
3152 · A-Publications & Printing	670.60	2,015.00	(1,344.40)	33.28%
3153 · A-Advertising	152.64	4,000.00	(3,847.36)	3.82%
3154 · A-Bank Charges	847.95			
3155 · A-Interest Expense	13,273.45	24,500.00	(11,226.55)	54.18%
3158 · A-Audit	20,635.70	11,050.00	9,585.70	186.75%
3159 · A-Legal Services	104,610.04	30,000.00	74,610.04	348.7%
3160 · A-Materials & Supplies	4,363.70	38,080.00	(33,716.30)	11.46%
3161 · A-Conservation Ont Levy	26,814.00	26,815.00	(1.00)	100.0%
3162 · A-Services	36,608.70	81,500.00	(44,891.30)	44.92%
3171 · A-Water	3,041.20	3,500.00	(458.80)	86.89%
3172 · A-Hydro	18,982.59	16,000.00	2,982.59	118.64%
3173 · A-Vehicle Gas	173.10	685.00	(511.90)	25.27%
3174 · A-Accounting Services	381.60	1,680.00	(1,298.40)	22.71%
3178 · A-Internal Chargeback	0.00	8,285.00	(8,285.00)	0.0%
3182 · Staff Clothing Purchase	(124.14)			
Total Expense	607,227.65	1,081,110.00	(473,882.35)	56.17%
Net Ordinary Income	5,142.01	0.00	5,142.01	100.0%

NBMCA
Profit Loss Budget vs. Actual
Corporate Service Capital

	Jan - Jun 24	Budget	$ Over Budget	% of Budget
Ordinary Income/Expense				
Income				
9713 · CS-Other Revenue	0.00	174,985.00	(174,985.00)	0.0%
Total Income	0.00	174,985.00	(174,985.00)	0.0%
Gross Profit	0.00	174,985.00	(174,985.00)	0.0%
Expense				
9730 · CS-Wages Salary	5,607.88	8,672.00	(3,064.12)	64.67%
9762 · CS-Services	0.00	161,700.00	(161,700.00)	0.0%
9778 · CS - Internal Chargeback	0.00	4,613.00	(4,613.00)	0.0%
Total Expense	5,607.88	174,985.00	(169,377.12)	3.21%
Net Ordinary Income	(5,607.88)	0.00	(5,607.88)	100.0%
Net Income	**(5,607.88)**	**0.00**	**(5,607.88)**	**100.0%**

NBMCA
Profit Loss Budget vs. Actual
Planning and Regualtions

	Jan - Jun 24	Budget	$ Over Budget	% of Budget
Ordinary Income/Expense				
Income				
3501 · WP-MNR Transfer Payment	0.00	22,690.00	(22,690.00)	0.0%
3504 · WP-General Levy	97,760.00	97,760.00	0.00	100.0%
3506 · WP-Fees	27,011.00	110,000.00	(82,989.00)	24.56%
3513 · WP-Other Income	79,900.00	110,602.00	(30,702.00)	72.24%
Total Income	204,671.00	341,052.00	(136,381.00)	60.01%
Gross Profit	204,671.00	341,052.00	(136,381.00)	60.01%
Expense				
3573 · Vehicle Gas	84.57	525.00	(440.43)	16.11%
3567 · Admin Overhead	48,805.50	97,611.00	(48,805.50)	50.0%
3549 · Postage	0.00	104.00	(104.00)	0.0%
3547 · Repair & Maintenance	0.00	3,000.00	(3,000.00)	0.0%
3530 · WP-Wages Salary	155,911.65	225,484.00	(69,572.35)	69.15%
3541 · WP-Staff Mileage & Expenses	143.48	1,500.00	(1,356.52)	9.57%
3542 · WP-Staff Certification & Train	0.00	2,500.00	(2,500.00)	0.0%
3560 · WP-Materials & Supplies	0.00	700.00	(700.00)	0.0%
3562 · WP-Services	0.00	3,800.00	(3,800.00)	0.0%
3566 · WP-Consulting Services	7,298.96			
3578 · WP-Internal Chargeback	0.00	5,828.00	(5,828.00)	0.0%
Total Expense	212,244.16	341,052.00	(128,807.84)	62.23%
Net Ordinary Income	(7,573.16)	0.00	(7,573.16)	100.0%
Net Income	**(7,573.16)**	**0.00**	**(7,573.16)**	**100.0%**

NBMCA
Profit Loss Budget vs. Actual
Water Resources Management

	Jan - Jun 24	Budget	$ Over Budget	% of Budget
Ordinary Income/Expense				
Income				
3601 · FC-MNR Transfer Payment	0.00	94,780.00	(94,780.00)	0.0%
3603 · FC-Grants from Others	25,031.37			
3604 · FC-General Levy	360,661.00	360,661.00	0.00	100.0%
3605 · FC-Sole-benefitting Levy	11,000.00	11,000.00	0.00	100.0%
3613 · FC-Other Revenue	159,626.00	159,626.00	0.00	100.0%
Total Income	556,318.37	626,067.00	(69,748.63)	88.86%
Gross Profit	556,318.37	626,067.00	(69,748.63)	88.86%
Expense				
3666 · WRM OPS - Consulting	0.00	20,000.00	(20,000.00)	0.0%
3642 · WRM OPS - Staff Cert. & Train.	3,052.80	3,000.00	52.80	101.76%
3667 · WRM OPS - Admin Overhead	91,747.00	183,494.00	(91,747.00)	50.0%
3630 · FC-Wages Salary	141,348.71	310,677.00	(169,328.29)	45.5%
3641 · FC-Staff mileage & Expense	587.63	2,000.00	(1,412.37)	29.38%
3643 · FC-Telephone	3,893.73	8,354.00	(4,460.27)	46.61%
3644 · FC-Taxes	20,070.83	19,025.00	1,045.83	105.5%
3645 · FC-Insurance	36,348.00	36,348.00	0.00	100.0%
3647 · FC-Repairs & Maintenance	0.00	6,800.00	(6,800.00)	0.0%
3648 · FC-Office Supplies	0.00	250.00	(250.00)	0.0%
3660 · FC-Material & Supplies	1,502.98	2,650.00	(1,147.02)	56.72%
3662 · FC-Services	39,155.30	16,800.00	22,355.30	233.07%
3672 · FC-Hydro	2,043.86	1,900.00	143.86	107.57%
3673 · FC-Vehicle Gas	1,075.81	6,680.00	(5,604.19)	16.11%
3678 · FC-Internal Chargeback	0.00	8,089.00	(8,089.00)	0.0%
Total Expense	340,826.65	626,067.00	(285,240.35)	54.44%
Net Ordinary Income	215,491.72	0.00	215,491.72	100.0%
Net Income	**215,491.72**	**0.00**	**215,491.72**	**100.0%**

NBMCA
Profit Loss Budget vs. Actual
Water Resources Management Capital

	Jan - Jun 24	Budget	$ Over Budget	% of Budget
Ordinary Income/Expense				
Income				
109-01 · WECI Project Trsf Pay'	(1,000.00)	100,000.00	(101,000.00)	(1.0%)
109-04 · WECI Project -GenLevy	45,000.00	45,000.00	0.00	100.0%
109-05 · WECI-Sole Benefitting Levy	200,000.00	200,000.00	0.00	100.0%
109-13 · WECI Project -Other Rev	8,374.00	177,000.00	(168,626.00)	4.73%
Total Income	252,374.00	522,000.00	(269,626.00)	48.35%
Gross Profit	252,374.00	522,000.00	(269,626.00)	48.35%
Expense				
109-78 · WRM CAP - Internal Chargeback	0.00	5,250.00	(5,250.00)	0.0%
109-30 · WECI Project -SalaryWage	4,698.93	9,442.00	(4,743.07)	49.77%
109-66 · WECI Project-Consult Servi	52,223.89	494,663.00	(442,439.11)	10.56%
109-67 · WECI Project-Admin Overhea	1,322.50	2,645.00	(1,322.50)	50.0%
Total Expense	58,245.32	512,000.00	(453,754.68)	11.38%
Net Ordinary Income	194,128.68	10,000.00	184,128.68	1,941.29%
Other Income/Expense				
Other Expense				
109-50 · WECI-TCA purchases	0.00	10,000.00	(10,000.00)	0.0%
Total Other Expense	0.00	10,000.00	(10,000.00)	0.0%
Net Other Income	0.00	(10,000.00)	10,000.00	0.0%
Net Income	**194,128.68**	**0.00**	**194,128.68**	**100.0%**

NBMCA
Profit Loss Budget vs. Actual
OSS Program

	Jan - Jun 24	Budget	$ Over Budget	% of Budget
Ordinary Income/Expense				
Income				
3215 · Credit Card Surcharge	0.00	18,000.00	(18,000.00)	0.0%
3206 · S-OBC-Fees	372,622.00	1,153,200.00	(780,578.00)	32.31%
3213 · S-OBC-Other Revenue	60,975.16	40,000.00	20,975.16	152.44%
Total Income	433,597.16	1,211,200.00	(777,602.84)	35.8%
Gross Profit	433,597.16	1,211,200.00	(777,602.84)	35.8%
Expense				
3267 · S-OBC - Admin Overhead	129,464.50	259,198.00	(129,733.50)	49.95%
3230 · S-OBC--Wages Salary	351,923.73	712,302.00	(360,378.27)	49.41%
3241 · S-OBC-Staff Mileage & Expenses	448.12	3,000.00	(2,551.88)	14.94%
3242 · S-OBC-Staff Certific & Trainin	2,576.34	10,450.00	(7,873.66)	24.65%
3243 · S-OBC-Telephone	8,062.95	16,000.00	(7,937.05)	50.39%
3245 · S-OBC-Insurance	18,810.96	19,100.00	(289.04)	98.49%
3247 · S-OBC-Repairs & Maintenance	3,290.99	12,500.00	(9,209.01)	26.33%
3248 · S-OBC-Office Supplies	411.94	5,100.00	(4,688.06)	8.08%
3249 · S-OBC-Postage	0.00	1,200.00	(1,200.00)	0.0%
3250 · S-OBC Equipment Purchase	(203.28)	3,000.00	(3,203.28)	(6.78%)
3251 · S-OBC-Equipment Rental	2,879.92	6,500.00	(3,620.08)	44.31%
3252 · S-OBC-Publications & Printing	0.00	500.00	(500.00)	0.0%
3254 · S-OBC-Bank Charges	56.00	2,700.00	(2,644.00)	2.07%
3256 · S-OBC-Credit Card Charges	9,788.86	22,800.00	(13,011.14)	42.93%
3258 · S-OBC-Audit	5,500.00	5,500.00	0.00	100.0%
3259 · S-OBC-Legal Services	0.00	2,500.00	(2,500.00)	0.0%
3260 · S-OBC-Materials and Supplies	362.28	3,000.00	(2,637.72)	12.08%
3262 · S-OBC-Services	6,286.46	7,000.00	(713.54)	89.81%
3270 · S-OBC-Rental Expense	31,148.90	78,300.00	(47,151.10)	39.78%
3273 · S-OBC-Vehicle Gas	2,705.54	14,000.00	(11,294.46)	19.33%
3278 · OBC--Internal Chargeback	0.00	26,550.00	(26,550.00)	0.0%
Total Expense	573,514.21	1,211,200.00	(637,685.79)	47.35%
Net Ordinary Income	(139,917.05)	0.00	(139,917.05)	100.0%
Net Income	**(139,917.05)**	**0.00**	**(139,917.05)**	**100.0%**

NBMCA
Profit Loss Budget vs. Actual
Source Water Protection

	Jan - Jun 24	Budget	$ Over Budget	% of Budget
Ordinary Income/Expense				
Income				
8301 · SWP OperatTransfer Pay'ts	72,773.11	160,753.00	(87,979.89)	45.27%
Total Income	72,773.11	160,753.00	(87,979.89)	45.27%
Gross Profit	72,773.11	160,753.00	(87,979.89)	45.27%
Expense				
8330 · C-SWP Operat-Wages Salary	55,083.37	124,383.00	(69,299.63)	44.29%
8338 · C-SWP-Per Diem	740.00	5,200.00	(4,460.00)	14.23%
8339 · C-SWP-Members Mileage	339.77	2,000.00	(1,660.23)	16.99%
8340 · C-SWP-Member Expenses	0.00	40.00	(40.00)	0.0%
8341 · C-SWP-Staff Mileage & Expenses	282.87	650.00	(367.13)	43.52%
8343 · C-SWP-Telephone	955.05	2,035.00	(1,079.95)	46.93%
8345 · SWP-Insurance	2,435.00	2,435.00	0.00	100.0%
8348 · C-SWP-Office Supplies	313.94	316.00	(2.06)	99.35%
8349 · C-SWP-Postage	619.30	220.00	399.30	281.5%
8351 · C-SWP-Equipment Rental	102.07	459.00	(356.93)	22.24%
8353 · C-SWP-Advertising & Communicat	503.71	250.00	253.71	201.48%
8358 · SWP-Audit	790.00	790.00	0.00	100.0%
8360 · C-SWP-Materials & Supplies	234.50	469.00	(234.50)	50.0%
8362 · C-SWP-Services	1,490.00	1,490.00	0.00	100.0%
8367 · C-SWP Operat-Admin Overhead	2,076.00	4,152.00	(2,076.00)	50.0%
8370 · C-SWP-Rent	6,231.00	12,551.00	(6,320.00)	49.65%
8373 · SWP-Vehicle Gas	41.87	260.00	(218.13)	16.1%
8378 · SWP-Internal Chargeback	1,526.50	3,053.00	(1,526.50)	50.0%
Total Expense	73,764.95	160,753.00	(86,988.05)	45.89%
Net Ordinary Income	(991.84)	0.00	(991.84)	100.0%
Net Income	**(991.84)**	**0.00**	**(991.84)**	**100.0%**

NBMCA
Profit Loss Budget vs. Actual
Lands and Properties Operations

	Jan - Jun 24	Budget	$ Over Budget	% of Budget
Ordinary Income/Expense				
Income				
7004 · LP-General Levy	111,000.00	111,000.00	0.00	100.0%
7005 · LP-Sole-benefitting Levy	260,000.00	260,000.00	0.00	100.0%
7007 · LP-Donations	0.00	1,000.00	(1,000.00)	0.0%
7010 · LP-Property Rent Revenue Extern	30,812.07	22,042.00	8,770.07	139.79%
7013 · LP-Other Revenue	101,500.00	185,669.00	(84,169.00)	54.67%
Total Income	503,312.07	579,711.00	(76,398.93)	86.82%
Gross Profit	503,312.07	579,711.00	(76,398.93)	86.82%
Expense				
7067 · LP-Admin Overhead	102,903.00	205,806.00	(102,903.00)	50.0%
7030 · LP-Wages Salary	99,734.51	258,284.00	(158,549.49)	38.61%
7044 · LP-Taxes	16,421.61	15,886.00	535.61	103.37%
7045 · LP-Insurance	15,585.00	15,585.00	0.00	100.0%
7047 · LP-Repairs & Maintenance	5,928.63	18,000.00	(12,071.37)	32.94%
7050 · LP-Shared Costs with Ski Hill	98.39			
7060 · LP-Materials & Supplies	7,596.66	8,100.00	(503.34)	93.79%
7062 · LP-Services	12,789.73	50,000.00	(37,210.27)	25.58%
7064 · LP-Vehicle Lease	0.00	3,000.00	(3,000.00)	0.0%
7073 · LP-Vehicle Gas	813.30	5,050.00	(4,236.70)	16.11%
Total Expense	261,870.83	579,711.00	(317,840.17)	45.17%
Net Ordinary Income	241,441.24	0.00	241,441.24	100.0%
Net Income	**241,441.24**	**0.00**	**241,441.24**	**100.0%**

NBMCA
Profit Loss Budget vs. Actual
Lands and Properties Capital

	Jan - Jun 24	Budget	$ Over Budget	% of Budget
Ordinary Income/Expense				
Income				
8604 · L&P Capital-General Levy	181,485.00	181,485.00	0.00	100.0%
8605 · C-L&P-Special Levy	80,000.00	80,000.00	0.00	100.0%
Total Income	261,485.00	261,485.00	0.00	100.0%
Gross Profit	261,485.00	261,485.00	0.00	100.0%
Expense				
8630 · C-L&P-Wages Salary	10,729.79	27,029.00	(16,299.21)	39.7%
8640 · Equipment_Purchase	0.00	5,000.00	(5,000.00)	0.0%
8641 · C-L&P-Staff mileage & Expenses	0.00	500.00	(500.00)	0.0%
8660 · C-L&P-Materials & Supplies	0.00	27,800.00	(27,800.00)	0.0%
8662 · C-L&P-Services	136,404.86	193,221.00	(56,816.14)	70.6%
8667 · C-L&P-Admin Overhead	3,967.50	7,935.00	(3,967.50)	50.0%
Total Expense	151,102.15	261,485.00	(110,382.85)	57.79%
Net Ordinary Income	110,382.85	0.00	110,382.85	100.0%
Net Income	**110,382.85**	**0.00**	**110,382.85**	**100.0%**

NBMCA
Profit Loss Budget vs. Actual
Watershed Support Programs

	Jan - Dec 24	Budget	$ Over Budget	% of Budget
Ordinary Income/Expense				
Income				
6104 · 61 - General Levy	3,000.00	3,000.00	0.00	100.0%
6106 · 61 - MRCR Fees	17,268.50	28,886.00	(11,617.50)	59.78%
6107 · 61 - Donations	24,115.64	32,200.00	(8,084.36)	74.89%
Total Income	44,384.14	64,086.00	(19,701.86)	69.26%
Gross Profit	44,384.14	64,086.00	(19,701.86)	69.26%
Expense				
6152 · WSP - Publications and Printing	0.00	4,000.00	(4,000.00)	0.0%
6162 · WSP - Services	9,912.85	21,750.00	(11,837.15)	45.58%
6160 · WSP - Materials and Supplies	4,404.80	12,550.00	(8,145.20)	35.1%
6164 · WSP - Vehicle Lease	0.00	596.00	(596.00)	0.0%
6167 · WSP - Admin Overhead	1,984.00	3,968.00	(1,984.00)	50.0%
6130 · WSP - Wages and Benefits	15,663.29	19,222.00	(3,558.71)	81.49%
6173 · WSP - Vehicle Gas	485.48	2,000.00	(1,514.52)	24.27%
Total Expense	32,450.42	64,086.00	(31,635.58)	50.64%
Net Ordinary Income	11,933.72	0.00	11,933.72	100.0%
Net Income	**11,933.72**	**0.00**	**11,933.72**	**100.0%**

NBMCA
Profit Loss Budget vs. Actual
Watershed Support Programs Capital

	Jan - Dec 24	Budget	$ Over Budget	% of Budget
Ordinary Income/Expense				
Income				
6205 · WSP CAP - Sole-Benefitting Levy	1,500.00	1,500.00	0.00	100.0%
6204 · WSP CAP - General Levy	8,000.00	8,000.00	0.00	100.0%
Total Income	9,500.00	9,500.00	0.00	100.0%
Gross Profit	9,500.00	9,500.00	0.00	100.0%
Expense				
6262 · WSP CAP - Services	0.00	8,000.00	(8,000.00)	0.0%
6260 · WSP CAP - Materials & Supplies	0.00	500.00	(500.00)	0.0%
6247 · WSP CAP - Repairs and Maint.	0.00	1,000.00	(1,000.00)	0.0%
Total Expense	0.00	9,500.00	(9,500.00)	0.0%
Net Ordinary Income	9,500.00	0.00	9,500.00	100.0%
Net Income	**9,500.00**	**0.00**	**9,500.00**	**100.0%**

NBMCA
Profit Loss Budget vs. Actual
Watershed Municipal Programs

	Jan - Jun 24	Budget	$ Over Budget	% of Budget
Ordinary Income/Expense				
Income				
6405 · WMP - Sole-benefitting Levy	12,000.00	11,197.00	803.00	107.17%
6404 · WMP - General Levy	11,197.00	12,000.00	(803.00)	93.31%
Total Income	23,197.00	23,197.00	0.00	100.0%
Gross Profit	23,197.00	23,197.00	0.00	100.0%
Expense				
6467 · WMP - Admin Overhead	1,987.50	3,975.00	(1,987.50)	50.0%
6430 · WMP - Wages and Benefts	15,663.29	19,222.00	(3,558.71)	81.49%
Total Expense	17,650.79	23,197.00	(5,546.21)	76.09%
Net Ordinary Income	5,546.21	0.00	5,546.21	100.0%
Net Income	**5,546.21**	**0.00**	**5,546.21**	**100.0%**

NBMCA
Profit Loss Budget vs. Actual
Ski Hill Capital Funds

	Jan - Jun 24	Budget	$ Over Budget	% of Budget
Ordinary Income/Expense				
Income				
114-13 · LSHSC Operating Funds Reserve	185,010.00	85,000.00	100,010.00	217.66%
Total Income	185,010.00	85,000.00	100,010.00	217.66%
Gross Profit	185,010.00	85,000.00	100,010.00	217.66%
Expense				
114-67 · LSHSC - Admin Overhead	12,500.00	25,000.00	(12,500.00)	50.0%
114-60 · LSHSC Op Reserve-Mat & Supplies	160,010.00	60,000.00	100,010.00	266.68%
Total Expense	172,510.00	85,000.00	87,510.00	202.95%
Net Ordinary Income	12,500.00	0.00	12,500.00	100.0%
Net Income	**12,500.00**	**0.00**	**12,500.00**	**100.0%**

NBMCA
Profit Loss Budget vs. Actual
Ski Hill Capital Funds

	Jan - Jun 24	Budget	$ Over Budget	% of Budget
Ordinary Income/Expense				
Income				
112-13 · LSHSC Capital - Other Revenue	65,000.00	65,000.00	0.00	100.0%
Total Income	65,000.00	65,000.00	0.00	100.0%
Gross Profit	65,000.00	65,000.00	0.00	100.0%
Expense				
112-62 · LSHSC Cap Reserve-Services	78,665.53	65,000.00	13,665.53	121.02%
Total Expense	78,665.53	65,000.00	13,665.53	121.02%
Net Ordinary Income	(13,665.53)	0.00	(13,665.53)	100.0%
Net Income	**(13,665.53)**	**0.00**	**(13,665.53)**	**100.0%**

Report #4
08-14-2024

NORTH BAY - MATTAWA CONSERVATION AUTHORITY

TO: The Chairperson and Members of the Board of Directors,
North Bay-Mattawa Conservation Authority

ORIGIN: Aaron Lougheed, Manager, Finance

DATE: August 14, 2024

SUBJECT: Board Expenses and Minimum Levy

Background:
With the changes to the Conservation Authorities Act, specifically as they relate to levy apportionment, many Conservation Authorities across Ontario are implementing a Minimum Levy to appropriately apportion Member Expenses. These expenses include Per Diems, Mileage, Honorariums, and miscellaneous costs associated with the function of the Members Meetings.

Analysis:
The primary way in which Conservation Authorities have decided to split these Member related charges is through an equal split of expenses on an annual basis. With respect to NBMCA this would result in the following scenario.

The current cost for the management of the Board of Directors is $19,000 which includes meeting costs, per diems, mileage, and Chair honorarium. This would be divided between the 12 members representing the 10 municipalities within the NBMCA watershed for a total minimum levy of $1,583.33. The total minimum levy is then subtracted from the total general levy and the MCVA calculation is used to determine the remainder of the general levy. This ensures that costs associated with any individual member would be the responsibility of the municipality they represent. The minimum levy would then increase by the same percentage as the general levy on an annual basis.

After internal discussions it was determined that a simpler solution to the minimum levy would be to have municipalities cover the expenses of each of their members internally and greatly reduce the amount of levy needed to cover per diems and mileage. This would result in a decreased budget of $3,600 ($300/member) to cover Meeting costs ($1,100) and the Chairs honorarium ($2,500) which would become the base levy for each municipality with the remainder of the general levy being apportioned though the MCVA method.

RECOMMENDED RESOLUTION:
THAT the Members related Per Diems and Mileage is not covered by the 2025 Budget
AND THAT A Minimum Levy of $300/Member come into effect January 1, 2025
AND THAT this report be received and appended to the minutes of this meeting.

Submitted by:
Aaron Lougheed, Manager, Finance

Reviewed By:
Robin Allen, Interim Chief Administrative Officer, Secretary Treasurer

NORTH BAY - MATTAWA CONSERVATION AUTHORITY

TO: The Chairperson and Members of the Board of Directors,
North Bay-Mattawa Conservation Authority

ORIGIN: Aaron Lougheed, Manager, Finance

DATE: August 14, 2024

SUBJECT: Laurentian Ski Hill Capital Reserve Request

Background

The Laurentian Ski Hill and Snowboarding Club ("Ski Hill") operates the ski hill on property owned by the North Bay-Mattawa Conservation Authority (NBMCA) and uses certain fixed capital assets owned by the NBMCA. The NBMCA holds two reserve accounts for the Ski Hill. One is to assist with Ski Hill operational expenses and the other is to help with NBMCA-owned capital asset expenses.

The agreement between NBMCA and the Ski Hill is such that borrowing from the reserve accounts requires NBMCA approval. The agreement also requires that the Ski Hill provide NBMCA with monthly balance sheets, income statements (with budget comparisons delivered within 5 weeks following the month end) and audited financial statements within reason of its April 30th year end.

NBMCA received funding requests from the ski hill as follows:

Inter-Mtn Testing performed an inspection and routine maintenance on the NBMCA owned Chair Lift with costs totaling $2,904.10

Analysis

Staff analysis involves reviewing the current capital reserves at NBMCA for the Ski Hill and, when available, will review the unaudited/audited financial statements and monthly reports from the Ski Hill.

Audited financial statements for the Ski Hill year-end April 30, 2024 have not been received by NBMCA at this time.

The NBMCA capital reserve for the Ski Hill currently has $110,306 available. Including all amount collected for 2024 through the Ski Hill Capital "Ask". The ski hill's current request of $2,904.10 can be provided to pay for maintenance work on the lift with a significant amount remaining in the reserve.

Recommendation:

Staff recommend that the NBMCA Board approve the Ski Hill's request for $2,904.10 from the NBMCA's Ski Hill Capital Reserve.

Recommended Resolution:

THAT the staff report 'Laurentian Ski Hill Capital Reserve Request' is received and appended to the minutes of this meeting;

AND THAT the Members approve the Laurentian Ski Hill and Snowboarding Club's request for $2,904.10 from the NBMCA's Ski Hill capital reserve.

Submitted By
Aaron Lougheed, Assistant Manager, Finance

Reviewed By
Robin Allen, Interim CAO and Secretary Treasurer

NORTH BAY - MATTAWA CONSERVATION AUTHORITY

TO: The Chairperson and Members of the Board of Directors,
North Bay-Mattawa Conservation Authority

ORIGIN: Aaron Lougheed, Manager, Finance

DATE: August 14, 2024

SUBJECT: Ski Hill Operating Agreement Extension

Background:
NBMCA and the Laurentian Ski Hill Snowboarding Club have been operating without a valid agreement since the one-year extension which occurred prior to the 2023/2024 Ski Season.

While on-going negotiations with the Ski Hill and City of North Bay occur the NBMCA realises the necessity to entre into a temporary agreement to facilitate continued operations of the Ski Hill.

As such it is recommended that the previous agreement be extended once more through the 2024/25 operating season.

RECOMMENDED RESOLUTION:
THAT the agreement made as of the 14th day of September 2021 between Laurentian Ski Hill Snowboarding Club and North Bay-Mattawa Conservation Authority be extended for a period through the 2024/2025 operating season upon similar resolution from the Board of the Laurentian Ski Hill Snowboarding Club.

Submitted by:
Aaron Lougheed, Manager, Finance

Reviewed By:
Robin Allen, Interim Chief Administrative Officer, Secretary Treasurer

Lift testing
5110

INTER-MTN TESTING
NON-DESTRUCTIVE TESTING SINCE 1987

POSTED

Invoice

Created Date: 07/16/2024

Invoice To: Laurentian Ski Hill

Laurentian Ski Hill
15 Janey Avenue
North Bay ON P1C 1N1

Invoice # T24-0406
Terms Net 30
P.O #

NDT Test Date: 07/15/2024
Job Location North Bay, ON

Description: Laurentian Ski Hill - G/H - July

Product	Description	Rate	Quantity	Tax	Total Price
SI - Hourly Testing	Hourly Inspector Rate - Site and reporting time	125.00	6	HST ON	750.00
SI - Consumables (MT/PT)	Tools and Consumables (MT/PT)	25.00	1	HST ON	25.00
SI - Shared Travel Combined Exp	Shared Travel Expenses (including accommodation, mileage, meals, equipment charges, where applicable)	1,700.00	1	HST ON	1,700.00
SI - Hourly Admin	Hourly Administration Rate	95.00	1	HST ON	95.00

Make Payment to: INTER-MTN. TESTING LTD.
Payment types accepted: Visa, Mastercard, Cheques and E-transfers (Payable to accounting@inter-mtntesting.com)
EFT payments can be arranged on request
***Overdue accounts charged interest at 2% per month**

Subtotal	2,570.00
Sales Tax	334.10
Total	2,904.10

GST/HST No. 102509288

Inter-Mtn. Testing Ltd. Contact Information

Company Address
102-140 Commercial Drive
Kelowna, BC. V1X 7X6
Canada

Prepared by: Stephanie Robinson
Phone: 250-491-4250
Email: accounting@inter-mtntesting.com

Limitation of Liability

NORTH BAY - MATTAWA CONSERVATION AUTHORITY

TO: The Chairperson and Members of the Board of Directors,
North Bay-Mattawa Conservation Authority

ORIGIN: Githan Kattera, Water Resources Coordinator/Regulations Officer
Saikumar Karingu, GIS Database Technician

DATE: August 02, 2024

SUBJECT: Lansdowne Floodplain Mapping Projects
Update

Background:

The NBMCA has received funding over the last five years to undertake improvements to the available floodplain mapping within our jurisdiction. Projects for five sub-watersheds are currently underway: Chippewa Creek, Parks Creek, and Jessups Creek in the City of North Bay, with Water's Edge Environmental Solutions as the consultant; La Vase River in North Bay and East Ferris, with AHYTECH Geomorphic as the consultant; and Lansdowne Creek in Callander and East Ferris, with Water's Edge Environmental Solutions as the consultant. For each project, the consultant gathers information about the watershed, including records of flows and surveys of water crossings. Computer models are run to characterize the runoff response from different precipitation events and annual snowmelt. A hydrology report and hydraulic report summarize this modelling work. The elevations can then be plotted to generate maps that show the areas that would be affected by specific events, such as the 100-year regulatory flood event.

Analysis:

Chippewa Creek Parks and Jessups Creek have existing floodplain mapping, whereas Lansdowne Creek's floodplain had not been previously mapped. The firm utilized data provided by the North Bay-Mattawa Conservation Authority (NBMCA) and open-source information to complete the mapping. The draft floodplain mapping report and modeling produced by the firm have been reviewed by NBMCA staff, who conducted an engineering analysis and ran the model to cross-verify the results. Staff examined how individual properties along the watercourse could be impacted by flooding and determined the extent to which the properties may be regulated by NBMCA under Section 28 of the Conservation Authorities Act.

The study assumes a one-zone Timmins Regional Storm scenario. All models and mapping produced under this project were based on the one-zone policy approach. Modeling was conducted for a total of nine storm events.

Property Impact Analysis (Engineering Analysis):

The North Bay-Mattawa Conservation Authority (NBMCA) has completed a Property Impact Analysis for the watersheds of Chippawa Creek, Parks Creek, Jessup Creek, and Lansdowne Creek. This analysis aims to identify the number of properties affected by flooding, categorizing them into Low, Medium, and High impact levels. The categorization is based on a simplified methodology that examines the percentage of each property within the mapped floodplain and assigns a ranking according to the degree to which development may be regulated. Further details regarding this analysis will be presented at the upcoming board meeting.

Table 1: Property Impact Analysis for Draft Floodplain Mapping on Chippewa Creek, Parks Creek, Jessups Creek, and Lansdowne Creek.

Ranked Impact on Property Development	Chippewa Creek (# of properties)	Parks Creek (# of properties)	Jessups Creek (# of properties)	Lansdowne Creek (# of properties)
Low Impact (0-30%)	327	340	70	42
Medium Impact (30-70%)	143	150	86	22
High Impact (70-100%)	191	74	18	25
Total number of properties	661	564	174	89

Recommendation:

That the members receive the report Floodplain Mapping Projects Update as presented and direct staff to proceed with public consultation.

Recommended Resolution:

That Floodplain Mapping Projects Update members report is received and appended to the minutes of this meeting; and
That staff are directed to proceed with public consultation on draft floodplain mapping for Chippewa Creek, Parks Creek, Jessups Creek, and Lansdowne Creek.

Reviewed by:

Kevin Taylor	Senior Manager Planning & Water Resources
Robin Allen	Interim CAO-Secretary Treasurer/CBCO, Chief Building Official - OSS Manager
Rebecca Morrow	HR Coordinator/Executive Assistant/Deputy CAO

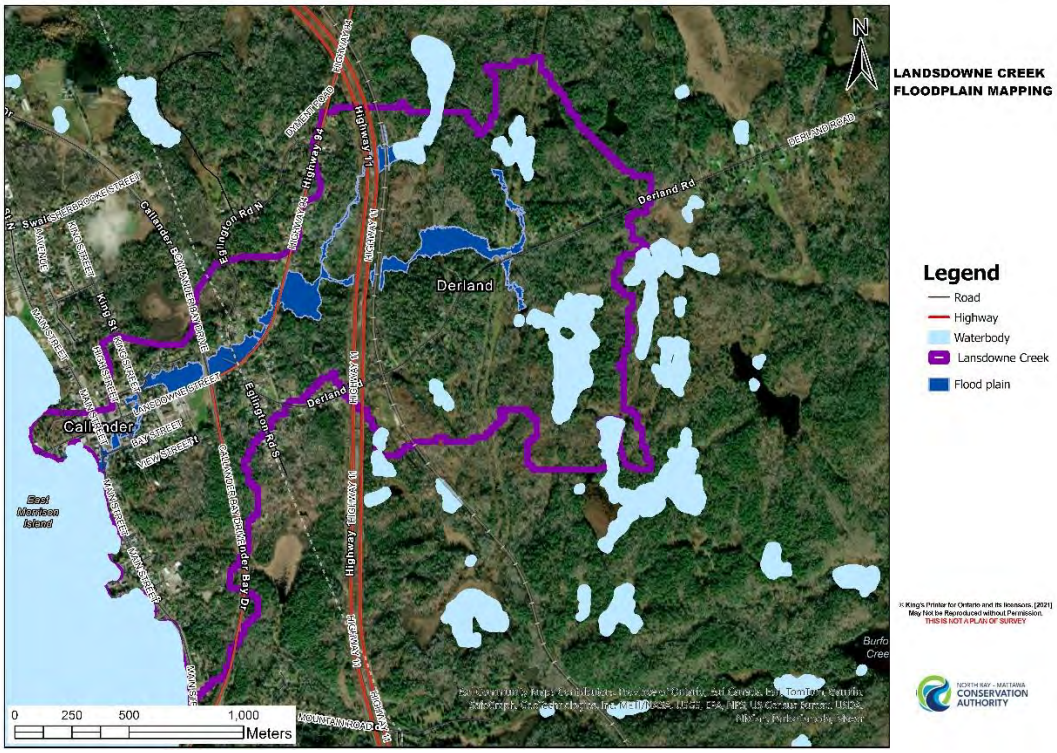


Figure 1-Lansdowne Floodplain Mapping Spill Area

water's edge
ENVIRONMENTAL SOLUTIONS TEAM LTD.

North Bay-Mattawa Conservation Authority

Lansdowne Creek Floodplain Mapping Project

Draft Report

December 14, 2023

December 14, 2023
WE 23016

Mr. David Ellingwood
Director, Water Resources

North Bay-Mattawa Conservation Authority
15 Janey Avenue
North Bay, ON
P1C 1N1

Dear Mr. Ellingwood:

RE: Lansdowne Creek Floodplain Mapping Project – *Draft Report*

1. Introduction

Water's Edge was authorized by the North Bay-Mattawa Conservation Authority (NBMCA) to conduct flood hazard mapping for Lansdowne Creek in the Town of Callander and the Municipality of East Ferris. This is a summary report of this mapping project, which was completed according to the RFP issued by NBMCA (dated February 27, 2023) and the proposal submitted by Water's Edge, dated March 17, 2023.

2. Streams Mapped

The following watercourses were included in this project:

- Lansdowne Creek – 1.5 km
- Tributary 1 – 1.2 km
- Tributary 2 – 0.9 km
- Tributary 3 – 0.5 km
-

3. Guidelines Followed

The floodplain mapping was done in accordance with the following Provincial and Federal guidelines:

MNR (2002). Technical Guide – River & Stream systems: Flooding Hazard Limit. Ontario Ministry of Natural Resources, Water Resources Section, Peterborough, Ontario, 2002.

Natural Resources Canada (2019). Federal Hydrologic and Hydraulic Procedures for Flood Hazard Version 1.0. Natural Resources Canada, 2019. (https://doi.org/10.4095/299808)

Conservation Ontario (2005). Guidelines for Developing Schedules of Regulated Areas. October 2005.

Moreover, the following documents were also consulted for general conformity:

MNR (1986). Flood Plain Management in Ontario – Technical Guidelines. Ontario Ministry of Natural Resources, Conservation Authorities and Water Management Branch, Toronto.

Natural Resources Canada (2019). Federal Geomatics Guidelines for Flood Mapping Version 1.0. Natural Resources Canada, 2019. (https://doi.org/10.4095/299810)

Natural Resources Canada (2022). Federal Airborne LiDAR Data Acquisition Guideline Version 3.1. Natural Resources Canada, 2022. (https://doi.org/10.4095/330330)

MMAH (2020). Provincial Policy Statement, 2020 – Under the Planning Act. Ontario Ministry of Municipal Affairs and Housing, Queen's Printer for Ontario, 28 February 2020. (https://files.ontario.ca/mmah-provincial-policy-statement-2020-accessible-final-en-2020-02-14.pdf)

For hydrologic and hydraulic modeling, we have followed the HEC-HMS and HEC-RAS Manuals unless otherwise stated.

4. Overview of the Project

The main three steps of floodplain mapping are (a) flow estimation, (b) flood level calculation, and (c) flood line plotting. For this project, we have estimated the flood flows via hydrologic modeling using the HEC-HMS model, calculated the flood levels via hydraulic modeling using the HEC-RAS model, and then plotted the flood lines against the LIDAR topography using RAS Mapper and GIS software.

The modeling was done for a total of nine (9) storm events: 2, 5, 10, 25, 50, 100, 200 and 500 year storm events; Timmins Storm.

It was found that the Regional or Timmins Storm produced higher flows and flood levels than the 100 year storm event. Therefore, Timmins Storm was taken as the governing flood event.

This summary report includes background information of the watershed, hydrologic modeling, hydraulic modeling, and floodplain delineation.

There is no existing flood hazard mapping for this creek.

A one-zone floodplain policy approach is assumed for this study. All models and mapping produced under this project were done on the one-zone policy approach.

5. Background Review and Data Collection

5.1 Information Collected and Reviewed

We have completed this project in accordance with the approved project Terms of Reference. We have collected and reviewed all available background materials and data. Specifically, it includes data sources for the analysis such as the following:

- Geospatial data: NBMCA
- LiDAR: GeoHub
- Soil data: Soil survey index (GeoHub)
- Landcover: Provincial Landcover Dataset
- IDF curves: Ontario Ministry of Transportation (MTO)
- Time of concentration: HEC-HMS manual/website
- Routing data: Muskingum-Cunge and Lag methods
- Watershed delineation: HEC-HMS
- Initial stream shapefile: OHN watercourse
- SCS curve number: Developed internally in HEC-HMS
- Impervious data: estimated based on mapping
- Site survey and field assessments (Water's Edge, 2023)
- Water level and flow data of Lansdowne Creek at (~20m D/S) Lansdowne St. – by Water's Edge, 2023
- Discussions with NBMCA

5.2 Datum

5.2.1 Vertical Datum:

All data was surveyed and modelled using CGVD2013 datum.

5.2.2 Horizontal Datum:

CSRS(NAD83) UTM Zone 17N was used for the horizontal datum/projection.

5.3 Structure and Cross-sections

A total of 31 road crossings (bridge/culvert) were surveyed by Water's Edge staff during the summer of 2023. Summary sheets, containing essential parameters and pictures, were compiled for all crossings (see Appendix C). We ensured that the collected information was sufficient for hydraulic modeling.

Many cross-sections of the creeks were also taken which supplemented the LiDAR in HEC-RAS to provide more accurate bathymetry at crossings. The point ESRI Shp. File was included with the submission.

5.4 Terrain Pre-processing

The following data was provided by NBMCA.

The NBMCA 2011 orthophotogrammetry has the following specifications:
- Ground resolution = 10 cm
- Spatial Reference = North American 1983 CSRS UTM Zone 17N
- Vertical Datum = CGVD28
- Units = metres

The MNDMNRF 2022 LiDAR has the following specifications (please refer to https://geohub.lio.gov.on.ca/maps/mnrf::ontario-digital-terrain-model-lidar-derived/about for the User Guide containing the complete specifications):
- Spatial Reference = NAD83(CSRS), Epoch 2010.00, UTM Zone 17N
- Vertical Datum = CGVD2013
- Units = metres

Upon examination of these two sets of data, it was found that LiDAR was more suitable for the present study.

The digital terrain model (DTM) used for watershed delineation was based on LiDAR data provided by the GeoHub. Additional manipulations of the DTM were necessary to prepare the surface for use in the hydrologic model. The LIDAR was resampled in GIS to a reduced 5m horizontal and 0.5m vertical cell size in order to allow reasonable computation. Following this, the rest of the pre-processing was completed in HEC-HMS (version 4.11). The first step was to ensure that flow paths were accurately represented in the DTM. This was accomplished using a shapefile of creek centerlines (NBMCA/OHN watercourse) and burning in a channel through structures such as bridges and culverts (culvert layer provided by NBMCA). The next step was to fill in depressions without apparent outlets. This step ensures that every cell within the watershed contributes flow to the outlet and that there is no depression storage to attenuate peak flows, resulting in a more conservative representation of surface conditions. Following the above steps, a linear workflow was followed that started with creating a flow direction raster that indicated which direction a given cell would drain to. Next, a flow accumulation raster was created that represented the number of upstream cells contributing to a given cell. A stream network was then defined based on the minimum number of drainage areas. This was done for reasonable values to achieve a number of subcatchments suitable for each size of river. The subcatchments were delineated based on the flow change locations and to provide a logical output into the hydraulic model.

6. Hydrologic Modelling

6.1 Model inputs

6.1.1 Catchment characteristics

In the absence of long-term streamflow data in this area, the single-event hydrologic modelling approach was taken to estimate peak flood flows corresponding to specified storm hyetograghs. The HEC-HMS model of United States Army Core of Engineers (USACE) was chosen, as it is widely used worldwide and in Canada. It also offers many options/modules for various hydrologic phenomena.

A new HEC-HMS model was set up for Lansdowne Creek watershed. Given appropriate pour points (or catchment outlets), HMS can delineate the basin and sub-basins based on the LIDAR-based topograghy.

Following the preprocessing steps, HEC-HMS calculates many parameters based on the surface properties. Some of the pertinent parameters are shown in the **Table 1** below.

Table 1 Watershed Characteristics

Basin	Area	Longest Flowpath	Longest Flowpath Slope	Basin slope	Basin Relief	Relief Ratio	Elongation ratio	Drainage Density
	(km2)	(km)	(m/m)	(m/m)	(m)			(km/km2)
SB1	0.6871	2.745	0.00926	0.17077	35.89	0.01307	0.34079	1.754
SB2	0.3707	1.322	0.01394	0.13231	27.44	0.02075	0.51956	1.318
SB3	0.3863	2.382	0.01703	0.17676	41.68	0.01750	0.29440	2.032
SB4	0.3468	1.255	0.01704	0.15401	26.24	0.02091	0.52940	1.082
SB5	0.8430	2.443	0.01409	0.10913	41.40	0.01695	0.42408	1.851
SB6	0.5330	1.588	0.02145	0.14731	34.21	0.02154	0.51875	1.700
SB7	0.0085	0.340	0.05159	0.12616	17.57	0.05164	0.30485	15.659
SB8	0.1427	1.049	0.02431	0.12956	26.15	0.02494	0.40648	4.139
SB9	0.3917	1.346	0.01871	0.10684	26.21	0.01947	0.52476	1.692

A review of the Municipalities of Callander and East Ferris Official Plans does not indicate significant development in the foreseeable future (Municipality of Callander, 2011; Municipality of East Ferris, 2023). Therefore, the current land use was used in the hydrologic modelling.

6.1.2 Precipitation data and design storms

Once the basin had been set up in the model, the precipitation data were entered. The Ontario Ministry of Transportation's IDF curve lookup tool, which uses a square grid technique to interpolate IDF curve parameters, was used to obtain the IDF curve for the area of interest, and the ordinates were used to determine rainfall volumes for the SCS distribution.

The map showing the IDF curve selection approach is included in **Appendix A**.

For SCS design storms, 24hour storms were used for the SCS method because past experience indicates that the 24 hour storms yield conservative (higher) compared to shorter duration storms. No areal reduction was performed for the return period events due to the small size of the watersheds.

The model was run for the 2, 5, 10, 25, 50, 100, 200 and 500 year return period storms using SCS Type II rainfall distribution. The Timmins Storm event was used as the regional event.

6.1.3 SCS Curve Number Grid

A curve number grid was created by in-house staff using Q-GIS to assign a curve number to each raster cell based on the soil and land cover characteristics at that point. Curve numbers were selected based on the TR-55 document from the NRCS (NRCS, 1986). Both Provincial Landcover and Open Canada Landcover were considered. It was determined that the Provincial Landcover dataset was similar to the NRCS lookup table and best represented different infiltration classifications. This ensures accurate geospatial representation of runoff characteristics. Soil hydrologic characteristics were defined using the Ontario Soil Survey Index.. The landuse categories were assigned based on the NRCS landuse classifications to facilitate the assignment of curve numbers.

Following the preparation of the soil and landuse data, the layers were combined to create a layer that included both landuse and soil data. A lookup table was created to assign a curve number based on the land use type and the hydrologic soil group. The lookup table is shown in **Appendix A**. The output yielded a curve number raster that was used to determine a weighted-average curve number for each sub-basin, which was then recorded in the attribute table of the subcatchment shapefile.

6.1.4 Percent Impervious

Information pertaining to imperviousness was not available. It was therefore estimated from aerial photographs. In most of the upstream watershed, it was conservatively estimated to be at 5%. In the downstream part, it was estimated in the range of 15-20%.

Curve Number (CN) and associated parameters are given in the following table.

Table 2 Curve Number and Other Parameters

Basin	Area	Initial Abstraction	Curve Number	% Impervious	Time of Concentration
	(km2)	(mm)		(%)	(hr)
SB1	0.6871	39.4	56.3	5.0	1.39
SB2	0.3707	32.5	61.0	5.0	0.87
SB3	0.3863	36.0	58.5	5.0	1.12
SB4	0.3468	39.9	56.0	15.0	0.81
SB5	0.8430	47.8	51.5	5.0	1.25
SB6	0.5330	30.6	62.4	5.0	0.91
SB7	0.0085	71.0	41.7	5.0	0.25
SB8	0.1427	48.6	51.1	20.0	0.64
SB9	0.3917	26.3	65.9	15.0	0.80

7. HEC-HMS Model

The main components of the hydrologic model are the loss method, the transform method, and the routing method. Each of these components are discussed below. Initial estimates of each parameter are shown in **Appendix B**.

The modeling was done for a total of nine (9) storm events: 2, 5, 10, 25, 50, 100, 200 and 500 year storm events; Timmins Storm.

7.1 Loss Method

The loss method selected was the SCS curve number approach due to its relatively small data requirements and ease of calibration. The development of the curve number grid has been described above. In addition to the curve number and percent impervious areas determined previously, initial abstraction was also calculated automatically in HEC-HMS. This calculation used the SCS method:

$$I_a = \left(0.2 * \frac{1000}{CN} - 10\right) * 25.4 = (\text{mm})$$

7.2 Routing Method

For larger reaches, the Muskingum-Cunge method for channel routing was selected because it is based on physical parameters and therefore does not require extensive calibration to use. The Muskingum-Cunge routing method is applicable for use in large drainage networks with compound cross-sections. The Muskingum-Cunge method is a modification of the Muskingum method where the main channel and overbank flows are decoupled. The required data for Muskingum-Cunge includes the reach length, average slope, cross-section data, and Manning's roughness coefficients. The reach lengths and slopes were determined in HEC-HMS, and the 8-point cross-section for each reach was obtained from HEC-RAS for a middle cross section of a reach. Details of the obtained cross-sections are included in **Appendix B**. Manning's roughness coefficient (0.035) was assigned to the main channel as well as for left and right overbank areas (0.05). Estimates of Manning's n were determined by analyzing the reach characteristics including riparian vegetation to determine the most appropriate roughness coefficient from open channel hydraulics (Chow, 1959). A celerity index of 1.524 m/s (5 ft/s) was assumed, following the HEC-HMS manual.

For smaller reaches (less than 100m), routing was performed using the Lag method. This is because Muskingum-Cunge (MC) proved to be unstable in short reaches. The Lag method is the simplest routing method available in HEC-HMS. This method can only represent the translation of flood waves and does not include any representation of attenuation or diffusion processes. The Lag time was calculated by dividing reach length over index celerity. Details are shown in the following table.

Table 3 Channel Routing Parameters

Reach	Length	Slope	Routing Method	Lag Time	Index Celerity	LOB Roughness	Channel Roughness	ROB Roughness
	(km)	(m/m)		(min)	(m/s)			
R1	0.662	0.0123	MC		1.524	0.050	0.035	0.050
R2	0.591	0.0058	MC		1.524	0.050	0.035	0.050
R3	0.133	0.0102	Lag	1.4				
R4	0.906	0.0153	MC		1.524	0.050	0.035	0.050

7.3 Transform Method

The Clark Unit Hydrograph was used as the transform method in the model. This method uses linear reservoir storage calculations to determine how the input hydrograph is translated and attenuated through a subcatchment. The two input parameters needed for these calculations are the time of concentration and a storage coefficient. The initial estimate of the time of concentration in each subcatchment was determined using the following equation recommended by the HEC-HMS manual.

$$Tc = 2.2\left(\frac{L \cdot Lc}{\sqrt{S_{10-85}}}\right)^{0.3}$$

Where T_c is the time of concentration (hrs), L is the longest flow path (mi), Lc is the centroidal flow path (mi), S_{10-85} is the average slope of the flow path represented by 10 to 85 percent of the longest flow path (ft/mi). The SI units were converted to imperial units while using the above equation. The storage coefficient is dependent on the time of concentration and was calculated using the following equation recommended in the HEC-HMS manual:

$$\frac{R}{R + Tc} = 0.5$$

Where R is the storage coefficient. These calculations were calculated internally in HEC-HMS.

7.4 Flow Comparison

Suitable data for meaningful calibration was not available in this watershed, as is the case for most small catchments. Under such circumstances, indirect methods are employed to gain confidence in hydrologic and hydraulic models.

In this study, the calculated flows (for Timmins Storm) were compared with the Creager Envelop Curve. This curve with a coefficient of 30 fits best to Canadian data (Watt et al., 1989).

The comparison is shown in **Figure 4.0**. It appears that the computed flows are well below the Creager Curve and the observed large floods (Canadian Extremes) used to derive this curve. This curve is considered the upper limit of floods in Canada. The data from our study also lines up well with the observed large floods in Ontario (Ontario Extremes), which were taken from MNRF (2014). Considering all, we conclude that the estimated flows for this study are reasonable.

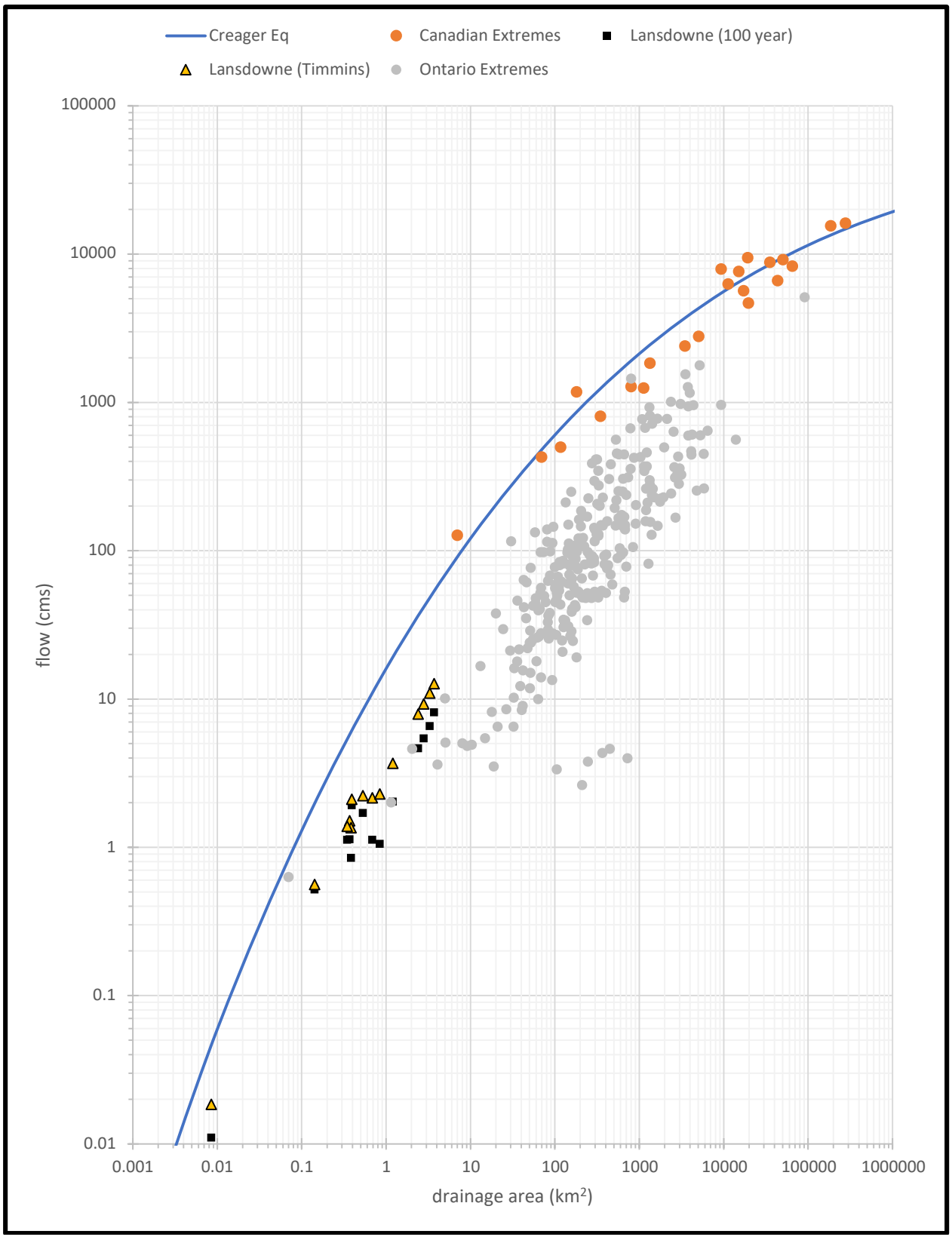


Figure 4 Flow Comparison

7.5 Design Flows for Hydraulic Modeling

The primary purpose of the hydrological model is to determine flow rates for use in hydraulic modelling. **Table 5** displays the HEC-HMS outputs used for hydraulic modelling.

Table 5 Peak Flow Summary

	Area	Return Period (years) or Storm Event								
	(km2)	2	5	10	25	50	100	200	500	Timmins
Basin		Flows (cms)								
SB1	0.6871	0.119	0.239	0.389	0.642	0.871	1.124	1.441	1.897	2.152
SB2	0.3707	0.105	0.261	0.423	0.676	0.894	1.129	1.416	1.818	1.507
SB3	0.3863	0.081	0.186	0.304	0.495	0.663	0.848	1.076	1.400	1.353
SB4	0.3468	0.258	0.382	0.518	0.731	0.919	1.122	1.372	1.727	1.386
SB5	0.8430	0.159	0.225	0.339	0.569	0.793	1.052	1.386	1.879	2.287
SB6	0.5330	0.164	0.411	0.657	1.034	1.355	1.700	2.118	2.700	2.230
SB7	0.0085	0.004	0.005	0.006	0.007	0.009	0.011	0.015	0.023	0.019
SB8	0.1427	0.167	0.224	0.275	0.358	0.434	0.518	0.624	0.777	0.562
SB9	0.3917	0.365	0.674	0.936	1.307	1.608	1.920	2.288	2.790	2.109
Outlet	3.7098	1.220	2.238	3.289	4.976	6.468	8.126	10.125	12.933	12.675
Node		Flows (cms)								
R1	3.3000	0.901	1.674	2.542	3.952	5.201	6.567	8.267	10.730	10.961
R2	2.8000	0.604	1.266	1.999	3.195	4.259	5.428	6.875	8.943	9.267
R3	2.4000	0.530	1.087	1.706	2.724	3.635	4.643	5.896	7.696	7.920
R4	1.2000	0.253	0.466	0.722	1.165	1.572	2.028	2.601	3.430	3.684

For detailed data on flows in each reach, junction, and subcatchment, please see **Appendix A**. Peak flows at Lansdowne Creek is shown for each design storm in Error! Reference source not found.**4**.

8. Hydraulic Modelling

Following current mapping guidelines, HEC-RAS manuals, and the contemporary industry standards, a 1D HEC-RAS model was set up. Version 6.4.1 of HEC-RAS model was used. The design flows determined from the HEC-HMS model were used as the input to the HEC-RAS model. The purpose of the hydraulic model is to determine the water surface elevations (WSEL), energy grade, velocity, and other hydraulic parameters corresponding to design flows. The results of this modelling exercise will determine the elevations that will be used for flood plain mapping.

8.1 Input Data

The data needed to create an accurate hydraulic model include channel geometry, structure geometry (i.e., bridges and culverts), design flow rates, Manning's roughness coefficients for the main channel and floodplains, expansion and contraction coefficients, and the boundary conditions.

8.1.1 Geometry and Structures

A finer grid 1m horizontal and 0.5m vertical cell size was used for hydraulic modeling. In total, 185 cross-sections were used. The cross-sections generated this way were further modified based on field measurements.

The location and alignment of river cross-sections, as well as the spacing between them, were based on engineering judgment as related to the expected flow conditions during high flood events.

Appendix B shows a schematic of HEC-RAS models. The details of the cross-sections are included in Appendix B.

To improve the accuracy of the underwater portion of the channel cross-section, adjustments were made based on field observations. To correct the geometry data and accurately represent the low flow channel, the model cross-sections were manually adjusted to match the channel inverts that were surveyed at each structure. While the entire low flow channel geometry is not as precise as the rest of the terrain data, the small differences in conveyance will not have a significant impact on the results or floodplain maps, as the flow within the low flow channel is a small fraction of the regulatory flows used to define the floodplain.

For each structure in the model, expansion and contraction reaches were included to assess the energy losses associated with flow entering and exiting a structure, caused by changes in geometry between cross-sections and at structures. The coefficients are higher when the transition is more abrupt, such as at crossings. The contraction and expansion coefficients used for crossings were 0.3 and 0.5, respectively, and for all other cross-sections, 0.1 and 0.3 were used. These values were recommended in the HEC-RAS manual for typical bridge sections with subcritical flow. The expansion and contraction reach lengths were determined by comparing the bankfull width of the channel to the bridge opening size, following the guidelines in the HEC-RAS manual. The use of expansion and contraction reaches (i.e., two cross-sections up- and downstream of structures) ensures that flow transitions are gradual as the flow narrows when approaching a structure and expands after one. The cross-sections immediately adjacent to the structures typically have more abrupt transitions as the flow is constrained by a culvert.

Ineffective flow areas were used in the model, primarily immediately upstream and downstream of hydraulic structures, so expansion and contraction losses could be accurately modelled.

Within the study area, there were 31 structures, including 3 bridges and 28 culverts. The HEC-RAS manuals were followed in modelling bridges and culverts in the HEC-RAS model. Deck elevations were taken from the LiDAR for the bridges and culverts.

The structure survey sheets for all structures are included in **Appendix C**.

8.1.2 Design Flows

The flow rates were determined from the HEC-HMS hydrologic model. **Table 4** lists the estimated design flows for return periods ranging from 2 to 500 years and Timmins Storm. Flow change locations were determined based on confluences of sub-catchment flows in HEC-HMS. Each reach in HEC-RAS can have multiple flows, based on flow change locations specified by cross-section station. The level of flow discretization in the HEC-RAS model reflects the level of discretization along the main channels in HEC-HMS. Flow rates for all return period storms are shown in **Appendix B**.

The modeling was done for a total of nine (9) storm events: 2, 5, 10, 25, 50, 100, and 200 year storm events; Timmins Storm.

There is a ~180m long underground pipe/tunnel at the downstream end of Lansdowne Creek. This pipe has several irregular cross-sections and bends, making it difficult to accurately compute its conveyance capacity. It was estimated that, during high flood events (the 100 year and Timmins Storm), this culvert will likely convey about 2 cms. This flow was about 16% of the Lansdowne Creek flow at this location (12.68 cms). Since there is no guarantee that this pipe would reliably and perpetually divert a certain amount of flow, it was not taken into account in the HEC-RAS modeling or the flood mapping. See attached photos of pipe in submission folders.

8.1.3 Manning's Roughness Coefficient

Manning's roughness coefficients will vary based on flood stage and season. Therefore, the values were selected to represent typical summer conditions.

Manning's roughness coefficient (Manning's n) was assigned to the main channel as well as the left and right overbank areas. Estimates of Manning's n were determined by analyzing the reach characteristics including riparian vegetation to determine the most appropriate roughness coefficient from open channel hydraulics (Chow, 1959). The initial values of Manning's n were selected as 0.035 for the main channel and 0.05 for the left- and right-overbank areas, as almost all riparian areas included some forest or dense brush that would provide similar degrees of roughness. For the cross sections below the grocery store where there is no creek, 0.03 was used for the 'channel' as there were more paved surfaces.

8.1.4 Boundary Conditions

Downstream boundary conditions are needed for HEC-RAS models. Known or estimated water levels are usually used as the downstream boundary condition.

According to Section 4.3 of MNR (2002, p.17-18), for rivers flowing into large lakes, where the high water conditions at the confluence are generated by two independent flood events, the flood standard should be based on the higher of:

- mean annual flood level in the river and/or stream and the flood hazard limit in the connecting channel, (See The Great Lakes – St. Lawrence River System and Large Inland Lakes Technical Guide.)
- the flood hazard limit (Hurricane Hazel, Timmins Storms, observed or the 100 year event) in the mean monthly levels in the connecting channel or lake.

Accordingly, the following boundary conditions have been used for this project:

- For High flow events in the creek (Timmins Storm, 100 year, or higher events), we used the mean annual lake level (**195.472** m).
- For smaller events in the creek (50 year, or lower events), we used the 1:100 year lake water level (**196.895** m).

This lake level values for Lake Nipissing were calculated using a Log-Normal distribution based on the data at North Bay (02DD006) for the period from 1933 through 2021, available from Environment Canada's HYDAT database.

9. HEC-RAS Model

Once the model was set up, the computed profiles and other parameters were scrutinized to assess whether the model outputs were reasonable. Special attention was given to the computed water levels and energy profiles near road crossings. Adjustments of model parameters, primarily the channel resistance and contraction and expansion coefficients, were made as necessary.

Suitable data for meaningful calibration was not available in this watershed, as is the case in most small catchments see **sec. 9.1** for further comparison. Under such circumstances, indirect methods, such as sensitivity analysis, are employed to gain confidence in hydrologic and hydraulic models.

9.1 Streamflow Collection

Below in **Figure 7** a rating curve for XS 351 of Lansdowne Creek was generated in HEC-RAS. This is the approximate location of where Water's Edge installed an insitu water level logger. During the 8 months there were no significant storms to measure the flow. Additionally, there was one Flow Tracker wading measurement completed that showed minimal (0.001CMS) flow. As a result the rating curve combined with flow measurements could not be successfully used in the modelling.

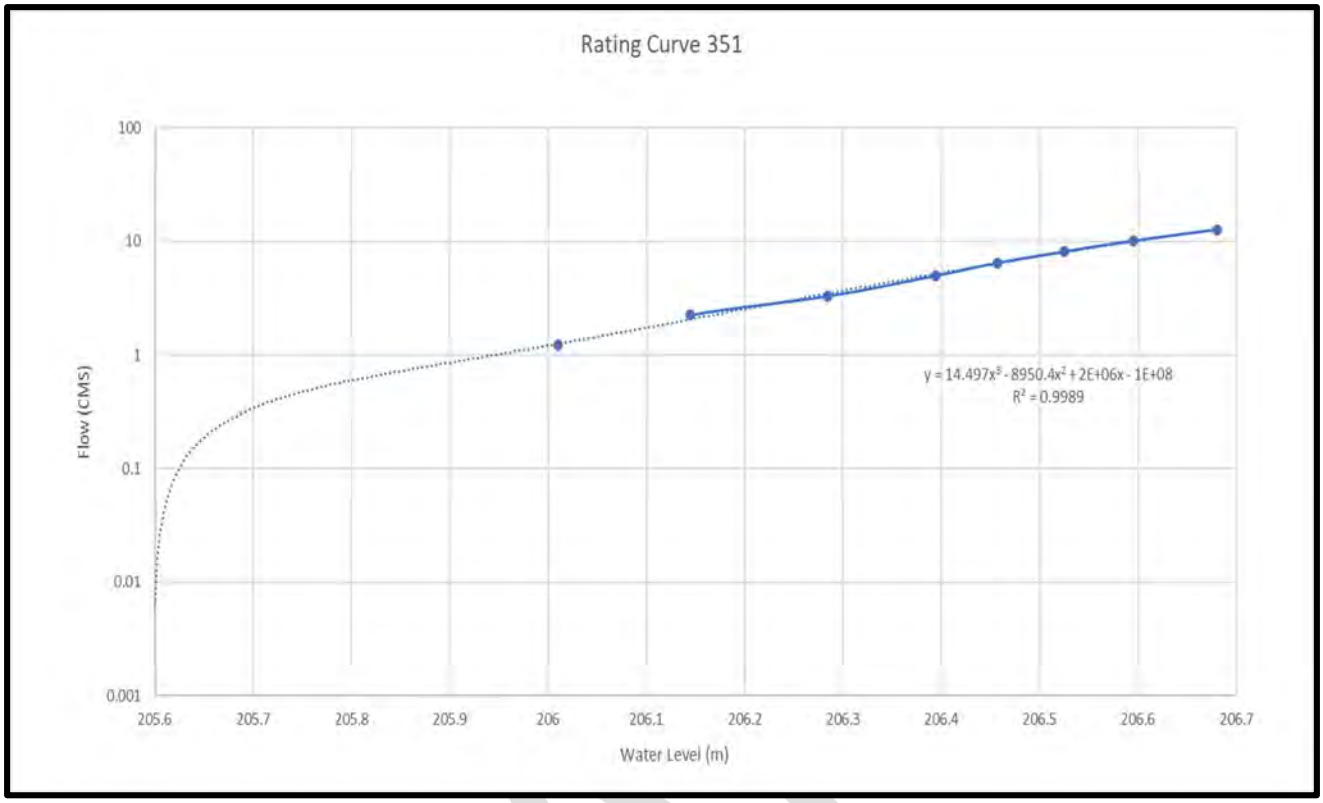


Figure 7 Hec-RAS Rating Curve

9.2 Sensitivity Analysis

A sensitivity analysis is used to determine the effect that parameters have on the model results. In HEC-RAS, Manning's n is the primary calibration parameter. The expansion and contraction coefficients can also have a significant impact on model results, but there is a smaller range of reasonable values. To determine the impact of parameter adjustments, the Manning's n was adjusted by multiple factors. The results are plotted to determine the relationship between the parameter adjustment factors and the model outputs.

Graphical representation of the sensitivity analysis is shown in **Figure 5**. The slope of each line in the graph represents the influence that the parameter has on water surface elevations.

Table 6 Sensitivity Analysis Results

River Sta	Profile	Q Total	Mannings n Multiplier	W.S. Elev
		(m3/s)		(m)
326	Timmins	12.68	1	206
326	Timmins	12.68	1.1	206
326	Timmins	12.68	0.9	206
326	2yr 24hr SCS	1.22	1	205.23
326	2yr 24hr SCS	1.22	1.1	205.23
326	2yr 24hr SCS	1.22	0.9	205.23
326	5yr 24hr SCS	2.24	1	205.35
326	5yr 24hr SCS	2.24	1.1	205.35
326	5yr 24hr SCS	2.24	0.9	205.35
326	10yr 24hr SCS	3.29	1	205.46
326	10yr 24hr SCS	3.29	1.1	205.46
326	10yr 24hr SCS	3.29	0.9	205.46
326	25yr 24hr SCS	4.98	1	205.58
326	25yr 24hr SCS	4.98	1.1	205.58
326	25yr 24hr SCS	4.98	0.9	205.58
326	50yr 24hr SCS	6.47	1	205.69
326	50yr 24hr SCS	6.47	1.1	205.69
326	50yr 24hr SCS	6.47	0.9	205.69
326	100yr 24hr SCS	8.13	1	205.78
326	100yr 24hr SCS	8.13	1.1	205.78
326	100yr 24hr SCS	8.13	0.9	205.78

The sensitivity analysis indicates that the parameters used in the model are not very sensitive. Within +/- 10% the water level did not change at this cross section. Other cross sections indicated minimal change and the overall floodline area change was minimal.

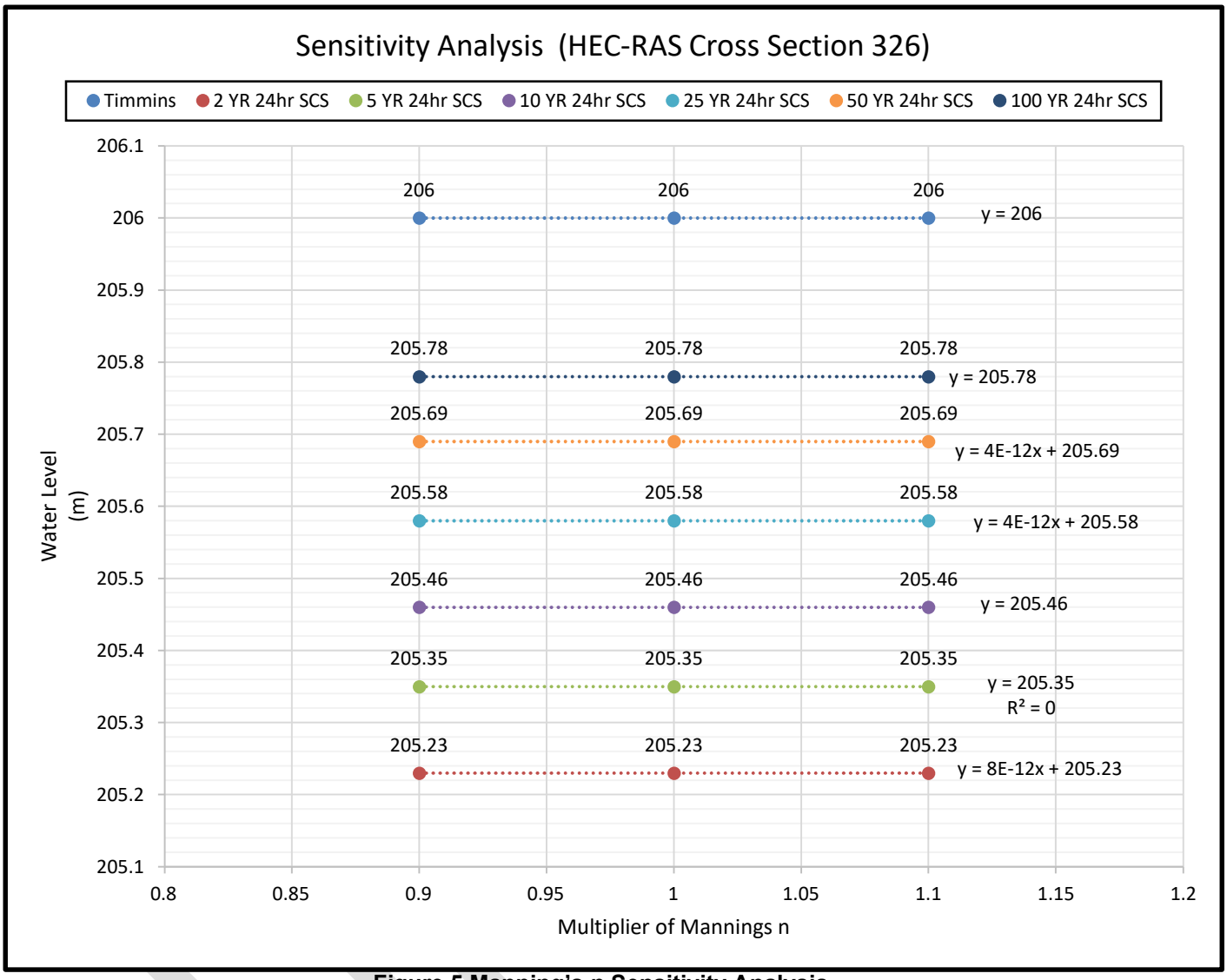


Figure 5 Manning's n Sensitivity Analysis

9.3 Regulatory Flood Levels (RFLs)

As per Section 2.3 of MNR (2002) guidelines, the regulatory flood in Zone 3, which includes the study area, the regulatory flood is the greater of the 1:100 year and Timmins Storm floods.

It was found that Timmins Storm produced higher flows and flood levels than the 100 year storm event.

For the present study, the regulatory flood levels were set equal to the computed water surface elevation as computed from the HEC-RAS models.

As specified in the RFP, the return period flows and the corresponding water levels have been summarized for all storm events (2, 5, 10, 25, 50, 100, and 200 year storm events; Timmins Storm). This is in Appendix B. Detailed HEC-RAS output tables are also included.

9.4 2D HEC-RAS Model

A 2D HEC-RAS model was also prepared as a complimentary tool for gaining insight in the creek hydraulics and flooding. It has no implication on the flood risk mapping done during this project. The 2D model for this study has the following features:

- An area of 1.5 km^2 is covered
- Number of Cells = 51377
- Average Face Length = 5m
- Average Cell Size = 29m^2
- Maximum Cell Size = 4,728m^2
- Minimum Cell Size = 1m^2
- Unsteady flow simulation
- Period of simulation – 19 hours
- Time step – variable
- Upstream boundary condition – HEC-HMS generated hydrographs
- Downstream boundary condition – water level of Lake Nipissing
- Model run for all storm events
- Downstream sink at grocery store culvert.

For the governing event (Timmins Storm), the 2D model yielded similar flood lines as the 1D model. Similar spill sections were also identified. The spill areas were significant, and it is recommended to investigate any solutions.

The 2D model developed here is only preliminary in nature and provides the foundation for further development and use in case such a need arises in future.

The sink flows were created based on culvert simulation using HY-8 culvert modeling software to determine a maximum flow of 2CMS before it overtops (see submission folder for HY-8 model)

10. Floodplain Mapping

10.1 Floodline Delineation

Once the RFLs are established, the plotting of flood lines or flood risk limits is a relatively straight forward matter. Given the topographical information in the form of LIDAR, the inundated area below the RFLs can be easily delineated manually or by using automated computer programs. In the present case, it was done automatically by RAS Mapper, followed by manual checking and adjustment.

10.2 Spill sections

Several spill sections were identified during this study. These spill sections are identified in the maps.

10.3 Buildings in the Floodplain

The presence of existing buildings within the floodplain and the variations in flood risk exposure to these buildings require special attention. After discussions with NBMCA, the floodlines

NBMCA's policy is to allow the flood line to run through buildings. Therefore, we have kept the flood lines as were produced by RAS Mapper, which are based on the bare-earth DTM and often runs through buildings.

10.4 Flood maps

As specified in the RFP, flood maps have been prepared for the Timmins Storm. All maps are in 1:1000 or 1:2000 scale on the equivalent of 24"x36" map sheets.

It is understood that the flood maps will be used by NBMCA during the administration of Ontario Regulation 177/06 and they have been prepared in accordance to the Ontario Guidelines for Developing Schedules of Regulated Areas, dated October 2005.

10.5 Risk Assessment

The risk to road crossings has been investigated, using the computed water levels for various flood events. A summary is presented in **Appendix C**.

Buildings susceptible to flood risk can be seen in the flood plain maps. Water depth, velocity, and depth*velocity maps have been prepared and will in assessing the risk of individual buildings and properties. These maps show life safety criteria (depth = > 0.3 metres, velocity = > 1.7 metres/second, and depth x velocity = > 0.4 metres2/second), which were specified in the RFP. Depth, velocity, and depth*velocity product mapping for the Regional Storm, has been prepared in raster (GEOTIFF) format and are shown in the Maps.

11. Deliverables

The key deliverables for this project, as per the RFP, include the following:

1. Final Report (including hydrologic and hydraulic analyses) [4 hard copies of draft report; Electronic copy of draft report; 4 hard copies of final report; Electronic copy of final report]
2. Hydrology modelling input and output data in digital format
3. HEC-RAS input and output in digital format
4. Power Point Presentation outlining reports presented at Open House
5. Floodplain mapping products as printed map sheets and in ESRI file format [Draft floodplain mapping – 1 hard set and a digital set; Final floodplain mapping sealed by a P. Eng. – 2 hard sets and a digital set; Floodplain mapping products in ESRI file format]

It is understood that all the data collected, and mapping materials produced under this project will become the property of North Bay-Mattawa Conservation Authority.

12. Summary and Recommendations

12.1 Summary

Flood hazard mapping for Lansdowne Creek has been completed. This was done according to the RFP issued by NBMCA (dated February 27, 2023) and the proposal submitted by Water's Edge, dated March 17, 2023.

The floodplain mapping was done in accordance with applicable Provincial and Federal guidelines.

The flood plain maps created under this project are suitable for use per section 28 regulations under the Conservation Authorities Act.

HEC-HMS model was used to estimate design flows and HEC-RAS model was used to estimate flood levels.

The modeling was done for a total of nine (9) storm events: 2, 5, 10, 25, 50, 100, 200 and 500 year storm events; Timmins Storm.

It was found that Timmins Storm produced higher flows and flood levels than the 100 year storm event. Therefore, Timmins Storm was taken as the governing flood event.

As specified in the RFP, flood maps have been prepared for the Timmins Storm. All maps are in 1:1000 or 1:2,000 scale on the equivalent of 24"x36" map sheets.

Flood lines for all other events were generated as shape files only. They were not printed on maps.

12.2 Recommendations

Based on the data, modeling, analyses, and results of this study, we recommend the following.

1. The 1D HEC-RAS model built here should be used as the model of record for the purposes of flood plain mapping.
2. A data collection program may be undertaken, which will include rainfall, stream flow, and water level. This will be helpful in future analysis of the hydrology and hydraulics of Lansdowne Creek.
3. Relevant data, analysis, drawings, and reports of all structures should be collected and archived.
4. The 2D HEC-RAS model developed during this project may be refined and used to gain a deeper insight into the flooding issues and possible remedial measures.
5. The flood mapping done here may be refined and updated as additional information becomes available.
6. Further investigation may be undertaken regarding the flooding issues in this area, since it appears that a substantial portion of developed areas is prone to flooding.
7. The flood forecasting and warning program may be adjusted to take advantage of the knowledge generated during this study.

Respectfully submitted,

Respectfully submitted,

DRAFT

Tim Antonio, B.A.Sc.
Water Resources Scientist

Ferdous Ahmed, Ph.D., P. Eng.
Sr. Water Resources Engineer

Ed Gazendam, Ph.D., P. Eng.
President, Sr. Water Resources Engineer

Water's Edge Environmental Solutions Team Ltd.

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APPENDIX A:

Hydrological Model

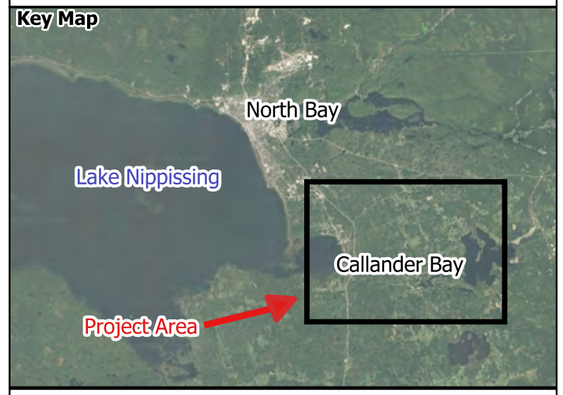
626000
627000
628000
629000
5122000
5121000

SB1
SB2
SB3
SB4
SB5
SB6
SB7
SB8
SB9
Lake Nippissing

Map 1

Callander Bay, Ontario

Lansdowne Creek Subbasins



Legend

HEC-HMS - Subbasins

water's edge
ENVIRONMENTAL SOLUTIONS TEAM

Project number: 23016
Date: Dec. 12, 2023

NAD83-UTM Zone 17
Size: 11*17

N

0 250 500 750 m

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SB1
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SB3
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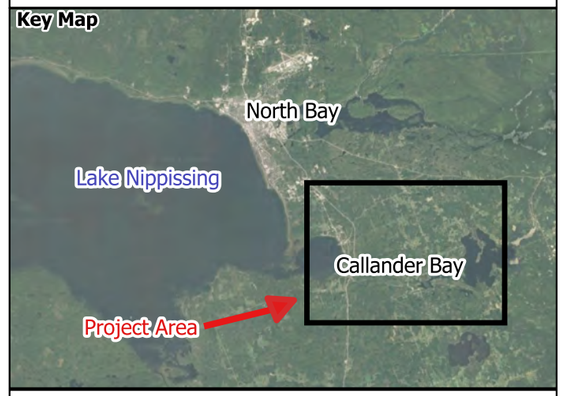
SB5
R1
R2
R3
R4
Lake Nippissing

Map 2

Callander Bay, Ontario

Lansdowne Creek HEC-HMS Reaches



Legend

HEC-HMS Reaches

water's edge
ENVIRONMENTAL SOLUTIONS TEAM

Project number: 23016
Date: Dec. 12, 2023

NAD83-UTM Zone 17
Size: 11*17

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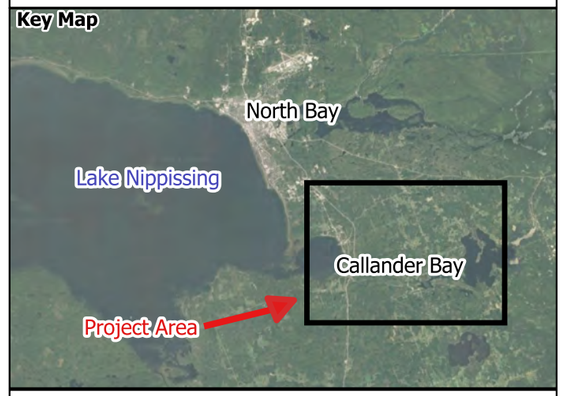
Lake Nippissing

Map 3

Callander Bay, Ontario

Lansdowne Creek Curve Numbers



Legend

- Subbasins

Curve Numbers

- 39
- 54
- 61
- 70
- 80
- 85
- 98

water's edge
ENVIRONMENTAL SOLUTIONS TEAM

Project number: 23016
Date: Dec. 12, 2023

NAD83-UTM Zone 17
Size: 11*17

0 250 500 750 m

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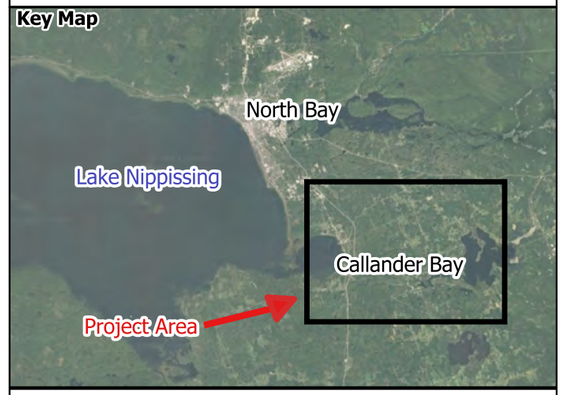
SB9
Lake Nippissing

Map 4

Callander Bay, Ontario

Lansdowne Creek Hydrologic
Soil Survey Index



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HEC-HMS - Subbasins

Soil Hydrologic Group Index

- A
- B
- D

Project number: 23016
Date: Dec. 12, 2023

NAD83-UTM Zone 17
Size: 11*17

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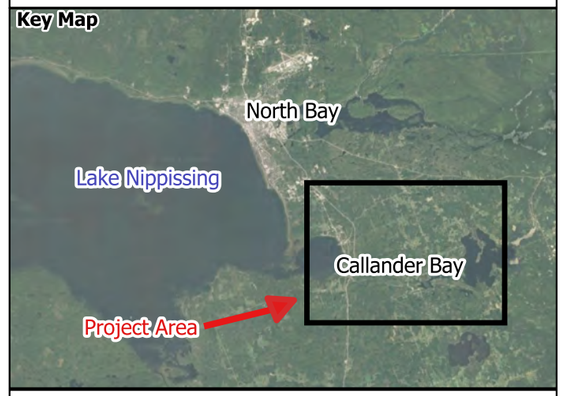
SB4
SB5
SB6
SB7
SB8
SB9
Lake Nippissing

Map 5

Callander Bay, Ontario

Lansdowne Creek
Land Cover



Legend

- HEC-HMS - Subbasins

Provincial Landcover

- Forest
- Coniferous Area
- Transportation
- Built Up Area - Pervious

water's edge
ENVIRONMENTAL SOLUTIONS TEAM

Project number: 23016
Date: Dec. 12, 2023

NAD83-UTM Zone 17
Size: 11*17

N

0 250 500 750 m

TR-55 Curve Numbers

Cover description		Curve numbers for hydrologic soil group			
Cover type and hydrologic condition	**Average percent impervious area2**	**A**	**B**	**C**	**D**
WOODS Fair (woods are grazed but not burned, and some forest litter covers the soil)			36	60	73	79
Goodwoods (woods are protected from grazing, and litter and brush adequately cover the soil)			30	55	70	77
Fully developed urban areas						
Open space (lawns, parks, golf courses, cemeteries, etc.)3:						
Poor condition (grass cover < 50%)			68	79	86	89
Fair condition (grass cover 50% to 75%)			49	69	79	84
Good condition (grass cover > 75%)			39	61	74	80
Impervious areas:						
Paved parking lots, roofs, driveways, etc. (excluding right-of-way)			98	98	98	98
Streets and roads:						
Paved; curbs and storm sewers (excluding right-of-way)			98	98	98	98
Paved; open ditches (including right-of-way)			83	89	92	93
Gravel (including right-of-way)			76	85	89	91
Dirt (including right-of-way)			72	82	87	89
Western desert urban areas:						
Natural desert landscaping (pervious areas only)4 . .			63	77	85	88
Artificial desert landscaping (impervious weed barrier, desert shrub with 1- to 2-inch sand or gravel mulch and basin borders)			96	96	96	96
Urban districts:						
Commercial and business	85	89	92	94	95
Industrial	72	81	88	91	93
Residential districts by average lot size						
1/8 acre or less (town houses)	65	77	85	90	92
1/4 acre	38	61	75	83	87
1/3 acre	30	57	72	81	86
1/2 acre	25	54	70	80	85
1 acre	20	51	68	79	84
2 acre	12	46	65	77	82
Developing urban areas						
Newly graded areas (pervious areas only, no vegetation)5			77	86	91	94
Open Water			100	100	100	100
Cultivated Agricultural Lands:						
Row Crops (good), e.g., corn, sugar beets, soy beans			31	42	82	85
Small Grain (good), e.g., wheat, barley, flax			60	82	80	84
Meadow (continuous grass, protected from grazing, and generally mowed for hay):			30	58	71	78
Pasture, Grassland, or Range – Continuous Forage for Grazing:						
Poor condition (ground cover <50% or heavily grazed with no mulch) 68 79 86 89			69	79	86	89
Fair condition (ground cover 50% to 75% and not heavily grazed) 49 69 79 84			49	69	79	84
Good condition (ground cover >75% and lightly or only occasionally grazed) 39 61 74 80			39	61	74	80

Provincial Land Use		TR-55						
		Cover description			Curve numbers for hydrologic soil group			
DN Value	**Provincial Land Use NB**	**Cover type and hydrologic condition**		**Average**	**A**	**B**	**C**	**D**
		Natural desert landscaping (pervious areas only)4 . .	1		63	77	85	88
		Natural desert landscaping (pervious areas only)4 . .	1		63	77	85	88
		Artificial desert landscaping (impervious weed	2		96	96	96	96
		Gravel (including right-of-way)	3		76	85	89	91
		Gravel (including right-of-way)	3		76	85	89	91
		Newly graded areas (pervious areas only,	4		77	86	91	94
		Newly graded areas (pervious areas only,	4		77	86	91	94
		Poor condition (grass cover < 50%)	5		68	79	86	89
		Paved; curbs and storm sewers (excluding	6		98	98	98	98
		WOODS Fair (woods are grazed but not burned, and some forest litter covers the soil)	7		36	60	73	79
		Poor condition (ground cover <50% or heavily grazed with no mulch) 68 79 86 89	8		69	79	86	89
		Fair condition (ground cover 50% to 75% and not heavily grazed) 49 69 79 84	9		49	69	79	84
		Good condition (ground cover >75% and lightly or only occasionally grazed) 39 61 74 80	10		39	61	74	80
10	Forest	Goodwoods (woods are protected from grazing, and litter and brush adequately cover the soil)	10		30	55	70	77
11	Coniferous Forest	Goodwoods (woods are protected from grazing, and litter and brush adequately cover the soil)	10		30	55	70	77
12	Mixed Fores	Goodwoods (woods are protected from grazing, and litter and brush adequately cover the soil)	10		30	55	70	77
13	Deciduous Forest	Goodwoods (woods are protected from grazing, and litter and brush adequately cover the soil)	10		30	55	70	77
		Open Water	11		98	98	98	98
		Open Water	11		98	98	98	98
		Open Water	11		98	98	98	98
23	Bog	Open Water	11		98	98	98	98
		Open Water	11		98	98	98	98
1	Open Water	Open Water	11		98	98	98	98
	Plantations -Tree Cultivated	Row Crops (good), e.g., corn, sugar beets, soy beans	12		31	42	82	85
	Hedge Rows	Row Crops (good), e.g., corn, sugar beets, soy beans	12		31	42	82	85
	Tilled		12		31	42	82	85
3	Transportation	Paved; curbs and storm sewers (excluding	13		98	98	98	98
25	Built Up Area - Pervious	1/2 acre	14	25	54	70	80	85
	Built Up Area Impervious	1/8 acre or less (town houses)	15	65	77	85	90	92
	Extraction -Aggregate	Gravel (including right-of-way)	3		76	85	89	91
	Extraction Peat / Topsoil	Row Crops (good), e.g., corn, sugar beets, soy beans	12		31	42	82	85
29	Undifferentieated	Good condition (ground cover >75% and lightly or only occasionally grazed)	16		39	61	74	80

APPENDIX B:

Hydraulic Model

626000
627000
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5121000

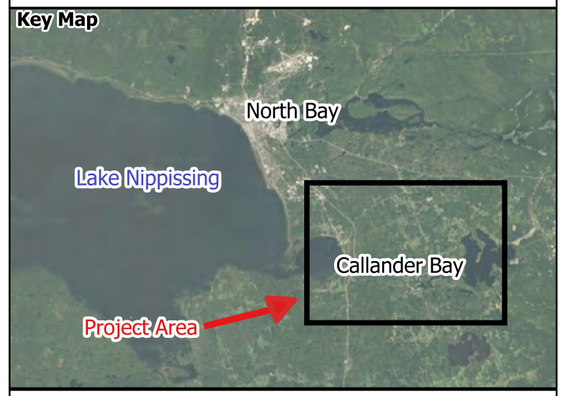
Trib 2
Trib 3
Reach 1
Trib 1
Lansdowne
Lake Nippissing

559 608 661 657 717 774 821 863
601 689 739
488 511 650 641
369 318 251 180 94 34 78 135 153 220 269
151 238 235 284 327 385 461 583 529 501 723 784 835 888 939 961 1003 1058 1118 1150
1403 1488 1433 1358 1332 1267
1060 1018 958 937 918 875 833 791 756 715 678 636 611 568 513
448 405 326 254 209 147 130 111 94 32 50
470 437 408 381 344 338 261 200 153 111 58 52

Map 6

Callander Bay, Ontario

Lansdowne Creek
HEC-RAS Schematic



Legend

- HEC-RAS Cross Sections
- HEC-RAS River

water's edge
ENVIRONMENTAL SOLUTIONS TEAM

Project number: 23016
Date: Dec. 12, 2023

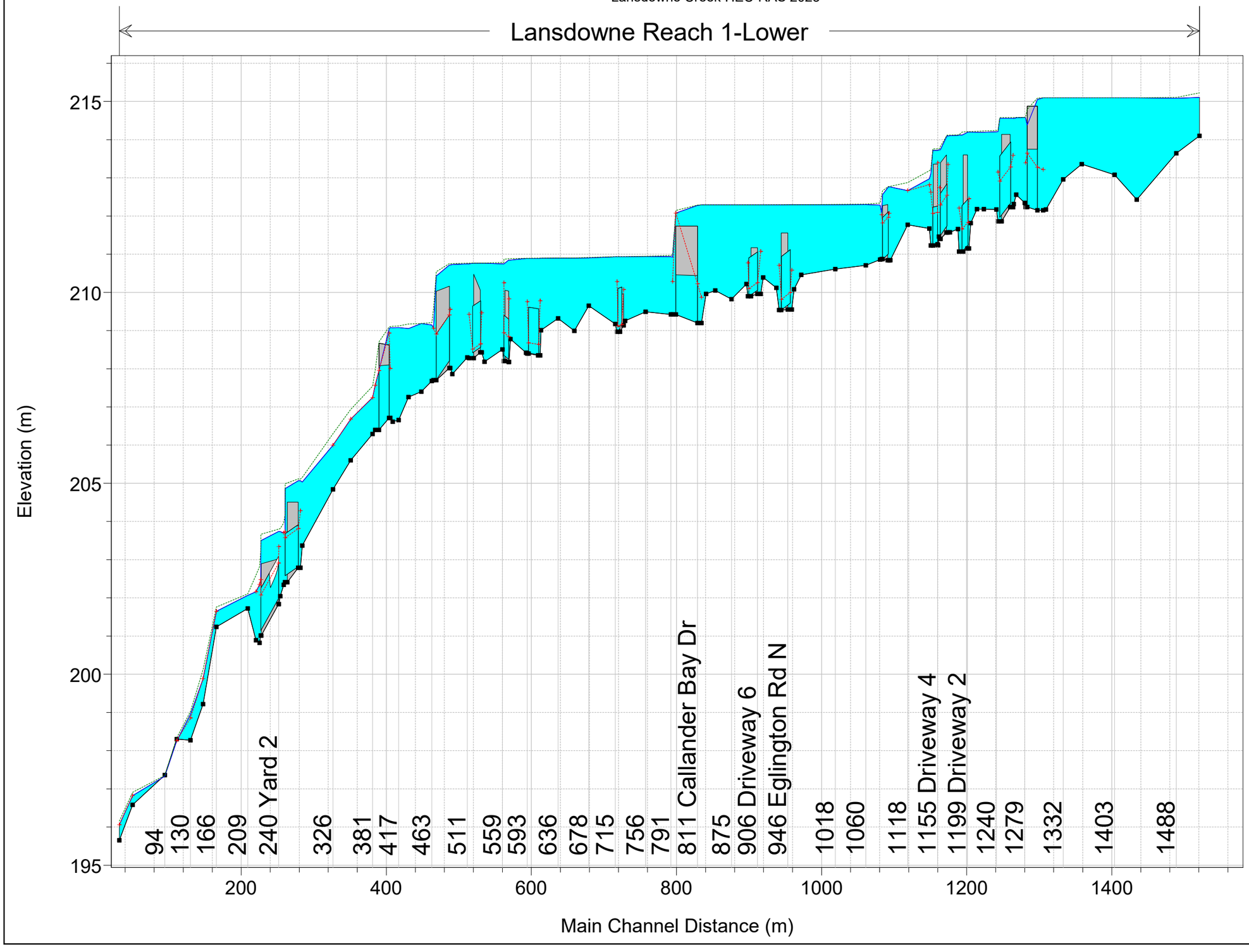
NAD83-UTM Zone 17
Size: 11*17

N

0 250 500 m

Lansdowne Creek HEC-RAS 2023

Lansdowne Reach 1-Lower

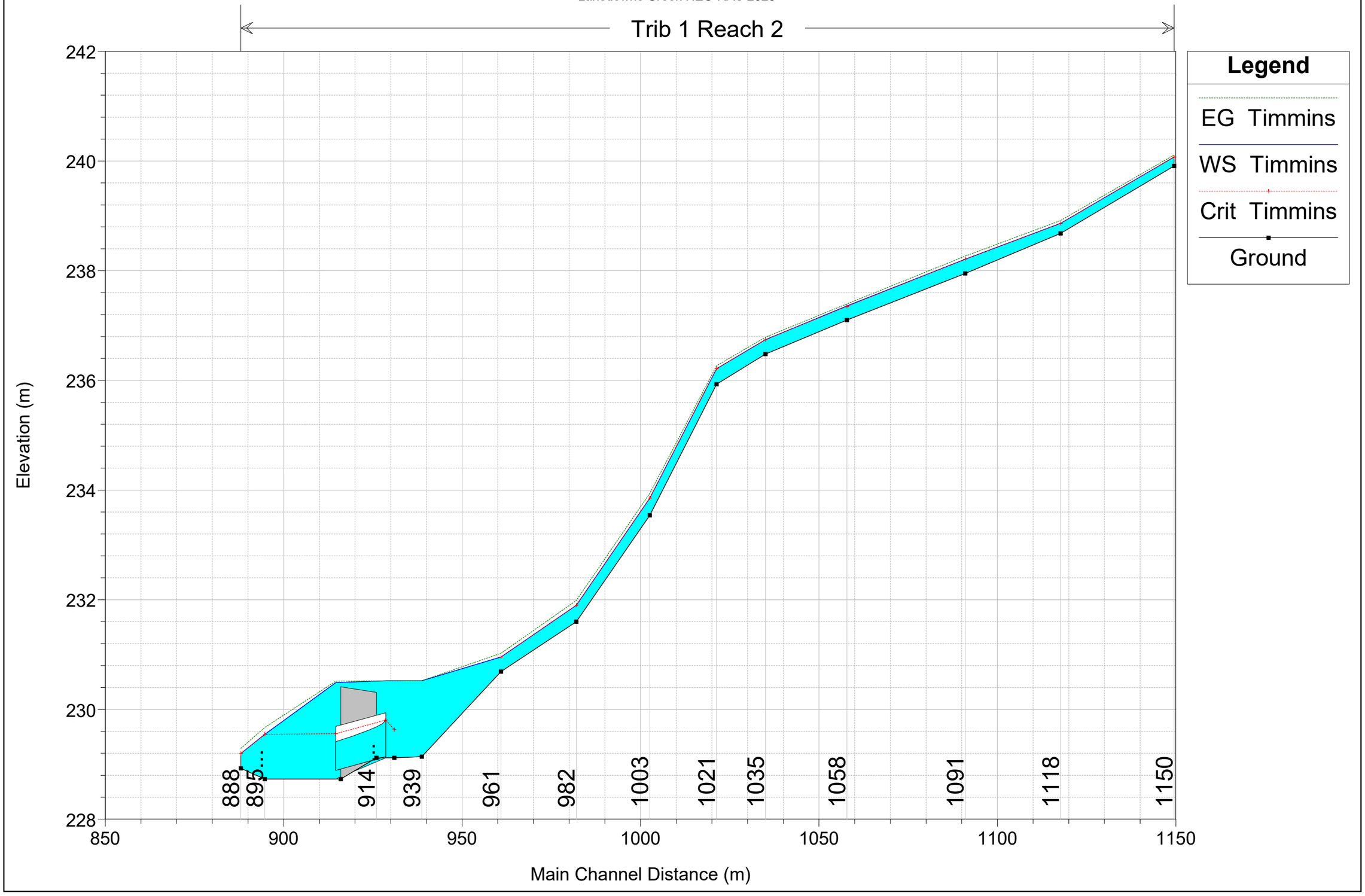


Legend

- EG Timmins
- WS Timmins
- Crit Timmins
- Ground

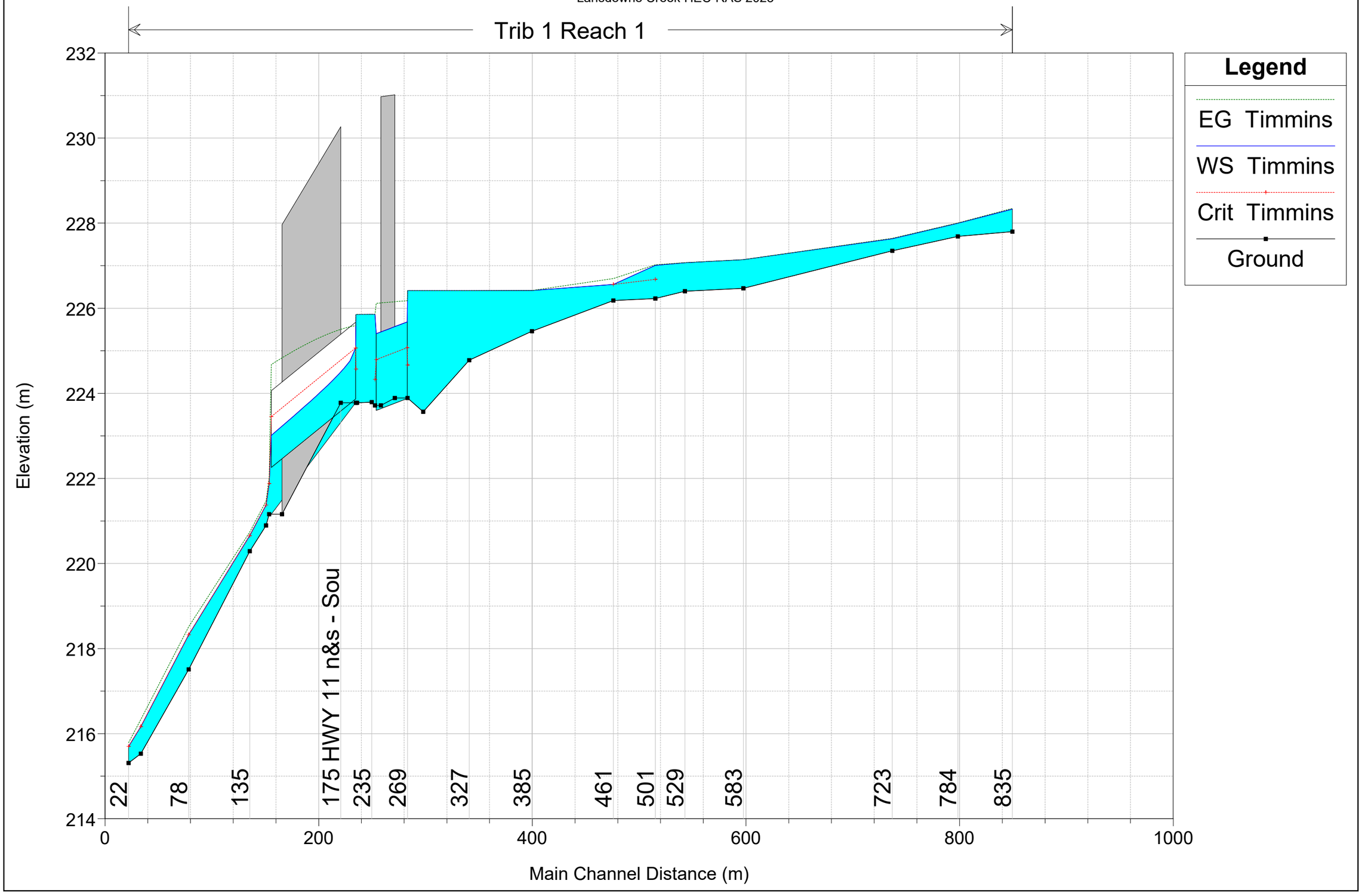
Lansdowne Creek HEC-RAS 2023

Trib 1 Reach 2



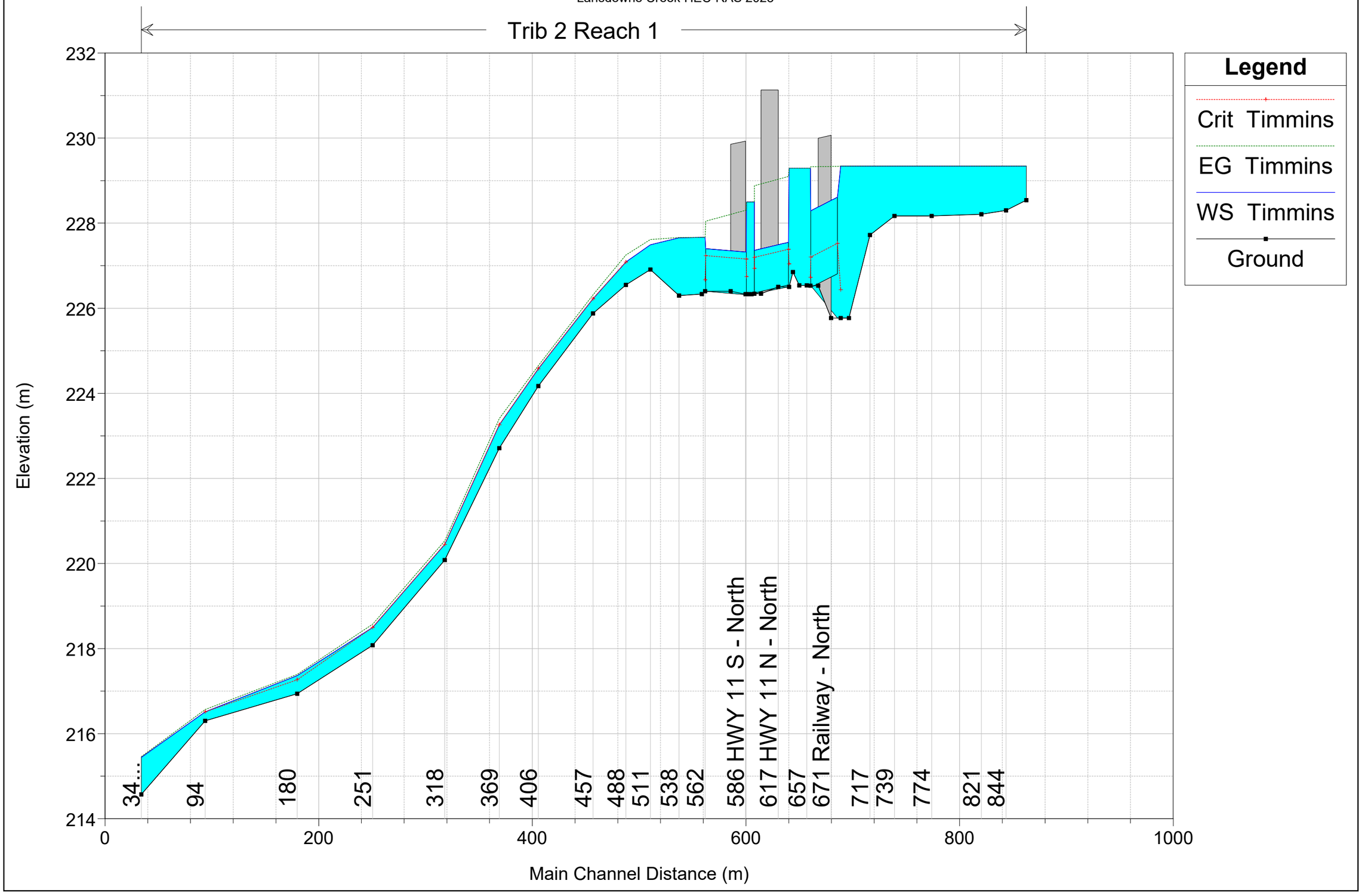
Lansdowne Creek HEC-RAS 2023

Trib 1 Reach 1



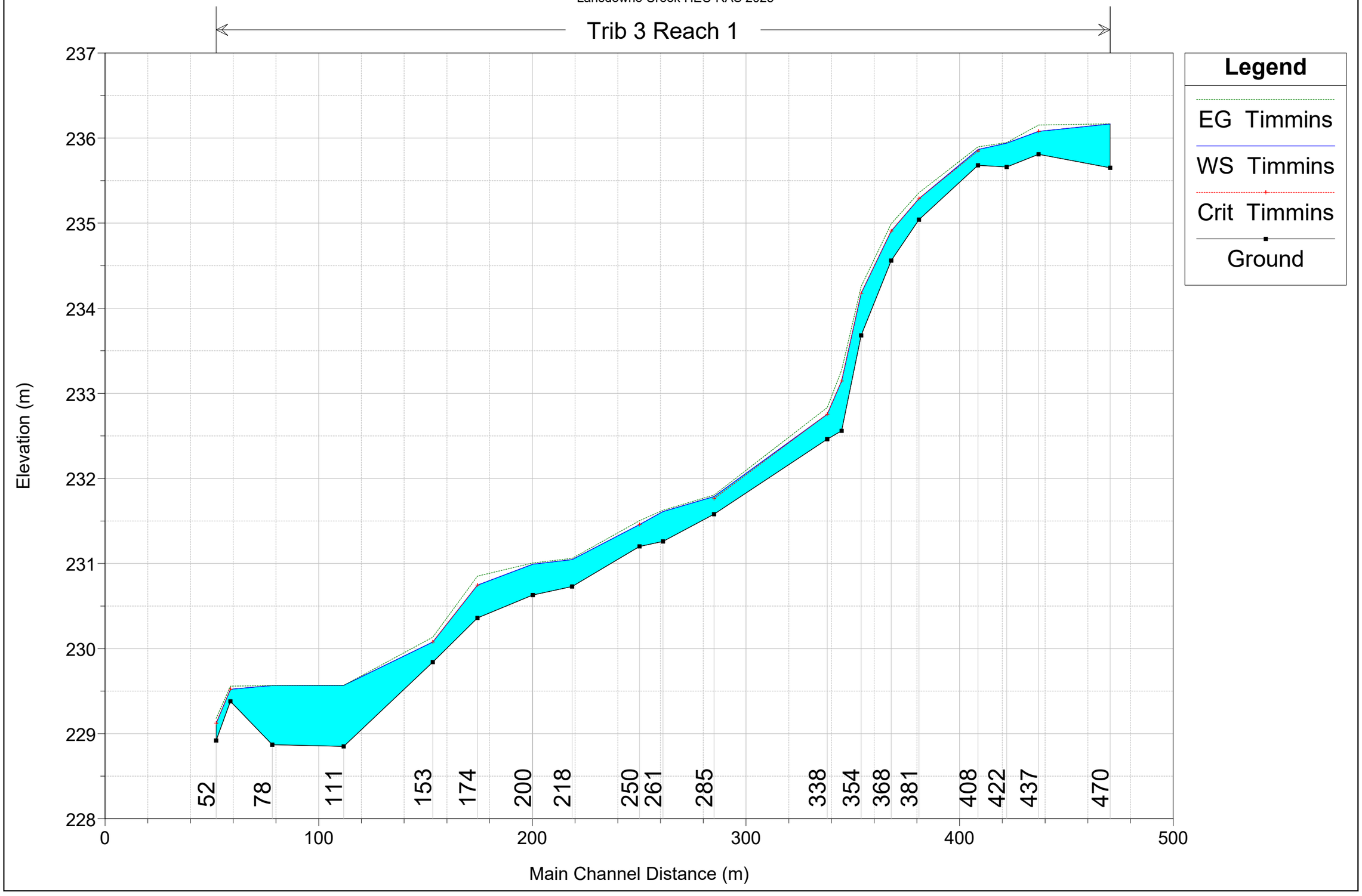
Lansdowne Creek HEC-RAS 2023

Trib 2 Reach 1



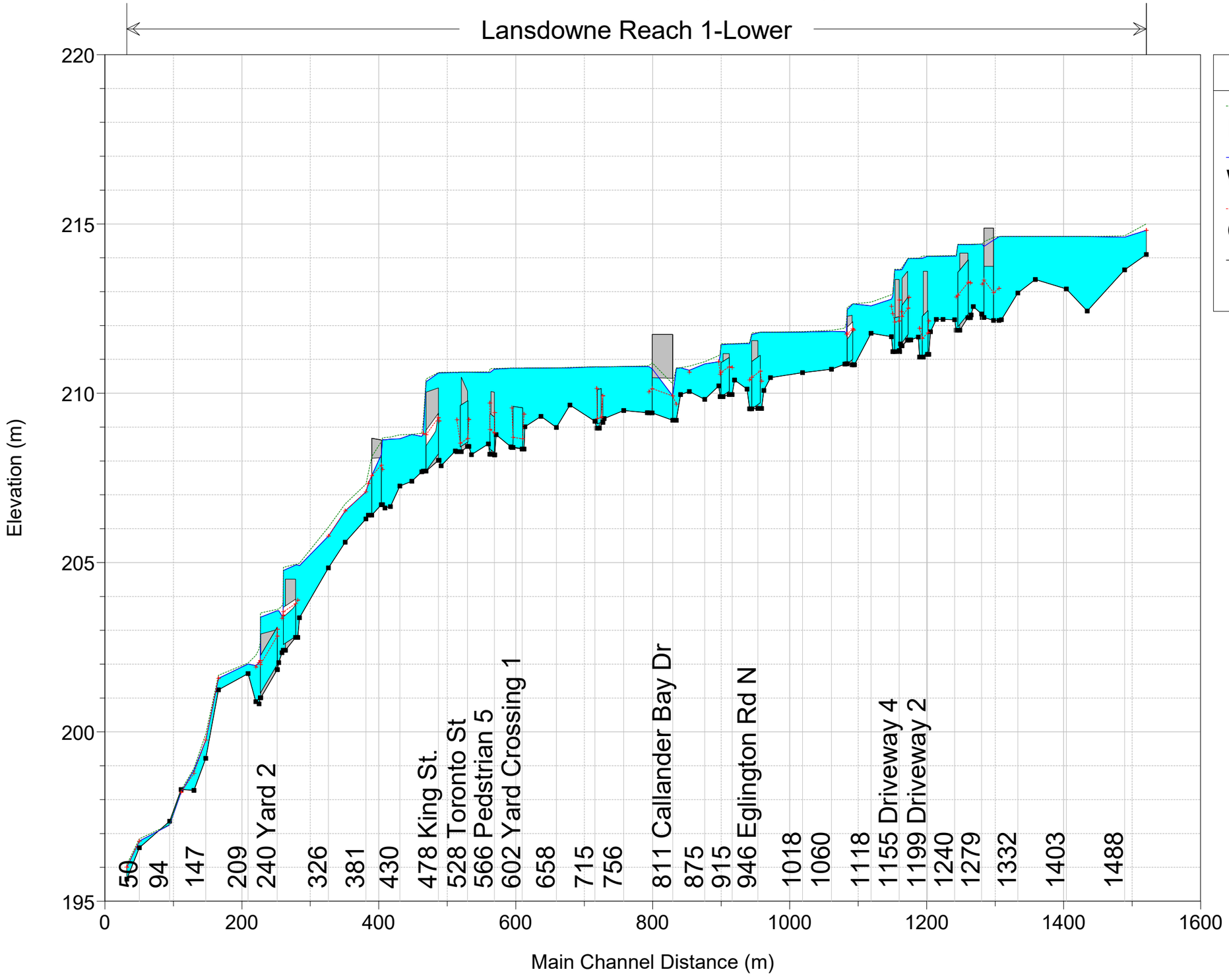
Lansdowne Creek HEC-RAS 2023

Trib 3 Reach 1



Lansdowne Creek HEC-RAS 2023

Lansdowne Reach 1-Lower



Legend

EG 100yr 24hr SCS

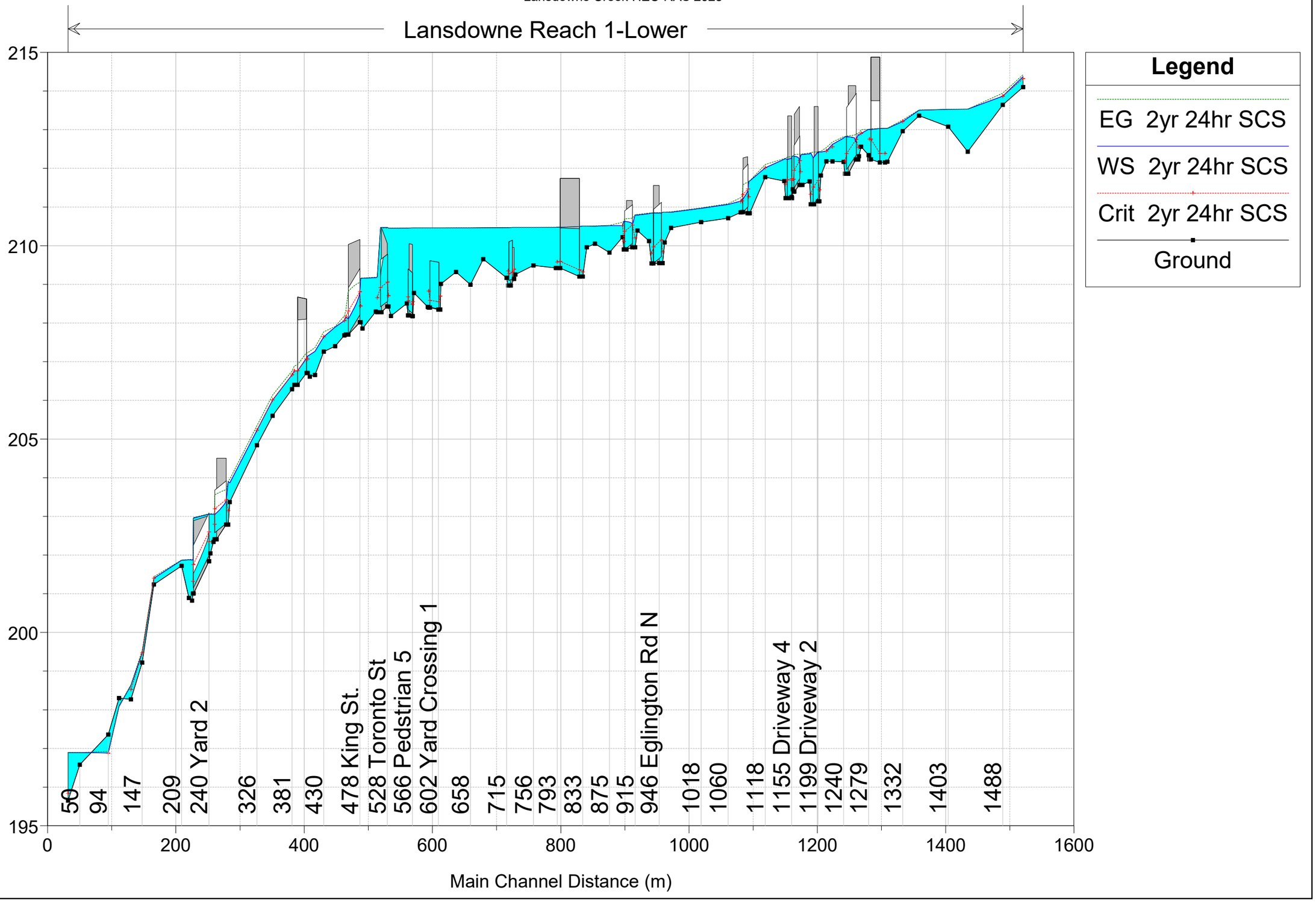
WS 100yr 24hr SCS

Crit 100yr 24hr SCS

Ground

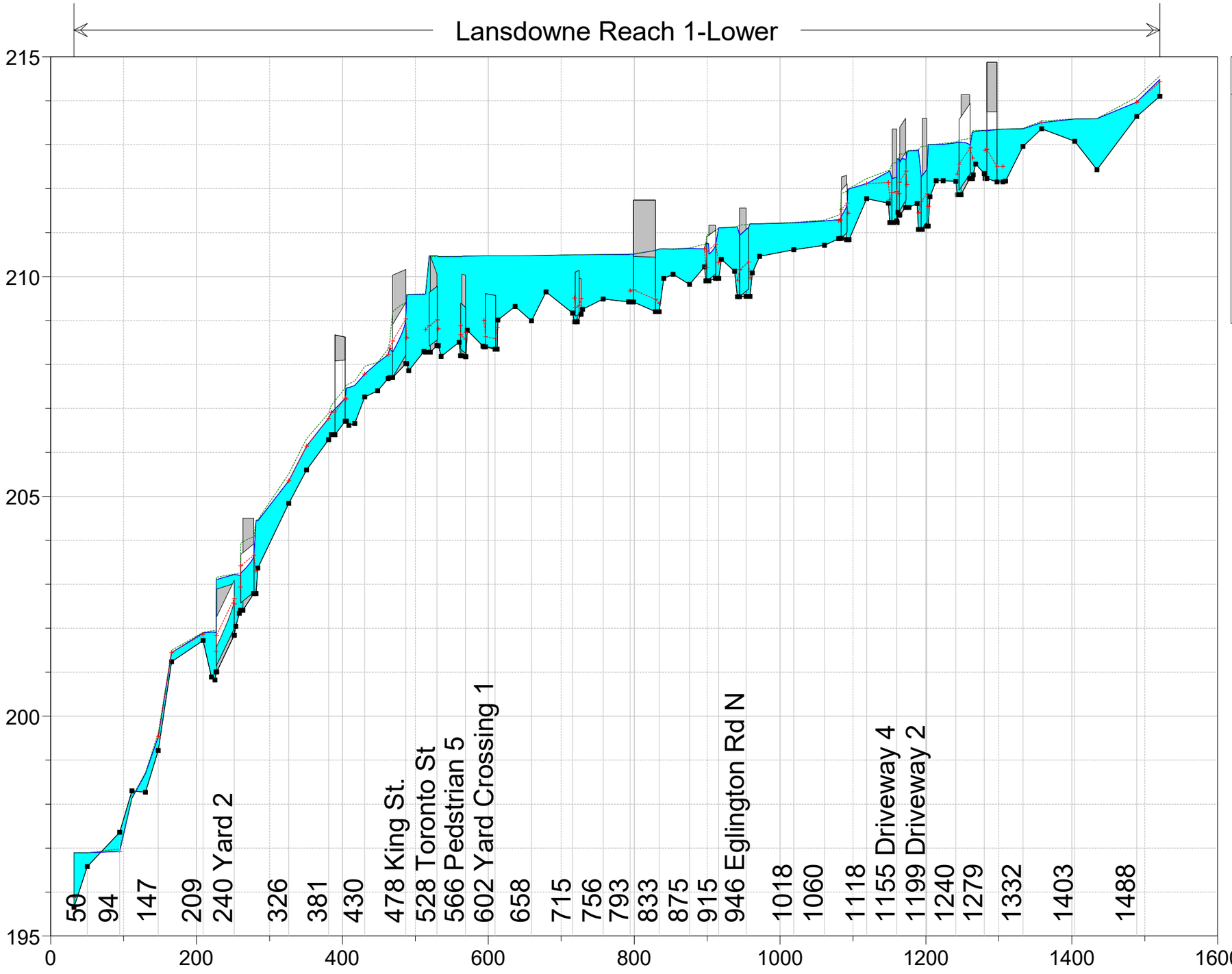
Lansdowne Creek HEC-RAS 2023

Lansdowne Reach 1-Lower



Lansdowne Creek HEC-RAS 2023

Lansdowne Reach 1-Lower



Legend

EG 5yr 24hr SCS

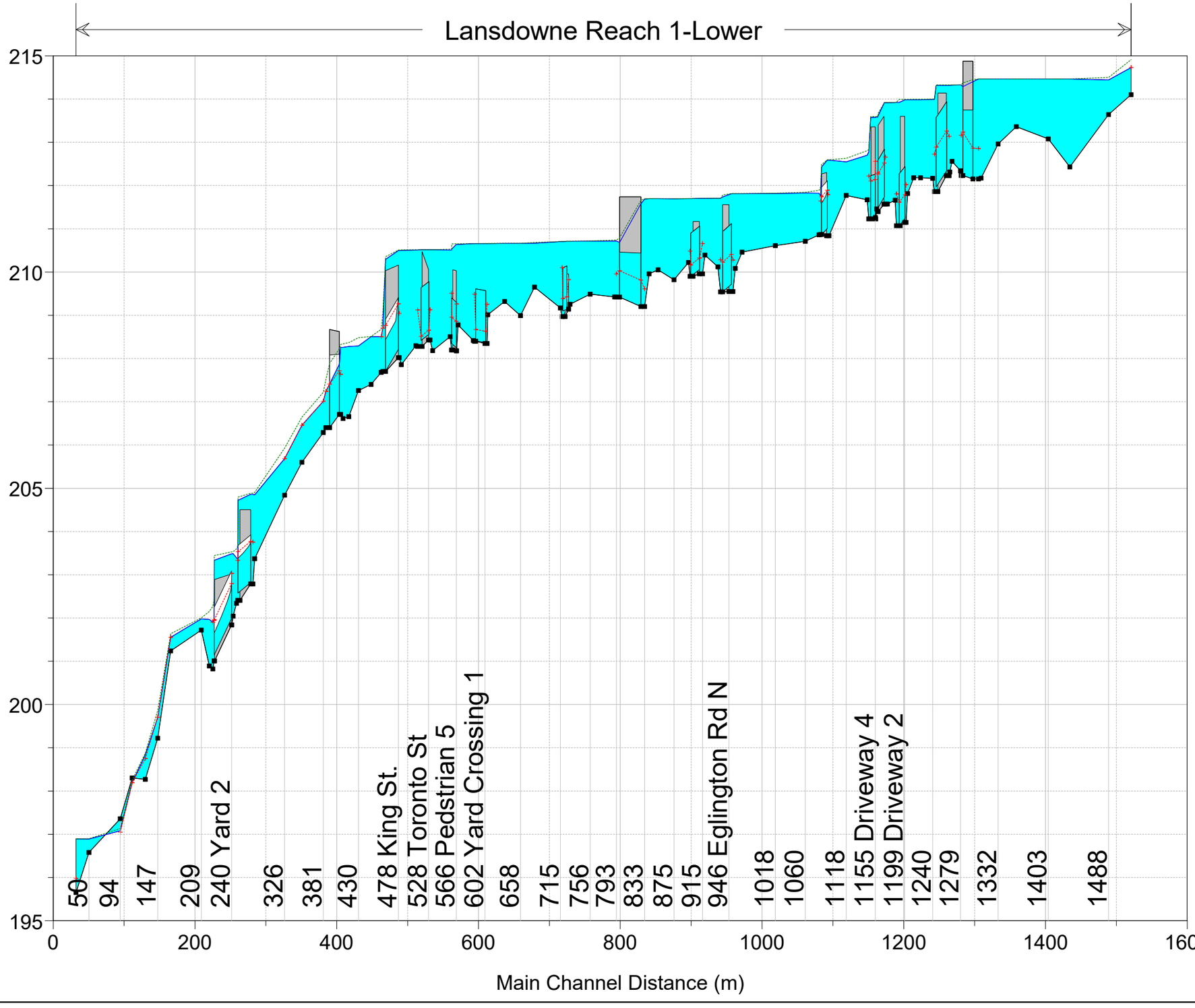
WS 5yr 24hr SCS

Crit 5yr 24hr SCS

Ground

Lansdowne Creek HEC-RAS 2023

Lansdowne Reach 1-Lower



Legend

EG 50yr 24hr SCS

WS 50yr 24hr SCS

Crit 50yr 24hr SCS

Ground

Project Name: Lansdowne Creek FPM

Project Number: 23016

HEC-RAS Output Tables

Date 20231212

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
Trib 3	Reach 1	470	Timmins	1.51	235.65	236.17		236.17	0.000056	0.11	14.11	39.54	0.06
Trib 3	Reach 1	470	2yr 24hr SCS	0.11	235.65	235.94		235.94	0.000004	0.02	5.94	31.25	0.01
Trib 3	Reach 1	470	5yr 24hr SCS	0.26	235.65	235.99		235.99	0.000011	0.03	7.48	33.46	0.02
Trib 3	Reach 1	470	10yr 24hr SCS	0.42	235.65	236.02		236.02	0.000018	0.05	8.7	35.09	0.03
Trib 3	Reach 1	470	25yr 24hr SCS	0.68	235.65	236.07		236.07	0.000029	0.07	10.29	36.11	0.04
Trib 3	Reach 1	470	50yr 24hr SCS	0.89	235.65	236.1		236.1	0.000036	0.08	11.38	36.94	0.04
Trib 3	Reach 1	470	100yr 24hr SCS	1.13	235.65	236.13		236.13	0.000044	0.09	12.5	38.11	0.05
Trib 3	Reach 1	470	200yr 24hr SCS	1.42	235.65	236.16		236.16	0.000053	0.1	13.75	39.27	0.06
Trib 3	Reach 1	437	Timmins	1.51	235.81	236.08	236.08	236.15	0.023814	1.2	1.25	8.72	1.01
Trib 3	Reach 1	437	2yr 24hr SCS	0.11	235.81	235.91	235.91	235.93	0.032563	0.69	0.16	3.28	0.99
Trib 3	Reach 1	437	5yr 24hr SCS	0.26	235.81	235.95	235.95	235.98	0.029965	0.79	0.33	5.19	0.99
Trib 3	Reach 1	437	10yr 24hr SCS	0.42	235.81	235.98	235.98	236.01	0.028042	0.88	0.48	6.08	1
Trib 3	Reach 1	437	25yr 24hr SCS	0.68	235.81	236.01	236.01	236.06	0.027227	0.99	0.68	7.01	1.02
Trib 3	Reach 1	437	50yr 24hr SCS	0.89	235.81	236.03	236.03	236.09	0.025995	1.06	0.84	7.52	1.02
Trib 3	Reach 1	437	100yr 24hr SCS	1.13	235.81	236.05	236.05	236.11	0.024765	1.12	1.01	8.03	1.01
Trib 3	Reach 1	437	200yr 24hr SCS	1.42	235.81	236.07	236.07	236.14	0.024085	1.19	1.2	8.56	1.01
Trib 3	Reach 1	422	Timmins	1.51	235.66	235.94		235.95	0.001593	0.4	3.78	18.21	0.28
Trib 3	Reach 1	422	2yr 24hr SCS	0.11	235.66	235.78		235.78	0.000258	0.09	1.2	13.48	0.1
Trib 3	Reach 1	422	5yr 24hr SCS	0.26	235.66	235.82		235.82	0.000517	0.15	1.68	14.47	0.14
Trib 3	Reach 1	422	10yr 24hr SCS	0.42	235.66	235.84		235.84	0.000746	0.2	2.09	15.98	0.18
Trib 3	Reach 1	422	25yr 24hr SCS	0.68	235.66	235.87		235.88	0.001011	0.26	2.6	16.78	0.21
Trib 3	Reach 1	422	50yr 24hr SCS	0.89	235.66	235.89		235.9	0.001184	0.3	2.94	17.24	0.23
Trib 3	Reach 1	422	100yr 24hr SCS	1.13	235.66	235.91		235.92	0.001364	0.34	3.29	17.66	0.25
Trib 3	Reach 1	422	200yr 24hr SCS	1.42	235.66	235.93		235.94	0.001543	0.39	3.67	18.09	0.27
Trib 3	Reach 1	408	Timmins	1.51	235.68	235.86	235.85	235.9	0.015895	0.79	1.9	18.41	0.79
Trib 3	Reach 1	408	2yr 24hr SCS	0.11	235.68	235.76		235.77	0.015545	0.34	0.32	10.86	0.63
Trib 3	Reach 1	408	5yr 24hr SCS	0.26	235.68	235.79	235.77	235.8	0.016053	0.45	0.57	12.99	0.69
Trib 3	Reach 1	408	10yr 24hr SCS	0.42	235.68	235.8		235.82	0.015957	0.51	0.82	15.44	0.71
Trib 3	Reach 1	408	25yr 24hr SCS	0.68	235.68	235.82	235.81	235.84	0.016239	0.6	1.13	16.78	0.74
Trib 3	Reach 1	408	50yr 24hr SCS	0.89	235.68	235.83	235.82	235.86	0.016322	0.65	1.36	17.86	0.76
Trib 3	Reach 1	408	100yr 24hr SCS	1.13	235.68	235.85	235.83	235.87	0.016058	0.71	1.58	18.12	0.77
Trib 3	Reach 1	408	200yr 24hr SCS	1.42	235.68	235.86	235.85	235.89	0.015943	0.78	1.83	18.34	0.78
Trib 3	Reach 1	381	Timmins	1.51	235.04	235.29	235.29	235.36	0.024361	1.16	1.3	9.77	1.01
Trib 3	Reach 1	381	2yr 24hr SCS	0.11	235.04	235.13	235.13	235.15	0.035021	0.64	0.17	4.12	1
Trib 3	Reach 1	381	5yr 24hr SCS	0.26	235.04	235.17	235.17	235.2	0.030568	0.76	0.34	5.66	1
Trib 3	Reach 1	381	10yr 24hr SCS	0.42	235.04	235.19	235.19	235.23	0.029685	0.86	0.49	6.58	1.02
Trib 3	Reach 1	381	25yr 24hr SCS	0.68	235.04	235.22	235.22	235.27	0.026772	0.95	0.72	7.77	1
Trib 3	Reach 1	381	50yr 24hr SCS	0.89	235.04	235.24	235.24	235.29	0.025991	1.02	0.88	8.4	1.01
Trib 3	Reach 1	381	100yr 24hr SCS	1.13	235.04	235.26	235.26	235.32	0.025552	1.08	1.04	8.96	1.01
Trib 3	Reach 1	381	200yr 24hr SCS	1.42	235.04	235.28	235.28	235.35	0.024683	1.14	1.24	9.58	1.02
Trib 3	Reach 1	368	Timmins	1.51	234.56	234.91	234.91	234.99	0.022921	1.3	1.16	7.01	1.02
Trib 3	Reach 1	368	2yr 24hr SCS	0.11	234.56	234.67	234.67	234.7	0.029835	0.83	0.13	1.9	1
Trib 3	Reach 1	368	5yr 24hr SCS	0.26	234.56	234.73	234.73	234.78	0.026679	0.98	0.26	2.69	1
Trib 3	Reach 1	368	10yr 24hr SCS	0.42	234.56	234.77	234.77	234.83	0.026093	1.04	0.4	3.72	1.01
Trib 3	Reach 1	368	25yr 24hr SCS	0.68	234.56	234.83	234.83	234.88	0.025192	1.05	0.65	5.75	1
Trib 3	Reach 1	368	50yr 24hr SCS	0.89	234.56	234.85	234.85	234.92	0.025402	1.14	0.78	6.24	1.02
Trib 3	Reach 1	368	100yr 24hr SCS	1.13	234.56	234.87	234.87	234.95	0.024209	1.21	0.94	6.56	1.02
Trib 3	Reach 1	368	200yr 24hr SCS	1.42	234.56	234.9	234.9	234.98	0.02324	1.28	1.11	6.9	1.02
Trib 3	Reach 1	354	Timmins	1.51	233.68	234.18	234.18	234.26	0.021541	1.25	1.21	7.28	0.98
Trib 3	Reach 1	354	2yr 24hr SCS	0.11	233.68	233.85	233.85	233.9	0.028772	0.95	0.12	1.27	1.01
Trib 3	Reach 1	354	5yr 24hr SCS	0.26	233.68	233.93	233.93	233.99	0.02582	1.14	0.23	1.79	1.01
Trib 3	Reach 1	354	10yr 24hr SCS	0.42	233.68	233.98	233.98	234.06	0.024459	1.22	0.34	2.33	1.01
Trib 3	Reach 1	354	25yr 24hr SCS	0.68	233.68	234.05	234.05	234.13	0.024757	1.21	0.56	3.95	1.02
Trib 3	Reach 1	354	50yr 24hr SCS	0.89	233.68	234.09	234.09	234.17	0.022231	1.23	0.72	4.52	0.99
Trib 3	Reach 1	354	100yr 24hr SCS	1.13	233.68	234.12	234.12	234.21	0.023262	1.31	0.86	5.09	1.02
Trib 3	Reach 1	354	200yr 24hr SCS	1.42	233.68	234.16	234.16	234.25	0.020593	1.29	1.1	6.15	0.97
Trib 3	Reach 1	344	Timmins	1.51	232.56	233.15	233.15	233.27	0.020353	1.58	0.96	3.74	1
Trib 3	Reach 1	344	2yr 24hr SCS	0.11	232.56	232.75	232.75	232.8	0.027976	0.99	0.11	1.1	1
Trib 3	Reach 1	344	5yr 24hr SCS	0.26	232.56	232.83	232.83	232.91	0.025453	1.19	0.22	1.52	1.01
Trib 3	Reach 1	344	10yr 24hr SCS	0.42	232.56	232.89	232.89	232.98	0.02421	1.32	0.32	1.83	1.01
Trib 3	Reach 1	344	25yr 24hr SCS	0.68	232.56	232.97	232.97	233.07	0.022649	1.46	0.47	2.21	1.01
Trib 3	Reach 1	344	50yr 24hr SCS	0.89	232.56	233.01	233.01	233.13	0.021907	1.54	0.58	2.47	1.01
Trib 3	Reach 1	344	100yr 24hr SCS	1.13	232.56	233.06	233.06	233.19	0.021185	1.61	0.7	2.73	1.01
Trib 3	Reach 1	344	200yr 24hr SCS	1.42	232.56	233.11	233.11	233.26	0.021809	1.72	0.83	2.97	1.04

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
Trib 3	Reach 1	338	Timmins	1.51	232.46	232.75	232.75	232.83	0.02276	1.24	1.23	8.33	1.01
Trib 3	Reach 1	338	2yr 24hr SCS	0.11	232.46	232.58	232.55	232.59	0.009445	0.48	0.23	3.25	0.57
Trib 3	Reach 1	338	5yr 24hr SCS	0.26	232.46	232.62	232.59	232.65	0.010637	0.63	0.41	4.1	0.64
Trib 3	Reach 1	338	10yr 24hr SCS	0.42	232.46	232.66	232.63	232.69	0.011195	0.72	0.59	5.06	0.67
Trib 3	Reach 1	338	25yr 24hr SCS	0.68	232.46	232.7	232.67	232.74	0.0154	0.82	0.83	7.66	0.78
Trib 3	Reach 1	338	50yr 24hr SCS	0.89	232.46	232.72	232.7	232.76	0.018324	0.95	0.94	7.82	0.87
Trib 3	Reach 1	338	100yr 24hr SCS	1.13	232.46	232.72	232.72	232.79	0.024811	1.15	0.99	7.9	1.02
Trib 3	Reach 1	338	200yr 24hr SCS	1.42	232.46	232.75	232.75	232.82	0.023251	1.22	1.17	8.23	1.01
Trib 3	Reach 1	285	Timmins	1.51	231.58	231.79	231.76	231.8	0.012364	0.6	2.52	30.8	0.67
Trib 3	Reach 1	285	2yr 24hr SCS	0.11	231.58	231.66	231.66	231.68	0.040414	0.56	0.2	6.51	1.02
Trib 3	Reach 1	285	5yr 24hr SCS	0.26	231.58	231.69	231.69	231.71	0.034858	0.63	0.41	10.28	1
Trib 3	Reach 1	285	10yr 24hr SCS	0.42	231.58	231.71	231.71	231.73	0.034414	0.64	0.66	15.59	1
Trib 3	Reach 1	285	25yr 24hr SCS	0.68	231.58	231.73	231.73	231.75	0.02281	0.61	1.11	20.58	0.85
Trib 3	Reach 1	285	50yr 24hr SCS	0.89	231.58	231.75	231.73	231.77	0.019069	0.61	1.46	24.17	0.79
Trib 3	Reach 1	285	100yr 24hr SCS	1.13	231.58	231.77	231.75	231.78	0.013771	0.57	1.97	27.74	0.69
Trib 3	Reach 1	285	200yr 24hr SCS	1.42	231.58	231.78	231.76	231.8	0.012671	0.59	2.39	30.13	0.67
Trib 3	Reach 1	261	Timmins	1.51	231.26	231.61		231.62	0.005113	0.52	2.92	22.79	0.46
Trib 3	Reach 1	261	2yr 24hr SCS	0.11	231.26	231.41		231.41	0.003107	0.29	0.38	5.02	0.33
Trib 3	Reach 1	261	5yr 24hr SCS	0.26	231.26	231.47		231.47	0.003725	0.34	0.76	8.76	0.37
Trib 3	Reach 1	261	10yr 24hr SCS	0.42	231.26	231.5		231.51	0.003834	0.38	1.09	10.72	0.38
Trib 3	Reach 1	261	25yr 24hr SCS	0.68	231.26	231.54		231.55	0.004265	0.43	1.6	14.63	0.41
Trib 3	Reach 1	261	50yr 24hr SCS	0.89	231.26	231.57		231.58	0.004275	0.45	1.99	16.99	0.42
Trib 3	Reach 1	261	100yr 24hr SCS	1.13	231.26	231.59		231.6	0.004803	0.47	2.42	21.04	0.44
Trib 3	Reach 1	261	200yr 24hr SCS	1.42	231.26	231.61		231.62	0.005069	0.51	2.8	22.46	0.46
Trib 3	Reach 1	250	Timmins	1.51	231.2	231.46	231.46	231.5	0.038498	0.96	1.71	20.06	0.88
Trib 3	Reach 1	250	2yr 24hr SCS	0.11	231.2	231.3	231.3	231.32	0.070225	0.63	0.17	4.2	0.99
Trib 3	Reach 1	250	5yr 24hr SCS	0.26	231.2	231.33	231.33	231.36	0.061719	0.78	0.33	5.25	1
Trib 3	Reach 1	250	10yr 24hr SCS	0.42	231.2	231.36	231.36	231.4	0.060233	0.87	0.48	6.43	1.01
Trib 3	Reach 1	250	25yr 24hr SCS	0.68	231.2	231.4	231.4	231.43	0.052133	0.84	0.81	10.38	0.95
Trib 3	Reach 1	250	50yr 24hr SCS	0.89	231.2	231.41	231.41	231.46	0.058982	0.96	0.93	10.93	1.03
Trib 3	Reach 1	250	100yr 24hr SCS	1.13	231.2	231.43	231.43	231.48	0.046434	0.94	1.24	15.72	0.94
Trib 3	Reach 1	250	200yr 24hr SCS	1.42	231.2	231.45	231.45	231.5	0.039391	0.95	1.61	19.73	0.88
Trib 3	Reach 1	218	Timmins	1.51	230.73	231.05		231.06	0.003402	0.54	2.78	14.87	0.4
Trib 3	Reach 1	218	2yr 24hr SCS	0.11	230.73	230.84		230.84	0.00237	0.23	0.48	7.26	0.28
Trib 3	Reach 1	218	5yr 24hr SCS	0.26	230.73	230.88		230.89	0.002968	0.31	0.83	9.16	0.33
Trib 3	Reach 1	218	10yr 24hr SCS	0.42	230.73	230.91		230.92	0.00302	0.37	1.14	9.98	0.35
Trib 3	Reach 1	218	25yr 24hr SCS	0.68	230.73	230.95		230.96	0.003285	0.44	1.54	11.04	0.38
Trib 3	Reach 1	218	50yr 24hr SCS	0.89	230.73	230.98		230.99	0.003497	0.48	1.84	11.92	0.39
Trib 3	Reach 1	218	100yr 24hr SCS	1.13	230.73	231.01		231.02	0.003686	0.5	2.25	14.38	0.41
Trib 3	Reach 1	218	200yr 24hr SCS	1.42	230.73	231.04		231.05	0.003476	0.54	2.65	14.76	0.4
Trib 3	Reach 1	200	Timmins	1.51	230.63	230.99		231.01	0.002555	0.52	2.93	13.63	0.36
Trib 3	Reach 1	200	2yr 24hr SCS	0.11	230.63	230.78		230.78	0.005157	0.28	0.4	7.96	0.4
Trib 3	Reach 1	200	5yr 24hr SCS	0.26	230.63	230.82		230.82	0.004213	0.34	0.76	9.51	0.39
Trib 3	Reach 1	200	10yr 24hr SCS	0.42	230.63	230.85	230.79	230.86	0.003877	0.37	1.13	11.7	0.38
Trib 3	Reach 1	200	25yr 24hr SCS	0.68	230.63	230.89		230.9	0.003329	0.42	1.61	12.37	0.37
Trib 3	Reach 1	200	50yr 24hr SCS	0.89	230.63	230.92		230.93	0.003111	0.45	1.96	12.83	0.37
Trib 3	Reach 1	200	100yr 24hr SCS	1.13	230.63	230.95		230.96	0.002839	0.48	2.36	13.34	0.36
Trib 3	Reach 1	200	200yr 24hr SCS	1.42	230.63	230.98		231	0.00262	0.51	2.79	13.56	0.36
Trib 3	Reach 1	174	Timmins	1.51	230.36	230.75	230.75	230.85	0.021192	1.43	1.05	5.15	1.01
Trib 3	Reach 1	174	2yr 24hr SCS	0.11	230.36	230.5	230.49	230.53	0.023735	0.74	0.15	2.11	0.9
Trib 3	Reach 1	174	5yr 24hr SCS	0.26	230.36	230.55	230.55	230.6	0.027097	0.97	0.27	2.84	1.01
Trib 3	Reach 1	174	10yr 24hr SCS	0.42	230.36	230.59	230.59	230.65	0.025764	1.09	0.39	3.3	1.02
Trib 3	Reach 1	174	25yr 24hr SCS	0.68	230.36	230.64	230.64	230.71	0.023156	1.2	0.57	3.86	1
Trib 3	Reach 1	174	50yr 24hr SCS	0.89	230.36	230.67	230.67	230.75	0.022805	1.29	0.69	4.21	1.01
Trib 3	Reach 1	174	100yr 24hr SCS	1.13	230.36	230.7	230.7	230.79	0.022081	1.35	0.84	4.59	1.01
Trib 3	Reach 1	174	200yr 24hr SCS	1.42	230.36	230.74	230.74	230.84	0.021156	1.41	1.01	5.03	1.01
Trib 3	Reach 1	153	Timmins	1.51	229.84	230.08	230.08	230.13	0.026471	1.06	1.43	13.1	1.02
Trib 3	Reach 1	153	2yr 24hr SCS	0.11	229.84	229.92	229.92	229.95	0.033152	0.68	0.16	3.42	1
Trib 3	Reach 1	153	5yr 24hr SCS	0.26	229.84	229.96	229.96	230	0.027904	0.85	0.31	4.04	0.99
Trib 3	Reach 1	153	10yr 24hr SCS	0.42	229.84	230	230	230.03	0.028508	0.75	0.56	9.23	0.96
Trib 3	Reach 1	153	25yr 24hr SCS	0.68	229.84	230.02	230.02	230.06	0.028049	0.87	0.78	9.99	1
Trib 3	Reach 1	153	50yr 24hr SCS	0.89	229.84	230.03	230.03	230.08	0.029208	0.97	0.92	10.43	1.04
Trib 3	Reach 1	153	100yr 24hr SCS	1.13	229.84	230.06	230.06	230.1	0.027038	0.97	1.17	12.41	1.01
Trib 3	Reach 1	153	200yr 24hr SCS	1.42	229.84	230.07	230.07	230.13	0.025647	1.02	1.39	13.04	1
Trib 3	Reach 1	111	Timmins	1.51	228.85	229.57		229.57	0.000086	0.16	9.62	21.63	0.07
Trib 3	Reach 1	111	2yr 24hr SCS	0.11	228.85	229.45		229.45	0.000001	0.02	7.24	20.11	0.01
Trib 3	Reach 1	111	5yr 24hr SCS	0.26	228.85	229.48		229.48	0.000005	0.03	7.75	20.44	0.02
Trib 3	Reach 1	111	10yr 24hr SCS	0.42	228.85	229.5		229.5	0.000011	0.05	8.11	20.68	0.03
Trib 3	Reach 1	111	25yr 24hr SCS	0.68	228.85	229.52		229.52	0.000025	0.08	8.56	20.97	0.04
Trib 3	Reach 1	111	50yr 24hr SCS	0.89	228.85	229.53		229.53	0.000038	0.1	8.86	21.16	0.05
Trib 3	Reach 1	111	100yr 24hr SCS	1.13	228.85	229.55		229.55	0.000056	0.12	9.17	21.35	0.06
Trib 3	Reach 1	111	200yr 24hr SCS	1.42	228.85	229.56		229.56	0.000079	0.15	9.51	21.57	0.07

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
Trib 3	Reach 1	78	Timmins	1.51	228.87	229.57		229.57	0.000047	0.11	13.3	30.21	0.05
Trib 3	Reach 1	78	2yr 24hr SCS	0.11	228.87	229.45		229.45	0.000001	0.01	10	28.6	0.01
Trib 3	Reach 1	78	5yr 24hr SCS	0.26	228.87	229.48		229.48	0.000003	0.02	10.72	28.92	0.01
Trib 3	Reach 1	78	10yr 24hr SCS	0.42	228.87	229.5		229.5	0.000006	0.04	11.23	29.16	0.02
Trib 3	Reach 1	78	25yr 24hr SCS	0.68	228.87	229.52		229.52	0.000014	0.06	11.85	29.46	0.03
Trib 3	Reach 1	78	50yr 24hr SCS	0.89	228.87	229.53		229.53	0.000021	0.07	12.26	29.65	0.04
Trib 3	Reach 1	78	100yr 24hr SCS	1.13	228.87	229.55		229.55	0.000031	0.09	12.69	29.85	0.04
Trib 3	Reach 1	78	200yr 24hr SCS	1.42	228.87	229.56		229.56	0.000043	0.11	13.15	30.07	0.05
Trib 3	Reach 1	58	Timmins	1.51	229.38	229.52	229.52	229.56	0.030281	0.84	1.79	25.53	1.02
Trib 3	Reach 1	58	2yr 24hr SCS	0.11	229.38	229.44	229.44	229.45	0.046655	0.52	0.21	8.64	1.06
Trib 3	Reach 1	58	5yr 24hr SCS	0.26	229.38	229.46	229.46	229.48	0.036836	0.58	0.45	13.31	1
Trib 3	Reach 1	58	10yr 24hr SCS	0.42	229.38	229.47	229.47	229.49	0.035271	0.61	0.69	18.19	0.99
Trib 3	Reach 1	58	25yr 24hr SCS	0.68	229.38	229.49	229.49	229.51	0.034939	0.68	0.99	21.62	1.02
Trib 3	Reach 1	58	50yr 24hr SCS	0.89	229.38	229.5	229.5	229.53	0.032646	0.71	1.25	24.23	1
Trib 3	Reach 1	58	100yr 24hr SCS	1.13	229.38	229.51	229.51	229.54	0.031643	0.77	1.46	24.76	1.01
Trib 3	Reach 1	58	200yr 24hr SCS	1.42	229.38	229.52	229.52	229.55	0.029142	0.82	1.74	25.42	1
Trib 3	Reach 1	52	Timmins	1.51	228.92	229.19		229.21	0.006213	0.62	2.44	17.22	0.52
Trib 3	Reach 1	52	2yr 24hr SCS	0.11	228.92	229.01	228.99	229.02	0.010348	0.37	0.3	6.47	0.55
Trib 3	Reach 1	52	5yr 24hr SCS	0.26	228.92	229.06	229.02	229.06	0.007265	0.4	0.65	9.81	0.49
Trib 3	Reach 1	52	10yr 24hr SCS	0.42	228.92	229.07	229.04	229.08	0.011324	0.53	0.79	10.78	0.63
Trib 3	Reach 1	52	25yr 24hr SCS	0.68	228.92	229.09	229.07	229.11	0.016332	0.7	0.97	11.36	0.77
Trib 3	Reach 1	52	50yr 24hr SCS	0.89	228.92	229.11	229.09	229.13	0.013711	0.72	1.24	12.5	0.73
Trib 3	Reach 1	52	100yr 24hr SCS	1.13	228.92	229.13	229.1	229.16	0.013294	0.76	1.49	13.44	0.73
Trib 3	Reach 1	52	200yr 24hr SCS	1.42	228.92	229.17		229.19	0.008835	0.69	2.08	16.44	0.61
Trib 2	Reach 1	863	Timmins	2.15	228.54	229.34		229.34	0.00012	0.19	11.53	27.79	0.09
Trib 2	Reach 1	863	2yr 24hr SCS	0.12	228.54	228.67	228.64	228.68	0.012825	0.43	0.28	5.64	0.62
Trib 2	Reach 1	863	5yr 24hr SCS	0.24	228.54	228.68	228.68	228.7	0.028449	0.69	0.35	6.34	0.94
Trib 2	Reach 1	863	10yr 24hr SCS	0.39	228.54	228.7	228.7	228.73	0.032607	0.79	0.49	8.14	1.03
Trib 2	Reach 1	863	25yr 24hr SCS	0.64	228.54	228.72	228.72	228.77	0.027667	0.89	0.72	8.82	1
Trib 2	Reach 1	863	50yr 24hr SCS	0.87	228.54	228.74	228.74	228.79	0.027257	0.99	0.88	9.19	1.02
Trib 2	Reach 1	863	100yr 24hr SCS	1.12	228.54	228.77	228.77	228.82	0.025664	1.02	1.09	10.3	1
Trib 2	Reach 1	863	200yr 24hr SCS	1.44	228.54	228.78	228.78	228.85	0.025213	1.12	1.29	10.53	1.02
Trib 2	Reach 1	844	Timmins	2.15	228.3	229.34		229.34	0.000006	0.07	33.98	40.75	0.02
Trib 2	Reach 1	844	2yr 24hr SCS	0.12	228.3	228.36		228.37	0.021567	0.36	0.34	13.63	0.72
Trib 2	Reach 1	844	5yr 24hr SCS	0.24	228.3	228.39		228.39	0.010414	0.31	0.78	22.99	0.53
Trib 2	Reach 1	844	10yr 24hr SCS	0.39	228.3	228.4		228.41	0.007618	0.32	1.23	26.84	0.48
Trib 2	Reach 1	844	25yr 24hr SCS	0.64	228.3	228.43		228.43	0.005794	0.35	1.85	28.92	0.44
Trib 2	Reach 1	844	50yr 24hr SCS	0.87	228.3	228.44		228.45	0.005331	0.38	2.31	30	0.43
Trib 2	Reach 1	844	100yr 24hr SCS	1.12	228.3	228.46		228.47	0.00501	0.41	2.74	30.22	0.43
Trib 2	Reach 1	844	200yr 24hr SCS	1.44	228.3	228.47		228.48	0.004762	0.44	3.25	30.43	0.43
Trib 2	Reach 1	821	Timmins	2.15	228.21	229.34		229.34	0.000002	0.04	64.43	81.92	0.01
Trib 2	Reach 1	821	2yr 24hr SCS	0.12	228.21	228.31		228.31	0.000839	0.1	1.16	26.49	0.16
Trib 2	Reach 1	821	5yr 24hr SCS	0.24	228.21	228.33		228.34	0.001036	0.13	1.83	33.78	0.18
Trib 2	Reach 1	821	10yr 24hr SCS	0.39	228.21	228.35		228.35	0.001123	0.15	2.52	38.59	0.19
Trib 2	Reach 1	821	25yr 24hr SCS	0.64	228.21	228.38		228.38	0.001212	0.19	3.41	41.55	0.21
Trib 2	Reach 1	821	50yr 24hr SCS	0.87	228.21	228.39		228.39	0.001257	0.21	4.12	43.11	0.22
Trib 2	Reach 1	821	100yr 24hr SCS	1.12	228.21	228.41		228.41	0.001287	0.23	4.81	44.25	0.23
Trib 2	Reach 1	821	200yr 24hr SCS	1.44	228.21	228.43		228.43	0.001301	0.26	5.62	45.18	0.23
Trib 2	Reach 1	774	Timmins	2.15	228.17	229.34		229.34	0.000001	0.03	87.41	91.07	0.01
Trib 2	Reach 1	774	2yr 24hr SCS	0.12	228.17	228.28		228.28	0.000484	0.07	1.81	52.97	0.11
Trib 2	Reach 1	774	5yr 24hr SCS	0.24	228.17	228.3		228.3	0.000446	0.08	2.93	58.65	0.12
Trib 2	Reach 1	774	10yr 24hr SCS	0.39	228.17	228.32		228.32	0.000464	0.1	4	63.33	0.12
Trib 2	Reach 1	774	25yr 24hr SCS	0.64	228.17	228.34		228.34	0.000531	0.12	5.19	63.9	0.14
Trib 2	Reach 1	774	50yr 24hr SCS	0.87	228.17	228.36		228.36	0.000537	0.14	6.23	64.15	0.14
Trib 2	Reach 1	774	100yr 24hr SCS	1.12	228.17	228.37		228.37	0.000588	0.16	7.07	64.65	0.15
Trib 2	Reach 1	774	200yr 24hr SCS	1.44	228.17	228.39		228.39	0.000602	0.18	8.22	65.77	0.16
Trib 2	Reach 1	739	Timmins	2.15	228.17	229.34		229.34	0.000001	0.04	62.94	67.93	0.01
Trib 2	Reach 1	739	2yr 24hr SCS	0.12	228.17	228.24	228.22	228.24	0.009717	0.27	0.45	15.3	0.5
Trib 2	Reach 1	739	5yr 24hr SCS	0.24	228.17	228.25	228.24	228.26	0.010226	0.31	0.79	22.78	0.53
Trib 2	Reach 1	739	10yr 24hr SCS	0.39	228.17	228.27	228.25	228.28	0.009658	0.33	1.19	29.65	0.52
Trib 2	Reach 1	739	25yr 24hr SCS	0.64	228.17	228.29	228.27	228.29	0.009658	0.38	1.68	33.77	0.54
Trib 2	Reach 1	739	50yr 24hr SCS	0.87	228.17	228.3	228.28	228.31	0.009314	0.41	2.14	37.74	0.55
Trib 2	Reach 1	739	100yr 24hr SCS	1.12	228.17	228.3	228.28	228.31	0.017718	0.55	2.03	36.82	0.75
Trib 2	Reach 1	739	200yr 24hr SCS	1.44	228.17	228.3	228.29	228.32	0.028097	0.7	2.06	37.09	0.94
Trib 2	Reach 1	717	Timmins	2.15	227.72	229.34		229.34	0.000001	0.03	77.08	73.64	0.01
Trib 2	Reach 1	717	2yr 24hr SCS	0.12	227.72	227.83	227.83	227.85	0.036978	0.61	0.2	5.36	1.01
Trib 2	Reach 1	717	5yr 24hr SCS	0.24	227.72	227.85	227.85	227.88	0.032516	0.66	0.37	8.04	0.98
Trib 2	Reach 1	717	10yr 24hr SCS	0.39	227.72	227.87	227.87	227.9	0.033041	0.7	0.56	11.22	1
Trib 2	Reach 1	717	25yr 24hr SCS	0.64	227.72	227.9	227.9	227.92	0.031742	0.72	0.89	16.75	0.99
Trib 2	Reach 1	717	50yr 24hr SCS	0.87	227.72	227.91	227.91	227.94	0.0331	0.78	1.12	19.19	1.03
Trib 2	Reach 1	717	100yr 24hr SCS	1.12	227.72	227.94		227.96	0.013263	0.63	1.77	21.01	0.69
Trib 2	Reach 1	717	200yr 24hr SCS	1.44	227.72	228.31		228.31	0.000068	0.11	13.56	44.71	0.06

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
Trib 2	Reach 1	697	Timmins	2.15	225.77	229.34		229.34	0	0.02	97.09	66.1	0.01
Trib 2	Reach 1	697	2yr 24hr SCS	0.12	225.77	227.14		227.14	0.000015	0.04	3.12	13.18	0.03
Trib 2	Reach 1	697	5yr 24hr SCS	0.24	225.77	227.24		227.24	0.000021	0.05	4.75	17.44	0.03
Trib 2	Reach 1	697	10yr 24hr SCS	0.39	225.77	227.35		227.35	0.000019	0.06	6.76	19.11	0.03
Trib 2	Reach 1	697	25yr 24hr SCS	0.64	225.77	227.53		227.53	0.000013	0.06	10.31	19.61	0.03
Trib 2	Reach 1	697	50yr 24hr SCS	0.87	225.77	227.72		227.72	0.00001	0.06	13.97	20.11	0.02
Trib 2	Reach 1	697	100yr 24hr SCS	1.12	225.77	227.96		227.96	0.000009	0.06	20.03	34.38	0.02
Trib 2	Reach 1	697	200yr 24hr SCS	1.44	225.77	228.31		228.31	0.000003	0.04	34.71	50.81	0.02
Trib 2	Reach 1	689	Timmins	2.15	225.77	229.34	226.44	229.34	0.000001	0.04	50.17	70.73	0.01
Trib 2	Reach 1	689	2yr 24hr SCS	0.12	225.77	227.14	225.98	227.14	0.000001	0.02	6.88	15.02	0.01
Trib 2	Reach 1	689	5yr 24hr SCS	0.24	225.77	227.24	226.05	227.24	0.000003	0.03	8.64	18.74	0.01
Trib 2	Reach 1	689	10yr 24hr SCS	0.39	225.77	227.35	226.11	227.35	0.000004	0.04	10.75	20.29	0.02
Trib 2	Reach 1	689	25yr 24hr SCS	0.64	225.77	227.53	226.18	227.53	0.000004	0.04	14.38	20.71	0.02
Trib 2	Reach 1	689	50yr 24hr SCS	0.87	225.77	227.72	226.24	227.72	0.000003	0.05	18.03	21.14	0.02
Trib 2	Reach 1	689	100yr 24hr SCS	1.12	225.77	227.96	226.29	227.96	0.000003	0.05	22.72	26.31	0.01
Trib 2	Reach 1	689	200yr 24hr SCS	1.44	225.77	228.31	226.34	228.31	0.000002	0.05	29.67	54.84	0.01
Trib 2	Reach 1	671	Railway - North	Culvert									
Trib 2	Reach 1	661	Timmins	2.15	226.53	229.29	226.73	229.29	0.000001	0.07	32.84	86.85	0.01
Trib 2	Reach 1	661	2yr 24hr SCS	0.12	226.53	227.13	226.57	227.13	0.000001	0.02	6.52	13.77	0.01
Trib 2	Reach 1	661	5yr 24hr SCS	0.24	226.53	227.23	226.59	227.23	0.000002	0.03	7.77	14.52	0.01
Trib 2	Reach 1	661	10yr 24hr SCS	0.39	226.53	227.34	226.61	227.34	0.000003	0.04	9.02	15.12	0.02
Trib 2	Reach 1	661	25yr 24hr SCS	0.64	226.53	227.52	226.63	227.52	0.000005	0.06	11.2	16.05	0.02
Trib 2	Reach 1	661	50yr 24hr SCS	0.87	226.53	227.7	226.65	227.7	0.000005	0.06	13.42	17	0.02
Trib 2	Reach 1	661	100yr 24hr SCS	1.12	226.53	227.93	226.67	227.93	0.000004	0.07	16.31	49.95	0.02
Trib 2	Reach 1	661	200yr 24hr SCS	1.44	226.53	228.28	226.69	228.28	0.000003	0.07	20.55	63.33	0.02
Trib 2	Reach 1	657	Timmins	2.15	226.54	229.29		229.29	0	0.02	118.66	89.95	0.01
Trib 2	Reach 1	657	2yr 24hr SCS	0.12	226.54	227.13		227.13	0.000034	0.06	1.98	8.77	0.04
Trib 2	Reach 1	657	5yr 24hr SCS	0.24	226.54	227.23		227.23	0.000046	0.08	2.98	11.06	0.05
Trib 2	Reach 1	657	10yr 24hr SCS	0.39	226.54	227.34		227.34	0.000045	0.09	4.2	12.24	0.05
Trib 2	Reach 1	657	25yr 24hr SCS	0.64	226.54	227.52		227.52	0.000032	0.1	6.5	13.49	0.05
Trib 2	Reach 1	657	50yr 24hr SCS	0.87	226.54	227.7		227.7	0.000024	0.1	9.08	15.88	0.04
Trib 2	Reach 1	657	100yr 24hr SCS	1.12	226.54	227.93		227.93	0.000018	0.06	18.28	49.99	0.03
Trib 2	Reach 1	657	200yr 24hr SCS	1.44	226.54	228.28		228.28	0.000003	0.04	37.94	62.36	0.02
Trib 2	Reach 1	650	Timmins	2.15	226.54	229.29		229.29	0	0.02	136.37	108.68	0
Trib 2	Reach 1	650	2yr 24hr SCS	0.12	226.54	227.13		227.13	0.000029	0.05	2.34	11.06	0.04
Trib 2	Reach 1	650	5yr 24hr SCS	0.24	226.54	227.23		227.23	0.000035	0.07	3.6	13.68	0.04
Trib 2	Reach 1	650	10yr 24hr SCS	0.39	226.54	227.34		227.34	0.000035	0.08	5.15	16.11	0.04
Trib 2	Reach 1	650	25yr 24hr SCS	0.64	226.54	227.52		227.52	0.000022	0.08	8.12	17.17	0.04
Trib 2	Reach 1	650	50yr 24hr SCS	0.87	226.54	227.7		227.7	0.000021	0.08	11.47	24.53	0.04
Trib 2	Reach 1	650	100yr 24hr SCS	1.12	226.54	227.93		227.93	0.000013	0.06	20.36	51.59	0.03
Trib 2	Reach 1	650	200yr 24hr SCS	1.44	226.54	228.28		228.28	0.000003	0.03	41.51	69.37	0.01
Trib 2	Reach 1	644	Timmins	2.15	226.85	229.29		229.29	0	0.02	136.12	110.63	0
Trib 2	Reach 1	644	2yr 24hr SCS	0.12	226.85	227.13		227.13	0.002418	0.34	0.36	2.92	0.31
Trib 2	Reach 1	644	5yr 24hr SCS	0.24	226.85	227.23		227.23	0.001507	0.32	0.75	4.62	0.26
Trib 2	Reach 1	644	10yr 24hr SCS	0.39	226.85	227.33		227.34	0.000989	0.28	1.38	7.62	0.21
Trib 2	Reach 1	644	25yr 24hr SCS	0.64	226.85	227.51		227.52	0.000393	0.2	3.23	15.35	0.14
Trib 2	Reach 1	644	50yr 24hr SCS	0.87	226.85	227.7		227.7	0.000128	0.13	6.75	26.58	0.08
Trib 2	Reach 1	644	100yr 24hr SCS	1.12	226.85	227.93		227.93	0.000027	0.07	15.99	49.22	0.04
Trib 2	Reach 1	644	200yr 24hr SCS	1.44	226.85	228.28		228.28	0.000004	0.04	37.85	76.26	0.02
Trib 2	Reach 1	641	Timmins	2.15	226.5	229.29	227.05	229.29	0.000002	0.06	33.54	113.08	0.01
Trib 2	Reach 1	641	2yr 24hr SCS	0.12	226.5	227.13	226.63	227.13	0.000038	0.08	1.54	5.04	0.04
Trib 2	Reach 1	641	5yr 24hr SCS	0.24	226.5	227.23	226.69	227.23	0.000069	0.11	2.11	6.16	0.06
Trib 2	Reach 1	641	10yr 24hr SCS	0.39	226.5	227.33	226.74	227.33	0.000082	0.14	2.77	6.59	0.07
Trib 2	Reach 1	641	25yr 24hr SCS	0.64	226.5	227.51	226.81	227.51	0.000091	0.16	4.13	9.21	0.07
Trib 2	Reach 1	641	50yr 24hr SCS	0.87	226.5	227.7	226.86	227.7	0.000081	0.13	6.46	23.05	0.07
Trib 2	Reach 1	641	100yr 24hr SCS	1.12	226.5	227.93	226.9	227.93	0.000028	0.11	10.49	42.91	0.04
Trib 2	Reach 1	641	200yr 24hr SCS	1.44	226.5	228.28	226.95	228.28	0.00001	0.09	16.41	66.74	0.03
Trib 2	Reach 1	617	HWY 11 N - North	Culvert									
Trib 2	Reach 1	608	Timmins	2.15	226.34	228.5	226.94	228.5	0.000035	0.19	12.43	8.94	0.05
Trib 2	Reach 1	608	2yr 24hr SCS	0.12	226.34	227.12	226.47	227.12	0.000021	0.06	2.24	6.37	0.03
Trib 2	Reach 1	608	5yr 24hr SCS	0.24	226.34	227.22	226.53	227.22	0.000043	0.1	2.89	7.72	0.05
Trib 2	Reach 1	608	10yr 24hr SCS	0.39	226.34	227.3	226.59	227.3	0.00006	0.13	3.54	8.54	0.06
Trib 2	Reach 1	608	25yr 24hr SCS	0.64	226.34	227.44	226.66	227.44	0.000072	0.17	4.56	8.59	0.07
Trib 2	Reach 1	608	50yr 24hr SCS	0.87	226.34	227.57	226.71	227.57	0.000075	0.19	5.48	8.63	0.07
Trib 2	Reach 1	608	100yr 24hr SCS	1.12	226.34	227.72	226.75	227.72	0.000069	0.2	6.6	8.68	0.07
Trib 2	Reach 1	608	200yr 24hr SCS	1.44	226.34	227.93	226.83	227.93	0.000059	0.2	8.15	8.75	0.06

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
Trib 2	Reach 1	606	Timmins	2.15	226.33	228.5		228.5	0.00003	0.1	22.86	50.97	0.04
Trib 2	Reach 1	606	2yr 24hr SCS	0.12	226.33	227.12		227.12	0.000015	0.05	2.24	6.35	0.03
Trib 2	Reach 1	606	5yr 24hr SCS	0.24	226.33	227.22		227.22	0.000034	0.08	2.9	7.7	0.04
Trib 2	Reach 1	606	10yr 24hr SCS	0.39	226.33	227.3		227.3	0.000049	0.11	3.62	8.53	0.05
Trib 2	Reach 1	606	25yr 24hr SCS	0.64	226.33	227.44		227.44	0.000053	0.13	4.81	8.6	0.06
Trib 2	Reach 1	606	50yr 24hr SCS	0.87	226.33	227.57		227.57	0.000052	0.15	5.89	8.66	0.06
Trib 2	Reach 1	606	100yr 24hr SCS	1.12	226.33	227.72		227.72	0.000046	0.16	7.21	8.73	0.05
Trib 2	Reach 1	606	200yr 24hr SCS	1.44	226.33	227.93		227.93	0.000038	0.16	9.03	8.83	0.05
Trib 2	Reach 1	603	Timmins	2.15	226.33	228.5		228.5	0.000006	0.07	45.31	74.66	0.02
Trib 2	Reach 1	603	2yr 24hr SCS	0.12	226.33	227.12		227.12	0.000018	0.06	1.98	4.91	0.03
Trib 2	Reach 1	603	5yr 24hr SCS	0.24	226.33	227.22		227.22	0.000049	0.1	2.53	6.9	0.05
Trib 2	Reach 1	603	10yr 24hr SCS	0.39	226.33	227.3		227.3	0.000075	0.12	3.21	8.34	0.06
Trib 2	Reach 1	603	25yr 24hr SCS	0.64	226.33	227.44		227.44	0.000094	0.14	4.53	11.35	0.07
Trib 2	Reach 1	603	50yr 24hr SCS	0.87	226.33	227.57		227.57	0.000078	0.14	6.03	12.71	0.07
Trib 2	Reach 1	603	100yr 24hr SCS	1.12	226.33	227.72		227.72	0.000057	0.14	8.07	14.37	0.06
Trib 2	Reach 1	603	200yr 24hr SCS	1.44	226.33	227.93		227.93	0.000036	0.13	11.63	26.62	0.05
Trib 2	Reach 1	601	Timmins	2.15	226.33	228.5	226.75	228.5	0.000012	0.13	16.78	72.28	0.03
Trib 2	Reach 1	601	2yr 24hr SCS	0.12	226.33	227.12	226.4	227.12	0.000008	0.04	2.77	6.2	0.02
Trib 2	Reach 1	601	5yr 24hr SCS	0.24	226.33	227.22	226.44	227.22	0.00002	0.07	3.41	7.55	0.03
Trib 2	Reach 1	601	10yr 24hr SCS	0.39	226.33	227.3	226.47	227.3	0.000034	0.09	4.13	8.96	0.04
Trib 2	Reach 1	601	25yr 24hr SCS	0.64	226.33	227.44	226.52	227.44	0.000044	0.12	5.52	10.93	0.05
Trib 2	Reach 1	601	50yr 24hr SCS	0.87	226.33	227.57	226.57	227.57	0.000039	0.13	6.85	12.29	0.05
Trib 2	Reach 1	601	100yr 24hr SCS	1.12	226.33	227.72	226.61	227.72	0.000032	0.13	8.47	15.15	0.05
Trib 2	Reach 1	601	200yr 24hr SCS	1.44	226.33	227.93	226.65	227.93	0.000024	0.13	10.69	34.82	0.04
Trib 2	Reach 1	586	HWY 11 S - North	Culvert									
Trib 2	Reach 1	562	Timmins	2.15	226.4	227.66	226.67	227.67	0.000067	0.26	8.18	12.16	0.08
Trib 2	Reach 1	562	2yr 24hr SCS	0.12	226.4	227.12	226.47	227.12	0.000002	0.03	4.49	8.83	0.01
Trib 2	Reach 1	562	5yr 24hr SCS	0.24	226.4	227.2	226.49	227.2	0.000004	0.05	5.06	9.1	0.02
Trib 2	Reach 1	562	10yr 24hr SCS	0.39	226.4	227.28	226.51	227.28	0.000008	0.07	5.55	9.33	0.02
Trib 2	Reach 1	562	25yr 24hr SCS	0.64	226.4	227.37	226.54	227.37	0.000015	0.1	6.16	9.62	0.03
Trib 2	Reach 1	562	50yr 24hr SCS	0.87	226.4	227.43	226.57	227.43	0.000023	0.13	6.6	9.82	0.04
Trib 2	Reach 1	562	100yr 24hr SCS	1.12	226.4	227.49	226.59	227.5	0.00003	0.16	7.03	10.02	0.05
Trib 2	Reach 1	562	200yr 24hr SCS	1.44	226.4	227.55	226.62	227.56	0.000042	0.19	7.43	10.21	0.06
Trib 2	Reach 1	559	Timmins	2.15	226.34	227.67		227.67	0.000136	0.18	11.66	27.59	0.09
Trib 2	Reach 1	559	2yr 24hr SCS	0.12	226.34	227.12		227.12	0.000046	0.07	1.67	6.84	0.05
Trib 2	Reach 1	559	5yr 24hr SCS	0.24	226.34	227.2		227.2	0.000087	0.1	2.52	11.21	0.06
Trib 2	Reach 1	559	10yr 24hr SCS	0.39	226.34	227.28		227.28	0.000105	0.12	3.37	12.97	0.07
Trib 2	Reach 1	559	25yr 24hr SCS	0.64	226.34	227.37		227.37	0.000121	0.14	4.63	15.28	0.08
Trib 2	Reach 1	559	50yr 24hr SCS	0.87	226.34	227.43		227.43	0.000149	0.15	5.76	19.65	0.09
Trib 2	Reach 1	559	100yr 24hr SCS	1.12	226.34	227.49		227.49	0.000158	0.16	7.19	24.51	0.09
Trib 2	Reach 1	559	200yr 24hr SCS	1.44	226.34	227.55		227.56	0.000145	0.17	8.7	25.46	0.09
Trib 2	Reach 1	538	Timmins	2.15	226.3	227.66		227.66	0.000452	0.3	7.11	19.2	0.16
Trib 2	Reach 1	538	2yr 24hr SCS	0.12	226.3	227.12		227.12	0.000047	0.1	1.18	2.54	0.05
Trib 2	Reach 1	538	5yr 24hr SCS	0.24	226.3	227.2		227.2	0.000215	0.16	1.47	5.4	0.1
Trib 2	Reach 1	538	10yr 24hr SCS	0.39	226.3	227.27		227.27	0.000319	0.2	1.91	6.83	0.12
Trib 2	Reach 1	538	25yr 24hr SCS	0.64	226.3	227.36		227.36	0.000431	0.25	2.61	9.04	0.15
Trib 2	Reach 1	538	50yr 24hr SCS	0.87	226.3	227.42		227.43	0.000486	0.27	3.24	10.8	0.16
Trib 2	Reach 1	538	100yr 24hr SCS	1.12	226.3	227.48		227.49	0.000592	0.28	4.04	15.21	0.17
Trib 2	Reach 1	538	200yr 24hr SCS	1.44	226.3	227.55		227.55	0.000566	0.29	5.04	17.56	0.17
Trib 2	Reach 1	511	Timmins	2.15	226.91	227.49		227.62	0.013127	1.56	1.38	4	0.84
Trib 2	Reach 1	511	2yr 24hr SCS	0.12	226.91	227.09	227.07	227.11	0.014861	0.7	0.17	1.84	0.74
Trib 2	Reach 1	511	5yr 24hr SCS	0.24	226.91	227.14	227.12	227.18	0.013419	0.84	0.29	2.2	0.74
Trib 2	Reach 1	511	10yr 24hr SCS	0.39	226.91	227.2	227.16	227.24	0.012481	0.95	0.41	2.47	0.74
Trib 2	Reach 1	511	25yr 24hr SCS	0.64	226.91	227.26		227.32	0.01283	1.1	0.58	2.85	0.77
Trib 2	Reach 1	511	50yr 24hr SCS	0.87	226.91	227.31		227.38	0.013071	1.19	0.73	3.23	0.79
Trib 2	Reach 1	511	100yr 24hr SCS	1.12	226.91	227.35		227.44	0.012985	1.28	0.88	3.42	0.81
Trib 2	Reach 1	511	200yr 24hr SCS	1.44	226.91	227.4		227.5	0.013015	1.39	1.04	3.58	0.82
Trib 2	Reach 1	488	Timmins	2.15	226.55	227.09	227.09	227.25	0.018983	1.81	1.19	3.63	1.01
Trib 2	Reach 1	488	2yr 24hr SCS	0.12	226.55	226.7	226.68	226.73	0.019032	0.79	0.15	1.68	0.83
Trib 2	Reach 1	488	5yr 24hr SCS	0.24	226.55	226.74	226.73	226.79	0.021717	1.01	0.24	2	0.93
Trib 2	Reach 1	488	10yr 24hr SCS	0.39	226.55	226.78	226.78	226.86	0.023247	1.2	0.32	2.18	0.99
Trib 2	Reach 1	488	25yr 24hr SCS	0.64	226.55	226.84	226.84	226.94	0.022355	1.38	0.46	2.43	1.01
Trib 2	Reach 1	488	50yr 24hr SCS	0.87	226.55	226.89	226.89	227	0.021375	1.49	0.58	2.63	1.01
Trib 2	Reach 1	488	100yr 24hr SCS	1.12	226.55	226.94	226.94	227.06	0.02072	1.59	0.71	2.82	1.01
Trib 2	Reach 1	488	200yr 24hr SCS	1.44	226.55	226.99	226.99	227.13	0.019891	1.67	0.86	3.09	1.01
Trib 2	Reach 1	457	Timmins	2.15	225.88	226.23	226.23	226.32	0.022528	1.33	1.61	9.26	1.02
Trib 2	Reach 1	457	2yr 24hr SCS	0.12	225.88	225.96	225.96	225.99	0.030602	0.78	0.15	2.52	1
Trib 2	Reach 1	457	5yr 24hr SCS	0.24	225.88	226	226	226.05	0.027504	0.91	0.26	3.08	1
Trib 2	Reach 1	457	10yr 24hr SCS	0.39	225.88	226.04	226.04	226.09	0.026476	0.99	0.39	3.94	1.01
Trib 2	Reach 1	457	25yr 24hr SCS	0.64	225.88	226.09	226.09	226.14	0.025298	1.06	0.6	5.34	1.01
Trib 2	Reach 1	457	50yr 24hr SCS	0.87	225.88	226.12	226.12	226.18	0.024763	1.11	0.78	6.3	1.01
Trib 2	Reach 1	457	100yr 24hr SCS	1.12	225.88	226.14	226.14	226.21	0.02324	1.17	0.96	6.84	1
Trib 2	Reach 1	457	200yr 24hr SCS	1.44	225.88	226.17	226.17	226.25	0.022434	1.24	1.16	7.42	1

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
Trib 2	Reach 1	406	Timmins	2.15	224.17	224.58	224.58	224.65	0.023656	1.19	1.81	12.74	1.01
Trib 2	Reach 1	406	2yr 24hr SCS	0.12	224.17	224.29	224.29	224.33	0.031149	0.8	0.15	2.38	1.01
Trib 2	Reach 1	406	5yr 24hr SCS	0.24	224.17	224.33	224.33	224.38	0.028166	0.94	0.25	2.88	1.02
Trib 2	Reach 1	406	10yr 24hr SCS	0.39	224.17	224.37	224.37	224.43	0.025863	1.07	0.37	3.25	1.01
Trib 2	Reach 1	406	25yr 24hr SCS	0.64	224.17	224.42	224.42	224.49	0.02341	1.19	0.54	3.73	1
Trib 2	Reach 1	406	50yr 24hr SCS	0.87	224.17	224.46	224.46	224.54	0.022961	1.21	0.72	4.82	1
Trib 2	Reach 1	406	100yr 24hr SCS	1.12	224.17	224.52	224.52	224.57	0.025454	1.04	1.08	9.86	1
Trib 2	Reach 1	406	200yr 24hr SCS	1.44	224.17	224.54	224.54	224.6	0.023551	1.06	1.36	11.41	0.98
Trib 2	Reach 1	369	Timmins	2.15	222.71	223.26	223.26	223.41	0.020374	1.69	1.27	4.59	1.02
Trib 2	Reach 1	369	2yr 24hr SCS	0.12	222.71	222.88	222.88	222.93	0.028907	0.95	0.13	1.41	1.01
Trib 2	Reach 1	369	5yr 24hr SCS	0.24	222.71	222.94	222.94	223	0.026373	1.1	0.22	1.8	1.01
Trib 2	Reach 1	369	10yr 24hr SCS	0.39	222.71	223	223	223.07	0.025343	1.15	0.34	2.55	1.01
Trib 2	Reach 1	369	25yr 24hr SCS	0.64	222.71	223.05	223.05	223.14	0.02364	1.31	0.49	2.87	1.02
Trib 2	Reach 1	369	50yr 24hr SCS	0.87	222.71	223.1	223.1	223.2	0.0229	1.41	0.62	3.2	1.02
Trib 2	Reach 1	369	100yr 24hr SCS	1.12	222.71	223.14	223.14	223.25	0.021759	1.43	0.78	3.82	1.01
Trib 2	Reach 1	369	200yr 24hr SCS	1.44	222.71	223.18	223.18	223.3	0.021406	1.53	0.94	4.08	1.02
Trib 2	Reach 1	318	Timmins	2.15	220.08	220.45	220.45	220.53	0.023552	1.28	1.68	10.55	1.03
Trib 2	Reach 1	318	2yr 24hr SCS	0.12	220.08	220.26	220.25	220.28	0.030652	0.74	0.16	2.84	0.98
Trib 2	Reach 1	318	5yr 24hr SCS	0.24	220.08	220.29	220.29	220.32	0.028761	0.75	0.32	5.12	0.97
Trib 2	Reach 1	318	10yr 24hr SCS	0.39	220.08	220.32	220.32	220.35	0.02885	0.78	0.5	7.74	0.98
Trib 2	Reach 1	318	25yr 24hr SCS	0.64	220.08	220.35	220.35	220.39	0.029677	0.92	0.69	8.5	1.03
Trib 2	Reach 1	318	50yr 24hr SCS	0.87	220.08	220.37	220.37	220.42	0.029119	1.01	0.86	9.12	1.05
Trib 2	Reach 1	318	100yr 24hr SCS	1.12	220.08	220.39	220.39	220.44	0.026407	1.06	1.05	9.57	1.02
Trib 2	Reach 1	318	200yr 24hr SCS	1.44	220.08	220.41	220.41	220.47	0.022144	1.09	1.32	10.1	0.96
Trib 2	Reach 1	251	Timmins	2.15	218.08	218.5	218.5	218.57	0.02405	1.21	1.77	12.22	1.02
Trib 2	Reach 1	251	2yr 24hr SCS	0.12	218.08	218.23	218.23	218.27	0.028947	0.93	0.13	1.47	1.01
Trib 2	Reach 1	251	5yr 24hr SCS	0.24	218.08	218.29	218.29	218.33	0.029044	0.9	0.27	3.26	1.01
Trib 2	Reach 1	251	10yr 24hr SCS	0.39	218.08	218.33	218.33	218.38	0.028811	0.95	0.41	4.59	1.02
Trib 2	Reach 1	251	25yr 24hr SCS	0.64	218.08	218.37	218.37	218.42	0.023419	1	0.64	5.79	0.96
Trib 2	Reach 1	251	50yr 24hr SCS	0.87	218.08	218.4	218.4	218.46	0.026259	1.13	0.77	6.33	1.03
Trib 2	Reach 1	251	100yr 24hr SCS	1.12	218.08	218.43	218.43	218.49	0.026839	1.1	1.02	8.83	1.03
Trib 2	Reach 1	251	200yr 24hr SCS	1.44	218.08	218.46	218.46	218.52	0.02426	1.1	1.31	10.57	0.99
Trib 2	Reach 1	180	Timmins	2.15	216.94	217.36	217.27	217.39	0.005018	0.78	2.75	11.32	0.51
Trib 2	Reach 1	180	2yr 24hr SCS	0.12	216.94	217.1	217.04	217.11	0.003885	0.33	0.36	4.43	0.37
Trib 2	Reach 1	180	5yr 24hr SCS	0.24	216.94	217.16		217.16	0.003957	0.36	0.67	7.52	0.38
Trib 2	Reach 1	180	10yr 24hr SCS	0.39	216.94	217.19	217.12	217.2	0.00413	0.42	0.93	8.54	0.4
Trib 2	Reach 1	180	25yr 24hr SCS	0.64	216.94	217.23	217.16	217.24	0.004369	0.49	1.32	10.06	0.43
Trib 2	Reach 1	180	50yr 24hr SCS	0.87	216.94	217.26	217.18	217.28	0.004314	0.54	1.62	10.53	0.44
Trib 2	Reach 1	180	100yr 24hr SCS	1.12	216.94	217.29	217.2	217.3	0.004462	0.59	1.89	10.79	0.45
Trib 2	Reach 1	180	200yr 24hr SCS	1.44	216.94	217.31	217.23	217.33	0.004675	0.66	2.18	10.98	0.47
Trib 2	Reach 1	94	Timmins	2.15	216.3	216.51	216.51	216.57	0.024801	1.04	2.07	18.56	1
Trib 2	Reach 1	94	2yr 24hr SCS	0.12	216.3	216.37	216.37	216.38	0.030703	0.53	0.23	6.68	0.91
Trib 2	Reach 1	94	5yr 24hr SCS	0.24	216.3	216.38	216.38	216.41	0.032988	0.68	0.35	7.52	1
Trib 2	Reach 1	94	10yr 24hr SCS	0.39	216.3	216.4	216.4	216.43	0.030949	0.76	0.51	8.8	1
Trib 2	Reach 1	94	25yr 24hr SCS	0.64	216.3	216.43	216.43	216.47	0.028338	0.85	0.76	10.2	0.99
Trib 2	Reach 1	94	50yr 24hr SCS	0.87	216.3	216.45	216.45	216.49	0.030145	0.85	1.03	14.6	1.02
Trib 2	Reach 1	94	100yr 24hr SCS	1.12	216.3	216.47	216.47	216.51	0.028857	0.9	1.25	15.78	1.02
Trib 2	Reach 1	94	200yr 24hr SCS	1.44	216.3	216.48	216.48	216.53	0.026919	0.94	1.53	17.13	1
Trib 2	Reach 1	34	Timmins	2.15	214.57	215.44		215.46	0.001626	0.56	3.85	11.12	0.3
Trib 2	Reach 1	34	2yr 24hr SCS	0.12	214.57	214.77		214.79	0.010327	0.68	0.18	1.48	0.63
Trib 2	Reach 1	34	5yr 24hr SCS	0.24	214.57	214.89		214.91	0.004882	0.62	0.39	2.13	0.46
Trib 2	Reach 1	34	10yr 24hr SCS	0.39	214.57	214.99		215.01	0.003546	0.62	0.63	2.77	0.41
Trib 2	Reach 1	34	25yr 24hr SCS	0.64	214.57	215.19		215.2	0.002329	0.46	1.39	6.96	0.33
Trib 2	Reach 1	34	50yr 24hr SCS	0.87	214.57	215.26		215.27	0.002016	0.45	1.95	9.29	0.31
Trib 2	Reach 1	34	100yr 24hr SCS	1.12	214.57	215.32		215.33	0.001645	0.45	2.48	10.01	0.29
Trib 2	Reach 1	34	200yr 24hr SCS	1.44	214.57	215.38		215.39	0.001386	0.46	3.12	10.69	0.27
Trib 1	Reach 2	1150	Timmins	2.29	239.91	240.07	240.07	240.11	0.0297	0.85	2.69	37.41	1.01
Trib 1	Reach 2	1150	2yr 24hr SCS	0.16	239.91	240	240	240.01	0.035532	0.41	0.39	18.85	0.9
Trib 1	Reach 2	1150	5yr 24hr SCS	0.23	239.91	240	240	240.01	0.041905	0.46	0.5	22.38	0.99
Trib 1	Reach 2	1150	10yr 24hr SCS	0.34	239.91	240.01	240.01	240.02	0.041868	0.53	0.65	23.85	1.02
Trib 1	Reach 2	1150	25yr 24hr SCS	0.57	239.91	240.02	240.02	240.04	0.038119	0.61	0.94	26.14	1.02
Trib 1	Reach 2	1150	50yr 24hr SCS	0.79	239.91	240.03	240.03	240.05	0.028124	0.6	1.31	29.1	0.91
Trib 1	Reach 2	1150	100yr 24hr SCS	1.05	239.91	240.04	240.04	240.07	0.032676	0.69	1.52	31.14	1
Trib 1	Reach 2	1150	200yr 24hr SCS	1.39	239.91	240.06	240.06	240.08	0.026273	0.7	2	34.31	0.92
Trib 1	Reach 2	1118	Timmins	2.29	238.68	238.87	238.86	238.91	0.022309	0.97	2.35	21.52	0.94
Trib 1	Reach 2	1118	2yr 24hr SCS	0.16	238.68	238.75	238.75	238.76	0.020606	0.42	0.39	11.93	0.74
Trib 1	Reach 2	1118	5yr 24hr SCS	0.23	238.68	238.77	238.76	238.78	0.01696	0.43	0.53	13.41	0.69
Trib 1	Reach 2	1118	10yr 24hr SCS	0.34	238.68	238.78	238.77	238.79	0.018733	0.5	0.68	14.88	0.75
Trib 1	Reach 2	1118	25yr 24hr SCS	0.57	238.68	238.8	238.79	238.81	0.01803	0.57	0.99	17.1	0.76
Trib 1	Reach 2	1118	50yr 24hr SCS	0.79	238.68	238.81	238.8	238.83	0.020692	0.67	1.18	17.9	0.83
Trib 1	Reach 2	1118	100yr 24hr SCS	1.05	238.68	238.82	238.81	238.85	0.018401	0.71	1.48	18.91	0.81
Trib 1	Reach 2	1118	200yr 24hr SCS	1.39	238.68	238.84	238.83	238.87	0.020635	0.81	1.72	19.66	0.87

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
Trib 1	Reach 2	1091	Timmins	2.29	237.95	238.21	238.21	238.27	0.025982	1.05	2.22	21.19	1.02
Trib 1	Reach 2	1091	2yr 24hr SCS	0.16	237.95	238.1	238.09	238.12	0.028747	0.63	0.27	6.63	0.93
Trib 1	Reach 2	1091	5yr 24hr SCS	0.23	237.95	238.11	238.11	238.13	0.036921	0.59	0.39	11.5	1
Trib 1	Reach 2	1091	10yr 24hr SCS	0.34	237.95	238.12	238.12	238.14	0.031674	0.6	0.56	13.97	0.95
Trib 1	Reach 2	1091	25yr 24hr SCS	0.57	237.95	238.14	238.14	238.17	0.033912	0.69	0.82	17.16	1.01
Trib 1	Reach 2	1091	50yr 24hr SCS	0.79	237.95	238.16	238.16	238.18	0.028518	0.71	1.09	19.23	0.95
Trib 1	Reach 2	1091	100yr 24hr SCS	1.05	237.95	238.16	238.16	238.2	0.032994	0.83	1.25	19.71	1.05
Trib 1	Reach 2	1091	200yr 24hr SCS	1.39	237.95	238.18	238.18	238.22	0.028634	0.89	1.57	20.62	1.01
Trib 1	Reach 2	1058	Timmins	2.29	237.1	237.36	237.35	237.39	0.022686	0.85	2.69	30.58	0.91
Trib 1	Reach 2	1058	2yr 24hr SCS	0.16	237.1	237.23	237.23	237.24	0.024386	0.47	0.34	9.99	0.81
Trib 1	Reach 2	1058	5yr 24hr SCS	0.23	237.1	237.25	237.24	237.26	0.020374	0.48	0.48	12.09	0.76
Trib 1	Reach 2	1058	10yr 24hr SCS	0.34	237.1	237.26	237.25	237.27	0.020217	0.53	0.65	13.81	0.78
Trib 1	Reach 2	1058	25yr 24hr SCS	0.57	237.1	237.28	237.27	237.3	0.021882	0.62	0.91	16.04	0.84
Trib 1	Reach 2	1058	50yr 24hr SCS	0.79	237.1	237.29	237.28	237.32	0.021476	0.67	1.17	18.18	0.85
Trib 1	Reach 2	1058	100yr 24hr SCS	1.05	237.1	237.31	237.3	237.33	0.020309	0.7	1.49	20.63	0.84
Trib 1	Reach 2	1058	200yr 24hr SCS	1.39	237.1	237.32	237.32	237.35	0.022433	0.79	1.76	22.11	0.89
Trib 1	Reach 2	1035	Timmins	2.29	236.48	236.74	236.74	236.79	0.031749	0.93	2.46	31.37	1.06
Trib 1	Reach 2	1035	2yr 24hr SCS	0.16	236.48	236.63	236.63	236.65	0.028155	0.58	0.27	6.39	0.9
Trib 1	Reach 2	1035	5yr 24hr SCS	0.23	236.48	236.64	236.64	236.66	0.035004	0.69	0.33	7.24	1.02
Trib 1	Reach 2	1035	10yr 24hr SCS	0.34	236.48	236.66	236.66	236.68	0.034297	0.7	0.49	10.23	1.02
Trib 1	Reach 2	1035	25yr 24hr SCS	0.57	236.48	236.68	236.68	236.7	0.031098	0.69	0.83	16.38	0.98
Trib 1	Reach 2	1035	50yr 24hr SCS	0.79	236.48	236.69	236.69	236.72	0.032078	0.73	1.09	20.35	1
Trib 1	Reach 2	1035	100yr 24hr SCS	1.05	236.48	236.71	236.71	236.74	0.034834	0.75	1.39	26.11	1.04
Trib 1	Reach 2	1035	200yr 24hr SCS	1.39	236.48	236.72	236.72	236.75	0.031142	0.77	1.8	30.09	1.01
Trib 1	Reach 2	1021	Timmins	2.29	235.93	236.21	236.21	236.27	0.031431	1.18	2.39	22.67	1.12
Trib 1	Reach 2	1021	2yr 24hr SCS	0.16	235.93	236	236	236.02	0.047281	0.77	0.23	4.52	1.18
Trib 1	Reach 2	1021	5yr 24hr SCS	0.23	235.93	236.01	236.01	236.05	0.043921	0.85	0.3	5.09	1.17
Trib 1	Reach 2	1021	10yr 24hr SCS	0.34	235.93	236.04	236.04	236.07	0.040356	0.94	0.41	5.79	1.16
Trib 1	Reach 2	1021	25yr 24hr SCS	0.57	235.93	236.07	236.07	236.11	0.036909	1.07	0.62	6.98	1.16
Trib 1	Reach 2	1021	50yr 24hr SCS	0.79	235.93	236.09	236.09	236.15	0.033866	1.14	0.82	7.93	1.14
Trib 1	Reach 2	1021	100yr 24hr SCS	1.05	235.93	236.12	236.12	236.18	0.032229	1.21	1.02	8.84	1.14
Trib 1	Reach 2	1021	200yr 24hr SCS	1.39	235.93	236.15	236.15	236.21	0.027926	1.21	1.36	11.07	1.08
Trib 1	Reach 2	1003	Timmins	2.29	233.54	233.85	233.85	233.94	0.021655	1.31	1.75	10	1
Trib 1	Reach 2	1003	2yr 24hr SCS	0.16	233.54	233.64	233.64	233.68	0.030479	0.86	0.19	2.58	1.02
Trib 1	Reach 2	1003	5yr 24hr SCS	0.23	233.54	233.67	233.67	233.71	0.029599	0.82	0.28	4.11	1
Trib 1	Reach 2	1003	10yr 24hr SCS	0.34	233.54	233.7	233.7	233.73	0.027659	0.81	0.42	5.86	0.97
Trib 1	Reach 2	1003	25yr 24hr SCS	0.57	233.54	233.73	233.73	233.77	0.028963	0.89	0.64	8.04	1.02
Trib 1	Reach 2	1003	50yr 24hr SCS	0.79	233.54	233.75	233.75	233.8	0.027815	0.99	0.8	8.36	1.03
Trib 1	Reach 2	1003	100yr 24hr SCS	1.05	233.54	233.77	233.77	233.83	0.026014	1.07	0.98	8.7	1.02
Trib 1	Reach 2	1003	200yr 24hr SCS	1.39	233.54	233.8	233.8	233.87	0.024665	1.16	1.2	9.1	1.02
Trib 1	Reach 2	982	Timmins	2.29	231.6	231.9	231.9	231.99	0.022349	1.31	1.75	10.24	1.01
Trib 1	Reach 2	982	2yr 24hr SCS	0.16	231.6	231.71	231.71	231.74	0.032684	0.76	0.21	3.7	1.02
Trib 1	Reach 2	982	5yr 24hr SCS	0.23	231.6	231.73	231.73	231.76	0.033122	0.8	0.29	4.7	1.04
Trib 1	Reach 2	982	10yr 24hr SCS	0.34	231.6	231.75	231.75	231.78	0.029362	0.8	0.43	6.45	0.99
Trib 1	Reach 2	982	25yr 24hr SCS	0.57	231.6	231.78	231.78	231.82	0.025787	0.89	0.64	7.53	0.97
Trib 1	Reach 2	982	50yr 24hr SCS	0.79	231.6	231.8	231.8	231.85	0.027485	0.97	0.81	8.69	1.02
Trib 1	Reach 2	982	100yr 24hr SCS	1.05	231.6	231.82	231.82	231.88	0.026137	1.06	0.99	9	1.02
Trib 1	Reach 2	982	200yr 24hr SCS	1.39	231.6	231.85	231.85	231.91	0.024714	1.15	1.21	9.35	1.02
Trib 1	Reach 2	961	Timmins	2.29	230.69	230.96	230.96	231.02	0.024223	1.16	1.97	14.78	1.01
Trib 1	Reach 2	961	2yr 24hr SCS	0.16	230.69	230.81	230.81	230.83	0.037697	0.64	0.25	6.44	1.03
Trib 1	Reach 2	961	5yr 24hr SCS	0.23	230.69	230.82	230.82	230.84	0.040984	0.66	0.35	9.06	1.07
Trib 1	Reach 2	961	10yr 24hr SCS	0.34	230.69	230.84	230.84	230.86	0.036447	0.71	0.48	10.23	1.04
Trib 1	Reach 2	961	25yr 24hr SCS	0.57	230.69	230.86	230.86	230.89	0.029937	0.8	0.71	10.91	1
Trib 1	Reach 2	961	50yr 24hr SCS	0.79	230.69	230.87	230.87	230.91	0.027904	0.88	0.9	11.4	1
Trib 1	Reach 2	961	100yr 24hr SCS	1.05	230.69	230.9	230.9	230.94	0.023325	0.89	1.18	12.75	0.94
Trib 1	Reach 2	961	200yr 24hr SCS	1.39	230.69	230.91	230.91	230.96	0.025778	1.01	1.37	13.22	1
Trib 1	Reach 2	939	Timmins	2.29	229.14	230.52		230.52	0.000025	0.1	23.93	43.65	0.04
Trib 1	Reach 2	939	2yr 24hr SCS	0.16	229.14	229.54		229.54	0.002835	0.3	0.53	5.04	0.3
Trib 1	Reach 2	939	5yr 24hr SCS	0.23	229.14	229.62		229.63	0.000997	0.21	1.07	8.12	0.19
Trib 1	Reach 2	939	10yr 24hr SCS	0.34	229.14	229.74		229.74	0.00028	0.14	2.35	12.44	0.11
Trib 1	Reach 2	939	25yr 24hr SCS	0.57	229.14	229.95		229.95	0.000071	0.1	5.52	17.45	0.06
Trib 1	Reach 2	939	50yr 24hr SCS	0.79	229.14	230.14		230.14	0.00004	0.08	9.38	26.97	0.05
Trib 1	Reach 2	939	100yr 24hr SCS	1.05	229.14	230.37		230.37	0.000014	0.06	17.38	39.71	0.03
Trib 1	Reach 2	939	200yr 24hr SCS	1.39	229.14	230.46		230.46	0.000013	0.07	21.2	42.33	0.03
Trib 1	Reach 2	931	Timmins	2.29	229.12	230.52	229.63	230.52	0.00003	0.12	24.38	55.43	0.04
Trib 1	Reach 2	931	2yr 24hr SCS	0.16	229.12	229.54	229.24	229.54	0.000207	0.17	0.93	3.14	0.1
Trib 1	Reach 2	931	5yr 24hr SCS	0.23	229.12	229.62	229.26	229.62	0.000211	0.19	1.21	3.5	0.1
Trib 1	Reach 2	931	10yr 24hr SCS	0.34	229.12	229.74	229.29	229.74	0.000228	0.18	1.94	14.48	0.12
Trib 1	Reach 2	931	25yr 24hr SCS	0.57	229.12	229.95	229.35	229.95	0.000095	0.14	4.15	20.77	0.07
Trib 1	Reach 2	931	50yr 24hr SCS	0.79	229.12	230.14	229.39	230.14	0.000051	0.13	6.18	27.08	0.05
Trib 1	Reach 2	931	100yr 24hr SCS	1.05	229.12	230.37	229.44	230.37	0.00003	0.12	8.61	35.11	0.04
Trib 1	Reach 2	931	200yr 24hr SCS	1.39	229.12	230.46	229.51	230.46	0.00003	0.13	13.39	48.22	0.04
Trib 1	Reach 2	914	Derland Rd	Culvert									

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
Trib 1	Reach 2	895	Timmins	2.29	228.73	229.55	229.55	229.67	0.022593	1.57	1.48	17.24	0.98
Trib 1	Reach 2	895	2yr 24hr SCS	0.16	228.73	229.06	228.94	229.08	0.005175	0.66	0.24	1.03	0.43
Trib 1	Reach 2	895	5yr 24hr SCS	0.23	228.73	229.09	228.98	229.13	0.007648	0.84	0.27	1.09	0.53
Trib 1	Reach 2	895	10yr 24hr SCS	0.34	228.73	229.13	229.05	229.19	0.011542	1.08	0.32	1.16	0.66
Trib 1	Reach 2	895	25yr 24hr SCS	0.57	228.73	229.18	229.15	229.3	0.019739	1.5	0.38	1.27	0.87
Trib 1	Reach 2	895	50yr 24hr SCS	0.79	228.73	229.23	229.23	229.39	0.025822	1.79	0.44	1.93	1.01
Trib 1	Reach 2	895	100yr 24hr SCS	1.05	228.73	229.32	229.32	229.49	0.025068	1.82	0.58	8.02	1
Trib 1	Reach 2	895	200yr 24hr SCS	1.39	228.73	229.44	229.44	229.55	0.024775	1.51	0.92	14.77	1
Trib 1	Reach 2	888	Timmins	2.29	228.93	229.2	229.2	229.29	0.023703	1.37	1.74	9.45	1.03
Trib 1	Reach 2	888	2yr 24hr SCS	0.16	228.93	228.99	228.99	229.01	0.044452	0.68	0.23	5.21	1.11
Trib 1	Reach 2	888	5yr 24hr SCS	0.23	228.93	229	229	229.03	0.038392	0.77	0.3	5.31	1.08
Trib 1	Reach 2	888	10yr 24hr SCS	0.34	228.93	229.02	229.02	229.05	0.035573	0.88	0.4	5.42	1.09
Trib 1	Reach 2	888	25yr 24hr SCS	0.57	228.93	229.05	229.05	229.1	0.032898	1.02	0.58	6.16	1.09
Trib 1	Reach 2	888	50yr 24hr SCS	0.79	228.93	229.08	229.08	229.13	0.027025	1.05	0.78	6.93	1.02
Trib 1	Reach 2	888	100yr 24hr SCS	1.05	228.93	229.1	229.1	229.17	0.02589	1.13	0.96	7.36	1.02
Trib 1	Reach 2	888	200yr 24hr SCS	1.39	228.93	229.13	229.13	229.21	0.024435	1.21	1.19	7.96	1.01
Trib 1	Reach 1	835	Timmins	5.77	227.8	228.24		228.29	0.012929	1	5.75	33.43	0.77
Trib 1	Reach 1	835	2yr 24hr SCS	0.41	227.8	228.02		228.03	0.012036	0.55	0.75	10.15	0.65
Trib 1	Reach 1	835	5yr 24hr SCS	0.87	227.8	228.07		228.09	0.01349	0.64	1.36	16.05	0.7
Trib 1	Reach 1	835	10yr 24hr SCS	1.36	227.8	228.11		228.13	0.011251	0.65	2.11	21.37	0.66
Trib 1	Reach 1	835	25yr 24hr SCS	2.15	227.8	228.15		228.17	0.009964	0.7	3.07	25.19	0.64
Trib 1	Reach 1	835	50yr 24hr SCS	2.85	227.8	228.17		228.2	0.010315	0.76	3.75	27.9	0.66
Trib 1	Reach 1	835	100yr 24hr SCS	3.62	227.8	228.2		228.23	0.010357	0.81	4.45	30.05	0.67
Trib 1	Reach 1	835	200yr 24hr SCS	4.58	227.8	228.22		228.26	0.011797	0.9	5.06	32.11	0.73
Trib 1	Reach 1	784	Timmins	5.77	227.62	227.97	227.88	227.98	0.003284	0.5	11.47	67.21	0.39
Trib 1	Reach 1	784	2yr 24hr SCS	0.41	227.62	227.81	227.76	227.81	0.00218	0.19	2.13	38.74	0.26
Trib 1	Reach 1	784	5yr 24hr SCS	0.87	227.62	227.84	227.78	227.84	0.002333	0.24	3.65	50.78	0.28
Trib 1	Reach 1	784	10yr 24hr SCS	1.36	227.62	227.86	227.8	227.86	0.002864	0.29	4.66	55.77	0.32
Trib 1	Reach 1	784	25yr 24hr SCS	2.15	227.62	227.88	227.82	227.89	0.003434	0.36	6.05	61.86	0.36
Trib 1	Reach 1	784	50yr 24hr SCS	2.85	227.62	227.9	227.83	227.91	0.003513	0.4	7.15	62.52	0.38
Trib 1	Reach 1	784	100yr 24hr SCS	3.62	227.62	227.92	227.85	227.93	0.00371	0.44	8.16	63.18	0.39
Trib 1	Reach 1	784	200yr 24hr SCS	4.58	227.62	227.94	227.86	227.95	0.0034	0.47	9.71	64.36	0.39
Trib 1	Reach 1	723	Timmins	5.77	227.35	227.57		227.6	0.015325	0.79	7.27	68.32	0.78
Trib 1	Reach 1	723	2yr 24hr SCS	0.41	227.35	227.44	227.44	227.46	0.037912	0.55	0.75	24.35	0.99
Trib 1	Reach 1	723	5yr 24hr SCS	0.87	227.35	227.47	227.47	227.49	0.032101	0.61	1.42	34.52	0.96
Trib 1	Reach 1	723	10yr 24hr SCS	1.36	227.35	227.5	227.48	227.51	0.016786	0.52	2.62	49.71	0.72
Trib 1	Reach 1	723	25yr 24hr SCS	2.15	227.35	227.52	227.5	227.54	0.011558	0.52	4.13	59.07	0.63
Trib 1	Reach 1	723	50yr 24hr SCS	2.85	227.35	227.54		227.56	0.010848	0.55	5.16	64.54	0.62
Trib 1	Reach 1	723	100yr 24hr SCS	3.62	227.35	227.56		227.57	0.009929	0.59	6.19	66.3	0.61
Trib 1	Reach 1	723	200yr 24hr SCS	4.58	227.35	227.56		227.59	0.012775	0.69	6.64	67.13	0.7
Trib 1	Reach 1	583	Timmins	5.77	226.47	227.08		227.09	0.001605	0.35	16.32	94.81	0.27
Trib 1	Reach 1	583	2yr 24hr SCS	0.41	226.47	226.78		226.79	0.000982	0.27	1.5	8.8	0.21
Trib 1	Reach 1	583	5yr 24hr SCS	0.87	226.47	226.89		226.9	0.001561	0.26	3.33	29.86	0.25
Trib 1	Reach 1	583	10yr 24hr SCS	1.36	226.47	226.94		226.94	0.001787	0.25	5.37	55.93	0.26
Trib 1	Reach 1	583	25yr 24hr SCS	2.15	226.47	226.97		226.97	0.002021	0.29	7.32	66.84	0.28
Trib 1	Reach 1	583	50yr 24hr SCS	2.85	226.47	226.99		227	0.002036	0.32	8.93	72.37	0.29
Trib 1	Reach 1	583	100yr 24hr SCS	3.62	226.47	227.01		227.02	0.002109	0.34	10.57	79.18	0.3
Trib 1	Reach 1	583	200yr 24hr SCS	4.58	226.47	227.05		227.05	0.001795	0.35	13.15	85.02	0.28
Trib 1	Reach 1	529	Timmins	5.77	226.4	227		227.01	0.001382	0.37	15.4	73.37	0.26
Trib 1	Reach 1	529	2yr 24hr SCS	0.41	226.4	226.59	226.59	226.63	0.031062	0.84	0.49	7.16	1.03
Trib 1	Reach 1	529	5yr 24hr SCS	0.87	226.4	226.66		226.69	0.016772	0.75	1.16	12.78	0.79
Trib 1	Reach 1	529	10yr 24hr SCS	1.36	226.4	226.73		226.75	0.01048	0.59	2.29	24.97	0.63
Trib 1	Reach 1	529	25yr 24hr SCS	2.15	226.4	226.79		226.8	0.005775	0.53	4.08	34.07	0.49
Trib 1	Reach 1	529	50yr 24hr SCS	2.85	226.4	226.83		226.84	0.004305	0.49	5.78	42.77	0.43
Trib 1	Reach 1	529	100yr 24hr SCS	3.62	226.4	226.87		226.88	0.003184	0.48	7.5	45.74	0.38
Trib 1	Reach 1	529	200yr 24hr SCS	4.58	226.4	226.94		226.95	0.001967	0.4	11.44	64.24	0.3
Trib 1	Reach 1	501	Timmins	5.77	226.23	226.93	226.68	226.95	0.002975	0.66	8.74	31.59	0.4
Trib 1	Reach 1	501	2yr 24hr SCS	0.41	226.23	226.48		226.49	0.001531	0.31	1.34	9.35	0.26
Trib 1	Reach 1	501	5yr 24hr SCS	0.87	226.23	226.56		226.57	0.001844	0.41	2.13	11.09	0.3
Trib 1	Reach 1	501	10yr 24hr SCS	1.36	226.23	226.62		226.63	0.002078	0.47	2.88	13.18	0.32
Trib 1	Reach 1	501	25yr 24hr SCS	2.15	226.23	226.67		226.69	0.002847	0.6	3.59	14.54	0.38
Trib 1	Reach 1	501	50yr 24hr SCS	2.85	226.23	226.72		226.74	0.003052	0.66	4.31	15.85	0.4
Trib 1	Reach 1	501	100yr 24hr SCS	3.62	226.23	226.77		226.8	0.003071	0.71	5.1	16.96	0.41
Trib 1	Reach 1	501	200yr 24hr SCS	4.58	226.23	226.86	226.63	226.88	0.002798	0.66	6.94	23.95	0.39
Trib 1	Reach 1	461	Timmins	5.77	226.18	226.56	226.56	226.7	0.018986	1.66	3.48	12.61	1.01
Trib 1	Reach 1	461	2yr 24hr SCS	0.41	226.18	226.3	226.3	226.33	0.02571	0.72	0.57	9.04	0.92
Trib 1	Reach 1	461	5yr 24hr SCS	0.87	226.18	226.34	226.34	226.38	0.026967	0.95	0.92	10.01	1
Trib 1	Reach 1	461	10yr 24hr SCS	1.36	226.18	226.37	226.37	226.43	0.025135	1.09	1.24	10.47	1.01
Trib 1	Reach 1	461	25yr 24hr SCS	2.15	226.18	226.48	226.41	226.51	0.007905	0.88	2.45	12.02	0.62
Trib 1	Reach 1	461	50yr 24hr SCS	2.85	226.18	226.53	226.45	226.57	0.006542	0.92	3.11	12.38	0.58
Trib 1	Reach 1	461	100yr 24hr SCS	3.62	226.18	226.56	226.48	226.62	0.007151	1.03	3.53	12.64	0.62
Trib 1	Reach 1	461	200yr 24hr SCS	4.58	226.18	226.52	226.52	226.64	0.020086	1.55	2.95	12.32	1.02

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
Trib 1	Reach 1	385	Timmins	5.77	225.46	226.41		226.42	0.000035	0.14	40.82	52.98	0.05
Trib 1	Reach 1	385	2yr 24hr SCS	0.41	225.46	225.57		225.57	0.00517	0.28	1.49	30.38	0.4
Trib 1	Reach 1	385	5yr 24hr SCS	0.87	225.46	225.6	225.56	225.6	0.00521	0.35	2.48	35.46	0.42
Trib 1	Reach 1	385	10yr 24hr SCS	1.36	225.46	225.62		225.63	0.004936	0.41	3.33	36.23	0.43
Trib 1	Reach 1	385	25yr 24hr SCS	2.15	225.46	225.61		225.64	0.018135	0.73	2.96	35.92	0.81
Trib 1	Reach 1	385	50yr 24hr SCS	2.85	225.46	225.61	225.61	225.66	0.028968	0.94	3.04	35.99	1.03
Trib 1	Reach 1	385	100yr 24hr SCS	3.62	225.46	225.63	225.63	225.68	0.025768	0.98	3.68	36.97	1
Trib 1	Reach 1	385	200yr 24hr SCS	4.58	225.46	225.95		225.95	0.000329	0.27	17.12	46.03	0.14
Trib 1	Reach 1	327	Timmins	5.77	224.78	226.41		226.41	0.000012	0.09	61.04	65.81	0.03
Trib 1	Reach 1	327	2yr 24hr SCS	0.41	224.78	224.93	224.93	224.96	0.029901	0.79	0.52	8.02	1
Trib 1	Reach 1	327	5yr 24hr SCS	0.87	224.78	224.97	224.97	225.01	0.0267	0.83	1.05	14.08	0.97
Trib 1	Reach 1	327	10yr 24hr SCS	1.36	224.78	225	225	225.05	0.028033	0.99	1.37	14.6	1.03
Trib 1	Reach 1	327	25yr 24hr SCS	2.15	224.78	225.13		225.15	0.004745	0.57	3.75	23.8	0.46
Trib 1	Reach 1	327	50yr 24hr SCS	2.85	224.78	225.37		225.37	0.000402	0.27	10.36	31.13	0.15
Trib 1	Reach 1	327	100yr 24hr SCS	3.62	224.78	225.61		225.61	0.000115	0.19	19.45	40.92	0.09
Trib 1	Reach 1	327	200yr 24hr SCS	4.58	224.78	225.94		225.94	0.000035	0.13	34.73	49.9	0.05
Trib 1	Reach 1	284	Timmins	5.77	223.57	226.41		226.41	0.000002	0.04	146.53	125.6	0.01
Trib 1	Reach 1	284	2yr 24hr SCS	0.41	223.57	224.39		224.39	0.000011	0.05	7.49	16.89	0.03
Trib 1	Reach 1	284	5yr 24hr SCS	0.87	223.57	224.64		224.64	0.000016	0.07	12.52	25.35	0.03
Trib 1	Reach 1	284	10yr 24hr SCS	1.36	223.57	224.85		224.85	0.000016	0.07	19.15	37.42	0.03
Trib 1	Reach 1	284	25yr 24hr SCS	2.15	223.57	225.14		225.14	0.000011	0.07	32.24	53.65	0.03
Trib 1	Reach 1	284	50yr 24hr SCS	2.85	223.57	225.37		225.37	0.000008	0.06	45.95	66.52	0.02
Trib 1	Reach 1	284	100yr 24hr SCS	3.62	223.57	225.61		225.61	0.000005	0.06	63.95	80.35	0.02
Trib 1	Reach 1	284	200yr 24hr SCS	4.58	223.57	225.94		225.94	0.000003	0.05	93.57	98.99	0.02
Trib 1	Reach 1	269	Timmins	5.77	223.89	226.41	224.67	226.41	0.000025	0.17	34.37	144.05	0.05
Trib 1	Reach 1	269	2yr 24hr SCS	0.41	223.89	224.38	224.03	224.39	0.000417	0.3	1.35	3.03	0.15
Trib 1	Reach 1	269	5yr 24hr SCS	0.87	223.89	224.63	224.12	224.64	0.000498	0.41	2.14	3.36	0.16
Trib 1	Reach 1	269	10yr 24hr SCS	1.36	223.89	224.84	224.2	224.85	0.000535	0.47	2.86	3.66	0.17
Trib 1	Reach 1	269	25yr 24hr SCS	2.15	223.89	225.12	224.3	225.14	0.00109	0.5	4.34	10.33	0.24
Trib 1	Reach 1	269	50yr 24hr SCS	2.85	223.89	225.36	224.39	225.37	0.000518	0.34	8.26	33.04	0.17
Trib 1	Reach 1	269	100yr 24hr SCS	3.62	223.89	225.61	224.47	225.61	0.0002	0.26	13.74	61.26	0.11
Trib 1	Reach 1	269	200yr 24hr SCS	4.58	223.89	225.94	224.56	225.94	0.000069	0.21	22.17	115.02	0.07
Trib 1	Reach 1	253	Railway South Cr	Culvert									
Trib 1	Reach 1	238	Timmins	5.77	223.72	225.85	224.33	225.86	0.000077	0.37	15.59	57.81	0.09
Trib 1	Reach 1	238	2yr 24hr SCS	0.41	223.72	224.34	223.88	224.34	0.000077	0.14	2.9	7.75	0.07
Trib 1	Reach 1	238	5yr 24hr SCS	0.87	223.72	224.56	223.96	224.56	0.0001	0.19	4.63	13.77	0.08
Trib 1	Reach 1	238	10yr 24hr SCS	1.36	223.72	224.74	224.02	224.74	0.000093	0.22	6.18	19.49	0.08
Trib 1	Reach 1	238	25yr 24hr SCS	2.15	223.72	224.98	224.1	224.99	0.000089	0.26	8.24	27.12	0.08
Trib 1	Reach 1	238	50yr 24hr SCS	2.85	223.72	225.17	224.16	225.18	0.000087	0.29	9.84	33.04	0.09
Trib 1	Reach 1	238	100yr 24hr SCS	3.62	223.72	225.36	224.21	225.37	0.000084	0.32	11.46	39.02	0.09
Trib 1	Reach 1	238	200yr 24hr SCS	4.58	223.72	225.59	224.26	225.59	0.000081	0.34	13.35	46.01	0.09
Trib 1	Reach 1	235	Timmins	5.77	223.79	225.86		225.86	0.000005	0.08	81.67	102.71	0.02
Trib 1	Reach 1	235	2yr 24hr SCS	0.41	223.79	224.34		224.34	0.00021	0.15	2.72	11.99	0.1
Trib 1	Reach 1	235	5yr 24hr SCS	0.87	223.79	224.56		224.56	0.000112	0.13	6.53	21.79	0.08
Trib 1	Reach 1	235	10yr 24hr SCS	1.36	223.79	224.74		224.74	0.000079	0.11	12.39	43.01	0.07
Trib 1	Reach 1	235	25yr 24hr SCS	2.15	223.79	224.99		224.99	0.000027	0.09	23.62	48.93	0.04
Trib 1	Reach 1	235	50yr 24hr SCS	2.85	223.79	225.18		225.18	0.000016	0.09	33.89	56.71	0.03
Trib 1	Reach 1	235	100yr 24hr SCS	3.62	223.79	225.37		225.37	0.000011	0.08	45.04	60.41	0.03
Trib 1	Reach 1	235	200yr 24hr SCS	4.58	223.79	225.59		225.59	0.000008	0.08	59.44	69.72	0.03
Trib 1	Reach 1	222	Timmins	5.77	223.78	225.85		225.86	0.000109	0.22	26.3	41.72	0.09
Trib 1	Reach 1	222	2yr 24hr SCS	0.41	223.78	224.33		224.33	0.000326	0.27	1.54	3.83	0.13
Trib 1	Reach 1	222	5yr 24hr SCS	0.87	223.78	224.55		224.56	0.000422	0.35	2.49	5.03	0.16
Trib 1	Reach 1	222	10yr 24hr SCS	1.36	223.78	224.73		224.74	0.000434	0.39	3.52	6.27	0.16
Trib 1	Reach 1	222	25yr 24hr SCS	2.15	223.78	224.98		224.98	0.000385	0.41	5.25	7.88	0.16
Trib 1	Reach 1	222	50yr 24hr SCS	2.85	223.78	225.17		225.17	0.00047	0.41	7.04	12.71	0.17
Trib 1	Reach 1	222	100yr 24hr SCS	3.62	223.78	225.36		225.37	0.000411	0.35	10.35	21.42	0.16
Trib 1	Reach 1	222	200yr 24hr SCS	4.58	223.78	225.59		225.59	0.000237	0.28	16.33	31.43	0.12
Trib 1	Reach 1	220	Timmins	5.77	223.78	225.85	224.57	225.86	0.000105	0.27	21.27	41.79	0.09
Trib 1	Reach 1	220	2yr 24hr SCS	0.41	223.78	224.33	224	224.33	0.000329	0.27	1.53	3.82	0.13
Trib 1	Reach 1	220	5yr 24hr SCS	0.87	223.78	224.55	224.07	224.56	0.000427	0.35	2.48	5.01	0.16
Trib 1	Reach 1	220	10yr 24hr SCS	1.36	223.78	224.73	224.15	224.74	0.000438	0.39	3.51	6.26	0.17
Trib 1	Reach 1	220	25yr 24hr SCS	2.15	223.78	224.98	224.24	224.98	0.000388	0.41	5.24	7.86	0.16
Trib 1	Reach 1	220	50yr 24hr SCS	2.85	223.78	225.17	224.31	225.17	0.000482	0.41	7.02	12.9	0.18
Trib 1	Reach 1	220	100yr 24hr SCS	3.62	223.78	225.36	224.38	225.37	0.000391	0.35	10.41	22.14	0.16
Trib 1	Reach 1	220	200yr 24hr SCS	4.58	223.78	225.59	224.47	225.59	0.000186	0.3	15.25	32.69	0.12
Trib 1	Reach 1	175	HWY 11 n&s - Sou	Culvert									
Trib 1	Reach 1	153	Timmins	5.77	221.16	221.88	221.88	222.02	0.020155	1.63	3.54	39.14	1.01
Trib 1	Reach 1	153	2yr 24hr SCS	0.41	221.16	221.4	221.4	221.49	0.024081	1.33	0.31	2.01	1
Trib 1	Reach 1	153	5yr 24hr SCS	0.87	221.16	221.56	221.56	221.64	0.024276	1.28	0.68	12.76	1
Trib 1	Reach 1	153	10yr 24hr SCS	1.36	221.16	221.63	221.63	221.72	0.023296	1.34	1.02	19.17	1
Trib 1	Reach 1	153	25yr 24hr SCS	2.15	221.16	221.72	221.72	221.81	0.022422	1.33	1.62	31.5	0.99
Trib 1	Reach 1	153	50yr 24hr SCS	2.85	221.16	221.77	221.77	221.86	0.022326	1.34	2.13	35.78	1
Trib 1	Reach 1	153	100yr 24hr SCS	3.62	221.16	221.8	221.8	221.91	0.021434	1.43	2.54	36.85	1
Trib 1	Reach 1	153	200yr 24hr SCS	4.58	221.16	221.84	221.84	221.96	0.020648	1.52	3.01	38.23	1

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
Trib 1	Reach 1	151	Timmins	5.77	220.9	221.38	221.38	221.47	0.023441	1.35	4.27	24.51	1.03
Trib 1	Reach 1	151	2yr 24hr SCS	0.41	220.9	221.08	221.08	221.14	0.02581	1.03	0.4	3.7	1
Trib 1	Reach 1	151	5yr 24hr SCS	0.87	220.9	221.16	221.16	221.22	0.027244	1.08	0.81	7.22	1.03
Trib 1	Reach 1	151	10yr 24hr SCS	1.36	220.9	221.22	221.22	221.27	0.023915	0.97	1.4	13.5	0.96
Trib 1	Reach 1	151	25yr 24hr SCS	2.15	220.9	221.25	221.25	221.32	0.026576	1.13	1.9	15.6	1.04
Trib 1	Reach 1	151	50yr 24hr SCS	2.85	220.9	221.29	221.29	221.36	0.022881	1.17	2.44	17.06	0.99
Trib 1	Reach 1	151	100yr 24hr SCS	3.62	220.9	221.31	221.31	221.39	0.023626	1.27	2.85	18.03	1.02
Trib 1	Reach 1	151	200yr 24hr SCS	4.58	220.9	221.35	221.35	221.43	0.022878	1.27	3.62	22.5	1.01
Trib 1	Reach 1	135	Timmins	5.77	220.29	220.65	220.65	220.74	0.022929	1.31	4.39	25.96	1.02
Trib 1	Reach 1	135	2yr 24hr SCS	0.41	220.29	220.43	220.43	220.47	0.030332	0.83	0.49	7.11	1.01
Trib 1	Reach 1	135	5yr 24hr SCS	0.87	220.29	220.48	220.48	220.53	0.029041	0.95	0.91	10.44	1.03
Trib 1	Reach 1	135	10yr 24hr SCS	1.36	220.29	220.53	220.53	220.57	0.027492	0.93	1.47	16.89	1
Trib 1	Reach 1	135	25yr 24hr SCS	2.15	220.29	220.56	220.56	220.61	0.023862	0.97	2.23	21.59	0.96
Trib 1	Reach 1	135	50yr 24hr SCS	2.85	220.29	220.58	220.58	220.64	0.026372	1.09	2.6	22.56	1.03
Trib 1	Reach 1	135	100yr 24hr SCS	3.62	220.29	220.6	220.6	220.67	0.02519	1.16	3.11	23.71	1.03
Trib 1	Reach 1	135	200yr 24hr SCS	4.58	220.29	220.63	220.63	220.7	0.024149	1.24	3.7	24.83	1.03
Trib 1	Reach 1	78	Timmins	5.77	217.51	218.33	218.33	218.52	0.017625	1.93	2.98	8	1.01
Trib 1	Reach 1	78	2yr 24hr SCS	0.41	217.51	217.76	217.76	217.84	0.023981	1.23	0.33	2.22	1.01
Trib 1	Reach 1	78	5yr 24hr SCS	0.87	217.51	217.87	217.87	217.97	0.021122	1.45	0.6	2.82	1
Trib 1	Reach 1	78	10yr 24hr SCS	1.36	217.51	217.95	217.95	218.08	0.020096	1.6	0.85	3.32	1.01
Trib 1	Reach 1	78	25yr 24hr SCS	2.15	217.51	218.06	218.06	218.2	0.019487	1.68	1.28	4.55	1.01
Trib 1	Reach 1	78	50yr 24hr SCS	2.85	217.51	218.13	218.13	218.28	0.018988	1.71	1.66	5.63	1.01
Trib 1	Reach 1	78	100yr 24hr SCS	3.62	217.51	218.19	218.19	218.36	0.018844	1.78	2.03	6.45	1.02
Trib 1	Reach 1	78	200yr 24hr SCS	4.58	217.51	218.26	218.26	218.43	0.018322	1.86	2.46	7.19	1.02
Trib 1	Reach 1	33	Timmins	5.77	215.53	216.17	216.17	216.33	0.018308	1.8	3.2	9.94	1.01
Trib 1	Reach 1	33	2yr 24hr SCS	0.41	215.53	215.75	215.75	215.81	0.023549	1.09	0.38	2.99	0.98
Trib 1	Reach 1	33	5yr 24hr SCS	0.87	215.53	215.84	215.84	215.93	0.021831	1.3	0.67	3.87	1
Trib 1	Reach 1	33	10yr 24hr SCS	1.36	215.53	215.91	215.91	216	0.023541	1.27	1.07	6.73	1.02
Trib 1	Reach 1	33	25yr 24hr SCS	2.15	215.53	215.97	215.97	216.08	0.021827	1.43	1.51	7.6	1.02
Trib 1	Reach 1	33	50yr 24hr SCS	2.85	215.53	216.02	216.02	216.14	0.020755	1.52	1.87	8.22	1.02
Trib 1	Reach 1	33	100yr 24hr SCS	3.62	215.53	216.06	216.06	216.2	0.019995	1.62	2.23	8.64	1.02
Trib 1	Reach 1	33	200yr 24hr SCS	4.58	215.53	216.11	216.11	216.26	0.018753	1.71	2.67	9.12	1.01
Trib 1	Reach 1	22	Timmins	5.77	215.31	215.73	215.73	215.82	0.015086	1.56	5.21	29.02	0.91
Trib 1	Reach 1	22	2yr 24hr SCS	0.41	215.31	215.47	215.47	215.51	0.028984	0.83	0.5	7.15	1
Trib 1	Reach 1	22	5yr 24hr SCS	0.87	215.31	215.52	215.52	215.57	0.024841	1	0.92	10.29	0.99
Trib 1	Reach 1	22	10yr 24hr SCS	1.36	215.31	215.56	215.56	215.62	0.020295	1.09	1.38	13.56	0.93
Trib 1	Reach 1	22	25yr 24hr SCS	2.15	215.31	215.6	215.6	215.67	0.019277	1.23	2.08	20.41	0.94
Trib 1	Reach 1	22	50yr 24hr SCS	2.85	215.31	215.64	215.64	215.71	0.015368	1.26	2.95	23.69	0.87
Trib 1	Reach 1	22	100yr 24hr SCS	3.62	215.31	215.67	215.67	215.74	0.014286	1.32	3.67	25.36	0.86
Trib 1	Reach 1	22	200yr 24hr SCS	4.58	215.31	215.69	215.69	215.78	0.016105	1.48	4.21	26.2	0.92
Lansdowne	Reach 1-Low	1520	Timmins	7.93	214.1	215.11		215.23	0.011255	1.53	5.17	14.12	0.81
Lansdowne	Reach 1-Low	1520	2yr 24hr SCS	0.53	214.1	214.37	214.32	214.42	0.010237	0.97	0.55	2.74	0.69
Lansdowne	Reach 1-Low	1520	5yr 24hr SCS	1.09	214.1	214.49	214.43	214.56	0.011234	1.22	0.89	3.36	0.75
Lansdowne	Reach 1-Low	1520	10yr 24hr SCS	1.71	214.1	214.58	214.52	214.68	0.011934	1.39	1.23	3.98	0.8
Lansdowne	Reach 1-Low	1520	25yr 24hr SCS	2.73	214.1	214.64	214.64	214.81	0.018569	1.82	1.5	4.53	1.01
Lansdowne	Reach 1-Low	1520	50yr 24hr SCS	3.64	214.1	214.73	214.73	214.91	0.018075	1.89	1.93	5.39	1.01
Lansdowne	Reach 1-Low	1520	100yr 24hr SCS	4.65	214.1	214.81	214.81	215	0.017709	1.93	2.4	6.4	1.01
Lansdowne	Reach 1-Low	1520	200yr 24hr SCS	5.9	214.1	214.89	214.89	215.09	0.017114	1.97	2.99	7.56	1
Lansdowne	Reach 1-Low	1488	Timmins	7.93	213.64	215.08		215.11	0.001291	0.66	12.1	23.26	0.29
Lansdowne	Reach 1-Low	1488	2yr 24hr SCS	0.53	213.64	213.87	213.87	213.94	0.023369	1.24	0.43	2.73	1
Lansdowne	Reach 1-Low	1488	5yr 24hr SCS	1.09	213.64	213.97	213.97	214.08	0.021297	1.48	0.73	3.33	1.01
Lansdowne	Reach 1-Low	1488	10yr 24hr SCS	1.71	213.64	214.05	214.05	214.19	0.01978	1.64	1.04	3.84	1
Lansdowne	Reach 1-Low	1488	25yr 24hr SCS	2.73	213.64	214.28		214.35	0.007609	1.19	2.3	6.72	0.65
Lansdowne	Reach 1-Low	1488	50yr 24hr SCS	3.64	213.64	214.44		214.5	0.004197	1.05	3.46	7.78	0.5
Lansdowne	Reach 1-Low	1488	100yr 24hr SCS	4.65	213.64	214.61		214.65	0.002939	0.93	4.98	10.3	0.43
Lansdowne	Reach 1-Low	1488	200yr 24hr SCS	5.9	213.64	214.82		214.85	0.001694	0.79	7.46	13.14	0.34
Lansdowne	Reach 1-Low	1433	Timmins	7.93	212.43	215.1		215.1	0.00001	0.09	130.25	180.79	0.03
Lansdowne	Reach 1-Low	1433	2yr 24hr SCS	0.53	212.43	213.53		213.53	0.000122	0.17	3.19	7.55	0.08
Lansdowne	Reach 1-Low	1433	5yr 24hr SCS	1.09	212.43	213.59		213.6	0.000364	0.3	3.67	8.35	0.14
Lansdowne	Reach 1-Low	1433	10yr 24hr SCS	1.71	212.43	213.96		213.96	0.000146	0.24	7.22	11.79	0.1
Lansdowne	Reach 1-Low	1433	25yr 24hr SCS	2.73	212.43	214.31		214.31	0.000089	0.2	16.6	54.58	0.08
Lansdowne	Reach 1-Low	1433	50yr 24hr SCS	3.64	212.43	214.47		214.47	0.000077	0.18	28.77	108.11	0.07
Lansdowne	Reach 1-Low	1433	100yr 24hr SCS	4.65	212.43	214.63		214.63	0.000049	0.14	50.3	151.6	0.06
Lansdowne	Reach 1-Low	1433	200yr 24hr SCS	5.9	212.43	214.84		214.84	0.00002	0.11	84.84	168.72	0.04
Lansdowne	Reach 1-Low	1403	Timmins	7.93	213.08	215.1		215.1	0.000003	0.07	230.17	245	0.02
Lansdowne	Reach 1-Low	1403	2yr 24hr SCS	0.53	213.08	213.53		213.53	0.000124	0.13	3.96	14.5	0.08
Lansdowne	Reach 1-Low	1403	5yr 24hr SCS	1.09	213.08	213.58		213.59	0.000296	0.23	4.84	16.27	0.13
Lansdowne	Reach 1-Low	1403	10yr 24hr SCS	1.71	213.08	213.96		213.96	0.000033	0.13	21.3	90.51	0.05
Lansdowne	Reach 1-Low	1403	25yr 24hr SCS	2.73	213.08	214.31		214.31	0.000008	0.08	66.97	154.57	0.03
Lansdowne	Reach 1-Low	1403	50yr 24hr SCS	3.64	213.08	214.47		214.47	0.000006	0.08	92.07	176.6	0.02
Lansdowne	Reach 1-Low	1403	100yr 24hr SCS	4.65	213.08	214.63		214.63	0.000004	0.07	123.15	210.81	0.02
Lansdowne	Reach 1-Low	1403	200yr 24hr SCS	5.9	213.08	214.84		214.84	0.000003	0.07	169.46	224.82	0.02

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
Lansdowne	Reach 1-Low	1358	Timmins	7.93	213.36	215.1		215.1	0.000002	0.06	220.72	196.53	0.01
Lansdowne	Reach 1-Low	1358	2yr 24hr SCS	0.53	213.36	213.5		213.51	0.007188	0.43	1.29	17.5	0.5
Lansdowne	Reach 1-Low	1358	5yr 24hr SCS	1.09	213.36	213.5	213.5	213.54	0.030487	0.88	1.29	17.5	1.03
Lansdowne	Reach 1-Low	1358	10yr 24hr SCS	1.71	213.36	213.95		213.95	0.000026	0.08	30.33	131.56	0.04
Lansdowne	Reach 1-Low	1358	25yr 24hr SCS	2.73	213.36	214.31		214.31	0.000004	0.05	83.25	161.25	0.02
Lansdowne	Reach 1-Low	1358	50yr 24hr SCS	3.64	213.36	214.47		214.47	0.000004	0.05	108.78	169.34	0.02
Lansdowne	Reach 1-Low	1358	100yr 24hr SCS	4.65	213.36	214.63		214.63	0.000003	0.05	136.34	170.92	0.02
Lansdowne	Reach 1-Low	1358	200yr 24hr SCS	5.9	213.36	214.84		214.84	0.000002	0.05	172.64	174.4	0.01
Lansdowne	Reach 1-Low	1332	Timmins	7.93	212.96	215.1		215.1	0.000003	0.06	188.99	141.8	0.02
Lansdowne	Reach 1-Low	1332	2yr 24hr SCS	0.53	212.96	213.21	213.21	213.25	0.017736	0.99	0.76	10.81	0.86
Lansdowne	Reach 1-Low	1332	5yr 24hr SCS	1.09	212.96	213.36		213.37	0.003132	0.41	3.15	22.41	0.36
Lansdowne	Reach 1-Low	1332	10yr 24hr SCS	1.71	212.96	213.95		213.95	0.000011	0.06	42.63	113.05	0.03
Lansdowne	Reach 1-Low	1332	25yr 24hr SCS	2.73	212.96	214.31		214.31	0.000003	0.05	84.86	120.83	0.02
Lansdowne	Reach 1-Low	1332	50yr 24hr SCS	3.64	212.96	214.47		214.47	0.000003	0.05	103.65	123.98	0.02
Lansdowne	Reach 1-Low	1332	100yr 24hr SCS	4.65	212.96	214.63		214.63	0.000003	0.06	124.24	130.72	0.02
Lansdowne	Reach 1-Low	1332	200yr 24hr SCS	5.9	212.96	214.84		214.84	0.000003	0.06	153.04	138.36	0.02
Lansdowne	Reach 1-Low	1308	Timmins	7.93	212.17	215.1		215.1	0.000003	0.08	132.61	77.75	0.02
Lansdowne	Reach 1-Low	1308	2yr 24hr SCS	0.53	212.17	213.03		213.04	0.000272	0.24	2.23	5.33	0.12
Lansdowne	Reach 1-Low	1308	5yr 24hr SCS	1.09	212.17	213.35		213.36	0.000161	0.18	7.23	39.97	0.09
Lansdowne	Reach 1-Low	1308	10yr 24hr SCS	1.71	212.17	213.95		213.95	0.000004	0.05	46.83	70.54	0.02
Lansdowne	Reach 1-Low	1308	25yr 24hr SCS	2.73	212.17	214.31		214.31	0.000003	0.05	72.81	74.4	0.02
Lansdowne	Reach 1-Low	1308	50yr 24hr SCS	3.64	212.17	214.47		214.47	0.000003	0.06	84.3	74.82	0.02
Lansdowne	Reach 1-Low	1308	100yr 24hr SCS	4.65	212.17	214.63		214.63	0.000003	0.07	96.51	75.98	0.02
Lansdowne	Reach 1-Low	1308	200yr 24hr SCS	5.9	212.17	214.84		214.84	0.000003	0.07	112.67	77.1	0.02
Lansdowne	Reach 1-Low	1305	Timmins	7.93	212.15	215.1	213.22	215.1	0.000003	0.07	142.14	75.76	0.02
Lansdowne	Reach 1-Low	1305	2yr 24hr SCS	0.53	212.15	213.03	212.39	213.03	0.000458	0.24	2.23	14.53	0.15
Lansdowne	Reach 1-Low	1305	5yr 24hr SCS	1.09	212.15	213.35	212.5	213.36	0.000121	0.19	5.88	66.11	0.08
Lansdowne	Reach 1-Low	1305	10yr 24hr SCS	1.71	212.15	213.95	212.61	213.95	0.000021	0.13	13.5	68.2	0.04
Lansdowne	Reach 1-Low	1305	25yr 24hr SCS	2.73	212.15	214.31	212.75	214.31	0.00002	0.15	18.81	69.07	0.04
Lansdowne	Reach 1-Low	1305	50yr 24hr SCS	3.64	212.15	214.46	212.86	214.47	0.000024	0.18	21.35	72.35	0.05
Lansdowne	Reach 1-Low	1305	100yr 24hr SCS	4.65	212.15	214.63	213.1	214.63	0.000028	0.2	24.4	73.72	0.05
Lansdowne	Reach 1-Low	1305	200yr 24hr SCS	5.9	212.15	214.84	213.15	214.84	0.000029	0.23	28.62	74.51	0.05
Lansdowne	Reach 1-Low	1298	HWY 94	Bridge									
Lansdowne	Reach 1-Low	1280	Timmins	7.93	212.23	214.57	213.39	214.6	0.000392	0.78	10.18	75.48	0.19
Lansdowne	Reach 1-Low	1280	2yr 24hr SCS	0.53	212.23	213	212.75	213.01	0.001291	0.43	1.24	4.19	0.25
Lansdowne	Reach 1-Low	1280	5yr 24hr SCS	1.09	212.23	213.32	212.87	213.33	0.000473	0.37	2.92	27.65	0.17
Lansdowne	Reach 1-Low	1280	10yr 24hr SCS	1.71	212.23	213.92	212.96	213.93	0.000085	0.27	6.41	72.44	0.08
Lansdowne	Reach 1-Low	1280	25yr 24hr SCS	2.73	212.23	214.23	213.06	214.24	0.000095	0.33	8.22	74.09	0.09
Lansdowne	Reach 1-Low	1280	50yr 24hr SCS	3.64	212.23	214.33	213.16	214.33	0.000136	0.42	8.76	74.38	0.11
Lansdowne	Reach 1-Low	1280	100yr 24hr SCS	4.65	212.23	214.4	213.22	214.41	0.000189	0.51	9.19	74.71	0.13
Lansdowne	Reach 1-Low	1280	200yr 24hr SCS	5.9	212.23	214.47	213.29	214.49	0.000262	0.61	9.62	74.98	0.15
Lansdowne	Reach 1-Low	1279	Timmins	7.93	212.34	214.58		214.59	0.000005	0.09	117.34	78.05	0.02
Lansdowne	Reach 1-Low	1279	2yr 24hr SCS	0.53	212.34	213.01		213.01	0.000059	0.08	8.17	42.55	0.05
Lansdowne	Reach 1-Low	1279	5yr 24hr SCS	1.09	212.34	213.33		213.33	0.000011	0.06	25.25	60.06	0.03
Lansdowne	Reach 1-Low	1279	10yr 24hr SCS	1.71	212.34	213.92		213.92	0.000001	0.04	66.8	74.79	0.01
Lansdowne	Reach 1-Low	1279	25yr 24hr SCS	2.73	212.34	214.24		214.24	0.000001	0.04	90.38	76.36	0.01
Lansdowne	Reach 1-Low	1279	50yr 24hr SCS	3.64	212.34	214.33		214.33	0.000002	0.05	97.61	76.77	0.01
Lansdowne	Reach 1-Low	1279	100yr 24hr SCS	4.65	212.34	214.41		214.41	0.000003	0.06	103.48	77.09	0.02
Lansdowne	Reach 1-Low	1279	200yr 24hr SCS	5.9	212.34	214.48		214.48	0.000004	0.07	109.39	77.43	0.02
Lansdowne	Reach 1-Low	1267	Timmins	7.93	212.56	214.57		214.58	0.000254	0.56	22.77	43.21	0.15
Lansdowne	Reach 1-Low	1267	2yr 24hr SCS	0.53	212.56	212.9	212.9	213	0.023744	1.34	0.4	2.24	1.02
Lansdowne	Reach 1-Low	1267	5yr 24hr SCS	1.09	212.56	213.31		213.32	0.001696	0.59	1.85	4.97	0.31
Lansdowne	Reach 1-Low	1267	10yr 24hr SCS	1.71	212.56	213.92		213.92	0.00015	0.29	6.21	12.44	0.1
Lansdowne	Reach 1-Low	1267	25yr 24hr SCS	2.73	212.56	214.23		214.23	0.000102	0.3	11.76	22.78	0.09
Lansdowne	Reach 1-Low	1267	50yr 24hr SCS	3.64	212.56	214.32		214.33	0.000126	0.35	14.16	27.97	0.1
Lansdowne	Reach 1-Low	1267	100yr 24hr SCS	4.65	212.56	214.4		214.41	0.000158	0.4	16.31	29.6	0.12
Lansdowne	Reach 1-Low	1267	200yr 24hr SCS	5.9	212.56	214.47		214.48	0.000191	0.46	18.83	37.52	0.13
Lansdowne	Reach 1-Low	1264	Timmins	9.73	212.31	214.56		214.58	0.000628	0.75	16.45	22.21	0.22
Lansdowne	Reach 1-Low	1264	2yr 24hr SCS	0.69	212.31	212.86		212.92	0.009504	1.13	0.61	1.99	0.65
Lansdowne	Reach 1-Low	1264	5yr 24hr SCS	1.38	212.31	213.29		213.32	0.00223	0.77	1.79	3.52	0.35
Lansdowne	Reach 1-Low	1264	10yr 24hr SCS	2.15	212.31	213.91		213.92	0.000462	0.43	5.01	7.7	0.17
Lansdowne	Reach 1-Low	1264	25yr 24hr SCS	3.4	212.31	214.23		214.23	0.000298	0.42	9.44	19.9	0.14
Lansdowne	Reach 1-Low	1264	50yr 24hr SCS	4.51	212.31	214.32		214.33	0.000346	0.48	11.31	20.86	0.16
Lansdowne	Reach 1-Low	1264	100yr 24hr SCS	5.73	212.31	214.39		214.4	0.00041	0.55	12.85	21.25	0.17
Lansdowne	Reach 1-Low	1264	200yr 24hr SCS	7.24	212.31	214.46		214.48	0.000492	0.63	14.39	21.64	0.19
Lansdowne	Reach 1-Low	1263	Timmins	9.73	212.23	214.56	213.59	214.58	0.000568	0.69	16.85	21.95	0.21
Lansdowne	Reach 1-Low	1263	2yr 24hr SCS	0.69	212.23	212.88	212.54	212.9	0.001603	0.61	1.14	2.41	0.28
Lansdowne	Reach 1-Low	1263	5yr 24hr SCS	1.38	212.23	213.29	212.69	213.31	0.000938	0.58	2.38	3.58	0.23
Lansdowne	Reach 1-Low	1263	10yr 24hr SCS	2.15	212.23	213.91	212.83	213.92	0.000333	0.39	5.58	7.71	0.14
Lansdowne	Reach 1-Low	1263	25yr 24hr SCS	3.4	212.23	214.23	213.01	214.23	0.000269	0.38	9.91	20.15	0.14
Lansdowne	Reach 1-Low	1263	50yr 24hr SCS	4.51	212.23	214.32	213.14	214.33	0.000313	0.44	11.78	20.62	0.15
Lansdowne	Reach 1-Low	1263	100yr 24hr SCS	5.73	212.23	214.39	213.26	214.4	0.00037	0.5	13.3	20.95	0.16
Lansdowne	Reach 1-Low	1263	200yr 24hr SCS	7.24	212.23	214.46	213.39	214.48	0.000444	0.58	14.82	21.3	0.18
Lansdowne	Reach 1-Low	1257	Driveway 1	Culvert									

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
Lansdowne	Reach 1-Low	1242	Timmins	9.73	211.86	214.21	213.15	214.24	0.000696	0.79	12.45	11.38	0.23
Lansdowne	Reach 1-Low	1242	2yr 24hr SCS	0.69	211.86	212.82	212.19	212.82	0.000281	0.31	2.24	3.7	0.13
Lansdowne	Reach 1-Low	1242	5yr 24hr SCS	1.38	211.86	213.06	212.33	213.07	0.000435	0.43	3.22	4.53	0.16
Lansdowne	Reach 1-Low	1242	10yr 24hr SCS	2.15	211.86	213.77	212.45	213.78	0.000103	0.27	8.06	8.81	0.09
Lansdowne	Reach 1-Low	1242	25yr 24hr SCS	3.4	211.86	213.93	212.61	213.93	0.000159	0.37	9.31	9.59	0.11
Lansdowne	Reach 1-Low	1242	50yr 24hr SCS	4.51	211.86	213.99	212.73	214	0.000231	0.46	9.86	9.94	0.13
Lansdowne	Reach 1-Low	1242	100yr 24hr SCS	5.73	211.86	214.05	212.84	214.07	0.000316	0.55	10.37	10.27	0.16
Lansdowne	Reach 1-Low	1242	200yr 24hr SCS	7.24	211.86	214.12	212.97	214.14	0.000482	0.63	11.48	10.64	0.19
Lansdowne	Reach 1-Low	1240	Timmins	9.73	212.17	214.21		214.24	0.000811	0.79	12.36	12.41	0.25
Lansdowne	Reach 1-Low	1240	2yr 24hr SCS	0.69	212.17	212.78		212.81	0.005854	0.8	0.86	3.59	0.52
Lansdowne	Reach 1-Low	1240	5yr 24hr SCS	1.38	212.17	213.04		213.06	0.002174	0.66	2.08	5.5	0.35
Lansdowne	Reach 1-Low	1240	10yr 24hr SCS	2.15	212.17	213.77		213.78	0.000147	0.28	7.58	9.53	0.1
Lansdowne	Reach 1-Low	1240	25yr 24hr SCS	3.4	212.17	213.92		213.93	0.000224	0.37	9.1	10.42	0.13
Lansdowne	Reach 1-Low	1240	50yr 24hr SCS	4.51	212.17	213.99		214	0.000331	0.46	9.82	11.09	0.16
Lansdowne	Reach 1-Low	1240	100yr 24hr SCS	5.73	212.17	214.05		214.07	0.000444	0.54	10.52	11.47	0.18
Lansdowne	Reach 1-Low	1240	200yr 24hr SCS	7.24	212.17	214.12		214.14	0.000588	0.64	11.27	11.86	0.21
Lansdowne	Reach 1-Low	1223	Timmins	9.73	212.18	214.19		214.23	0.000683	0.85	13.56	15.02	0.24
Lansdowne	Reach 1-Low	1223	2yr 24hr SCS	0.69	212.18	212.62	212.55	212.68	0.010297	1.1	0.63	2.55	0.7
Lansdowne	Reach 1-Low	1223	5yr 24hr SCS	1.38	212.18	213.01		213.03	0.001751	0.67	2.06	4.59	0.32
Lansdowne	Reach 1-Low	1223	10yr 24hr SCS	2.15	212.18	213.77		213.77	0.000142	0.3	7.83	12.14	0.1
Lansdowne	Reach 1-Low	1223	25yr 24hr SCS	3.4	212.18	213.92		213.93	0.000203	0.39	9.73	13.03	0.12
Lansdowne	Reach 1-Low	1223	50yr 24hr SCS	4.51	212.18	213.99		214	0.000283	0.49	10.61	13.49	0.15
Lansdowne	Reach 1-Low	1223	100yr 24hr SCS	5.73	212.18	214.05		214.06	0.000373	0.58	11.43	13.94	0.17
Lansdowne	Reach 1-Low	1223	200yr 24hr SCS	7.24	212.18	214.11		214.13	0.000489	0.69	12.31	14.39	0.2
Lansdowne	Reach 1-Low	1214	Timmins	9.73	212.18	214.19		214.22	0.000418	0.77	19.02	29.78	0.19
Lansdowne	Reach 1-Low	1214	2yr 24hr SCS	0.69	212.18	212.45	212.45	212.54	0.022776	1.32	0.52	3.01	1.01
Lansdowne	Reach 1-Low	1214	5yr 24hr SCS	1.38	212.18	213		213.02	0.000776	0.5	2.77	5.21	0.22
Lansdowne	Reach 1-Low	1214	10yr 24hr SCS	2.15	212.18	213.77		213.77	0.00008	0.28	9.57	16.64	0.08
Lansdowne	Reach 1-Low	1214	25yr 24hr SCS	3.4	212.18	213.92		213.93	0.00012	0.37	12.28	19.97	0.1
Lansdowne	Reach 1-Low	1214	50yr 24hr SCS	4.51	212.18	213.99		213.99	0.00017	0.45	13.64	21.72	0.12
Lansdowne	Reach 1-Low	1214	100yr 24hr SCS	5.73	212.18	214.05		214.06	0.000228	0.53	15.01	23.4	0.14
Lansdowne	Reach 1-Low	1214	200yr 24hr SCS	7.24	212.18	214.11		214.12	0.000301	0.63	16.56	26.44	0.16
Lansdowne	Reach 1-Low	1205	Timmins	9.73	211.82	214.2		214.21	0.000441	0.56	20.42	28.88	0.18
Lansdowne	Reach 1-Low	1205	2yr 24hr SCS	0.69	211.82	212.42		212.44	0.002402	0.65	1.07	3.17	0.35
Lansdowne	Reach 1-Low	1205	5yr 24hr SCS	1.38	211.82	213		213.01	0.000352	0.38	3.6	5.24	0.15
Lansdowne	Reach 1-Low	1205	10yr 24hr SCS	2.15	211.82	213.77		213.77	0.000084	0.23	10.13	16.09	0.08
Lansdowne	Reach 1-Low	1205	25yr 24hr SCS	3.4	211.82	213.92		213.92	0.000173	0.29	12.97	22.11	0.11
Lansdowne	Reach 1-Low	1205	50yr 24hr SCS	4.51	211.82	213.99		213.99	0.000237	0.35	14.52	25.4	0.13
Lansdowne	Reach 1-Low	1205	100yr 24hr SCS	5.73	211.82	214.05		214.05	0.000288	0.41	16.16	27.69	0.14
Lansdowne	Reach 1-Low	1205	200yr 24hr SCS	7.24	211.82	214.11		214.12	0.000348	0.47	17.92	28.24	0.16
Lansdowne	Reach 1-Low	1202	Timmins	9.73	211.15	214.2	212.46	214.21	0.000365	0.56	21.57	28.78	0.16
Lansdowne	Reach 1-Low	1202	2yr 24hr SCS	0.69	211.15	212.43	211.45	212.43	0.000105	0.22	3.07	3.24	0.07
Lansdowne	Reach 1-Low	1202	5yr 24hr SCS	1.38	211.15	213	211.6	213.01	0.000115	0.27	5.16	4.44	0.08
Lansdowne	Reach 1-Low	1202	10yr 24hr SCS	2.15	211.15	213.77	211.72	213.77	0.000068	0.21	11.01	16.14	0.07
Lansdowne	Reach 1-Low	1202	25yr 24hr SCS	3.4	211.15	213.92	211.89	213.92	0.000127	0.28	13.98	22.79	0.09
Lansdowne	Reach 1-Low	1202	50yr 24hr SCS	4.51	211.15	213.99	212.02	213.99	0.000171	0.34	15.66	26.88	0.11
Lansdowne	Reach 1-Low	1202	100yr 24hr SCS	5.73	211.15	214.05	212.14	214.05	0.000218	0.4	17.32	27.81	0.12
Lansdowne	Reach 1-Low	1202	200yr 24hr SCS	7.24	211.15	214.11	212.27	214.12	0.000275	0.46	19.08	28.19	0.14
Lansdowne	Reach 1-Low	1199	Driveway 2	Culvert									
Lansdowne	Reach 1-Low	1189	Timmins	9.73	211.07	214.12	212.21	214.13	0.000155	0.44	29.11	41.97	0.11
Lansdowne	Reach 1-Low	1189	2yr 24hr SCS	0.69	211.07	212.4	211.33	212.4	0.000046	0.16	4.33	4.7	0.05
Lansdowne	Reach 1-Low	1189	5yr 24hr SCS	1.38	211.07	212.88	211.45	212.88	0.000058	0.2	7.07	6.93	0.06
Lansdowne	Reach 1-Low	1189	10yr 24hr SCS	2.15	211.07	213.61	211.56	213.61	0.000031	0.16	14.05	16.53	0.05
Lansdowne	Reach 1-Low	1189	25yr 24hr SCS	3.4	211.07	213.85	211.7	213.85	0.000042	0.2	19.4	26.93	0.06
Lansdowne	Reach 1-Low	1189	50yr 24hr SCS	4.51	211.07	213.92	211.81	213.93	0.000059	0.25	21.69	33.92	0.07
Lansdowne	Reach 1-Low	1189	100yr 24hr SCS	5.73	211.07	213.99	211.92	213.99	0.000079	0.3	23.91	36.59	0.08
Lansdowne	Reach 1-Low	1189	200yr 24hr SCS	7.24	211.07	214.04	212.03	214.05	0.000107	0.35	26.06	39.51	0.09
Lansdowne	Reach 1-Low	1187	Timmins	9.73	211.66	214.11		214.12	0.000343	0.54	23.47	42.83	0.16
Lansdowne	Reach 1-Low	1187	2yr 24hr SCS	0.69	211.66	212.37		212.4	0.002428	0.68	1.01	2.58	0.35
Lansdowne	Reach 1-Low	1187	5yr 24hr SCS	1.38	211.66	212.87		212.88	0.000887	0.52	2.66	4.86	0.22
Lansdowne	Reach 1-Low	1187	10yr 24hr SCS	2.15	211.66	213.61		213.61	0.000109	0.24	9.25	13.7	0.09
Lansdowne	Reach 1-Low	1187	25yr 24hr SCS	3.4	211.66	213.85		213.85	0.000126	0.27	14.23	26.48	0.09
Lansdowne	Reach 1-Low	1187	50yr 24hr SCS	4.51	211.66	213.92		213.93	0.000159	0.32	16.28	29.1	0.11
Lansdowne	Reach 1-Low	1187	100yr 24hr SCS	5.73	211.66	213.98		213.99	0.000201	0.38	18.31	36.38	0.12
Lansdowne	Reach 1-Low	1187	200yr 24hr SCS	7.24	211.66	214.04		214.05	0.000254	0.44	20.42	39.91	0.14
Lansdowne	Reach 1-Low	1176	Timmins	9.73	211.57	214.1		214.12	0.000421	0.73	22.31	35.6	0.18
Lansdowne	Reach 1-Low	1176	2yr 24hr SCS	0.69	211.57	212.36		212.37	0.001507	0.59	1.17	2.4	0.27
Lansdowne	Reach 1-Low	1176	5yr 24hr SCS	1.38	211.57	212.86		212.87	0.000705	0.51	2.69	3.63	0.19
Lansdowne	Reach 1-Low	1176	10yr 24hr SCS	2.15	211.57	213.6		213.61	0.000114	0.3	9.06	15.61	0.09
Lansdowne	Reach 1-Low	1176	25yr 24hr SCS	3.4	211.57	213.84		213.85	0.000128	0.36	14.29	26.92	0.09
Lansdowne	Reach 1-Low	1176	50yr 24hr SCS	4.51	211.57	213.92		213.92	0.000174	0.43	16.37	29.77	0.11
Lansdowne	Reach 1-Low	1176	100yr 24hr SCS	5.73	211.57	213.98		213.99	0.000225	0.51	18.23	31.12	0.13
Lansdowne	Reach 1-Low	1176	200yr 24hr SCS	7.24	211.57	214.03		214.04	0.000297	0.59	19.93	32.16	0.15

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
Lansdowne	Reach 1-Low	1173	Timmins	9.73	211.57	214.1	213.35	214.12	0.000347	0.76	23.81	41.82	0.17
Lansdowne	Reach 1-Low	1173	2yr 24hr SCS	0.69	211.57	212.34	211.91	212.37	0.000959	0.7	0.99	2.76	0.26
Lansdowne	Reach 1-Low	1173	5yr 24hr SCS	1.38	211.57	212.83	212.09	212.86	0.000702	0.84	1.65	4.83	0.24
Lansdowne	Reach 1-Low	1173	10yr 24hr SCS	2.15	211.57	213.57	212.25	213.6	0.000349	0.81	2.65	14.72	0.19
Lansdowne	Reach 1-Low	1173	25yr 24hr SCS	3.4	211.57	213.84	212.48	213.85	0.000097	0.37	15.16	26.4	0.09
Lansdowne	Reach 1-Low	1173	50yr 24hr SCS	4.51	211.57	213.92	212.66	213.92	0.000135	0.45	17.17	29.05	0.1
Lansdowne	Reach 1-Low	1173	100yr 24hr SCS	5.73	211.57	213.98	212.83	213.99	0.00018	0.52	19.09	33.81	0.12
Lansdowne	Reach 1-Low	1173	200yr 24hr SCS	7.24	211.57	214.03	213.04	214.04	0.000242	0.62	21.02	37.41	0.14
Lansdowne	Reach 1-Low	1169	Driveway 3	Culvert									
Lansdowne	Reach 1-Low	1162	Timmins	9.73	211.4	213.73	212.74	213.77	0.000931	0.95	16.08	49.34	0.25
Lansdowne	Reach 1-Low	1162	2yr 24hr SCS	0.69	211.4	212.32	211.72	212.32	0.000378	0.38	1.82	3.09	0.15
Lansdowne	Reach 1-Low	1162	5yr 24hr SCS	1.38	211.4	212.68	211.88	212.69	0.000374	0.5	2.77	3.81	0.16
Lansdowne	Reach 1-Low	1162	10yr 24hr SCS	2.15	211.4	213.17	212.02	213.19	0.00025	0.53	4.08	5	0.14
Lansdowne	Reach 1-Low	1162	25yr 24hr SCS	3.4	211.4	213.52	212.18	213.53	0.000255	0.44	9.34	24.14	0.13
Lansdowne	Reach 1-Low	1162	50yr 24hr SCS	4.51	211.4	213.58	212.29	213.6	0.000346	0.54	11.02	27.23	0.15
Lansdowne	Reach 1-Low	1162	100yr 24hr SCS	5.73	211.4	213.65	212.41	213.67	0.000437	0.62	12.99	32.55	0.17
Lansdowne	Reach 1-Low	1162	200yr 24hr SCS	7.24	211.4	213.68	212.54	213.71	0.000621	0.76	13.97	34.87	0.21
Lansdowne	Reach 1-Low	1161	Timmins	9.73	211.46	213.74		213.76	0.000721	0.81	18.99	54.77	0.22
Lansdowne	Reach 1-Low	1161	2yr 24hr SCS	0.69	211.46	212.32		212.32	0.000542	0.38	1.82	3.55	0.17
Lansdowne	Reach 1-Low	1161	5yr 24hr SCS	1.38	211.46	212.68		212.69	0.000441	0.44	3.14	3.76	0.15
Lansdowne	Reach 1-Low	1161	10yr 24hr SCS	2.15	211.46	213.17		213.18	0.000318	0.39	5.56	7.79	0.14
Lansdowne	Reach 1-Low	1161	25yr 24hr SCS	3.4	211.46	213.52		213.53	0.000225	0.4	10.79	26.33	0.12
Lansdowne	Reach 1-Low	1161	50yr 24hr SCS	4.51	211.46	213.59		213.6	0.000303	0.49	12.76	31.6	0.14
Lansdowne	Reach 1-Low	1161	100yr 24hr SCS	5.73	211.46	213.65		213.67	0.000365	0.55	14.99	34.78	0.16
Lansdowne	Reach 1-Low	1161	200yr 24hr SCS	7.24	211.46	213.68		213.7	0.000512	0.67	16.18	45.14	0.19
Lansdowne	Reach 1-Low	1160	Timmins	9.73	211.23	213.72		213.76	0.001133	1	16.99	54.21	0.28
Lansdowne	Reach 1-Low	1160	2yr 24hr SCS	0.69	211.23	212.3		212.32	0.001627	0.58	1.18	2.32	0.26
Lansdowne	Reach 1-Low	1160	5yr 24hr SCS	1.38	211.23	212.66		212.68	0.001298	0.62	2.22	3.52	0.25
Lansdowne	Reach 1-Low	1160	10yr 24hr SCS	2.15	211.23	213.17		213.18	0.000514	0.48	4.49	6.17	0.17
Lansdowne	Reach 1-Low	1160	25yr 24hr SCS	3.4	211.23	213.51		213.53	0.000344	0.5	8.85	26.59	0.15
Lansdowne	Reach 1-Low	1160	50yr 24hr SCS	4.51	211.23	213.58		213.6	0.000457	0.59	10.78	33.57	0.17
Lansdowne	Reach 1-Low	1160	100yr 24hr SCS	5.73	211.23	213.65		213.67	0.000559	0.68	13.19	44.26	0.19
Lansdowne	Reach 1-Low	1160	200yr 24hr SCS	7.24	211.23	213.67		213.7	0.000785	0.82	14.43	48.57	0.23
Lansdowne	Reach 1-Low	1159	Timmins	9.73	211.26	213.72	213.39	213.76	0.002332	0.94	14.12	43.93	0.35
Lansdowne	Reach 1-Low	1159	2yr 24hr SCS	0.69	211.26	212.3	211.69	212.32	0.001945	0.66	1.05	1.27	0.23
Lansdowne	Reach 1-Low	1159	5yr 24hr SCS	1.38	211.26	212.63	211.9	212.68	0.003076	0.95	1.45	1.62	0.28
Lansdowne	Reach 1-Low	1159	10yr 24hr SCS	2.15	211.26	213.11	212.1	213.17	0.002595	1.05	2.05	3.52	0.26
Lansdowne	Reach 1-Low	1159	25yr 24hr SCS	3.4	211.26	213.51	212.36	213.52	0.000995	0.55	6.73	23.37	0.25
Lansdowne	Reach 1-Low	1159	50yr 24hr SCS	4.51	211.26	213.58	212.56	213.59	0.001205	0.63	8.57	31.29	0.26
Lansdowne	Reach 1-Low	1159	100yr 24hr SCS	5.73	211.26	213.64	212.75	213.66	0.001304	0.68	10.96	39.16	0.27
Lansdowne	Reach 1-Low	1159	200yr 24hr SCS	7.24	211.26	213.67	212.99	213.7	0.001757	0.8	12.04	40.74	0.31
Lansdowne	Reach 1-Low	1155	Driveway 4	Culvert									
Lansdowne	Reach 1-Low	1149	Timmins	9.73	211.23	213.11	212.62	213.23	0.003127	1.51	6.45	6.96	0.46
Lansdowne	Reach 1-Low	1149	2yr 24hr SCS	0.69	211.23	212.25	211.59	212.26	0.000385	0.34	2.03	3.55	0.14
Lansdowne	Reach 1-Low	1149	5yr 24hr SCS	1.38	211.23	212.41	211.75	212.43	0.000815	0.52	2.67	4.45	0.21
Lansdowne	Reach 1-Low	1149	10yr 24hr SCS	2.15	211.23	212.53	211.89	212.55	0.001213	0.67	3.2	4.89	0.27
Lansdowne	Reach 1-Low	1149	25yr 24hr SCS	3.4	211.23	212.68	212.08	212.72	0.001626	0.85	4.01	5.39	0.31
Lansdowne	Reach 1-Low	1149	50yr 24hr SCS	4.51	211.23	212.78	212.22	212.83	0.001983	0.99	4.54	5.72	0.35
Lansdowne	Reach 1-Low	1149	100yr 24hr SCS	5.73	211.23	212.87	212.35	212.94	0.002291	1.13	5.06	6.03	0.38
Lansdowne	Reach 1-Low	1149	200yr 24hr SCS	7.24	211.23	212.98	212.47	213.06	0.002627	1.28	5.65	6.42	0.42
Lansdowne	Reach 1-Low	1147	Timmins	9.73	211.67	212.98	212.82	213.19	0.00876	2.04	4.8	7.58	0.77
Lansdowne	Reach 1-Low	1147	2yr 24hr SCS	0.69	211.67	212.24		212.25	0.002122	0.6	1.14	3.47	0.33
Lansdowne	Reach 1-Low	1147	5yr 24hr SCS	1.38	211.67	212.38	212.14	212.42	0.002777	0.82	1.69	3.91	0.4
Lansdowne	Reach 1-Low	1147	10yr 24hr SCS	2.15	211.67	212.48		212.54	0.003749	1.03	2.09	4.28	0.47
Lansdowne	Reach 1-Low	1147	25yr 24hr SCS	3.4	211.67	212.62		212.7	0.004506	1.23	2.76	4.9	0.53
Lansdowne	Reach 1-Low	1147	50yr 24hr SCS	4.51	211.67	212.7		212.81	0.005515	1.43	3.15	5.18	0.59
Lansdowne	Reach 1-Low	1147	100yr 24hr SCS	5.73	211.67	212.78	212.57	212.91	0.006558	1.62	3.54	5.52	0.65
Lansdowne	Reach 1-Low	1147	200yr 24hr SCS	7.24	211.67	212.86	212.67	213.03	0.007496	1.79	4.04	6.05	0.7
Lansdowne	Reach 1-Low	1118	Timmins	9.73	211.77	212.67	212.67	212.88	0.012403	2.1	5.38	14.77	0.9
Lansdowne	Reach 1-Low	1118	2yr 24hr SCS	0.69	211.77	212.02	212.02	212.1	0.022924	1.27	0.54	3.38	1.01
Lansdowne	Reach 1-Low	1118	5yr 24hr SCS	1.38	211.77	212.12	212.12	212.23	0.020634	1.5	0.92	4.11	1.01
Lansdowne	Reach 1-Low	1118	10yr 24hr SCS	2.15	211.77	212.34		212.4	0.005719	1.06	2.03	5.77	0.57
Lansdowne	Reach 1-Low	1118	25yr 24hr SCS	3.4	211.77	212.5		212.56	0.004557	1.09	3.32	10.54	0.53
Lansdowne	Reach 1-Low	1118	50yr 24hr SCS	4.51	211.77	212.55		212.63	0.005812	1.28	3.84	11.4	0.6
Lansdowne	Reach 1-Low	1118	100yr 24hr SCS	5.73	211.77	212.58		212.69	0.007717	1.52	4.17	12.2	0.7
Lansdowne	Reach 1-Low	1118	200yr 24hr SCS	7.24	211.77	212.6	212.57	212.76	0.010521	1.81	4.48	12.98	0.82
Lansdowne	Reach 1-Low	1094	Timmins	9.73	210.84	212.76		212.78	0.000383	0.63	24.39	43.85	0.18
Lansdowne	Reach 1-Low	1094	2yr 24hr SCS	0.69	210.84	211.67		211.68	0.000466	0.3	2.26	5.91	0.16
Lansdowne	Reach 1-Low	1094	5yr 24hr SCS	1.38	210.84	212		212	0.000291	0.31	4.47	9.94	0.13
Lansdowne	Reach 1-Low	1094	10yr 24hr SCS	2.15	210.84	212.37		212.37	0.000093	0.24	11.33	22.29	0.08
Lansdowne	Reach 1-Low	1094	25yr 24hr SCS	3.4	210.84	212.53		212.54	0.000116	0.3	15.61	32.21	0.09
Lansdowne	Reach 1-Low	1094	50yr 24hr SCS	4.51	210.84	212.59		212.6	0.000162	0.37	17.58	35.38	0.11
Lansdowne	Reach 1-Low	1094	100yr 24hr SCS	5.73	210.84	212.63		212.64	0.000217	0.44	19.22	38.16	0.13
Lansdowne	Reach 1-Low	1094	200yr 24hr SCS	7.24	210.84	212.68		212.69	0.000288	0.52	21.14	40.46	0.15

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
Lansdowne	Reach 1-Low	1092	Timmins	9.73	210.84	212.76	212.07	212.77	0.000433	0.66	24.4	42.72	0.19
Lansdowne	Reach 1-Low	1092	2yr 24hr SCS	0.69	210.84	211.67	211.27	211.68	0.001	0.43	1.6	5.24	0.23
Lansdowne	Reach 1-Low	1092	5yr 24hr SCS	1.38	210.84	211.99	211.44	212	0.000451	0.43	3.31	9.24	0.17
Lansdowne	Reach 1-Low	1092	10yr 24hr SCS	2.15	210.84	212.36	211.56	212.37	0.00023	0.41	5.33	23.56	0.13
Lansdowne	Reach 1-Low	1092	25yr 24hr SCS	3.4	210.84	212.53	211.71	212.53	0.000245	0.47	10.5	35.53	0.14
Lansdowne	Reach 1-Low	1092	50yr 24hr SCS	4.51	210.84	212.59	211.79	212.6	0.00019	0.4	17.41	38.18	0.12
Lansdowne	Reach 1-Low	1092	100yr 24hr SCS	5.73	210.84	212.63	211.87	212.64	0.000251	0.47	19.15	40.19	0.14
Lansdowne	Reach 1-Low	1092	200yr 24hr SCS	7.24	210.84	212.68	211.95	212.69	0.000322	0.55	21.15	41.66	0.16
Lansdowne	Reach 1-Low	1090	Driveway 5	Culvert									
Lansdowne	Reach 1-Low	1082	Timmins	9.73	210.87	212.09	212.03	212.54	0.010801	2.97	3.28	19.96	0.92
Lansdowne	Reach 1-Low	1082	2yr 24hr SCS	0.69	210.87	211.21	211.16	211.28	0.010065	1.12	0.62	2.88	0.71
Lansdowne	Reach 1-Low	1082	5yr 24hr SCS	1.38	210.87	211.31	211.28	211.44	0.014821	1.6	0.86	3.46	0.89
Lansdowne	Reach 1-Low	1082	10yr 24hr SCS	2.15	210.87	211.51	211.41	211.62	0.008044	1.49	1.45	4.81	0.7
Lansdowne	Reach 1-Low	1082	25yr 24hr SCS	3.4	210.87	211.68	211.54	211.83	0.007	1.71	1.99	10.5	0.68
Lansdowne	Reach 1-Low	1082	50yr 24hr SCS	4.51	210.87	211.76	211.64	211.97	0.008151	2.01	2.25	12.62	0.75
Lansdowne	Reach 1-Low	1082	100yr 24hr SCS	5.73	210.87	211.74	211.74	212.09	0.014381	2.62	2.19	12.3	1
Lansdowne	Reach 1-Low	1082	200yr 24hr SCS	7.24	210.87	211.86	211.86	212.27	0.013651	2.83	2.56	13.95	1
Lansdowne	Reach 1-Low	1079	Timmins	9.73	210.86	212.29		212.34	0.001475	1.09	13.75	35.38	0.34
Lansdowne	Reach 1-Low	1079	2yr 24hr SCS	0.69	210.86	211.15	211.15	211.24	0.02013	1.32	0.52	2.74	0.96
Lansdowne	Reach 1-Low	1079	5yr 24hr SCS	1.38	210.86	211.29	211.26	211.4	0.014687	1.42	0.97	3.54	0.87
Lansdowne	Reach 1-Low	1079	10yr 24hr SCS	2.15	210.86	211.52		211.58	0.005782	1.13	1.91	4.88	0.58
Lansdowne	Reach 1-Low	1079	25yr 24hr SCS	3.4	210.86	211.71		211.77	0.004436	1.09	3.18	8.84	0.52
Lansdowne	Reach 1-Low	1079	50yr 24hr SCS	4.51	210.86	211.82		211.89	0.003544	1.13	4.37	12.4	0.48
Lansdowne	Reach 1-Low	1079	100yr 24hr SCS	5.73	210.86	211.82		211.92	0.005869	1.44	4.32	12.15	0.62
Lansdowne	Reach 1-Low	1079	200yr 24hr SCS	7.24	210.86	211.87	211.76	212	0.006951	1.66	4.94	13.69	0.68
Lansdowne	Reach 1-Low	1060	Timmins	9.73	210.71	212.3		212.31	0.000315	0.56	29.82	64.22	0.16
Lansdowne	Reach 1-Low	1060	2yr 24hr SCS	0.69	210.71	211.07		211.09	0.003383	0.63	1.1	4.62	0.41
Lansdowne	Reach 1-Low	1060	5yr 24hr SCS	1.38	210.71	211.27		211.29	0.002114	0.62	2.22	6.65	0.34
Lansdowne	Reach 1-Low	1060	10yr 24hr SCS	2.15	210.71	211.51		211.53	0.000944	0.52	4.14	8.87	0.24
Lansdowne	Reach 1-Low	1060	25yr 24hr SCS	3.4	210.71	211.71		211.73	0.000742	0.56	6.28	11.74	0.23
Lansdowne	Reach 1-Low	1060	50yr 24hr SCS	4.51	210.71	211.83		211.85	0.000726	0.62	7.99	23.16	0.23
Lansdowne	Reach 1-Low	1060	100yr 24hr SCS	5.73	210.71	211.83		211.86	0.001176	0.78	7.98	23.1	0.29
Lansdowne	Reach 1-Low	1060	200yr 24hr SCS	7.24	210.71	211.88		211.92	0.001441	0.91	9.28	27.1	0.33
Lansdowne	Reach 1-Low	1018	Timmins	9.73	210.61	212.3		212.3	0.000151	0.42	37.14	55.69	0.12
Lansdowne	Reach 1-Low	1018	2yr 24hr SCS	0.69	210.61	210.97		210.98	0.001951	0.48	1.43	5.97	0.32
Lansdowne	Reach 1-Low	1018	5yr 24hr SCS	1.38	210.61	211.22		211.23	0.000783	0.43	3.2	7.93	0.22
Lansdowne	Reach 1-Low	1018	10yr 24hr SCS	2.15	210.61	211.5		211.5	0.000378	0.36	6.06	13.27	0.16
Lansdowne	Reach 1-Low	1018	25yr 24hr SCS	3.4	210.61	211.7		211.71	0.000301	0.39	9.79	26.56	0.15
Lansdowne	Reach 1-Low	1018	50yr 24hr SCS	4.51	210.61	211.82		211.82	0.00029	0.43	13.42	37.51	0.15
Lansdowne	Reach 1-Low	1018	100yr 24hr SCS	5.73	210.61	211.81		211.82	0.000488	0.55	13.11	36.16	0.19
Lansdowne	Reach 1-Low	1018	200yr 24hr SCS	7.24	210.61	211.86		211.87	0.000616	0.64	15.01	43.05	0.22
Lansdowne	Reach 1-Low	971	Timmins	9.73	210.46	212.3		212.3	0.000059	0.27	59.18	76.16	0.07
Lansdowne	Reach 1-Low	971	2yr 24hr SCS	0.69	210.46	210.87		210.88	0.002315	0.49	1.41	6.53	0.34
Lansdowne	Reach 1-Low	971	5yr 24hr SCS	1.38	210.46	211.2		211.2	0.0004	0.32	4.32	10.06	0.16
Lansdowne	Reach 1-Low	971	10yr 24hr SCS	2.15	210.46	211.48		211.49	0.000202	0.27	8.52	29.03	0.12
Lansdowne	Reach 1-Low	971	25yr 24hr SCS	3.4	210.46	211.7		211.7	0.000127	0.27	18.47	57.58	0.1
Lansdowne	Reach 1-Low	971	50yr 24hr SCS	4.51	210.46	211.81		211.82	0.000109	0.27	25.3	60.12	0.09
Lansdowne	Reach 1-Low	971	100yr 24hr SCS	5.73	210.46	211.8		211.81	0.000188	0.36	24.62	59.76	0.12
Lansdowne	Reach 1-Low	971	200yr 24hr SCS	7.24	210.46	211.85		211.85	0.000233	0.41	27.46	61.85	0.14
Lansdowne	Reach 1-Low	961	Timmins	9.73	210.08	212.29		212.3	0.000041	0.25	69.62	86.02	0.06
Lansdowne	Reach 1-Low	961	2yr 24hr SCS	0.69	210.08	210.86		210.87	0.000391	0.26	2.61	7.97	0.15
Lansdowne	Reach 1-Low	961	5yr 24hr SCS	1.38	210.08	211.2		211.2	0.000152	0.23	6.08	11.59	0.1
Lansdowne	Reach 1-Low	961	10yr 24hr SCS	2.15	210.08	211.48		211.49	0.000085	0.22	11.42	36.03	0.08
Lansdowne	Reach 1-Low	961	25yr 24hr SCS	3.4	210.08	211.69		211.7	0.00007	0.23	22.83	67.96	0.07
Lansdowne	Reach 1-Low	961	50yr 24hr SCS	4.51	210.08	211.81		211.81	0.000066	0.25	31.14	73.26	0.07
Lansdowne	Reach 1-Low	961	100yr 24hr SCS	5.73	210.08	211.8		211.8	0.000113	0.32	30.29	72.49	0.1
Lansdowne	Reach 1-Low	961	200yr 24hr SCS	7.24	210.08	211.85		211.85	0.000143	0.37	33.74	75.04	0.11
Lansdowne	Reach 1-Low	958	Timmins	9.73	209.55	212.29	210.58	212.3	0.000031	0.26	78.13	89.85	0.05
Lansdowne	Reach 1-Low	958	2yr 24hr SCS	0.69	209.55	210.86	209.84	210.87	0.000025	0.12	5.7	7.99	0.04
Lansdowne	Reach 1-Low	958	5yr 24hr SCS	1.38	209.55	211.2	209.97	211.2	0.000031	0.17	9.1	12.28	0.05
Lansdowne	Reach 1-Low	958	10yr 24hr SCS	2.15	209.55	211.48	210.06	211.49	0.000033	0.2	12.6	53.02	0.05
Lansdowne	Reach 1-Low	958	25yr 24hr SCS	3.4	209.55	211.7	210.19	211.7	0.000033	0.22	29.81	67.62	0.05
Lansdowne	Reach 1-Low	958	50yr 24hr SCS	4.51	209.55	211.81	210.28	211.81	0.000036	0.24	38.28	75.23	0.06
Lansdowne	Reach 1-Low	958	100yr 24hr SCS	5.73	209.55	211.8	210.36	211.8	0.000061	0.31	37.41	74.76	0.07
Lansdowne	Reach 1-Low	958	200yr 24hr SCS	7.24	209.55	211.85	210.45	211.85	0.00008	0.36	40.93	76.31	0.09
Lansdowne	Reach 1-Low	946	Eglington Rd N	Culvert									
Lansdowne	Reach 1-Low	940	Timmins	9.73	209.54	212.29	210.71	212.29	0.000033	0.22	78.5	84.13	0.05
Lansdowne	Reach 1-Low	940	2yr 24hr SCS	0.69	209.54	210.85	209.81	210.85	0.000086	0.19	3.63	6.31	0.07
Lansdowne	Reach 1-Low	940	5yr 24hr SCS	1.38	209.54	211.13	209.92	211.14	0.000142	0.27	5.07	26.7	0.09
Lansdowne	Reach 1-Low	940	10yr 24hr SCS	2.15	209.54	211.32	210.03	211.33	0.000189	0.35	6.07	32.09	0.11
Lansdowne	Reach 1-Low	940	25yr 24hr SCS	3.4	209.54	211.42	210.16	211.43	0.000361	0.52	6.58	35.87	0.15
Lansdowne	Reach 1-Low	940	50yr 24hr SCS	4.51	209.54	211.71	210.28	211.71	0.000063	0.24	32.94	66.96	0.07
Lansdowne	Reach 1-Low	940	100yr 24hr SCS	5.73	209.54	211.46	210.39	211.5	0.000913	0.84	6.82	37.05	0.24
Lansdowne	Reach 1-Low	940	200yr 24hr SCS	7.24	209.54	211.51	210.52	211.56	0.001294	1.02	7.07	44.35	0.28

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
Lansdowne	Reach 1-Low	937	Timmins	9.73	210.12	212.29		212.29	0.000041	0.22	73.36	87.14	0.06
Lansdowne	Reach 1-Low	937	2yr 24hr SCS	0.69	210.12	210.83		210.84	0.002269	0.53	1.3	4.75	0.32
Lansdowne	Reach 1-Low	937	5yr 24hr SCS	1.38	210.12	211.12		211.13	0.000859	0.46	3	6.88	0.22
Lansdowne	Reach 1-Low	937	10yr 24hr SCS	2.15	210.12	211.32		211.33	0.000632	0.4	7.23	36.57	0.19
Lansdowne	Reach 1-Low	937	25yr 24hr SCS	3.4	210.12	211.42		211.43	0.000617	0.45	11.17	44.61	0.2
Lansdowne	Reach 1-Low	937	50yr 24hr SCS	4.51	210.12	211.7		211.71	0.000128	0.27	26.7	67.41	0.1
Lansdowne	Reach 1-Low	937	100yr 24hr SCS	5.73	210.12	211.47		211.48	0.001162	0.66	13.45	48.67	0.27
Lansdowne	Reach 1-Low	937	200yr 24hr SCS	7.24	210.12	211.52		211.54	0.001212	0.71	16.13	51.81	0.28
Lansdowne	Reach 1-Low	918	Timmins	9.73	210.39	212.29		212.29	0.000027	0.17	89.86	111.71	0.05
Lansdowne	Reach 1-Low	918	2yr 24hr SCS	0.69	210.39	210.79		210.81	0.001755	0.5	1.37	4.93	0.3
Lansdowne	Reach 1-Low	918	5yr 24hr SCS	1.38	210.39	211.11		211.12	0.000968	0.38	3.67	16.08	0.23
Lansdowne	Reach 1-Low	918	10yr 24hr SCS	2.15	210.39	211.31		211.32	0.000311	0.29	9.78	44.53	0.14
Lansdowne	Reach 1-Low	918	25yr 24hr SCS	3.4	210.39	211.41		211.42	0.000326	0.34	14.64	55.05	0.15
Lansdowne	Reach 1-Low	918	50yr 24hr SCS	4.51	210.39	211.7		211.71	0.000078	0.21	31.36	67.33	0.08
Lansdowne	Reach 1-Low	918	100yr 24hr SCS	5.73	210.39	211.46		211.47	0.000634	0.49	17.06	55.38	0.21
Lansdowne	Reach 1-Low	918	200yr 24hr SCS	7.24	210.39	211.51		211.52	0.000669	0.53	20.01	55.99	0.21
Lansdowne	Reach 1-Low	915	Timmins	9.73	209.96	212.29	211.07	212.29	0.000029	0.17	90.49	115.21	0.05
Lansdowne	Reach 1-Low	915	2yr 24hr SCS	0.69	209.96	210.8	210.2	210.8	0.0003	0.26	2.64	4.52	0.11
Lansdowne	Reach 1-Low	915	5yr 24hr SCS	1.38	209.96	211.11	210.32	211.11	0.000371	0.31	4.42	11.13	0.13
Lansdowne	Reach 1-Low	915	10yr 24hr SCS	2.15	209.96	211.31	210.42	211.32	0.00027	0.27	9.9	40.25	0.12
Lansdowne	Reach 1-Low	915	25yr 24hr SCS	3.4	209.96	211.41	210.57	211.42	0.000307	0.32	14.88	55.81	0.13
Lansdowne	Reach 1-Low	915	50yr 24hr SCS	4.51	209.96	211.7	210.66	211.7	0.000077	0.21	31.89	71.95	0.07
Lansdowne	Reach 1-Low	915	100yr 24hr SCS	5.73	209.96	211.45	210.76	211.46	0.000616	0.47	17.28	56.04	0.19
Lansdowne	Reach 1-Low	915	200yr 24hr SCS	7.24	209.96	211.51	210.86	211.52	0.000663	0.51	20.24	56.36	0.19
Lansdowne	Reach 1-Low	906	Driveway 6	Culvert									
Lansdowne	Reach 1-Low	897	Timmins	9.73	209.9	212.29	210.77	212.29	0.00002	0.18	95.82	105.02	0.04
Lansdowne	Reach 1-Low	897	2yr 24hr SCS	0.69	209.9	210.63	210.11	210.63	0.000159	0.23	2.99	6.51	0.1
Lansdowne	Reach 1-Low	897	5yr 24hr SCS	1.38	209.9	210.76	210.2	210.77	0.000329	0.37	3.68	7.52	0.15
Lansdowne	Reach 1-Low	897	10yr 24hr SCS	2.15	209.9	210.87	210.29	210.89	0.000483	0.5	4.32	8.4	0.18
Lansdowne	Reach 1-Low	897	25yr 24hr SCS	3.4	209.9	211.22	210.4	211.23	0.000279	0.38	10.42	27.99	0.14
Lansdowne	Reach 1-Low	897	50yr 24hr SCS	4.51	209.9	211.7	210.49	211.7	0.000043	0.2	39.87	84.84	0.06
Lansdowne	Reach 1-Low	897	100yr 24hr SCS	5.73	209.9	211.11	210.56	211.16	0.001759	0.99	5.77	20.48	0.35
Lansdowne	Reach 1-Low	897	200yr 24hr SCS	7.24	209.9	211.22	210.64	211.25	0.001293	0.82	10.31	27.72	0.3
Lansdowne	Reach 1-Low	895	Timmins	9.73	210.22	212.29		212.29	0.000024	0.18	92.59	108.18	0.05
Lansdowne	Reach 1-Low	895	2yr 24hr SCS	0.69	210.22	210.52	210.52	210.61	0.022767	1.29	0.53	3.19	1.01
Lansdowne	Reach 1-Low	895	5yr 24hr SCS	1.38	210.22	210.63	210.63	210.73	0.021883	1.42	0.97	4.87	1.02
Lansdowne	Reach 1-Low	895	10yr 24hr SCS	2.15	210.22	210.82		210.87	0.006934	1.01	2.14	7.64	0.61
Lansdowne	Reach 1-Low	895	25yr 24hr SCS	3.4	210.22	211.22		211.23	0.000916	0.5	7.67	26.03	0.24
Lansdowne	Reach 1-Low	895	50yr 24hr SCS	4.51	210.22	211.7		211.7	0.000061	0.21	36.18	84.46	0.07
Lansdowne	Reach 1-Low	895	100yr 24hr SCS	5.73	210.22	210.93	210.93	211.11	0.017537	1.88	3.05	8.6	1.01
Lansdowne	Reach 1-Low	895	200yr 24hr SCS	7.24	210.22	211.02	211.02	211.2	0.016627	1.88	3.87	12.19	0.99
Lansdowne	Reach 1-Low	875	Timmins	9.73	209.82	212.29		212.29	0.000021	0.2	89.53	93.26	0.05
Lansdowne	Reach 1-Low	875	2yr 24hr SCS	0.69	209.82	210.52		210.52	0.000324	0.27	2.51	6.25	0.14
Lansdowne	Reach 1-Low	875	5yr 24hr SCS	1.38	209.82	210.64		210.65	0.000598	0.42	3.32	7.02	0.19
Lansdowne	Reach 1-Low	875	10yr 24hr SCS	2.15	209.82	210.82		210.83	0.000589	0.46	4.71	8.6	0.2
Lansdowne	Reach 1-Low	875	25yr 24hr SCS	3.4	209.82	211.21		211.22	0.000178	0.35	13.88	37.59	0.12
Lansdowne	Reach 1-Low	875	50yr 24hr SCS	4.51	209.82	211.7		211.7	0.000032	0.2	40.65	68.55	0.05
Lansdowne	Reach 1-Low	875	100yr 24hr SCS	5.73	209.82	210.87		210.93	0.003309	1.12	5.14	9.07	0.47
Lansdowne	Reach 1-Low	875	200yr 24hr SCS	7.24	209.82	210.96		211.03	0.003332	1.2	6.38	17.7	0.48
Lansdowne	Reach 1-Low	852	Timmins	9.73	210.05	212.29		212.29	0.00001	0.13	120.08	94.2	0.03
Lansdowne	Reach 1-Low	852	2yr 24hr SCS	0.69	210.05	210.51		210.51	0.000824	0.33	2.1	8.43	0.21
Lansdowne	Reach 1-Low	852	5yr 24hr SCS	1.38	210.05	210.62		210.63	0.001033	0.44	3.19	10.18	0.24
Lansdowne	Reach 1-Low	852	10yr 24hr SCS	2.15	210.05	210.81		210.82	0.000605	0.41	5.92	22.49	0.19
Lansdowne	Reach 1-Low	852	25yr 24hr SCS	3.4	210.05	211.21		211.21	0.000075	0.21	27.21	72.75	0.08
Lansdowne	Reach 1-Low	852	50yr 24hr SCS	4.51	210.05	211.7		211.7	0.000012	0.12	65.33	85.72	0.03
Lansdowne	Reach 1-Low	852	100yr 24hr SCS	5.73	210.05	210.68	210.62	210.8	0.01111	1.55	3.81	11.94	0.81
Lansdowne	Reach 1-Low	852	200yr 24hr SCS	7.24	210.05	210.89		210.95	0.003913	1.12	8.18	37.15	0.5
Lansdowne	Reach 1-Low	840	Timmins	9.73	209.96	212.29		212.29	0.000006	0.11	128.86	88.69	0.02
Lansdowne	Reach 1-Low	840	2yr 24hr SCS	0.69	209.96	210.51		210.51	0.000017	0.05	14.4	40	0.03
Lansdowne	Reach 1-Low	840	5yr 24hr SCS	1.38	209.96	210.63		210.63	0.000026	0.08	19.18	40.23	0.04
Lansdowne	Reach 1-Low	840	10yr 24hr SCS	2.15	209.96	210.81		210.81	0.000021	0.09	27.09	46.02	0.04
Lansdowne	Reach 1-Low	840	25yr 24hr SCS	3.4	209.96	211.21		211.21	0.000011	0.09	48.41	60.04	0.03
Lansdowne	Reach 1-Low	840	50yr 24hr SCS	4.51	209.96	211.7		211.7	0.000005	0.08	80.03	74.09	0.02
Lansdowne	Reach 1-Low	840	100yr 24hr SCS	5.73	209.96	210.75		210.76	0.000203	0.27	24.4	44.06	0.12
Lansdowne	Reach 1-Low	840	200yr 24hr SCS	7.24	209.96	210.92		210.92	0.00014	0.26	32.24	49.33	0.1
Lansdowne	Reach 1-Low	833	Timmins	9.73	209.2	212.29	209.87	212.29	0.00001	0.02	144.72	90.74	0
Lansdowne	Reach 1-Low	833	2yr 24hr SCS	0.69	209.2	210.51	209.32	210.51	0.000773	0.07	9.79	42.35	0.02
Lansdowne	Reach 1-Low	833	5yr 24hr SCS	1.38	209.2	210.63	209.39	210.63	0.001853	0.12	11.31	43.26	0.04
Lansdowne	Reach 1-Low	833	10yr 24hr SCS	2.15	209.2	210.81	209.45	210.81	0.002148	0.14	13.65	48.64	0.04
Lansdowne	Reach 1-Low	833	25yr 24hr SCS	3.4	209.2	211.21	209.54	211.21	0.00154	0.14	18.73	68.07	0.04
Lansdowne	Reach 1-Low	833	50yr 24hr SCS	4.51	209.2	211.68	209.61	211.69	0.000902	0.13	24.9	80.43	0.03
Lansdowne	Reach 1-Low	833	100yr 24hr SCS	5.73	209.2	210.73	209.68	210.75	0.020859	0.42	12.61	46.06	0.13
Lansdowne	Reach 1-Low	833	200yr 24hr SCS	7.24	209.2	210.88	209.75	210.91	0.018898	0.43	14.56	54.56	0.12

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
Lansdowne	Reach 1-Low	811	Callander Bay Dr	Bridge									
Lansdowne	Reach 1-Low	793	Timmins	9.73	209.42	210.92	210.28	210.99	0.001744	1.17	9.18	39.3	0.34
Lansdowne	Reach 1-Low	793	2yr 24hr SCS	0.69	209.42	210.48	209.58	210.48	0.00004	0.14	5.16	10.88	0.05
Lansdowne	Reach 1-Low	793	5yr 24hr SCS	1.38	209.42	210.51	209.67	210.51	0.000143	0.27	5.44	11.63	0.09
Lansdowne	Reach 1-Low	793	10yr 24hr SCS	2.15	209.42	210.56	209.75	210.57	0.000296	0.4	5.84	16.63	0.14
Lansdowne	Reach 1-Low	793	25yr 24hr SCS	3.4	209.42	210.64	209.87	210.65	0.000585	0.57	6.55	21.62	0.19
Lansdowne	Reach 1-Low	793	50yr 24hr SCS	4.51	209.42	210.72	209.95	210.74	0.000757	0.68	7.29	29.19	0.22
Lansdowne	Reach 1-Low	793	100yr 24hr SCS	5.73	209.42	210.79	210.04	210.82	0.000953	0.79	7.92	31.38	0.25
Lansdowne	Reach 1-Low	793	200yr 24hr SCS	7.24	209.42	210.86	210.14	210.9	0.001185	0.93	8.59	33.76	0.28
Lansdowne	Reach 1-Low	791	Timmins	12.68	209.42	210.94		210.97	0.001605	0.95	22.05	48.75	0.31
Lansdowne	Reach 1-Low	791	2yr 24hr SCS	1.22	209.42	210.47		210.48	0.000317	0.27	5.59	17.7	0.12
Lansdowne	Reach 1-Low	791	5yr 24hr SCS	2.24	209.42	210.5		210.51	0.000862	0.46	6.16	21.26	0.21
Lansdowne	Reach 1-Low	791	10yr 24hr SCS	3.29	209.42	210.55		210.56	0.001314	0.6	7.19	24.46	0.26
Lansdowne	Reach 1-Low	791	25yr 24hr SCS	4.98	209.42	210.63		210.65	0.001659	0.74	9.59	32.98	0.3
Lansdowne	Reach 1-Low	791	50yr 24hr SCS	6.47	209.42	210.72		210.74	0.001486	0.77	12.69	36.61	0.29
Lansdowne	Reach 1-Low	791	100yr 24hr SCS	8.13	209.42	210.79		210.81	0.001465	0.81	15.38	40.31	0.29
Lansdowne	Reach 1-Low	791	200yr 24hr SCS	10.13	209.42	210.86		210.89	0.00152	0.88	18.63	44.79	0.3
Lansdowne	Reach 1-Low	756	Timmins	12.68	209.49	210.94		210.94	0.000203	0.44	57.05	100.54	0.13
Lansdowne	Reach 1-Low	756	2yr 24hr SCS	1.22	209.49	210.47		210.47	0.000041	0.14	17.26	72.45	0.05
Lansdowne	Reach 1-Low	756	5yr 24hr SCS	2.24	209.49	210.5		210.5	0.000106	0.23	19.28	73.46	0.09
Lansdowne	Reach 1-Low	756	10yr 24hr SCS	3.29	209.49	210.54		210.55	0.000153	0.29	22.63	75.9	0.11
Lansdowne	Reach 1-Low	756	25yr 24hr SCS	4.98	209.49	210.63		210.63	0.000185	0.34	29.15	81.8	0.12
Lansdowne	Reach 1-Low	756	50yr 24hr SCS	6.47	209.49	210.72		210.72	0.000165	0.35	36.66	83.68	0.11
Lansdowne	Reach 1-Low	756	100yr 24hr SCS	8.13	209.49	210.79		210.79	0.00017	0.37	42.72	87.43	0.12
Lansdowne	Reach 1-Low	756	200yr 24hr SCS	10.13	209.49	210.87		210.87	0.000181	0.4	49.79	95.56	0.12
Lansdowne	Reach 1-Low	728	Timmins	12.68	209.25	210.93		210.94	0.000228	0.42	50.86	95.05	0.13
Lansdowne	Reach 1-Low	728	2yr 24hr SCS	1.22	209.25	210.47		210.47	0.000032	0.1	17.91	46.28	0.04
Lansdowne	Reach 1-Low	728	5yr 24hr SCS	2.24	209.25	210.5		210.5	0.00009	0.18	19.15	48.18	0.08
Lansdowne	Reach 1-Low	728	10yr 24hr SCS	3.29	209.25	210.54		210.54	0.000143	0.24	21.29	50.72	0.1
Lansdowne	Reach 1-Low	728	25yr 24hr SCS	4.98	209.25	210.62		210.62	0.000197	0.3	25.73	62.44	0.12
Lansdowne	Reach 1-Low	728	50yr 24hr SCS	6.47	209.25	210.71		210.71	0.00019	0.32	31.91	73.02	0.12
Lansdowne	Reach 1-Low	728	100yr 24hr SCS	8.13	209.25	210.78		210.79	0.000203	0.35	37.29	81.53	0.12
Lansdowne	Reach 1-Low	728	200yr 24hr SCS	10.13	209.25	210.86		210.86	0.000209	0.38	44.02	90.88	0.13
Lansdowne	Reach 1-Low	726	Timmins	12.68	209.14	210.93	210.08	210.94	0.000126	0.39	56.98	94.4	0.11
Lansdowne	Reach 1-Low	726	2yr 24hr SCS	1.22	209.14	210.47	209.39	210.47	0.000009	0.08	22.95	50.52	0.03
Lansdowne	Reach 1-Low	726	5yr 24hr SCS	2.24	209.14	210.5	209.5	210.5	0.000028	0.14	24.28	51.4	0.05
Lansdowne	Reach 1-Low	726	10yr 24hr SCS	3.29	209.14	210.54	209.59	210.54	0.000048	0.2	26.56	54.64	0.06
Lansdowne	Reach 1-Low	726	25yr 24hr SCS	4.98	209.14	210.62	209.72	210.62	0.000076	0.26	31.29	63.44	0.08
Lansdowne	Reach 1-Low	726	50yr 24hr SCS	6.47	209.14	210.71	209.83	210.71	0.000085	0.29	37.34	73.37	0.08
Lansdowne	Reach 1-Low	726	100yr 24hr SCS	8.13	209.14	210.78	209.93	210.79	0.000099	0.32	43.05	89.33	0.09
Lansdowne	Reach 1-Low	726	200yr 24hr SCS	10.13	209.14	210.86	209.98	210.86	0.00011	0.35	50.15	92.98	0.1
Lansdowne	Reach 1-Low	724	Pedestrian 2	Culvert									
Lansdowne	Reach 1-Low	717	Timmins	12.68	208.97	210.93	210.28	210.94	0.000212	0.35	52.53	88.01	0.1
Lansdowne	Reach 1-Low	717	2yr 24hr SCS	1.22	208.97	210.47	209.35	210.47	0.000026	0.09	19.92	52.74	0.03
Lansdowne	Reach 1-Low	717	5yr 24hr SCS	2.24	208.97	210.5	209.51	210.5	0.000073	0.15	21.3	54.14	0.06
Lansdowne	Reach 1-Low	717	10yr 24hr SCS	3.29	208.97	210.54	209.64	210.54	0.000118	0.2	23.68	57.16	0.07
Lansdowne	Reach 1-Low	717	25yr 24hr SCS	4.98	208.97	210.62	209.82	210.62	0.000165	0.25	28.57	64.38	0.09
Lansdowne	Reach 1-Low	717	50yr 24hr SCS	6.47	208.97	210.7	210.1	210.71	0.000169	0.27	34.25	67.91	0.09
Lansdowne	Reach 1-Low	717	100yr 24hr SCS	8.13	208.97	210.78	210.14	210.79	0.000176	0.29	39.85	77.08	0.09
Lansdowne	Reach 1-Low	717	200yr 24hr SCS	10.13	208.97	210.85	210.25	210.85	0.0002	0.32	45.26	85.1	0.1
Lansdowne	Reach 1-Low	715	Timmins	12.68	209.17	210.93		210.94	0.000263	0.44	48.27	81.01	0.13
Lansdowne	Reach 1-Low	715	2yr 24hr SCS	1.22	209.17	210.47		210.47	0.00004	0.12	17.42	52.34	0.05
Lansdowne	Reach 1-Low	715	5yr 24hr SCS	2.24	209.17	210.49		210.5	0.000108	0.21	18.78	54.12	0.08
Lansdowne	Reach 1-Low	715	10yr 24hr SCS	3.29	209.17	210.54		210.54	0.000176	0.28	21.14	57.05	0.1
Lansdowne	Reach 1-Low	715	25yr 24hr SCS	4.98	209.17	210.62		210.62	0.000227	0.33	25.88	61.28	0.12
Lansdowne	Reach 1-Low	715	50yr 24hr SCS	6.47	209.17	210.7		210.71	0.000223	0.35	31.3	65.89	0.12
Lansdowne	Reach 1-Low	715	100yr 24hr SCS	8.13	209.17	210.78		210.78	0.000229	0.38	36.65	71.75	0.12
Lansdowne	Reach 1-Low	715	200yr 24hr SCS	10.13	209.17	210.85		210.85	0.000252	0.41	41.66	77.98	0.13
Lansdowne	Reach 1-Low	678	Timmins	12.68	209.65	210.9		210.92	0.000768	0.82	39.03	109.98	0.25
Lansdowne	Reach 1-Low	678	2yr 24hr SCS	1.22	209.65	210.46		210.47	0.000221	0.31	7.1	31.33	0.12
Lansdowne	Reach 1-Low	678	5yr 24hr SCS	2.24	209.65	210.47		210.49	0.000684	0.55	7.5	34.82	0.22
Lansdowne	Reach 1-Low	678	10yr 24hr SCS	3.29	209.65	210.5		210.52	0.001126	0.73	8.58	39.02	0.28
Lansdowne	Reach 1-Low	678	25yr 24hr SCS	4.98	209.65	210.58		210.6	0.001365	0.86	11.68	45.8	0.32
Lansdowne	Reach 1-Low	678	50yr 24hr SCS	6.47	209.65	210.67		210.68	0.001173	0.86	16.65	70.71	0.3
Lansdowne	Reach 1-Low	678	100yr 24hr SCS	8.13	209.65	210.75		210.76	0.000921	0.81	23.23	85.61	0.27
Lansdowne	Reach 1-Low	678	200yr 24hr SCS	10.13	209.65	210.81		210.83	0.000994	0.88	29.4	102.45	0.28

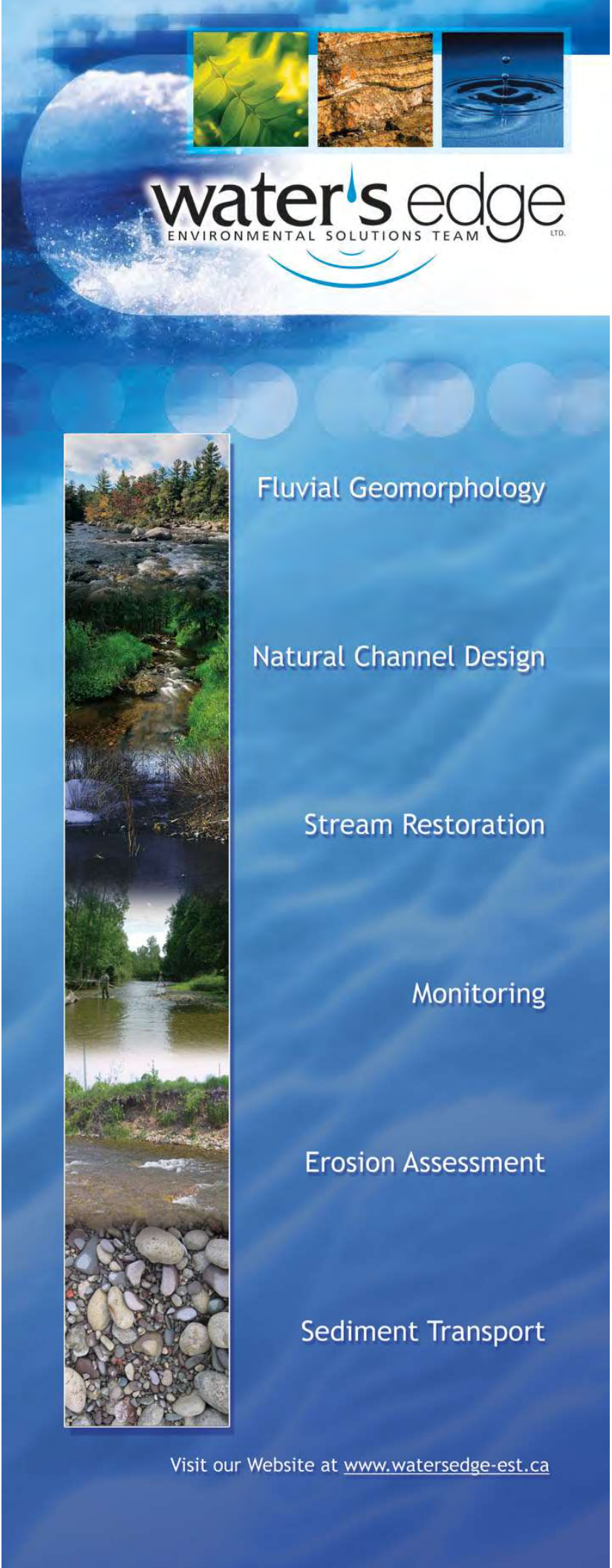
River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
Lansdowne	Reach 1-Low	658	Timmins	12.68	208.99	210.9		210.9	0.000369	0.48	49.9	103.71	0.15
Lansdowne	Reach 1-Low	658	2yr 24hr SCS	1.22	208.99	210.46		210.46	0.000085	0.18	12.17	52.67	0.07
Lansdowne	Reach 1-Low	658	5yr 24hr SCS	2.24	208.99	210.47		210.48	0.000263	0.32	12.75	56.12	0.12
Lansdowne	Reach 1-Low	658	10yr 24hr SCS	3.29	208.99	210.5		210.51	0.000442	0.42	14.36	59.88	0.15
Lansdowne	Reach 1-Low	658	25yr 24hr SCS	4.98	208.99	210.57		210.58	0.000552	0.48	19.59	81.15	0.17
Lansdowne	Reach 1-Low	658	50yr 24hr SCS	6.47	208.99	210.66		210.67	0.000427	0.44	27.46	88.41	0.16
Lansdowne	Reach 1-Low	658	100yr 24hr SCS	8.13	208.99	210.75		210.75	0.000358	0.43	35.01	91.61	0.14
Lansdowne	Reach 1-Low	658	200yr 24hr SCS	10.13	208.99	210.81		210.82	0.000367	0.46	41.06	96.47	0.15
Lansdowne	Reach 1-Low	636	Timmins	12.68	209.32	210.9		210.9	0.000108	0.36	70.67	104.71	0.1
Lansdowne	Reach 1-Low	636	2yr 24hr SCS	1.22	209.32	210.46		210.46	0.00001	0.08	28.34	80.12	0.03
Lansdowne	Reach 1-Low	636	5yr 24hr SCS	2.24	209.32	210.47		210.47	0.000031	0.15	29.24	82.96	0.05
Lansdowne	Reach 1-Low	636	10yr 24hr SCS	3.29	209.32	210.5		210.5	0.000061	0.21	31.63	87.73	0.07
Lansdowne	Reach 1-Low	636	25yr 24hr SCS	4.98	209.32	210.57		210.57	0.000092	0.27	38.08	92.73	0.09
Lansdowne	Reach 1-Low	636	50yr 24hr SCS	6.47	209.32	210.66		210.66	0.000091	0.29	46.82	97.91	0.09
Lansdowne	Reach 1-Low	636	100yr 24hr SCS	8.13	209.32	210.75		210.75	0.00009	0.3	55.08	100.01	0.09
Lansdowne	Reach 1-Low	636	200yr 24hr SCS	10.13	209.32	210.81		210.81	0.000102	0.33	61.56	103.3	0.09
Lansdowne	Reach 1-Low	612	Timmins	12.68	209.01	210.89		210.9	0.000215	0.48	45.18	57.74	0.13
Lansdowne	Reach 1-Low	612	2yr 24hr SCS	1.22	209.01	210.46		210.46	0.000013	0.09	22.93	43.93	0.03
Lansdowne	Reach 1-Low	612	5yr 24hr SCS	2.24	209.01	210.47		210.47	0.000041	0.16	23.38	44.13	0.05
Lansdowne	Reach 1-Low	612	10yr 24hr SCS	3.29	209.01	210.5		210.5	0.000078	0.23	24.6	45.7	0.08
Lansdowne	Reach 1-Low	612	25yr 24hr SCS	4.98	209.01	210.57		210.57	0.000131	0.31	27.95	49.31	0.1
Lansdowne	Reach 1-Low	612	50yr 24hr SCS	6.47	209.01	210.66		210.66	0.000148	0.35	32.57	52.82	0.11
Lansdowne	Reach 1-Low	612	100yr 24hr SCS	8.13	209.01	210.74		210.75	0.00016	0.38	36.99	53.64	0.11
Lansdowne	Reach 1-Low	612	200yr 24hr SCS	10.13	209.01	210.81		210.81	0.000191	0.43	40.38	54.33	0.12
Lansdowne	Reach 1-Low	611	Timmins	12.68	208.35	210.89	209.78	210.9	0.000158	0.47	48.79	58.09	0.11
Lansdowne	Reach 1-Low	611	2yr 24hr SCS	1.22	208.35	210.46	208.7	210.46	0.000006	0.08	26.46	43.73	0.02
Lansdowne	Reach 1-Low	611	5yr 24hr SCS	2.24	208.35	210.47	208.84	210.47	0.000021	0.15	26.91	44.05	0.04
Lansdowne	Reach 1-Low	611	10yr 24hr SCS	3.29	208.35	210.5	208.96	210.5	0.000041	0.21	28.11	44.87	0.05
Lansdowne	Reach 1-Low	611	25yr 24hr SCS	4.98	208.35	210.57	209.12	210.57	0.000074	0.29	31.39	49.06	0.07
Lansdowne	Reach 1-Low	611	50yr 24hr SCS	6.47	208.35	210.66	209.25	210.66	0.000091	0.33	36	52.84	0.08
Lansdowne	Reach 1-Low	611	100yr 24hr SCS	8.13	208.35	210.74	209.39	210.75	0.000106	0.37	40.45	54.36	0.09
Lansdowne	Reach 1-Low	611	200yr 24hr SCS	10.13	208.35	210.8	209.68	210.81	0.000132	0.42	43.9	55.63	0.1
Lansdowne	Reach 1-Low	602	Yard Crossing 1	Culvert									
Lansdowne	Reach 1-Low	593	Timmins	12.68	208.4	210.89	209.76	210.89	0.000143	0.48	51.14	65.67	0.11
Lansdowne	Reach 1-Low	593	2yr 24hr SCS	1.22	208.4	210.46	208.83	210.46	0.000006	0.08	24.76	50.77	0.02
Lansdowne	Reach 1-Low	593	5yr 24hr SCS	2.24	208.4	210.47	209	210.47	0.000019	0.15	25.25	53.34	0.04
Lansdowne	Reach 1-Low	593	10yr 24hr SCS	3.29	208.4	210.5	209.14	210.5	0.000043	0.23	26.69	57.5	0.06
Lansdowne	Reach 1-Low	593	25yr 24hr SCS	4.98	208.4	210.57	209.35	210.57	0.000079	0.32	30.77	60.59	0.08
Lansdowne	Reach 1-Low	593	50yr 24hr SCS	6.47	208.4	210.66	209.49	210.66	0.000089	0.35	36.37	61.83	0.09
Lansdowne	Reach 1-Low	593	100yr 24hr SCS	8.13	208.4	210.74	209.57	210.74	0.000101	0.39	41.5	62.96	0.09
Lansdowne	Reach 1-Low	593	200yr 24hr SCS	10.13	208.4	210.8	209.67	210.81	0.000126	0.44	45.44	64.83	0.1
Lansdowne	Reach 1-Low	591	Timmins	12.68	208.42	210.89		210.89	0.000138	0.48	53.76	64.28	0.11
Lansdowne	Reach 1-Low	591	2yr 24hr SCS	1.22	208.42	210.46		210.46	0.000006	0.08	27.6	54.9	0.02
Lansdowne	Reach 1-Low	591	5yr 24hr SCS	2.24	208.42	210.47		210.47	0.00002	0.15	28.13	56.47	0.04
Lansdowne	Reach 1-Low	591	10yr 24hr SCS	3.29	208.42	210.5		210.5	0.000038	0.21	29.63	57.87	0.06
Lansdowne	Reach 1-Low	591	25yr 24hr SCS	4.98	208.42	210.57		210.57	0.000065	0.29	33.71	60.59	0.07
Lansdowne	Reach 1-Low	591	50yr 24hr SCS	6.47	208.42	210.66		210.66	0.000087	0.35	39.28	61.52	0.09
Lansdowne	Reach 1-Low	591	100yr 24hr SCS	8.13	208.42	210.74		210.74	0.000097	0.38	44.37	61.94	0.09
Lansdowne	Reach 1-Low	591	200yr 24hr SCS	10.13	208.42	210.8		210.81	0.000119	0.43	48.23	62.59	0.1
Lansdowne	Reach 1-Low	570	Timmins	12.68	208.78	210.85		210.88	0.000749	0.98	22.7	45.29	0.25
Lansdowne	Reach 1-Low	570	2yr 24hr SCS	1.22	208.78	210.46		210.46	0.000025	0.15	10.98	19.16	0.04
Lansdowne	Reach 1-Low	570	5yr 24hr SCS	2.24	208.78	210.47		210.47	0.000082	0.27	11.11	19.34	0.08
Lansdowne	Reach 1-Low	570	10yr 24hr SCS	3.29	208.78	210.49		210.5	0.000164	0.38	11.55	19.91	0.11
Lansdowne	Reach 1-Low	570	25yr 24hr SCS	4.98	208.78	210.55		210.56	0.000302	0.54	12.84	21.64	0.15
Lansdowne	Reach 1-Low	570	50yr 24hr SCS	6.47	208.78	210.64		210.65	0.000383	0.63	14.89	28.07	0.17
Lansdowne	Reach 1-Low	570	100yr 24hr SCS	8.13	208.78	210.72		210.74	0.000469	0.73	17.4	35.02	0.19
Lansdowne	Reach 1-Low	570	200yr 24hr SCS	10.13	208.78	210.77		210.8	0.000612	0.85	19.38	37.63	0.22
Lansdowne	Reach 1-Low	568	Timmins	12.68	208.18	210.85	209.83	210.88	0.000798	0.98	22.8	45.44	0.2
Lansdowne	Reach 1-Low	568	2yr 24hr SCS	1.22	208.18	210.46	208.55	210.46	0.000019	0.13	12.31	17.92	0.03
Lansdowne	Reach 1-Low	568	5yr 24hr SCS	2.24	208.18	210.47	208.73	210.47	0.000062	0.24	12.44	18.05	0.05
Lansdowne	Reach 1-Low	568	10yr 24hr SCS	3.29	208.18	210.49	208.89	210.49	0.000125	0.35	12.85	18.44	0.08
Lansdowne	Reach 1-Low	568	25yr 24hr SCS	4.98	208.18	210.55	209.1	210.56	0.000242	0.49	14.05	20.24	0.11
Lansdowne	Reach 1-Low	568	50yr 24hr SCS	6.47	208.18	210.64	209.26	210.65	0.000327	0.59	15.88	22.44	0.13
Lansdowne	Reach 1-Low	568	100yr 24hr SCS	8.13	208.18	210.72	209.43	210.73	0.000438	0.7	17.96	32.12	0.15
Lansdowne	Reach 1-Low	568	200yr 24hr SCS	10.13	208.18	210.77	209.61	210.79	0.00058	0.82	19.78	35.33	0.17
Lansdowne	Reach 1-Low	566	Pedstrian 5	Culvert									
Lansdowne	Reach 1-Low	561	Timmins	12.68	208.2	210.75	210.25	210.78	0.001198	1.03	19.79	32.59	0.27
Lansdowne	Reach 1-Low	561	2yr 24hr SCS	1.22	208.2	210.46	208.67	210.46	0.000036	0.16	11.53	26.13	0.05
Lansdowne	Reach 1-Low	561	5yr 24hr SCS	2.24	208.2	210.46	208.88	210.46	0.000122	0.29	11.5	26.08	0.08
Lansdowne	Reach 1-Low	561	10yr 24hr SCS	3.29	208.2	210.45	209.06	210.46	0.000266	0.42	11.45	25.99	0.12
Lansdowne	Reach 1-Low	561	25yr 24hr SCS	4.98	208.2	210.41	209.31	210.43	0.000768	0.69	10.19	25.08	0.21
Lansdowne	Reach 1-Low	561	50yr 24hr SCS	6.47	208.2	210.51	209.51	210.53	0.000806	0.75	12.84	26.65	0.21
Lansdowne	Reach 1-Low	561	100yr 24hr SCS	8.13	208.2	210.61	209.71	210.64	0.000792	0.79	15.75	27.64	0.22
Lansdowne	Reach 1-Low	561	200yr 24hr SCS	10.13	208.2	210.66	209.9	210.69	0.001067	0.93	16.93	29.39	0.25

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
Lansdowne	Reach 1-Low	559	Timmins	12.68	208.51	210.75		210.78	0.000703	1.07	23.17	39.04	0.24
Lansdowne	Reach 1-Low	559	2yr 24hr SCS	1.22	208.51	210.46		210.46	0.000018	0.15	14.22	26.67	0.04
Lansdowne	Reach 1-Low	559	5yr 24hr SCS	2.24	208.51	210.46		210.46	0.000061	0.28	14.19	26.65	0.07
Lansdowne	Reach 1-Low	559	10yr 24hr SCS	3.29	208.51	210.45		210.46	0.000132	0.42	14.14	26.62	0.1
Lansdowne	Reach 1-Low	559	25yr 24hr SCS	4.98	208.51	210.41		210.42	0.000368	0.68	12.85	25.86	0.17
Lansdowne	Reach 1-Low	559	50yr 24hr SCS	6.47	208.51	210.51		210.53	0.000421	0.76	15.56	27.74	0.19
Lansdowne	Reach 1-Low	559	100yr 24hr SCS	8.13	208.51	210.61		210.64	0.00045	0.82	18.61	29.82	0.19
Lansdowne	Reach 1-Low	559	200yr 24hr SCS	10.13	208.51	210.66		210.69	0.000607	0.96	19.91	32.62	0.23
Lansdowne	Reach 1-Low	534	Timmins	12.68	208.18	210.76		210.77	0.000118	0.39	49.58	67.16	0.09
Lansdowne	Reach 1-Low	534	2yr 24hr SCS	1.22	208.18	210.46		210.46	0.000002	0.05	33.32	42.95	0.01
Lansdowne	Reach 1-Low	534	5yr 24hr SCS	2.24	208.18	210.46		210.46	0.000008	0.09	33.31	42.94	0.02
Lansdowne	Reach 1-Low	534	10yr 24hr SCS	3.29	208.18	210.46		210.46	0.000018	0.13	33.3	42.94	0.04
Lansdowne	Reach 1-Low	534	25yr 24hr SCS	4.98	208.18	210.41		210.42	0.000047	0.21	31.44	42.48	0.06
Lansdowne	Reach 1-Low	534	50yr 24hr SCS	6.47	208.18	210.52		210.52	0.000057	0.25	35.86	43.52	0.06
Lansdowne	Reach 1-Low	534	100yr 24hr SCS	8.13	208.18	210.62		210.63	0.000066	0.28	40.93	53.35	0.07
Lansdowne	Reach 1-Low	534	200yr 24hr SCS	10.13	208.18	210.67		210.67	0.00009	0.33	43.44	58.29	0.08
Lansdowne	Reach 1-Low	530	Timmins	12.68	208.43	210.76	209.47	210.77	0.000082	0.38	60.38	69.86	0.09
Lansdowne	Reach 1-Low	530	2yr 24hr SCS	1.22	208.43	210.46	208.71	210.46	0.000002	0.05	40.53	56.03	0.01
Lansdowne	Reach 1-Low	530	5yr 24hr SCS	2.24	208.43	210.46	208.81	210.46	0.000006	0.09	40.52	56.02	0.02
Lansdowne	Reach 1-Low	530	10yr 24hr SCS	3.29	208.43	210.46	208.91	210.46	0.000014	0.14	40.5	56	0.03
Lansdowne	Reach 1-Low	530	25yr 24hr SCS	4.98	208.43	210.41	209.03	210.42	0.000036	0.22	38.12	53.77	0.06
Lansdowne	Reach 1-Low	530	50yr 24hr SCS	6.47	208.43	210.52	209.13	210.52	0.000045	0.25	43.96	61.03	0.06
Lansdowne	Reach 1-Low	530	100yr 24hr SCS	8.13	208.43	210.62	209.23	210.63	0.00005	0.28	50.84	66.73	0.07
Lansdowne	Reach 1-Low	530	200yr 24hr SCS	10.13	208.43	210.67	209.34	210.67	0.000069	0.33	53.91	68.14	0.08
Lansdowne	Reach 1-Low	528	Toronto St	Culvert									
Lansdowne	Reach 1-Low	513	Timmins	12.68	208.28	210.75	209.43	210.77	0.000301	0.64	26.46	47.5	0.16
Lansdowne	Reach 1-Low	513	2yr 24hr SCS	1.22	208.28	209.18	208.66	209.19	0.00042	0.37	3.34	6.37	0.16
Lansdowne	Reach 1-Low	513	5yr 24hr SCS	2.24	208.28	209.6	208.79	209.61	0.000217	0.35	6.52	8.88	0.12
Lansdowne	Reach 1-Low	513	10yr 24hr SCS	3.29	208.28	210.1	208.89	210.11	0.000088	0.31	11.15	11.64	0.09
Lansdowne	Reach 1-Low	513	25yr 24hr SCS	4.98	208.28	210.4	209.03	210.41	0.000098	0.37	14.1	16.51	0.09
Lansdowne	Reach 1-Low	513	50yr 24hr SCS	6.47	208.28	210.51	209.12	210.52	0.000133	0.45	16.07	23.87	0.11
Lansdowne	Reach 1-Low	513	100yr 24hr SCS	8.13	208.28	210.61	209.22	210.62	0.000169	0.53	18.03	38.68	0.13
Lansdowne	Reach 1-Low	513	200yr 24hr SCS	10.13	208.28	210.65	209.32	210.67	0.000241	0.64	18.93	42.3	0.15
Lansdowne	Reach 1-Low	511	Timmins	12.68	208.3	210.75		210.76	0.000299	0.72	27.34	30.25	0.17
Lansdowne	Reach 1-Low	511	2yr 24hr SCS	1.22	208.3	209.17		209.19	0.001059	0.56	2.2	4.3	0.25
Lansdowne	Reach 1-Low	511	5yr 24hr SCS	2.24	208.3	209.59		209.61	0.000486	0.5	4.87	11.24	0.18
Lansdowne	Reach 1-Low	511	10yr 24hr SCS	3.29	208.3	210.1		210.11	0.000125	0.36	12.9	18.46	0.1
Lansdowne	Reach 1-Low	511	25yr 24hr SCS	4.98	208.3	210.4		210.41	0.000115	0.39	18.86	22.03	0.1
Lansdowne	Reach 1-Low	511	50yr 24hr SCS	6.47	208.3	210.51		210.52	0.000143	0.46	21.18	22.44	0.11
Lansdowne	Reach 1-Low	511	100yr 24hr SCS	8.13	208.3	210.61		210.62	0.000172	0.52	23.55	24.65	0.12
Lansdowne	Reach 1-Low	511	200yr 24hr SCS	10.13	208.3	210.65		210.67	0.00024	0.62	24.66	27.75	0.15
Lansdowne	Reach 1-Low	491	Timmins	12.68	207.86	210.73		210.76	0.000375	0.76	20.43	20.11	0.18
Lansdowne	Reach 1-Low	491	2yr 24hr SCS	1.22	207.86	209.16		209.17	0.000772	0.46	2.67	5.34	0.21
Lansdowne	Reach 1-Low	491	5yr 24hr SCS	2.24	207.86	209.59		209.6	0.000348	0.41	5.53	7.98	0.15
Lansdowne	Reach 1-Low	491	10yr 24hr SCS	3.29	207.86	210.1		210.11	0.000126	0.33	10.63	11.94	0.1
Lansdowne	Reach 1-Low	491	25yr 24hr SCS	4.98	207.86	210.4		210.41	0.000125	0.38	14.7	15.19	0.1
Lansdowne	Reach 1-Low	491	50yr 24hr SCS	6.47	207.86	210.5		210.51	0.000164	0.46	16.32	16.4	0.12
Lansdowne	Reach 1-Low	491	100yr 24hr SCS	8.13	207.86	210.6		210.62	0.000204	0.53	18.05	17.73	0.13
Lansdowne	Reach 1-Low	491	200yr 24hr SCS	10.13	207.86	210.64		210.66	0.00029	0.65	18.73	18.22	0.16
Lansdowne	Reach 1-Low	488	Timmins	12.68	208.02	210.72	209.55	210.75	0.000697	0.84	17.35	23.82	0.21
Lansdowne	Reach 1-Low	488	2yr 24hr SCS	1.22	208.02	209.15	208.44	209.17	0.000424	0.47	2.61	3.66	0.16
Lansdowne	Reach 1-Low	488	5yr 24hr SCS	2.24	208.02	209.58	208.61	209.59	0.000456	0.56	3.98	5.88	0.17
Lansdowne	Reach 1-Low	488	10yr 24hr SCS	3.29	208.02	210.09	208.73	210.1	0.000278	0.57	5.81	9.23	0.14
Lansdowne	Reach 1-Low	488	25yr 24hr SCS	4.98	208.02	210.4	208.91	210.41	0.000248	0.43	11.8	11.37	0.12
Lansdowne	Reach 1-Low	488	50yr 24hr SCS	6.47	208.02	210.5	209.04	210.51	0.00032	0.52	13.13	14.52	0.14
Lansdowne	Reach 1-Low	488	100yr 24hr SCS	8.13	208.02	210.6	209.18	210.61	0.000392	0.6	14.74	19.37	0.16
Lansdowne	Reach 1-Low	488	200yr 24hr SCS	10.13	208.02	210.63	209.36	210.66	0.000556	0.72	15.44	20.75	0.19
Lansdowne	Reach 1-Low	478	King St.	Culvert									
Lansdowne	Reach 1-Low	465	Timmins	12.68	207.7	209.06	209.06	209.55	0.013931	3.11	4.08	9.74	1
Lansdowne	Reach 1-Low	465	2yr 24hr SCS	1.22	207.7	208.16	208.16	208.32	0.020942	1.77	0.69	2.16	1
Lansdowne	Reach 1-Low	465	5yr 24hr SCS	2.24	207.7	208.37	208.37	208.53	0.01979	1.79	1.25	5.86	1
Lansdowne	Reach 1-Low	465	10yr 24hr SCS	3.29	207.7	208.47	208.47	208.68	0.018298	2	1.64	6.35	0.99
Lansdowne	Reach 1-Low	465	25yr 24hr SCS	4.98	207.7	208.61	208.61	208.87	0.016912	2.27	2.2	7.13	1
Lansdowne	Reach 1-Low	465	50yr 24hr SCS	6.47	207.7	208.71	208.71	209.02	0.016111	2.48	2.61	7.53	1
Lansdowne	Reach 1-Low	465	100yr 24hr SCS	8.13	207.7	208.81	208.81	209.17	0.015217	2.67	3.04	7.97	1
Lansdowne	Reach 1-Low	465	200yr 24hr SCS	10.13	207.7	208.94	208.92	209.35	0.013941	2.84	3.56	8.7	0.98
Lansdowne	Reach 1-Low	463	Timmins	12.68	207.68	209.15		209.2	0.002016	1.17	12.86	15.74	0.35
Lansdowne	Reach 1-Low	463	2yr 24hr SCS	1.22	207.68	208.07	208.07	208.19	0.033508	1.54	0.79	3.33	1.01
Lansdowne	Reach 1-Low	463	5yr 24hr SCS	2.24	207.68	208.22	208.22	208.35	0.028852	1.6	1.4	5.46	1.01
Lansdowne	Reach 1-Low	463	10yr 24hr SCS	3.29	207.68	208.31	208.31	208.46	0.024735	1.71	1.93	6.62	0.98
Lansdowne	Reach 1-Low	463	25yr 24hr SCS	4.98	207.68	208.44	208.44	208.59	0.016945	1.77	3.05	11.08	0.86
Lansdowne	Reach 1-Low	463	50yr 24hr SCS	6.47	207.68	208.5	208.5	208.67	0.015931	1.9	3.83	11.95	0.86
Lansdowne	Reach 1-Low	463	100yr 24hr SCS	8.13	207.68	208.73		208.82	0.005442	1.42	6.68	13.55	0.53
Lansdowne	Reach 1-Low	463	200yr 24hr SCS	10.13	207.68	209.11		209.15	0.001458	0.98	12.31	15.57	0.3

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
Lansdowne	Reach 1-Low	448	Timmins	12.68	207.4	209.18		209.19	0.000044	0.23	80.59	69.78	0.06
Lansdowne	Reach 1-Low	448	2yr 24hr SCS	1.22	207.4	207.89		207.91	0.003598	0.65	2.45	17.23	0.43
Lansdowne	Reach 1-Low	448	5yr 24hr SCS	2.24	207.4	208.04		208.05	0.001808	0.52	6.2	36.15	0.31
Lansdowne	Reach 1-Low	448	10yr 24hr SCS	3.29	207.4	208.16		208.17	0.000862	0.43	11.62	53.67	0.23
Lansdowne	Reach 1-Low	448	25yr 24hr SCS	4.98	207.4	208.34		208.35	0.00036	0.36	22.84	67.68	0.16
Lansdowne	Reach 1-Low	448	50yr 24hr SCS	6.47	207.4	208.51		208.51	0.000181	0.31	33.84	68.04	0.12
Lansdowne	Reach 1-Low	448	100yr 24hr SCS	8.13	207.4	208.78		208.79	0.00007	0.24	52.84	68.67	0.08
Lansdowne	Reach 1-Low	448	200yr 24hr SCS	10.13	207.4	209.14		209.14	0.000032	0.2	77.38	69.65	0.05
Lansdowne	Reach 1-Low	430	Timmins	12.68	207.26	209.05		209.17	0.002954	1.54	8.27	7.82	0.47
Lansdowne	Reach 1-Low	430	2yr 24hr SCS	1.22	207.26	207.64	207.64	207.77	0.020631	1.6	0.76	2.96	1.01
Lansdowne	Reach 1-Low	430	5yr 24hr SCS	2.24	207.26	207.78	207.78	207.96	0.01895	1.87	1.2	3.43	1.01
Lansdowne	Reach 1-Low	430	10yr 24hr SCS	3.29	207.26	207.89	207.89	208.11	0.017997	2.05	1.6	3.79	1.01
Lansdowne	Reach 1-Low	430	25yr 24hr SCS	4.98	207.26	208.04	208.04	208.3	0.017125	2.27	2.2	4.27	1.01
Lansdowne	Reach 1-Low	430	50yr 24hr SCS	6.47	207.26	208.29		208.48	0.008815	1.91	3.38	5.07	0.75
Lansdowne	Reach 1-Low	430	100yr 24hr SCS	8.13	207.26	208.66		208.77	0.003909	1.49	5.46	6.45	0.52
Lansdowne	Reach 1-Low	430	200yr 24hr SCS	10.13	207.26	209.05		209.13	0.001872	1.23	8.29	7.83	0.37
Lansdowne	Reach 1-Low	417	Timmins	12.68	206.66	209.08		209.12	0.001382	1	16.87	38.98	0.29
Lansdowne	Reach 1-Low	417	2yr 24hr SCS	1.22	206.66	207.27		207.36	0.012084	1.36	0.89	2.48	0.73
Lansdowne	Reach 1-Low	417	5yr 24hr SCS	2.24	206.66	207.52		207.62	0.008848	1.39	1.61	3.2	0.62
Lansdowne	Reach 1-Low	417	10yr 24hr SCS	3.29	206.66	207.73		207.83	0.007413	1.42	2.32	3.78	0.58
Lansdowne	Reach 1-Low	417	25yr 24hr SCS	4.98	206.66	208.03		208.13	0.00547	1.38	3.61	4.68	0.5
Lansdowne	Reach 1-Low	417	50yr 24hr SCS	6.47	206.66	208.28		208.37	0.004296	1.32	4.89	5.62	0.45
Lansdowne	Reach 1-Low	417	100yr 24hr SCS	8.13	206.66	208.65		208.71	0.003031	1.12	7.32	10.47	0.4
Lansdowne	Reach 1-Low	417	200yr 24hr SCS	10.13	206.66	209.07		209.1	0.00091	0.81	16.57	37.68	0.23
Lansdowne	Reach 1-Low	409	Timmins	12.68	206.61	209.07		209.11	0.000755	1.02	21.69	44.16	0.24
Lansdowne	Reach 1-Low	409	2yr 24hr SCS	1.22	206.61	207.18		207.27	0.010779	1.36	0.9	2.48	0.72
Lansdowne	Reach 1-Low	409	5yr 24hr SCS	2.24	206.61	207.48		207.56	0.005762	1.28	1.75	3.24	0.56
Lansdowne	Reach 1-Low	409	10yr 24hr SCS	3.29	206.61	207.69		207.78	0.004751	1.32	2.49	3.77	0.52
Lansdowne	Reach 1-Low	409	25yr 24hr SCS	4.98	206.61	208		208.09	0.003493	1.31	3.81	4.59	0.46
Lansdowne	Reach 1-Low	409	50yr 24hr SCS	6.47	206.61	208.26		208.34	0.002629	1.27	5.1	5.54	0.41
Lansdowne	Reach 1-Low	409	100yr 24hr SCS	8.13	206.61	208.63		208.69	0.001403	1.15	7.46	9.6	0.32
Lansdowne	Reach 1-Low	409	200yr 24hr SCS	10.13	206.61	209.07		209.09	0.000494	0.82	21.42	44.06	0.2
Lansdowne	Reach 1-Low	405	Timmins	12.68	206.71	209.08	208	209.1	0.00056	0.83	24.13	44.27	0.21
Lansdowne	Reach 1-Low	405	2yr 24hr SCS	1.22	206.71	207.15	207.07	207.23	0.009807	1.28	0.95	2.78	0.7
Lansdowne	Reach 1-Low	405	5yr 24hr SCS	2.24	206.71	207.47	207.21	207.53	0.004611	1.15	1.94	3.61	0.5
Lansdowne	Reach 1-Low	405	10yr 24hr SCS	3.29	206.71	207.68	207.34	207.75	0.003724	1.16	2.83	4.45	0.46
Lansdowne	Reach 1-Low	405	25yr 24hr SCS	4.98	206.71	208	207.53	208.07	0.002464	1.12	4.43	5.49	0.39
Lansdowne	Reach 1-Low	405	50yr 24hr SCS	6.47	206.71	208.26	207.64	208.32	0.0018	1.11	5.84	6.28	0.35
Lansdowne	Reach 1-Low	405	100yr 24hr SCS	8.13	206.71	208.63	207.75	208.68	0.001055	1.02	7.98	14.9	0.28
Lansdowne	Reach 1-Low	405	200yr 24hr SCS	10.13	206.71	209.07	207.88	209.09	0.000366	0.67	23.79	43.6	0.17
Lansdowne	Reach 1-Low	396	Lansdowne St	Bridge									
Lansdowne	Reach 1-Low	385	Timmins	12.68	206.4	207.57	207.57	207.96	0.015092	2.76	4.6	5.91	1
Lansdowne	Reach 1-Low	385	2yr 24hr SCS	1.22	206.4	206.76	206.76	206.89	0.020763	1.6	0.76	2.97	1.01
Lansdowne	Reach 1-Low	385	5yr 24hr SCS	2.24	206.4	206.91	206.91	207.07	0.018892	1.8	1.25	3.77	1
Lansdowne	Reach 1-Low	385	10yr 24hr SCS	3.29	206.4	207.02	207.02	207.21	0.018036	1.92	1.72	4.58	1
Lansdowne	Reach 1-Low	385	25yr 24hr SCS	4.98	206.4	207.15	207.15	207.38	0.01684	2.13	2.34	5	0.99
Lansdowne	Reach 1-Low	385	50yr 24hr SCS	6.47	206.4	207.24	207.24	207.51	0.016429	2.3	2.81	5.18	1
Lansdowne	Reach 1-Low	385	100yr 24hr SCS	8.13	206.4	207.34	207.34	207.65	0.01605	2.46	3.3	5.35	1
Lansdowne	Reach 1-Low	385	200yr 24hr SCS	10.13	206.4	207.44	207.44	207.79	0.01594	2.63	3.85	5.56	1.01
Lansdowne	Reach 1-Low	381	Timmins	12.68	206.29	207.25	207.25	207.54	0.014826	2.41	5.3	9.31	1
Lansdowne	Reach 1-Low	381	2yr 24hr SCS	1.22	206.29	206.66	206.66	206.76	0.020407	1.38	0.88	4.41	0.99
Lansdowne	Reach 1-Low	381	5yr 24hr SCS	2.24	206.29	206.78	206.77	206.89	0.018863	1.49	1.5	6.3	0.98
Lansdowne	Reach 1-Low	381	10yr 24hr SCS	3.29	206.29	206.85	206.85	206.99	0.019624	1.67	1.97	7.21	1.02
Lansdowne	Reach 1-Low	381	25yr 24hr SCS	4.98	206.29	206.94	206.94	207.12	0.018158	1.87	2.66	7.72	1.02
Lansdowne	Reach 1-Low	381	50yr 24hr SCS	6.47	206.29	207.01	207.01	207.22	0.017226	1.99	3.24	8.19	1.01
Lansdowne	Reach 1-Low	381	100yr 24hr SCS	8.13	206.29	207.09	207.09	207.31	0.016496	2.11	3.86	8.69	1.01
Lansdowne	Reach 1-Low	381	200yr 24hr SCS	10.13	206.29	207.16	207.16	207.42	0.015439	2.24	4.53	9.01	1
Lansdowne	Reach 1-Low	351	Timmins	12.68	205.6	206.68	206.68	206.94	0.011773	2.5	6.72	13.67	0.92
Lansdowne	Reach 1-Low	351	2yr 24hr SCS	1.22	205.6	206.01	206.01	206.14	0.020609	1.58	0.77	3.08	1.01
Lansdowne	Reach 1-Low	351	5yr 24hr SCS	2.24	205.6	206.14	206.14	206.31	0.019156	1.83	1.23	3.73	1.02
Lansdowne	Reach 1-Low	351	10yr 24hr SCS	3.29	205.6	206.28	206.28	206.43	0.014648	1.72	2.14	8.75	0.91
Lansdowne	Reach 1-Low	351	25yr 24hr SCS	4.98	205.6	206.39	206.39	206.56	0.012428	1.87	3.23	10.92	0.87
Lansdowne	Reach 1-Low	351	50yr 24hr SCS	6.47	205.6	206.46	206.46	206.64	0.012582	2.04	3.93	11.38	0.9
Lansdowne	Reach 1-Low	351	100yr 24hr SCS	8.13	205.6	206.53	206.53	206.73	0.012235	2.18	4.73	12.05	0.9
Lansdowne	Reach 1-Low	351	200yr 24hr SCS	10.13	205.6	206.6	206.6	206.83	0.012184	2.35	5.6	12.83	0.92
Lansdowne	Reach 1-Low	326	Timmins	12.68	204.84	206	206	206.3	0.014609	2.44	5.2	8.65	0.99
Lansdowne	Reach 1-Low	326	2yr 24hr SCS	1.22	204.84	205.23	205.23	205.35	0.020319	1.51	0.81	3.46	1
Lansdowne	Reach 1-Low	326	5yr 24hr SCS	2.24	204.84	205.35	205.35	205.51	0.018692	1.74	1.28	4.16	1
Lansdowne	Reach 1-Low	326	10yr 24hr SCS	3.29	204.84	205.46	205.46	205.64	0.017516	1.9	1.74	4.7	1
Lansdowne	Reach 1-Low	326	25yr 24hr SCS	4.98	204.84	205.58	205.58	205.81	0.016891	2.09	2.38	5.41	1.01
Lansdowne	Reach 1-Low	326	50yr 24hr SCS	6.47	204.84	205.69	205.69	205.93	0.015983	2.18	2.96	6.05	1
Lansdowne	Reach 1-Low	326	100yr 24hr SCS	8.13	204.84	205.78	205.78	206.05	0.015621	2.28	3.56	6.69	1
Lansdowne	Reach 1-Low	326	200yr 24hr SCS	10.13	204.84	205.88	205.88	206.17	0.015398	2.37	4.27	7.48	1

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
Lansdowne	Reach 1-Low	284	Timmins	12.68	203.37	205.04		205.15	0.004335	1.58	9.47	19.53	0.54
Lansdowne	Reach 1-Low	284	2yr 24hr SCS	1.22	203.37	203.86		203.96	0.012836	1.4	0.87	2.89	0.81
Lansdowne	Reach 1-Low	284	5yr 24hr SCS	2.24	203.37	204.44		204.47	0.001469	0.72	3.09	4.73	0.29
Lansdowne	Reach 1-Low	284	10yr 24hr SCS	3.29	203.37	204.65		204.68	0.001728	0.77	4.31	7.45	0.32
Lansdowne	Reach 1-Low	284	25yr 24hr SCS	4.98	203.37	204.77		204.82	0.002404	0.94	5.38	9.75	0.38
Lansdowne	Reach 1-Low	284	50yr 24hr SCS	6.47	203.37	204.85		204.91	0.002848	1.08	6.23	13.49	0.42
Lansdowne	Reach 1-Low	284	100yr 24hr SCS	8.13	203.37	204.91		204.98	0.003332	1.24	7.15	16.72	0.46
Lansdowne	Reach 1-Low	284	200yr 24hr SCS	10.13	203.37	204.97		205.06	0.00383	1.4	8.17	17.47	0.5
Lansdowne	Reach 1-Low	282	Timmins	12.68	202.79	205.07	204.28	205.11	0.001549	0.96	15.07	36.37	0.33
Lansdowne	Reach 1-Low	282	2yr 24hr SCS	1.22	202.79	203.91	203.15	203.92	0.000387	0.42	2.93	3.56	0.15
Lansdowne	Reach 1-Low	282	5yr 24hr SCS	2.24	202.79	204.45	203.3	204.46	0.000307	0.4	5.59	7.33	0.14
Lansdowne	Reach 1-Low	282	10yr 24hr SCS	3.29	202.79	204.65	203.44	204.66	0.00041	0.46	7.26	9.38	0.16
Lansdowne	Reach 1-Low	282	25yr 24hr SCS	4.98	202.79	204.79	203.62	204.8	0.000766	0.58	8.87	16.25	0.22
Lansdowne	Reach 1-Low	282	50yr 24hr SCS	6.47	202.79	204.86	203.76	204.88	0.000956	0.67	10.2	18	0.25
Lansdowne	Reach 1-Low	282	100yr 24hr SCS	8.13	202.79	204.93	203.89	204.95	0.001204	0.76	11.41	19.89	0.28
Lansdowne	Reach 1-Low	282	200yr 24hr SCS	10.13	202.79	204.99	204.04	205.03	0.001389	0.86	12.84	24.22	0.31
Lansdowne	Reach 1-Low	273	High St.	Culvert									
Lansdowne	Reach 1-Low	260	Timmins	12.68	202.41	203.73	203.73	204.18	0.015628	2.97	4.27	11.86	1
Lansdowne	Reach 1-Low	260	2yr 24hr SCS	1.22	202.41	203.05	202.8	203.08	0.002546	0.8	1.53	3.33	0.38
Lansdowne	Reach 1-Low	260	5yr 24hr SCS	2.24	202.41	203.2	202.94	203.26	0.003689	1.09	2.06	3.65	0.46
Lansdowne	Reach 1-Low	260	10yr 24hr SCS	3.29	202.41	203.28	203.06	203.38	0.005603	1.41	2.33	3.8	0.58
Lansdowne	Reach 1-Low	260	25yr 24hr SCS	4.98	202.41	203.34	203.21	203.53	0.009658	1.93	2.58	3.94	0.76
Lansdowne	Reach 1-Low	260	50yr 24hr SCS	6.47	202.41	203.37	203.34	203.66	0.014679	2.41	2.68	3.99	0.94
Lansdowne	Reach 1-Low	260	100yr 24hr SCS	8.13	202.41	203.45	203.45	203.82	0.016792	2.7	3.01	4.16	1.01
Lansdowne	Reach 1-Low	260	200yr 24hr SCS	10.13	202.41	203.59	203.59	203.99	0.015955	2.81	3.61	4.71	1
Lansdowne	Reach 1-Low	258	Timmins	12.68	202.34	203.7	203.7	203.96	0.009782	2.38	6.65	13.95	0.8
Lansdowne	Reach 1-Low	258	2yr 24hr SCS	1.22	202.34	203.05		203.08	0.001602	0.66	1.84	3.8	0.3
Lansdowne	Reach 1-Low	258	5yr 24hr SCS	2.24	202.34	203.21		203.25	0.002374	0.91	2.45	4.1	0.38
Lansdowne	Reach 1-Low	258	10yr 24hr SCS	3.29	202.34	203.28		203.36	0.003614	1.19	2.77	4.24	0.47
Lansdowne	Reach 1-Low	258	25yr 24hr SCS	4.98	202.34	203.36		203.49	0.006123	1.62	3.08	4.38	0.61
Lansdowne	Reach 1-Low	258	50yr 24hr SCS	6.47	202.34	203.39		203.6	0.008951	1.99	3.25	4.45	0.75
Lansdowne	Reach 1-Low	258	100yr 24hr SCS	8.13	202.34	203.43	203.35	203.72	0.012426	2.39	3.4	4.51	0.88
Lansdowne	Reach 1-Low	258	200yr 24hr SCS	10.13	202.34	203.6	203.6	203.85	0.010269	2.28	5.24	13.27	0.81
Lansdowne	Reach 1-Low	254	Timmins	12.68	202.05	203.73		203.82	0.002477	1.43	11.65	15.05	0.41
Lansdowne	Reach 1-Low	254	2yr 24hr SCS	1.22	202.05	203.06		203.07	0.000361	0.38	3.2	4.64	0.15
Lansdowne	Reach 1-Low	254	5yr 24hr SCS	2.24	202.05	203.22		203.24	0.000655	0.56	4.35	13.06	0.2
Lansdowne	Reach 1-Low	254	10yr 24hr SCS	3.29	202.05	203.31		203.33	0.000923	0.7	5.56	13.79	0.24
Lansdowne	Reach 1-Low	254	25yr 24hr SCS	4.98	202.05	203.41		203.45	0.001319	0.89	6.99	14.05	0.29
Lansdowne	Reach 1-Low	254	50yr 24hr SCS	6.47	202.05	203.49		203.53	0.001615	1.03	8.04	14.23	0.32
Lansdowne	Reach 1-Low	254	100yr 24hr SCS	8.13	202.05	203.58		203.63	0.00179	1.13	9.31	14.44	0.34
Lansdowne	Reach 1-Low	254	200yr 24hr SCS	10.13	202.05	203.61		203.69	0.002439	1.35	9.81	14.54	0.4
Lansdowne	Reach 1-Low	252	Timmins	12.68	201.84	203.74	203.35	203.8	0.001711	1.25	13.84	16.7	0.34
Lansdowne	Reach 1-Low	252	2yr 24hr SCS	1.22	201.84	203.06	202.35	203.07	0.000334	0.38	3.31	8.07	0.13
Lansdowne	Reach 1-Low	252	5yr 24hr SCS	2.24	201.84	203.22	202.56	203.23	0.000526	0.54	5.24	14.25	0.17
Lansdowne	Reach 1-Low	252	10yr 24hr SCS	3.29	201.84	203.31	202.74	203.33	0.000742	0.67	6.41	14.58	0.21
Lansdowne	Reach 1-Low	252	25yr 24hr SCS	4.98	201.84	203.41	202.99	203.44	0.001085	0.87	7.8	15.04	0.26
Lansdowne	Reach 1-Low	252	50yr 24hr SCS	6.47	201.84	203.49	203.03	203.53	0.001354	1.01	8.82	15.38	0.29
Lansdowne	Reach 1-Low	252	100yr 24hr SCS	8.13	201.84	203.58	203.03	203.62	0.00122	0.98	11.23	15.82	0.28
Lansdowne	Reach 1-Low	252	200yr 24hr SCS	10.13	201.84	203.62	203.25	203.67	0.001662	1.16	11.8	16.02	0.33
Lansdowne	Reach 1-Low	240	Yard 2	Culvert									
Lansdowne	Reach 1-Low	227	Timmins	12.68	201.01	202.48	202.48	203.22	0.010567	3.8	3.34	6.66	1
Lansdowne	Reach 1-Low	227	2yr 24hr SCS	1.22	201.01	201.87	201.32	201.89	0.000576	0.62	1.96	4.84	0.21
Lansdowne	Reach 1-Low	227	5yr 24hr SCS	2.24	201.01	201.9	201.47	201.97	0.001739	1.1	2.03	4.89	0.37
Lansdowne	Reach 1-Low	227	10yr 24hr SCS	3.29	201.01	201.92	201.61	202.05	0.003581	1.6	2.06	4.91	0.54
Lansdowne	Reach 1-Low	227	25yr 24hr SCS	4.98	201.01	201.89	201.8	202.21	0.008976	2.49	2	4.87	0.85
Lansdowne	Reach 1-Low	227	50yr 24hr SCS	6.47	201.01	201.95	201.95	202.42	0.01229	3.04	2.13	4.96	1
Lansdowne	Reach 1-Low	227	100yr 24hr SCS	8.13	201.01	202.1	202.1	202.65	0.01164	3.27	2.48	5.24	1
Lansdowne	Reach 1-Low	227	200yr 24hr SCS	10.13	201.01	202.28	202.28	202.91	0.01104	3.52	2.88	5.9	1
Lansdowne	Reach 1-Low	225	Timmins	12.68	200.82	202.35	202.35	202.82	0.016363	3.04	4.21	4.8	0.98
Lansdowne	Reach 1-Low	225	2yr 24hr SCS	1.22	200.82	201.88		201.89	0.000724	0.53	2.32	3.2	0.2
Lansdowne	Reach 1-Low	225	5yr 24hr SCS	2.24	200.82	201.91		201.95	0.002188	0.92	2.43	3.31	0.34
Lansdowne	Reach 1-Low	225	10yr 24hr SCS	3.29	200.82	201.93		202.02	0.004409	1.32	2.5	3.38	0.49
Lansdowne	Reach 1-Low	225	25yr 24hr SCS	4.98	200.82	201.93		202.13	0.009982	1.98	2.51	3.39	0.74
Lansdowne	Reach 1-Low	225	50yr 24hr SCS	6.47	200.82	201.9	201.9	202.27	0.018699	2.69	2.4	3.29	1.01
Lansdowne	Reach 1-Low	225	100yr 24hr SCS	8.13	200.82	202.05	202.05	202.44	0.01822	2.77	2.93	3.78	1.01
Lansdowne	Reach 1-Low	225	200yr 24hr SCS	10.13	200.82	202.2	202.2	202.62	0.017498	2.87	3.53	4.27	1
Lansdowne	Reach 1-Low	220	Timmins	12.68	200.89	202.16	202.16	202.59	0.014598	2.91	4.41	5.49	1
Lansdowne	Reach 1-Low	220	2yr 24hr SCS	1.22	200.89	201.88		201.89	0.000426	0.41	2.98	4.61	0.16
Lansdowne	Reach 1-Low	220	5yr 24hr SCS	2.24	200.89	201.91		201.94	0.001213	0.71	3.15	4.7	0.28
Lansdowne	Reach 1-Low	220	10yr 24hr SCS	3.29	200.89	201.94		201.99	0.002322	1.01	3.28	4.76	0.38
Lansdowne	Reach 1-Low	220	25yr 24hr SCS	4.98	200.89	201.96		202.07	0.004817	1.47	3.39	4.82	0.56
Lansdowne	Reach 1-Low	220	50yr 24hr SCS	6.47	200.89	201.97		202.15	0.007941	1.9	3.41	4.83	0.71
Lansdowne	Reach 1-Low	220	100yr 24hr SCS	8.13	200.89	201.95	201.91	202.26	0.013422	2.44	3.34	4.79	0.93
Lansdowne	Reach 1-Low	220	200yr 24hr SCS	10.13	200.89	202.03	202.03	202.41	0.015428	2.75	3.69	5.02	1

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
Lansdowne	Reach 1-Low	209	Timmins	12.68	201.72	202.06		202.1	0.004753	0.87	14.62	62.84	0.58
Lansdowne	Reach 1-Low	209	2yr 24hr SCS	1.22	201.72	201.87		201.87	0.005801	0.4	3.06	49.17	0.51
Lansdowne	Reach 1-Low	209	5yr 24hr SCS	2.24	201.72	201.9	201.86	201.91	0.005576	0.48	4.63	54.43	0.53
Lansdowne	Reach 1-Low	209	10yr 24hr SCS	3.29	201.72	201.92		201.94	0.005288	0.55	6.05	57.15	0.53
Lansdowne	Reach 1-Low	209	25yr 24hr SCS	4.98	201.72	201.95	201.9	201.97	0.00502	0.63	7.91	57.55	0.54
Lansdowne	Reach 1-Low	209	50yr 24hr SCS	6.47	201.72	201.98		202	0.005031	0.69	9.36	59.23	0.56
Lansdowne	Reach 1-Low	209	100yr 24hr SCS	8.13	201.72	202		202.03	0.004891	0.75	10.95	60.87	0.56
Lansdowne	Reach 1-Low	209	200yr 24hr SCS	10.13	201.72	202.03	201.96	202.06	0.004893	0.81	12.56	61.62	0.57
Lansdowne	Reach 1-Low	166	Timmins	12.68	201.24	201.65	201.65	201.76	0.014925	1.49	8.6	39.87	1.01
Lansdowne	Reach 1-Low	166	2yr 24hr SCS	1.22	201.24	201.4	201.4	201.44	0.020786	0.91	1.35	16.47	1.01
Lansdowne	Reach 1-Low	166	5yr 24hr SCS	2.24	201.24	201.45	201.45	201.5	0.018902	1.02	2.19	20.86	1.01
Lansdowne	Reach 1-Low	166	10yr 24hr SCS	3.29	201.24	201.48	201.48	201.54	0.018398	1.08	3.04	25.93	1.01
Lansdowne	Reach 1-Low	166	25yr 24hr SCS	4.98	201.24	201.52	201.52	201.6	0.01795	1.19	4.2	30.63	1.02
Lansdowne	Reach 1-Low	166	50yr 24hr SCS	6.47	201.24	201.56	201.56	201.63	0.017006	1.24	5.22	34.74	1.01
Lansdowne	Reach 1-Low	166	100yr 24hr SCS	8.13	201.24	201.58	201.58	201.67	0.016321	1.33	6.13	35.85	1.02
Lansdowne	Reach 1-Low	166	200yr 24hr SCS	10.13	201.24	201.61	201.61	201.71	0.015472	1.39	7.31	38.39	1.01
Lansdowne	Reach 1-Low	147	Timmins	12.68	199.22	199.88	199.88	200.12	0.011803	2.16	5.88	12.51	1
Lansdowne	Reach 1-Low	147	2yr 24hr SCS	1.22	199.22	199.47	199.47	199.53	0.018329	1.1	1.11	9.07	1.01
Lansdowne	Reach 1-Low	147	5yr 24hr SCS	2.24	199.22	199.54	199.54	199.62	0.017046	1.29	1.74	10.71	1.02
Lansdowne	Reach 1-Low	147	10yr 24hr SCS	3.29	199.22	199.59	199.59	199.69	0.015678	1.44	2.29	11.19	1.02
Lansdowne	Reach 1-Low	147	25yr 24hr SCS	4.98	199.22	199.65	199.65	199.79	0.014443	1.62	3.07	11.76	1.01
Lansdowne	Reach 1-Low	147	50yr 24hr SCS	6.47	199.22	199.7	199.7	199.86	0.013696	1.76	3.68	11.95	1.01
Lansdowne	Reach 1-Low	147	100yr 24hr SCS	8.13	199.22	199.76	199.76	199.94	0.01305	1.89	4.31	12.13	1.01
Lansdowne	Reach 1-Low	147	200yr 24hr SCS	10.13	199.22	199.82	199.82	200.02	0.01245	2.02	5.02	12.33	1.01
Lansdowne	Reach 1-Low	130	Timmins	12.68	198.27	198.95	198.86	199.02	0.004935	1.22	11.67	44.27	0.63
Lansdowne	Reach 1-Low	130	2yr 24hr SCS	1.22	198.27	198.63	198.52	198.65	0.004011	0.54	2.27	17.51	0.48
Lansdowne	Reach 1-Low	130	5yr 24hr SCS	2.24	198.27	198.7		198.72	0.004526	0.64	3.49	22.7	0.52
Lansdowne	Reach 1-Low	130	10yr 24hr SCS	3.29	198.27	198.74		198.77	0.004727	0.73	4.5	24.97	0.55
Lansdowne	Reach 1-Low	130	25yr 24hr SCS	4.98	198.27	198.79		198.83	0.004862	0.86	5.87	29.7	0.58
Lansdowne	Reach 1-Low	130	50yr 24hr SCS	6.47	198.27	198.84	198.75	198.88	0.00432	0.92	7.3	31.06	0.56
Lansdowne	Reach 1-Low	130	100yr 24hr SCS	8.13	198.27	198.87	198.78	198.92	0.004469	1.01	8.5	35.53	0.58
Lansdowne	Reach 1-Low	130	200yr 24hr SCS	10.13	198.27	198.91	198.82	198.97	0.004698	1.11	9.88	39.61	0.61
Lansdowne	Reach 1-Low	111	Timmins	12.68	198.3	198.26	198.26	198.34	0.040394		10.18	67.59	0
Lansdowne	Reach 1-Low	111	2yr 24hr SCS	1.22	198.3	198.08		198.11	0.034026		1.84	26.19	0
Lansdowne	Reach 1-Low	111	5yr 24hr SCS	2.24	198.3	198.13		198.16	0.027775		3.28	36.13	0
Lansdowne	Reach 1-Low	111	10yr 24hr SCS	3.29	198.3	198.16		198.19	0.02737		4.29	42.18	0
Lansdowne	Reach 1-Low	111	25yr 24hr SCS	4.98	198.3	198.19		198.23	0.028967		5.9	52.96	0
Lansdowne	Reach 1-Low	111	50yr 24hr SCS	6.47	198.3	198.19	198.19	198.25	0.046427		6.02	53.38	0
Lansdowne	Reach 1-Low	111	100yr 24hr SCS	8.13	198.3	198.22	198.22	198.28	0.045936		7.3	58.5	0
Lansdowne	Reach 1-Low	111	200yr 24hr SCS	10.13	198.3	198.24	198.24	198.31	0.04298		8.58	61.96	0
Lansdowne	Reach 1-Low	94	Timmins	12.68	197.36	197.33		197.35	0.00457		19.24	59.27	0
Lansdowne	Reach 1-Low	94	2yr 24hr SCS	1.22	197.36	196.88	196.88	196.92	0.038535		1.38	15.89	0
Lansdowne	Reach 1-Low	94	5yr 24hr SCS	2.24	197.36	196.92	196.92	196.98	0.047896		2.14	19.68	0
Lansdowne	Reach 1-Low	94	10yr 24hr SCS	3.29	197.36	196.96	196.96	197.03	0.047318		2.89	21.22	0
Lansdowne	Reach 1-Low	94	25yr 24hr SCS	4.98	197.36	197	197	197.09	0.042136		3.91	24.62	0
Lansdowne	Reach 1-Low	94	50yr 24hr SCS	6.47	197.36	197.08	197.05	197.13	0.020665		6.28	36.27	0
Lansdowne	Reach 1-Low	94	100yr 24hr SCS	8.13	197.36	197.25		197.27	0.00449		14.76	58.47	0
Lansdowne	Reach 1-Low	94	200yr 24hr SCS	10.13	197.36	197.29		197.31	0.004525		16.84	58.84	0
Lansdowne	Reach 1-Low	50	Timmins	12.68	196.58	196.82	196.82	196.91	0.020447	1.09	9.87	63.62	1.05
Lansdowne	Reach 1-Low	50	2yr 24hr SCS	1.22	196.58	196.89		196.9	0.000058	0.06	15.08	81.78	0.06
Lansdowne	Reach 1-Low	50	5yr 24hr SCS	2.24	196.58	196.89		196.9	0.000198	0.11	15.04	81.65	0.1
Lansdowne	Reach 1-Low	50	10yr 24hr SCS	3.29	196.58	196.89		196.9	0.000433	0.16	14.97	81.44	0.15
Lansdowne	Reach 1-Low	50	25yr 24hr SCS	4.98	196.58	196.89		196.9	0.001024	0.24	14.8	80.92	0.23
Lansdowne	Reach 1-Low	50	50yr 24hr SCS	6.47	196.58	196.89		196.9	0.001794	0.32	14.58	79.56	0.31
Lansdowne	Reach 1-Low	50	100yr 24hr SCS	8.13	196.58	196.78	196.78	196.84	0.019133	1.13	7.16	55.74	1.03
Lansdowne	Reach 1-Low	50	200yr 24hr SCS	10.13	196.58	196.8	196.8	196.87	0.019878	1.2	8.46	58.43	1.06
Lansdowne	Reach 1-Low	32	Timmins	12.68	195.65	196.06	196.06	196.15	0.015997	1.35	9.42	52.04	1.01
Lansdowne	Reach 1-Low	32	2yr 24hr SCS	1.22	195.65	196.9	195.84	196.9	0.000001	0.02	82.41	184.25	0.01
Lansdowne	Reach 1-Low	32	5yr 24hr SCS	2.24	195.65	196.9	195.88	196.9	0.000002	0.03	82.41	184.25	0.01
Lansdowne	Reach 1-Low	32	10yr 24hr SCS	3.29	195.65	196.9	195.91	196.9	0.000004	0.04	82.41	184.25	0.02
Lansdowne	Reach 1-Low	32	25yr 24hr SCS	4.98	195.65	196.9	195.96	196.9	0.000009	0.06	82.41	184.25	0.03
Lansdowne	Reach 1-Low	32	50yr 24hr SCS	6.47	195.65	196.9	195.98	196.9	0.000015	0.08	82.41	184.25	0.04
Lansdowne	Reach 1-Low	32	100yr 24hr SCS	8.13	195.65	196.01	196.01	196.08	0.016903	1.21	6.7	45.05	1.01
Lansdowne	Reach 1-Low	32	200yr 24hr SCS	10.13	195.65	196.03	196.03	196.11	0.01683	1.29	7.83	47.78	1.02



APPENDIX C:

Structure Information

Project Name: Lansdowne Creek FPM

Project Number: 23016

Bridge Crossing Risk Assessment

River	Reach	River Sta	Profile	E.G. US.	Min El Prs	BR Open Area	Q Total	Min El Weir Flow	W.S. Elev	Q Weir	Delta EG	Crossing Depth
				(m)	(m)	(m2)	(m3/s)	(m)	(m)	(m3/s)	(m)	>= 0.3m
Lansdowne	Reach 1-Lower	1298 HWY 94	Timmins	215.1	213.75	2.79	7.93	214.88	215.1		0.5	0
Lansdowne	Reach 1-Lower	1298 HWY 94	2yr 24hr SCS	213.03	213.75	2.79	0.53	214.88	213.03		0.02	0
Lansdowne	Reach 1-Lower	1298 HWY 94	5yr 24hr SCS	213.36	213.75	2.79	1.09	214.88	213.35		0.03	0
Lansdowne	Reach 1-Lower	1298 HWY 94	10yr 24hr SCS	213.95	213.75	2.79	1.71	214.88	213.95		0.03	0
Lansdowne	Reach 1-Lower	1298 HWY 94	25yr 24hr SCS	214.31	213.75	2.79	2.73	214.88	214.31		0.07	0
Lansdowne	Reach 1-Lower	1298 HWY 94	50yr 24hr SCS	214.47	213.75	2.79	3.64	214.88	214.46		0.13	0
Lansdowne	Reach 1-Lower	1298 HWY 94	100yr 24hr SCS	214.63	213.75	2.79	4.65	214.88	214.63		0.21	0
Lansdowne	Reach 1-Lower	1298 HWY 94	200yr 24hr SCS	214.84	213.75	2.79	5.9	214.88	214.84		0.35	0
Lansdowne	Reach 1-Lower	811 Callander Bay Dr	Timmins	212.29	210.44	3.12	9.73	212	212.29		1.3	0
Lansdowne	Reach 1-Lower	811 Callander Bay Dr	2yr 24hr SCS	210.51	210.44	3.12	0.69	212	210.51		0.03	0
Lansdowne	Reach 1-Lower	811 Callander Bay Dr	5yr 24hr SCS	210.63	210.44	3.12	1.38	212	210.63		0.11	0
Lansdowne	Reach 1-Lower	811 Callander Bay Dr	10yr 24hr SCS	210.81	210.44	3.12	2.15	212	210.81		0.25	0
Lansdowne	Reach 1-Lower	811 Callander Bay Dr	25yr 24hr SCS	211.21	210.44	3.12	3.4	212	211.21		0.56	0
Lansdowne	Reach 1-Lower	811 Callander Bay Dr	50yr 24hr SCS	211.69	210.44	3.12	4.51	212	211.68		0.95	0
Lansdowne	Reach 1-Lower	811 Callander Bay Dr	100yr 24hr SCS	210.75	210.44	3.12	5.73	212	210.73		-0.07	0
Lansdowne	Reach 1-Lower	811 Callander Bay Dr	200yr 24hr SCS	210.91	210.44	3.12	7.24	212	210.88		0.01	0
Lansdowne	Reach 1-Lower	396 Lansdowne St	Timmins	209.1	208.1	2.95	12.68	208.68	207.57		1.15	0
Lansdowne	Reach 1-Lower	396 Lansdowne St	2yr 24hr SCS	207.23	208.1	2.95	1.22	208.68	206.76		0.34	0
Lansdowne	Reach 1-Lower	396 Lansdowne St	5yr 24hr SCS	207.53	208.1	2.95	2.24	208.68	206.91		0.46	0
Lansdowne	Reach 1-Lower	396 Lansdowne St	10yr 24hr SCS	207.75	208.1	2.95	3.29	208.68	207.02		0.54	0
Lansdowne	Reach 1-Lower	396 Lansdowne St	25yr 24hr SCS	208.07	208.1	2.95	4.98	208.68	207.15		0.69	0
Lansdowne	Reach 1-Lower	396 Lansdowne St	50yr 24hr SCS	208.32	208.1	2.95	6.47	208.68	207.24		0.81	0
Lansdowne	Reach 1-Lower	396 Lansdowne St	100yr 24hr SCS	208.68	208.1	2.95	8.13	208.68	207.34		1.04	0
Lansdowne	Reach 1-Lower	396 Lansdowne St	200yr 24hr SCS	209.09	208.1	2.95	10.13	208.68	207.44		1.3	0

Project Name: Lansdowne Creek FPM

Project Number: 23016

Crossing Risk Assessment

River	Reach	River Sta	Profile	E.G. US.	W.S. US.	E.G. IC	E.G. OC	Min El Weir Flow	Q Culv Group	Q Weir	Delta WS	Culv Vel US	Culv Vel DS	Crossing Depth
				(m)	(m)	(m)	(m)	(m)	(m3/s)	(m3/s)	(m)	(m/s)	(m/s)	>= 0.3m
Lansdowne	Reach 1-Lower	1257 Driveway 1 Group #1	Timmins	214.58	214.56	214.5	214.58	214.14	3.44	6.29	0.35	1.71	1.71	0.42
Lansdowne	Reach 1-Lower	1257 Driveway 1 Group #1	2yr 24hr SCS	212.9	212.88	212.9	213.03	214.14	0.69		0.06	1.69	0.64	0
Lansdowne	Reach 1-Lower	1257 Driveway 1 Group #1	5yr 24hr SCS	213.31	213.29	213.18	213.31	214.14	1.38		0.23	1.85	0.95	0
Lansdowne	Reach 1-Lower	1257 Driveway 1 Group #1	10yr 24hr SCS	213.92	213.91	213.45	213.92	214.14	2.15		0.14	1.12	1.07	0
Lansdowne	Reach 1-Lower	1257 Driveway 1 Group #1	25yr 24hr SCS	214.23	214.23	213.86	214.23	214.14	3.14	0.26	0.3	1.56	1.56	0
Lansdowne	Reach 1-Lower	1257 Driveway 1 Group #1	50yr 24hr SCS	214.33	214.32	214.19	214.33	214.14	3.27	1.24	0.32	1.63	1.63	0
Lansdowne	Reach 1-Lower	1257 Driveway 1 Group #1	100yr 24hr SCS	214.4	214.39	214.3	214.4	214.14	3.34	2.39	0.34	1.66	1.66	0
Lansdowne	Reach 1-Lower	1257 Driveway 1 Group #1	200yr 24hr SCS	214.48	214.46	214.39	214.48	214.14	3.38	3.86	0.34	1.68	1.68	0.32
Lansdowne	Reach 1-Lower	1199 Driveway 2 Culvert #1	Timmins	214.21	214.2	214.14	214.21	213.6	1.2	8.53	0.08	1.06	1.06	0.6
Lansdowne	Reach 1-Lower	1199 Driveway 2 Culvert #1	2yr 24hr SCS	212.43	212.43	211.85	212.43	213.6	0.69		0.03	0.62	0.61	0
Lansdowne	Reach 1-Lower	1199 Driveway 2 Culvert #1	5yr 24hr SCS	213.01	213	212.16	213.01	213.6	1.38		0.12	1.22	1.22	0
Lansdowne	Reach 1-Lower	1199 Driveway 2 Culvert #1	10yr 24hr SCS	213.77	213.77	212.49	213.77	213.6	1.57	0.58	0.16	1.39	1.39	0
Lansdowne	Reach 1-Lower	1199 Driveway 2 Culvert #1	25yr 24hr SCS	213.92	213.92	213.18	213.92	213.6	1.07	2.33	0.07	0.95	0.95	0.32
Lansdowne	Reach 1-Lower	1199 Driveway 2 Culvert #1	50yr 24hr SCS	213.99	213.99	213.93	213.99	213.6	1.02	3.49	0.06	0.9	0.9	0.39
Lansdowne	Reach 1-Lower	1199 Driveway 2 Culvert #1	100yr 24hr SCS	214.05	214.05	213.99	214.05	213.6	1.02	4.71	0.06	0.9	0.9	0.45
Lansdowne	Reach 1-Lower	1199 Driveway 2 Culvert #1	200yr 24hr SCS	214.12	214.11	214.06	214.12	213.6	1.08	6.16	0.07	0.96	0.96	0.51
Lansdowne	Reach 1-Lower	1169 Driveway 3 Group #1	Timmins	214.12	214.1	214.07	214.12	213.64	2.04	7.69	0.37	2.14	2.14	0.46
Lansdowne	Reach 1-Lower	1169 Driveway 3 Group #1	2yr 24hr SCS	212.37	212.34	212.37	212.46	213.64	0.69		0.03	1.84	0.9	0
Lansdowne	Reach 1-Lower	1169 Driveway 3 Group #1	5yr 24hr SCS	212.86	212.83	212.71	212.86	213.64	1.38		0.15	1.62	1.45	0
Lansdowne	Reach 1-Lower	1169 Driveway 3 Group #1	10yr 24hr SCS	213.6	213.57	213.11	213.6	213.64	2.15		0.39	2.26	2.26	0
Lansdowne	Reach 1-Lower	1169 Driveway 3 Group #1	25yr 24hr SCS	213.85	213.84	213.73	213.85	213.64	1.89	1.51	0.32	1.99	1.99	0
Lansdowne	Reach 1-Lower	1169 Driveway 3 Group #1	50yr 24hr SCS	213.92	213.92	213.83	213.92	213.64	1.91	2.6	0.33	2.01	2.01	0
Lansdowne	Reach 1-Lower	1169 Driveway 3 Group #1	100yr 24hr SCS	213.99	213.98	213.91	213.99	213.64	1.9	3.83	0.32	2	2	0.34
Lansdowne	Reach 1-Lower	1169 Driveway 3 Group #1	200yr 24hr SCS	214.04	214.03	214	214.04	213.64	1.98	5.26	0.35	2.08	2.08	0.39
Lansdowne	Reach 1-Lower	1155 Driveway 4 Group #1	Timmins	213.76	213.72	213.74	213.76	213.36	2.16	7.57	0.61	2.75	2.75	0.36
Lansdowne	Reach 1-Lower	1155 Driveway 4 Group #1	2yr 24hr SCS	212.32	212.3	211.92	212.32	213.36	0.69		0.04	0.88	0.88	0
Lansdowne	Reach 1-Lower	1155 Driveway 4 Group #1	5yr 24hr SCS	212.68	212.63	212.28	212.68	213.36	1.38		0.22	1.76	1.76	0
Lansdowne	Reach 1-Lower	1155 Driveway 4 Group #1	10yr 24hr SCS	213.17	213.11	212.73	213.17	213.36	2.15		0.59	2.74	2.74	0
Lansdowne	Reach 1-Lower	1155 Driveway 4 Group #1	25yr 24hr SCS	213.52	213.51	213.47	213.52	213.36	2.46	0.94	0.83	3.13	3.13	0
Lansdowne	Reach 1-Lower	1155 Driveway 4 Group #1	50yr 24hr SCS	213.6	213.58	213.56	213.6	213.36	2.42	2.09	0.8	3.08	3.08	0
Lansdowne	Reach 1-Lower	1155 Driveway 4 Group #1	100yr 24hr SCS	213.66	213.64	213.61	213.66	213.36	2.39	3.34	0.77	3.04	3.04	0
Lansdowne	Reach 1-Lower	1155 Driveway 4 Group #1	200yr 24hr SCS	213.7	213.67	213.67	213.7	213.36	2.28	4.96	0.69	2.9	2.9	0.31
Lansdowne	Reach 1-Lower	1090 Driveway 5 Group #1	Timmins	212.78	212.76	212.77	212.78	212.37	2.99	6.74	0.67	3.15	3.15	0.39
Lansdowne	Reach 1-Lower	1090 Driveway 5 Group #1	2yr 24hr SCS	211.68	211.67	211.64	211.68	212.37	0.69		0.45	1.84	2.69	0
Lansdowne	Reach 1-Lower	1090 Driveway 5 Group #1	5yr 24hr SCS	212	211.99	211.99	212	212.37	1.38		0.68	2.32	3.14	0
Lansdowne	Reach 1-Lower	1090 Driveway 5 Group #1	10yr 24hr SCS	212.37	212.36	212.37	212.31	212.37	2.13	0.05	0.86	2.79	3.53	0
Lansdowne	Reach 1-Lower	1090 Driveway 5 Group #1	25yr 24hr SCS	212.53	212.53	212.53	212.41	212.37	2.37	1.03	0.85	2.96	3.65	0
Lansdowne	Reach 1-Lower	1090 Driveway 5 Group #1	50yr 24hr SCS	212.6	212.59	212.6	212.45	212.37	2.47	2.04	0.83	3.02	3.69	0
Lansdowne	Reach 1-Lower	1090 Driveway 5 Group #1	100yr 24hr SCS	212.64	212.63	212.64	212.48	212.37	2.53	3.2	0.89	3.07	3.73	0
Lansdowne	Reach 1-Lower	1090 Driveway 5 Group #1	200yr 24hr SCS	212.69	212.68	212.69	212.51	212.37	2.61	4.63	0.82	2.74	4.4	0.31
Lansdowne	Reach 1-Lower	946 Eglington Rd N Group #1	Timmins	212.3	212.29	212.3	212.3	211.63	0.3	9.43	0	0.2	0.2	0.66
Lansdowne	Reach 1-Lower	946 Eglington Rd N Group #1	2yr 24hr SCS	210.87	210.86	210.32	210.87	211.63	0.69		0.02	0.52	0.46	0
Lansdowne	Reach 1-Lower	946 Eglington Rd N Group #1	5yr 24hr SCS	211.2	211.2	210.63	211.2	211.63	1.38		0.07	0.9	0.9	0
Lansdowne	Reach 1-Lower	946 Eglington Rd N Group #1	10yr 24hr SCS	211.49	211.48	210.94	211.49	211.63	2.15		0.16	1.4	1.4	0
Lansdowne	Reach 1-Lower	946 Eglington Rd N Group #1	25yr 24hr SCS	211.7	211.7	211.43	211.7	211.63	2.8	0.6	0.28	1.82	1.82	0
Lansdowne	Reach 1-Lower	946 Eglington Rd N Group #1	50yr 24hr SCS	211.81	211.81	211.71	211.81	211.63	1.74	2.77	0.11	1.13	1.13	0
Lansdowne	Reach 1-Lower	946 Eglington Rd N Group #1	100yr 24hr SCS	211.8	211.8	211.75	211.8	211.63	3.1	2.63	0.34	2.01	2.01	0
Lansdowne	Reach 1-Lower	946 Eglington Rd N Group #1	200yr 24hr SCS	211.85	211.85	211.82	211.85	211.63	3.1	4.14	0.34	2.01	2.01	0
Lansdowne	Reach 1-Lower	906 Driveway 6 Group #1	Timmins	212.29	212.29	212.29	212.29	211.18	0.13	9.6	0	0.16	0.16	1.11
Lansdowne	Reach 1-Lower	906 Driveway 6 Group #1	2yr 24hr SCS	210.8	210.8	210.73	210.8	211.18	0.69		0.17	1.82	1.12	0
Lansdowne	Reach 1-Lower	906 Driveway 6 Group #1	5yr 24hr SCS	211.11	211.11	211.11	211.19	211.18	1.38		0.35	2.44	1.92	0
Lansdowne	Reach 1-Lower	906 Driveway 6 Group #1	10yr 24hr SCS	211.32	211.31	211.32	211.36	211.18	1.69	0.46	0.44	2.68	2.17	0
Lansdowne	Reach 1-Lower	906 Driveway 6 Group #1	25yr 24hr SCS	211.42	211.41	211.39	211.42	211.18	1.15	2.25	0.19	1.47	1.47	0
Lansdowne	Reach 1-Lower	906 Driveway 6 Group #1	50yr 24hr SCS	211.7	211.7	211.7	211.7	211.18	0.23	4.28	0.01	0.29	0.29	0.52
Lansdowne	Reach 1-Lower	906 Driveway 6 Group #1	100yr 24hr SCS	211.46	211.45	211.47	211.46	211.18	1.56	4.17	0.34	1.99	1.99	0
Lansdowne	Reach 1-Lower	906 Driveway 6 Group #1	200yr 24hr SCS	211.52	211.51	211.5	211.52	211.18	1.43	5.81	0.29	1.83	1.83	0.33
Lansdowne	Reach 1-Lower	724 Pedestrian 2 Group #1	Timmins	210.94	210.93	210.94	210.94	209.96	0	12.68	0	0	0	0.97
Lansdowne	Reach 1-Lower	724 Pedestrian 2 Group #1	2yr 24hr SCS	210.47	210.47	210.21	210.47	209.96	0.1	1.12	0	0.13	0.13	0.51
Lansdowne	Reach 1-Lower	724 Pedestrian 2 Group #1	5yr 24hr SCS	210.5	210.5	210.5	210.5	209.96	0.13	2.11	0	0.16	0.16	0.54
Lansdowne	Reach 1-Lower	724 Pedestrian 2 Group #1	10yr 24hr SCS	210.54	210.54	210.54	210.54	209.96	0.16	3.13	0	0.2	0.2	0.58
Lansdowne	Reach 1-Lower	724 Pedestrian 2 Group #1	25yr 24hr SCS	210.62	210.62	210.62	210.62	209.96	0.18	4.8	0	0.23	0.23	0.66
Lansdowne	Reach 1-Lower	724 Pedestrian 2 Group #1	50yr 24hr SCS	210.71	210.71	210.71	210.71	209.96	0.27	6.2	0.01	0.34	0.34	0.75
Lansdowne	Reach 1-Lower	724 Pedestrian 2 Group #1	100yr 24hr SCS	210.79	210.78	210.79	210.79	209.96	0.08	8.05	0	0.1	0.1	0.82
Lansdowne	Reach 1-Lower	724 Pedestrian 2 Group #1	200yr 24hr SCS	210.86	210.86	210.85	210.86	209.96	0.32	9.81	0.01	0.41	0.41	0.9
Lansdowne	Reach 1-Lower	602 Yard Crossing 1 Group #1	Timmins	210.9	210.89	210.9	210.9	209.46	0.26	12.42	0	0.23	0.23	1.43
Lansdowne	Reach 1-Lower	602 Yard Crossing 1 Group #1	2yr 24hr SCS	210.46	210.46	209.24	210.46	209.46	0.12	1.1	0	0.1	0.1	1
Lansdowne	Reach 1-Lower	602 Yard Crossing 1 Group #1	5yr 24hr SCS	210.47	210.47	209.67	210.47	209.46	0.18	2.06	0	0.16	0.16	1.01
Lansdowne	Reach 1-Lower	602 Yard Crossing 1 Group #1	10yr 24hr SCS	210.5	210.5	210.25	210.5	209.46	0.24	3.05	0	0.21	0.21	1.04
Lansdowne	Reach 1-Lower	602 Yard Crossing 1 Group #1	25yr 24hr SCS	210.57	210.57	210.57	210.57	209.46	0.29	4.69	0	0.26	0.26	1.11
Lansdowne	Reach 1-Lower	602 Yard Crossing 1 Group #1	50yr 24hr SCS	210.66	210.66	210.66	210.66	209.46	0.25	6.22	0	0.22	0.22	1.2
Lansdowne	Reach 1-Lower	602 Yard Crossing 1 Group #1	100yr 24hr SCS	210.75	210.74	210.74	210.75	209.46	0.29	7.84	0	0.26	0.26	1.28
Lansdowne	Reach 1-Lower	602 Yard Crossing 1 Group #1	200yr 24hr SCS	210.81	210.8	210.81	210.81	209.46	0.33	9.8	0	0.29	0.29	1.34
Lansdowne	Reach 1-Lower	566 Pedstrian 5 Culvert #1	Timmins	210.88	210.85	210.81	210.88	210.06	1.1	11.58	0.1	1.27	1.27	0.79
Lansdowne	Reach 1-Lower	566 Pedstrian 5 Culvert #1	2yr 24hr SCS	210.46	210.46	209.2	210.46	210.06	0.17	1.05	0	0.2	0.2	0.4
Lansdowne	Reach 1-Lower	566 Pedstrian 5 Culvert #1	5yr 24hr SCS	210.47	210.47	209.81	210.47	210.06	0.35	1.89	0.01	0.4	0.4	0.41
Lansdowne	Reach 1-Lower	566 Pedstrian 5 Culvert #1	10yr 24hr SCS	210.49	210.49	210.46	210.49	210.06	0.61	2.68	0.04	0.7	0.7	0.43
Lansdowne	Reach 1-Lower	566 Pedstrian 5 Culvert #1	25yr 24hr SCS	210.56	210.55	210.44	210.56	210.06	1.19	3.79	0.15	1.38	1.38	0.49
Lansdowne	Reach 1-Lower	566 Pedstrian 5 Culvert #1	50yr 24hr SCS	210.65	210.64	210.56	210.65	210.06	1.15	5.32	0.13	1.32	1.32	0.58
Lansdowne	Reach 1-Lower	566 Pedstrian 5 Culvert #1	100yr 24hr SCS	210.73	210.72	210.66	210.73	210.06	1.04	7.09	0.1	1.21	1.21	0.66
Lansdowne	Reach 1-Lower	566 Pedstrian 5 Culvert #1	200yr 24hr SCS	210.8	210.77	210.72	210.8	210.06	1.13	9	0.11	1.3	1.3	0.71
Lansdowne	Reach 1-Lower	528 Toronto St Group #1	Timmins	210.77	210.76	208.68	210.77	210.47	0.03	7.51	0.02	0.03	0.03	0
Lansdowne	Reach 1-Lower	528 Toronto St Group #1	2yr 24hr SCS	210.46	210.46	209.4	210.46	210.47	0.86	11.57	1.27	0.74	1.12	0
Lansdowne	Reach 1-Lower	528 Toronto St Group #1	5yr 24hr SCS	210.46	210.46	209.79	210.46	210.47	0.73	11.57	0.85	0.62	0.63	0
Lansdowne	Reach 1-Lower	528 Toronto St Group #1	10yr 24hr SCS	210.46	210.46	210.22	210.46	210.47	0.47	11.57	0.35	0.4	0.4	0
Lansdowne	Reach 1-Lower	528 Toronto St Group #1	25yr 24hr SCS	210.42	210.41	208.72	210.42	210.47	0.06	10.35	0.01	0.05	0.05	0
Lansdowne	Reach 1-Lower	528 Toronto St Group #1	50yr 24hr SCS	210.52	210.52	208.68	210.52	210.47	0.03	5	0.01	0.03	0.03	0
Lansdowne	Reach 1-Lower	528 Toronto St Group #1	100yr 24hr SCS	210.63	210.62	208.69	210.63	210.47	0.04	8.97	0.01	0.04	0.04	0
Lansdowne	Reach 1-Lower	528 Toronto St Group #1	200yr 24hr SCS	210.67	210.67	208.68	210.67	210.47	0.04	8.44	0.02	0.03	0.03	0
Lansdowne	Reach 1-Lower	478 King St. Group #1	Timmins	210.75	210.72	211.43	210.75	210.19	4.86	7.82	1.66	4.3	4.3	0.53
Lansdowne	Reach 1-Lower	478 King St. Group #1	2yr 24hr SCS	209.17	209.15	209.07	209.17	210.19	1.22		1	2.15	3.75	0
Lansdowne	Reach 1-Lower	478 King St. Group #1	5yr 24hr SCS	209.59	209.58	209.52	209.59	210.19	2.24		1.21	2.7	4.24	0
Lansdowne	Reach 1-Lower	478 King St. Group #1	10yr 24hr SCS	210.1	210.09	210.1	210.03	210.19	3.29		1.61	2.91	4.88	0
Lansdowne	Reach 1-Lower	478 King St. Group #1	25yr 24hr SCS	210.41	210.4	210.41	210.22	210.19	3.71	1.27	1.79	3.28	5.21	0
Lansdowne	Reach 1-Lower	478 King St. Group #1	50yr 24hr SCS	210.51	210.5	210.51	210.29	210.19	3.85	2.62	1.79	3.4	5.32	0.31
Lansdowne	Reach 1-Lower	478 King St. Group #1	100yr 24hr SCS	210.61	210.6	210.61	210.35	210.19	3.98	4.15	1.79	3.52	5.43	0.41
Lansdowne	Reach 1-Lower	478 King St. Group #1	200yr 24hr SCS	210.66	210.63	211.44	210.66	210.19	4.9	5.23	1.7	4.34	4.34	0.44
Lansdowne	Reach 1-Lower	273 High St. Group #1	Timmins	205.11	205.07	205.08	205.11	204.51	3.35	9.33	1.34	3.55	3.53	0.56
Lansdowne	Reach 1-Lower	273 High St. Group #1	2yr 24hr SCS	203.92	203.91	203.77	203.92	204.51	1.22		0.86	2.22	3.16	0
Lansdowne	Reach 1-Lower	273 High St. Group #1	5yr 24hr SCS	204.46	204.45	204.19	204.46	204.51	2.24		1.25	2.87	3.67	0
Lansdowne	Reach 1-Lower	273 High St. Group #1	10yr 24hr SCS	204.66	204.65	204.33	204.66	204.51	2.6	0.69	1.38	3.12	3.83	0
Lansdowne	Reach 1-Lower	273 High St. Group #1	25yr 24hr SCS	204.8	204.79	204.42	204.8	204.51	2.83	2.15	1.44	3.29	3.94	0
Lansdowne	Reach 1-Lower	273 High St. Group #1	50yr 24hr SCS	204.88	204.86	204.48	204.88	204.51	2.96	3.51	1.49	3.39	4	0.35
Lansdowne	Reach 1-Lower	273 High St. Group #1	100yr 24hr SCS	204.96	204.93	204.53	204.96	204.51	3.07	5.06	1.48	3.47	4.05	0.42
Lansdowne	Reach 1-Lower	273 High St. Group #1	200yr 24hr SCS	205.03	204.99	204.58	205.03	204.51	3.18	6.95	1.41	3.56	4.1	0.48
Lansdowne	Reach 1-Lower	240 Yard 2 Group #1	Timmins	203.8	203.74	203.8	203.91	203.03	2.75	10.02	1.26	3.22	2.89	0.71
Lansdowne	Reach 1-Lower	240 Yard 2 Group #1	2yr 24hr SCS	203.07	203.06	202.88	203.07	203.03	1.19	0.03	1.19	2.2	4.34	0
Lansdowne	Reach 1-Lower	240 Yard 2 Group #1	5yr 24hr SCS	203.23	203.22	203.03	203.23	203.03	1.5	0.74	1.32	2.4	4.53	0
Lansdowne	Reach 1-Lower	240 Yard 2 Group #1	10yr 24hr SCS	203.33	203.31	203.12	203.33	203.03	1.68	1.61	1.39	2.51	4.63	0
Lansdowne	Reach 1-Lower	240 Yard 2 Group #1	25yr 24hr SCS	203.44	203.41	203.23	203.44	203.03	1.89	3.09	1.52	2.65	4.74	0.38
Lansdowne	Reach 1-Lower	240 Yard 2 Group #1	50yr 24hr SCS	203.53	203.49	203.32	203.53	203.03	2.06	4.41	1.54	2.75	4.82	0.46
Lansdowne	Reach 1-Lower	240 Yard 2 Group #1	100yr 24hr SCS	203.62	203.58	203.73	203.62	203.03	2.21	5.92	1.48	2.86	2.33	0.55
Lansdowne	Reach 1-Lower	240 Yard 2 Group #1	200yr 24hr SCS	203.67	203.62	204.22	203.84	203.03	3.23	6.9	1.34	3.4	3.4	0.59
Trib 1	Reach 2	914 Derland Rd Group #1	Timmins	230.52	230.52	230.24	230.52	230.42	1.22	1.07	0.98	2.72	3.5	0
Trib 1	Reach 2	914 Derland Rd Group #1	2yr 24hr SCS	229.54	229.54	229.47	229.54	230.42	0.16		0.47	1.29	2.19	0
Trib 1	Reach 2	914 Derland Rd Group #1	5yr 24hr SCS	229.62	229.62	229.55	229.62	230.42	0.23		0.53	1.43	2.38	0
Trib 1	Reach 2	914 Derland Rd Group #1	10yr 24hr SCS	229.74	229.74	229.65	229.74	230.42	0.34		0.61	1.61	2.6	0
Trib 1	Reach 2	914 Derland Rd Group #1	25yr 24hr SCS	229.95	229.95	229.82	229.95	230.42	0.57		0.77	1.92	2.91	0
Trib 1	Reach 2	914 Derland Rd Group #1	50yr 24hr SCS	230.14	230.14	229.95	230.14	230.42	0.79		0.91	2.18	3.13	0
Trib 1	Reach 2	914 Derland Rd Group #1	100yr 24hr SCS	230.37	230.37	230.14	230.37	230.42	1.05		1.05	2.5	3.36	0
Trib 1	Reach 2	914 Derland Rd Group #1	200yr 24hr SCS	230.46	230.46	230.2	230.46	230.42	1.15	0.22	1.02	2.63	3.45	0
Trib 1	Reach 1	253 Railway South Cr Group #1	Timmins	226.41	226.41	225.92	226.41	231.41	5.77		0.56	2.27	2.27	0
Trib 1	Reach 1	253 Railway South Cr Group #1	2yr 24hr SCS	224.39	224.38	224.29	224.39	231.41	0.41		0.05	0.87	0.42	0
Trib 1	Reach 1	253 Railway South Cr Group #1	5yr 24hr SCS	224.64	224.63	224.5	224.64	231.41	0.87		0.07	1.05	0.63	0
Trib 1	Reach 1	253 Railway South Cr Group #1	10yr 24hr SCS	224.85	224.84	224.68	224.85	231.41	1.36		0.1	1.18	0.8	0
Trib 1	Reach 1	253 Railway South Cr Group #1	25yr 24hr SCS	225.14	225.12	224.93	225.14	231.41	2.15		0.14	1.35	1.02	0
Trib 1	Reach 1	253 Railway South Cr Group #1	50yr 24hr SCS	225.37	225.36	225.13	225.37	231.41	2.85		0.19	1.48	1.21	0
Trib 1	Reach 1	253 Railway South Cr Group #1	100yr 24hr SCS	225.61	225.61	225.34	225.61	231.41	3.62		0.24	1.62	1.43	0
Trib 1	Reach 1	253 Railway South Cr Group #1	200yr 24hr SCS	225.94	225.94	225.6	225.94	231.41	4.58		0.35	1.82	1.8	0
Trib 1	Reach 1	175 HWY 11 n&s - Sou Culvert #1	Timmins	225.86	225.85	225.74	225.86	230.27	5.77		3.97	3.22	5.71	0
Trib 1	Reach 1	175 HWY 11 n&s - Sou Culvert #1	2yr 24hr SCS	224.33	224.33	224.26	224.33	230.27	0.41		2.93	1.44	2.89	0
Trib 1	Reach 1	175 HWY 11 n&s - Sou Culvert #1	5yr 24hr SCS	224.56	224.55	224.46	224.56	230.27	0.87		2.99	1.76	3.61	0
Trib 1	Reach 1	175 HWY 11 n&s - Sou Culvert #1	10yr 24hr SCS	224.74	224.73	224.63	224.74	230.27	1.36		3.1	2	4.12	0
Trib 1	Reach 1	175 HWY 11 n&s - Sou Culvert #1	25yr 24hr SCS	224.98	224.98	224.86	224.98	230.27	2.15		3.26	2.29	4.57	0
Trib 1	Reach 1	175 HWY 11 n&s - Sou Culvert #1	50yr 24hr SCS	225.17	225.17	225.04	225.17	230.27	2.85		3.4	2.5	4.89	0
Trib 1	Reach 1	175 HWY 11 n&s - Sou Culvert #1	100yr 24hr SCS	225.37	225.36	225.23	225.37	230.27	3.62		3.56	2.7	5.16	0
Trib 1	Reach 1	175 HWY 11 n&s - Sou Culvert #1	200yr 24hr SCS	225.59	225.59	225.46	225.59	230.27	4.58		3.75	2.94	5.44	0
Trib 2	Reach 1	671 Railway - North Group #1	Timmins	229.34	229.34	227.79	229.34	230.11	2.15		0.05	0.84	0.84	0
Trib 2	Reach 1	671 Railway - North Group #1	2yr 24hr SCS	227.14	227.14	227.02	227.14	230.11	0.12		0	0.4	0.15	0
Trib 2	Reach 1	671 Railway - North Group #1	5yr 24hr SCS	227.24	227.24	227.11	227.24	230.11	0.24		0.01	0.54	0.24	0
Trib 2	Reach 1	671 Railway - North Group #1	10yr 24hr SCS	227.35	227.35	227.2	227.35	230.11	0.39		0.01	0.65	0.33	0
Trib 2	Reach 1	671 Railway - North Group #1	25yr 24hr SCS	227.53	227.53	227.32	227.53	230.11	0.64		0.02	0.71	0.43	0
Trib 2	Reach 1	671 Railway - North Group #1	50yr 24hr SCS	227.72	227.72	227.41	227.72	230.11	0.87		0.02	0.71	0.48	0
Trib 2	Reach 1	671 Railway - North Group #1	100yr 24hr SCS	227.96	227.96	227.49	227.96	230.11	1.12		0.02	0.67	0.51	0
Trib 2	Reach 1	671 Railway - North Group #1	200yr 24hr SCS	228.31	228.31	227.59	228.31	230.11	1.44		0.02	0.65	0.57	0
Trib 2	Reach 1	617 HWY 11 N - North Group #1	Timmins	229.29	229.29	228.2	229.29	231.14	2.15		0.79	2.74	2.74	0
Trib 2	Reach 1	617 HWY 11 N - North Group #1	2yr 24hr SCS	227.13	227.13	226.81	227.13	231.14	0.12		0	0.26	0.19	0
Trib 2	Reach 1	617 HWY 11 N - North Group #1	5yr 24hr SCS	227.23	227.23	226.92	227.23	231.14	0.24		0.01	0.43	0.34	0
Trib 2	Reach 1	617 HWY 11 N - North Group #1	10yr 24hr SCS	227.33	227.33	227.03	227.33	231.14	0.39		0.03	0.61	0.51	0
Trib 2	Reach 1	617 HWY 11 N - North Group #1	25yr 24hr SCS	227.51	227.51	227.2	227.51	231.14	0.64		0.07	0.85	0.81	0
Trib 2	Reach 1	617 HWY 11 N - North Group #1	50yr 24hr SCS	227.7	227.7	227.33	227.7	231.14	0.87		0.13	1.11	1.11	0
Trib 2	Reach 1	617 HWY 11 N - North Group #1	100yr 24hr SCS	227.93	227.93	227.48	227.93	231.14	1.12		0.21	1.43	1.43	0
Trib 2	Reach 1	617 HWY 11 N - North Group #1	200yr 24hr SCS	228.28	228.28	227.66	228.28	231.14	1.44		0.36	1.83	1.83	0
Trib 2	Reach 1	586 HWY 11 S - North Group #1	Timmins	228.5	228.5	227.97	228.5	230.15	2.15		0.83	2.74	2.74	0
Trib 2	Reach 1	586 HWY 11 S - North Group #1	2yr 24hr SCS	227.12	227.12	226.58	227.12	230.15	0.12		0	0.18	0.2	0
Trib 2	Reach 1	586 HWY 11 S - North Group #1	5yr 24hr SCS	227.22	227.22	226.69	227.22	230.15	0.24		0.01	0.33	0.35	0
Trib 2	Reach 1	586 HWY 11 S - North Group #1	10yr 24hr SCS	227.3	227.3	226.81	227.3	230.15	0.39		0.03	0.5	0.53	0
Trib 2	Reach 1	586 HWY 11 S - North Group #1	25yr 24hr SCS	227.44	227.44	226.97	227.44	230.15	0.64		0.08	0.81	0.82	0
Trib 2	Reach 1	586 HWY 11 S - North Group #1	50yr 24hr SCS	227.57	227.57	227.11	227.57	230.15	0.87		0.14	1.11	1.11	0
Trib 2	Reach 1	586 HWY 11 S - North Group #1	100yr 24hr SCS	227.72	227.72	227.25	227.72	230.15	1.12		0.23	1.43	1.43	0
Trib 2	Reach 1	586 HWY 11 S - North Group #1	200yr 24hr SCS	227.93	227.93	227.44	227.93	230.15	1.44		0.37	1.83	1.83	0

Lansdowne Creek Structures Inventory

				Survey Date:		May 17, 2023	
Surveyor:		Eh Klay Law		**Watercourse:**		Lansdowne Creek	
Street Location:		Marina Culvert		**Municipality:**		Callander Bay	
Structure Number:		1		**Date of Construction:**		n/a	
Coordinates	**E:**	626015.4650m		**Temporary Benchmark**			
	N:	5119987.5420m		**Elev.**	n/a		
Structure Shape:		culvert		n/a			
Structure Material:		n/a					
Opening Characteristics							
Cell Shape:	n/a	**Cells:**	1				
Material:	n/a	**Rise:**	n/a	**Sag Elevation:**		n/a	
Diameter:	n/a	**Span:**	n/a	**Railing Height:**	n/a	**Length:**	n/a
Pier Configuration		**Number:**	n/a	**Elev. Left:**	n/a	**Elev. Right:**	n/a
Width:	n/a	**Location:**	n/a	**Length of Culvert/Crossing:**		n/a	
End Treatment:				**Skew Angle:**	n/a	**Rise:**	n/a
n/a				**Opening Face Width:**		n/a	
Upstream Treatment:				**Downstream Treatment:**			
n/a				n/a			
Upstream Elevations:				**Downstream Elevations:**			
Invert		n/a		**Invert**		n/a	
Obvert		n/a		**Obvert**		196.12	
Top		n/a		**Top**		196.58	
Comments: Hidden under a deck							

Description: Looking u/s

Description: Looking at right

Description: Looking d/s

Description: Looking at d/s face

Lansdowne Creek Structures Inventory

				Survey Date:		May 17, 2023	
Surveyor:		Eh Klay Law		**Watercourse:**		Lansdowne Creek	
Street Location:		Main Street		**Municipality:**		Callander Bay	
Structure Number:		2		**Date of Construction:**		n/a	
Coordinates	**E:**	626193.2520m		**Temporary Benchmark**			
	N:	5120037.1270m		**Elev.**	n/a		
Structure Shape:		culvert		n/a			
Structure Material:		Steel Corrugated Pipe					
Opening Characteristics							
Cell Shape:	Circular	**Cells:**	1				
Material:	n/a	**Rise:**	1.2m	**Sag Elevation:**		n/a	
Diameter:	1200mm	**Span:**	1.2m	**Railing Height:**	n/a	**Length:**	n/a
Pier Configuration		**Number:**	n/a	**Elev. Left:**	n/a	**Elev. Right:**	n/a
Width:	n/a	**Location:**	n/a	**Length of Culvert/Crossing:**		n/a	
End Treatment:				**Skew Angle:**	n/a	**Rise:**	n/a
Headwall				**Opening Face Width:**		n/a	
Upstream Treatment:				**Downstream Treatment:**			
n/a				n/a			
Upstream Elevations:				**Downstream Elevations:**			
Invert		200.42		**Invert**		n/a	
Obvert		201.68		**Obvert**		n/a	
Top		202.30		**Top**		n/a	
Comments:							

Description: Looking u/s

Description: Looking at u/s face

Description: Looking at right bank

Description: deck on right bank

Lansdowne Creek Structures Inventory

				Survey Date:		May 17, 2023	
Surveyor:		Eh Klay Law		**Watercourse:**		Lansdowne Creek	
Street Location:		High Street and Main Street		**Municipality:**		Callander Bay	
Structure Number:		3		**Date of Construction:**		n/a	
Coordinates	**E:**	626213.897m		**Temporary Benchmark**			
	N:	626213.897m		**Elev.**	n/a		
Structure Shape:		culvert		n/a			
Structure Material:		Corrugated Steel Pipe					
Opening Characteristics							
Cell Shape:	Circular	**Cells:**	1				
Material:	n/a	**Rise:**	1m	**Sag Elevation:**		n/a	
Diameter:	1000 mm	**Span:**	1m	**Railing Height:**	n/a	**Length:**	n/a
Pier Configuration		**Number:**	n/a	**Elev. Left:**	n/a	**Elev. Right:**	n/a
Width:	n/a	**Location:**	n/a	**Length of Culvert/Crossing:**		25m	
End Treatment:				**Skew Angle:**	n/a	**Rise:**	n/a
Gabion				**Opening Face Width:**		n/a	
Upstream Treatment:				**Downstream Treatment:**			
Gabion on the left				n/a			
Upstream Elevations:				**Downstream Elevations:**			
Invert		201.95		**Invert**		201.07	
Obvert		202.99		**Obvert**		202.15	
Top		n/a		**Top**		n/a	
Comments:							

Description: Looking u/s

Description: Looking at u/s face

Description: Looking d/s

Description: Looking at d/s face

Lansdowne Creek Structures Inventory

				Survey Date:		May 17, 2023	
Surveyor:		Eh Klay Law		**Watercourse:**		Lansdowne Creek	
Street Location:		High Street		**Municipality:**		Callander Bay	
Structure Number:		4		**Date of Construction:**		n/a	
Coordinates	**E:**	626240.7610m		**Temporary Benchmark**			
	N:	5120055.4860m		**Elev.**	n/a		
Structure Shape:		culvert		n/a			
Structure Material:		HDPE					
Opening Characteristics							
Cell Shape:	Circular	**Cells:**	1				
Material:	n/a	**Rise:**	1.1m	**Sag Elevation:**		204.42	
Diameter:	1100 mm	**Span:**	1.1m	**Railing Height:**	0.9m	**Length:**	3.7m
Pier Configuration		**Number:**	n/a	**Elev. Left:**	205.39	**Elev. Right:**	205.31
Width:	n/a	**Location:**	n/a	**Length of Culvert/Crossing:**		18m	
End Treatment:				**Skew Angle:**	9°	**Rise:**	n/a
Gabion				**Opening Face Width:**		n/a	
Upstream Treatment:				**Downstream Treatment:**			
n/a				Gabion on the left			
Upstream Elevations:				**Downstream Elevations:**			
Invert		202.77		**Invert**		202.56	
Obvert		203.92		**Obvert**		203.68	
Top		204.10		**Top**		203.75	
Comments:							

Description: Looking u/s

Description: Looking at u/s face

Description: Looking d/s

Description: Looking at d/s face

Lansdowne Creek Structures Inventory

				Survey Date:		May 17, 2023	
Surveyor:		Eh Klay Law		**Watercourse:**		Lansdowne Creek	
Street Location:		Lansdowne Street		**Municipality:**		Callander Bay	
Structure Number:		5		**Date of Construction:**		n/a	
Coordinates	**E:**	626286.683m		**Temporary Benchmark**			
	N:	5120158.434m		**Elev.**	208.63		
Structure Shape:		culvert		n/a			
Structure Material:		Concrete					
Opening Characteristics							
Cell Shape:	Box	**Cells:**	1				
Material:	n/a	**Rise:**	1.5m	**Sag Elevation:**		208.75	
Diameter:	n/a	**Span:**	2.2m	**Railing Height:**	0.9m	**Length:**	8m
Pier Configuration		**Number:**	n/a	**Elev. Left:**	209.49	**Elev. Right:**	209.47
Width:	n/a	**Location:**	n/a	**Length of Culvert/Crossing:**		18m	
End Treatment:				**Skew Angle:**	n/a	**Rise:**	n/a
n/a				**Opening Face Width:**		n/a	
Upstream Treatment:				**Downstream Treatment:**			
n/a				n/a			
Upstream Elevations:				**Downstream Elevations:**			
Invert		206.62		**Invert**		206.59	
Obvert		208.10		**Obvert**		208.08	
Top		208.67		**Top**		208.79	
Comments:							

Description: Looking u/s

Description: Looking at u/s face

Description: Looking d/s

Description: Looking at d/s face

Lansdowne Creek Structures Inventory

				Survey Date:		May 16, 2023	
Surveyor:		Eh Klay Law		**Watercourse:**		Lansdowne Creek	
Street Location:		King Street		**Municipality:**		Callander Bay	
Structure Number:		6		**Date of Construction:**		n/a	
Coordinates	**E:**	626274.8030m		**Temporary Benchmark**			
	N:	5120236.6110m		**Elev.**	n/a		
Structure Shape:		culvert		n/a			
Structure Material:		Concrete					
Opening Characteristics							
Cell Shape:	Circular	**Cells:**	1				
Material:	n/a	**Rise:**	1.2m	**Sag Elevation:**		209.85	
Diameter:	1200mm	**Span:**	1.2m	**Railing Height:**	0.8m	**Length:**	14m
Pier Configuration		**Number:**	n/a	**Elev. Left:**	211.06	**Elev. Right:**	211.08
Width:	n/a	**Location:**	n/a	**Length of Culvert/Crossing:**		23.6m	
End Treatment:				**Skew Angle:**	44°	**Rise:**	n/a
n/a				**Opening Face Width:**		n/a	
Upstream Treatment:				**Downstream Treatment:**			
n/a				n/a			
Upstream Elevations:				**Downstream Elevations:**			
Invert		207.86		**Invert**		207.64	
Obvert		209.41		**Obvert**		208.91	
Top		209.43		**Top**		209	
Comments: Metered to slope culvert							

Description: Looking u/s

Description: Looking at u/s face

Description: Looking d/s

Description: Looking at d/s face

Lansdowne Creek Structures Inventory

				Survey Date:		May 16, 2023	
Surveyor:		Eh Klay Law		**Watercourse:**		Lansdowne Creek	
Street Location:		Toronto Street		**Municipality:**		Callander Bay	
Structure Number:		7		**Date of Construction:**		n/a	
Coordinates	**E:**	626305.6450m		**Temporary Benchmark**			
	N:	5120264.8890m		**Elev.**	n/a		
Structure Shape:		culvert		n/a			
Structure Material:		Concrete					
Opening Characteristics							
Cell Shape:	Circular	**Cells:**	1				
Material:	n/a	**Rise:**	1.22m	**Sag Elevation:**		210.08	
Diameter:	1220mm	**Span:**	1.22m	**Railing Height:**	n/a	**Length:**	n/a
Pier Configuration		**Number:**	n/a	**Elev. Left:**	n/a	**Elev. Right:**	n/a
Width:	n/a	**Location:**	n/a	**Length of Culvert/Crossing:**		16m	
End Treatment:				**Skew Angle:**	47°	**Rise:**	n/a
Rap-Rap/Vegetated Riverstone				**Opening Face Width:**		n/a	
Upstream Treatment:				**Downstream Treatment:**			
Rap-Rap/Vegetated Riverstone				Rap-Rap/Vegetated Riverstone			
Upstream Elevations:				**Downstream Elevations:**			
Invert	208.32			**Invert**	208.28		
Obvert	209.78			**Obvert**	209.64		
Top	209.85			**Top**	209.84		
Comments:							

Description: Looking u/s

Description: Looking at u/s face

Description: Looking d/s

Description: Looking at d/s face

Lansdowne Creek Structures Inventory

				Survey Date:		May 17, 2023	
Surveyor:		Eh Klay Law		**Watercourse:**		Lansdowne Creek	
Street Location:		Pedestrian Bridge 2		**Municipality:**		Callander Bay	
Structure Number:		8		**Date of Construction:**		n/a	
Coordinates	**E:**	626347.6660m		**Temporary Benchmark**			
	N:	5120275.7930m		**Elev.**	n/a		
Structure Shape:		bridge / culvert		n/a			
Structure Material:		concrete / wood					
Opening Characteristics							
Cell Shape:	circular	**Cells:**	1				
Material:	n/a	**Rise:**	1.05m	**Sag Elevation:**		209.98	
Diameter:	1050mm	**Span:**	1.05m	**Railing Height:**	1m	**Length:**	4m
Pier Configuration		**Number:**	n/a	**Elev. Left:**	211.37	**Elev. Right:**	211.20
Width:	n/a	**Location:**	n/a	**Length of Culvert/Crossing:**		6.5m	
End Treatment:				**Skew Angle:**	n/a	**Rise:**	n/a
n/a				**Opening Face Width:**		n/a	
Upstream Treatment:				**Downstream Treatment:**			
n/a				n/a			
Upstream Elevations:				**Downstream Elevations:**			
Invert		208.42		**Invert**		208.41	
Obvert		209.30		**Obvert**		209.40	
Top		210.20		**Top**		210.61	
Comments:							

Description: Looking u/s

Description: Looking at u/s face

Description: Looking d/s

Description: Looking at d/s face

Lansdowne Creek Structures Inventory

				Survey Date:		May 17, 2023	
Surveyor:		Eh Klay Law		**Watercourse:**		Lansdowne Creek	
Street Location:		Pedestrian Bridge 1		**Municipality:**		Callander Bay	
Structure Number:		9		**Date of Construction:**		n/a	
Coordinates	**E:**	626352.9810m		**Temporary Benchmark**			
	N:	5120276.4610m		**Elev.**	n/a		
Structure Shape:		bridge		n/a			
Structure Material:		wood					
Opening Characteristics							
Cell Shape:	rectangle	**Cells:**	1				
Material:	n/a	**Rise:**	1.4m	**Sag Elevation:**		209.95	
Diameter:	n/a	**Span:**	5.3m	**Railing Height:**	0.8m	**Length:**	4m
Pier Configuration		**Number:**	n/a	**Elev. Left:**	211.03	**Elev. Right:**	210.87
Width:	n/a	**Location:**	n/a	**Length of Culvert/Crossing:**		0.9m	
End Treatment:				**Skew Angle:**	n/a	**Rise:**	n/a
HDPE filled with dirt as abutment on the right side of the				**Opening Face Width:**		n/a	
Upstream Treatment:				**Downstream Treatment:**			
HDPE filled with dirt as abutment				HDPE filled with dirt as abutment			
Upstream Elevations:				**Downstream Elevations:**			
Invert	208.62			**Invert**	208.40		
Obvert	210.01			**Obvert**	209.91		
Top	210.02			**Top**	210.07		
Comments: balcony/deck sit on the left bank							

Description: Looking u/s

Description: Looking at u/s face

Description: Looking d/s

Description: Looking at d/s face

Lansdowne Creek Structures Inventory

				Survey Date:		May 17, 2023	
Surveyor:		Eh Klay Law		**Watercourse:**		Lansdowne Creek	
Street Location:		Driveway (300 Lansdowne)		**Municipality:**		Callander Bay	
Structure Number:		10		**Date of Construction:**		n/a	
Coordinates	**E:**	626384.5590m		**Temporary Benchmark**			
	N:	5120274.2320m		**Elev.**	n/a		
Structure Shape:		culvert		n/a			
Structure Material:		HDPE					
Opening Characteristics							
Cell Shape:	Circular	**Cells:**	1				
Material:	n/a	**Rise:**	1.2m	**Sag Elevation:**		209.09	
Diameter:	1200mm	**Span:**	1.2m	**Railing Height:**	n/a	**Length:**	n/a
Pier Configuration		**Number:**	n/a	**Elev. Left:**	n/a	**Elev. Right:**	n/a
Width:	n/a	**Location:**	n/a	**Length of Culvert/Crossing:**		13m	
End Treatment:				**Skew Angle:**	n/a	**Rise:**	n/a
n/a				**Opening Face Width:**		n/a	
Upstream Treatment:				**Downstream Treatment:**			
n/a				n/a			
Upstream Elevations:				**Downstream Elevations:**			
Invert		209.01		**Invert**		208.80	
Obvert		209.87		**Obvert**		209.91	
Top		210.75		**Top**		210.08	

Comments: Wooden dam infront of the culvert inlet. Owner has a couple small ponds in his property

Description: Looking u/s

Description: Looking at u/s face

Description: Looking d/s

Description: Looking at d/s face

Lansdowne Creek Structures Inventory

				Survey Date:		May 17, 2023	
Surveyor:		Eh Klay Law		**Watercourse:**		Lansdowne Creek	
Street Location:		Pedestrian Bridge (350 Lans		**Municipality:**		Callander Bay	
Structure Number:		11		**Date of Construction:**		n/a	
Coordinates	**E:**	626429.0000m		**Temporary Benchmark**			
	N:	5120267.5000m		**Elev.**	n/a		
Structure Shape:		bridge		n/a			
Structure Material:		Wood					
Opening Characteristics							
Cell Shape:	Irregular	**Cells:**	1				
Material:	n/a	**Rise:**	1m-1.5m	**Sag Elevation:**		209.98	
Diameter:	n/a	**Span:**	4.7m	**Railing Height:**	n/a	**Length:**	n/a
Pier Configuration		**Number:**	n/a	**Elev. Left:**	n/a	**Elev. Right:**	n/a
Width:	n/a	**Location:**	n/a	**Length of Culvert/Crossing:**		1m	
End Treatment:				**Skew Angle:**	n/a	**Rise:**	n/a
n/a				**Opening Face Width:**		n/a	
Upstream Treatment:				**Downstream Treatment:**			
n/a				n/a			
Upstream Elevations:				**Downstream Elevations:**			
Invert		208.77		**Invert**		208.71	
Obvert		209.86		**Obvert**		209.73	
Top		210.10		**Top**		210.15	
Comments:							

Description: Looking u/s

Description: Looking at u/s face

Description: Looking d/s

Description: Looking at d/s face

Lansdowne Creek Structures Inventory

				Survey Date:		May 17, 2023	
Surveyor:		Eh Klay Law		**Watercourse:**		Lansdowne Creek	
Street Location:		Pedestrian Bridge (368 Lans		**Municipality:**		Callander Bay	
Structure Number:		12		**Date of Construction:**		n/a	
Coordinates	**E:**	626438.8630m		**Temporary Benchmark**			
	N:	5120270.5200m		**Elev.**	n/a		
Structure Shape:		bridge		n/a			
Structure Material:		Wood					
Opening Characteristics							
Cell Shape:	Irregular	**Cells:**	1				
Material:	n/a	**Rise:**	1m-2m	**Sag Elevation:**		n/a	
Diameter:	n/a	**Span:**	4.3m	**Railing Height:**	n/a	**Length:**	n/a
Pier Configuration		**Number:**	n/a	**Elev. Left:**	n/a	**Elev. Right:**	n/a
Width:	n/a	**Location:**	n/a	**Length of Culvert/Crossing:**		1.2m	
End Treatment:				**Skew Angle:**	n/a	**Rise:**	n/a
n/a				**Opening Face Width:**		n/a	
Upstream Treatment:				**Downstream Treatment:**			
n/a				n/a			
Upstream Elevations:				**Downstream Elevations:**			
Invert		208.99		**Invert**		208.99	
Obvert		210.54		**Obvert**		210.55	
Top		210.78		**Top**		210.69	

Comments: Owner said that he will be removing the bridge and reaplce it with just a simple wooden boards for crossing. Owner put a steel rack on the bridge to prevent people walking on the bridge.

Description: Looking u/s

Description: Looking at u/s face

Description: Looking d/s

Description: Looking at d/s face

Lansdowne Creek Structures Inventory

				Survey Date:		May 17, 2023	
Surveyor:		Eh Klay Law		**Watercourse:**		Lansdowne Creek	
Street Location:		Yard Crossing (408 Lansdow		**Municipality:**		Callander Bay	
Structure Number:		13		**Date of Construction:**		n/a	
Coordinates	**E:**	626494.9620m		**Temporary Benchmark**			
	N:	5120302.3020m		**Elev.**	n/a		
Structure Shape:		culvert		n/a			
Structure Material:		Corrugated Steel Pipe					
Opening Characteristics							
Cell Shape:	Circular	**Cells:**	1				
Material:	n/a	**Rise:**	1m	**Sag Elevation:**		209.94	
Diameter:	1000mm	**Span:**	1m	**Railing Height:**	n/a	**Length:**	n/a
Pier Configuration		**Number:**	n/a	**Elev. Left:**	n/a	**Elev. Right:**	n/a
Width:	n/a	**Location:**	n/a	**Length of Culvert/Crossing:**		3.7m	
End Treatment:				**Skew Angle:**	n/a	**Rise:**	n/a
Failing retaining wall in the creek				**Opening Face Width:**		n/a	
Upstream Treatment:				**Downstream Treatment:**			
n/a				n/a			
Upstream Elevations:				**Downstream Elevations:**			
Invert	209.22			**Invert**	209.10		
Obvert	210.14			**Obvert**	210.23		
Top	n/a			**Top**	n/a		
Comments:							

Description: Looking u/s

Description: Looking at u/s face

Description: Looking d/s

Description: Looking at d/s face

Lansdowne Creek Structures Inventory

				Survey Date:		May 16, 2023	
Surveyor:		Eh Klay Law		**Watercourse:**		Lansdowne Creek	
Street Location:		Callander Bay Drive		**Municipality:**		Callander Bay	
Structure Number:		14		**Date of Construction:**		n/a	
Coordinates	**E:**	626579.004m		**Temporary Benchmark**			
	N:	5120339.222m		**Elev.**	210.80		
Structure Shape:		culvert		CC - Located on southeast corner of the culvert			
Structure Material:		Concrete					
Opening Characteristics							
Cell Shape:	Box	**Cells:**	1				
Material:	n/a	**Rise:**	1m	**Sag Elevation:**		n/a	
Diameter:	n/a	**Span:**	2m	**Railing Height:**	n/a	**Length:**	n/a
Pier Configuration		**Number:**	n/a	**Elev. Left:**	n/a	**Elev. Right:**	n/a
Width:	n/a	**Location:**	n/a	**Length of Culvert/Crossing:**		39m	
End Treatment:				**Skew Angle:**	n/a	**Rise:**	n/a
n/a				**Opening Face Width:**		n/a	
Upstream Treatment:				**Downstream Treatment:**			
n/a				n/a			
Upstream Elevations:				**Downstream Elevations:**			
Invert		209.20		**Invert**		209.42	
Obvert		210.44		**Obvert**		210.46	
Top		210.71		**Top**		210.73	
Comments:							

Description: Looking u/s

Description: Looking at u/s face

Description: Looking d/s

Description: Looking at d/s face

Lansdowne Creek Structures Inventory

				Survey Date:		May 16, 2023	
Surveyor:		Eh Klay Law		**Watercourse:**		Lansdowne Creek	
Street Location:		Lansdowne Street		**Municipality:**		Callander Bay	
Structure Number:		15		**Date of Construction:**		n/a	
Coordinates	**E:**	626613.312m		**Temporary Benchmark**			
	N:	5120300.175m		**Elev.**	n/a		
Structure Shape:		culvert		n/a			
Structure Material:		Concrete					
Opening Characteristics							
Cell Shape:	Circular	**Cells:**	1				
Material:	n/a	**Rise:**	0.9m	**Sag Elevation:**		n/a	
Diameter:	900mm	**Span:**	0.9m	**Railing Height:**	n/a	**Length:**	n/a
Pier Configuration		**Number:**	n/a	**Elev. Left:**	n/a	**Elev. Right:**	n/a
Width:	n/a	**Location:**	n/a	**Length of Culvert/Crossing:**		27m	
End Treatment:				**Skew Angle:**	n/a	**Rise:**	n/a
n/a				**Opening Face Width:**		n/a	
Upstream Treatment:				**Downstream Treatment:**			
n/a				n/a			
Upstream Elevations:				**Downstream Elevations:**			
Invert		210.02		**Invert**		209.79	
Obvert		210.84		**Obvert**		210.49	
Top		211.07		**Top**		210.58	
Comments:							

Description: Looking u/s

Description: Looking at u/s face

Description: Looking d/s

Description: Looking at d/s face

Lansdowne Creek Structures Inventory

				Survey Date:		May 16, 2023	
Surveyor:		Eh Klay Law		**Watercourse:**		Lansdowne Creek	
Street Location:		Eglinton Road North		**Municipality:**		Callander Bay	
Structure Number:		16		**Date of Construction:**		n/a	
Coordinates	**E:**	626695.612m		**Temporary Benchmark**			
	N:	5120402.817m		**Elev.**	n/a		
Structure Shape:		culvert		n/a			
Structure Material:		Corrugated Steel Pipe					
Opening Characteristics							
Cell Shape:	Circular	**Cells:**	1				
Material:	n/a	**Rise:**	1.4m	**Sag Elevation:**		211.50	
Diameter:	1400mm	**Span:**	1.4m	**Railing Height:**	n/a	**Length:**	n/a
Pier Configuration		**Number:**	n/a	**Elev. Left:**	n/a	**Elev. Right:**	n/a
Width:	n/a	**Location:**	n/a	**Length of Culvert/Crossing:**		12.2m	
End Treatment:				**Skew Angle:**	n/a	**Rise:**	n/a
n/a				**Opening Face Width:**		n/a	
Upstream Treatment:				**Downstream Treatment:**			
n/a				n/a			
Upstream Elevations:				**Downstream Elevations:**			
Invert		209.90		**Invert**		210.06	
Obvert		211.12		**Obvert**		210.94	
Top		n/a		**Top**		n/a	
Comments:							

Description: Looking u/s

Description: Looking at u/s face

Description: Looking d/s

Description: Looking at d/s face

Lansdowne Creek Structures Inventory

				Survey Date:		May 16, 2023	
Surveyor:		Eh Klay Law		**Watercourse:**		Lansdowne Creek	
Street Location:		Driveway (1786 Lansdowne		**Municipality:**		Callander Bay	
Structure Number:		17		**Date of Construction:**		n/a	
Coordinates	**E:**	626800.9560m		**Temporary Benchmark**			
	N:	5120471.4490m		**Elev.**	n/a		
Structure Shape:		culvert		n/a			
Structure Material:		Corrugated Steel Pipe					
Opening Characteristics							
Cell Shape:	Circular	**Cells:**	1				
Material:	n/a	**Rise:**	1.1m	**Sag Elevation:**		212.37	
Diameter:	1100mm	**Span:**	1.1m	**Railing Height:**	n/a	**Length:**	n/a
Pier Configuration		**Number:**	n/a	**Elev. Left:**	n/a	**Elev. Right:**	n/a
Width:	n/a	**Location:**	n/a	**Length of Culvert/Crossing:**		8m	
End Treatment:				**Skew Angle:**	n/a	**Rise:**	n/a
n/a				**Opening Face Width:**		n/a	
Upstream Treatment:				**Downstream Treatment:**			
n/a				n/a			
Upstream Elevations:				**Downstream Elevations:**			
Invert		210.95		**Invert**		210.87	
Obvert		212.11		**Obvert**		211.96	
Top		212.48		**Top**		212.23	
Comments:							

Description: Looking u/s

Description: Looking at u/s face

Description: Looking d/s

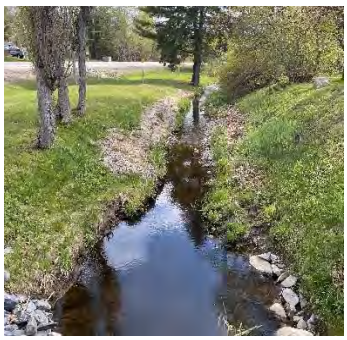
Description: Looking at d/s face

Lansdowne Creek Structures Inventory

				Survey Date:		May 16, 2023	
Surveyor:		Eh Klay Law		**Watercourse:**		Lansdowne Creek	
Street Location:		Driveway (1772 Lansdowne		**Municipality:**		Callander Bay	
Structure Number:		18		**Date of Construction:**		n/a	
Coordinates	**E:**	626835.0790m		**Temporary Benchmark**			
	N:	5120531.6340m		**Elev.**	n/a		
Structure Shape:		culvert		n/a			
Structure Material:		Concrete					
Opening Characteristics							
Cell Shape:	Circular	**Cells:**	1				
Material:	n/a	**Rise:**	1m	**Sag Elevation:**		213.32	
Diameter:	1000mm	**Span:**	1m	**Railing Height:**	n/a	**Length:**	n/a
Pier Configuration		**Number:**	n/a	**Elev. Left:**	n/a	**Elev. Right:**	n/a
Width:	n/a	**Location:**	n/a	**Length of Culvert/Crossing:**		6.5m	
End Treatment:				**Skew Angle:**	n/a	**Rise:**	n/a
n/a				**Opening Face Width:**		n/a	
Upstream Treatment:				**Downstream Treatment:**			
n/a				n/a			
Upstream Elevations:				**Downstream Elevations:**			
Invert		211.23		**Invert**		211.35	
Obvert		212.26		**Obvert**		212.23	
Top		212.52		**Top**		212.37	
Comments:							

Description: Looking u/s

Description: Looking at u/s face



Description: Looking d/s

Description: Looking at d/s face

Lansdowne Creek Structures Inventory

				Survey Date:		May 16, 2023	
Surveyor:		Eh Klay Law		**Watercourse:**		Lansdowne Creek	
Street Location:		Driveway (1770 Lansdowne		**Municipality:**		Callander Bay	
Structure Number:		19		**Date of Construction:**		n/a	
Coordinates	**E:**	626838.3160m		**Temporary Benchmark**			
	N:	5120542.0140m		**Elev.**	n/a		
Structure Shape:		culvert		n/a			
Structure Material:		Corrugated Steel Pipe					
Opening Characteristics							
Cell Shape:	Circular	**Cells:**	1				
Material:	n/a	**Rise:**	1.2m	**Sag Elevation:**		213.32	
Diameter:	1100	**Span:**	1.1m	**Railing Height:**	1	**Length:**	6
Pier Configuration		**Number:**	n/a	**Elev. Left:**	213.40	**Elev. Right:**	213.37
Width:	n/a	**Location:**	n/a	**Length of Culvert/Crossing:**		9m	
End Treatment:				**Skew Angle:**	n/a	**Rise:**	n/a
n/a				**Opening Face Width:**		n/a	
Upstream Treatment:				**Downstream Treatment:**			
n/a				n/a			
Upstream Elevations:				**Downstream Elevations:**			
Invert		211.59		**Invert**		211.66	
Obvert		212.90		**Obvert**		212.78	
Top		213.48		**Top**		213.41	
Comments:							

Description: Looking u/s

Description: Looking at u/s face

Description: Looking d/s

Description: Looking at d/s face

Lansdowne Creek Structures Inventory

				Survey Date:		May 16, 2023	
Surveyor:		Eh Klay Law		**Watercourse:**		Lansdowne Creek	
Street Location:		Driveway (1764 Lansdowne		**Municipality:**		Callander Bay	
Structure Number:		20		**Date of Construction:**		n/a	
Coordinates	**E:**	626851.560m		**Temporary Benchmark**			
	N:	5120569.059m		**Elev.**	n/a		
Structure Shape:		culvert		n/a			
Structure Material:		Concrete					
Opening Characteristics							
Cell Shape:	Circular	**Cells:**	1				
Material:	n/a	**Rise:**	1.2m	**Sag Elevation:**		n/a	
Diameter:	1200mm	**Span:**	1.2m	**Railing Height:**	0.5	**Length:**	2.7
Pier Configuration		**Number:**	n/a	**Elev. Left:**	214.02	**Elev. Right:**	214.04
Width:	n/a	**Location:**	n/a	**Length of Culvert/Crossing:**		8.2m	
End Treatment:				**Skew Angle:**	n/a	**Rise:**	n/a
n/a				**Opening Face Width:**		n/a	
Upstream Treatment:				**Downstream Treatment:**			
n/a				n/a			
Upstream Elevations:				**Downstream Elevations:**			
Invert		211.74		**Invert**		211.49	
Obvert		212.84		**Obvert**		212.67	
Top		n/a		**Top**		n/a	

Comments: Planters as railing.

Description: Looking u/s

Description: Looking at u/s face

Description: Looking d/s

Description: Looking at d/s face

Lansdowne Creek Structures Inventory

				Survey Date:		May 15, 2023	
Surveyor:		Eh Klay Law		**Watercourse:**		Lansdowne Creek	
Street Location:		Pedestrian Bridge (1764 Lan		**Municipality:**		Callander Bay	
Structure Number:		21		**Date of Construction:**		n/a	
Coordinates	**E:**	626857.4580m		**Temporary Benchmark**			
	N:	5120581.3770m		**Elev.**	n/a		
Structure Shape:		bridge		n/a			
Structure Material:		Wood					
Opening Characteristics							
Cell Shape:	Irregular	**Cells:**	1				
Material:	n/a	**Rise:**	n/a	**Sag Elevation:**		n/a	
Diameter:	n/a	**Span:**	6m	**Railing Height:**	0.9	**Length:**	5
Pier Configuration		**Number:**	n/a	**Elev. Left:**	214.59	**Elev. Right:**	214.55
Width:	n/a	**Location:**	n/a	**Length of Culvert/Crossing:**		1.4	
End Treatment:				**Skew Angle:**	n/a	**Rise:**	n/a
Wooden retaining wall on the Right				**Opening Face Width:**		n/a	
Upstream Treatment:				**Downstream Treatment:**			
Retaining wall				Retaining wall			
Upstream Elevations:				**Downstream Elevations:**			
Invert		211.74		**Invert**		211.79	
Obvert		213.51		**Obvert**		213.33	
Top		213.67		**Top**		213.70	
Comments:							

Description: Looking u/s

Description: Looking at u/s face

Description: Looking d/s

Description: Looking at d/s face

Lansdowne Creek Structures Inventory

				Survey Date:		May 15, 2023	
Surveyor:		Eh Klay Law		**Watercourse:**		Lansdowne Creek	
Street Location:		Driveway (1752 Lansdowne		**Municipality:**		Callander Bay	
Structure Number:		22		**Date of Construction:**		n/a	
Coordinates	**E:**	626875.077m		**Temporary Benchmark**			
	N:	5120619.329m		**Elev.**	n/a		
Structure Shape:		culvert		n/a			
Structure Material:		Corrugated Steel Pipe					
Opening Characteristics							
Cell Shape:	Circular	**Cells:**	1				
Material:	n/a	**Rise:**	1.6m	**Sag Elevation:**		214.18	
Diameter:	1600mm	**Span:**	1.6m	**Railing Height:**	n/a	**Length:**	n/a
Pier Configuration		**Number:**	n/a	**Elev. Left:**	n/a	**Elev. Right:**	n/a
Width:	n/a	**Location:**	n/a	**Length of Culvert/Crossing:**		15	
End Treatment:				**Skew Angle:**	n/a	**Rise:**	n/a
n/a				**Opening Face Width:**		n/a	
Upstream Treatment:				**Downstream Treatment:**			
n/a				n/a			
Upstream Elevations:				**Downstream Elevations:**			
Invert		212.33		**Invert**		212.26	
Obvert		213.94		**Obvert**		213.57	
Top		n/a		**Top**		n/a	
Comments:							

Description: Looking u/s

Description: Looking at u/s face

Description: Looking d/s

Description: Looking at d/s face

Lansdowne Creek Structures Inventory

				Survey Date:		May 15, 2023	
Surveyor:		Eh Klay Law		**Watercourse:**		Lansdowne Creek	
Street Location:		Highway 94		**Municipality:**		Callander Bay	
Structure Number:		23		**Date of Construction:**		n/a	
Coordinates	**E:**	626892.8290m		**Temporary Benchmark**			
	N:	5120641.3590m		**Elev.**	n/a		
Structure Shape:		culvert		n/a			
Structure Material:		Concrete					
Opening Characteristics							
Cell Shape:	Box	**Cells:**	1				
Material:	n/a	**Rise:**	1m	**Sag Elevation:**		214.89	
Diameter:	n/a	**Span:**	2.5m	**Railing Height:**	n/a	**Length:**	n/a
Pier Configuration		**Number:**	n/a	**Elev. Left:**	n/a	**Elev. Right:**	n/a
Width:	n/a	**Location:**	n/a	**Length of Culvert/Crossing:**		12.4	
End Treatment:				**Skew Angle:**	1°	**Rise:**	n/a
n/a				**Opening Face Width:**		n/a	
Upstream Treatment:				**Downstream Treatment:**			
n/a				n/a			
Upstream Elevations:				**Downstream Elevations:**			
Invert		212.72		**Invert**		212.49	
Obvert		213.75		**Obvert**		213.63	
Top		214.34		**Top**		214.22	

Comments: failing and eroding box culvert.

Description: Looking u/s

Description: Looking at u/s face

Description: Looking d/s

Description: Looking at d/s face

Lansdowne Creek Structures Inventory

				Survey Date:		May 16, 2023	
Surveyor:		Eh Klay Law		**Watercourse:**		Lansdowne Creek	
Street Location:		Pedestrian Bridge (1743 Lan		**Municipality:**		Callander Bay	
Structure Number:		24		**Date of Construction:**		n/a	
Coordinates	**E:**	627027.5790m		**Temporary Benchmark**			
	N:	5120676.7810m		**Elev.**	n/a		
Structure Shape:		bridge		n/a			
Structure Material:		Wood					
Opening Characteristics							
Cell Shape:	Irregular	**Cells:**	1				
Material:	n/a	**Rise:**	1.4m	**Sag Elevation:**		214.05	
Diameter:	n/a	**Span:**	6.7m	**Railing Height:**	n/a	**Length:**	n/a
Pier Configuration		**Number:**	n/a	**Elev. Left:**	n/a	**Elev. Right:**	n/a
Width:	n/a	**Location:**	n/a	**Length of Culvert/Crossing:**		2.4	
End Treatment:				**Skew Angle:**	n/a	**Rise:**	n/a
Wooden Gabion as butment on the right				**Opening Face Width:**		n/a	
Upstream Treatment:				**Downstream Treatment:**			
Wooden Gabion on the right				Wooden Gabion on the right			
Upstream Elevations:				**Downstream Elevations:**			
Invert	212.35			**Invert**	212.43		
Obvert	213.75			**Obvert**	213.84		
Top	214.23			**Top**	214.26		
Comments:							

Description: Looking u/s

Description: Looking at u/s face

Description: Looking d/s

Description: Looking at d/s face

Lansdowne Creek Structures Inventory

				Survey Date:		May 16, 2023	
Surveyor:		Eh Klay Law		**Watercourse:**		Lansdowne Creek	
Street Location:		Highway 11 Southbound 2		**Municipality:**		Callander Bay	
Structure Number:		25		**Date of Construction:**		n/a	
Coordinates	**E:**	627279.133m		**Temporary Benchmark**			
	N:	5121228.930m		**Elev.**	n/a		
Structure Shape:		culvert		n/a			
Structure Material:		Concrete					
Opening Characteristics							
Cell Shape:	Circular	**Cells:**	1				
Material:	n/a	**Rise:**	1m	**Sag Elevation:**		n/a	
Diameter:	1000mm	**Span:**	1m	**Railing Height:**	0.8	**Length:**	n/a
Pier Configuration		**Number:**	n/a	**Elev. Left:**	230.76	**Elev. Right:**	230.82
Width:	n/a	**Location:**	n/a	**Length of Culvert/Crossing:**		40	
End Treatment:				**Skew Angle:**	45°	**Rise:**	n/a
n/a				**Opening Face Width:**		n/a	
Upstream Treatment:				**Downstream Treatment:**			
n/a				n/a			
Upstream Elevations:				**Downstream Elevations:**			
Invert		226.76		**Invert**		226.42	
Obvert		227.32		**Obvert**		227.40	
Top		227.56		**Top**		227.66	
Comments:							

Description: Looking u/s

Description: Looking at u/s face

Description: Looking d/s

Description: Looking at d/s face

Lansdowne Creek Structures Inventory

				Survey Date:		May 16, 2023	
Surveyor:		Eh Klay Law		**Watercourse:**		Lansdowne Creek	
Street Location:		Highway 11 Northbound 2		**Municipality:**		Callander Bay	
Structure Number:		26		**Date of Construction:**		n/a	
Coordinates	**E:**	627316.550m		**Temporary Benchmark**			
	N:	5121254.042m		**Elev.**	n/a		
Structure Shape:		culvert		n/a			
Structure Material:		Concrete					
Opening Characteristics							
Cell Shape:	Circular	**Cells:**	1				
Material:	n/a	**Rise:**	1m	**Sag Elevation:**		n/a	
Diameter:	1000mm	**Span:**	1m	**Railing Height:**	0.8m	**Length:**	n/a
Pier Configuration		**Number:**	n/a	**Elev. Left:**	232.06	**Elev. Right:**	232.02
Width:	n/a	**Location:**	n/a	**Length of Culvert/Crossing:**		37	
End Treatment:				**Skew Angle:**	15°	**Rise:**	n/a
n/a				**Opening Face Width:**		n/a	
Upstream Treatment:				**Downstream Treatment:**			
n/a				n/a			
Upstream Elevations:				**Downstream Elevations:**			
Invert		226.55		**Invert**		226.33	
Obvert		227.65		**Obvert**		227.36	
Top		227.78		**Top**		227.40	
Comments:							

Description: Looking u/s

Description: Looking at u/s face

Description: Looking d/s

Description: Looking at d/s face

Lansdowne Creek Structures Inventory

				Survey Date:		May 16, 2023	
Surveyor:		Eh Klay Law		**Watercourse:**		Lansdowne Creek	
Street Location:		Railway 2		**Municipality:**		Callander Bay	
Structure Number:		27		**Date of Construction:**		n/a	
Coordinates	**E:**	627362.5120m		**Temporary Benchmark**			
	N:	5121266.0930m		**Elev.**	n/a		
Structure Shape:		culvert		n/a			
Structure Material:		Corrugated Steel Pipe					
Opening Characteristics							
Cell Shape:	Circular	**Cells:**	1				
Material:	n/a	**Rise:**	n/a	**Sag Elevation:**		230.19	
Diameter:	1000mm	**Span:**	n/a	**Railing Height:**	n/a	**Length:**	n/a
Pier Configuration		**Number:**	n/a	**Elev. Left:**	n/a	**Elev. Right:**	n/a
Width:	n/a	**Location:**	n/a	**Length of Culvert/Crossing:**		25	
End Treatment:				**Skew Angle:**	9°	**Rise:**	n/a
n/a				**Opening Face Width:**		n/a	
Upstream Treatment:				**Downstream Treatment:**			
n/a				n/a			
Upstream Elevations:				**Downstream Elevations:**			
Invert		226.63		**Invert**		226.70	
Obvert		n/a		**Obvert**		227.81	
Top		n/a		**Top**		227.84	

Comments: Upstream culvert covered with dirt and debris. Upstream side of the culvert has no defined channel and mostly just wetland.

Description: Looking u/s

Description: Looking at u/s face

Description: Looking d/s

Description: Looking at d/s face

Lansdowne Creek Structures Inventory

				Survey Date:		May 16, 2023	
Surveyor:		Eh Klay Law		**Watercourse:**		Lansdowne Creek	
Street Location:		Highway 11 Southbound		**Municipality:**		Callander Bay	
Structure Number:		28		**Date of Construction:**		n/a	
Coordinates	**E:**	627236.672m		**Temporary Benchmark**			
	N:	5120732.787m		**Elev.**	n/a		
Structure Shape:		culvert		n/a			
Structure Material:		Concrete					
Opening Characteristics							
Cell Shape:	Circular	**Cells:**	1				
Material:	n/a	**Rise:**	1.8m	**Sag Elevation:**		n/a	
Diameter:	1800mm	**Span:**	1.8m	**Railing Height:**	0.8m	**Length:**	n/a
Pier Configuration		**Number:**	n/a	**Elev. Left:**	229.16	**Elev. Right:**	229.13
Width:	n/a	**Location:**	n/a	**Length of Culvert/Crossing:**		38	
End Treatment:				**Skew Angle:**	4°	**Rise:**	n/a
n/a				**Opening Face Width:**		n/a	
Upstream Treatment:				**Downstream Treatment:**			
n/a				n/a			
Upstream Elevations:				**Downstream Elevations:**			
Invert		n/a		**Invert**		222.20	
Obvert		n/a		**Obvert**		224.06	
Top		n/a		**Top**		224.16	
Comments:							

Description: Looking d/s from highway

Description: pool infront of outlet

Description: Looking d/s

Description: Looking at d/s face

Lansdowne Creek Structures Inventory

				Survey Date:		May 16, 2023	
Surveyor:		Eh Klay Law		**Watercourse:**		Lansdowne Creek	
Street Location:		Highway 11 Northbound		**Municipality:**		Callander Bay	
Structure Number:		29		**Date of Construction:**		n/a	
Coordinates	**E:**	627274.149m		**Temporary Benchmark**			
	N:	5120731.756m		**Elev.**	n/a		
Structure Shape:		culvert		n/a			
Structure Material:		Concrete					
Opening Characteristics							
Cell Shape:	Circular	**Cells:**	1				
Material:	n/a	**Rise:**	1.8m	**Sag Elevation:**		n/a	
Diameter:	1800mm	**Span:**	1.8m	**Railing Height:**	0.8m	**Length:**	n/a
Pier Configuration		**Number:**	n/a	**Elev. Left:**	230.73	**Elev. Right:**	230.73
Width:	n/a	**Location:**	n/a	**Length of Culvert/Crossing:**		40	
End Treatment:				**Skew Angle:**	4°	**Rise:**	n/a
n/a				**Opening Face Width:**		n/a	
Upstream Treatment:				**Downstream Treatment:**			
n/a				n/a			
Upstream Elevations:				**Downstream Elevations:**			
Invert		223.94		**Invert**		n/a	
Obvert		225.67		**Obvert**		n/a	
Top		225.78		**Top**		n/a	
Comments:							

Description: Looking u/s

Description: Looking at u/s face

Description: Looking u/s from highway

Description: Looking at d/s face

Lansdowne Creek Structures Inventory

				Survey Date:		May 16, 2023	
Surveyor:		Eh Klay Law		**Watercourse:**		Lansdowne Creek	
Street Location:		Railway		**Municipality:**		Callander Bay	
Structure Number:		30		**Date of Construction:**		n/a	
Coordinates	**E:**	627320.2640m		**Temporary Benchmark**			
	N:	5120732.8440m		**Elev.**	n/a		
Structure Shape:		culvert		n/a			
Structure Material:		Corrugated Steel Pipe					
Opening Characteristics							
Cell Shape:	Circular	**Cells:**	1				
Material:	n/a	**Rise:**	1.8m	**Sag Elevation:**		231.48	
Diameter:	1800mm	**Span:**	1.8m	**Railing Height:**	n/a	**Length:**	n/a
Pier Configuration		**Number:**	n/a	**Elev. Left:**	n/a	**Elev. Right:**	n/a
Width:	n/a	**Location:**	n/a	**Length of Culvert/Crossing:**		32.84	
End Treatment:				**Skew Angle:**	11°	**Rise:**	n/a
n/a				**Opening Face Width:**		n/a	
Upstream Treatment:				**Downstream Treatment:**			
n/a				n/a			
Upstream Elevations:				**Downstream Elevations:**			
Invert		223.57		**Invert**		223.72	
Obvert		225.68		**Obvert**		225.40	
Top		n/a		**Top**		n/a	

Comments: Culvert bottom of the upstream side completly gone/eroded.

Description: Looking u/s

Description: Looking at u/s face

Description: Looking d/s

Description: Looking at d/s face

Lansdowne Creek Structures Inventory

				Survey Date:		May 15, 2023	
Surveyor:		Eh Klay Law		**Watercourse:**		Lansdowne Creek	
Street Location:		Derland Road		**Municipality:**		Callander Bay	
Structure Number:		31		**Date of Construction:**		n/a	
Coordinates	**E:**	627882.6580m		**Temporary Benchmark**			
	N:	5120814.7490m		**Elev.**	n/a		
Structure Shape:		culvert		n/a			
Structure Material:		HDPE					
Opening Characteristics							
Cell Shape:	Circular	**Cells:**	1				
Material:	n/a	**Rise:**	0.8m	**Sag Elevation:**		230.53	
Diameter:	800mm	**Span:**	0.8m	**Railing Height:**	n/a	**Length:**	n/a
Pier Configuration		**Number:**	n/a	**Elev. Left:**	n/a	**Elev. Right:**	n/a
Width:	n/a	**Location:**	n/a	**Length of Culvert/Crossing:**		12.25	
End Treatment:				**Skew Angle:**	n/a	**Rise:**	n/a
n/a				**Opening Face Width:**		n/a	
Upstream Treatment:				**Downstream Treatment:**			
n/a				n/a			
Upstream Elevations:				**Downstream Elevations:**			
Invert		229.14		**Invert**		223.89	
Obvert		229.90		**Obvert**		229.66	
Top		229.98		**Top**		229.73	
Comments:							

Description: Looking u/s

Description: Looking at u/s face

Description: Looking d/s

Description: Looking at d/s face

APPENDIX D:

Full Size Maps

NORTH BAY - MATTAWA CONSERVATION AUTHORITY

TO: The Chairperson and Members of the Board of Directors,
North Bay-Mattawa Conservation Authority

ORIGIN: Kevin Taylor, Senior Manager Planning & Water Resources

DATE: Aug 1, 2024.

SUBJECT: Update report on C.A. Act Deliverables under O. Reg. 686/21

Background:

On April 1, 2024, changes to the Conservation Authorities Act resulted in new requirements for Conservation Authorities to have a number of strategies and plans in place. Two (2) strategies have mandated public consultation, the Watershed Strategy and Conservation Areas Strategy. Four (4) other plans/reports are required to be submitted to the MNRF by Dec. 31, 2024.

Deliverables:

A summary of the deliverables for the Strategies, Plans and Reports are listed below.

Name	O. REG 686/21	Date modified	Type
Deliverable #1 Ice Management Plan	NEW- CAT 1	2024-07-25 12:28 PM	File folder
Deliverable #2 Nat. Haz. Infras. Operational Management Plan	NEW- CAT 1	2023-09-19 9:17 AM	File folder
Deliverable #3 Nat. Haz. Infras. Asset Management Plan	NEW-CAT 1	2023-09-19 9:17 AM	File folder
Deliverable #4 Conservation Area Strategy	NEW - CAT 1	2024-06-20 9:46 AM	File folder
Deliverable #5 Conservation Lands Inventory	NEW- CAT 1	2024-07-10 3:15 PM	File folder
Deliverable #6 Watershed Strategy	NEW- CAT 1	2024-08-02 9:12 AM	File folder

Water Resources Team: [Angela, Githan, Kevin, Saikumar] & Robin

- currently working on preparing final these reports
- previous work completed was conducted by Chitra, Valerie, Angela & Githan.

Status Of Deliverables:

#1 **Ice Management Plan**: Angela — **70 %** Completed

(Parks Creek only) waiting for final comments from consultant

#2 **Natural Hazard Infrastructure Operational Plan**: Githan — **0%** Starting report

(Parks Creek only)

#3 **Natural Hazard Infrastructure Asset Management Plan**: Githan — **0%** Starting report

(Parks Creek only)

#4 **Conservation Area Strategy**:* Robin — **90%** Completed

(final section -objectives)

#5 **Conservation Lands Inventory**: Saikumar — **90%** Completed

(some unknowns about land acquisition, ownership dates)

#6 **Watershed Strategy**:* Kevin, Angela, Githan — **80%** Completed

(some data updates required; links/references to be checked)

*Posted on NBMCA website for public consultation [June 10] comments@nbmca.ca

Timelines:

These deliverables will be completed by Dec. 2, 2024, to allow commenting back from MNRF.

Project name	June	July	August	September	October	November	December
Deliverable #1 **Ice Management Plan**	Draft Report(July 26th)		Review (August 23th)	Board	Final Report		Dec 02nd Submissions
Deliverable #2 **Nat. Haz. Infras. Operational Management Plan**	Draft Report(July 26th)		Review	Board	Final Report		Dec 02nd Submissions
Deliverable #3 **Nat. Haz. Infras. Asset Management Plan**	Draft Report(July 26th)		Review	Board	Final Report		Dec 02nd Submissions
Deliverable #4 **Conservation Area Strategy**	Draft Report(July 26th)		Review	Board	Final Report		Dec 02nd Submissions
Deliverable #5 **Conservation Lands Inventory**	Draft Report(July 26th)		Review	Board	Final Report		Dec 02nd Submissions
Deliverable #6 **Watershed Strategy**	Draft Report(July 26th)		Review	Board	Final Report		Dec 02nd Submissions

Recommendation:

THAT the members receive and approve the interim report for the C.A. Act deliverables as presented.

Recommended Resolution:

THAT the C.A. Act Deliverables Interim Report is received and appended to the minutes of this meeting.

Kevin Taylor

_____

Kevin Taylor,
Senior Manager Planning & Water Resources

NORTH BAY - MATTAWA CONSERVATION AUTHORITY

TO: The Chairman and Members of the Board of Directors,
North Bay-Mattawa Conservation Authority

ORIGIN: Rebecca Morrow, Human Resources Coordinator/Executive Assistant/Deputy CAO

DATE: August 14, 2024

SUBJECT: Updated North Bay-Mattawa Conservation Authority Personnel Policy

Background:
The Ministry of Labour, Immigration, Training and Skills Development (MLITSD) issued an order on January 22, 2024, directing NBMCA to update the workplace harassment and violence policy as follows:

The policy/program must include a method for when complaints are about senior managers or board members; and the policy/program must also include an avenue for senior managers to report a complaint. The program must also state, and it is required by the legislation that written results be provided to the complainant and alleged harasser. These results must state whether the complaint meets the definition (of workplace harassment, discrimination or violence), and is substantiated, or not substantiated; and if found substantiated, what actions were taken to correct the situation. Interim measures to be put in place for complaints to be made and investigated until fully documented and approved by Board.

Analysis:
The Personnel Policy will be updated to include the changes required in the order issued by the MLITDS. The changes include an updated complaint procedure to address complaints received. The changes as satisfy the requirements of the MLITDS and the MLITDS order issued on January 22, 2024 has now been closed.

Recommendation:
That the NBMCA approve of the changes as outlined in the attached updated Workplace Violence and Harassment Policy.

RECOMMENDED RESOLUTION:
THAT the Workplace Violence and Harassment Policy is approved and appended to the minutes of this meeting;
AND THAT the Personnel Policy be updated to include the updated Workplace Violence and Harassment Policy;
AND THAT this report be approved and appended to the minutes of this meeting.

Prepared by
Rebecca Morrow, Executive Assistant/Deputy CAO

Reviewed By
Robin Allen, Interim Chief Administrative Officer, Secretary Treasurer

Workplace Violence and Harassment Policy

I. PURPOSE

The **North-Bay Mattawa Conservation Authority** (the "**NBMCA**") is committed to providing a workplace in which all people are treated with respect and dignity. The safety and well-being of everyone working for or in connection with the NBMCA is a priority for the NBMCA and accordingly, workplace harassment, workplace violence, and discrimination will not be tolerated.

The purpose of this workplace harassment, workplace violence and discrimination policy (the "**Policy**") is:

- To establish clear standards, expectations and requirements for the maintenance of a work environment that is free from workplace harassment, workplace violence, and discrimination.
- To establish a process for receiving complaints and to provide a mechanism to deal with those complaints effectively.

II. SCOPE

This policy applies to all employees, volunteers, students, clients of NBMCA services, contractors and directors of the NBMCA, any individuals engaged in business with or attending at the NBMCA workplace or NBMCA.

It applies to behaviour at the NBMCA workplace which means any place where NBMCA business or work-related activities are conducted and includes, but is not limited to, the physical offices and facilities, field, work assignments at community sites, work-related travel, conferences and training sessions (the "Workplace"), in the course of telephone, email and other communications and at all NBMCA-sponsored events.

The NBMCA will ensure this Policy is implemented and followed and that all Workers have the appropriate information and instruction to protect themselves from violence and harassment in the workplace.

All Workers are responsible for conducting themselves in a manner consistent with this Policy. Any violations of this Policy may lead to discipline, up to and including termination of employment for cause.

III. PROHIBITED CONDUCT

A. Workplace Violence

Workplace violence includes the attempted or actual exercise of physical force by a person against a Worker that causes or could reasonably cause physical injury to the Worker. Workplace

violence also includes any statement or behaviour that a person could reasonably interpret as a threat to exercise physical force against a Worker.

Behaviours that may constitute workplace violence include, but are not limited to:

- engaging in physical assault or aggression;
- threatening verbal communications or gestures (e.g., shaking one's fist); and
- leaving threatening notes or sending threatening emails in the workplace.

B. Workplace Harassment

Workplace harassment means any single incident, or repeated incidents, of objectionable or unwelcome conduct, comment, bullying or action by a person that the person knows, or ought reasonably to know, will or could cause offence or humiliation to a Worker, or adversely affect the Worker's health and safety and includes, but is not limited to:

(a) conduct, comments, bullying or action because of race, religious beliefs, colour, physical disability, mental disability, age, ancestry, place of origin, marital status, source of income, family status, gender, gender identity, gender expression and sexual orientation or any other protected ground set out in the Ontario *Human Rights Code* (the *Code*) or under other applicable legislation; and

(b) a sexual solicitation or advance.

Examples of Workplace Harassment include but are not limited to:

- verbal harassment based on any of the protected grounds; stereotyping; name-calling;
- insults, threats, and slurs; crude, degrading, suggestive, or unwelcome remarks; offensive songs; jokes or innuendos based on any of the protected grounds that demean, ridicule, intimidate or offend;
- unwelcome physical touching or solicitation;
- sending or making offensive or intimidating emails or phone calls;
- conduct or comment denying an individual's dignity and respect;
- written or graphic materials, graffiti, unwanted notes or letters etc.;
- avoidance or exclusion from any group or individual; and
- bullying,

but excludes any reasonable conduct of the NBMCA in respect of the management of Workers or the workplace.

Sexual harassment is a form of workplace harassment. Sexual harassment includes, but is not limited to:

(a) engaging in a course of vexatious comment or conduct against a Worker on the basis of sex, sexual orientation, gender identity or gender expression, where the course of comment or conduct is known to be, or ought reasonably be known, to be unwelcome; and

(b) making a sexual solicitation or advance where the person making the solicitation or advance is in a position to confer, grant or deny a benefit or advancement to the Worker and the person knows, or ought to reasonably know, that the solicitation or advance is unwelcome.

Examples of behaviours that may constitute sexual harassment include, but is not limited to:

- unwelcome sexual flirtation or advances (oral, written or physical), requests for sexual favours, sexual and sexist jokes, racial, homophobic, leering (suggestive staring) or sexist slurs;
- unwelcome sexual flirtation, advances or propositions (oral, written or physical), or requests for sexual favours;
- unwelcome verbal, visual or physical conduct of a sexual nature, including unnecessary touching of an individual:
- sexually-oriented comments or teasing, jokes or taunts about gender-specific traits, a person's body or attire;
- displaying or circulating sexually suggestive objects or pictures, sexually explicit or offensive jokes, stories, cartoons, nicknames or comments of a sexual nature;
- sending or making offensive or intimidating emails or phone calls of a sexual nature; and
- sexual assault.

A single incident of inappropriate behaviour may be significant or substantial enough to constitute Workplace Harassment or Workplace Violence and, therefore, a breach of the Policy.

Poisoned Work Environment:

A poisoned work environment is characterized as a hostile or offensive workplace caused by activity or behaviour not necessarily directed at anyone in particular. It can arise from even a single incident. It may be created by the comments or actions of any person, regardless of their authority or status including a co-worker, supervisor, or manager.

Domestic Violence:

Domestic violence is violence committed by someone who is in a personal relationship with an employee (such as a spouse or former spouse, current or former intimate partner or a family

member). If an employee believes that he or she is at risk of domestic violence in the workplace, he or she must inform their immediate supervisor and/or manager so that the NBMCA can take reasonable precautions to protect the employee and any other individuals in the workplace likely to be affected.

C. Discrimination

Discrimination may include, but is not limited to, any conduct or action directed toward, or about, or taken with respect to any employee because of that employee's race, ancestry, place of origin, colour, ethnic origin, citizenship, creed, sex, sexual orientation, gender identity, gender expression, age, marital status, family status, or disability, or any other protected ground.

IV. RESPONSIBILITIES

All Workers are responsible for conducting themselves in a manner consistent with this Policy.

All **Workers** must:

- maintain a safe work environment;
- understand and uphold the principles of this Policy;
- not engage in or ignore violent, threatening, intimidating or other disruptive behaviours;
- promptly report any incident where the Worker is subjected to, witnesses, or has knowledge of workplace violence or harassment, or has reason to believe that workplace violence or harassment may occur; and
- maintain confidentiality through the complaint, investigation and communication process unless necessary to obtain advice about their rights.

All of the NBMCA's **Managers and/or Supervisors** must:

- maintain and actively promote a safe and healthy workplace, free of workplace violence and harassment;
- understand and uphold the principles of this Policy;
- provide appropriate information, training, and instruction on this Policy to all Workers;
- take all reasonable and practical measures to minimize or eliminate risks of workplace violence or harassment identified through workplace assessments, inspections, or the occurrence of an incident;
- respond promptly to all reports of violence or harassment;
- report all cases of workplace violence and harassment to the **Chief Administrative Officer or designate** (or to the **Board of Directors of the NBMCA** where the alleged

workplace violence or harassment is directed at, or is allegedly perpetrated by, the Chief Administrative Officer) as soon as possible; and

- immediately investigate any complaint of workplace violence or harassment that has taken place or a situation that a Worker feels may become violent; and
- inform complainants and alleged offenders of the results of an investigation and any corrective action that will be taken;

Any questions or concerns regarding this Policy, or suggestions about how to eliminate risks of workplace violence or harassment should be directed to the Chief Administrative Officer or designate**.**

V. COMPLAINT, INVESTIGATION & DISCIPLINARY PROCEDURE

A. Reporting Workplace Violence

Workers must immediately report all incidents of workplace violence or threats of violence, including if they witness or receive, or have been told that another person has witnessed or received, threats of violence, to a supervisor, manager or the Chief Administrative Officer or designate.

Where the Chief Administrator is the alleged offender of the alleged workplace violence or harassment, the mater must be immediately reported to the Chair of the Board of Directors or designate.

Threats or violence of a serious nature should be reported to the local police immediately. Workers should also notify a supervisor, manager and/or the Chief Administrative Officer about the incident as soon as possible.

B. Reporting Workplace Harassment and/or Discrimination

Any Worker who believes that he or she has been the victim of workplace harassment and/or discrimination, or has witnessed such behaviour directed at others, should report the conduct to a supervisor, manager and/or to the Chief Administrative Officer (subject to the below process where the Chief Administrative Officer is the alleged offender).

Reporting Process:

i. <u>Informal Resolution with the Alleged Offender</u>

A Worker who believes they are the subject of harassment and/or discrimination is encouraged to indicate to the person(s) whose comments or conduct are offensive in a clear, direct and firm way, either verbally or in writing, that the comments or actions are considered offensive and that a complaint will be filed if the offensive conduct continues. The employee should maintain a written record of the date, time, details of the offensive conduct, and names of witnesses, if any.

ii. Informal Referral to Management

A Worker who is not comfortable dealing with the matter on their own through the Informal Resolution Process, or who is aware or has witnessed workplace harassment and/or discrimination, is to report the matter to their immediate Supervisor or Manager. If the immediate Supervisor or Manager is not available, the employee is encouraged to proceed to the next level of supervision in the department. While the Worker is free to report the matter verbally, the Worker is encouraged to make the report in writing, using the NBMCA Harassment and/or Discrimination Complaint Form.

The Supervisor or Manager will undertake a review of the complaint, which will include discussing the allegation with the complainant, and where appropriate the respondent(s)/alleged offender(s), witnesses and/or other appropriate personnel. The Supervisor of Manager may seek out assistance from the Chief Administrative Officer or designate if appropriate in the circumstances.

The complainant and the alleged offender may each be accompanied by a co-worker.

iii. **Formal Complaint**

If informal attempts at resolving the matter are not appropriate, or prove to be ineffective, a formal complaint may be filed. The following procedures shall apply in the instance of a formal complaint:

The Worker is expected to make advise their immediate Supervisor or Manager, and/or Human Resources staff/designate, if applicable, as soon as possible, preferably within forty-five (45) working days of the alleged incident(s). It is preferred that the Worker submit a completed Harassment and/or Discrimination Complaint Form (Appendix __) outlining the time, date, and allegations in detail. While a complaint and/or Form may be submitted after 45 working days of the alleged incident(s), complaints not filed within a reasonable time may be difficult to investigate. Supervisors and Managers who receive complaints, regardless of in what form (oral or in writing) shall contact the CAO and the Human Resources staff, if applicable, immediately upon receipt of the complaint.

- **Complaints about the immediate Supervisor or Manager**

  If a Worker has a complaint about their immediate supervisor or manager, the complainant should submit their complaint, preferably in completed Harassment and/or Discrimination Complaint Form (Appendix _) to the next higher-level manager or to the Chief Administrative Officer.

- **Complaints about the Chief Administrative Officer or Deputy Chief Administrative Officer or Human Resources Staff**

If a Worker has a complaint about the Chief Administrative Officer, the complainant is to submit their complaint, preferably in a completed Harassment Complaint Form and/or Discrimination (Appendix __) to the Chair of the Board of Directors.

If a Worker has a complaint about the Deputy Chief Administrative Officer or Human Resources staff, the complainant is to submit their complaint, preferably in a completed Harassment and/or Discrimination Complaint Form (Appendix _) to the Chief Administrative Officer.

- **Complaints about a Worker by the Chief Administrative Officer, or Deputy Chief Administrative Officer or Human Resources staff**

  If the CAO has a complaint about a Worker, they are to submit their complaint, preferably in a completed Harassment and/or Discrimination Complaint Form (Appendix _) to the Chair of the Board of Directors.

  If the Deputy CAO or Human Resources staff has a complaint about a Worker, the complainant they are to submit their complaint, preferably in a completed Harassment and/or Discrimination Complaint Form (Appendix _) to the CAO.

- **Complaints about Board Members**

  If a Worker has a complaint about a Board Member other than the Chair or Vice-Chair, they are to submit their complaint, preferably in a completed Harassment Complaint and/or Discrimination Form (Appendix _) to the Chair of the Board of Directors.

  If a Worker has a complaint about the Chair or Vice Chair of the Board, they are encouraged to submit their complaint to another member of the Board of Directors, preferably in a completed Harassment and/or Discrimination Complaint Form (Appendix _). In the alternative, they may contact the Ministry of Labour, Immigration, Training and Skills Development and follow the Ministry's instructions.

- **Complaints under the *Criminal Code*:**

  Workplace violence, including assault, sexual assault, and other forms of violence, are matters covered under the *Criminal Code*. If these circumstances occur at the workplace, the Police can be contacted and asked to investigate. Sexual and other forms of assault are serious criminal offences that should be reported to Police.

C. Investigation of Complaints or Incidents

Complaints of workplace violence and harassment and/or discrimination will be promptly investigated by the NBMCA. Any person who engages in or threatens workplace violence or harassment and/or discrimination may be asked to:

(i) leave the workplace;
(ii) cease performing any work on behalf of the NBMCA; and/or
(iii) not return to the workplace.

All Workers are expected to cooperate fully in any investigation. If, after investigation, the NBMCA finds that a violation of this Policy has occurred, the NBMCA will determine what remedial action should be taken to avoid future incidents and to protect the health and safety of all parties in the workplace.

i. Informal Resolution Procedures (Mediation)

Some complaints can be resolved through informal mediation between all parties involved.

The Chief Administrative Officer or designate, or Chair or Vice-Chair of the Board, where applicable (based on the alleged offender) if the complainant consents, may arrange a meeting between the complainant and the person against whom the complaint is laid with a view to obtaining an apology or such other resolution satisfactory to complainant.

ii. Investigation of Complaint

Where a resolution to a complaint is not achieved/or is not attempted through mediation, the complaint will be forwarded to the appropriate person as set out in B. above for further investigation. An investigation will be commenced by the NBMCA following receipt of a written request as set out in B. above**.**

An investigation will generally include obtaining a written statement from the complainant as well as interviews with persons involved in, or who observed, the incident and any person with knowledge of the incident. These individuals may be asked to provide a written statement. The NBMCA may appoint a person or persons (the "**Investigator**") to investigate a written complaint and report on the investigation to the Chief Administrative Officer, as appliable or to the applicable member of the Board, where the complaint is by or about the Chief Administrative Officer or Board Member, as applicable**.**

In some cases, the NBMCA may decide to have the complaint investigated by an independent third party, depending on the circumstances.

iii. Resolution of the Complaint

Following the conclusion of the investigation, the Worker who has allegedly experienced workplace violence or harassment and/or discrimination, and the alleged offender, will be informed of the results of the investigation and of any corrective action that has been taken or that will be taken as a result of the investigation.

Any Worker determined by the NBMCA to be responsible for a violation of this Policy will be subject to appropriate disciplinary action, up to and including termination of employment for cause.

If a Worker is found to have knowingly made a false complaint of workplace harassment and/or discrimination, appropriate disciplinary action may be taken against that individual, up to and including termination of employment for cause.

Nothing in this Policy prevents or discourages a Worker from filing an application with a province's Human Rights Tribunal or Commission on a matter related to an alleged violation of human rights legislation. All Workers retain the right to exercise any other legal avenues that may be available.

D. CONFIDENTIALITY

To protect the interests of all involved, confidentiality will be maintained through the complaint, investigatory and disciplinary processes to the extent practicable and appropriate in the circumstances. Information obtained about an incident or complaint of workplace violence or harassment, including identifying information about any individuals involved, will not be disclosed unless the disclosure is necessary for the purposes of investigating or taking corrective action with respect to the incident or complaint, or is otherwise required by law. However, investigations may require disclosure of certain information to the alleged offender and other witnesses in order to gather pertinent facts.

Additionally, while the investigation is on-going, the Worker who has allegedly experienced workplace violence or harassment, the alleged offender, and any witnesses should not discuss the incident, complaint or investigation with anyone unless necessary to obtain advice about their rights.

E. No Reprisal

The NBMCA will not retaliate in any way against anyone who makes a complaint in good faith or who acts as a witness in relation to an incident or complaint of workplace violence and/or workplace harassment.

The NBMCA also prohibits retaliation by anyone within the NBMCA against a Worker who makes a complaint in good faith or acts as a witness in relation to an incident or complaint of workplace violence and/or workplace harassment.

Anyone who retaliates against a person for seeking assistance through this Policy, or for filing a complaint, may be subject to discipline, up to and including termination of employment for cause.

VI. UPDATES TO POLICY

This Policy will be reviewed by the NBMCA on a regular basis and may be updated from time to time, as appropriate.

Each time the NBMCA undertakes an assessment of the risks of workplace violence or harassment that may arise from the nature of the workplace, the type of work or the conditions of work, NBMCA will update this Policy with any measures and procedures to control the risks identified in the assessment that may expose a Worker to physical injury.

Adopted: **[Date]**