July 2015

BOW RIVER AND ELBOW RIVER

Hydraulic Model and Flood Inundation Mapping Update

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REPORT

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Executive Summary

In June 2013, Calgary experienced severe flooding on the Bow and Elbow Rivers. Post-flood observations on both rivers showed that the river bed and banks at many locations were altered. The alteration was mainly due to sediment transport, and river channel and bank erosion, scour and/or gravel migration during the flood event. An updated hydraulic model and updated flood inundation maps, based on the updated flood peak discharge estimates as well as the morphological and hydraulic characteristics of the river channels and floodplains after the 2013 flood, were desired to provide an updated basis for supporting emergency response planning and operations for future flood events.

The City of Calgary (The City), in partnership with Alberta Environment and Parks (AEP, formerly Environment and Sustainable Resource Development, ESRD), commissioned Golder Associates Ltd. (Golder) to conduct this study. The study purpose was to update the 2012 Bow and Elbow River hydraulic model and flood inundation maps (Golder 2012) based on the latest river channel and floodplain information collected after the 2013 flood.

The overall study scope included:

- an update of the basin-wide hydrology analysis using preliminary 2013 flow data;
- a hydraulic model update based on surveyed 2013 flood high watermark (HWM) data, new Light Detection and Ranging (LiDAR) data for the river floodplains, and river cross-sectional data surveyed after the 2013 flood; and
- an update of the flood inundation maps within Calgary.

The results of the study will be used to:

- support The City's emergency response plans during extreme floods;
- identify locations of areas potentially under risk of inundation to assist in emergency flood management during the annual flood season;
- provide additional information to assist in flood hazard area management; and
- support a better understanding of river morphology and erosion, water quality and storm water runoff impacts as well as future developments such as bridges and residences.

The study area includes the reaches of the Elbow River and Bow River within Calgary city limits. In the study area, the Bow River is joined by several tributaries, including the Elbow River, Nose Creek, Fish Creek and Pine Creek. The Bow River study reach has a total length of 70 km which extends from Bearspaw Dam to the Highwood River confluence. The Elbow River study reach extends from the Calgary city limit at 101st Street SW located upstream of Glenmore Reservoir to its confluence with the Bow River. The 2012 hydraulic model has been updated in this study only for the 11 km reach of the Elbow River downstream of Glenmore Dam.

A hydrologic analysis was performed to update the estimates of flood peak discharges at various locations in the study area based on preliminary 2013 flow data. Results of the hydrology analysis were documented in a separate report (Golder 2014).

Golder completed a river channel bathymetric survey in September through October, 2013. This survey involved collection of channel cross-sectional data, and measurements of water levels and discharges along the study reaches. An integrated Digital Elevation Model (DEM) was created for the study area based on the channel bathymetric survey data and the LiDAR data collected after the 2013 flood. Results of the bathymetric survey and creation of the integrated DEM were documented in a separate report (Golder 2015).

The 2012 HEC-RAS hydraulic model setup was updated using the cross-sectional data extracted from the integrated DEM for developing the 2015 hydraulic model. The 2015 model was set up with one geometry file so that it can be used to simulate various floods. The separate branches introduced in the 2012 model at Bowness Island, Prince's Island and Zoo Island along the Bow River study reach and at Riverdale Avenue, Roxboro Road, 26th Avenue SW, 25th Avenue SW and 22nd Avenue SW along the Elbow River study reach, were retained in the 2015 model. The Elbow River branch through the Stampede grounds included in the 2012 model was removed in the 2015 model.

The 2015 HEC-RAS model contains a total number of 347 cross sections along the Bow River study reach and 243 cross sections along the Elbow River study reach downstream of Glenmore Dam. The open boundaries of the hydraulic model are at:

- Bearspaw Dam - the upstream end of the Bow River study reach;
- the Calgary city limit west of Glenmore Reservoir - the upstream end of the Elbow River study reach; and
- the Highwood River confluence - the downstream end of the Bow River study reach.

The hydraulic model was set up for steady-state flow simulation. The upstream boundary conditions were river discharges. The downstream boundary condition was estimated based on normal flow conditions and an energy slope of 0.22%.

Preliminary Manning's roughness *n* values and the contraction and expansion loss coefficients for the 2015 model were selected to be similar to the calibrated values in the 2012 model. In this study, channel Manning's roughness *n* values were assessed and validated against the 2013 surveyed low flow discharge and water level data. Floodplain Manning's *n* values, as well as contraction and expansion loss coefficients at bridges and other locations, were refined by further calibrating the model against the 2013 flood HWM data. Final calibrated values of channel and floodplain Manning's *n* were validated using the simulation results against the 2005 flood HWM data.

The 2015 HEC-RAS model was used to simulate the 2-, 5-, 8-, 10-, 20-, 35-, 50-, 75-, 100-, 200-, 350-, 500- and 1,000-year flood events.

A model sensitivity analysis was conducted to evaluate the effect of varying Manning's *n* values on simulated water levels. The 100-year flood scenario was used for the model sensitivity analysis and for quantifying the level of uncertainty associated with the simulated flood levels.

The 2015 flood inundation maps were prepared based on the integrated DEM and the simulated flood water levels for the various flood events using the 2015 model. The mapping for the Bow River covers the areas within city limits. The mapping for the Elbow River covers the reach downstream of Glenmore Dam. In addition to the inundation areas directly flooded, the following types of inundation areas were delineated:

- pooled inundation areas, delineated based on water levels at single overflow locations;
- isolated inundation areas, which have no direct connection to the flooded channel and overbank areas; and
- flood control structure failure inundation areas, which are behind the permanent flood control barriers identified by The City (Calgary 2015).

The results of this study support the following conclusions:

- The updated flood peak discharge estimates used in this study, which are higher than those of the 2012 study, provided an updated basis for simulating the flood levels and preparing the flood inundation maps.
- The updated channel cross-sectional data, the measurements of low flow water levels and discharges after the 2013 flood, and the 2013 flood HWMs provided the geometric and hydraulic information for updating the HEC-RAS model setup, refining the model calibration, and validating the model.
- The model calibration and validation results show that only small adjustments were needed for the floodplain Manning's *n* values at a small number of locations along the Bow River, and the expansion and contraction loss coefficient values at some bridges along the Elbow River. The calibrated and validated 2015 HEC-RAS model provides an improved and updated basis for simulating the flood levels for the various return period flood events.
- The results of the Manning's *n* roughness parameter sensitivity analysis show that the levels of uncertainty associated with the simulated 100-year flood levels are generally within ±0.19 m along the Bow River and ±0.15 m along the Elbow River.
- The existing flood control structure at Inglewood is not sufficient to protect the area against the 100-year flood.
- The existing earth berm, existing concrete retaining wall and proposed flood wall at Stampede Park would be overtopped during the 100-year flood.
- A bridge is flood-affected if its low chord is in contact with flood water. Few of the modelled bridges along the Bow River would be flood-affected during flood events with return periods of 20 years or less. A total of 13 modelled bridges along the Bow River and all modelled bridges along the Elbow River would be flood-affected during the 100-year flood.
- Based on the updated flood inundation maps, the main residential and/or commercial development areas that would be affected during the 100-year flood include: Bowness, Shouldice, an area north of Montgomery Blvd NW, Kensington/Sunnyside, Prince's Island, parts of downtown Calgary, East Village, Bridgeland, Calgary Zoo, Inglewood, and various areas in south Calgary along the Bow River; and Riverdale/Elbow Park, Rideau Park/Roxboro, Mission District, Erlton Area, Victoria and Stampede along the Elbow River.
- The updated flood inundation maps, including the flood level information at individual cross sections, provide good information for flood protection planning and design, in addition to other regulatory requirement.

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1.0 INTRODUCTION

1.1 Background

In June 2013, Calgary experienced severe flooding on the Bow and Elbow Rivers. Post-flood observations on both rivers showed that the river bed and banks at many locations were altered. The alteration was due to sediment transport, and river channel and bank erosion, scour and/or migration during the flood event.

The hydraulic model and flood inundation mapping completed in 2012 for the Bow and Elbow Rivers through Calgary (Golder 2012) was based on channel bathymetry and floodplain elevation data collected in 2010 and hydrologic estimates made before the 2013 flood. Updated flood inundation maps based on post-2013 flood hydrologic estimates and topographic data were desired to better reflect current conditions and support emergency response planning and operations for future flood events.

The City of Calgary (The City), in partnership with Alberta Environment and Parks (AEP, formerly Environment and Sustainable Resource Development, ESRD), commissioned Golder Associates Ltd. (Golder) to conduct this study. The purpose was to update the Bow and Elbow River hydraulic model and flood inundation maps based on new hydrology and river channel and floodplain information collected after the 2013 flood. The overall study scope includes the following:

- Complete a basin-wide hydrology analysis including preliminary 2013 flow data;
- Update the 2012 hydraulic model based on surveyed 2013 flood high watermark (HWM) data, new LiDAR data for the river floodplains, and river cross-sectional data surveyed after the 2013 flood; and
- Update the 2012 flood inundation maps within Calgary.

1.2 Study Objectives

The study objectives are listed below:

- Document preliminary June 2013 flood peak magnitudes at various locations in the Bow River basin, and undertake a frequency analysis to determine flood peak estimates for various return periods;
- Update flood inundation maps in support of emergency response planning and operations during extreme floods that have the potential for causing loss of life and infrastructure damage;
- Update flood water surface profiles and identify the areas potentially under risk of flood inundation to assist in emergency flood management during the annual flood season;
- Provide additional perspective to support current and future land use planning and development; and
- Provide pertinent flood information to support a better understanding of river morphology and erosion, water quality and storm water runoff impacts as well as future developments such as bridges and residences.

1.3 Study Reaches

The study area is shown in Figure 1. It includes the reaches of the Elbow and Bow Rivers in Calgary. Within the study area, the Bow River is joined by several streams, including the Elbow River, Nose Creek, Fish Creek and Pine Creek. The Elbow River flows through the Glenmore Reservoir before joining the Bow River just downstream of Calgary downtown.

The Bow River study reach extends from Bearspaw Dam to the Highwood River confluence. The Elbow River study reach extends from 101st Street SW located upstream of Glenmore Reservoir to its confluence with the Bow River. Because no updated information along the Elbow River upstream of Glenmore Reservoir was available, the hydraulic model was only updated for the Elbow River reach downstream of Glenmore Dam.

The updated inundation maps for the Bow River cover the areas within Calgary city limits. The updated inundation maps for the Elbow River cover the areas downstream of Glenmore Dam.

1.4 Work Scope

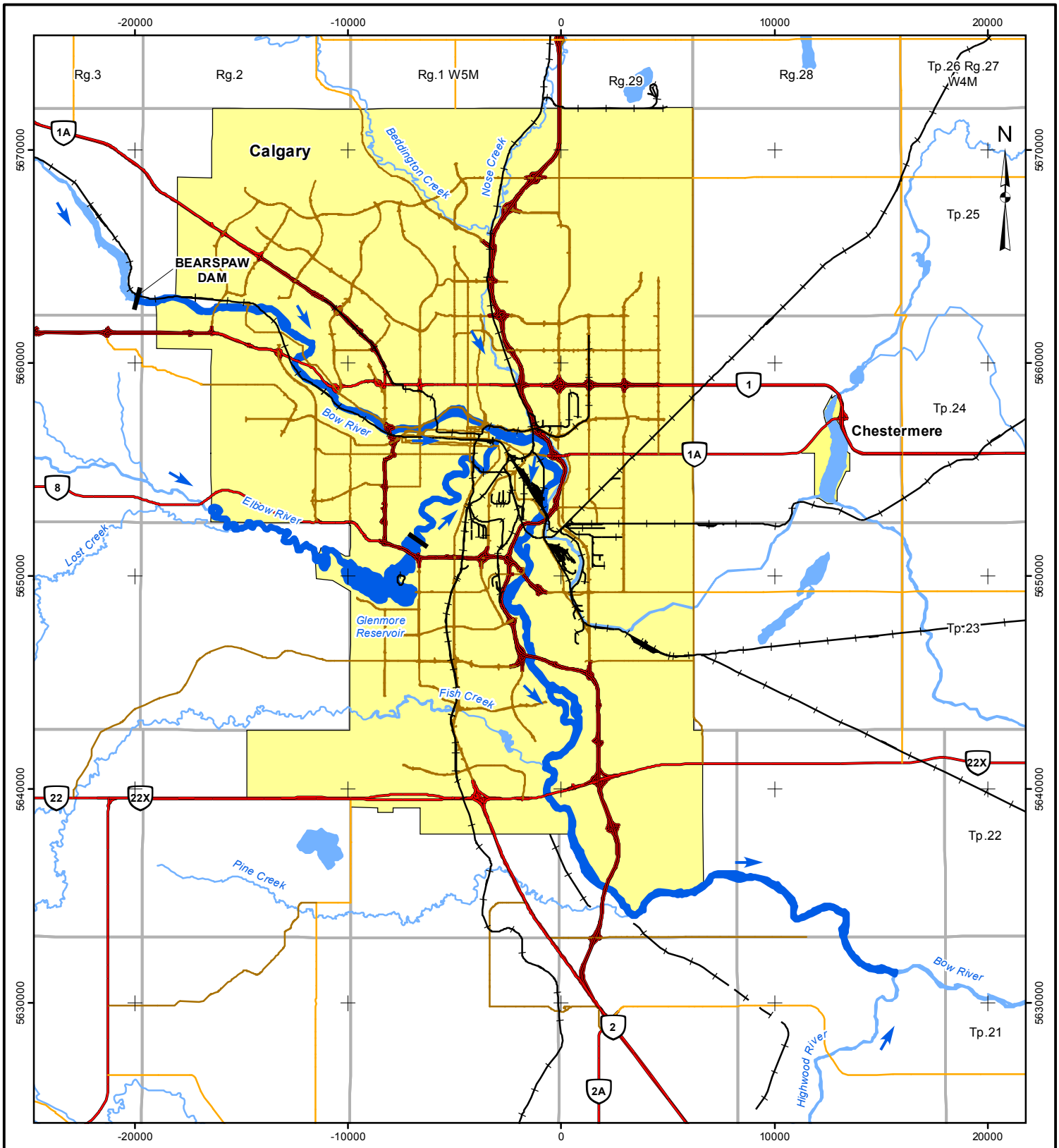
This study involved updating the 2012 HEC-RAS model (Golder 2012). The updated model was used to simulate 2-year to 1,000-year flood events. The simulated water surface profiles were used to prepare new flood inundation maps for floods with return periods of 5, 8,10, 20, 35, 50, 75,100, 200, 350, 500 and 1,000 years.

The specific study scope includes the following:

- conduct a site reconnaissance;
- conduct a basin-wide hydrology analysis;
- update the HEC-RAS model;
- calibrate and validate the HEC-RAS model;
- conduct model sensitivity analysis;
- evaluate the differences of simulation results of the 2012 and updated HEC-RAS models;
- generate flood profiles;
- prepare updated flood inundation maps; and
- prepare a study report.

The basin-wide hydrology analysis is presented elsewhere in a separate and stand-alone report (Golder 2014).

The latest versions of HEC-RAS (Version 4.1, dated January 2010) and HEC-GeoRAS (Version 10.1 for ArcGIS 10.1) were used in this study. The flood inundation maps were prepared with a 1:7,500 scale and using the 3TM 114° NAD83 coordinate system and datum.



LEGEND

- DAM
- FLOW DIRECTION
- STUDY REACH

TRANSPORTATION FEATURES

- DIVIDED HIGHWAY
- PRIMARY HIGHWAY
- SECONDARY HIGHWAY
- MAJOR ROAD
- RAILWAY
- WATERCOURSE
- POPULATED PLACE
- WATERBODY

5 0 5

SCALE 1:250,000 KILOMETRES

REFERENCE

HYDROGRAPHY DATA OBTAINED FROM ALTALIS © GOVERNMENT OF ALBERTA 2014. ALL RIGHTS RESERVED. TRANSPORTATION DATA OBTAINED FROM CANMAP. MUNICIPAL BOUNDARIES OBTAINED FROM STATISTICS CANADA.
PROJECTION: 3TM W114 DATUM: NAD 83

PROJECT
BOW RIVER AND ELBOW RIVER HYDRAULIC MODEL AND FLOOD INUNDATION MAPPING UPDATE

TITLE
STUDY AREA

Golder Associates
Calgary, Alberta

PROJECT 13-1326-0054			SCALE AS SHOWN	REV. 0
DESIGN	JC	12 Mar. 2015		
GIS	PT	12 Mar. 2015		
CHECK	JC	12 Jun. 2015		
REVIEW	DL	12 Jun. 2015		

FIGURE: 1

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2.0 AVAILABLE DOCUMENTS AND DATA

Table 1 summarizes available study reports and data provided by The City and AEP, and collected by Golder for this study. Refer to the References section of this report for more information.

Table 1: Available Data and Documents

No.	Description	Date	Author or Source
1	City of Calgary Floodplain Study	1983	AENV 1983, Updated 1996
2	Draft Elbow River Flood Plain Management Study	1986	WER/IBI/Ecos 1986
3	Elbow River – M.D of Rockyview Flood Risk Mapping Study – Final Report, HEC-2 Files and DEM Files	1996	AGRA 1996, Updated 1998
4	High Water Mark Reports, Bow and Elbow Rivers	2005	AENV 2005a, 2005b
5	2005 High Watermark Survey	2005	Provided by The City of Calgary
6	2005 Flood Report	2005	City of Calgary 2005
7	Glenmore Reservoir Bathymetry Data	2006	Provided by The City of Calgary
8	Calgary Bow River Weir Project, Physical Model Studies, Final Report.	2007	NHC 2007
9	Hydraulic Model Evaluation Using 2005 High Watermark Data for Bow and Elbow Rivers through Calgary	2007	AENV 2007
10	Glenmore Reservoir Spillway Curves	2008	Provided by The City of Calgary
11	Draft June 2005 River Flood Data Report	2009	City of Calgary 2009
12	Hydrology Study, Bow and Elbow Rivers Updated Hydraulic Model Project	2010	Golder 2010
13	Bow and Elbow River Updated Hydraulic Model Project, Hydraulic Modelling and Inundation Mapping	2012	Golder 2012
14	Design and as-built drawing for various new and rehabilitated infrastructure (Sandy Beach Bridge, Riverdale Ave Bridge, Rideau Park Bridge, Erlton Flood Control Weir, Stampede Erosion and Protection Works, Traverse Bridge, Peace Bridge, Prince's Island Causeway, Centre St. Bridge Scour Protection Work and St. Patrick's Island Bridge)	Various	Provided by The City of Calgary
15	2013 Western Headworks Canal Flood Action Plan	2013	ESRD/WID/ City of Calgary 2013
16	High Water Mark Data for the June 2013 Flood Event	2013	Provided by The City of Calgary
17	High Water Mark Report, Bow River at Calgary, July 3-4, and July 18, 2013	2014	ESRD 2014a
18	High Water Mark Report, Lower Elbow River, City of Calgary, July 3, 2013	2014	ESRD 2014b
19	Bow River and Elbow River, Basin-Wide Hydrology Assessment and 2013 Flood Documentation	2014	Golder 2014
20	Bow and Elbow Rivers Updated Hydraulic Model Project, Survey Data Collection and Digital Elevation Model Creation	2015	Golder 2015
21	City of Calgary Permanent Flood Control Barriers	2015	City of Calgary 2015

3.0 SITE RECONNAISSANCE

A site reconnaissance was conducted by Mr. Frank Frigo and Ms. Deighen Blakely of The City, Mr. Peter Onyshko of AEP, and Mr. Hua Zhang and Mr. Jie Chen of Golder on January 16 and 17, 2014. They confirmed the selection of the model study reaches and boundaries, inspected the key locations of interest, and discussed the modelling approach. The site reconnaissance focused on observing and identifying recent changes in the Bow and Elbow Rivers and areas where large changes occurred during the 2013 flood event.

The site reconnaissance was important to gather relevant information for supporting a realistic representation of the physical system in the model, including the major physical features that may restrict or resist the channel flood flows. Constructing a representative hydraulic model requires a good understanding of its prototype hydraulic system.

4.0 MODEL SET UP

4.1 Methodology

The HEC-RAS (Version 4.1, January 2010) hydraulic model platform was selected to develop the Bow and Elbow River model in the 2012 study (Golder 2012). The 2012 HEC-RAS model was updated in this study using an updated integrated Digital Elevation Model (DEM) prepared by Golder (Golder 2015).

HEC-RAS can be used to perform one-dimensional (1D) hydraulic calculations for natural and constructed channels. The model was developed at the Hydrologic Engineering Center (HEC) of the U.S. Army Corps of Engineers (USACE). The River Analysis System (RAS) software has a graphical user interface, separate hydraulic analysis components, data storage and management capabilities, and graphics and reporting facilities.

The HEC-RAS model was developed to calculate water surface profiles by solving the energy equation between cross sections. It can be used for modelling subcritical, supercritical, and mixed flow regimes. The model is able to simulate both steady and unsteady flow. In this study, the model was run in subcritical and steady-state mode. HEC-RAS is a commonly-used hydraulic model in North America and around the world.

The HEC-GeoRAS module (Version 10.1, dated February 2013) was used to prepare cross-sectional data based on the integrated DEM (Golder 2015). HEC-GeoRAS is an ArcGIS extension tool specifically designed to create a HEC-RAS import file from the geospatial data. The water surface profile exported from HEC-RAS may also be processed in HEC-GeoRAS to visualize the flood inundation extent.

To meet the goals of this study, The City and AEP desired a model setup capable of simulating all flow events with one geometry file. Effective roughness may vary between low and high flows for the same river. The main focus of this study is simulation of flood flows. Although the model calibration process involved consideration of low and high flows, a good representation of flood levels has a higher priority than low flows.

4.2 Model Reaches

As a 1D model, HEC-RAS assumes constant water levels at each cross section, through both the main channel and overbank areas. This includes side channels, unless they are explicitly represented via separate branches in the model with separate cross sections. In the model setup, separate branches were introduced at Bowness Island, Prince's Island and Zoo Island along the Bow River study reach, because large water level differences are expected to occur between the main and side channels.

There are no large islands along the Elbow River study reach downstream of Glenmore Dam. However, during large flood events, Elbow River flood waters may be conveyed by some streets forming separate branches where flow conditions and water levels are expected to be different from those in the main channel. Therefore, some streets that were observed or assumed to convey relatively large amounts of flow were simulated as separate branches. They include Riverdale Avenue, Roxboro Road, 26th Avenue SW, 25th Avenue SW and 22nd Avenue SW. Details of these model branches are described below:

- Riverdale Avenue: The upstream end of the reach is connected to the Elbow River. The downstream end is connected to the Elbow River downstream of the Riverdale Avenue Pedestrian Bridge of 8th Street SW. It is assumed that the residential houses between Riverdale Avenue and Elbow River form a conveyance barrier between the two reaches.

- Roxboro Road: A large side channel is formed along Roxboro Road during large floods, conveying flows parallel to the Elbow River from its west end across 4th Street SW to its east end at Roxboro Road/Roxboro Park. It is assumed that the residential houses between Roxboro Road and Elbow River form a conveyance barrier between these two reaches.
- 26th Avenue SW: During the 2005 and 2013 floods, it was observed that portions of the Elbow River flow was conveyed along 26th Avenue SW east of 1st Street SW. This short section of 26th Avenue SW was included in the model as a separate branch.
- 25th Avenue SW: North of 25th Avenue SW, the Elbow River flows north, then east around the Talisman Centre/Lyndsay Park, then south-east along the south side of the Calgary Stampede Ground and back to the Bow River. The area between the 25th Avenue SW Bridge and Calgary Stampede is prone to inundation during flood events. Based on the observations during the 2013 flood event, it is assumed that 25th Avenue SW forms an additional side channel that is activated for flood events with return periods greater than 35 years.
- 22nd Avenue SW: This section of roadway was constructed specifically to convey flood flows and is a designated floodway area. The west extension of 22nd Avenue SW to the Elbow River is constructed as a hidden weir (Erlton Flood Control Weir) to convey a portion of the Elbow River flood flows. It was included as a separate branch in the model with a downstream connection near the LRT Bridge.

The branches along the Elbow River study reach between Riverdale Avenue and the Calgary Stampede grounds are shown in Figure 2. In the 2012 study, an additional flow separation with a separate branch through the Calgary Stampede grounds was included in the model setup. However, based on observations during the 2013 flood and post-flood construction of a new flood wall south of the Stampede Grandstand, this branch was no longer considered necessary.

No updates to the 2012 hydraulic model geometry upstream of Glenmore Reservoir were undertaken, because no new data was available for that upstream river reach.

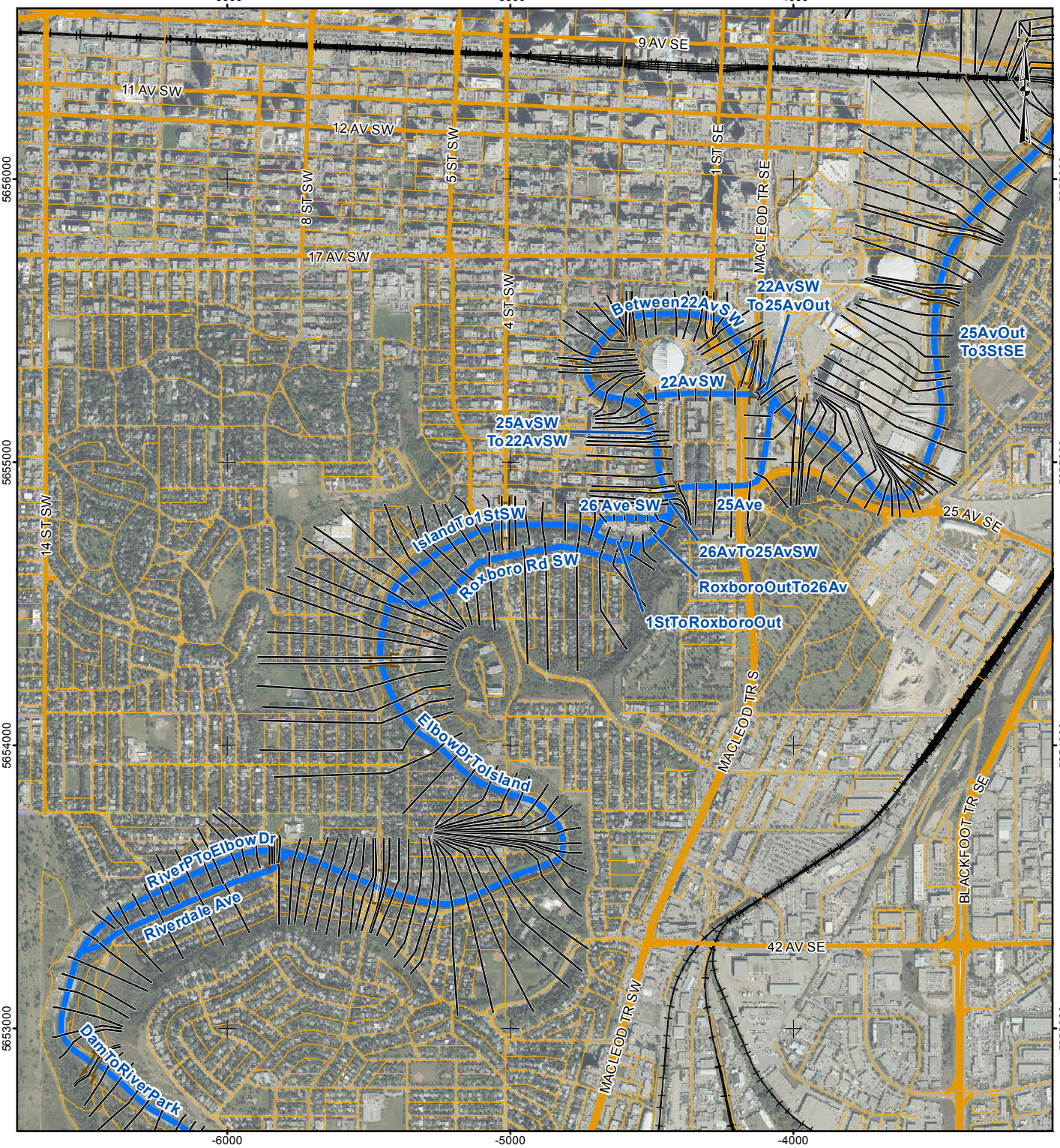
All branches were connected to the main channels of the Bow and Elbow Rivers, resulting in one integrated model. The amount of flow separation was calculated by HEC-RAS using the optimized calculation method.

Junction hydraulics and flow splits were modelled using the energy equation, which is the standard procedure in HEC-RAS for steady-state flow simulations (USACE 2010). The initial flow split estimates at the junctions are discussed in Section 4.8.

4.3 Cross-Sectional Data

Cross-sectional data were extracted from the updated, integrated DEM. Locations of the cross sections in the model were selected based on the locations of surveyed cross sections and modelling requirements. The alignments and locations of the cross sections in the 2012 model were generally maintained in the 2015 model, unless they had to be changed to better reflect post-2013 flood conditions or represent observed flow patterns. Additional cross sections were added at some locations to refine the representation of the river characteristics, to enable modelling of new infrastructure or bridges, or to represent structure removal.

HEC-GeoRAS was used to define the main channel and overbank alignments and bank stations, cross section river stations, and the connections between the main channels of the Bow and Elbow Rivers and the branch channels. Table 2 presents an overview of the river and side channel reaches represented in the HEC-RAS model, and lists the number of cross sections in each reach.



LEGEND

- BRIDGE
- CHANNEL CENTRE LINE
- CROSS SECTION
- LOCAL ROAD
- MAJOR ROAD
- RAILWAY

500 0 500

SCALE 1:20,000 METRES

REFERENCE

TRANSPORTATION DATA AND 2013 POST FLOOD IMAGERY OBTAINED FROM THE CITY OF CALGARY.
PROJECTION: 3TM W114 DATUM: NAD 83

PROJECT

BOW RIVER AND ELBOW RIVER HYDRAULIC MODEL AND FLOOD INUNDATION MAPPING UPDATE

TITLE

BRANCHES ADOPTED IN THE MODEL OF THE ELBOW RIVER

Golder Associates
Calgary, Alberta

PROJECT		13-1326-0054	FILE No.	
DESIGN	JC	12 Mar. 2015	SCALE AS SHOWN	REV. 0
GIS	PT	12 Mar. 2015		
CHECK	JC	12 Jun. 2015		
REVIEW	DL	12 Jun. 2015		

FIGURE: 2

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Table 2: Number of Cross Sections in the HEC-RAS Model

River or Branch Channel	Reach	From River Station (m)	To River Station (m)	Length (m)	Number of Cross Sections
Bow River	Dam to Bowmont	62521	69367	6846	37
Bow River	Bowmont Island	61651	62521	870	3
Bow River	Bowmont to Prince	50393	61651	11259	69
Bow River	Prince Island	49016	50393	1377	10
Bow River	Prince to Zoo	47901	49016	1115	12
Bow River	Zoo to Elbow	47184	47901	717	5
Bow River	Elbow to Zoo End	45785	47184	1400	6
Bow River	Zoo End to DSBC	0	45785	45785	205
Bowmont Side	Bowmont Side	0	874	874	3
Prince Side	Prince Side	0	1130	1130	14
Zoo Side	Zoo Side	0	2064	2064	14
Elbow River	Dam to River Park	8389	11420	3031	110
Elbow River	River Park to Elbow Dr.	7549	8389	841	18
Elbow River	Elbow Dr. to Island	5281	7549	2268	47
Elbow River	Island to 1st St. SW	4466	5281	815	18
Elbow River	1st St. to Roxboro Out	4298	4466	168	3
Elbow River	Roxboro Out to 26th Ave.	4136	4298	162	3
Elbow River	26th Ave. to 25th Ave. SW	4072	4136	64	2
Elbow River	25th Ave SW to 22nd Ave. SW	3710	4072	362	11
Elbow River	Between 22nd Ave. SW	2623	3710	1087	30
Elbow River	22nd Ave SW to 25th Ave Out	2581	2623	43	2
Elbow River	25th Ave Out to 3rd St. SE	0	2581	2581	54
Riverdale Ave	Riverdale Ave.	0	820	820	6
Roxboro Road SW	Roxboro Rd. SW	0	977	977	12
26th Avenue SW	26th Ave. SW	0	297	297	6
25th Avenue SW	25th Ave. SW	0	630	630	9
22nd Avenue SW	22nd Ave SW	0	480	480	8
				TOTAL	**717**

The 2015 model includes a total number of 347 cross sections along the Bow River study reach. It has 293 cross sections along the 57.8 km river reach between Bearspaw Dam and the downstream city limit, resulting in an average spacing of 197 m between adjacent cross sections. Spacing is greater downstream of city limits than within city limits.

The length of the Elbow River study reach below Glenmore Dam is 11.3 km. The Elbow River model reach contains 55 cross sections upstream of Glenmore Dam and 243 cross sections downstream. This results in an average spacing of 47 m between adjacent cross sections.

The left and right bank stations defining the main channel were determined using HEC-GeoRAS based on post-2013 flood LiDAR data, aerial imagery and survey data. Manning's *n* roughness values were specified using the distributed roughness approach, which allows for multiple, varying roughness values within each cross section. The initial roughness distribution was derived using the following data:

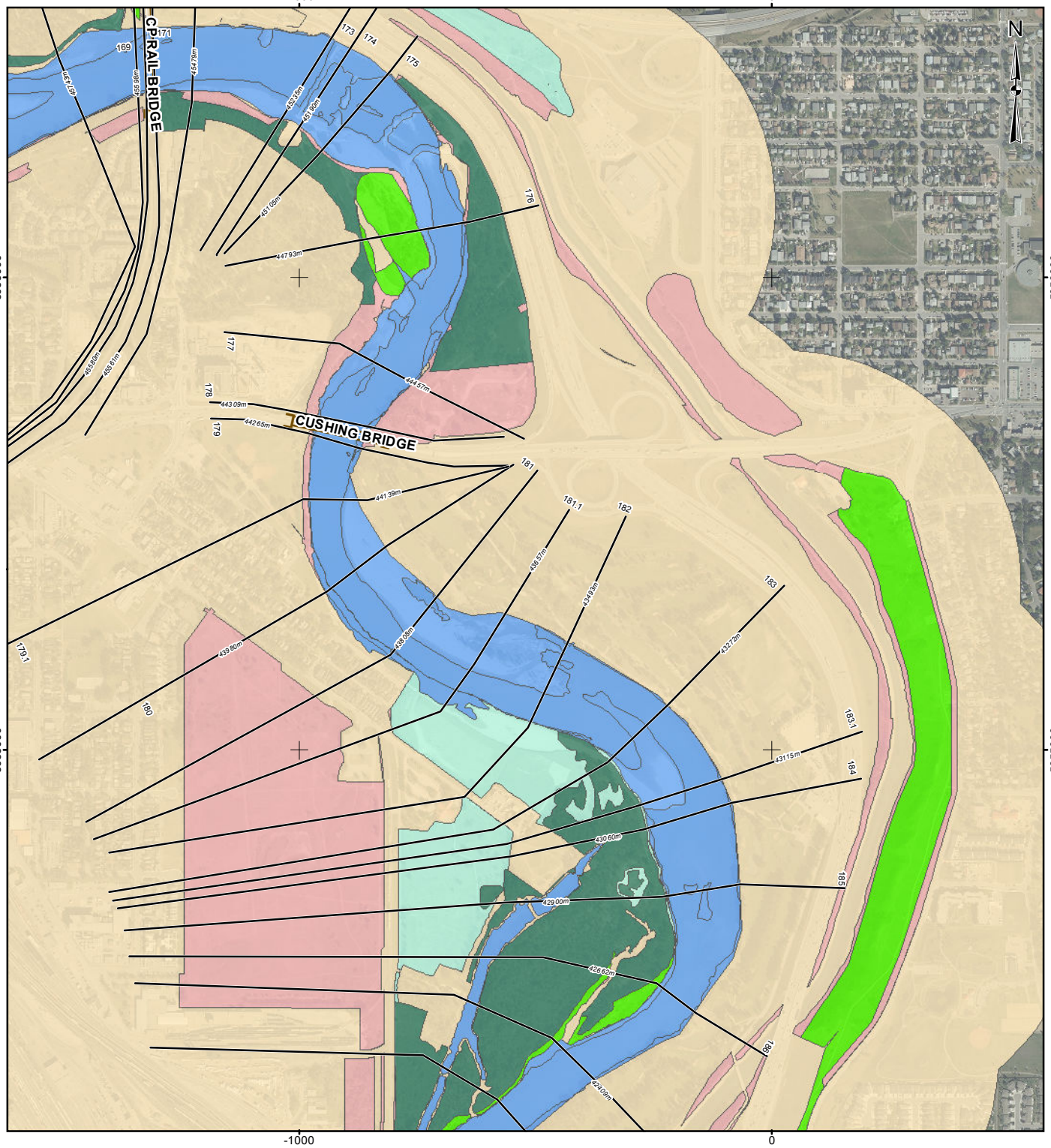
- Bank lines established from the LiDAR data, aerial imagery and surveyed data to identify the main channels of the Bow and Elbow Rivers;
- Data from The City's Parks Asset and Reporting and Information System (PARIS) that defines natural areas and habitats in a GIS dataset; and
- Street and cadastral data in the Elbow River floodplain to help identify side channels and flow splits.

These data sources were used to determine ten roughness classes (Table 3). The initial roughness values assigned in the 2015 model were similar to those in the 2012 model. The roughness values at some locations were modified during model update and calibration, as appropriate. The roughnesses values were applied to the cross sections using HEC-GeoRAS. An example of the roughness distribution is shown in Figure 3.

Table 3: List of Roughness Classes and Values

No.	Description	Habitats from PARIS (1)	Manning's n Value	
			2012 Model	2015 Model
1	Bow River bed from Highwood River to Louise Bridge	-	0.040	0.0399
2	Bow River bed from Louise Bridge to Shouldice Park	-	0.032	0.032001
3	Bow River bed from Shouldice Park to Bearspaw Dam	-	0.035	0.035002
4	Elbow River bed	-	0.035	0.035003
5	Grassland	Native Grassland, non-native vegetation (mostly grass), Wetland	0.040	0.040001
6	Bushes/shrubs	Upland low shrub, upland tall shrub, riverine tall shrub (willows)	0.080	0.080001
7	Trees/Forest	Aspen forest, Balsam popular forest, white Spruce forest	0.100	0.100001
8	City area (Urban mixture)	Disturbed, all other areas	0.040	0.040002
9	Streets (along Elbow River side channels)	-	0.030	0.030001
10	Other natural area	Other natural areas	0.050	0.050001

(1) Parks Asset and Reporting and Information System.



LEGEND

BRIDGE

CROSS SECTION

LANDUSE DISTRIBUTION

1 - RIVER BED FROM HIGHWOOD RIVER TO LOUISE BRIDGE
2 - RIVER BED FROM LOUSIE BRIDGE TO SHOULDICE PARK
3 - RIVER BED FROM SHOULDICE PARK TO BEARSPAWN BRIDGE
4 - RIVER BED ELBOW RIVER
5 - GRASSLAND
6 - BRUSHES / SHRUB
7 - TREES / FOREST
8 - CITY AREA (URBAN MIXTURE)
9 - STREETS
10 - OTHER NATURAL AREA

REFERENCE

TRANSPORTATION DATA, LANDUSE DATA AND 2013 POST FLOOD IMAGERY OBTAINED FROM THE CITY OF CALGARY.
PROJECTION: 3TM W114 DATUM: NAD 83

500 0 500
SCALE 1:12,000 METRES

PROJECT
BOW RIVER AND ELBOW RIVER HYDRAULIC MODEL AND FLOOD INUNDATION MAPPING UPDATE

TITLE
EXAMPLE OF ROUGHNESS DISTRIBUTION BASED ON LAND USE CLASSES

Golder Associates
Calgary, Alberta

PROJECT	13-1326-0054		FILE No.	
DESIGN	JC	12 Mar. 2015	SCALE AS SHOWN	REV. 0
GIS	PT	12 Mar. 2015		
CHECK	JC	12 Jun. 2015		
REVIEW	DL	12 Jun. 2015		

FIGURE: 3

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Note in Table 5 that Manning's n values (e.g. 0.035001 instead of 0.035) were specified in the 2015 HEC-RAS model to differentiate two land use classes that may have the same Manning's n value. This differentiation has been kept in the model to facilitate potential and efficient update or modification of the Manning's n value for a particular land use class.

The side channels along the Elbow River (see Section 4.2) are dry under normal flow conditions. They only convey water during higher flows and floods, when water escapes the main channel. Dry river reaches with no flow connection to adjacent reaches can not be modelled in HEC-RAS. This model limitation was addressed by introducing a small deep slot in each side channel cross section. Each slot has a width of 0.30 m. The slot depths were defined in a way that the resulting thalweg of each side channel is a linear connection between the upstream and downstream ends of each side channel reach (see Figure 4). Each slot was treated as a "main channel" within the side channel cross section by HEC-RAS, and the surrounding areas as overbank "floodplain" areas in the side channel branch. This is necessary to support appropriate determination of the hydraulic radius, which influences the conveyance calculation in HEC-RAS.

The introduction of small deep slots in the side channel cross sections also allowed the use of automatic flow split optimization in HEC-RAS. The 0.30 m slot width was selected to ensure that no more than 1% of total Elbow River flow is conveyed in the slots during low and normal flow conditions, when the side channels are dry.

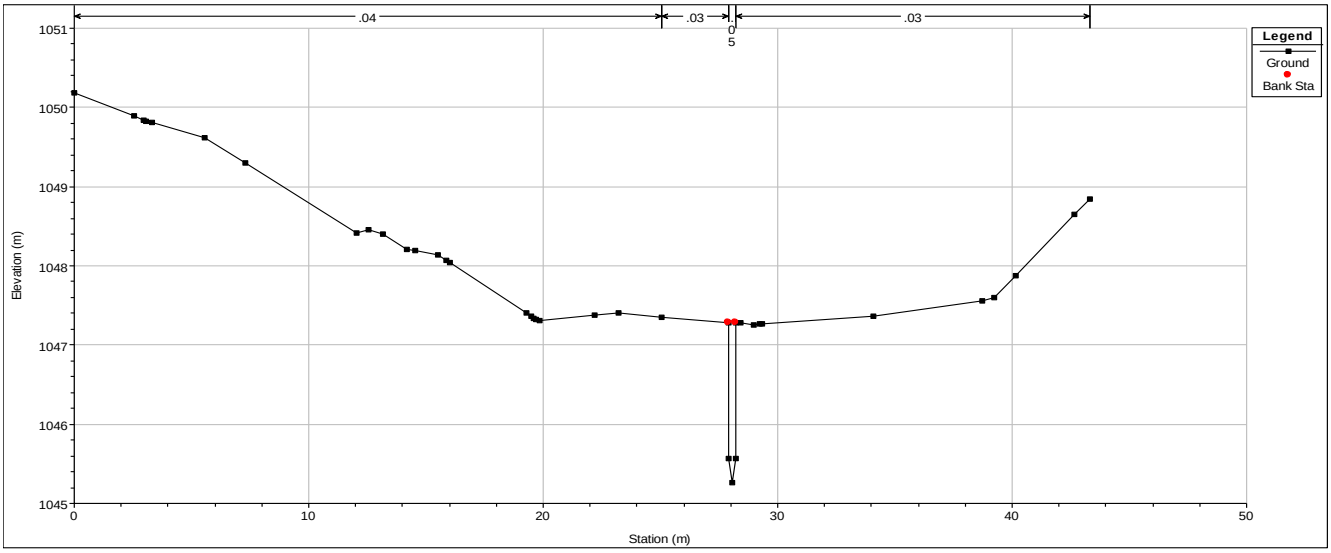

Figure 4: Example of a Small Deep Slot Added to Side Channel Cross Sections

4.4 Bridges

There are a total of 43 bridges along the Bow River study reach (see Table 4). They include two new bridges (i.e. Peace Bridge and St. Patrick's Island Pedestrian Bridge) that were not included in the 2012 model. There was some scour remediation work completed on the south pier (Pier 2) of Centre Street Bridge in May 2014. The remediation work was incorporated into the updated HEC-RAS model to represent the latest modification.

During the 2013 flood, St. Patrick's Island Pedestrian Bridge was under construction, and the cofferdam influenced the local hydraulic condition. This cofferdam was included in the bridge geometry for the model calibration against the 2013 flood, but excluded for flood simulations.

Table 4: List of Bridges in the HEC-RAS Model along the Bow River Study Reach

No.	River	River Station (m)	Name	Description	Type
1	Bow River	65773	Stoney Trail Bridge(1)	-	5-Span
2	Bow River	64207	85 St SW Bridge	-	4-Span
3	Bow River	63565	Bowmont Bridge	Pedestrian Bridge	Pedestrian
4	Bow River	63474	CP Rail Twin Bridges	-	Clear-Span
5	Bow River	59604	Hextall Bridge	Pedestrian Bridge Upstream of Bowness Road	Pedestrian
6	Bow River	59583	Souldice Bridge	Bowness Road	3-Span
7	Bow River	59182	Trans-Canada Highway Bridge	16th Avenue NW	5-Span
8	Bow River	56728	Harry Boothman Bridge	Edworthy Park Pedestrian Bridge	Pedestrian
9	Bow River	53167	Crowchild Trail Bridge(1)	-	5-Span
10	Bow River	51706	Mewata Bridge	14th Street SW	3-Span
11	Bow River	50929	Louise Bridge	9th, 10th Street SW	5-Span
12	Bow River	50814	North West Light Rail Bridge	-	4-Span
13	Bow River	50411	Peace Bridge	Pedestrian Bridge	Pedestrian
14	Bow River	49625	Prince's Island Bridge	-	Pedestrian
15	Bow River	48932	Centre St Bridge(2)	-	4-Span
16	Bow River	48167	4th Avenue Flyover Bridge	-	4-Span
17	Bow River	48132	Old Langevin Bridge	-	2-Span
18	Bow River	48023	New Langevin (Edmonton Trail) Bridge	Edmonton Trail	6-Span
19	Bow River	47988	Harry Kroeger Bridge	LRT Bridge	5-Span
20	Bow River	47705	St. Patrick's Island Pedestrian Bridge	Pedestrian Bridge	Clear-Span
21	Bow River	46540	St. Georges Island Bridge	12th Street SE	6-Span
22	Bow River	45573	CP Rail Bridge	-	5-Span
23	Bow River	44288	Cushing Bridge	Blackfoot Trail / 17th Avenue SE Bridge	3-Span
24	Bow River	41011	Abandoned CP Rail Bridge	-	3-Span
25	Bow River	40949	CP Rail Bridge	-	5-Span

Table 4: List of Bridges in the HEC-RAS Model along the Bow River Study Reach (Continued)

No.	River	River Station (m)	Name	Description	Type
26	Bow River	40815	Bonnybrook Bridge	-	5-Span
27	Bow River	40141	Calf Robe Bridge	Deerfoot Trail	5-Span
28	Bow River	39626	CN Rail Bridge	-	6-Span
29	Bow River	37158	Graves Bridge, Upstream	Glenmore Trail	6-Span
30	Bow River	37138	Graves Bridge, Downstream	Glenmore Trail	6-Span
31	Bow River	34433	Eric Harvie Bridge	Pedestrian Bridge	Pedestrian
32	Bow River	32424	Ivor Strong Bridge	Deerfoot Trail near Douglasdale	5-Span
33	Bow River	30868	Sue Higgins Bridge	Pedestrian Bridge	Pedestrian
34	Bow River	26388	McKenzie Bridge	Pedestrian Bridge	Pedestrian
35	Bow River	23614	Marquis de Lorne Bridge, Upstream	Highway 22X	5-Span
36	Bow River	23573	Marquis de Lorne Bridge, Downstream	Highway 22X	6-Span
37	Bow River	18031	Dunbow Road Bridge, Upstream	Highway 2	4-Span
38	Bow River	17998	Dunbow Road Bridge, Downstream	Highway 2	4-Span
39	Prince's Island Lagoon	476	Jaipur Bridge	Prince's Island Pedestrian Bridge	3-Span
40	Prince's Island Lagoon	308	Prince's Island Bridge on Side Channel	Downstream of Weir	Pedestrian
41	Zoo Side Channel	1868	St. Patrick's Island Bridge on Zoo Side Channel	Zoo Side Channel	Pedestrian
42	Zoo Side Channel	1119	Baines Bridge	Zoo Road NE / 12th Street NE	3-Span
43	Zoo Side Channel	434	Zoo Service Bridge	Zoo Side Channel	3-Span

Notes: (1) The bridge deck in the HEC-RAS model is the deck of lower pedestrian bridge.
(2) The deck of lower bridge was not included in the HEC-RAS model. It has less local effect than the deck of higher bridge during high flood events.

The George C. King Bridge near St. Patrick's Island was demolished before the 2013 flood. Therefore, the bridge was removed from the updated HEC-RAS model.

There are a total of 20 bridges along the Elbow River study reach (see Table 5). During the 2013 flood, four of these bridges (i.e. the Sandy Beach Pedestrian Bridge, Riverdale Avenue Pedestrian Bridge, Rideau Park Pedestrian Bridge and Stampede Park (S) Saddledome Access Bridge) were damaged or washed away. These four bridges have been rehabilitated in 2014. A new bridge, Traverse Bridge, was constructed near the Elbow River confluence. These bridges were not represented in the model for calibration against the 2013 flood, but were included for flood simulations.

Table 5: List of Bridges in the HEC-RAS Model along the Elbow River Study Reach

No.	River	River Station (m)	Name	Description	Type
1	Elbow River	8851	Sandy Beach Bridge	Pedestrian Bridge	Pedestrian
2	Elbow River	7601	Riverdale Avenue Bridge	Pedestrian Bridge	Pedestrian
3	Elbow River	7206	Elboya Bridge	Elbow Drive Bridge	3-Span
4	Elbow River	5506	Rideau Park Bridge	32nd Avenue Pedestrian Bridge	Pedestrian
5	Elbow River	4783	Mission Bridge	Mission Road / 4th Street SW	4-Span
6	Elbow River	4043	25th Avenue SW Bridge	-	4-Span
7	Elbow River	3483	Lindsay Park	21st Avenue Pedestrian Bridge	Pedestrian
8	Elbow River	3243	Lindsay Park CNR Bridge	19 Avenue SW / St. Mary's High School	3-Span
9	Elbow River	2954	Pattison Bridge	McLeod Trail South	2-Span
10	Elbow River	2720	Victoria Bridge	McLeod Trail North	3-Span
11	Elbow River	2677	LRT Bridge	-	3-Span
12	Elbow River	2455	Stampede Park Access Bridge	3rd Street SE	4-Span
13	Elbow River	1902	Horse Barn Bridge (New)	-	Clear-Span
14	Elbow River	1855	Horse Barn Bridge (Old)	-	3-Span
15	Elbow River	1244	Stampede Park (S) Saddledome Access Bridge	Saddledome Access Bridge	Clear-Span
16	Elbow River	991	Stampede Park (N) Saddledome Access Bridge	Saddledome Access Bridge	2-Span
17	Elbow River	576	MacDonald Bridge	MacDonald Avenue	Clear-Span
18	Elbow River	334	9th Avenue Train Bridge	-	2-Span
19	Elbow River	287	9th Avenue SE Bridge	Inglewood	Clear-Span
20	Elbow River	165	Travers Bridge	Elbow River Confluence	Pedestrian

The bridge geometries used in the HEC-RAS model were based on the river and bridge surveys completed in 2010 (Golder 2011), except for the new and rehabilitated bridges, which were based on the designed or as-built drawings provided by The City in 2014.

All existing bridges are represented in the HEC-RAS model. They include those which may not affect water levels during floods (e.g. clear span bridges with sufficient freeboard over the 100-year flood). Losses through bridges are calculated in the model using the energy equation (i.e. standard step method).

The ineffective areas upstream and downstream of the bridges were modelled mainly using the non-permanent ineffective area approach, where appropriate. However, the upstream and downstream ineffective areas at five of the bridges were modelled with a combination of non-permanent and permanent ineffective area approaches to minimize the water surface profile crossing at these locations. These five bridges are Hextall Bridge, CP Rail Bridge, and the abandoned CP Rail Bridge along the Bow River; and Stampede Park Access Bridge and 9th Avenue Train Bridge along the Elbow River.

The initial values of the contraction and expansion coefficients at the bridges were selected to be 0.3 and 0.5, respectively. These are typical values based on the HEC-RAS user manual. The values at some locations were modified, where appropriate, during model calibration.

4.5 Dams and Weirs

Four dam or weir structures were explicitly modelled in HEC-RAS, as listed in Table 6.

Table 6: Weirs Included in the HEC-RAS Model

No.	River	River Station (m)	Name	Description
1	Prince Side	362	Prince's Lagoon Weirs	2 Obermeyer Gates
2	Bow River	45212	Harvie Passage	Western Headworks (WH) Weir
3	Elbow River	11417	Glenmore Dam	Water Supply Dam
4	22nd Ave SW	447	Erlton Flood Control Weir	Lateral Structure

The weir at the downstream end of Prince's Island Lagoon (Prince's Island side channel) is comprised of two Obermeyer Gates with widths of 5.50 m each. For the purpose of this study, it was assumed that both gates will be fully opened during floods.

The Western Headworks (WH) Weir includes three sluice gates located at the north bank of the Bow River. The weir has a crest elevation of 1034.57 m and a width of 151 m. The sluice gates were closed during the 2013 flood event. The HEC-RAS model was set up with the sluice gates closed for the model calibration against the 2013 flood and subsequent flood simulations. The weir was modelled based on a rating curve extracted from the physical model study (NHC 2007).

Glenmore Dam was included in the HEC-RAS model as a weir structure with a fixed stage-discharge relation based on the data provided by The City (Glenmore Reservoir Spillway Curves, 2008). The cross sections within Glenmore Reservoir were based on the data provided by The City (Glenmore Reservoir Bathymetry Data, 2006).

The Erlton Flood Control Weir along the right bank of the Elbow River near Erlton at 22nd Avenue SW is a lateral structure. The weir was designed to divert flow from the Elbow River to 22nd Avenue SW during high flow events. The weir has a crest elevation of 1048.00 m and a width of 30.15 m. The structure was eroded during the 2013 flood. It was repaired to the pre-flood condition in 2014. This weir is considered a permanent flood control structure by The City (see Section 4.6).

4.6 Flood Control Structures

The existing permanent flood control structures as defined by The City are described below (Calgary 2015). Figure 5 presents the locations of these permeant flood control structures.

Montgomery Barrier

This is an earthfill barrier along the left bank of the Bow River. It extends approximately between Cross Sections 57756 and 57146. The barrier is integrated with the existing pathway. This barrier was included in the 2015 HEC-RAS model.

Kensington Barrier

This is an earthfill barrier along the left bank of the Bow River between Crowchild Trail and 14th Street Bridges (approximately between Cross Sections 52609 and 51741). The barrier is integrated with the pathway in the park along Memorial Drive. This barrier was included in the 2015 HEC-RAS model.

Kensington to Sunnyside Barrier

This is an earthfill barrier along the left bank of the Bow River. It extends from 14th Street Bridge to a location downstream of Centre Street Bridge (approximately between Cross Sections 51688 and 48431). The barrier consists of the pathway along Memorial Drive and a part of Memorial Drive. This barrier was included in the 2015 HEC-RAS model.

East Village – Riverwalk Barrier

This barrier was constructed along the Riverwalk pathway on the left bank of the Bow River. It extends from Centre Street Bridge to the Elbow River confluence (approximately between Cross Sections 48912 and 47272). The barrier includes recent upgrades by raising the ground in this area in the last five years. This barrier was included in the 2015 HEC-RAS model.

Bridgeland Barrier

This is an earthfill barrier along the left bank of the Bow River. It extends approximately between Cross Sections 48200 and 48115. The barrier was integrated with the existing pathway. It was included in the 2015 HEC-RAS model.

Inglewood Barrier

This is a combined earthfill and concrete wall barrier along right bank of the Bow River. It extends from the Elbow River confluence to approximately 15th Street SE (approximately between Cross Sections 47047 and 46024). A section of this barrier, referring to as the Inglewood Flood Wall, runs through private back yards from New Bow Lane to 15th Street SE. This barrier was included in the 2015 HEC-RAS model.

Glenmore Barrier

This is an earthfill barrier on river right of the Bow River. It extends from Glenmore Trail westbound off-ramp to Deerfoot Trail northbound (approximately between Cross Sections 38348 and 38032). The barrier was recently constructed. It has not been included in the 2015 HEC-RAS model.

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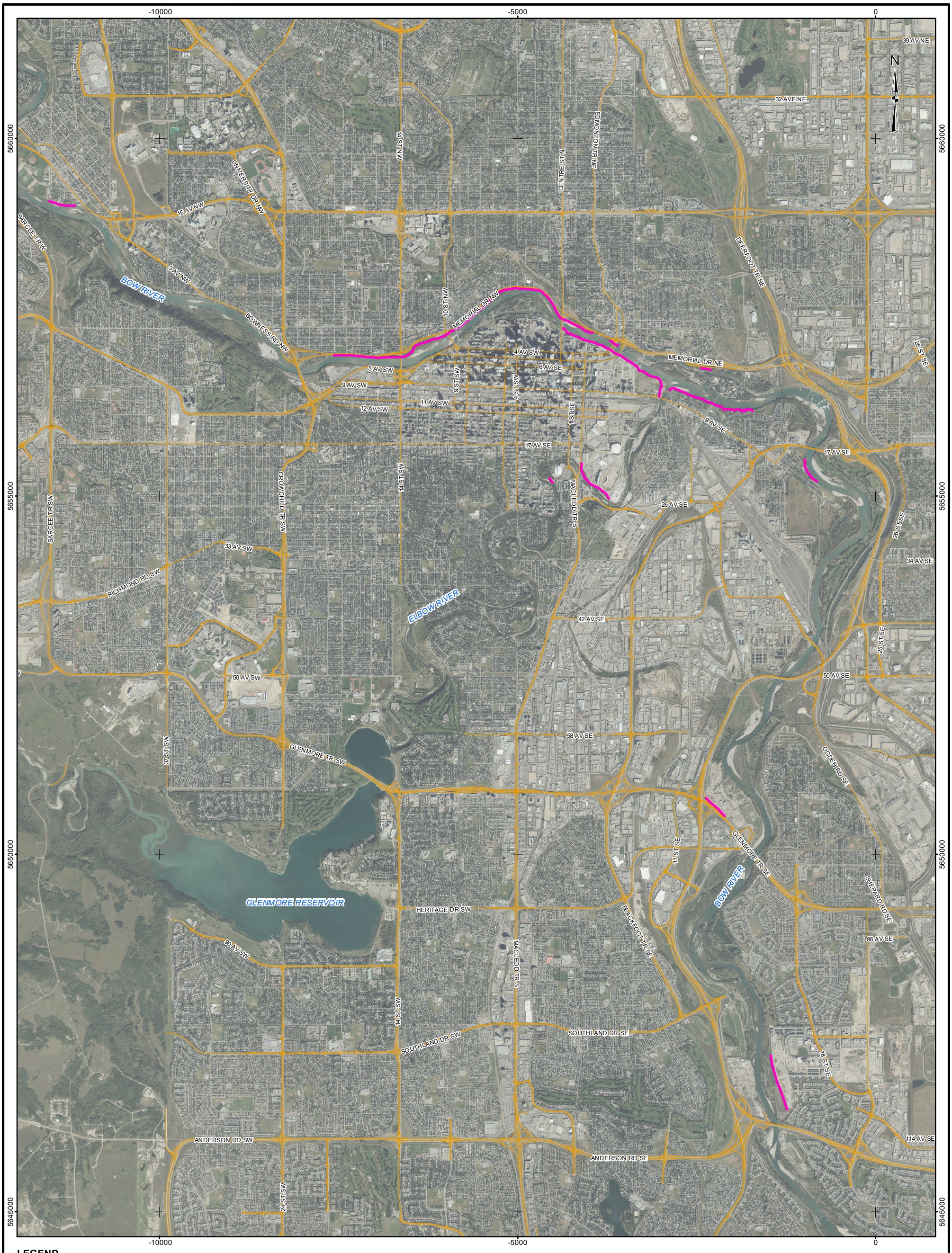


LEGEND

- FLOOD CONTROL STRUCTURE
- MAJOR ROAD

2 0 2

SCALE 1:50,000 KILOMETRES

REFERENCE

2013 POST FLOOD IMAGERY OBTAINED FROM THE CITY OF CALGARY.
PROJECTION: 3TM W114 DATUM: NAD 83

PROJECT
BOW RIVER AND ELBOW RIVER HYDRAULIC MODEL AND FLOOD INUNDATION MAPPING UPDATE

TITLE
FLOOD CONTROL STRUCTURES

Golder Associates

PROJECT		13-1326-0054	FILE No.	
DESIGN	JC	08 Apr. 2015	SCALE AS SHOWN	REV. 0
GIS	HKG	08 Apr. 2015		
CHECK	JC	12 Jun. 2015		
REVIEW	DL	12 Jun. 2015		

FIGURE: 5

Quarry Park Barrier

This is an earthfill barrier along the left bank of the Bow River. It extends approximately between Cross Sections 33419 and 32588. The barrier was recently constructed with the new development in the area. It was included in the 2015 HEC-RAS model.

Erlton Flood Control Weir

This weir was constructed along the right bank of the Elbow River approximately between Cross Sections 3738 and 3671. The weir was designed to divert flow from the Elbow River to 22nd Avenue SW during high flows (see Section 4.5). This structure was included in the 2015 HEC-RAS model.

Stampede Park Flood Wall

This is a combination of earthfill berm and concrete walls along a reach of the Elbow River. It extends from the Big 4 Building to the Horse Barn Building (approximately between Cross Sections 2840 and 2140). The structure includes a 200 m long flood wall that was proposed along the south race track at Stampede Park after the 2013 flood.

This flood wall will protect the Stampede Park from overland flooding for up to the 100-year flood event based on the simulated water levels using the 2012 hydraulic model. The top elevation of the proposed floodwall is 1046.30 m (AMEC 2014). It will be tied to the existing floodwall with a top elevation of 1046.0 m.

The earthfill berm, existing flood wall and proposed flood wall were represented in the updated HEC-RAS model. The 2015 HEC-RAS modelling results show this flood wall is not of sufficient height to protect against the 100-year flood, which peak discharge is greater than the 2012 estimate.

Deane House Barrier

This is a combination of earthfill and concrete wall barrier near the mouth of Elbow River. It extends from 9th Avenue SE Bridge to the Deane House Property (approximately between Cross Sections 275 and 84). The barrier was under construction when the modelling for this study was being undertaken, and was not included in the 2015 HEC-RAS model. Construction was completed by the time this report was published (July 2015).

Other Barriers

After the 2013 flood, the river banks at two locations were raised to approximately the 100-year flood levels that were based on the 2012 HEC-RAS modelling results. These locations are:

- Zoo Island - along the left bank of Zoo Side Channel approximately between Cross Sections 1103 to 884; and
- Inglewood 8th Avenue - along the right bank of the Bow River approximately between Cross Sections 44139 to 43808.

These two barriers have not been included in the 2015 HEC-RAS model, because the as-built data for the two sites were not available during the model setup.

4.7 Other Structures

4.7.1 Prince's Island Park Causeway

This causeway is located at the upstream end of the Prince's Island Park side channel. The causeway consists of an earth embankment with three box culverts, with a width of 2.40 m and a height of 1.20 m each. The inlet

invert of the culverts is 1042.00 m. Both the upstream and downstream side slopes are protected with riprap and concrete.

The surface elevation of the causeway decreases from south to north with a minimum elevation of 1045.50 m. The causeway was overtopped and damaged during the 2013 flood. It has been rehabilitated to a more robust condition that that prior to the 2013 flood.

4.7.2 Harvie Passage

The Harvie Passage was damaged during the 2013 flood. During preparation of the hydraulic model, it was understood that the structure will be rehabilitated to pre-flood conditions. The geometry data of the Harvie Passage used in the 2012 model were based on the as-built information. The same geometry data were used in the 2015 HEC-RAS model.

4.7.3 Rehabilitation Sites

Some of the river channel banks were altered during the 2013 flood. Detailed designs of the bank protection and rehabilitation measures at six locations along the Bow River were available for the study. Two erosion protection works along the Elbow River were constructed in Stampede Park. The locations of these rehabilitation sites are shown in Figure 6 and are listed below:

Bow River:

- Home Road and 52nd Street NW
- Memorial Drive at 19th Street NW
- Memorial Drive near Sunnyside
- Inglewood at 8th Avenue SE (both right bank repair and left bank gravel removal)
- Douglasdale and Enmax Substation
- Diamond Cove

Elbow River:

- Right bank at Stampede Park (25th Avenue SE/3rd Street SE) Access Bridge
- Left bank south of Stampede Grand Stand

The final designs for these sites were incorporated into the integrated DEM, and used in the 2015 HEC-RAS model. Rehabilitation works at these sites have been completed.

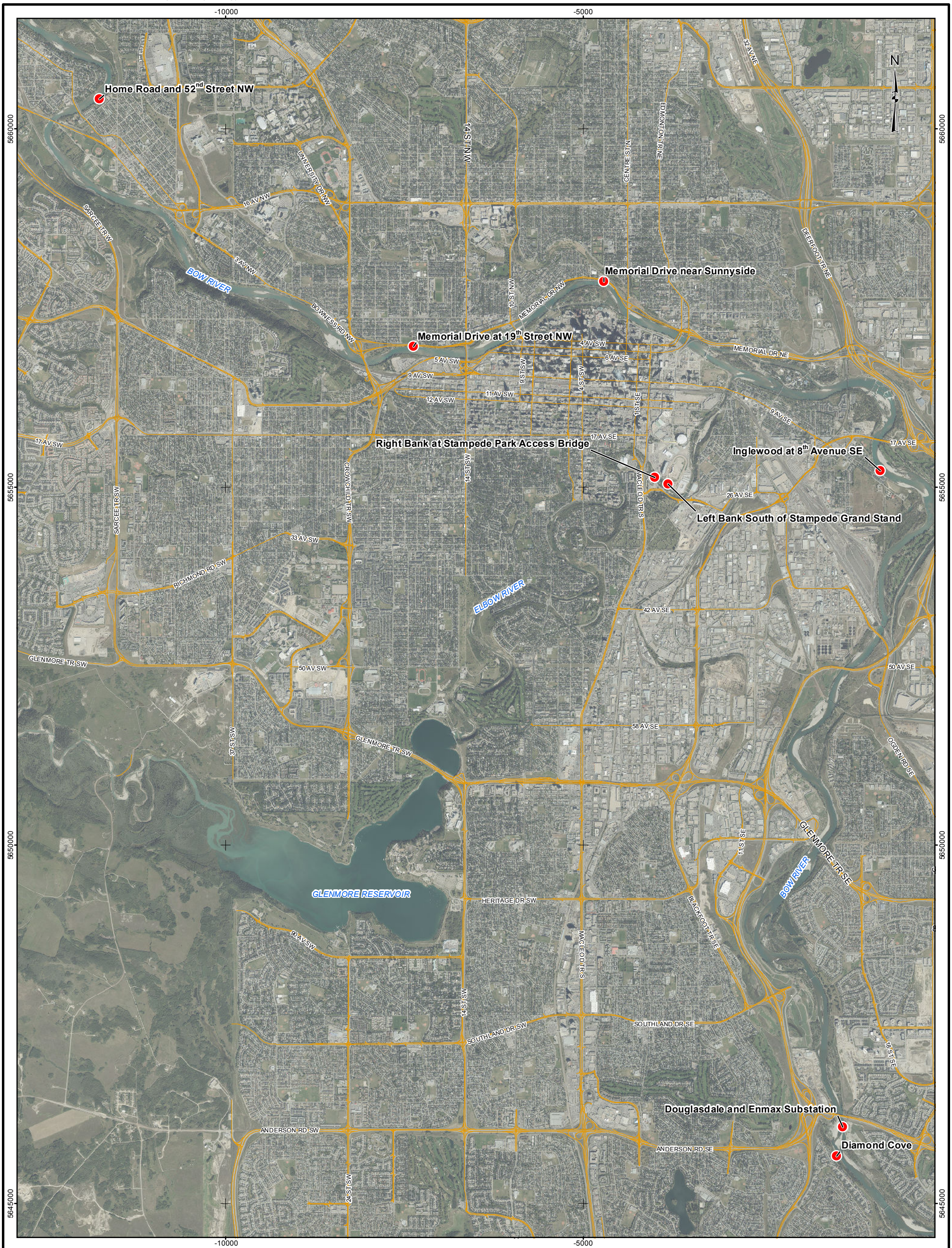
4.8 Boundary Conditions

The HEC-RAS model requires specification of boundary conditions at all open and internal boundaries. The open boundaries of the hydraulic model are listed below:

- Bearspaw Dam - the upstream end of the Bow River study reach;
- The Calgary city limit west of Glenmore Reservoir - the upstream end of the Elbow River study reach; and
- The Highwood River confluence - the downstream end of the Bow River study reach.

The hydraulic model was set up for steady-state flow simulation. The upstream boundary conditions are river discharges.

I:\2013\13-1326\13-1326-0054\Mapping\MXD\Hydrology\Report Figures\1313260054_Fig_6_Rehabilitation-Sites_Rev0.mxd



LEGEND

- SITE LOCATION
- MAJOR ROAD

2 0 2

SCALE 1:50,000 KILOMETRES

REFERENCE

2013 POST FLOOD IMAGERY OBTAINED FROM THE CITY OF CALGARY.
PROJECTION: 3TM W114 DATUM: NAD 83

PROJECT

BOW RIVER AND ELBOW RIVER HYDRAULIC MODEL AND FLOOD INUNDATION MAPPING UPDATE

TITLE

REHABILITATION SITES

Golder Associates

PROJECT		13-1326-0054	FILE No.	
DESIGN	JC	08 Apr. 2015	SCALE AS SHOWN	REV. 0
GIS	HKG	08 Apr. 2015		
CHECK	JC	12 Jun. 2015		
REVIEW	DL	12 Jun. 2015		

FIGURE: 6

The downstream boundary condition on the Bow River at the Highwood River confluence was estimated based on normal flow depth and an energy slope of 0.22%. The downstream model boundary is approximately 9 km downstream of the City limit. The thalweg elevation difference along the Bow River from the City limit to the Highwood River confluence is approximately 18 m. Therefore, the simulated water levels at the downstream City limit are not sensitive to the downstream boundary condition.

At the upstream end of the Bow River reach, flow may enter the Bow River from the Bearspaw Dam spillway between the two most upstream cross sections. Therefore, the simulation results at the most upstream cross section may be approximate.

The downstream end of the Elbow River reach is connected to the Bow River at River Station 47160, forming an internal boundary.

All side channels are connected to the main channels of the Bow and Elbow Rivers using junction elements in HEC-RAS. The reach layout described in Section 4.2 results in a total of 16 junctions. The initially assumed flow split ratio for the side channels along the Bow River (i.e. Bowmont Island, Prince's Island and Zoo Island) was 10%. The Elbow River side channels were assumed to initially convey 1% of the total Elbow River flow.

All flood flow simulations were completed using the flow optimization option provided in HEC-RAS, which determines the split flow ratio between main and side channels by iterative optimization. The iterative optimization algorithm works best when initial flow spilt ratios are close to the optimized solution.

The major tributaries considered and included in the HEC-RAS model are Nose Creek, Fish Creek and Pine Creek. A list of all external and internal boundary conditions is provided in Table 7.

Table 7: HEC-RAS Model Boundary Conditions

No.	River	River Station (m)	Description	Type
1	Bow River	69,367	Inflow at Upstream Boundary	External
2	Bow River	62,521	Flow Split to Bowmont Island Side Channel	Internal(1)
3	Bow River	50,393	Flow Split to Prince's Island Side Channel	Internal(1)
4	Bow River	47,901	Flow Split to Zoo Island Side Channel	Internal(1)
5	Bow River	47,184	Inflow of Elbow River	Internal
6	Bow River	45,598	Inflow from Nose Creek	External
7	Bow River	25,134	Inflow from Fish Creek	External
8	Bow River	16,585	Inflow from Pine Creek	External
9	Bow River	0	Normal Flow Depth at Downstream Boundary with energy slope of 0.22%	External
10	Elbow River	33,042	Inflow at Upstream Boundary	External
11	Elbow River	8,389	Flow Split to Riverdale Avenue Side Channel	Internal(2)
12	Elbow River	5,281	Flow Split to Roxboro Road Side Channel	Internal(2)
13	Elbow River	4,466	Flow Split to 26th Avenue SW Side Channel	Internal(2)
14	Elbow River	4,072	Flow Split to 25th Avenue SW Side Channel	Internal(2)
15	Elbow River	3,710	Flow Split to 22nd Avenue SW Side Channel	Internal(2)
16	Elbow River	0	Junction with Bow River	Internal

Notes:
1) Initial value assigned for side channels along Bow River: 10% of total flow is conveyed by side channels.
2) Initial value assigned for side channels along Elbow River: 1% of total flow is conveyed by side channels.
3) Upstream junctions of split flows are listed because only these require definition of boundary conditions.

5.0 MODEL VALIDATION AND CALIBRATION REFINEMENT

5.1 Approach

The Manning's roughness *n* value is the main HEC-RAS model parameter. The initially selected Manning's n values were adjusted, as appropriate, during the model update, calibration, and validation process. This process involves the following:

- The calibrated Manning's *n* values for both river channels and floodplains in the 2012 model were selected as the initial values, and updated as outlined in Section 4.3.
- The channel Manning's *n* values were validated against the 2013 surveyed low flow data.
- The floodplain Manning's *n* values as well as the contraction and expansion loss coefficients at some locations were refined by further calibrating the model against the 2013 flood HWM data without modifying the calibrated Manning's *n* values for the main river channels.
- The calibrated channel and floodplain Manning's *n* values were validated against the 2005 flood HWM data.

5.2 Low Flow Validation

5.2.1 Bow River Model

The Bow River channel roughness values were validated against measured discharge and water level data collected over a low flow period from September 8 to October 30, 2013. The surveyed river discharge varied from 58 m^3/s to 131 m^3/s during this period.

The calibrated channel Manning's *n* values range approximately from 0.030 to 0.040, which are within the expected range of roughness for rivers with large gravel (Chow 1959). Figure 7 presents the channel Manning's *n* values along the Bow River study reach. In general, these values are slightly higher than those used in the 1983 HEC-2 model (i.e. $n = 0.026 \sim 0.034$) but similar to those used in the 2012 HEC-RAS model.

Figures 8(a), 8(b) and 8(c) show a comparison between the simulated water surface profile and measured water levels for the low flow validation. Table A.1 in Appendix A lists the differences between the simulated and measured water levels.

The mean difference between the simulated and measured water levels is -0.03 m, with individual differences ranging from -0.66 m to +0.66 m (see Figure 9). At five of the 297 cross sections (1.7%) where the measured water levels are available, the simulated water levels are at least 0.30 m higher than the measurements. At 14 of the 297 cross sections (4.7%), the simulated water levels are at least 0.30 m lower than the measurements.

5.2.2 Elbow River Model

The calibrated Elbow River channel roughness values were validated against the measured discharge and water level data collected for the low flow period from September 3 to 12, 2013. The measured river discharge varied from 2.3 m^3/s to 3.7 m^3/s during this period.

Figure 10 presents the channel Manning's *n* values along the Elbow River study reach. In general, these values are higher than those (i.e. $n = 0.022 \sim 0.026$) used in the 1983 HEC-2 model but similar to those used in the 2012 HEC-RAS model.

Figure 11 compares the simulated water surface profile to the measured water levels for the low flow validation. The mean difference between the simulated and measured water levels is -0.14 m, with individual differences ranging from -0.67 m to +0.85 m (see Figure 12). Table A.2 in Appendix A presents the water level differences between the simulation and measurement.

At three of the 234 cross sections (1.3%), the simulated water level is at least 0.30 m higher than the surveyed water level. At five of the 234 cross sections (2.1%), the simulated water level is at least 0.30 m lower than the surveyed water level.

5.2.3 Conclusion

The above model validation results show that the simulated Bow and Elbow River water levels using the calibrated channel Manning's *n* values in the 2012 study generally compare well with the measured water levels for low flow conditions. Overall, the simulated water levels for low flow conditions are slightly lower than the surveyed water levels. This is considered reasonable, because effective river channel roughness for low flow conditions tends to be slightly higher than for high flow conditions. Because the calibrated model is primarily used for flood modelling, the simulation results for the low flow conditions are accepted as validating the calibrated Manning's *n* values for the main channels.

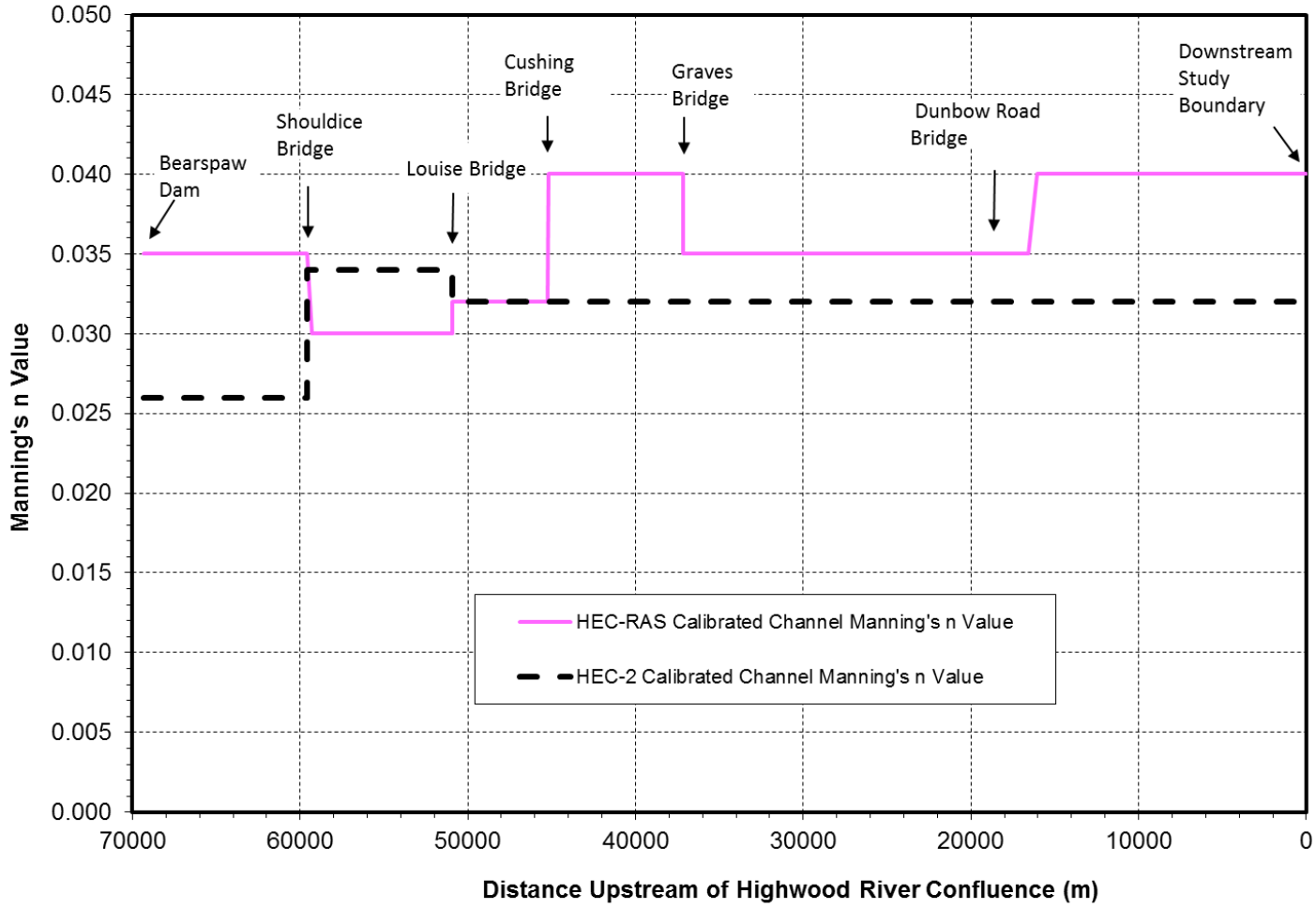


Figure 7: Comparison of Calibrated Channel Manning's n Values along the Bow River Study Reach

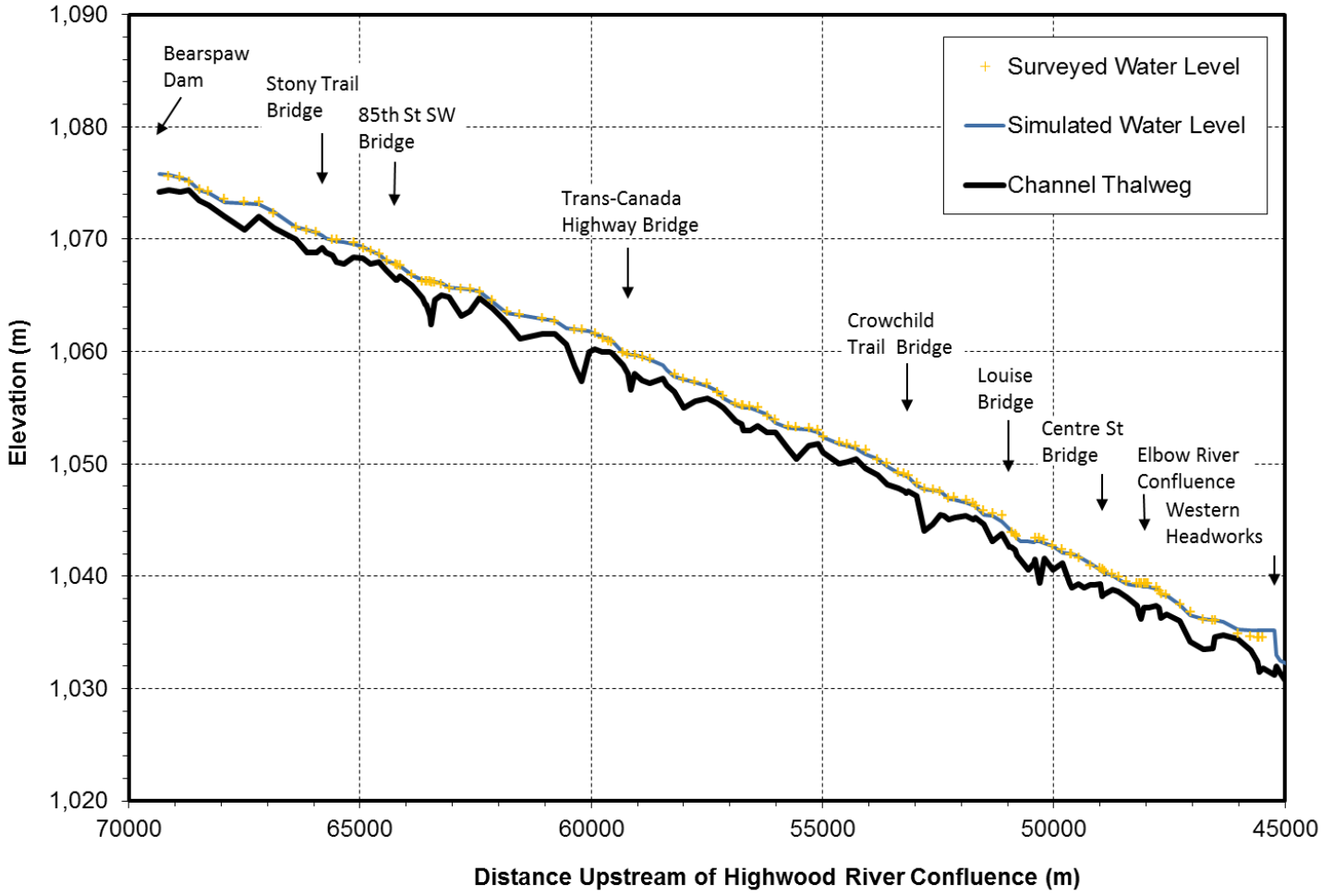


Figure 8(a): Comparison of Simulated Water Surface Profile with Surveyed Water Levels along the Bow River Study Reach for Low Flow Validation– Part 1

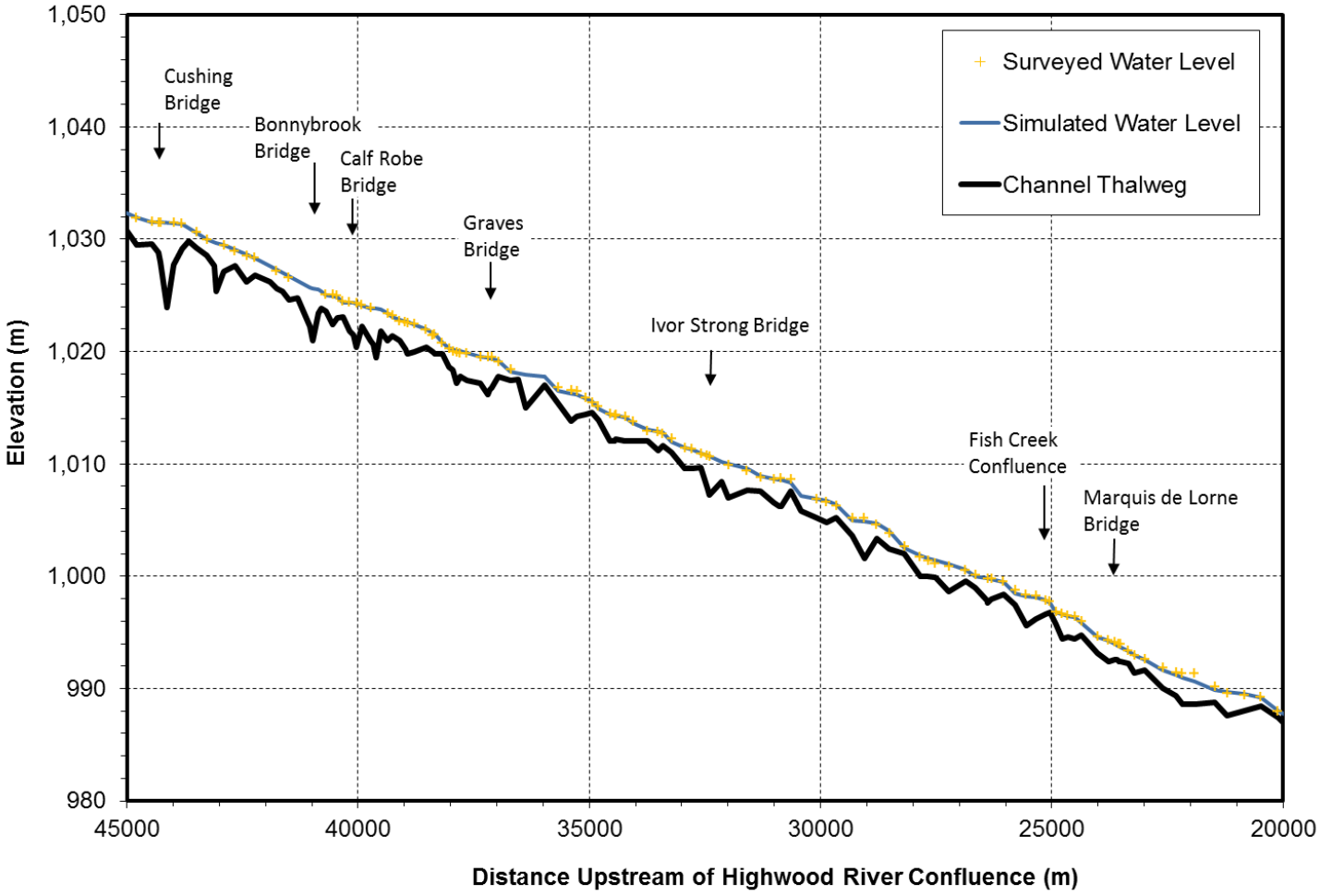


Figure 8(b): Comparison of Simulated Water Surface Profile with Surveyed Water Levels along the Bow River Study Reach for Low Flow Validation – Part 2

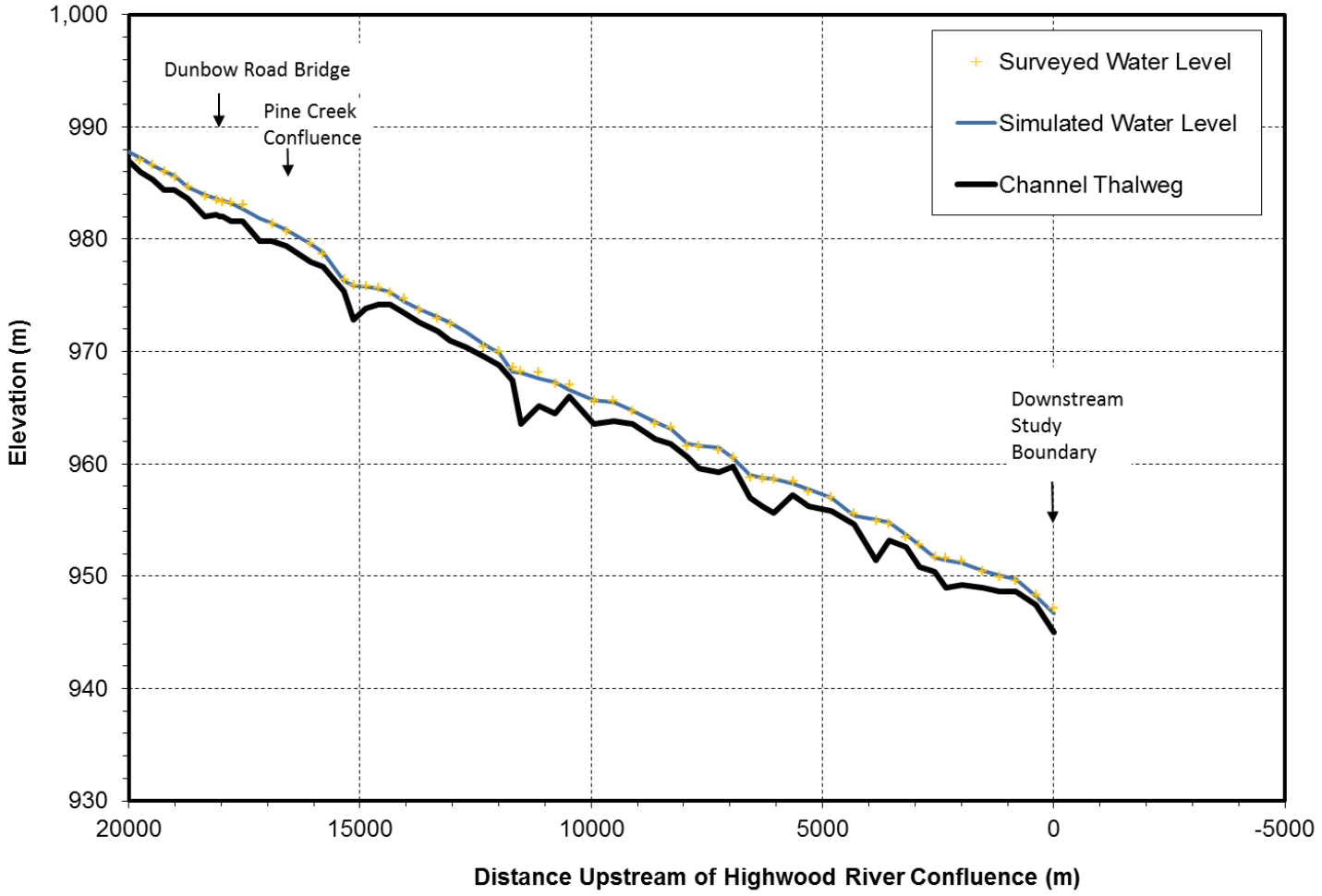


Figure 8(c): Comparison of Simulated Water Surface Profile with Surveyed Water Levels along the Bow River Study Reach for Low Flow Validation – Part 3

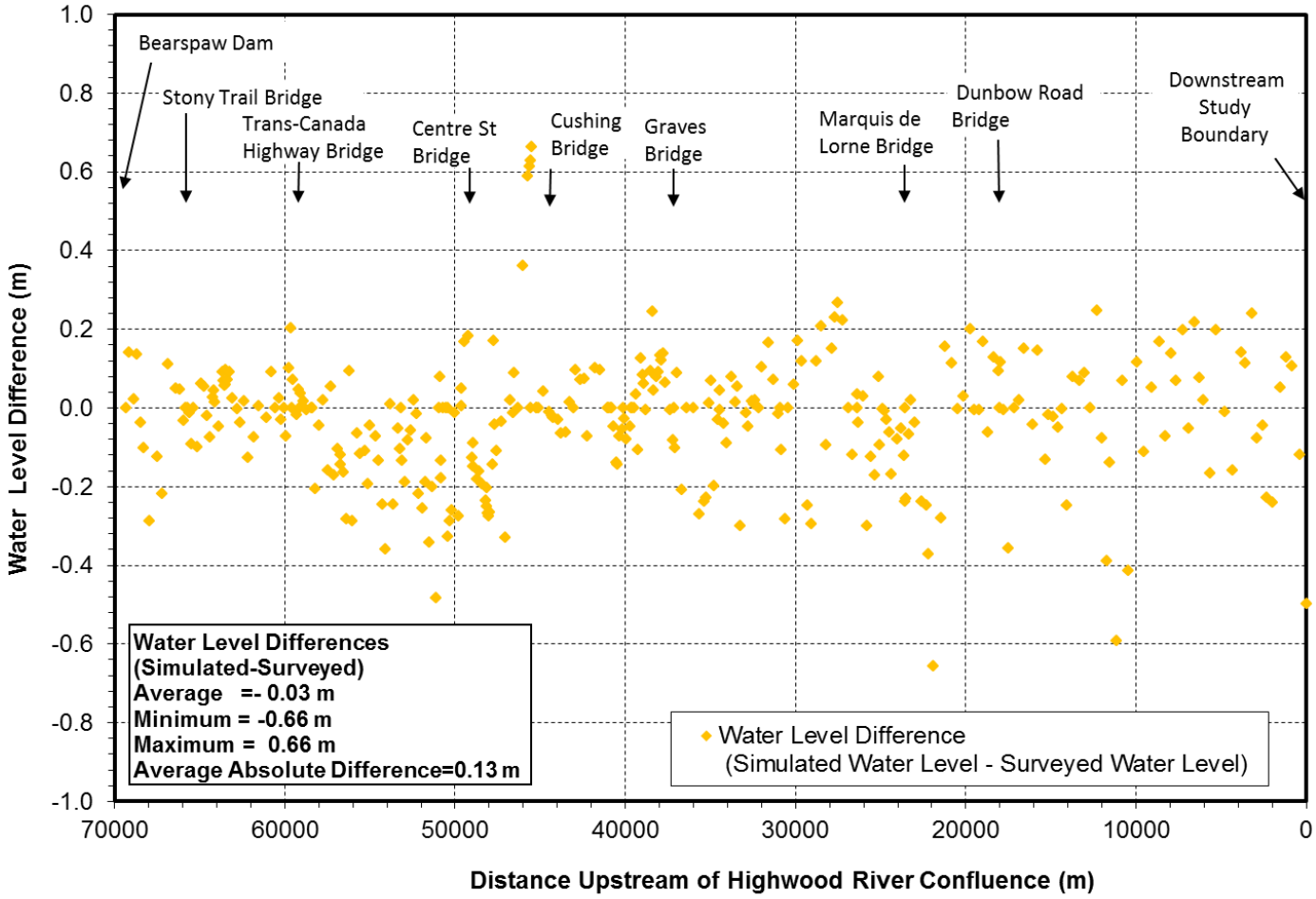


Figure 9: Difference of Simulated and Surveyed Water Levels along the Bow River during the 2013 Survey for Low Flow Validation

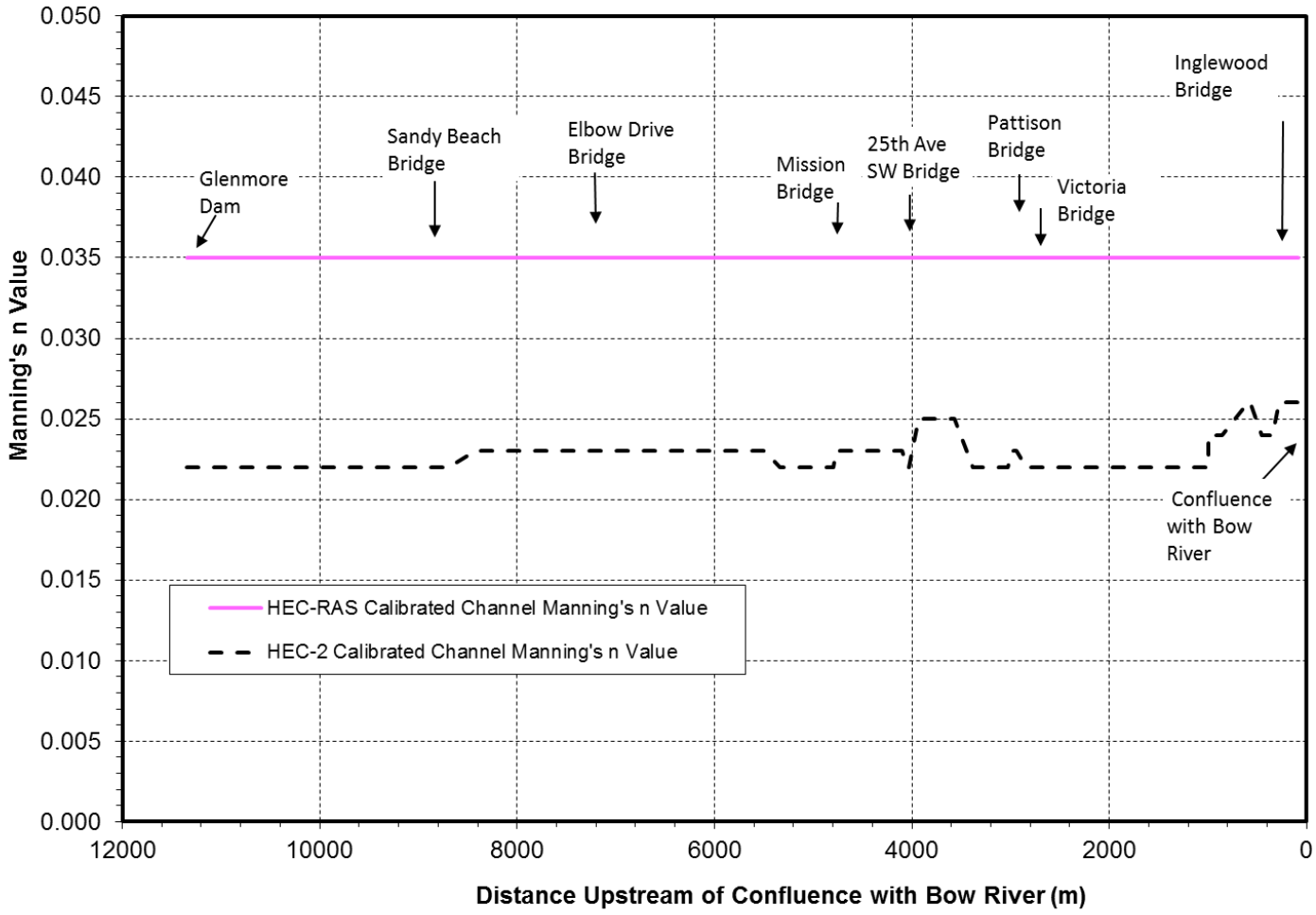


Figure 10: Comparison of Calibrated Channel Manning's n Values along the Elbow River Study Reach

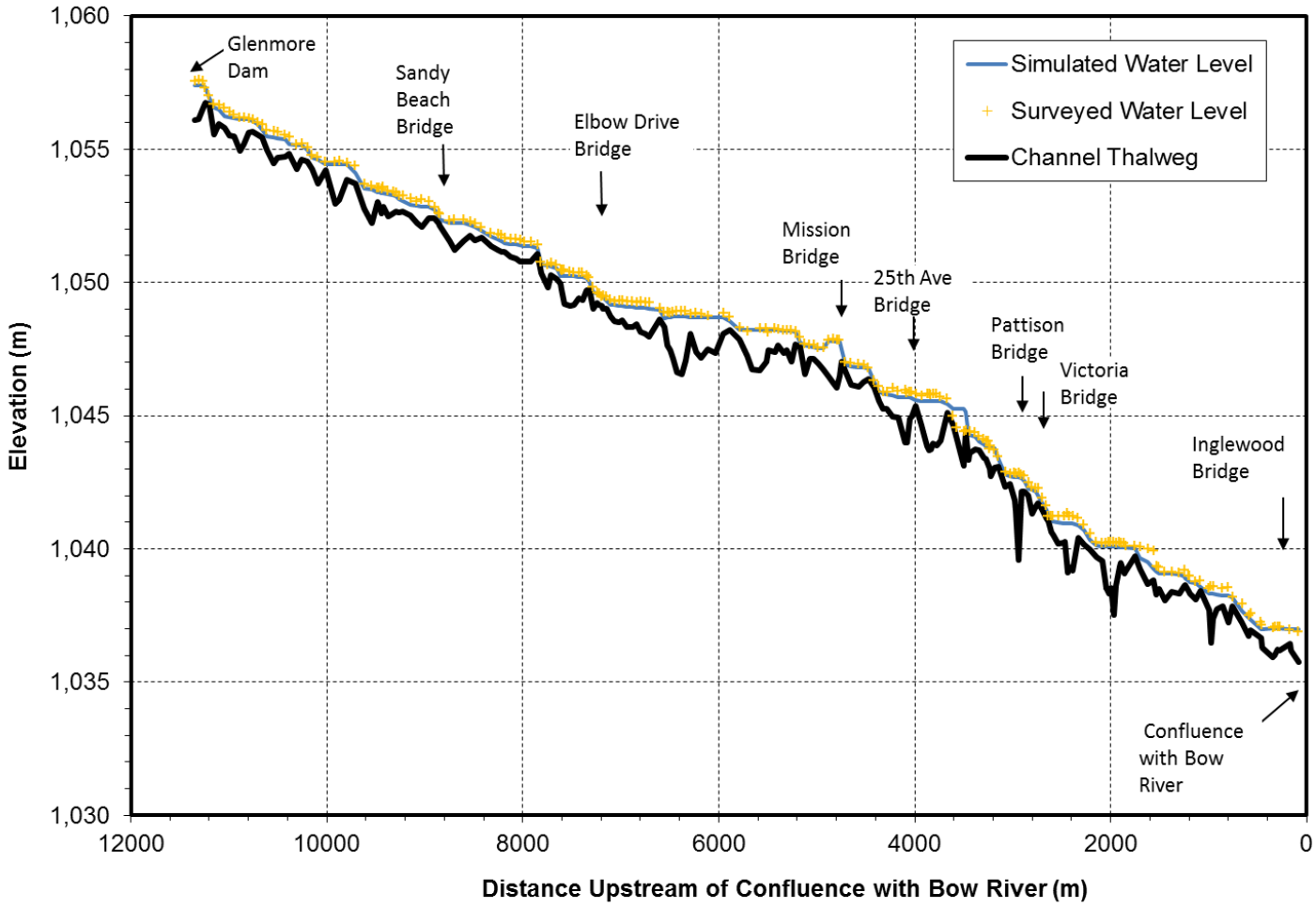


Figure 11: Comparison of Simulated Water Surface Profile with Surveyed Water Levels along the Elbow River Study Reach for Low Flow Validation

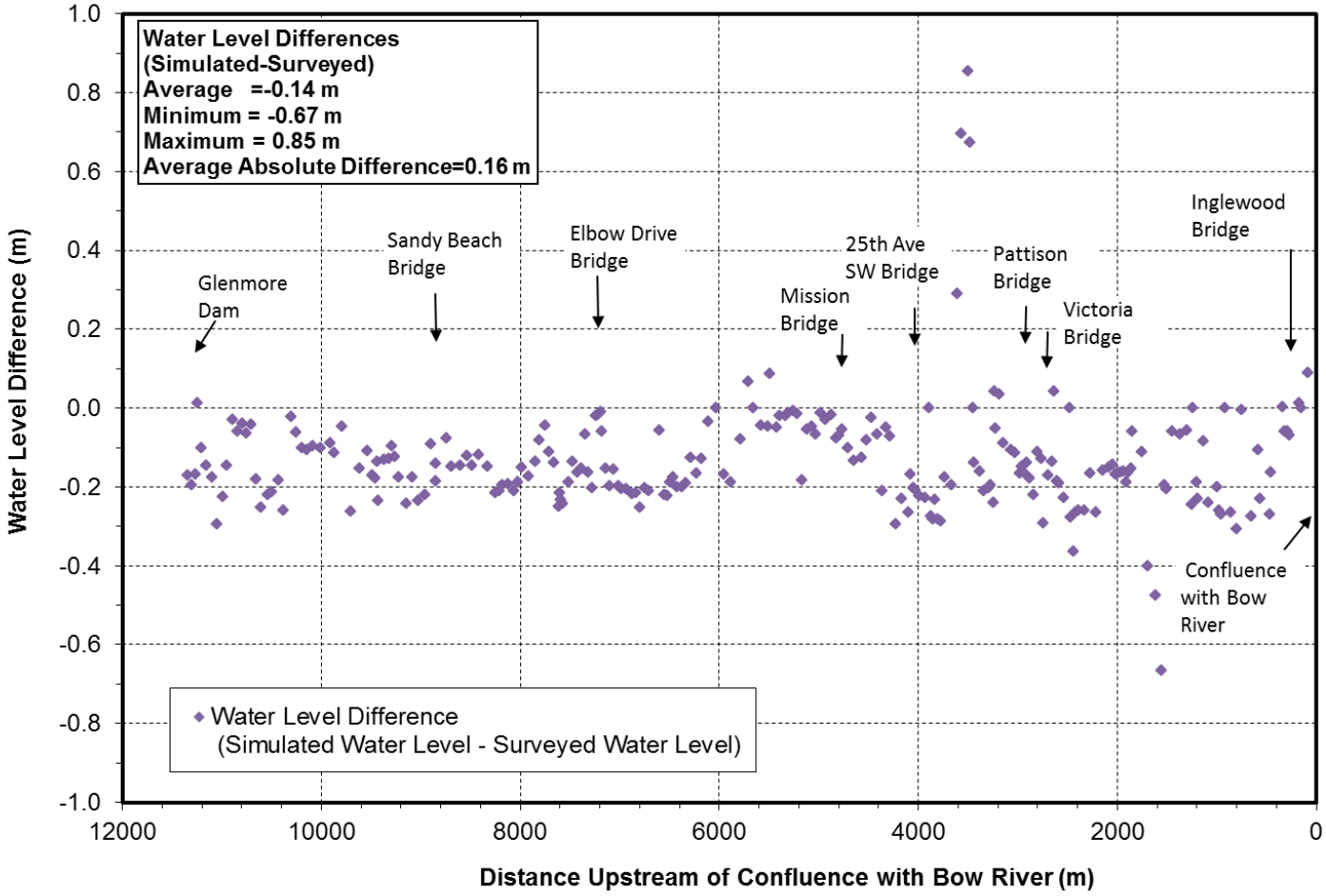


Figure 12: Difference of Simulated and Surveyed Water Levels along the Elbow River during the 2013 Survey for Low Flow Validation

5.3 Model Calibration Refinement

5.3.1 Method

The calibrated floodplain Manning's *n* values and the expansion and contraction loss coefficient values at the bridges were refined based on the June 2013 flood HWM data. The calibrated channel Manning's *n* values were not changed as part of the calibration refinement.

In simulating the June 2013 flood, all bridges in the HEC-RAS model were assumed to remain in place, and no debris accumulation was modelled. This assumption may result in locally underestimated water levels upstream of the bridges, as there was large debris noted at several bridges during the June 2013 flood. The expansion and contraction loss coefficients were adjusted during the model calibration refinement process.

5.3.2 Bow River Model

Table 8 lists the discharges used for simulating the 2013 flood. The discharge at the upstream Bow River boundary and the discharge from Glenmore Dam on the Elbow River were based on the flows estimated by The City. The inflow from Pine Creek was based on the recorded data. The inflows from Nose Creek and Fish Creek were assumed to be similar to those of 20-year floods, because there was no recorded flow data available for the 2013 flood event.

Table 8: Discharges used for Simulating the 2013 Flood Event

River	Location	Discharge (m^3/s)	Notes
Bow River	Bearspaw Dam	1,750	Estimated Flow by The City
Elbow River	Elbow River below Glenmore Dam	699	Estimated Flow by The City
Nose Creek	Confluence with Bow River	35.3	20-year Flood Flow
Fish Creek	Confluence with Bow River	198	20-year Flood Flow
Pine Creek	Confluence with Bow River	3.70	Flow recorded and provided by The City

The floodplain Manning's *n* values used in the 2012 HEC-RAS model were adjusted at Cross Sections 26045 to 24361 during the model calibration refinement process.

Figures 13(a), 13(b) and 13(c) compare the simulated water surface profile with the HWMs. The mean difference between the simulated and the surveyed HWMs by AEP is +0.08 m with individual differences ranging from -0.70 m to +0.62 m (see Figure 14). The mean difference between the simulated and surveyed HWMs by The City is +0.26 m, with individual differences ranging from -0.96 m to +1.80 m.

Tables A.3 and A.4 in Appendix A presents a detailed comparison of the simulated water levels and surveyed HWMs.

5.3.3 Elbow River Model

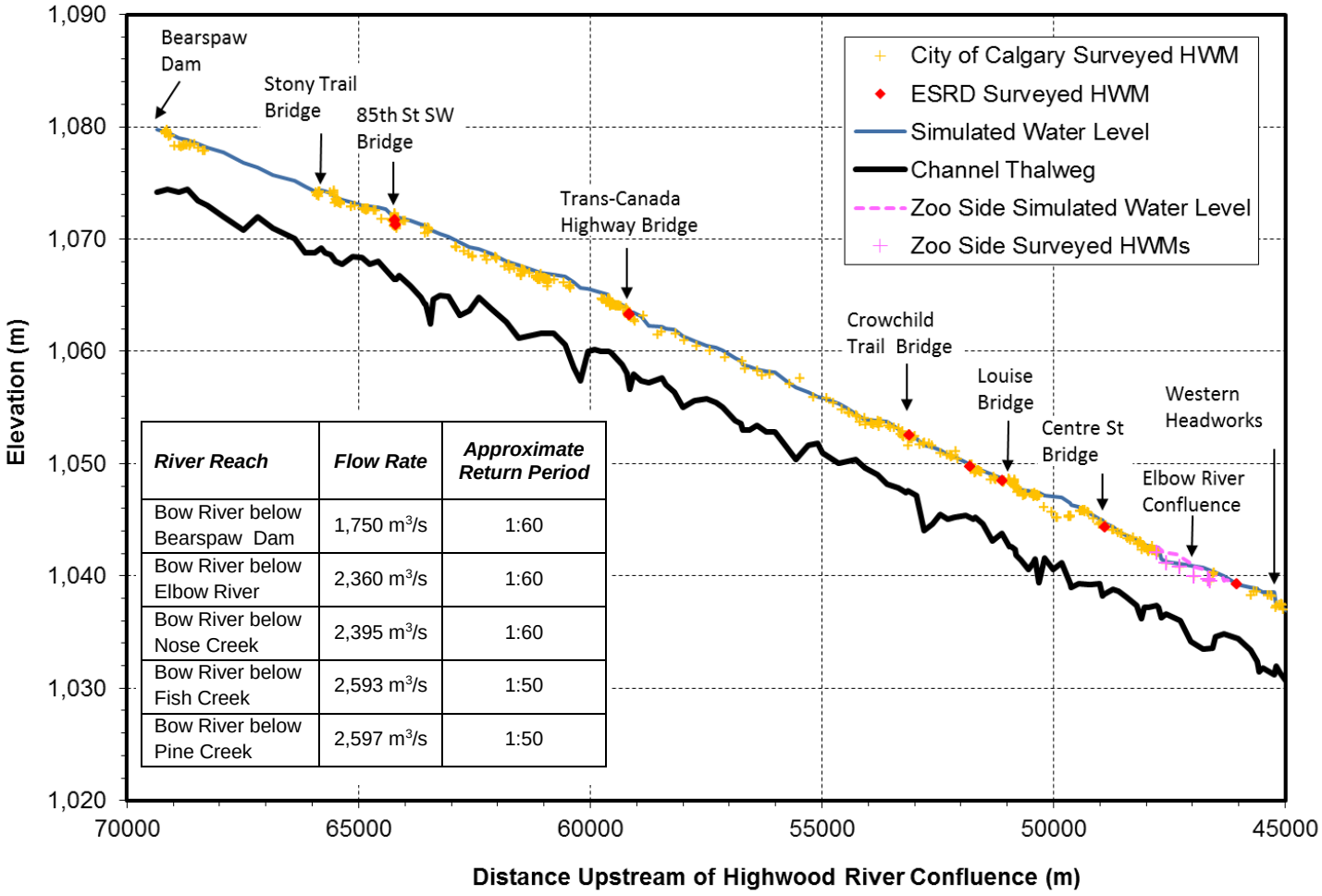
For the Elbow River study reach, the Manning's *n* values for the main channel and floodplains in the 2015 model are the same as those in the 2012 model. The contraction and expansion loss coefficients at several bridges were slightly adjusted during the calibration refinement process.

Figure 15 compares the simulated water surface profile with the HWMs. The mean difference between the simulated water levels and the surveyed HWMs by AEP is +0.07 m with individual differences ranging from -0.31 m to +0.61 m (see Figure 16). The mean difference between the simulated water levels and surveyed HWMs by The City is +0.15 m with individual differences ranging from -0.59 m to +1.33 m.

Tables A.5 to A.6 in Appendix A present a detailed comparison of the simulated water levels and surveyed HWMs

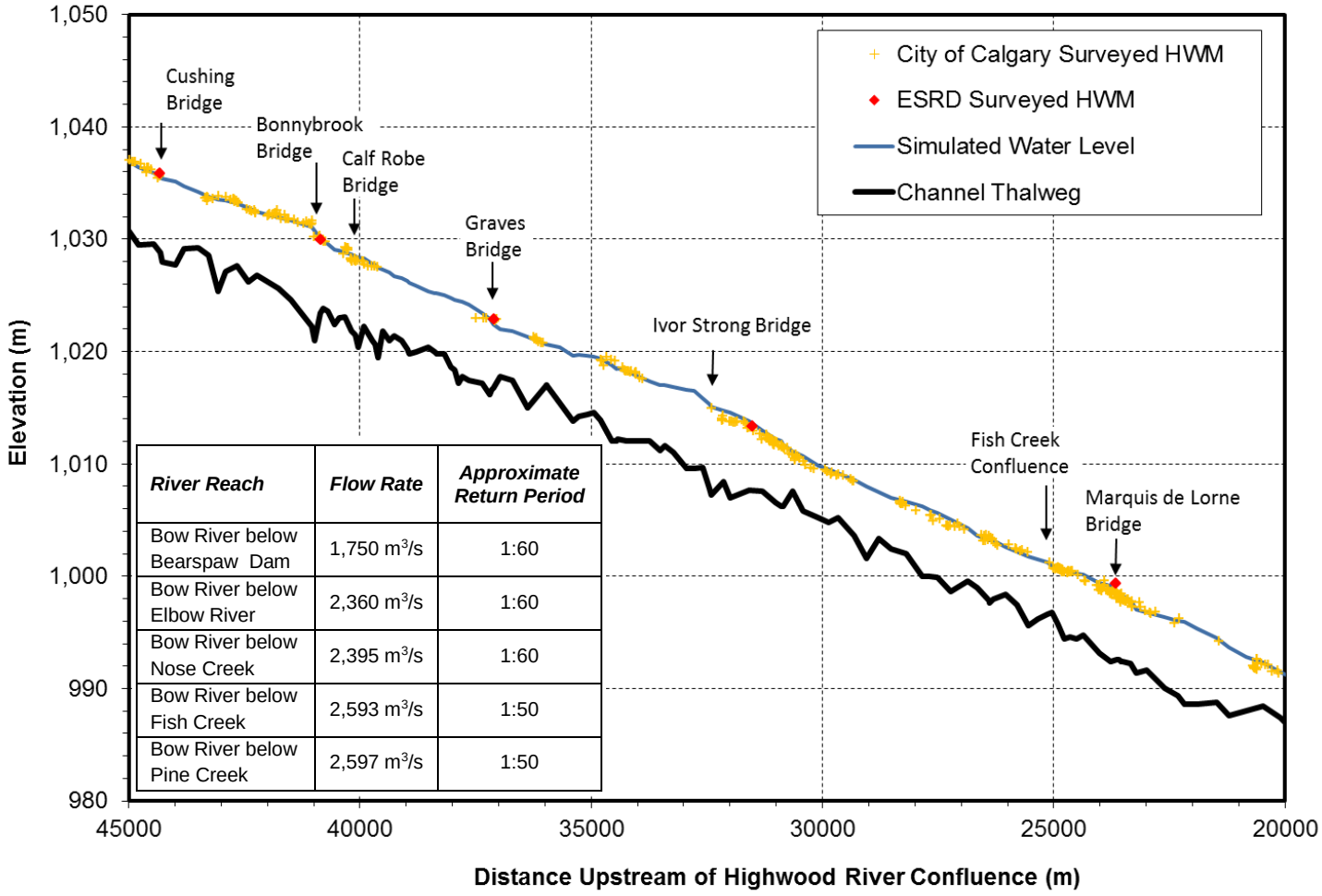
5.3.4 Conclusion

The above simulation results obtained during the model calibration refinement process show that the simulated water levels generally compare well with the 2013 flood HWMs. Overall, the simulated water levels for the 2013 flood are slightly higher than the HWMs. Such results are considered appropriate, because the calibrated model is used for flood modelling and a small degree of conservatism with the simulated water levels is prudent.



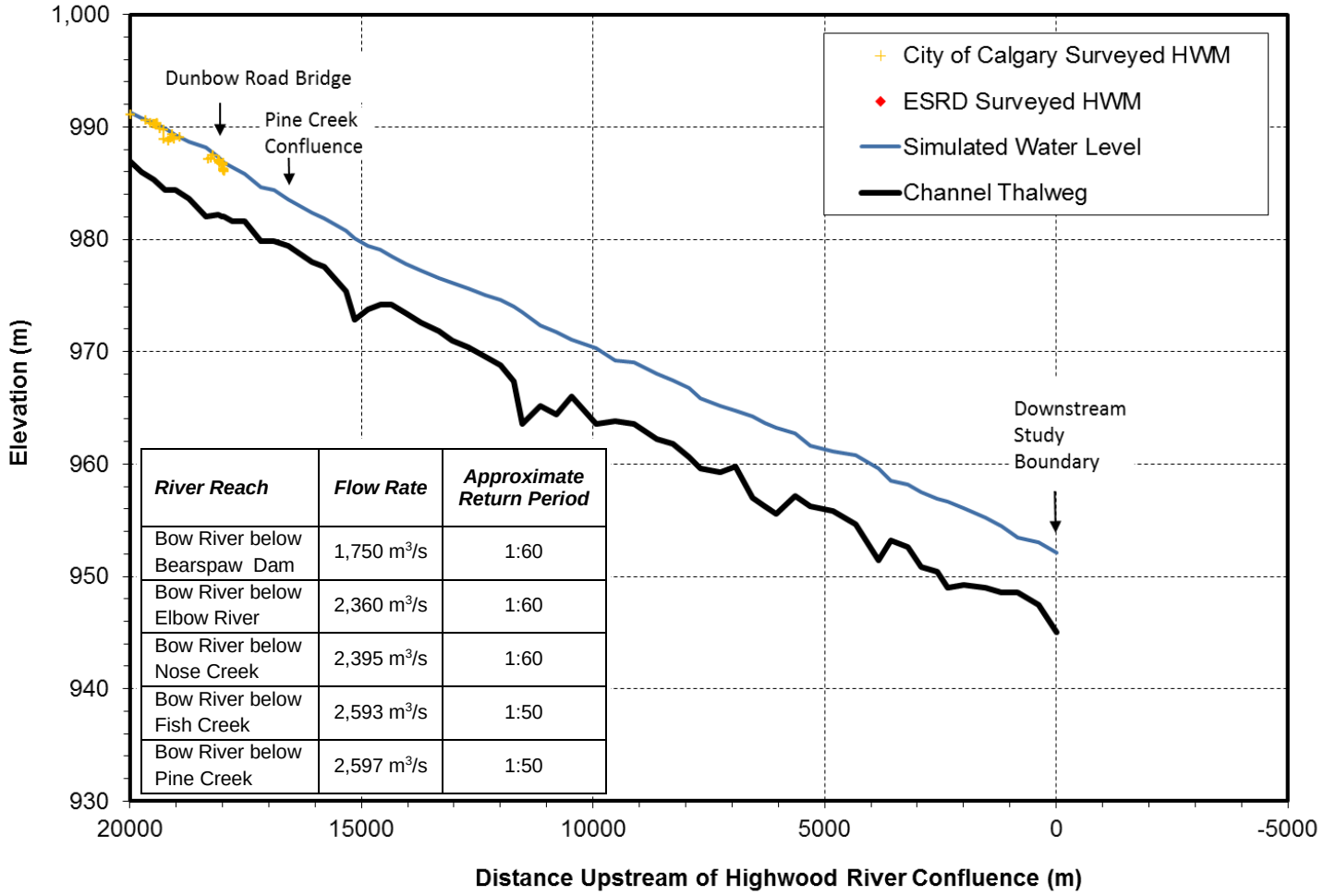
River Reach	*Flow Rate*	*Approximate Return Period*
Bow River below Bearspaw Dam	1,750 m^3/s	1:60
Bow River below Elbow River	2,360 m^3/s	1:60
Bow River below Nose Creek	2,395 m^3/s	1:60
Bow River below Fish Creek	2,593 m^3/s	1:50
Bow River below Pine Creek	2,597 m^3/s	1:50

Figure 13(a): Comparison of Simulated Water Surface Profile and Surveyed HWMs along the Bow River for the June 2013 Flood Event –- Part 1



River Reach	*Flow Rate*	*Approximate Return Period*
Bow River below Bearspaw Dam	1,750 m^3/s	1:60
Bow River below Elbow River	2,360 m^3/s	1:60
Bow River below Nose Creek	2,395 m^3/s	1:60
Bow River below Fish Creek	2,593 m^3/s	1:50
Bow River below Pine Creek	2,597 m^3/s	1:50

Figure 13(b): Comparison of Simulated Water Surface Profile and Surveyed HWMs along the Bow River for the June 2013 Flood Event – Part 2



River Reach	*Flow Rate*	*Approximate Return Period*
Bow River below Bearspaw Dam	1,750 m^3/s	1:60
Bow River below Elbow River	2,360 m^3/s	1:60
Bow River below Nose Creek	2,395 m^3/s	1:60
Bow River below Fish Creek	2,593 m^3/s	1:50
Bow River below Pine Creek	2,597 m^3/s	1:50

Figure 13(c): Comparison of Simulated Water Surface Profile and Surveyed HWMs along the Bow River for the June 2013 Flood Event – Part 3

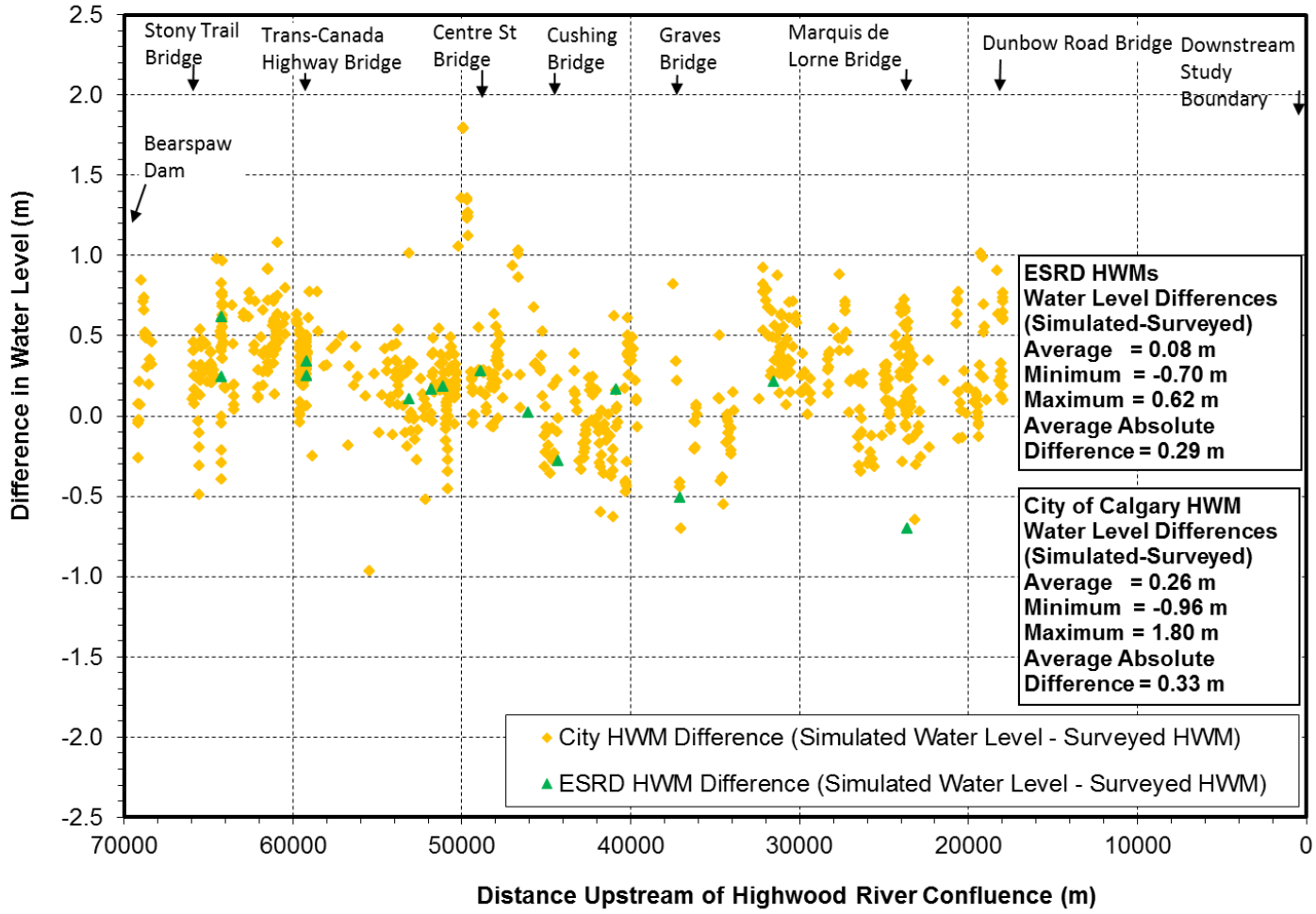


Figure 14: Difference of Simulated Water Levels and Surveyed HWMs along the Bow River for the June 2013 Flood Event

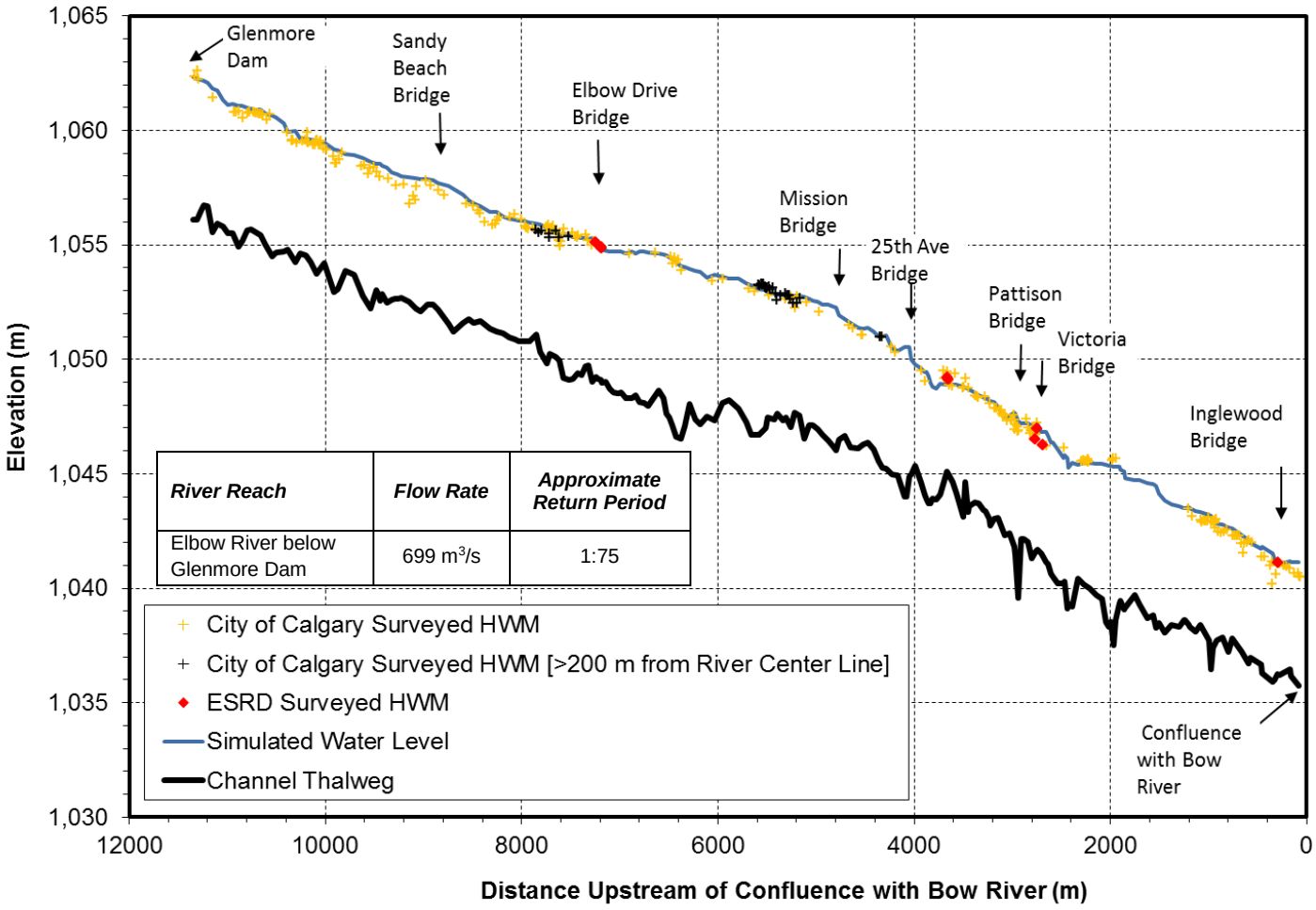


Figure 15: Comparison of Simulated Water Surface Profile and Surveyed HWMs along the Elbow River for the June 2013 Flood Event

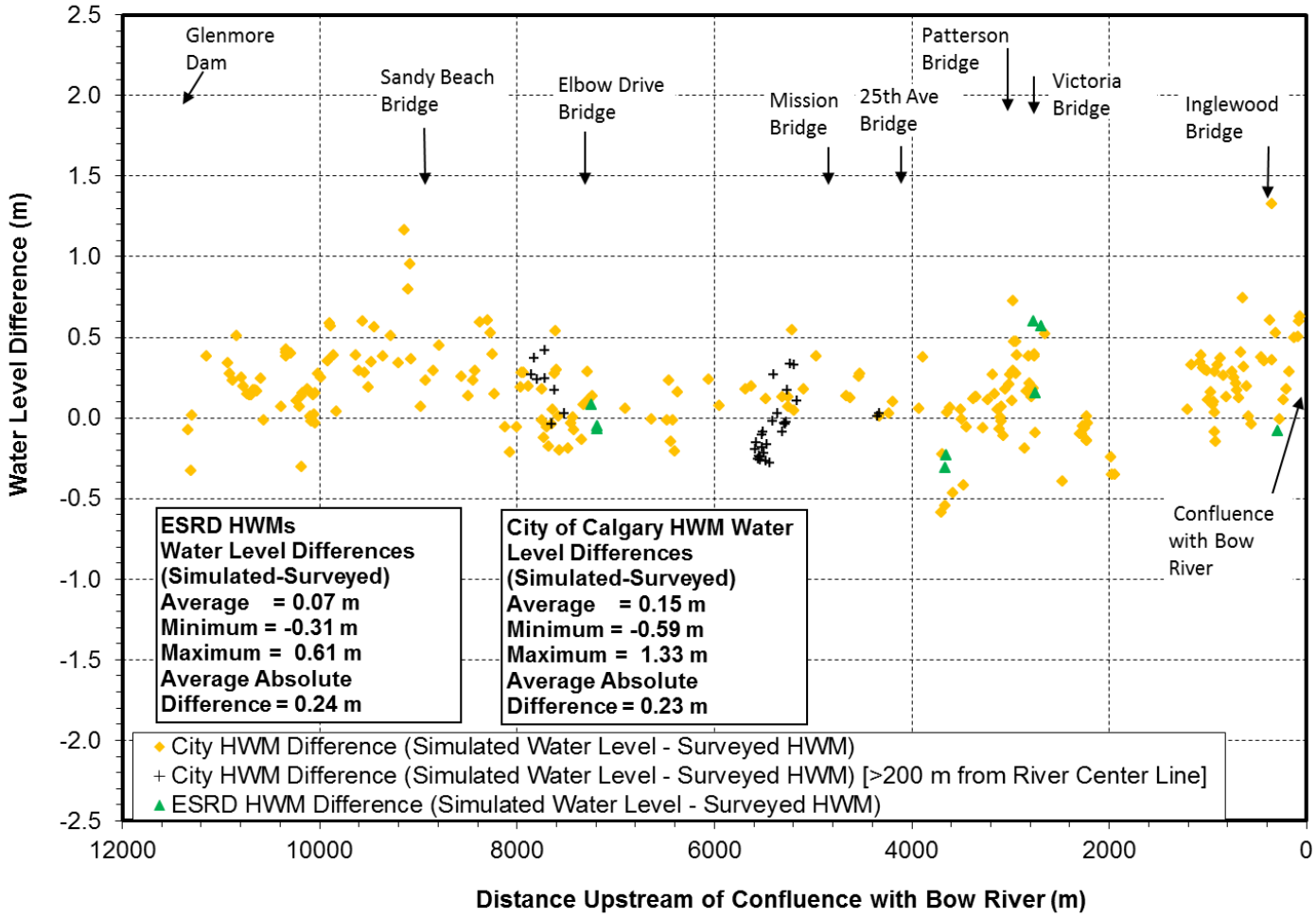


Figure 16: Difference of Simulated Water Levels and Surveyed HWMs along the Elbow River for the June 2013 Flood Event

5.4 High Flow Model Validation

5.4.1 Method

The calibrated HEC-RAS model was validated against the recorded June 2005 flood discharge (Water Survey of Canada) and surveyed HWM data provided by AEP and The City.

5.4.2 Bow River Model

The June 2005 flood event on the Bow River had an estimated return period of approximately 8 years based on the latest hydrology analysis (Golder 2014). The recorded flood peak discharge ranged from 791 m^3/s upstream of the Elbow River confluence to 1,360 m^3/s downstream of the Fish Creek confluence.

Figures 17(a), 17(b) and 17(c) compare the simulated water surface profiles to the measured HWMs. In general, the simulated water levels match well with the HWMs along the Bow River study reach. The average difference between the simulated water levels and the surveyed HWMs by AEP is -0.12 m, with individual differences ranging from -0.48 m to +0.41 m (see Figure 18). The simulated water levels are slightly higher than the HWMs surveyed by The City, with an average difference of +0.03 m and individual differences ranging from -0.96 m to +1.00 m.

Tables A.7 and A.8 in Appendix A present a detailed comparison of the simulated water levels and surveyed HWMs.

5.4.3 Elbow River Model

The recorded flood peak discharge on the Elbow River below Glenmore Dam during the June 2005 flood event was 300 m^3/s. This discharge has an estimated return period of 25 years based on the latest hydrology analysis (Golder 2014).

Figures 19 and 20 compare the simulated water surface profiles to the surveyed HWMs. Tables A.9 and A.10 in Appendix A present a detailed comparison of the simulated water levels and surveyed HWMs.

The average difference between the simulated water levels and the HWMs surveyed by AEP is +0.15 m, with individual differences ranging from +0.02 m to +0.27 m. The average difference between the simulated water levels and the HWMs surveyed by The City is +0.53 m, with individual differences ranging from -0.46 m to +0.96 m.

5.4.4 Conclusion

The above model validation results show that the simulated water levels generally compare well with the 2005 flood HWMs. Overall, the simulated water levels for the Elbow River are slightly higher than the HWMs. Such results are considered appropriate, because the calibrated model is used for flood modelling and a degree of conservatism with the simulated water levels is prudent.

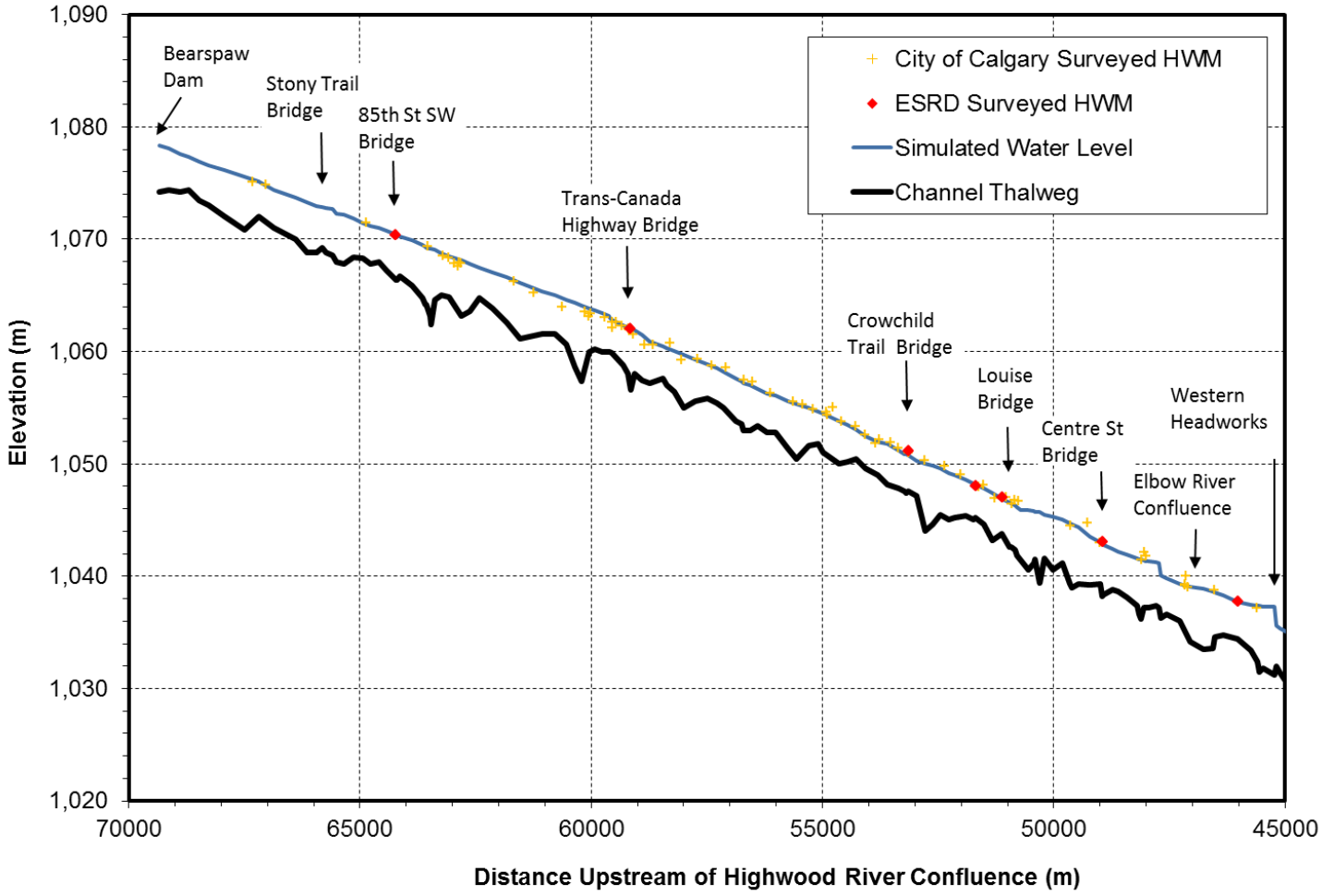


Figure 17(a): Comparison of Simulated Water Surface Profile and Surveyed HWMs along the Bow River for the June 2005 Flood Event – Part 1

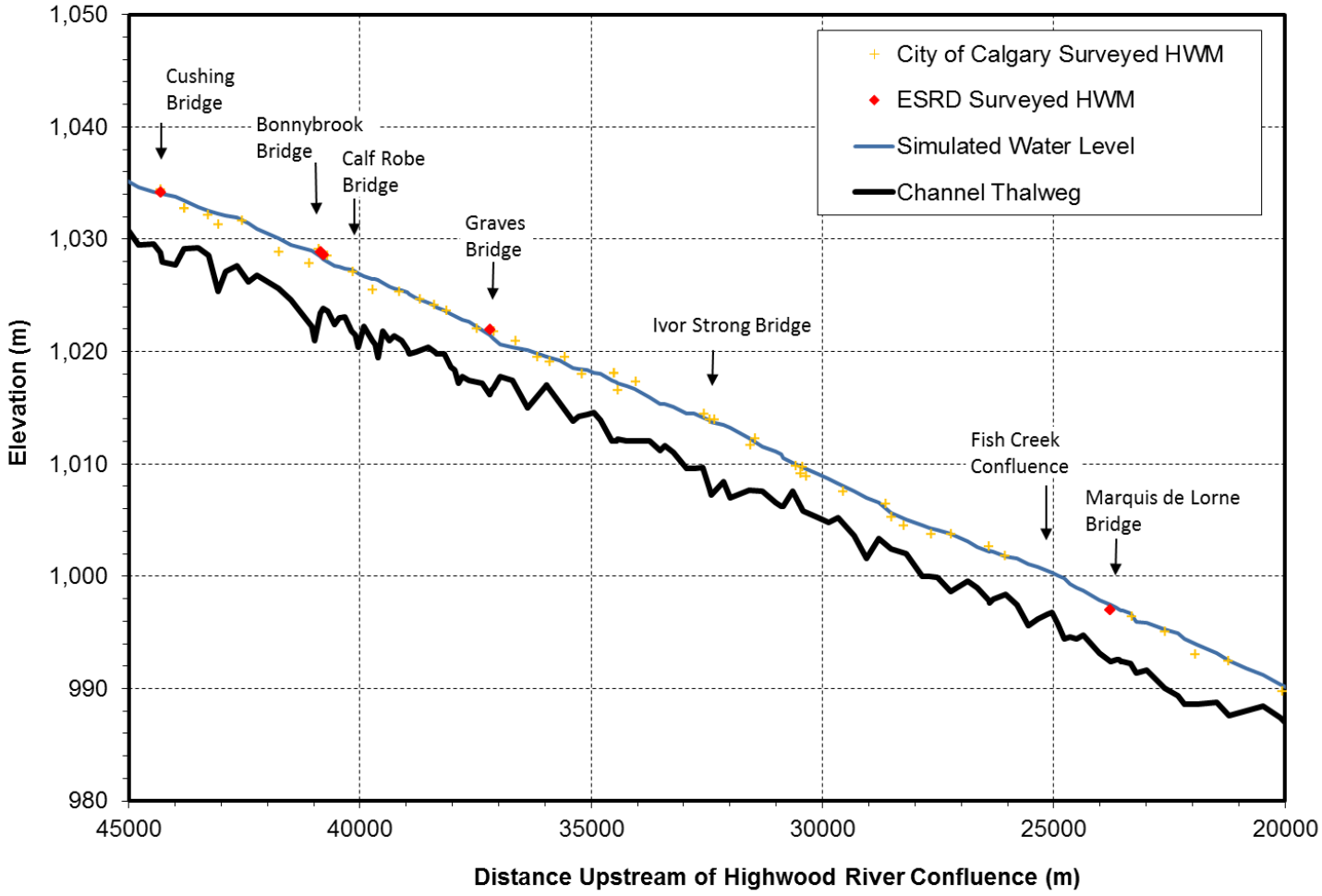


Figure 17(b): Comparison of Simulated Water Surface Profile and Surveyed HWMs along the Bow River for the June 2005 Flood Event – Part 2

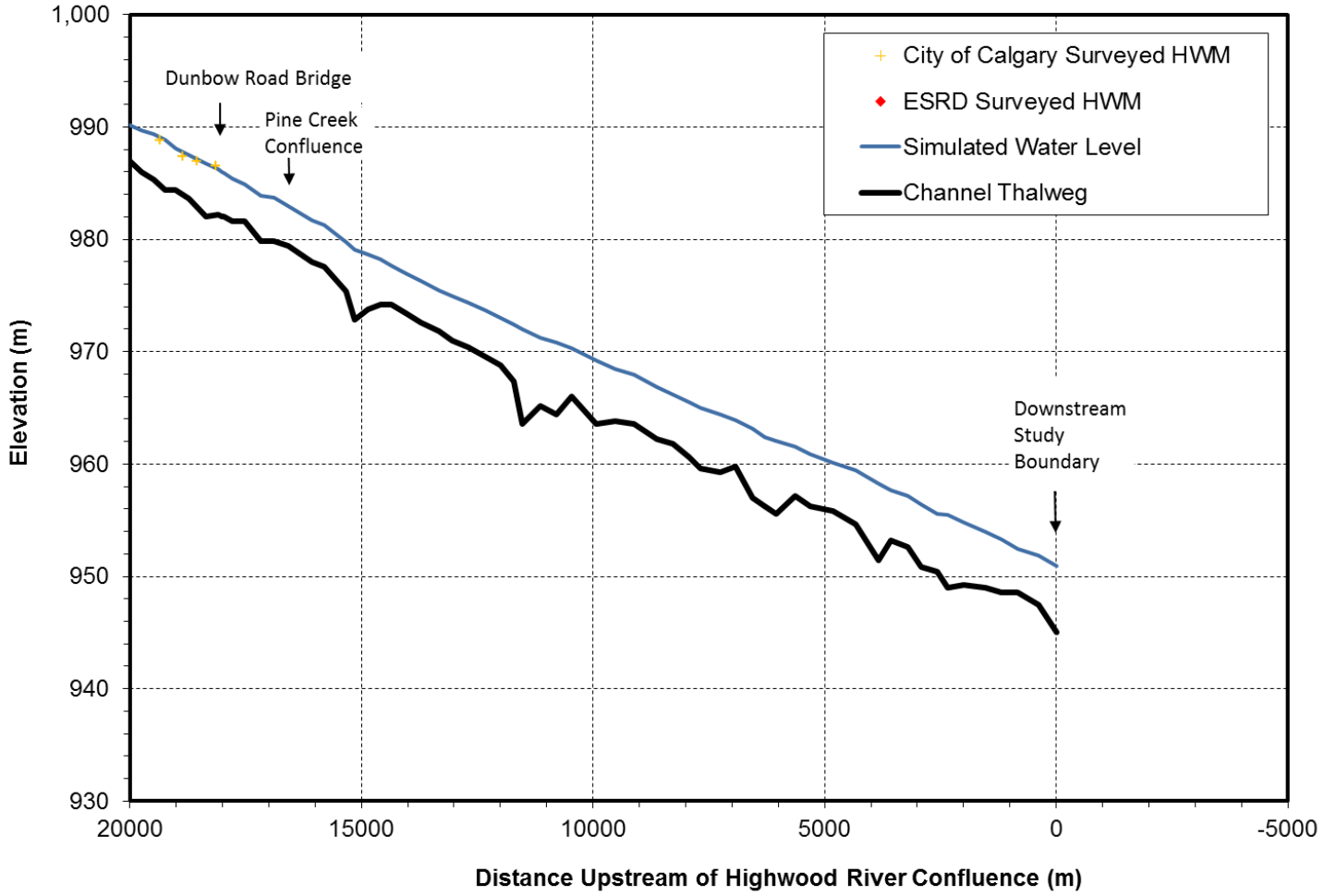


Figure 17(c): Comparison of Simulated Water Surface Profile and Surveyed HWMs along the Bow River for the June 2005 Flood Event – Part 3

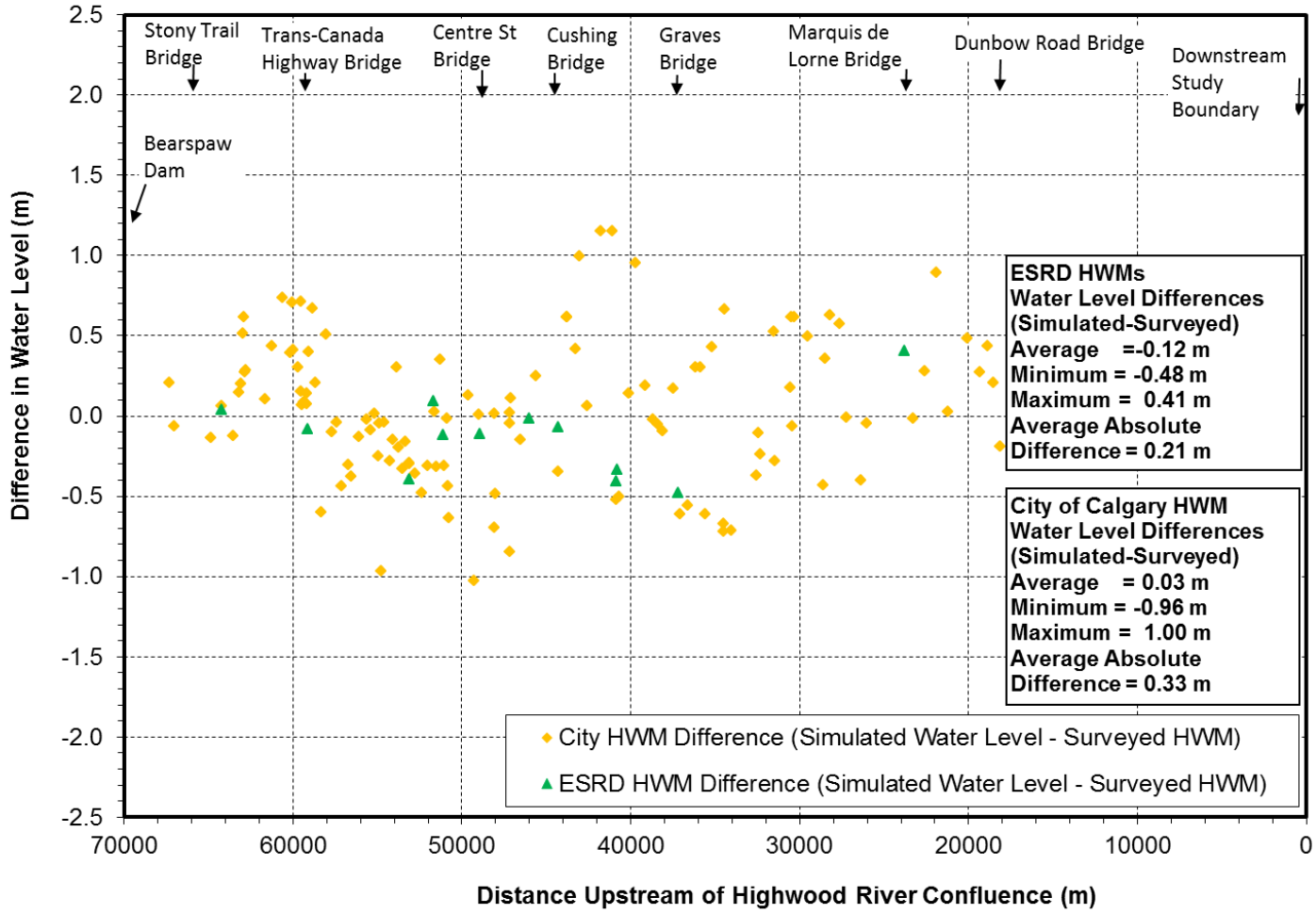


Figure 18: Difference of Simulated Water Levels and Surveyed HWMs along Bow River for the June 2005 Flood Event

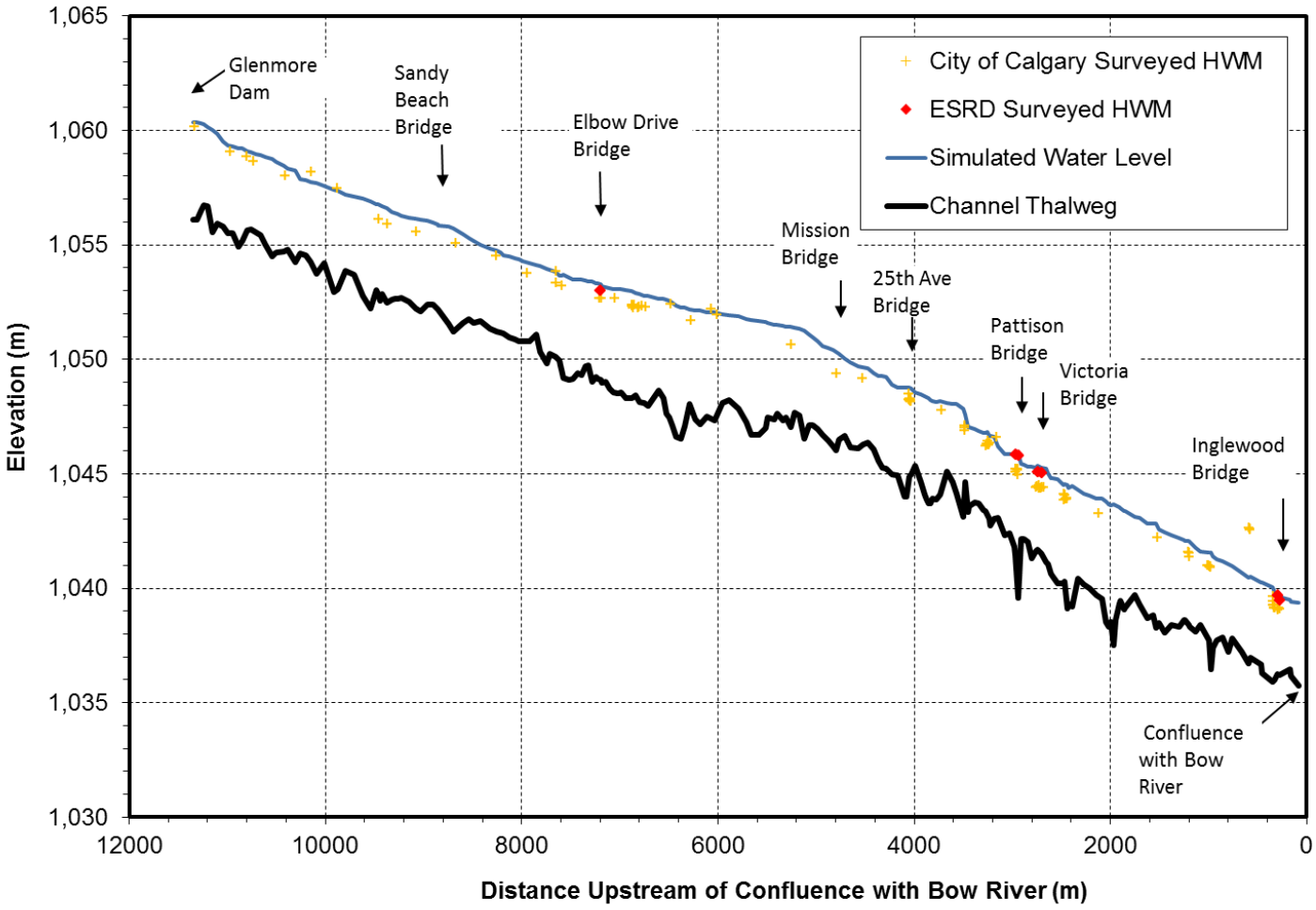


Figure 19: Comparison of Simulated Water Surface Profile and Surveyed HWMs along the Elbow River for the June 2005 Flood Event

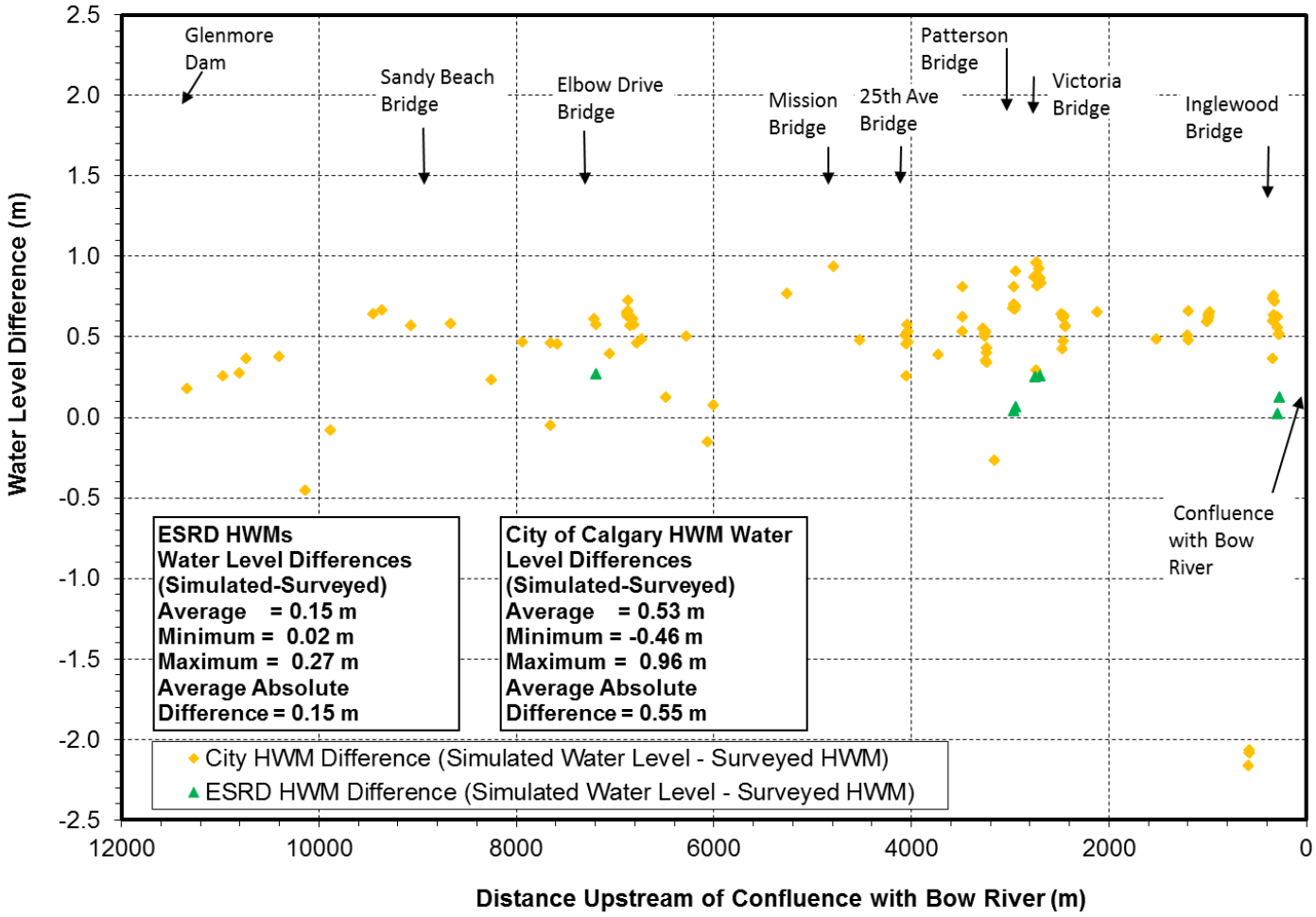


Figure 20: Difference of Simulated Water Levels and Surveyed HWMs along Elbow River for the June 2005 Flood Event

5.5 Sensitivity Analysis

5.5.1 Purpose and Method

A model sensitivity analysis was conducted to evaluate the effect of Manning's *n* values on simulated water levels. The discharges used for the model sensitivity analysis are the 100-year flood peak discharges. The results of the sensitivity analysis quantify the level of uncertainty associated with the simulated flood levels.

The sensitivity analysis involves the following cases:

- Case 1: ±10% changes to the calibrated channel Manning's *n* values only;
- Case 2: ±10% changes to the calibrated floodplain Manning's *n* values only; and
- Case 3: ±10% changes to both the calibrated channel and floodplain Manning's *n* values.

No sensitivity analysis has been performed for the downstream boundary condition, because the simulated water levels at the city limit are not expected to be affected in the model in consideration of the following:

- the downstream model boundary is far enough downstream of the city limit (i.e. 9 km); and
- the Bow River channel thalweg elevation difference between the city limit and the Highwood River confluence (i.e. downstream model boundary) is large enough (i.e. approximately 18 m).

5.5.2 Results

Bow River

Figures B.1 to B.3 in Appendix B present the differences in the simulated water levels. These results are summarized in Table 9.

Table 9: Summary of Sensitivity Analysis Results for the Bow River Study Reach

Case	Differences in Simulated Water Levels (m)					
	Lower Bound[(1)]			Upper Bound[(2)]		
	Minimum	Average	Maximum	Minimum	Average	Maximum
1	-0.43	-0.15	0.06	0.00	0.14	0.30
2	-0.13	-0.05	0.05	-0.02	0.04	0.12
3	-0.41	-0.19	0.00	0.00	0.19	0.32

Notes: [(1)] The calibrated Manning's *n* values are decreased by 10%. [(2)] The calibrated Manning's *n* values are increased by 10%.

The sensitivity analysis results show that the levels of uncertainty associated with the simulated 100-year flood levels are generally within ±0.19 m, with a range from -0.43 m to 0.32 m. These bounds of uncertainty should be considered if the flood levels are used for emergency response planning or infrastructure design purposes.

Elbow River

Figures B.4 to B.6 in Appendix B present the differences of the simulated water levels. These results are summarized in Table 10.

Table 10: Summary of Sensitivity Analysis Results for the Elbow River Study Reach

Case	Difference of Simulated Water Levels (m)					
	Lower Bound[(1)]			Upper Bound[(2)]		
	Minimum	Average	Maximum	Minimum	Average	Maximum
1	-0.26	-0.12	0.01	-0.01	0.11	0.47
2	-0.11	-0.04	0.05	-0.02	0.04	0.26
3	-0.29	-0.15	0.00	0.00	0.15	0.46

Notes: [(1)] The calibrated Manning's *n* values are decreased by 10%. [(2)] The calibrated Manning's *n* values are increased by 10%.

The sensitivity analysis results show that the levels of uncertainty associated with the simulated 100-year flood levels are generally within ±0.15 m, with a range from -0.29 m to 0.47 m. These bounds of uncertainty should be considered if the flood levels are used for emergency response planning or infrastructure design purposes.

6.0 FLOOD PROFILES

6.1 Method

Surface water profiles were simulated for the 2-, 5-, 8-, 10-, 20-, 35-, 50-, 75-, 100-, 200-, 350-, 500- and 1,000-year flood events using the calibrated HEC-RAS model. The estimated peak discharges for these flood events were determined in an analysis that included the preliminary 2013 flood peaks (Golder 2014). The discharges (see Table 11) used for the simulations were based on an unregulated flow scenario for both the Bow and Elbow Rivers.

The boundary condition at the downstream end of the Bow River study reach was estimated based on normal flow depth with an energy slope of 0.22% for all flood discharges.

The flow separation at the side channels was calculated using the automatic optimization algorithm in HEC-RAS. The results of the flow separation are listed in Table 12.

6.2 Modelling Results

6.2.1 Bow River

The flood flow modelling results for the Bow River are shown in Figures 21(a) through 21(f). The detailed results, including simulated water levels, main channel flow velocities and Froude numbers, are presented in Tables C.1 and C.2 in Appendix C.

During the 200-, 350-, 500- and 1,000-year floods, complex overland flow conditions may occur in Kensington and Sunnyside. The HEC-RAS model was constructed by assuming that the residential areas in these two communities do not convey flood water, and that the flood flows are conveyed only in the main and side channels. These assumptions result in conservative estimates of the flood water levels.

The Inglewood flood control structure is considered insufficient to protect Inglewood against inundation during the 100-year flood event. When the flood control structure is overtopped, or if it were to fail, water would flow through Inglewood and the Blackfoot Trail underpass and then reconnect with the Bow River downstream of Cushing Bridge. This flow path was not explicitly modelled in the HEC-RAS model, but the approach results in conservative estimates of the flood water levels.

6.2.2 Elbow River

The flood flow modelling results for the Elbow River are shown in Figure 22. The detailed results, including the simulated water levels, main channel flow velocities and Froude numbers, are presented in Tables C.3 and C.4 in Appendix C.

Along the Elbow River there are flood water overflow points near the Mission Bridge, at Pattison and Victoria Bridge, and at the Stampede area, where water is expected to spill out of the main channel to flow north toward downtown. For the purpose of this study and based on discussions with The City and AEP, it was assumed that flood flow would be conveyed in the main channel and the defined side channels only, but that additional areas could be inundated without conveying flow. This modelling approach results in conservative estimates of the flood water levels.

Complex flow patterns are expected to occur within the Elbow River floodplain in the Roxboro, Mission, Victoria, Erlton, Stampede and Downtown areas for flood events with return periods greater than 35 years. These complex flow patterns were modelled in HEC-RAS by introducing multiple side channels (see Section 4.2). However, it is recognized that the 1D model approach may produce less representative results in areas farther from the main and side channels.

It is noted that the simulated 200-year flood water levels at Cross Sections 2424 and 2332 are lower than the 100-year flood water levels. This profile crossing issue is believed to be caused by numerical instability, because the water surface profile at these cross sections have a zig-zag pattern, instead of a smooth profile. To address this profile crossing issue, the 200-year flood water levels at Cross-Sections 2424 and 2332 were estimated based on the simulated water levels at the cross sections adjacent to them. The estimated water levels at Cross Sections 2424 and 2332 were then used in the flood inundation mapping.

Table 11: Flood Peak Discharges along the Bow and Elbow Rivers (Golder 2014)

No.	River	Description	River Station	Flood Discharge for Various Return Periods (m^3/s)												
				2-year	5-year	8-year	10-year	20-year	35-year	50-year	75-year	100-year	200-year	350-year	500-year	1000-year
1	Bow River	Downstream of Bearspaw Dam	69342	369	659	838	927	1,230	1,490	1,660	1,870	2,020	2,390	2,710	2,920	3,340
2	Bow River	Downstream of Elbow River (1)	47047	433	802	1,040	1,160	1,500	1,860	2,150	2,570	2,820	3,520	4,160	4,610	5,610
3	Bow River	Downstream of Nose Creek	45598	439	816	1,060	1,180	1,540	1,910	2,210	2,640	2,910	3,650	4,330	4,820	5,920
4	Bow River	Downstream of Fish Creek	25134	478	902	1,150	1,320	1,740	2,140	2,530	3,010	3,360	4,270	5,190	5,770	7,220
5	Bow River	Downstream of Pine Creek	16585	482	915	1,170	1,340	1,770	2,170	2,570	3,050	3,400	4,320	5,260	5,840	7,300
6	Elbow River	Downstream of Glenmore Dam	11343	63.9	143	201	234	275	372	494	701	803	1,130	1,444	1,690	2,270

(1) Total flow in Bow River main channel and Zoo side channel

Table 12: Simulated Flows in Side Channels

No.	River	Side Channel	2-year Flood			5-year Flood			8-year Flood		
			Total Flow (m^3/s)	Flow in Side Channel (m^3/s)	Flow Split Ratio	Total Flow (m^3/s)	Flow in Side Channel (m^3/s)	Flow Split Ratio	Total Flow (m^3/s)	Flow in Side Channel (m^3/s)	Flow Split Ratio
1	Bow River	Bowmont Side	369	143	39%	659	250	38%	838	318	38%
2	Bow River	Prince Side	369	14.0	4%	659	28.0	4%	838	39.0	5%
3	Bow River	Zoo Side	369	78.0	21%	659	156	24%	838	207	25%
4	Elbow River	Riverdale Ave.	64.0	0.00	0%	143	0.00	0%	201	0.00	0%
5	Elbow River	Roxboro Rd. SW	64.0	0.00	0%	143	0.00	0%	201	0.00	0%
6	Elbow River	26th Ave. SW	64.0	0.00	0%	143	0.00	0%	201	0.00	0%
7	Elbow River	25th Ave. SW	64.0	0.00	0%	143	0.00	0%	201	0.00	0%
8	Elbow River	22th Ave. SW	64.0	0.00	0%	143	0.00	0%	201	1.00	0%

Table 12: Simulated Flows in Side Channels (continued)

No.	River	Side Channel	10-year Flood			20-year Flood			35-year Flood		
			Total Flow (m^3/s)	Flow in Side Channel (m^3/s)	Flow Split Ratio	Total Flow (m^3/s)	Flow in Side Channel (m^3/s)	Flow Split Ratio	Total Flow (m^3/s)	Flow in Side Channel (m^3/s)	Flow Split Ratio
1	Bow River	Bowmont Side	927	351	38%	1,230	464	38%	1,490	559	38%
2	Bow River	Prince Side	927	47.0	5%	1,230	97.0	8%	1,490	160	11%
3	Bow River	Zoo Side	927	234	25%	1,230	328	27%	1,490	408	27%
4	Elbow River	Riverdale Ave.	234	0.00	0%	275	0.00	0%	372	0.00	0%
5	Elbow River	Roxboro Rd. SW	234	0.00	0%	275	0.00	0%	372	2.00	1%
6	Elbow River	26th Ave. SW	234	0.00	0%	275	1.00	0%	370	12.0	3%
7	Elbow River	25th Ave. SW	234	0.00	0%	275	0.00	0%	372	3.00	1%
8	Elbow River	22th Ave. SW	234	1.00	1%	275	6.00	2%	369	17.0	5%

Table 12: Simulated Flows in Side Channels (continued)

No.	River	Side Channel	50-year Flood			75-year Flood			100-year Flood		
			Total Flow (m^3/s)	Flow in Side Channel (m^3/s)	Flow Split Ratio	Total Flow (m^3/s)	Flow in Side Channel (m^3/s)	Flow Split Ratio	Total Flow (m^3/s)	Flow in Side Channel (m^3/s)	Flow Split Ratio
1	Bow River	Bowmont Side	1,660	620	37%	1,870	694	37%	2,020	748	37%
2	Bow River	Prince Side	1,660	218	13%	1,870	300	16%	2,020	367	18%
3	Bow River	Zoo Side	1,660	462	28%	1,870	532	28%	2,020	581	29%
4	Elbow River	Riverdale Ave.	494	4.00	1%	701	38.0	5%	803	64.0	8%
5	Elbow River	Roxboro Rd. SW	494	13.0	3%	701	47.0	7%	803	71.0	9%
6	Elbow River	26th Ave. SW	481	31.0	6%	654	66.0	10%	732	84.0	11%
7	Elbow River	25th Ave. SW	494	32.0	7%	701	100	14%	803	135	17%
8	Elbow River	22th Ave. SW	462	31.0	7%	601	63.0	10%	668	80.0	12%

Table 12: Simulated Flow in Side Channels (continued)

No.	River	Side Channel	200-year Flood			350-year Flood			500-year Flood			1,000-year Flood		
			Total Flow (m^3/s)	Flow in Side Channel (m^3/s)	Flow Split Ratio	Total Flow (m^3/s)	Flow in Side Channel (m^3/s)	Flow Split Ratio	Total Flow (m^3/s)	Flow in Side Channel (m^3/s)	Flow Split Ratio	Total Flow (m^3/s)	Flow in Side Channel (m^3/s)	Flow Split Ratio
1	Bow River	Bowmont Side	2,390	878	37%	2,710	989	36%	2,920	1,061	36%	3,340	1,202	36%
2	Bow River	Prince Side	2,390	551	23%	2,710	714	26%	2,920	809	28%	3,340	1,017	30%
3	Bow River	Zoo Side	2,390	711	30%	2,710	833	31%	2,920	918	31%	3,340	1,119	33%
4	Elbow River	Riverdale Ave.	1,130	148	13%	1,440	233	16%	1,690	304	18%	2,270	471	21%
5	Elbow River	Roxboro Rd. SW	1,130	139	12%	1,440	208	14%	1,690	267	16%	2,270	408	18%
6	Elbow River	26th Ave. SW	991	142	14%	1,232	194	16%	1,423	238	17%	1,862	342	18%
7	Elbow River	25th Ave. SW	1,130	241	21%	1,440	309	21%	1,690	375	22%	2,270	533	23%
8	Elbow River	22th Ave. SW	889	157	18%	1,131	250	22%	1,315	334	25%	1,737	458	26%

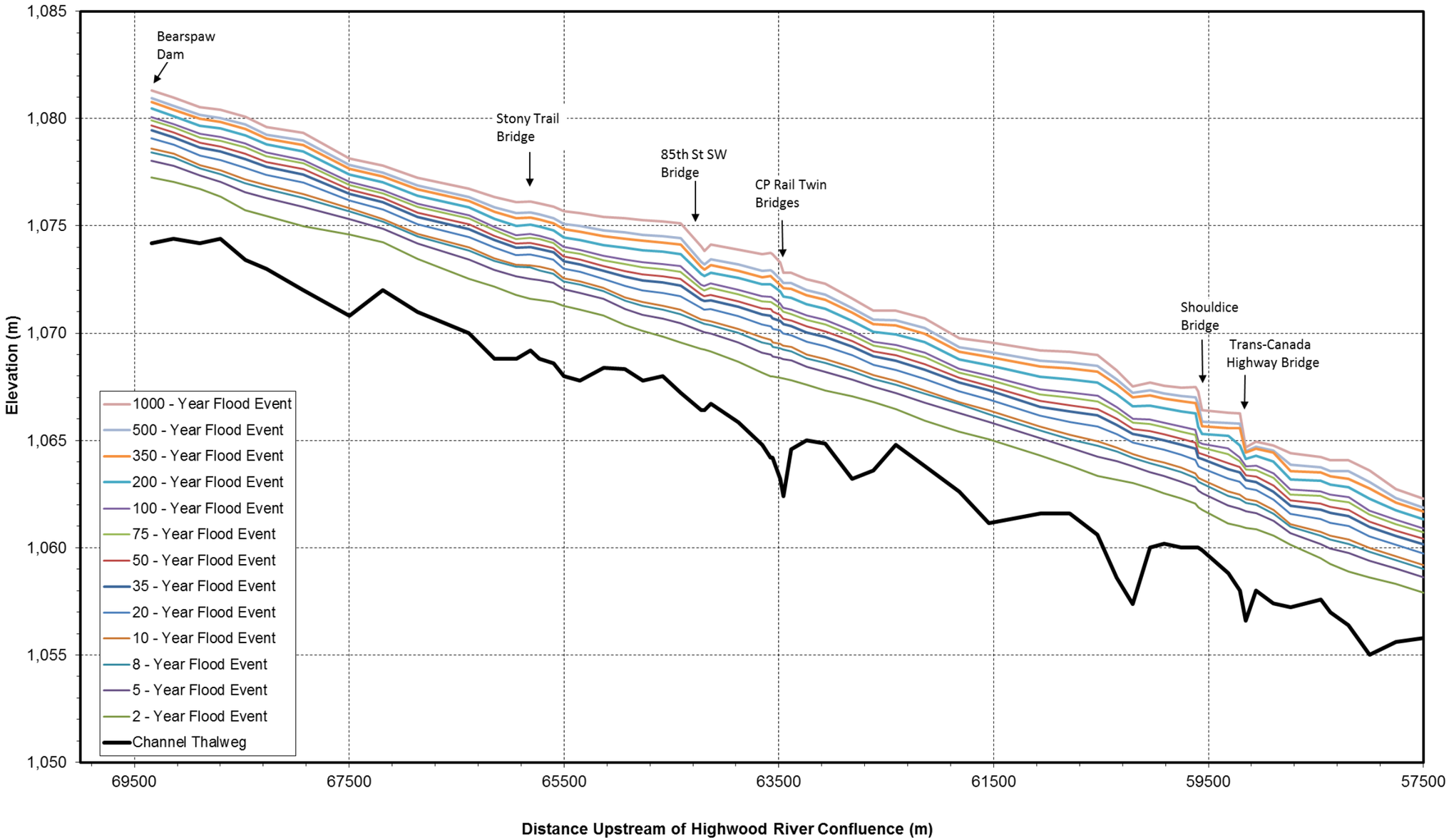


Figure 21(a): Simulated Water Surface Profiles along the Bow River Study Reach - Part 1

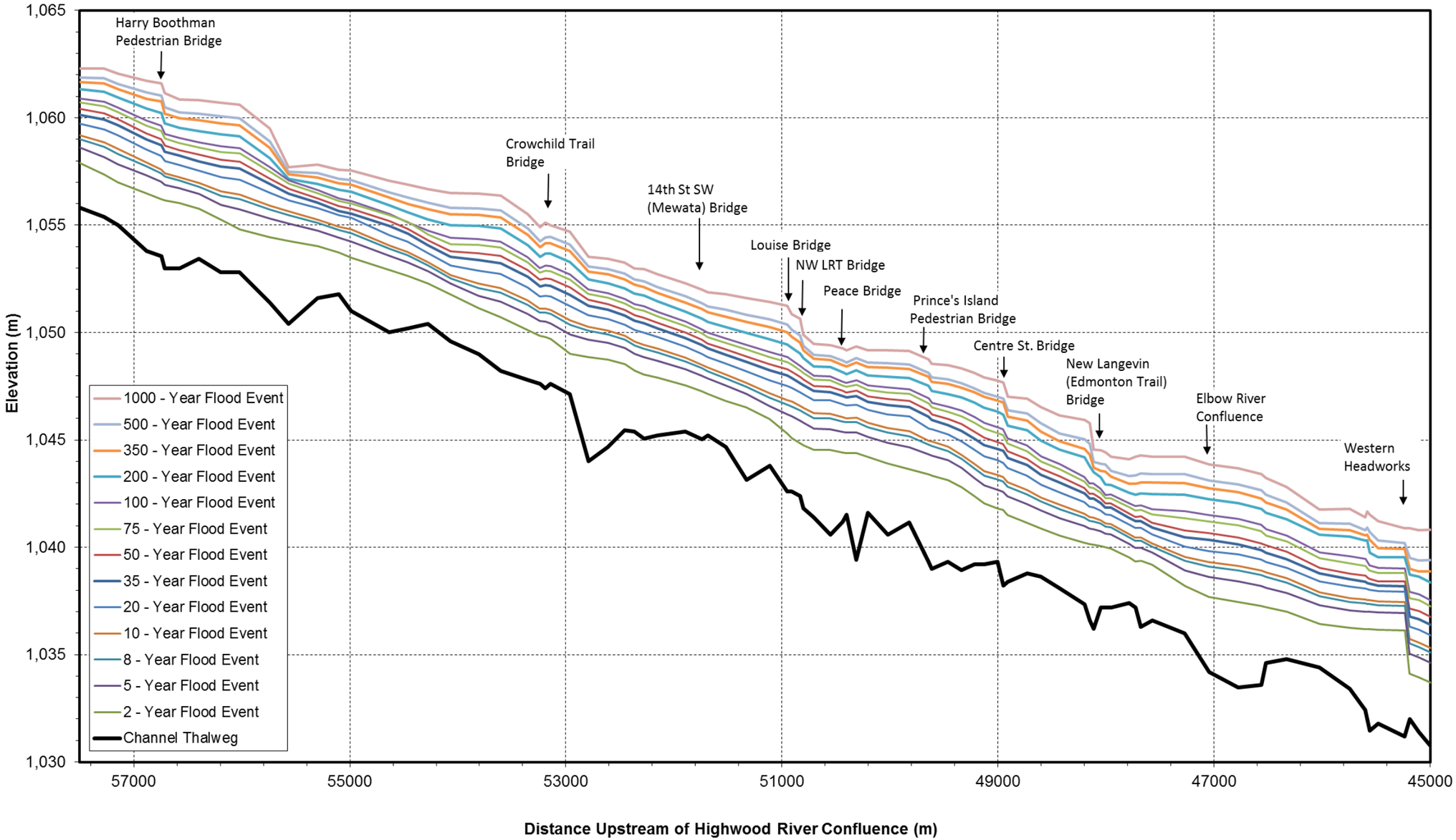


Figure 21(b): Simulated Water Surface Profiles along the Bow River Study Reach - Part 2

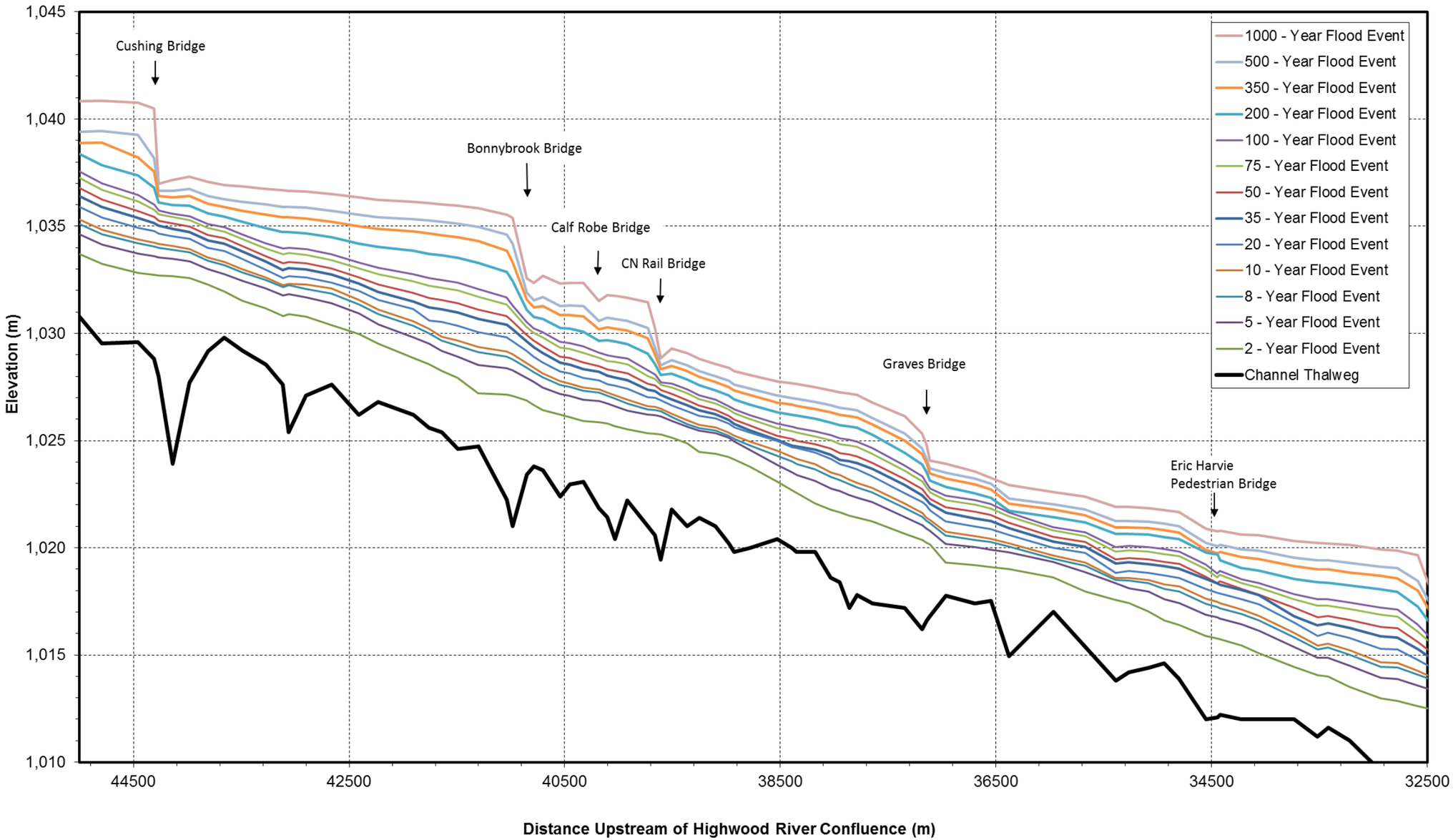


Figure 21(c): Simulated Water Surface Profiles along the Bow River Study Reach - Part 3

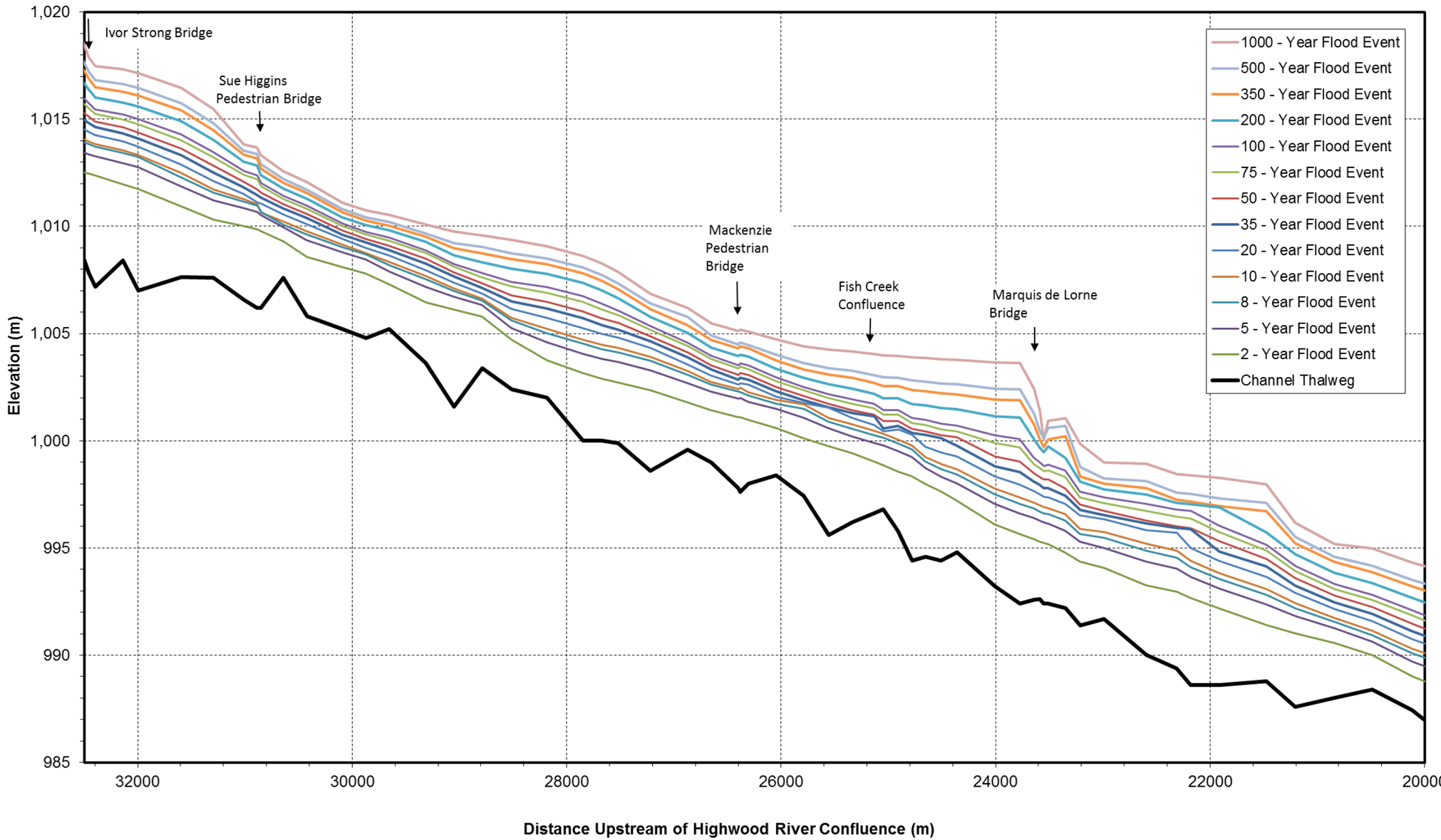


Figure 21(d): Simulated Water Surface Profiles along the Bow River Study Reach - Part 4

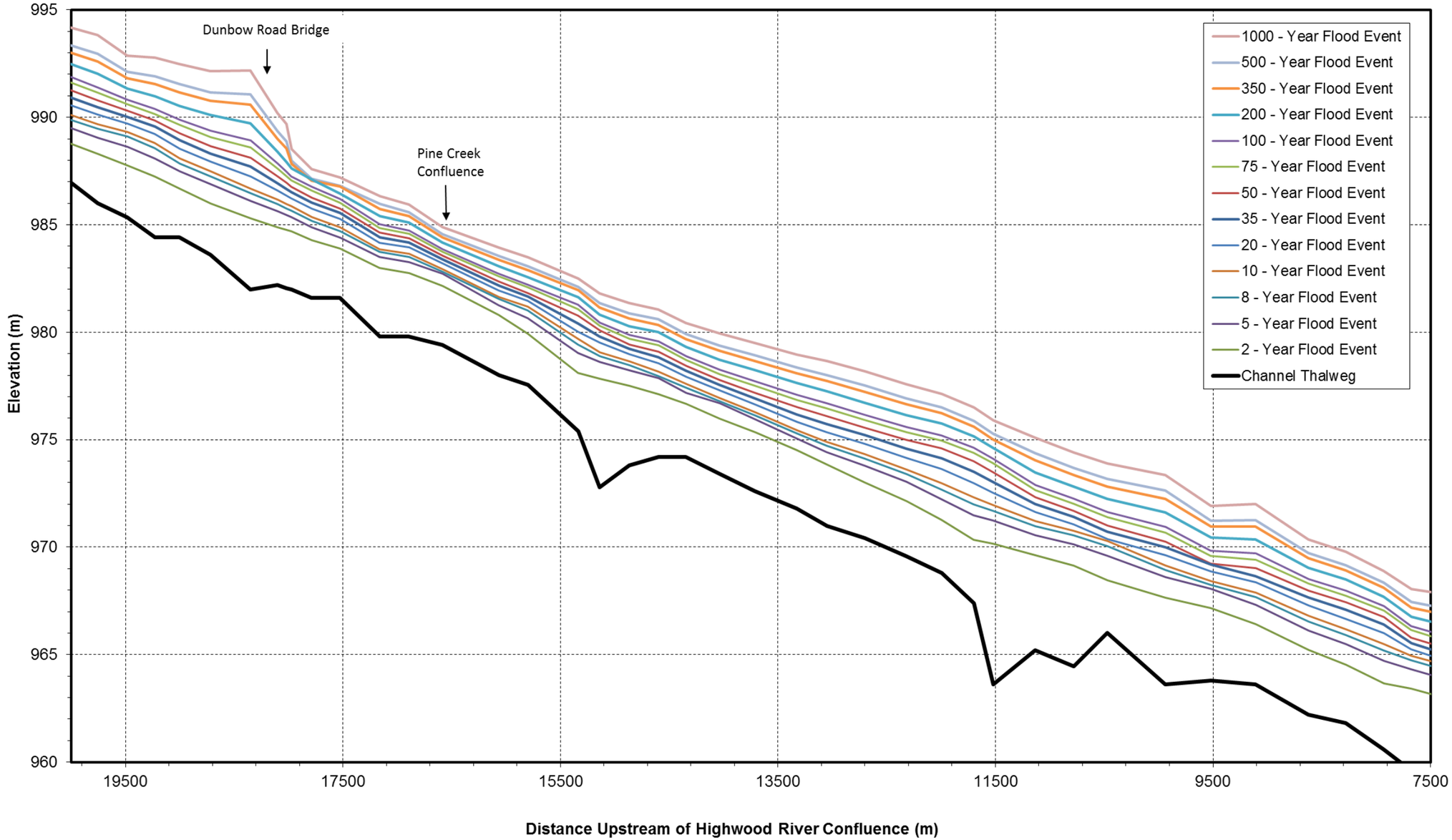


Figure 21(e): Simulated Water Surface Profiles along the Bow River Study Reach - Part 5

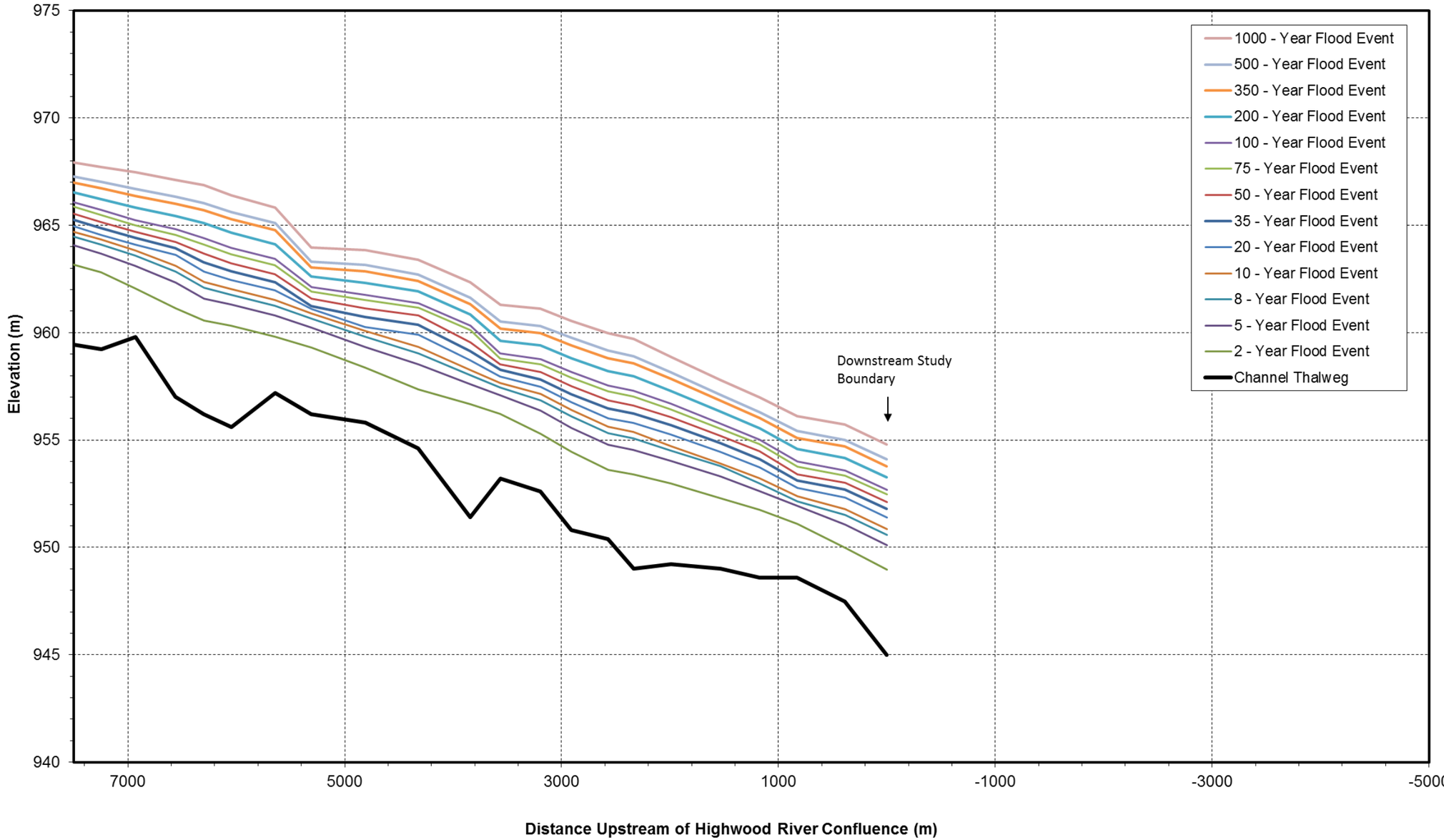


Figure 21(f): Simulated Water Surface Profiles along the Bow River Study Reach - Part 6

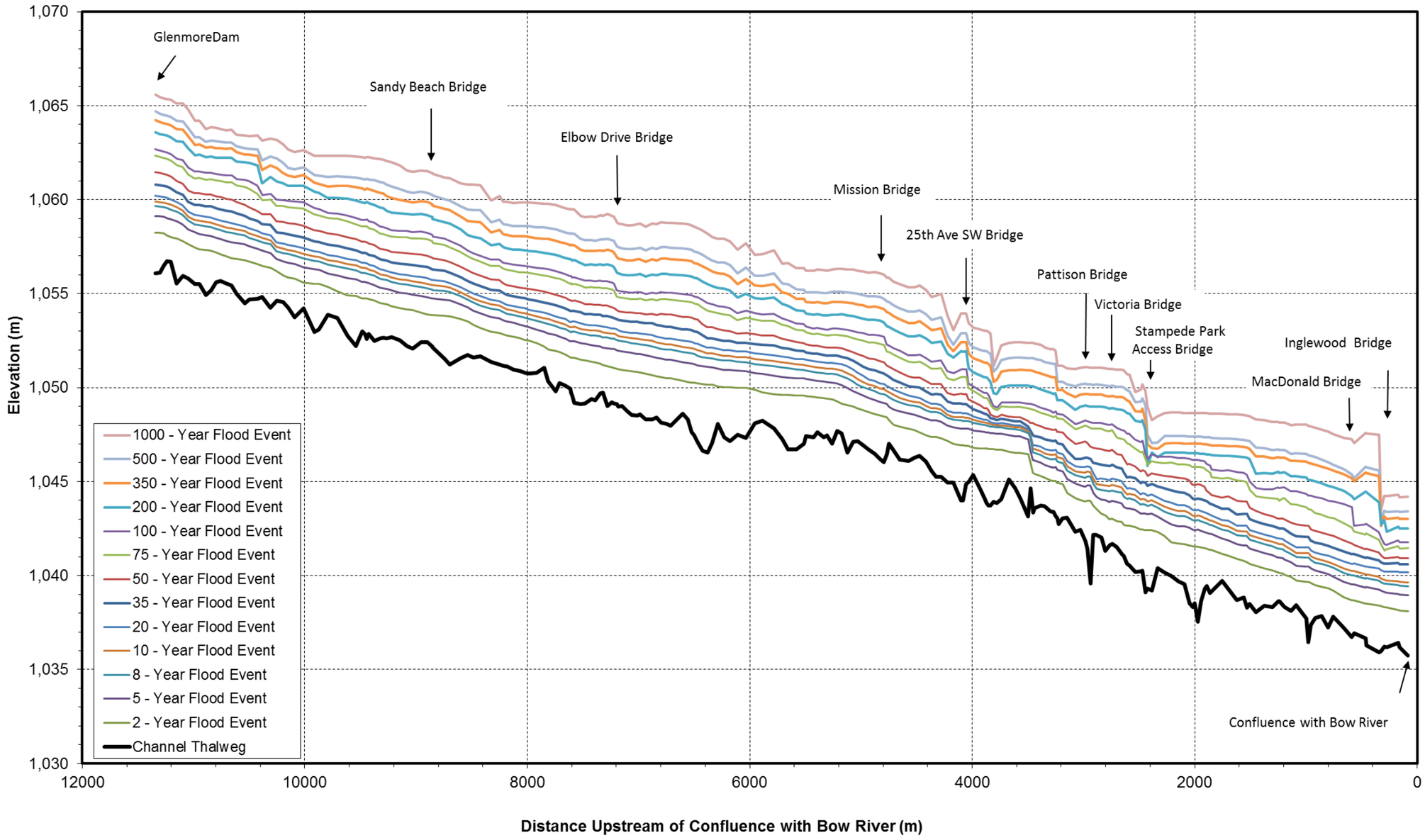


Figure 22: Simulated Water Surface Profiles along the Elbow River Study Reach

7.0 FLOOD INUNDATION MAPPING

7.1 Methodology

Flood inundation maps were prepared based on the following information:

- simulated water levels at individual cross sections for the 5-, 8-, 10-, 20-, 35-, 50-, 75-, 100-, 200-, 350-, 500- and 1,000-year flood events;
- location and extents of individual cross sections;
- topography from the Integrated DEM (Golder 2015); and
- information about permanent flood control structures, consideration of past overland flow areas, and other flood experience information.

Cross sections in ArcGIS were attributed with the water level output from the HEC-RAS model. The model cross sections were extended where required to cover the maximum extents of inundated areas. Water levels between cross sections were linearly interpolated using a Triangulated Irregular Network (TIN) interpolation technique, and a water surface TIN was created.

Inundation extents were delineated by intersecting the water surface TINs and the integrated DEM. The delineated inundation areas were then carefully reviewed and modified for the following scenarios:

- Scenario 1 – Isolated Areas: Isolated areas are potentially inundated areas that have no direct overland connection to the main river channels. These areas may be potentially inundated due to unidentified culverts, groundwater connection, permeable embankments, or backup from storm sewer systems.
- Scenario 2 – Single Overtopping Point: At locations where inundated areas are connected to the main channel at a single overtopping point (spill point), the inundation extent was re-evaluated using a constant water level which is equal to that at the spill point.
- Scenario 3 – Multiple Overtopping Points: If there are multiple overtopping points related to a single overflow area, the inundation extent was based on the hydraulic gradient in the main channel between the overtopping points. The inundation extent upstream of the most upstream overtopping point and downstream of the most downstream overtopping point were evaluated using the estimated water level at these bounding spill points.
- Scenario 4 – Single Overtopping Point Causing Overtopping Downstream: In some locations, Scenario 2 can lead to the following situation: if the area behind the single overtopping location would be (after some time) completely inundated and pooled with a constant water level elevation similar to the water level at the spill point, this may cause a second overtopping further downstream and flow back into the main channel, because at that point the water level behind the embankment may be higher than that in the main channel. In this case, the inundation extent was re-evaluated using a linear interpolation between the water level at the upstream spill point and the ground elevation at the downstream re-entry point.
- Scenario 5 – Potential Flood Inundation due to Flood Control Structure Failure: In areas where permanent flood control structures (see Section 4.6) have been identified and are not overtopped, the protected areas are shown as potentially flooded. The inundation extent is determined by assuming that the flood control structure is ineffective.

7.2 Preparation of Flood Inundation Maps

7.2.1 General

One set of flood inundation maps was prepared for each flood event. The study area is covered by a total of 28 sheets (11-inch x 17-inch) at a scale of 1:7,500. This includes the Bow River reach between Bearspaw Dam and the downstream city limit at Range Road 285, and the Elbow River reach between Glenmore Dam and its confluence with the Bow River.

The maps include the 2013 aerial imagery and other base data (roads and railways) provided by The City and AEP. The maps use the 3TM 114° NAD83 coordinate system and datum. The resulting inundation maps for the 5-, 10-, 20-, 50- and 100-year flood events are presented in Appendix D. The other inundation maps were provided to The City and AEP as digital files only.

The flood inundation maps were prepared in a geographical information system (ESRI ArcGIS 10.2). The maps including all layers were provided to AEP and The City as digital files in the ESRI ArcGIS file format.

7.2.2 Manual Edits

7.2.2.1 Requirements

Flood inundation mapping at a number of locations required some manual edits as follows:

- Areas determined to be isolated were connected to the main channels where known culverts exist (e.g. the newly built canal through the community of Cranston between Cross Sections 300 and 307 and Pine Creek flowing parallel to the Bow River between Cross Sections 311 and 317).
- Areas known to be inundated during a flood event but not automatically delineated using ArcGIS, were added to the inundation area (e.g. the spillway at Bearspaw Dam, canal in the newly built park in the community of Cranston and Pine Creek).
- At locations where flood control structures were not fully integrated into the DEM, the potentially inundated areas behind the structures were treated like a Scenario 5 flood extent (e.g. the Stampede and Inglewood Flood Walls).
- The Western Headworks (WH) canal and the related areas were not included in the flood inundation mapping except where a direct overland flow connection to the Bow River exists.

The details of the manual edits are discussed in the following sections.

7.2.2.2 Montgomery

100-year and 75-year Floods

Multiple overtopping locations are predicted at the flood control structures along Montgomery Blvd NW, between Cross Sections 66 (near Home Road NW) and 68. The type of floodplain inundation in this area is considered to be Scenario 3 and mapped accordingly.

50-year, 35-year and 20-year Floods

The inundation extent behind the flood control structure between Cross Sections 66 (near Home Road NW) and 68 is classified as flood control structure failure inundation (Scenario 5).

7.2.2.3 Hillhurst, Kensington and Sunnyside

1000-year, 500-year and 350-year Floods

The flood flows are predicted to reach a low-lying area north of Kensington Road NW between 18th and 21st Street NW. In this area, the inundation area upstream of Cross Section 96 was re-determined using the water level at the cross section (Scenario 3).

100-year Flood

A series of overtopping locations are predicted at the flood control structures along the north bank of the Bow River. These locations are Hillhurst, Kensington and Sunnyside between Cross Sections 102 and 125. The first spill point is located at Cross Section 102. The directly inundated area upstream of this spill point was re-determined using the water level at the overtopping point (Scenario 3). The type of floodplain inundation between Cross Sections 102 (approximately 12th Street NW) and 125 (approximately 3rd Street NW) is considered to be Scenario 3 and mapped accordingly.

The flood inundation extent behind the flood control structures upstream of Cross Section 102 is classified as flood control structure failure inundation (Scenario 5).

75-year and 50-year Floods

Multiple overtopping locations are predicted at the flood control structures along the north bank of the Bow River at Kensington and Sunnyside between Cross Sections 108 and 125. The first spill point is located downstream of Cross Section 108. The directly inundated area upstream of this spill point was re-determined using the water level at the overtopping point (Scenario 3).

The type of floodplain inundation between Cross Sections 108 (approximately 9th Street NW) and 125 (approximately 3rd Street NW) is considered to be Scenario 3 and mapped accordingly. The inundation extent behind the flood control structures upstream of Cross Section 108 is classified as flood control structure failure inundation (Scenario 5).

35-year Flood

A few overtopping locations are predicted at the flood control structures along the north bank of the Bow River at Sunnyside between Cross Sections 120 and 125. The directly inundated area upstream of this spill point was re-determined using the water level at the overtopping point (Scenario 3).

The type of floodplain inundation between Cross Sections 120 (approximately 4A Street NW) and 125 (approximately 3rd Street NW) is considered to be Scenario 3 and mapped accordingly. The flood inundation extent behind the flood control structures at Sunnyside is classified as flood control structure failure inundation (Scenario 5).

20-year Flood

A single overtopping location is predicted at Cross Section 123 (Approximately 3rd Street NW) causing some inundation of parts of Sunnyside. The flood inundation extent behind the flood control structures along Memorial Drive was re-determined using the water level at the single spill point (Scenario 2). The inundation extent behind the flood control structures at Sunnyside is classified as flood control structure failure inundation (Scenario 5).

10-year, 8-year and 5-year Floods

The flood inundation extent behind the flood control structures at Sunnyside is classified as flood control structure failure inundation (Scenario 5).

7.2.2.4 Downtown Area (North of CP Railway)

100-year Flood

A series of overtopping locations are predicted in the downtown area between 6th Street SW and 6th Street SE. The type of inundation in this area is considered to be Scenario 3. The first spill location is located at Cross Section 111 (upstream of Prince's Island Park Causeway). The flood inundation extent between Cross Sections 111 and 139 was determined based on the hydraulic gradient in the main channel and Prince's Island side channel. Downstream of Cross Section 139, the inundation extent up to the Elbow River confluence was determined based on the water level at this cross section.

75-year Flood

A single overtopping location is predicted at Cross Section 134 (Centre Street Bridge) causing inundation of parts of Chinatown. The flood inundation extent upstream of Cross Section 134 was re-determined using the water level at the single spill point (Scenario 2).

7.2.2.5 McDougall Road (Bridgeland)

The integrated DEM has a gap at the construction site of the new St. Patrick's Island Bridge along the flood control structure at the north river bank of the Bow River (Zoo Side Channel). For flood inundation mapping, it is assumed that this gap will be filled once construction of the bridge is completed.

1000-year Flood

A single spill point is predicted at 12th Street NE causing inundation north of 1st Avenue NE. The flood inundation extent in this area was re-determined using the water level at Cross Section 156.

100-year Flood

A single overtopping location is predicted at Cross Section 152 (9th Street NE) causing inundation along McDougall Road and adjacent areas. The flood inundation extent in the Bridgeland area was re-determined using the water level at the single spill point (Scenario 2). The flood inundation extent behind the flood control structures upstream of 6th Street NE and downstream of Cross Section 152 (9th Street NE) is classified as flood control structure failure inundation (Scenario 5).

75-year Flood

The flood inundation extent behind the flood control structures along McDougall Road and adjacent areas is classified as flood control structure failure inundation (Scenario 5).

7.2.2.6 Inglewood

100-year and 75-year Floods

The combined concrete flood wall and earthfill berm were constructed in 2009 by The City to protect the Inglewood area against the 100-year flood (see Section 4.6). The concrete wall was not included in the DEM provided by The City. The top elevations of portions of the concrete wall and berm were surveyed by Golder in 2010. The lowest point of the top of the flood control structure was surveyed to be 1039.9 m. Overtopping at some locations of the flood control structure is predicted during the 100-year and 75-year flood events.

The floods are predicted to overtop the flood control structure between Cross Sections 162 and 166, travel east along 9th Avenue SE, and flow under Blackfoot Trail (at the underpass) and back to the Bow River main channel at Cross Section 180 (approximate 21th Street SE). The flood inundation extent between the most downstream overtopping point at Cross Section 166 and the downstream spill point at Cross Section 180 was re-determined using linear interpolation between the water level at the overtopping point upstream and the ground elevation at the downstream spill point (Scenario 4).

The flood inundation extent behind the flood control structure upstream of Cross Section 162 was re-determined using the water level at the overtopping point (Scenario 2). The flood inundation extent behind the flood control structures was classified as flood control structure failure inundation (Scenario 5) for the 75-year flood.

50-year and 35-year Floods

Based on the simulation results, the 35-year and 50-year floods would not overtop the existing flood control structure. The low lying areas behind the flood control structure are considered potentially inundated only if the flood control structure were to fail (Scenario 5).

In the event of a failure of the flood control structures in Inglewood, flood water is assumed to travel east along 9th Avenue SE and flow downstream under Blackfoot Trail at the underpass. The inundation extent between the most downstream failure point at Cross Section 166 and the downstream spill point at Cross Section 180 was re-determined using linear interpolation between the water level at the failure point and the ground elevation at Cross Section 180.

7.2.2.7 Quarry Park

The Quarry Park area was under construction when this study was underway. It is recognized that the DEM used in the study may not reflect the final ground surface.

350-year Flood

The flood inundation extent behind the flood control structures upstream of Cross Section 243 was re-determined using the water level at this cross section.

100-year Flood

The flood inundation extent behind the flood control structures between Cross Sections 243 and 244 is classified as flood control structure failure inundation (Scenario 5). If the failure was to occur, a single overtopping location is predicted near Cross Section 245 causing additional inundation in the area west of Douglas Glen Grove SE. The inundation extent in the area was re-determined using the water level at the single spill point (Scenario 2).

75-year, 50-year and 35-year Floods

The flood inundation extent behind the flood control structures between Cross Sections 243 and 246 is classified as flood control structure failure inundation (Scenario 5).

7.2.2.8 Elbow Park

100-year and 75-year Flood

The Elbow River has a sharp bend downstream of the Elboya Bridge. The flood inundation extent in this area was delineated based on estimated overland flow through the streets. The water levels between Cross Sections 444 and 459 were levelled throughout the residential areas along the north side of Elbow River up to 36th Avenue SW. Further overland flooding was then re-determined based on a linear interpolation

between the water level at 36th Avenue SW and Cross Section 486. Observations during the 2013 flood event indicated that this large area is at risk of flooding during the 100-year flood.

7.2.2.9 Mission, Stampede and Downtown

The areas along the Elbow River from the location upstream of the Mission Bridge to the confluence with the Bow River are prone to inundation from multiple spill locations and complex overland flows.

100-year and 75-year Floods

The flood inundation extents in these areas were estimated by linear interpolation of water levels between multiple cross sections along the Elbow River and corresponding cross sections along the Bow River on the north side of the Canadian Pacific Railway (CPR) tracks running through the Beltline area, south of the Downtown core. The interpolation was based on breaklines (linear features that ensure that known elevation values are maintained in a surface) between Cross Sections 577 on Elbow River and 143 on Bow River, 575 on Elbow River and 139 on Bow River, as well as 573 on Elbow River and 137 on Bow River.

Water level interpolation was also enforced along breaklines from Cross Section 507 (upstream of Mission Bridge) following Cliff Street/5A Street SW to the intersection with 16th Avenue SW, and then following 16th Avenue SW to Cross Section 573 (upstream of Pattison Bridge). Another breakline was defined by connecting the 5A Street SW / 16th Avenue SW intersection with Cross Section 121 on the Bow River. The breaklines are shown in Figure 23.

50-year and 35-year Floods

The earth berm and flood wall at Stampede Park would not be overtopped during 50-year and 35-year floods. The inundation extent through the Stampede Park area for these floods is classified as flood control structure failure inundation (Scenario 5).

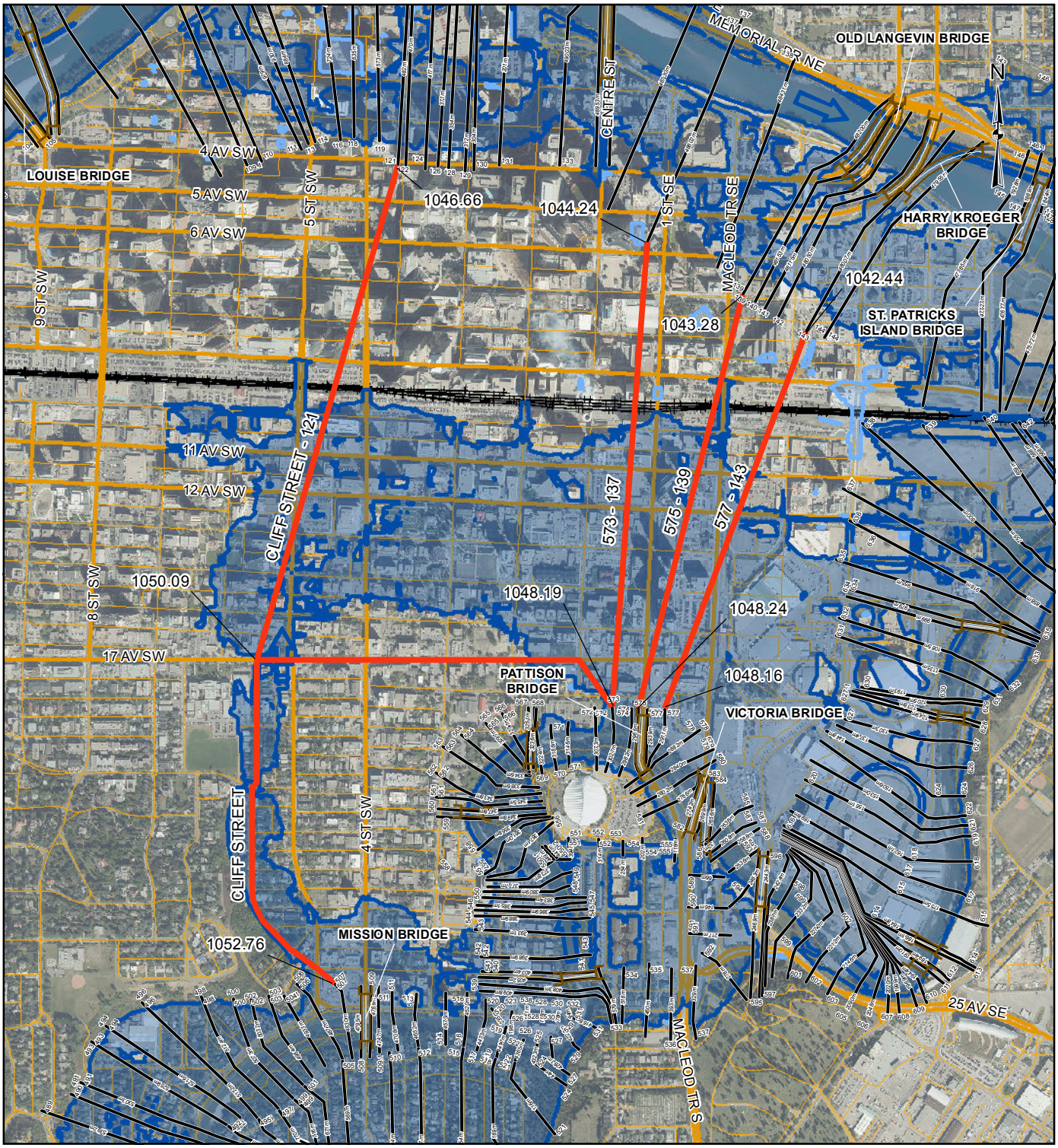
7.2.2.10 Other Areas

1) Upstream of the TransCanada Highway Bridge on 16th Avenue NW, the flood inundation extent on the left (east) floodplain around Bowness Road NW (Cross Sections 53 to 57) was re-determined using water level at a single spill point (Scenario 2) for the 100-year and 75-year floods.

2) At Pearce Estate Park (Cross Sections 171 to 176), a single overtopping point was determined downstream of Cross Section 176, causing the inundation of parts of the park during the 10-year and 8-year floods. An updated inundation extent was re-determined using the water level at the single spill point. The flood inundation extent in the area is classified as isolated (Scenario 1).

3) The flood inundation extent on the right floodplain at the RCGA Golf Course (Cross Sections 210 to 222) was re-determined using linear interpolation between the water level at Cross Section 213 and the ground elevation at the downstream spill point (Scenario 4) for the 8-year flood.

4) For the 200-year to 500-year floods, water spills onto the left floodplain along Deerfoot Trail SE at Ivor Strong Bridge and reaches a low-lying area around 24th Street SE. The flood inundation extents in this area were re-determined based on the 500-year flood water level at Cross Section 247 and the water levels at Cross Section 249 for the 350-year and 200-year floods.



LEGEND

- BRIDGE
- BREAKLINE
- LOCAL ROAD
- MAJOR ROAD

100-YEAR FLOOD INUNDATION EXTENT

- 100-YEAR FLOOD EXTENT
- 100-YEAR FLOOD EXTENT (ISOLATED AREA)

500 0 500

SCALE 1:15,000 METRES

REFERENCE

TRANSPORTATION DATA AND 2013 POST FLOOD IMAGERY OBTAINED FROM THE CITY OF CALGARY.
PROJECTION: 3TM W114 DATUM: NAD 83

PROJECT

BOW RIVER AND ELBOW RIVER HYDRAULIC MODEL AND FLOOD INUNDATION MAPPING UPDATE

TITLE

BREAKLINES AND WATER LEVELS (100-YEAR FLOOD EVENT) FOR INUNDATION MAPPING ALONG THE LOWER ELBOW RIVER

Golder Associates
Calgary, Alberta

PROJECT		13-1326-0054	FILE No.	
DESIGN	JC	12 Mar. 2015	SCALE AS SHOWN	REV. 0
GIS	PT	12 Mar. 2015		
CHECK	JC	12 Jun. 2015		
REVIEW	DL	12 Jun. 2015		

FIGURE: 23

I:\2013\13-1326\13-1326-0054\Mapping\MXD\Hydrology\Report Figures\1313260054_Fig_23_LowerElbowRiver-Mapping_Rev0.mxd

5) At Fish Creek Park below Deerbrook Crescent SW (Cross Sections 266 to 271), a single overtopping point was determined at Cross Section 266 during the 100-year flood, causing the inundation of parts of the park downstream and a second overtopping near Cross Section 271. The flood inundation extent in the park area was re-determined using linear interpolation between the water level at Cross Section 266 and the ground elevation at the downstream spill point (Scenario 4).

6) The flood inundation extent at McKenzie Meadows Golf Course (Cross Sections 279 to 288) was re-determined using linear interpolation between the water level at Cross Section 279 and the ground elevation at the downstream spill point at Cross Section 286 (Scenario 4) for floods with return periods less than 35 years.

7) The flood inundation extent on the left floodplain downstream of Marquis de Lorne (Highway 22X) Bridge was re-determined using linear interpolation between the water level at spill point upstream of Cross Section 296 and the ground elevation at the downstream spill point (Scenario 4) for the 20-year flood. The flood inundation extents for the 10-year and 8-year floods were re-determined using the water level at the single spill point upstream of Cross Section 296 (Scenario 2).

8) For the 200-year to 500-year floods, the flood inundation extent on the right floodplain south of 194th Avenue SE was re-determined using linear interpolation between the water level at Cross Section 302 and the ground elevation at the downstream spill point around Cross Section 306.

9) In the area along the left floodplain between Cross Sections 314 and 317, a single overtopping point was determined at Cross Section 317 for floods with return periods less than the 35 years. The flood inundation extents upstream of Cross Section 317 were re-determined using water levels at the spill point (Scenario 2).

10) The flood inundation extent on the right floodplain between Cross Sections 320 and 328 was re-determined using the water level at a single spill point at Cross Section 324 for the 20-year flood (Scenario 2). The flood inundation extents were re-determined using water levels at a single spill point upstream of Cross Section 328 for floods with return periods less than 20 years (Scenario 2).

11) The flood inundation extent on the left floodplain between Cross Sections 337 and 339 was re-determined using the water level at a single spill point at Cross Section 339 for the 5-year flood (Scenario 2).

8.0 FLOODING EFFECTS

8.1 Effects on Bridges

A bridge is considered to be flood-affected when flood waters reach its low chord. None of the modelled bridges along the Bow River are predicted to be flood-affected during the flood events with return periods of 20 years or less. Two pedestrian bridges (i.e. Bowmont Bridge and Prince's Island Pedestrian Bridge on Lagoon) are predicted to be flood-affected during the 35-year flood.

A total of 13 bridges are predicted to be flood-affected during the 100-year flood. They are the Bowmont Bridge, Hextall Bridge, Souldice Bridge, Harry Boothman Bridge, St. George's Island Bridge, CP Rail Bridge (near Nose Creek), Cushing Bridge, CP Rail Bridge (upstream of Bonnybrook Bridge), Sue Higgins Bridge, Eric Harvie Bridge, Jaipur Bridge, Prince's Island Bridge on Lagoon, and Baines Bridge.

Table 13 presents a summary of the simulated water levels at the bridges along the Bow River for the 2-year through 1,000-year floods, and the flow velocities and clearances during the 100-year flood.

During the 100-year flood, the predicted water levels at all bridges along the Elbow River exceed the low chord elevations of the bridges.

Table 14 presents a summary of the simulated water levels at the bridges along the Elbow River for the 2-year through 1,000-year floods, and the flow velocities and clearances during the 100-year flood.

8.2 100-Year Flood Inundation in Residential and Commercial Areas

8.2.1 Bow River

Valley Ridge

- Parts of the Valley Ridge Golf Course would be inundated.

Bowness

- Bowness Park would be inundated.
- Large parts of the residential area downstream of the CP Rail Bridge (Bow Crescent NW) would be inundated.
- The main portion of Bowness north of Bowwood Drive NW approximately east of 63rd Street NW along Bowness Road to the Shouldice Bridge would be inundated.

Shouldice and Montgomery

- In the area north of the Trans-Canada Highway, the residential area around 51th Street between 18th Avenue NW and Bowness Road NW, including Bowness Road, would be inundated. There would also be an inundated area between Bowness Road and the Trans-Canada Highway, including the tennis courts.
- The berm along Montgomery Blvd NW would be overtopped. Parts of the residential area between Montgomery Blvd NW and Montgomery Avenue NW would be inundated.
- Most of the Edworthy Park would be inundated north of the CP Railway. The CP Railway embankment would be overtopped at a several locations east of Edworthy Park.

Table 13: Effects on Bridges along the Bow River

Bridge Station (m)	Name	Min. Deck Elevation (m)	Min. Low Chord Elev. (m)	Predicted Water Level at Bridge for Various Flood Events (m), Rounded to the Nearest Decimetre												Average Flow Velocity for the 100-year Flood Event (m/s)	Clearance for the 100-year Flood Event (m)	Flood Event Causing Pressure Flow (Return Period in year)
				2-year	5-year	8-year	10-year	20-year	35-year	50-year	75-year	100-year	200-year	350-year	500-year	1,000-year		
65773	Stoney Trail Bridge	1078.9	1078.0	1071.6	1072.5	1073.1	1073.2	1073.7	1074.0	1074.2	1074.5	1074.6	1075.1	1075.4	1075.6	1076.1	1.9	3.4	>1:1000
64207	85th St SW Bridge	1075.4	1073.6	1069.3	1070.1	1070.5	1070.7	1071.2	1071.6	1071.8	1072.1	1072.3	1072.8	1073.1	1073.3	1074.0	3.7	1.3	Between 1: 500 and 1:1000
63565	Bowmont Bridge	1070.8	1070.5	1068.0	1069.0	1069.5	1069.7	1070.3	1070.8	1071.1	1071.5	1071.7	1072.3	1072.7	1073.0	1073.7	1.9	-1.2	Between 1:20 and 1:35
63474	CP Rail Twin Bridges	1072.8	1071.7	1067.9	1068.9	1069.3	1069.5	1070.1	1070.6	1070.9	1071.2	1071.4	1071.9	1072.3	1072.5	1073.3	2.9	0.3	Between 1:100 and 1:200
59604	Hextall Bridge	1065.9	1065.1	1062.1	1062.8	1063.3	1063.5	1064.1	1064.6	1064.9	1065.3	1065.5	1066.3	1066.8	1067.0	1067.5	3.9	-0.5	Between 1:50 and 1:75
59583	Souldice Bridge	1067.5	1064.7	1061.9	1062.7	1063.1	1063.3	1063.8	1064.2	1064.4	1064.7	1064.9	1065.6	1066.3	1066.7	1067.3	3.9	-0.2	1:75
59182	Trans-Canada Highway Bridge	1066.9	1066.6	1061.0	1061.8	1062.3	1062.5	1063.1	1063.5	1063.8	1064.0	1064.2	1064.8	1065.6	1065.8	1066.3	3.3	2.4	>1:1000
56728	Harry Boothman Bridge	1059.0	1058.8	1056.2	1057.0	1057.4	1057.6	1058.2	1058.7	1059.0	1059.4	1059.6	1060.2	1060.8	1061.0	1061.6	3.4	-0.9	Between 1:35 and 1:50
53167	Crowchild Trail Bridge	1056.5	1054.6	1049.8	1050.5	1050.9	1051.1	1051.7	1052.2	1052.5	1052.9	1053.1	1053.7	1054.2	1054.4	1055.1	3.3	1.4	Between 1:500 and1:1000
51706	Mewata Bridge	1055.9	1053.7	1047.3	1048.0	1048.4	1048.5	1049.0	1049.4	1049.7	1050.0	1050.2	1050.7	1051.1	1051.4	1052.0	3.5	3.5	>1:1000
50929	Louise Bridge	1050.9	1050.3	1045.3	1046.2	1046.7	1046.9	1047.5	1048.0	1048.3	1048.6	1048.9	1049.5	1050.0	1050.4	1051.3	3.1	1.5	Between :350 and 1:500
50814	North West Light Rail Bridge	1049.9	1048.6	1044.8	1045.9	1046.4	1046.6	1047.2	1047.7	1047.9	1048.2	1048.4	1049.0	1049.6	1049.9	1050.6	3.1	0.2	Between 1:100 and 1:200
50411	Peace Bridge	1049.5	1048.5	1044.4	1045.4	1045.9	1046.1	1046.7	1047.1	1047.3	1047.6	1047.7	1048.2	1048.5	1048.7	1049.3	3.3	0.8	1:350
49625	Prince's Island Bridge	1048.3	1047.3	1043.4	1044.3	1044.8	1045.0	1045.5	1046.1	1046.4	1046.7	1046.9	1047.5	1047.9	1048.1	1048.8	2.6	0.3	Between 1:100 and 1:200
48932	Centre St Bridge	1047.6	1046.5	1041.7	1042.6	1043.1	1043.3	1044.0	1044.5	1044.8	1045.2	1045.5	1046.2	1046.8	1046.9	1047.7	4.0	1.0	Between 1:200 and 1:350
48167	4th Ave Flyover Bridge	1049.0	1047.0	1040.2	1041.0	1041.4	1041.6	1042.1	1042.5	1042.8	1043.1	1043.3	1044.2	1044.6	1045.0	1045.9	4.3	3.7	>1:1000
48132	Old Langevin Bridge	1044.8	1043.0	1040.1	1040.9	1041.2	1041.4	1041.9	1042.3	1042.5	1042.8	1043.0	1043.8	1044.3	1044.8	1045.8	4.0	0.0	1:100
48023	New Langevin (Edmonton Trail) Bridge	1045.8	1043.8	1040.1	1040.8	1041.1	1041.3	1041.7	1042.1	1042.3	1042.6	1042.7	1043.3	1043.6	1043.9	1044.5	4.3	1.1	Between 1:350 and 1:500
47988	Harry Kroeger Bridge	1044.6	1044.6	1040.0	1040.6	1041.0	1041.1	1041.5	1041.9	1042.1	1042.3	1042.4	1042.9	1043.5	1043.9	1044.4	3.9	2.2	>1:1000
47705	St. Patrick's Island Bridge	1043.1	1042.8	1039.4	1040.0	1040.3	1040.5	1040.9	1041.2	1041.4	1041.7	1041.9	1042.4	1043.0	1043.4	1044.2	3.8	0.9	Between 1:200 and 1:350
46540	St. Georges Island Bridge	1041.1	1040.2	1037.3	1038.2	1038.7	1038.9	1039.4	1039.9	1040.2	1040.7	1041.1	1041.8	1042.3	1042.7	1043.4	3.0	-0.9	1:50
45573	CP Rail Bridge	1039.9	1038.9	1036.2	1037.0	1037.4	1037.5	1038.0	1038.3	1038.6	1039.0	1039.3	1040.3	1040.6	1040.9	1041.7	3.4	-0.4	Between 1:50 and 1:75
44288	Cushing Bridge	1039.6	1035.8	1032.7	1033.6	1034.1	1034.3	1034.8	1035.2	1035.4	1035.8	1036.0	1036.8	1037.6	1038.2	1040.5	3.8	-0.2	1:75
41011	Abandoned CP Rail Bridge	1036.4	1035.0	1027.2	1028.4	1028.9	1029.2	1029.8	1030.4	1030.8	1031.4	1031.7	1032.9	1033.9	1034.6	1035.5	3.6	3.3	Between 1:500 and 1:1000
40949	CP Rail Bridge	1033.2	1031.0	1027.1	1028.3	1028.8	1029.0	1029.7	1030.2	1030.6	1031.0	1031.3	1032.5	1033.3	1034.2	1035.4	3.9	-0.3	1:75
40815	Bonnybrook Bridge	1035.0	1031.9	1026.9	1027.9	1028.4	1028.6	1029.2	1029.6	1029.9	1030.3	1030.5	1031.1	1031.6	1031.9	1032.6	3.3	1.4	1:500
40141	Calf Robe Bridge	1034.5	1032.1	1025.9	1026.9	1027.3	1027.4	1027.8	1028.2	1028.5	1028.9	1029.1	1029.7	1030.2	1030.6	1031.5	3.1	3.0	>1:1000
39626	CN Rail Bridge	1036.0	1032.1	1025.3	1026.2	1026.4	1026.6	1027.0	1027.3	1027.6	1027.9	1028.1	1028.6	1029.0	1029.4	1030.3	3.9	4.0	>1:1000
37158	Graves Bridge, Upstream	1027.6	1025.4	1020.4	1021.1	1021.4	1021.6	1022.2	1022.5	1022.7	1023.1	1023.3	1023.9	1024.4	1024.6	1025.3	3.7	2.0	>1:1000
37138	Graves Bridge, Downstream	1027.6	1025.4	1020.2	1020.9	1021.3	1021.4	1022.0	1022.2	1022.5	1022.8	1023.1	1023.5	1024.0	1024.1	1024.8	4.0	2.3	>1:1000
34433	Eric Harvie Bridge	1019.3	1018.8	1015.8	1016.8	1017.2	1017.5	1017.9	1018.3	1018.3	1018.6	1018.8	1019.7	1019.8	1020.1	1020.8	3.9	0.0	1:100
32424	Ivor Strong Bridge	1022.8	1019.6	1012.5	1013.4	1013.8	1014.0	1014.4	1014.8	1015.1	1015.5	1015.8	1016.4	1016.9	1017.2	1017.9	4.0	3.8	>1:1000
30868	Sue Higgins Bridge	1013.2	1012.3	1009.9	1010.7	1011.0	1011.1	1011.1	1011.5	1011.7	1012.2	1012.4	1012.9	1013.2	1013.4	1013.7	4.9	-0.1	Between 1:75 and 1:100
26388	McKenzie Bridge	1004.6	1004.1	1001.1	1002.0	1002.3	1002.4	1002.6	1002.9	1003.1	1003.4	1003.5	1003.9	1004.3	1004.5	1005.1	2.9	0.6	Between 1:200 and 1:350
23614	Marquis de Lorne Bridge, Upstream	1003.9	1001.9	995.4	996.4	996.8	997.1	997.7	998.1	998.5	998.9	999.2	1000.1	1000.8	1001.3	1002.4	4.2	2.7	Between 1:500 and 1:1000
23573	Marquis de Lorne Bridge, Downstream	1004.0	1002.4	995.3	996.3	996.7	997.0	997.5	997.9	998.3	998.7	999.0	999.7	1000.1	1000.5	1001.4	4.4	3.4	>1:1000
18031	Dunbow Road Bridge, Upstream	993.9	991.0	984.9	985.6	986.0	986.2	986.6	986.9	987.2	987.6	987.8	988.4	989.0	989.4	990.2	4.2	3.2	>1:1000
17998	Dunbow Road Bridge, Downstream	993.7	991.0	984.8	985.4	985.8	986.0	986.4	986.7	986.9	987.3	987.5	987.9	988.5	988.9	989.7	4.2	3.5	>1:1000
476	Jaipur Bridge	1047.6	1045.9	1044.2	1044.5	1044.7	1044.8	1045.2	1045.6	1045.9	1046.3	1046.7	1047.5	1048.0	1048.3	1048.9	2.0	-0.8	1:50
308	Prince's Island Bridge on Side	1045.6	1045.1	1042.9	1043.2	1043.7	1043.9	1044.6	1045.2	1045.6	1046.0	1046.3	1046.9	1047.4	1047.6	1048.3	2.3	-1.2	Between 1:20 and 1:35
1868	St. Patrick's Island Bridge on Zoo side	1043.2	1042.9	1039.6	1040.3	1040.7	1040.9	1041.4	1041.7	1042.0	1042.3	1042.5	1042.9	1043.4	1043.7	1044.4	2.3	0.5	1:200
1119	Baines Bridge	1042.5	1040.7	1038.1	1038.8	1039.2	1039.3	1039.9	1040.3	1040.6	1041.0	1041.3	1042.1	1042.6	1043.0	1043.7	2.2	-0.5	Between 1:50 and 1:75
434	Zoo Service Bridge	1041.0	1040.1	1036.7	1037.6	1038.0	1038.2	1038.7	1039.1	1039.4	1039.8	1040.1	1040.9	1041.3	1041.6	1042.3	2.4	0.0	1:100

Table 14: Effects on Bridges along the Elbow River

Bridge Station (m)	Name	Min. Deck Elevation (m)	Min. Low Chord Elev. (m)	Predicted Water Level at Bridge for Various Flood Events (m), Rounded to the Nearest Decimetre												Average Flow Velocity for the 100-year Flood Event (m/s)	Clearance for the 100-year Flood Event (m)	Flood Event Causing Pressure Flow
				2-year	5-year	8-year	10-year	20-year	35-year	50-year	75-year	100-year	200-year	350-year	500-year	1,000-year			
8851	Sandy Beach Bridge	1058.5	1057.9	1053.9	1054.7	1055.2	1055.5	1055.7	1056.3	1056.9	1057.8	1058.1	1059.1	1059.8	1060.3	1061.4	2.7	-0.3	Between 1:75 and 1:100
7601	Riverdale Avenue Bridge	1055.5	1055.2	1051.6	1052.5	1053.0	1053.2	1053.5	1054.1	1054.6	1055.6	1056.0	1056.8	1057.6	1058.2	1059.5	2.9	-0.8	Between 1:50 and 1:75
7206	Elboya Bridge	1054.8	1054.2	1051.1	1052.1	1052.6	1052.9	1053.2	1053.7	1054.2	1055.2	1055.5	1056.4	1057.2	1057.8	1059.1	2.9	-1.3	1:50
5506	Rideau Park Bridge	1053.2	1052.9	1049.6	1050.5	1050.9	1051.2	1051.5	1051.9	1052.4	1053.0	1053.4	1054.1	1054.7	1055.2	1056.4	3.1	-0.5	Between 1:50 and 1:75
4783	Mission Bridge	1051.7	1050.5	1048.5	1049.2	1049.7	1049.9	1050.2	1050.8	1051.4	1052.3	1052.7	1053.5	1054.2	1054.7	1056.0	4.8	-2.2	Between 1:20 and 1:35
4043	25th Ave SW Bridge	1050.3	1048.5	1046.9	1047.8	1048.2	1048.4	1048.6	1049.1	1049.7	1050.6	1051.0	1051.9	1052.4	1052.9	1053.9	4.2	-2.5	Between 1:10 and 1:20
3483	Lindsay Park	1047.5	1046.8	1046.5	1047.2	1047.6	1047.7	1047.8	1048.0	1048.2	1048.9	1049.2	1050.1	1050.9	1051.6	1052.4	1.4	-2.3	Between 1:2 and 1:5
3243	Lindsay Park CNR Bridge	1050.2	1048.6	1045.0	1045.8	1046.2	1046.5	1046.7	1047.2	1047.8	1048.5	1048.7	1049.7	1050.6	1051.3	1052.0	2.4	-0.1	Between 1:75 and 1:100
2954	Pattison Bridge	1046.9	1045.4	1044.0	1044.8	1045.3	1045.5	1045.8	1046.3	1047.1	1047.9	1048.2	1049.0	1049.7	1050.2	1051.1	1.8	-2.8	Between 1:8 and 1:10
2720	Victoria Bridge	1047.0	1045.4	1043.0	1044.0	1044.5	1044.8	1045.2	1045.9	1046.7	1047.7	1048.1	1048.9	1049.6	1050.1	1051.0	2.0	-2.6	Between 1:20 and 1:35
2677	LRT Bridge	1047.8	1045.7	1042.9	1043.9	1044.5	1044.8	1045.1	1045.8	1046.5	1047.4	1047.8	1048.9	1049.5	1050.1	1051.0	1.6	-2.1	Between 1:20 and 1:35
2455	Stampede Park Access Bridge	1046.4	1045.3	1042.5	1043.3	1043.8	1044.1	1044.4	1045.0	1045.6	1046.6	1047.2	1048.3	1048.9	1049.4	1050.2	2.7	-1.8	Between 1:35 and 1:50
1902	Horse Barn Bridge (New)	1044.7	1043.9	1041.5	1042.3	1042.8	1043.1	1043.4	1044.0	1044.7	1045.7	1046.1	1046.5	1047.0	1047.4	1048.6	2.1	-2.1	Between 1:20 and 1:35
1855	Horse Barn Bridge (Old)	1044.6	1043.6	1041.4	1042.2	1042.7	1042.9	1043.2	1043.8	1044.4	1045.5	1045.9	1046.4	1047.0	1047.4	1048.6	2.1	-2.3	Between 1:20 and 1:35
1244	Stampede Park (S) Saddledome Access Bridge	1043.5	1042.8	1040.2	1041.0	1041.5	1041.7	1042.0	1042.5	1043.0	1044.1	1044.7	1045.5	1046.3	1046.7	1048.2	2.1	-1.9	Between 1:35 and 1:50
991	Stampede Park (N) Saddledome Access Bridge	1044.4	1042.9	1039.7	1040.5	1040.9	1041.2	1041.5	1042.1	1042.7	1043.6	1044.4	1045.2	1046.1	1046.5	1048.0	2.5	-1.5	Between 1:50 and 1:75
576	MacDonald Bridge	1042.3	1042.1	1038.7	1039.5	1040.0	1040.2	1040.6	1041.1	1041.7	1042.5	1043.6	1044.2	1045.2	1045.4	1047.3	3.6	-1.5	Between 1:50 and 1:75
334	9th Ave Train Bridge	1044.6	1042.0	1038.4	1039.3	1039.7	1039.9	1040.4	1040.8	1041.2	1041.9	1042.3	1043.9	1045.3	1045.6	1047.5	3.8	-0.3	Between 1:75 and 1:100
287	9th Ave SE Bridge	1042.5	1041.3	1038.3	1039.1	1039.6	1039.8	1040.2	1040.6	1040.9	1041.3	1041.7	1042.9	1043.1	1043.5	1044.2	4.6	-0.3	1:75
165	Travers Bridge	1041.6	1041.0	1038.2	1039.0	1039.5	1039.7	1040.2	1040.7	1041.0	1041.6	1041.9	1042.6	1043.1	1043.4	1044.3	2.8	-0.9	1:50

Kensington/Sunnyside

- In the area northeast of the Crowchild Trail/Memorial Drive intersection there are some isolated areas that might be flooded by seepage flows through the permeable in-situ soil materials or by water backing up in the storm sewer system.
- There could be potential overland flooding in the area north of Memorial Drive located between 20th Street NW and 14th Street NW if the flood control structure and embankments were to fail, or potentially due to water backing up in the storm sewer system.
- The area north of Memorial Drive located between 14th Street NW and 10th Street NW would be inundated, including Kensington Road, Gladstone Road, 5th Avenue NW and parts of Riley Park and Hillhurst Sunnyside Park.
- 14th Street NW would be inundated at Kensington Close NW and near Robertson College.
- 10th Street NW would be inundated between Kensington Road NW and 8th Avenue NW.
- Parts of the LRT tracks would be inundated, including Sunnyside Station.
- The residential area at Sunnyside east of 10th Street NW and north of Memorial Drive would be inundated.

Downtown/East Village

- Prince's Island would be inundated except for the higher lying area in the centre of the island.
- Flood waters would spill at the upstream end of Prince's Island Lagoon flowing south along 6th Street SW then through the downtown area along 3rd Avenue SW.
- Parts of Chinatown along 2nd Avenue SW, and along 1st Street SE north of 4th Avenue SW, would be inundated.
- The area near the intersections of 4th Avenue SE, 5th Avenue SE and MacLeod Trail SE would be inundated.
- Inundation of East Village east of MacLeod Trail SE would be caused by water flowing from Chinatown eastwards.
- The 100-year flood would just overtop the CP Railway tracks near 6th Street SE.

Bridgeland

- Flood flows would spill near 8th Street NE. Flooding would occur near McDougall Road between 6th Street NE and 12th Street NE.
- Memorial Drive between 8th Street NE and 11th Street NE would be inundated.
- If the flood control structure near the 4th Avenue Flyover were to fail or be breached, an additional area along the Meredith Road NE between 4th Street NE and 6th Street NE would be inundated.

Calgary Zoo

- The Zoo Island would be inundated during the 100-year flood.
- The low lying areas of the Calgary Zoo on the north side of the Zoo Side Channel and the adjacent Bow River Pathway would be flooded.

Inglewood

- Most of the Inglewood District would be inundated. Flood waters would spill over the Inglewood Flood Control Structure between 13th Street SE and 15th Street SE.
- Water would flow in the south-east direction along 9th Avenue SE, flow through the underpass under the rail tracks and Blackfoot Trail, and result in flooding in the area south-east of 7th Avenue. SE including the Piitoayis Family School and the Blackfoot Truck Stop.
- The area south of the Bow River located upstream and downstream of the WH Weir would be inundated, including the Pearce Estate Park and 17A Street SE. Water flowing south on 17A Street SE would cause flooding of Blackfoot Trail.
- On the east bank of the Bow River downstream of the Cushing Bridge, the Inglewood Golf Course and Clubhouse would be subject to flooding.
- On river right, large parts of the Inglewood Bird Sanctuary would be inundated.

Bonnybrook/Ogden

- Parts of the Bonnybrook Wastewater Treatment Plant would be inundated.
- Parts of the Old Refinery Park and Beaver Dam Flats would be inundated.
- The floodplain areas east of Deerfoot Trail and north of Glenmore Trail would be inundated, including the Golf Canada Calgary Centre and the LaFarge Production Plant at 13th Street SE.
- Glenmore Trail would be inundated east of the Deerfoot Trail intersection.
- The Heritage Drive underpass under the Glenmore Trail (at Graves Bridge) would be inundated.

South Calgary

- There are some isolated areas at the Heritage Meadows Way, including 12th Street SE and 11th Street SE, which may be flooded by seepage flow through permeable materials or water backing up in the storm sewer system.
- Carburn Park and Southland Park would be inundated.
- The LaFarge Production site south of Southland Park along 15th Street SE would be inundated.
- In Quarry Park, the area east of Douglas Glen Heights SE/ Douglas Glen Grove SE may be potentially inundated by seepage flow through permeable materials or water backup from the storm sewer systems. An area west of Douglas Glen Grove SE would be flooded. The Quarry Park area was under construction when this study was underway. The inundation mapping in this area should be confirmed after the construction is completed.

- The Enmax Power Station south of the Ivor Strong Bridge and the Eaglequest Golf Driving Range would be inundated.
- Most of the McKenzie Meadows Golf Club would be inundated. On river right, parts of the Fish Creek Provincial Park would be inundated.
- Inundation would occur on the left and right floodplains south of the Marquis of Lorne Bridge. There appears to be new development underway in the area west of the Bow River, including a new golf course and residential development. The flood inundation extent may require review after the development in this area is completed.
- There appears to be new development along the east side of the Bow River in the community of Cranston, including a constructed stormwater drainage channel flowing from approximately at 194th Street SE and flowing back into the Bow River at Cross Section 306. The flood inundation extent may require review after the development is completed.
- The river floodplain south of the Deerfoot Extension Bridge would be inundated.

8.2.2 Elbow River

Riverdale/Elbow Park

- The residential areas along Riverdale Avenue and parts of the Lansdowne Avenue would be inundated. The area south of the Elbow River and east of Elbow Drive SW would be inundated including Stanley Park.
- The Elbow Park Elementary School north of the Elbow River would be inundated. The residential area at Elbow Park east of 8th Street SW would be inundated. The inundated area would have overland flows along 4th Street SW, 5th Street SW, 6th Street SW, 7th Street SW and 7A Street SW during the 100-year event. Observation during the 2013 flood event suggested that there were connections through these streets during the 100-year flood.

Rideau Park/Roxboro

- The inundation would extend throughout Rideau Park to the relatively steep valley walls.
- The Roxboro community, located on the south side of the Elbow River downstream of Rideau Park, would be inundated during the 100-year flood event.

Mission

- If temporary flood protection measures similar to the berm constructed during the 2013 flood event were not deployed, flood flows would spill into the Mission community upstream of Mission Bridge and would flow north along Cliff Street. The area north of Mission Bridge and south of 24th Avenue SW, between 2th Street SW and 5th Street SW, would be inundated.
- Flood flows along Cliff Street from the spill at Mission Bridge would inundate parts of the Beltline area between 17th Avenue SW and the CP Rail tracks. As described in Section 7.2.2.9, the underpass under the rail tracks of 4th Street SW and 5th Street SW could be flooded.
- The area east of 2nd Street SW would be affected, including 26th Avenue SW and 25th Avenue SW and the 25th Avenue Bridge.

Erlton

- The Erlton district would be inundated between 27th Avenue SW and 22nd Avenue SW. The portion of flood flow that would be conveyed through 25th Avenue SW would flow back into the Elbow River near MacLeod Trail. 22nd Avenue SW is a designated floodway that was constructed to convey flood flow from the Elbow River.
- MacLeod Trail and the C-Train tracks would be inundated between 27th Avenue SW and 22nd Avenue SW, including the Erlton C-Train Station.
- Lindsay Park would be inundated, with exception of the Talisman Centre.

Victoria Park and Stampede

- Based on the assumptions described in Section 7.2.2.9, most of Victoria Park and the Stampede Park grounds would be inundated during the 100-year flood.
- Elbow River flood flows would spill between Pattison Bridge and Victoria Bridge and flow north towards the rail tracks. MacLeod Trail and 1st Street SE would be flooded between the Elbow River bridges to the rail tracks including their underpasses.
- The existing earth berm, existing concrete retaining wall and new flood wall at Stampede Park would be overtopped.

9.0 MODEL COMPARISON

9.1 River Channel and Floodplain Geometries

9.1.1 Integrated DEM

An integrated DEM in the format of an ArcGIS terrain data set was created to support development of the 2015 HEC-RAS model. A terrain dataset is a multi-resolution, triangulated irregular network (TIN) based surface built from multiple data sets stored as features in a geodatabase. The terrain dataset facilitates the storage and maintenance of large amounts of vector-based surface measurements (e.g. LiDAR point clouds) coupled with the ability to use surfaces derived from those measurements. A detailed description of the integrated DEM is available in a separate and stand-alone report (Golder 2015).

In the 2012 study, the integrated DEM consisted of six TIN data sets covering the study area (Golder 2011).

Table 15 provides a comparison of the data sources used to create the integrated terrain data for the 2015 and 2012 HEC-RAS models.

Table 15: DEM Data Sources

Area	2015 Model DEM	2012 Model DEM
Main Channel	• 2013-2014 bathymetry survey • Edge of water defined from LiDAR survey • River banks above water edge during low flow conditions from LiDAR • Elevation of dry islands and exposed gravel bars from LiDAR	• 2010 bathymetry survey • Edge of water from City DAS dataset • River banks up edge of water defined by river survey • Elevation of dry islands from river survey
Floodplain	• 2013 high resolution LiDAR survey(1) • Bow River bank protection design drawings(2) • Elbow River flood protection design at Stampede(3) • Harvie Passage as-built(4) • Various other sources for local features	• City DEM • Harvie Passage as-built • Various other sources for local features

Notes:
(1) The City provided post-2013 flood bare earth LiDAR cloud points in LAS format with a resolution of approximately 25 points per square meter (average point spacing 0.2 m).
(2) The information was taken from the Bow River bank erosion protection design at Home Road and 52nd Street NW, Memorial Drive at 19th Street NW, Memorial Drive near Sunnyside, Inglewood at 8th Avenue SE, Douglasdale and Enmax Substation, and Diamond Cove (Golder 2014).
(3) AutoCAD drawings for bank protection along the Elbow River at Stampede (AMEC 2014).
(4) Assumes that the Harvie Passage project will be rehabilitated to the condition before the 2013 flood.

The bathymetry survey data were interpolated to create a continuous surface to be integrated with the LiDAR/DEM on the floodplains. In the 2012 study, the process could not fully incorporate the exact outline of the river or edge of water, and involved an assumption that the river banks were parallel to the river centre line. In the current study, a 5 m wide buffer was applied between the two datasets to avoid unrealistic breaks or elevation jumps at the tie-in point between the bathymetry and floodplain DEM. This is considered an appropriate method that provided sufficient accuracy for hydraulic modelling (Golder 2012).

To improve accuracy of the tie-in between the channel bathymetry and the floodplain LiDAR data, Golder developed an automated method for bathymetry interpolation that takes into account the curvature and the detailed edge of water on either side of the river (Golder 2015).

9.1.2 Cross Sections

The river beds and some river banks were altered during the June 2013 flood event. As an example, Figure 24(a) shows the aerial imagery at a location on the Bow River, downstream of the Elbow River confluence, before and after the 2013 flood.

Figure 24(b) compares the cross-sectional profiles at the same location in the 2012 and 2015 HEC-RAS models. At this particular cross section, relatively large sediment deposition occurred. A total of 24 cross-sectional profiles at select locations are compared between the 2012 and 2015 models, as shown in Figures E.1 and E.2 in Appendix E.

9.1.3 Channel Thalweg Profiles

Figures E.3(a) to E.3(c) in Appendix E compare the channel thalweg profiles along the Bow River study reach between the 2012 and 2015 HEC-RAS models. Figure E.4 in Appendix E shows the channel thalweg difference along the Bow River between the two models. On average, the thalweg elevation along the Bow River study reach in the 2015 HEC-RAS model is 5 cm lower than that of the 2012 HEC-RAS model. The local changes of the thalweg elevations are within ±60 cm at 70% of the cross sections and greater than ±60 cm at 30% of the cross sections. The thalweg elevation differences range from -3.5 m to +3.0 m.

Figure E.6 in Appendix E presents the channel thalweg profiles along the Elbow River study reach between the 2012 and 2015 HEC-RAS Models. Figure E.7 in Appendix E compares the thalweg difference between the two models. On average, the thalweg elevation in the 2015 HEC-RAS model is 9 cm lower than that of the 2012 HEC-RAS model. The local changes of the thalweg elevations are within ±30 cm at 70% of the cross sections and greater than ±30 cm at 30% of the cross sections. The thalweg elevation differences range from -2.5 m to +1.7 m.

(1) BEFORE THE 2013 FLOOD

(2) AFTER THE 2013 FLOOD

LEGEND

- FLOW DIRECTION
- BRIDGE
- CROSS SECTION (NUMBER AND STATION)
- LOCAL ROAD

100 0 100

SCALE 1:4,000 METRES

REFERENCE

TRANSPORTATION DATA , 2011 IMAGERY AND 2013 POST FLOOD IMAGERY
OBTAINED FROM THE CITY OF CALGARY.
PROJECTION: 3TM W114 DATUM: NAD 83

PROJECT

BOW RIVER AND ELBOW RIVER HYDRAULIC MODEL AND FLOOD INUNDATION MAPPING UPDATE

TITLE

CHANNEL ALTERATION ON THE BOW RIVER DOWNSTREAM OF THE ELBOW RIVER CONFLUENCE

Golder Associates
Calgary, Alberta

PROJECT	13-1326-0054		FILE No.	
DESIGN	JC	12 Mar. 2015	SCALE AS SHOWN	REV. 0
GIS	PT	12 Mar. 2015		
CHECK	JC	12 Jun. 2015		
REVIEW	DL	12 Jun. 2015		

FIGURE: 24(a)

I:\2013\13-1326\13-1326-0054\Mapping\MXD\Hydrology\Report Figures\1313260054_Fig_24a_BowRiver-ChannelAlteration_Rev0.mxd

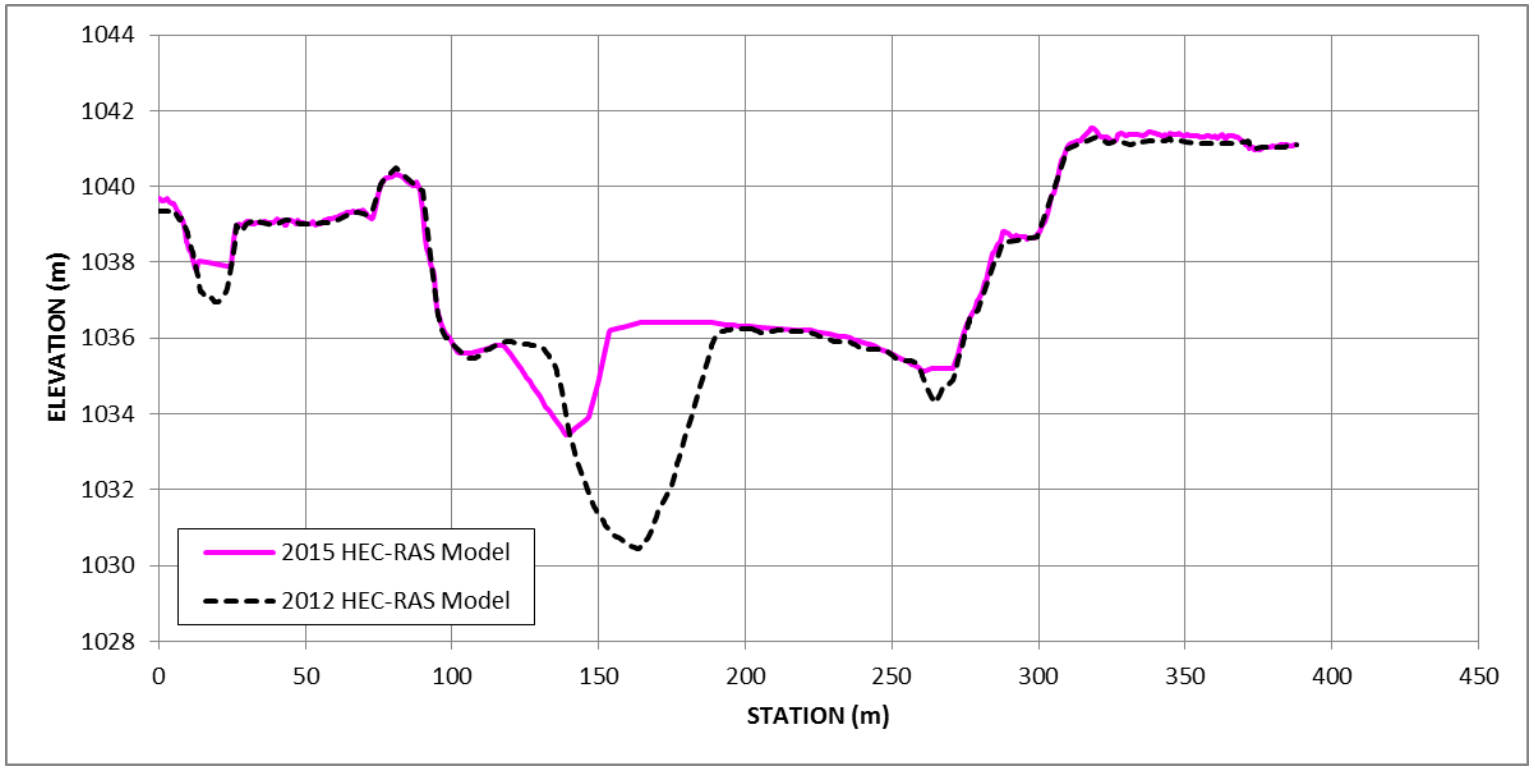


Figure 24(b): Comparison of Pre- and Post- Flood Cross-Section Profiles on the Bow River downstream of the Elbow River Confluence (Cross Section 46775)

9.2 Model Setups

9.2.1 River System

The 2015 HEC-RAS model setup includes the same reaches and flow splits as the 2012 HEC-RAS model, with the exception of the flow split through Stampede Park, which was removed in the 2015 model.

This side channel was set up in the 2012 HEC-RAS model along the southeast race track of the Stampede Grand Stand. It was assumed that portion of the Elbow River flows would flood the Stampede grounds south of the Stampede Grand Stand and flow north along the race track and then back to the Elbow River upstream of the Stampede Park South/Saddledome Access Bridge.

After the 2013 flood event, a flood wall was constructed along the race track to prevent the Stampede Park from flooding for flood events with return periods up to 100 years (based on the 2012 HEC-RAS model). The race track south of Stampede Grand Stand would not convey flow for flood events up to the 100-year flood (based on the simulated water surface elevations using the 2012 model). Therefore, this side channel was removed from the 2015 HEC-RAS model setup.

9.2.2 Cross Sections

A total of 18 new cross sections were added in the 2015 HEC-RAS model to better represent the river characteristics at some locations. These new cross sections are listed in Table 16.

A total of 30 cross sections were relocated or re-aligned in consideration of the new structures along the river reaches or large channel migration. The relocated or re-aligned cross sections are listed in Table 17. The corresponding numbers of the cross sections in the 2012 HEC-RAS model are also listed in the table for comparison.

In addition, the cross sections along the Stampede Park side channel were not included in the 2015 HEC-RAS model. The cross sections from Station 2,332 to 1,506 along the Elbow River main channel were extended to cover the Stampede Park area.

The 2015 HEC-RAS model contains 662 cross sections compared to 650 in the 2012 HEC-RAS model. A comparison of the cross-sectional numbers is provided in Table 18.

Table 16: New Cross Sections in the 2015 HEC-RAS Model

River	Reach	Cross-Section Number	Locations
Bow River	Bowmont to Prince	52366	Between Crowchild Trail Bridge and 14th St SW Bridge
		50438	Upstream of Peace Bridge
	Prince Island	49338	Upstream of Centre St Bridge
		49130	Upstream of Centre St Bridge
	Zoo End to DSBC	44139	Between 17th Avenue (Cushing) Bridge and CP Rail Bridge
		43657	Between 17th Avenue (Cushing) Bridge and CP Rail Bridge
		43115	Between 17th Avenue (Cushing) Bridge and CP Rail Bridge
		41903	Between 17th Avenue (Cushing) Bridge and CP Rail Bridge
		41643	Between 17th Avenue (Cushing) Bridge and CP Rail Bridge
		41303	Between 17th Avenue (Cushing) Bridge and CP Rail Bridge
		36547	Downstream of Graves (Glenmore Trail) Bridges
Elbow River	Island to 1st St. SW	4747	Downstream of Mission (4th Street SW) Bridge
	25th Ave Out to 3rd St. SE	1249	Upstream of Stampede Park (S) Saddledome Access Bridge(1)
		156	Downstream of Traverse Bridge(2)
Zoo Side	Zoo Side	1889	Upstream of St. Patrick's Island Pedestrian Bridge
		1844	Upstream of St. Patrick's Island Pedestrian Bridge
22nd Avenue SW	22nd Ave SW	449	Entrance of 22nd Avenue SW
		441	Entrance of 22nd Avenue SW

Notes: (1) The Stampede Park (S) Saddledome Access Bridge was constructed at a new location approximately 100 m upstream of its former location. The former bridge was washed away during the June 2013 flood.
(2) The Traverse Bridge was under construction during development of the 2015 HEC-RAS Model. It has been completed by the time this report was prepared.

Table 17: Cross Sections Relocated/Realigned in 2015 HEC-RAS Model

River	Reach	Cross-Section Number in the 2015 HEC-RAS Model	Cross-Section Number in the 2012 HEC-RAS Model	Locations
Bow River	Bowmont to Prince	50403	50405	Downstream of Peace Bridge
	Zoo to Elbow	47785	47785	Upstream of St. Patrick's Island Pedestrian Bridge
		47727	47648	Upstream of St. Patrick's Island Pedestrian Bridge
		47677	47637	Downstream of St. Patrick's Island Pedestrian Bridge
		47572	47572	Downstream of St. Patrick's Island Pedestrian Bridge
	Zoo End to DSBC	32136	32109	Downstream of Ivor Strong (Deerfoot Trail) Bridge
		31996	32005	Downstream of Ivor Strong (Deerfoot Trail) Bridge
Elbow River	25th Ave Out to 3rd St. SE	2332	2332[1]	Stampede Park
		2272	2272[1]	Stampede Park
		2212	2212[1]	Stampede Park
		2146	2146[1]	Stampede Park
		2090	2090[1]	Stampede Park
		2048	2048[1]	Stampede Park
		2020	2020[1]	Stampede Park
		1999	1999[1]	Stampede Park
		1969	1969[1]	Stampede Park
		1944	1944[1]	Stampede Park
		1910	1910[1]	Stampede Park
		1894	1894[1]	Stampede Park
		1861	1861[1]	Stampede Park
		1848	1848[1]	Stampede Park
		1755	1755[1]	Stampede Park
		1698	1698[1]	Stampede Park
		1621	1621[1]	Stampede Park
		1561	1561[1]	Stampede Park
		1530	1530[1]	Stampede Park
		1506	1506[1]	Stampede Park
		1238	1226[2]	Downstream of Stampede Park (S) Saddledome Access Bridge[3]
Zoo Side	Zoo Side	1928	1928	Upstream of St. Patrick's Island Pedestrian Bridge
		1740	1740	Downstream of St. Patrick's Island Pedestrian Bridge

Notes:
[1] The reach referred to as "3rd St. SE to Stampede" in the 2012 HEC-RAS model.
[2] The reach referred to as "Stampede to Bow River" in the 2012 HEC-RAS model.
[3] The Stampede Park (S) Saddledome Access Bridge was constructed at a new location approximate 100 m upstream of its former location. The former bridge was washed away during the June 2013 flood.

Table 18: Total Numbers of Cross Sections in the 2012 and 2015 HEC-RAS Models

River	Reach	Number of Cross Sections	
		2012 HEC-RAS Model	2015 HEC-RAS Model
Bow River	Main Channel	336	347
	Side Channels	29	31
Elbow River	Main Channel	240(1)	243(1)
	Side Channels	45	41
Total		**650**	**662**

Note: (1) The cross sections along the reach upstream of Glenmore Dam were not included in this comparison.

9.2.3 Structures

Bow River

The updates in the 2015 HEC-RAS model include the following:

- Two new bridges have been included, including the Peace Bridge and St. Patrick's Island Pedestrian Bridge (including the portion across the Zoo Side Channel).
- The George C. King Bridge has been removed from the model as the bridge no longer exists.

Elbow River

The updates in the 2015 HEC-RAS model include the following:

- The geometries of four bridges were updated based on the designed/as-built drawing provided by The City. These bridges are Sandy Beach Pedestrian Bridge, Riverdale Ave Pedestrian Bridge, Rideau Park Pedestrian Bridge, and Stampede Park (S) Saddledome Access Bridge.
- The new Traverse Bridge was included based on the design drawings.
- Additional points were added to define the arches of the Mission Bridge to better represent this structure.
- The Erlton Flood Control Weir, a lateral structure along the right bank of Elbow River near Erlton at 22nd Avenue SW, was included.
- The proposed flood wall, a 200 m long concrete flood wall along the south race track at Stampede Park was added, based on the issued-for-construction drawings.

Table 19 summarizes the number of structures along the Bow and Elbow Rivers represented in the 2012 and 2015 HEC-RAS models.

Table 19: Number of Structures in the 2012 and 2015 HEC-RAS Models

River	Structure Type	2012 HEC-RAS Model	2015 HEC-RAS Model
Bow River	Bridge	42	44
	Weir	2	2
Elbow River	Bridge	19	20
	Weir	1	2

Note: Structures on the side channels were included.

9.2.4 Ineffective Areas

The ineffective areas on the floodplains were modified in the 2015 HEC-RAS model, based on observations during the June 2013 flood event and the proposed flood wall at Stampede Park. The ineffective levels at residential areas were raised to elevations above the 1,000-year flood levels, because the 1,000-year flood levels were estimated to be below the roofs of the houses.

9.3 Flood Frequency Estimates

The flood frequency estimates for the Elbow and Bow Rivers and the tributaries through Calgary were re-assessed and updated (Golder 2014) to incorporate the 2013 flood flow data. The flood frequency estimates used in this study and the 2015 HEC-RAS model are different from those used in the 2012 study and HEC-RAS model (Golder 2010). Table 20 compares the flood peak discharges at various locations between the two models.

The 2014 hydrology study shows increased flood peak discharge estimates for both the Bow and Elbow Rivers compared to the 2012 study. For example, the updated 100-year flood peak discharge on the Bow River below the confluence with the Elbow River is 2,820 m^3/s, compared to 2,410 m^3/s used in the 2012 study.

Table 20: Comparison of Flood Frequency Estimates used in the 2012 and 2015 Flood Inundation Mapping Studies

Return Period (Years)	Flood Peak Discharge (m^3/s)																	
	Elbow River below Glenmore Dam			Bow River below Bearspaw Dam			Bow River below Elbow River			Bow River below Nose Creek			Bow River below Fish Creek			Bow River below Pine Creek		
	2012 Study	2015 Study	Difference[(1)]	2012 Study	2015 Study	Difference[(1)]	2012 Study	2015 Study	Difference[(1)]	2012 Study	2015 Study	Difference[(1)]	2012 Study	2015 Study	Difference[(1)]	2012 Study	2015 Study	Difference[(1)]
2	52	64	12	423	369	-54	475	433	-42	481	439	-42	520	478	-42	526	482	-44
5	99	143	44	606	659	53	705	802	97	719	816	97	805	902	97	822	915	93
10	193	234	41	774	927	153	967	1,160	193	990	1,180	190	1,120	1,320	200	1,150	1,340	190
20	274	275	1	983	1,230	247	1,260	1,500	240	1,290	1,540	250	1,490	1,740	250	1,520	1,770	250
50	445	494	49	1,350	1,660	310	1,790	2,150	360	1,850	2,210	360	2,170	2,530	360	2,220	2,570	350
100	699	803	104	1,710	2,020	310	2,410	2,820	410	2,500	2,910	410	2,940	3,360	420	3,000	3,400	400
200	922	1,130	208	2,170	2,390	220	3,090	3,520	430	3,220	3,650	430	3,840	4,270	430	3,920	4,320	400
500	1,220	1,690	470	2,980	2,920	-60	4,200	4,610	410	4,420	4,820	400	5,360	5,770	410	5,460	5,840	380
1,000	1,490	2,270	780	3,810	3,340	-470	5,290	5,610	320	5,600	5,920	320	6,900	7,220	320	7,020	7,300	280

Note: [(1)] The difference is equal to the value of the 2015 study minus the value of the 2012 study for the same return period.

9.4 100-Year Flood Modelling Results

This section describes the differences between the 2015 model using the updated (higher) 100-year flood peak discharge and the 2012 model using the previous (lower) 100-year flood peak discharge.

Figures E.3(a) to E.3(c) present a comparison of the simulated 100-year flood water surface profiles along the Bow River using the two models. The simulated water levels using the 2015 HEC-RAS model are generally higher than those using the 2012 HEC-RAS model for the Bow River except at the following locations:

- Near Calf Robe Bridge;
- Downstream of Graves Bridge;
- Upstream of Ivor Strong Bridge;
- Downstream of Marquis de Lorne (Highway 22X) Bridge;
- Upstream of Fish Creek Confluence; and
- Downstream of Pine Creek Confluence.

The lower water levels at the first three locations are due to the lower bed elevations after the 2013 flood event. The lower water levels at the last three locations are due to the adjustment of ineffective flow areas based on observations made during the 2013 flood.

Figure E.5 compares the differences of simulated water levels along the Bow River. The simulated water levels using the 2015 model are on average 0.27 m higher than those using the 2012 model. The range of the water level differences is from -0.78 m to +1.02 m.

Figure E.6 presents a comparison of the water surface profiles along the Elbow River. The simulated water levels using the 2015 model are generally higher than those using the 2012 model except at one location downstream of Stampede Park. The lower water level at this location is due to the adjustment of the ineffective areas based observations made during the 2013 flood.

Figure E.8 compares the differences of simulated water levels along the Elbow River. The simulated water levels using the 2015 model are on average 0.38 m higher than those using the 2012 model. The range of the water level differences is from -0.33 m to 1.23 m.

The differences of simulated water levels between the two models are mainly due to the following factors:

- Increased flood peak discharges in the 2015 model;
- Changes of channel bathymetry;
- More accurate LiDAR floodplain data; and
- Adjustment of ineffective areas in some locations.

10.0 CONCLUSIONS

10.1 Model Calibration Refinement

The model calibration refinement based on the June 2013 flood HWM data involved changes to parameters which were previously calibrated in the 2012 study. This included minor adjustment of the floodplain Manning's *n* values at select locations along the Bow River; and adjustment of the expansion and contraction loss coefficient values at some bridges along the Elbow River.

The simulation results obtained during the model calibration refinement process show that the simulated water levels generally compare well with the 2013 flood HWMs. Overall, the simulated water levels for the 2013 flood are slightly higher than the surveyed HWMs. Such results are considered acceptable, because the calibrated model is used for flood modelling and a small degree of conservatism with the simulated water levels is considered prudent.

10.2 Model Validation

The channel Manning's roughness *n* values were validated against the 2013 surveyed low flow data and the 2005 flood HWM data. The calibrated floodplain Manning's *n* values were validated against the 2005 flood HWM data.

The model validation results show that the simulated water levels generally compare well with the measured water levels for the 2013 low flow conditions. Overall, the simulated water levels for the low flow conditions are slightly lower than the surveyed levels. This is considered reasonable, because river channel roughness coefficients for low flow conditions tend to be slightly higher than those for high flow conditions. Because the calibrated model is used for flood modelling, the simulation results for the low flow conditions are accepted as validating the calibrated Manning's *n* values for the main channels.

The model validation results show that the simulated water levels generally compare well with the 2005 flood HWMs. Overall, the simulated water levels for the Elbow River are slightly higher than the HWMs. Such results are considered acceptable, because the calibrated model is used for flood modelling and a degree of conservatism with the simulated water levels is considered prudent.

10.3 Model Sensitivity

A model sensitivity analysis was conducted to evaluate the effects of varying Manning's *n* values on simulated water levels. The 100-year flood peak discharge scenario was used for the model sensitivity analysis. The results of the sensitivity analysis quantify the level of uncertainty associated with the simulated flood levels.

The results of the sensitivity analysis show that the main channel roughness values have a higher influence on the simulated flood water levels than the floodplain roughness values. The uncertainty in the simulated flood levels is estimated to be, on average, within ±0.19 m along the Bow River and ±0.15 m along the Elbow River, based on the differences in the simulated flood water levels associated with the ±10% changes of the calibrated channel and floodplain Manning's *n* values.

10.4 Flood Profiles

The calibrated and validated 2015 HEC-RAS model provides an updated and refined basis for simulating the surface water profiles for the updated 2-, 5-, 8-, 10-, 20-, 35-, 50-, 75-, 100-, 200-, 350-, 500- and 1,000-year flood peak discharges (Golder 2014).

10.5 Major Flood Inundation Areas

The 2015 HEC-RAS model provides an updated and refined basis for identifying the main residential and/or commercial development areas that would be affected during the 100-year flood event as summarized below:

Bow River

1) Bowness: Large parts of the residential area downstream of the CP Rail Bridge (Bow Crescent NW) would be inundated. The main portion of Bowness north of Bowwood Drive NW approximately east of 63rd Street NW along Bowness Road to the Shouldice Bridge would be inundated.

2) Shouldice and Montgomery: The residential area around 51th Street between 18th Avenue NW and Bowness Road NW, including Bowness Road, would be inundated. The berm along Montgomery Blvd NW would be overtopped. Parts of the residential area north of Montgomery Blvd NW would be inundated.

3) Kensington/Sunnyside: The area north of Memorial Drive located between 14th Street NW and 10th Street NW would be inundated, including Kensington Road, Gladstone Road and 5th Avenue NW and parts of Riley Park and Hillhurst Sunnyside Park. 14th Street NW would be inundated at Kensington Close NW and near Robertson College. 10th Street NW would be inundated between Kensington Road NW and 8th Avenue NW. Parts of the LRT tracks would be inundated, including Sunnyside Station. The residential area at Sunnyside east of 10th Street NW and north of Memorial Drive would be inundated.

4) Downtown: Prince's Island would be inundated except for the higher area in the centre of the island. Flood waters would spill at the upstream end of Prince's Island Lagoon flowing south along 6th Street SW then through the downtown area along 3th Avenue SW. Parts of Chinatown along 2nd Avenue SW and along 1st Street SE north of 4th Avenue SW would be inundated. The area near the intersection of 4th Avenue SE, 5th Avenue SE and MacLeod Trail SE would be inundated. Inundation of East Village east of MacLeod Trail SE would be caused by water flowing eastwards from Chinatown.

5) Bridgeland: Flood flows would spill near 8th Street NE. Flood inundation would occur near McDougall Road between 6th Street NE and 12th Street NE. Memorial Drive between 8th Street NE. and 11th Street NE would be inundated.

6) Calgary Zoo: The Zoo Island would be inundated. The low lying areas of the Calgary Zoo on the north side of the Zoo side channel and the adjacent Bow River Pathway would be flooded.

7) Inglewood: Most of the Inglewood District would be inundated. Flood waters would spill over the Inglewood Flood Control Structure between 13th Street SE and 15th Street SE. Water would flow in the southeastern direction along 9th Avenue SE and under the rail tracks and Blackfoot Trail (through the underpass), and result in flooding of the area southeast of 7th Avenue SE, including the Piitoayis Family School and the Blackfoot Truck Stop. The area south of the Bow River located upstream and downstream of the WH Weir would be inundated, including the Pearce Estate Park and 17A Street SE. Water flowing south on

17A Street SE would cause flooding of Blackfoot Trail. The Inglewood Golf Course and Clubhouse would be subject to flooding. Large parts of the Inglewood Bird Sanctuary would be inundated.

8) South Calgary: Inundation would occur in various areas along the Bow River south of the Bonnybrook (Ogden Road) Bridge, including parts of the Bonnybrook Wastewater Treatment Plant, parts of the Old Refinery Park and Beaver Dam Flats, part of Glenmore Trail, parts of Heritage Meadows, Carburn Park and Southland Park, the LaFarge Production site south of Southland Park, part of Quarry Park, the Enmax Power Station south of the Ivor Strong Bridge, the Eaglequest Golf Driving Range, most of the McKenzie Meadows Golf Club, parts of the Fish Creek Provincial Park, and parts of the left and right floodplains south of the Deerfoot Extension Bridge.

Elbow River

1) Riverdale/Elbow Park: The residential areas along Riverdale Avenue and parts of the Lansdowne Avenue would be inundated. The area south of the Elbow River and east of Elbow Drive SW would be inundated including Stanley Park. The Elbow Park Elementary School north of the Elbow River would be inundated. The residential area at Elbow Park east of 8th Street SW would be flooded. The inundated area would have overland flows along 4th Street SW, 5th Street SW, 6th Street SW, 7th Street SW and 7A Street SW during the 100-year event. Observation during the 2013 flood event suggested that there were connections through these streets during the 100-year flood.

2) Rideau Park/Roxboro: Rideau Park and Roxboro communities would be inundated.

3) Mission: If temporary flood protection measures similar to the berm constructed during the 2013 flood event were not deployed, flood flows would spill into the Mission community upstream of Mission Bridge and would flow north along Cliff Street. The area north of Mission Bridge and south of 24th Avenue SW, between 2th Street SW and 5th Street SW, would be inundated. Flood flows along Cliff Street from the spill at Mission Bridge would inundate parts of the Beltline area between 17th Avenue SW and the CP Rail tracks. The underpass under the rail tracks of 4th Street SW and 5th Street SW could be flooded. The area east of 2nd Street SW would be affected including 26th Avenue SW and 25th Avenue SW and the 25th Avenue Bridge.

4) Erlton Area: The Erlton district would be inundated between 27th Avenue SW and 22nd Avenue SW. The portion of flood flow conveyed along 25th Avenue SW would flow back into the Elbow River near MacLeod Trail. 22nd Avenue SW is a designated floodway that was constructed to convey flood flow from the Elbow River. MacLeod Trail and the C-Train tracks would be inundated between 27th Avenue SW and 22nd Avenue SW, including the Erlton C-Train Station. Lindsay Park would be inundated, with exception of the Talisman Centre.

5) Victoria Park and Stampede: Most of Victoria Park and the Stampede Park ground would be inundated. Elbow River flood flows would spill between Pattison Bridge and Victoria Bridge and flow north towards the rail tracks. MacLeod Trail and 1st Street SE would be flooded between the Elbow River bridges to the rail tracks including their underpasses. The existing earth berm, existing concrete retaining wall and new flood wall at Stampede Park would be overtopped.

10.6 Flood Effects on Bridges

A bridge is considered to be flood-affected when flood waters reach its lower chord.

None of the modelled bridges along the Bow River would be flood-affected during flood events with return period of less than 35 years. A total of 13 bridges along the Bow River would be flood-affected during the 100-year flood. They are the Bowmont Bridge, Hextall Bridge, Souldice Bridge, Harry Boothman Bridge, St. Georges Island Bridge, CP Rail Bridge (near Nose Creek), Cushing Bridge, CP Rail Bridge (upstream of Bonnybrook Bridge), Sue Higgins Bridge, Eric Harvie Bridge, Jaipur Bridge, Prince's Island Bridge on Lagoon, and Baines Bridge.

During the 100-year flood, all bridges along the Elbow River would be flood-affected.

Report Signature Page

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APPENDIX A

Model Validation and Calibration Refinement

July 2015
Report No. 13-1326-0054

Table A.1: Comparison of Simulated and Surveyed Water Levels along the Bow River during the 2013 Survey

Station in Flood Mapping	HEC-RAS Station (m)	Surveyed Water Level (m)	Simulated Water Level (m)	Difference (Simulated - Surveyed) (m)	Simulated Discharge (m^3/s)	Daily Discharge from Gauge[1,2] (m^3/s)	Surveyed Discharge (m^3/s)	Surveyed Date	Notes
1	69342	-	1075.82	-	-	-	-	-	Bearspaw Dam
2	69135	1075.56	1075.70	0.14	66.2	69.4	66.2	10/2/2013	
3	68889	1075.49	1075.51	0.02	66.2	69.4	66.2	10/2/2013	
4	68700	1075.08	1075.22	0.14	66.2	69.4	66.2	10/2/2013	
5	68467	1074.42	1074.38	-0.04	66.2	69.4	66.2	10/2/2013	
6	68272	1074.26	1074.16	-0.10	66.2	69.4	66.2	10/2/2013	
7	67927	1073.59	1073.31	-0.29	66.2	69.4	66.2	10/2/2013	on the sand bar
8	67498	1073.34	1073.22	-0.12	66.2	69.4	66.2	10/2/2013	
9	67187	1073.32	1073.10	-0.22	66.2	69.4	66.2	10/2/2013	
10	66863	1072.34	1072.45	0.11	69.0	69.9	69.0	10/3/2013	
11	66385	1071.04	1071.09	0.05	69.0	69.9	69.0	10/3/2013	
12	66149	1070.76	1070.81	0.05	69.0	69.9	69.0	10/3/2013	
13	65945	1070.61	1070.58	-0.03	69.0	69.9	69.0	10/3/2013	
14	65813	-	1070.31	-	69.0	-	-	-	Upstream of Stoney Trail Bridge
15	65727	-	1070.04	-	69.0	-	-	-	
16	65600	1069.93	1069.92	-0.01	69.0	69.9	69.0	10/3/2013	
17	65502	1069.95	1069.86	-0.09	69.0	69.9	69.0	10/3/2013	
18	65352	-	1069.77	-	69.0	-	-	-	
19	65132	1069.70	1069.60	-0.10	69.0	69.9	69.0	10/3/2013	
20	64931	1069.24	1069.30	0.06	69.0	69.9	69.0	10/3/2013	
21	64768	1068.92	1068.97	0.05	57.5	61.1	57.5	10/7/2013	
22	64580	1068.66	1068.64	-0.02	57.5	61.1	57.5	10/7/2013	
23	64415	1068.14	1068.07	-0.07	57.5	61.1	57.5	10/7/2013	
24	64223	1067.75	1067.77	0.03	57.5	61.1	57.5	10/7/2013	Upstream of 85 St SW Bridge
25	64193	1067.70	1067.74	0.04	57.5	61.1	57.5	10/7/2013	
26	64135	1067.65	1067.67	0.01	57.5	61.1	57.5	10/7/2013	
27	63877	1066.84	1066.79	-0.05	57.5	61.1	57.5	10/7/2013	
28	63657	1066.26	1066.35	0.09	57.5	61.1	57.5	10/7/2013	
29	63576	1066.21	1066.28	0.07	57.5	61.1	57.5	10/7/2013	Upstream of Bowmont Pedestrian Bridge
30	63557	1066.22	1066.27	0.06	57.5	61.1	57.5	10/7/2013	
31	63489	1066.21	1066.27	0.06	57.5	61.1	57.5	10/7/2013	Upstream of CP Rail Twin Bridges
32	63460	1066.17	1066.27	0.10	57.5	61.1	57.5	10/7/2013	
33	63386	1066.17	1066.24	0.07	57.5	61.1	57.5	10/7/2013	
34	63240	1066.02	1066.12	0.09	57.5	61.1	57.5	10/7/2013	
35	63069	1065.66	1065.68	0.02	57.5	61.1	57.5	10/7/2013	
36	62817	1065.59	1065.58	0.00	57.5	61.1	57.5	10/7/2013	
37	62619	1065.55	1065.51	-0.04	57.5	61.1	57.5	10/7/2013	
38	62411	1065.32	1065.33	0.02	57.5	61.1	57.5	10/7/2013	
40	62142	1064.55	1064.43	-0.13	57.5	61.1	57.5	10/7/2013	
42	61820	1063.53	1063.46	-0.07	60.6	59.6	60.6	10/8/2013	
44	61544	1063.28	1063.28	0.00	60.6	59.6	60.6	10/8/2013	
45	61067	1062.96	1062.94	-0.02	60.6	59.6	60.6	10/8/2013	
46	60789	1062.69	1062.78	0.09	106.0	105.7	106.0	9/10/2013	
47	60533	-	1062.06	-	106.0	-	-	-	
48	60353	1061.93	1061.96	0.02	106.0	105.7	106.0	9/10/2013	
49	60206	1061.95	1061.92	-0.03	106.0	105.7	106.0	9/10/2013	
50	60047	-	1061.82	-	106.0	-	-	-	
51	59916	1061.64	1061.57	-0.07	106.0	105.7	106.0	9/10/2013	
52	59754	1061.22	1061.32	0.10	106.0	105.7	106.0	9/10/2013	
53	59622	1060.94	1061.14	0.20	106.0	105.7	106.0	9/10/2013	Upstream of Hextall Bridge
54	59594	-	1061.06	-	106.0	-	-	-	
55	59558	1060.89	1060.96	0.07	106.0	105.7	106.0	9/10/2013	Downstream of Shouldice Bridge
56	59316	1059.90	1059.88	-0.02	106.0	105.7	106.0	9/10/2013	
57	59210	1059.72	1059.77	0.05	106.0	105.7	106.0	9/10/2013	Upstream of 16 Ave (Trans-Canada Highway) Bridge
58	59153	-	1059.74	-	106.0	-	-	-	
59	59057	1059.65	1059.69	0.04	106.0	105.7	106.0	9/10/2013	
60	58896	1059.48	1059.50	0.02	106.0	105.7	106.0	9/10/2013	
61	58736	1059.30	1059.30	-0.01	106.0	105.7	106.0	9/10/2013	
62	58454	-	1058.83	-	106.0	-	-	-	
63	58367	-	1058.36	-	106.0	-	-	-	
64	58196	1057.95	1057.75	-0.20	106.0	105.7	106.0	9/10/2013	
65	58000	1057.57	1057.53	-0.04	106.0	105.7	106.0	9/10/2013	
66	57756	1057.28	1057.30	0.02	106.0	105.7	106.0	9/10/2013	
67	57497	1057.13	1056.97	-0.16	106.0	105.7	106.0	9/10/2013	
68	57275	1056.41	1056.47	0.06	106.0	105.7	106.0	9/10/2013	
69	57146	1056.05	1055.88	-0.17	106.0	105.7	106.0	9/10/2013	
70	56884	1055.36	1055.25	-0.11	106.0	105.7	106.0	9/10/2013	
71	56746	1055.19	1055.07	-0.12	106.0	105.7	106.0	9/10/2013	Upstream of Harry Boothman Pedestrian Bridge
72	56714	1055.17	1055.03	-0.14	106.0	105.7	106.0	9/10/2013	
73	56577	1055.12	1054.96	-0.16	106.0	105.7	106.0	9/10/2013	
74	56396	1055.03	1054.74	-0.28	106.0	105.7	106.0	9/10/2013	
75	56194	1054.31	1054.41	0.09	106.0	105.7	106.0	9/10/2013	
76	56019	1053.96	1053.67	-0.29	106.0	105.7	106.0	9/10/2013	
77	55741	1053.31	1053.25	-0.07	106.0	105.7	106.0	9/10/2013	High control point locates downstream
78	55568	1053.28	1053.16	-0.12	106.0	105.7	106.0	9/10/2013	
79	55296	1053.15	1053.04	-0.11	106.0	105.7	106.0	9/10/2013	
80	55099	1053.01	1052.82	-0.19	106.0	105.7	106.0	9/10/2013	
81	54987	1052.42	1052.37	-0.04	106.0	105.7	106.0	9/10/2013	
82	54636	1051.89	1051.81	-0.07	106.0	105.7	106.0	9/10/2013	
83	54464	1051.76	1051.63	-0.13	106.0	105.7	106.0	9/10/2013	
84	54278	1051.58	1051.34	-0.25	106.0	105.7	106.0	9/10/2013	
85	54068	1051.20	1050.84	-0.36	106.0	105.7	106.0	9/10/2013	On the sand bar and large island located downstream
86	53806	1050.40	1050.41	0.01	106.0	105.7	106.0	9/10/2013	
87	53605	1050.04	1049.80	-0.24	106.0	105.7	106.0	9/10/2013	
88	53355	1049.23	1049.18	-0.05	106.0	105.7	106.0	9/10/2013	

Station in Flood Mapping	HEC-RAS Station (m)	Surveyed Water Level (m)	Simulated Water Level (m)	Difference (Simulated - Surveyed) (m)	Simulated Discharge (m^3/s)	Daily Discharge from Gauge[1,2] (m^3/s)	Surveyed Discharge (m^3/s)	Surveyed Date	Notes
89	53240	1049.11	1049.00	-0.11	106.0	105.7	106.0	9/10/2013	
90	53188	-	1048.94	-	106.0	-	-	-	Upstream of Crowchild Trail Bridge
91	53140	1048.95	1048.82	-0.13	94.9	97.9	94.9	9/9/2013	
92	52964	1048.28	1048.09	-0.19	94.9	97.9	94.9	9/9/2013	
93	52792	1047.81	1047.73	-0.08	94.9	97.9	94.9	9/9/2013	
94	52609	1047.74	1047.69	-0.06	94.9	97.9	94.9	9/9/2013	
95	52456	1047.56	1047.58	0.02	94.9	97.9	94.9	9/9/2013	
96	52279	1046.92	1046.90	-0.02	94.9	97.9	94.9	9/9/2013	
97	52149	1047.03	1046.81	-0.22	94.9	97.9	94.9	9/9/2013	
98	51893	1046.79	1046.54	-0.25	94.9	97.9	94.9	9/9/2013	
99	51741	1046.48	1046.30	-0.19	94.9	97.9	94.9	9/9/2013	Upstream of 14th St SW (Mewata) Bridge
100	51688	1046.29	1046.21	-0.08	94.9	97.9	94.9	9/9/2013	
101	51519	1045.85	1045.50	-0.34	94.9	97.9	94.9	9/9/2013	
102	51328	1045.58	1045.38	-0.20	94.9	97.9	94.9	9/9/2013	
103	51114	1045.39	1044.91	-0.48	94.9	97.9	94.9	9/9/2013	High control point located downstream
104	50951	-	1044.18	-	94.9	-	-	-	Upstream of Louise (Hillhurst) Bridge
105	50910	1043.91	1043.99	0.08	94.9	97.9	94.9	9/9/2013	
106	50831	1043.77	1043.64	-0.13	94.9	130.6	94.9	9/11/2013	Upstream of NW LRT Bridge
107	50800	1043.53	1043.35	-0.18	94.9	97.9	94.9	9/9/2013	
108	50706	-	1043.13	-	94.9	-	-	-	
109	50553	-	1043.11	-	94.9	-	-	-	
109.1	50438	-	1043.05	-	94.9	-	-	-	Upstream of Peace Bridge
110	50403	1043.40	1043.07	-0.33	107.0	-	107.0	9/8/2013	Prince side channel
112	50312	1043.37	1043.09	-0.29	107.0	-	107.0	9/8/2013	
115	50204	1043.22	1042.96	-0.26	107.0	-	107.0	9/8/2013	
117	50021	1042.70	1042.69	-0.01	107.0	-	107.0	9/8/2013	
120	49822	1042.37	1042.10	-0.28	107.0	-	107.0	9/8/2013	
123	49642	1041.95	1042.00	0.05	107.0	-	107.0	9/8/2013	Upstream of Prince's Island Pedestrian Bridge
125	49613	1041.98	1041.98	0.00	107.0	-	107.0	9/8/2013	
127	49464	1041.63	1041.80	0.17	107.0	-	107.0	9/8/2013	
132	49218	1040.99	1041.17	0.18	107.0	-	-	-	
133	49003	1040.70	1040.57	-0.13	107.0	-	107.0	9/8/2013	
134	48953	1040.59	1040.44	-0.15	94.9	97.9	94.9	9/9/2013	Upstream of Centre St Bridge
135	48912	1040.43	1040.34	-0.09	94.9	97.9	94.9	9/9/2013	
136	48730	1040.22	1040.04	-0.18	94.9	97.9	94.9	9/9/2013	
137	48603	1039.91	1039.75	-0.16	94.9	97.9	94.9	9/9/2013	
138	48431	1039.55	1039.35	-0.19	94.9	97.9	94.9	9/9/2013	
139	48200	1039.37	1039.14	-0.24	94.9	97.9	94.9	9/9/2013	Upstream of 4th Ave Flyover Bridge
140	48153	1039.32	1039.12	-0.20	94.9	97.9	94.9	9/9/2013	Upstream of Old Langevin Bridge
141	48115	1039.36	1039.11	-0.25	94.9	97.9	94.9	9/9/2013	
142	48050	1039.36	1039.09	-0.27	94.9	97.9	94.9	9/9/2013	Upstream of New Langevin (Edmonton Trail) Bridge
143	48007	1039.35	1039.07	-0.28	94.9	97.9	94.9	9/9/2013	Upstream of LRT (Harry Kroeger) Bridge
144	47955	1039.32	1039.05	-0.27	94.9	97.9	94.9	9/9/2013	
145	47785	1039.01	1038.87	-0.14	94.9	97.9	94.9	9/9/2013	Cofferdam chock effect
147	47727	1038.66	1038.83	0.17	94.9	97.9	94.9	9/9/2013	Upstream of St. Patrick's Island Pedestrian Bridge
148	47677	1038.39	1038.35	-0.04	94.9	97.9	94.9	9/9/2013	
149	47572	1038.38	1038.27	-0.11	94.9	97.9	94.9	9/9/2013	
151	47272	1037.50	1037.47	-0.03	94.9	97.9	94.9	9/9/2013	
153	47047	1036.85	1036.52	-0.33	94.9	97.9	94.9	9/9/2013	Sand bar
157	46775	1036.19	1036.21	0.02	94.9	97.9	94.9	9/9/2013	
159	46564	1036.10	1036.08	-0.01	94.9	97.9	94.9	9/9/2013	Upstream of St. Georges Island Bridge
161	46518	1036.04	1036.12	0.09	106.0	-	106.0	9/12/2013	
162	46329	-	1035.97	-	106.0	-	-	-	
166	46024	1034.90	1035.26	0.36	114.6	-	114.6	9/13/2013	
168	45743	1034.60	1035.19	0.59	114.6	-	114.6	9/13/2013	
169	45598	1034.57	1035.18	0.61	114.6	-	114.6	9/13/2013	
170	45580	-	1035.18	-	114.6	-	-	-	Upstream of CP Rail Bridge
171	45561	1034.55	1035.18	0.63	114.6	-	114.6	9/13/2013	
172	45479	1034.51	1035.17	0.66	114.6	-	114.6	9/13/2013	Backwater due to Western Headworks
173	45235	-	1035.17	-	114.6	-	-	-	Upstream of Western Headworks
174	45190	-	1032.97	-	114.6	-	-	-	
175	45105	-	1032.50	-	114.6	-	-	-	
176	44793	1031.87	1031.91	0.04	130.8	-	130.8	9/14/2013	
177	44457	1031.53	1031.52	-0.01	130.8	-	130.8	9/14/2013	
178	44309	1031.50	1031.48	-0.02	130.8	-	130.8	9/14/2013	Upstream of 17 Ave (Cushing) Bridge
179	44265	1031.50	1031.47	-0.03	130.8	-	130.8	9/14/2013	
180	43980	1031.46	1031.43	-0.03	130.8	-	130.8	9/14/2013	
181	43808	1031.38	1031.31	-0.07	130.8	-	130.8	9/14/2013	
182	43493	1030.62	1030.55	-0.06	130.8	-	130.8	9/14/2013	
183	43272	1029.94	1029.96	0.02	130.8	-	130.8	9/14/2013	
184	43061	-	1029.63	-	130.8	-	-	-	
185	42900	1029.41	1029.51	0.10	122.1	-	122.1	9/17/2013	
186	42662	1028.98	1029.05	0.07	122.1	-	122.1	9/17/2013	
187	42409	1028.54	1028.62	0.07	122.1	-	122.1	9/17/2013	
188	42230	1028.36	1028.29	-0.07	122.1	-	122.1	9/17/2013	
189	41759	1027.17	1027.27	0.10	122.1	-	122.1	9/17/2013	
190	41493	1026.62	1026.72	0.10	122.1	-	122.1	9/17/2013	
191	41038	-	1025.66	-	122.1	-	-	-	
192	40985	-	1025.65	-	122.1	-	-	-	Upstream of CP Rail Bridge
193	40852	-	1025.57	-	122.1	-	-	-	Upstream of Bonnybrook (Ogden Road) Bridge
194	40787	-	1025.34	-	122.1	-	-	-	
195	40703	1025.08	1025.03	-0.05	122.1	-	122.1	9/17/2013	
196	40543	1025.07	1024.93	-0.14	129.7	143.3	129.7	9/19/2013	
197	40453	1024.96	1024.81	-0.14	129.7	143.3	129.7	9/19/2013	
198	40328	1024.45	1024.38	-0.07	129.7	143.3	129.7	9/19/2013	
199	40183	1024.41	1024.36	-0.06	129.7	143.3	129.7	9/19/2013	Upstream of Calf Robe (Deerfoot Trail) Bridge

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200	40105	-	1024.32	-	129.7	-	-	-	
201	40036	1024.29	1024.26	-0.03	129.7	143.3	129.7	9/19/2013	
202	39919	1024.15	1024.07	-0.08	129.7	143.3	129.7	9/19/2013	
203	39730	1023.90	1023.85	-0.05	129.7	143.3	129.7	9/19/2013	
204	39663	-	1023.82	-	129.7	-	-	-	Upstream of CN Rail Bridge
205	39608	-	1023.81	-	129.7	-	-	-	
206	39506	-	1023.73	-	129.7	-	-	-	
207	39363	1023.41	1023.44	0.04	129.7	143.3	129.7	9/19/2013	
208	39252	1023.18	1023.08	-0.11	129.7	143.3	129.7	9/19/2013	
209	39101	1022.72	1022.85	0.13	129.7	143.3	129.7	9/19/2013	
210	38978	1022.59	1022.67	0.08	121.0	-	121.0	9/21/2013	
211	38927	1022.56	1022.62	0.06	121.0	-	121.0	9/21/2013	
212	38785	1022.46	1022.45	-0.01	121.0	-	121.0	9/21/2013	
213	38530	1021.93	1022.03	0.09	121.0	-	121.0	9/21/2013	
214	38390	1021.42	1021.66	0.25	121.0	-	121.0	9/21/2013	
215	38348	1021.49	1021.53	0.05	121.0	-	121.0	9/21/2013	
216	38178	1020.74	1020.82	0.08	121.0	-	121.0	9/21/2013	
217	38032	1020.23	1020.33	0.09	121.0	-	121.0	9/21/2013	
218	37948	1020.05	1020.18	0.13	121.0	-	121.0	9/21/2013	
219	37862	1019.96	1020.08	0.12	121.0	-	121.0	9/21/2013	
220	37790	1019.87	1020.01	0.14	121.0	-	121.0	9/21/2013	
221	37647	1019.80	1019.87	0.06	121.0	-	121.0	9/21/2013	
222	37348	1019.53	1019.52	0.00	121.0	-	121.0	9/21/2013	
223	37185	1019.52	1019.44	-0.08	121.0	-	121.0	9/21/2013	Upstream of Graves (Glenmore Trail) Bridges
224	37145	-	1019.42	-	121.0	-	-	-	
225	37112	1019.50	1019.40	-0.10	121.0	-	121.0	9/21/2013	
226	36967	1019.08	1019.17	0.09	94.4	105.8	94.4	9/23/2013	
227	36694	1018.44	1018.23	-0.21	94.4	105.8	94.4	9/23/2013	
228	36379	-	1017.93	-	94.4	-	-	-	
229	35968	-	1017.78	-	94.4	-	-	-	
230	35673	1016.77	1016.50	-0.27	94.4	105.8	94.4	9/23/2013	
231	35388	1016.53	1016.29	-0.24	94.4	105.8	94.4	9/23/2013	
232	35268	1016.44	1016.21	-0.23	94.4	105.8	94.4	9/23/2013	
233	35084	1015.84	1015.86	0.01	94.4	105.8	94.4	9/23/2013	
234	34940	1015.49	1015.56	0.07	94.4	105.8	94.4	9/23/2013	
235	34801	1015.08	1014.88	-0.20	94.4	105.8	94.4	9/23/2013	
236	34553	1014.46	1014.43	-0.03	94.4	105.8	94.4	9/23/2013	
237	34446	1014.31	1014.35	0.04	87.7	103.6	87.7	9/24/2013	Upstream of Eric Harvie Pedestrian Bridge
238	34424	1014.35	1014.34	0.00	87.7	103.6	87.7	9/24/2013	
239	34222	1014.18	1014.14	-0.04	87.7	103.6	87.7	9/24/2013	
240	34061	1013.74	1013.65	-0.09	87.7	103.6	87.7	9/24/2013	
241	33737	1012.96	1013.04	0.08	87.7	103.6	87.7	9/24/2013	
242	33519	1012.84	1012.86	0.02	87.7	103.6	87.7	9/24/2013	
243	33419	1012.71	1012.76	0.06	87.7	103.6	87.7	9/24/2013	
244	33222	1012.26	1011.96	-0.30	87.7	103.6	87.7	9/24/2013	Water levels significantly different at both banks
245	32932	1011.45	1011.43	-0.01	87.7	103.6	87.7	9/24/2013	
246	32776	1011.30	1011.26	-0.05	87.7	103.6	87.7	9/24/2013	
247	32588	1010.90	1010.92	0.02	87.7	103.6	87.7	9/24/2013	
248	32456	1010.75	1010.76	0.01	87.7	103.6	87.7	9/24/2013	Upstream of Ivor Strong (Deerfoot Trail) Bridge
249	32397	1010.66	1010.68	0.02	87.7	103.6	87.7	9/24/2013	
250	32136	-	1010.18	-	87.7	-	-	-	
251	31996	1009.93	1010.04	0.11	87.7	103.6	87.7	9/24/2013	
252	31595	1009.42	1009.59	0.17	87.7	103.6	87.7	9/24/2013	
253	31294	1008.81	1008.89	0.07	87.7	103.6	87.7	9/24/2013	
254	31013	1008.65	1008.63	-0.01	87.7	103.6	87.7	9/24/2013	
255	30885	-	1008.57	-	87.7	-	-	-	Upstream of Sue Higgins Pedestrian Bridge
256	30851	1008.70	1008.59	-0.11	93.6	101.9	93.6	9/30/2013	
257	30640	1008.62	1008.34	-0.28	93.6	101.9	93.6	9/30/2013	
258	30422	-	1007.15	-	93.6	-	-	-	
259	30090	1006.84	1006.90	0.06	93.6	101.9	93.6	9/30/2013	
260	29873	1006.60	1006.77	0.17	93.6	101.9	93.6	9/30/2013	
261	29655	1006.31	1006.43	0.12	93.6	101.9	93.6	9/30/2013	
262	29312	1005.19	1004.95	-0.25	93.6	101.9	93.6	9/30/2013	
263	29053	1005.18	1004.89	-0.29	93.6	101.9	93.6	9/30/2013	
264	28790	1004.61	1004.73	0.12	93.6	101.9	93.6	9/30/2013	
265	28513	1003.85	1004.06	0.21	93.6	101.9	93.6	9/30/2013	
266	28184	1002.63	1002.53	-0.09	93.6	101.9	93.6	9/30/2013	
267	27849	1001.67	1001.83	0.15	93.6	101.9	93.6	9/30/2013	
268	27669	1001.36	1001.59	0.23	93.6	101.9	93.6	9/30/2013	
269	27518	1001.14	1001.41	0.27	93.6	101.9	93.6	9/30/2013	Downstream end of island/branch
270	27220	1000.83	1001.06	0.22	93.6	101.9	93.6	9/30/2013	
271	26870	1000.57	1000.57	0.00	93.6	101.9	93.6	9/30/2013	
272	26652	1000.12	1000.00	-0.12	93.6	101.9	93.6	9/30/2013	
273	26397	-	999.79	-	93.6	-	-	-	Upstream of Mackenzie Pedestrian Bridge
274	26381	999.76	999.79	0.03	94.7	101.7	94.7	10/1/2013	
275	26305	999.79	999.75	-0.04	94.7	101.7	94.7	10/1/2013	
276	26045	999.50	999.52	0.03	94.7	101.7	94.7	10/1/2013	
277	25787	998.76	998.46	-0.30	94.7	101.7	94.7	10/1/2013	Water levels significantly different at both banks
278	25559	998.36	998.24	-0.12	94.7	101.7	94.7	10/1/2013	
279	25337	998.30	998.12	-0.17	94.7	101.7	94.7	10/1/2013	
280	25134	997.83	997.91	0.08	94.7	101.7	94.7	10/1/2013	
281	25048	997.75	997.66	-0.10	94.7	101.7	94.7	10/1/2013	
282	24910	996.79	996.78	0.00	94.7	101.7	94.7	10/1/2013	
283	24779	996.66	996.65	-0.01	94.7	101.7	94.7	10/1/2013	
284	24653	996.52	996.49	-0.03	94.7	101.7	94.7	10/1/2013	
285	24507	996.39	996.33	-0.06	94.7	101.7	94.7	10/1/2013	

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286	24361	996.02	995.85	-0.17	94.7	101.7	94.7	10/1/2013	
287	24008	994.67	994.59	-0.08	94.7	101.7	94.7	10/1/2013	
288	23774	994.30	994.25	-0.05	94.7	101.7	94.7	10/1/2013	
289	23642	994.12	994.00	-0.12	94.7	101.7	94.7	10/1/2013	Upstream of Marquis de Lorne (Highway 22X) Bridge
290	23590	-	993.85	-	94.7	-	-	-	
291	23549	993.98	993.74	-0.24	94.7	101.7	94.7	10/1/2013	
292	23509	993.93	993.70	-0.23	94.7	101.7	94.7	10/1/2013	
293	23349	993.38	993.31	-0.07	94.7	101.7	94.7	10/1/2013	
294	23212	992.96	992.98	0.02	94.7	101.7	94.7	10/1/2013	
295	22989	992.59	992.55	-0.04	94.7	101.7	94.7	10/1/2013	
296	22597	991.86	991.63	-0.24	94.7	101.7	94.7	10/1/2013	
297	22312	991.46	991.22	-0.25	94.7	101.7	94.7	10/1/2013	
298	22180	991.37	991.00	-0.37	92.6	-	92.6	9/26/2013	
299	21914	991.32	990.66	-0.66	92.6	-	92.6	9/26/2013	High control point located downstream
300	21473	990.17	989.89	-0.28	92.6	-	92.6	9/26/2013	
301	21204	989.54	989.69	0.16	92.6	-	92.6	9/26/2013	
302	20840	989.42	989.54	0.11	92.6	-	92.6	9/26/2013	
303	20486	989.23	989.22	0.00	92.6	-	92.6	9/26/2013	
304	20116	988.00	988.03	0.03	92.6	-	92.6	9/26/2013	
305	19755	987.06	987.26	0.20	92.6	-	92.6	9/26/2013	
306	19480	986.60	986.59	-0.01	92.6	-	92.6	9/26/2013	
307	19229	986.06	986.06	0.00	92.6	-	92.6	9/26/2013	
308	19002	985.51	985.68	0.17	92.6	-	92.6	9/26/2013	
309	18716	984.69	984.63	-0.06	94.1	-	94.1	9/27/2013	
310	18350	983.80	983.93	0.13	94.1	-	94.1	9/27/2013	
311	18101	983.51	983.61	0.09	94.1	-	94.1	9/27/2013	Upstream of Dunbow Road (Highway 2) Bridge
312	18017	-	983.48	-	94.1	-	-	-	
313	17974	983.30	983.42	0.12	94.1	-	94.1	9/27/2013	
314	17788	983.22	983.21	-0.01	94.1	-	94.1	9/27/2013	
315	17528	983.08	982.73	-0.36	94.1	-	94.1	9/27/2013	High control point located downstream
316	17163	-	981.83	-	94.1	-	-	-	
317	16891	981.37	981.39	0.02	94.1	-	94.1	9/27/2013	
318	16585	980.71	980.86	0.15	94.1	-	94.1	9/27/2013	
319	16067	979.63	979.59	-0.04	94.1	-	94.1	9/27/2013	
320	15801	978.65	978.80	0.15	76.4	-	76.4	10/9/2013	
321	15337	976.44	976.31	-0.13	76.4	-	76.4	10/9/2013	
322	15137	975.92	975.90	-0.02	76.4	-	76.4	10/9/2013	
323	14868	975.80	975.77	-0.02	76.4	-	76.4	10/9/2013	
324	14601	975.63	975.58	-0.05	76.4	-	76.4	10/9/2013	
325	14345	975.27	975.27	0.00	76.4	-	76.4	10/9/2013	
326	14038	974.70	974.45	-0.25	76.4	-	76.4	10/9/2013	
327	13712	973.69	973.77	0.08	76.4	-	76.4	10/9/2013	
328	13326	972.98	973.05	0.07	76.4	-	76.4	10/9/2013	
329	13050	972.48	972.57	0.09	76.4	-	76.4	10/9/2013	
330	12701	-	971.77	-	76.4	-	-	-	
331	12318	970.39	970.64	0.25	76.4	-	76.4	10/9/2013	
332	11995	970.00	969.92	-0.08	76.4	-	76.4	10/9/2013	
333	11701	968.55	968.16	-0.39	76.4	-	76.4	10/9/2013	High control point located downstream
334	11521	968.27	968.13	-0.14	79.6	79.6	-	10/17/2013	
335	11135	968.17	967.58	-0.59	79.6	79.6	-	10/17/2013	
336	10780	967.18	967.25	0.07	79.6	79.6	-	10/17/2013	Island
337	10471	967.01	966.60	-0.41	79.6	79.6	-	10/17/2013	Island
338	9936	965.58	965.70	0.12	79.6	79.6	-	10/17/2013	
339	9519	965.59	965.48	-0.11	82.3	82.5	82.3	10/18/2013	
340	9109	964.70	964.75	0.05	82.3	82.5	82.3	10/18/2013	
341	8623	963.59	963.76	0.17	82.3	82.5	82.3	10/18/2013	
342	8278	963.22	963.15	-0.07	82.3	82.5	82.3	10/18/2013	
343	7928	961.62	961.76	0.14	82.3	82.5	82.3	10/18/2013	
344	7676	961.59	961.66	0.07	82.3	82.5	82.3	10/18/2013	
345	7246	961.25	961.45	0.20	82.3	82.5	82.3	10/18/2013	side channel
346	6932	960.58	960.53	-0.05	82.3	82.5	82.3	10/18/2013	
347	6560	958.83	959.05	0.22	82.3	82.5	82.3	10/18/2013	
348	6300	958.70	958.77	0.08	82.3	82.5	82.3	10/18/2013	
349	6047	958.63	958.65	0.02	82.3	82.5	82.3	10/18/2013	
350	5643	958.46	958.29	-0.17	82.3	82.5	82.3	10/18/2013	
351	5308	957.54	957.74	0.20	82.3	82.5	82.3	10/18/2013	
352	4811	957.01	957.00	-0.01	82.3	82.5	82.3	10/18/2013	
353	4323	955.56	955.40	-0.16	82.3	82.5	82.3	10/18/2013	
354	3840	954.89	955.03	0.14	82.3	82.5	82.3	10/18/2013	
355	3566	954.70	954.81	0.11	82.3	82.5	82.3	10/18/2013	
356	3195	953.47	953.71	0.24	65.9	72.4	65.9	10/30/2013	On big island
357	2910	952.85	952.78	-0.08	65.9	72.4	65.9	10/30/2013	
358	2571	951.74	951.69	-0.04	65.9	72.4	65.9	10/30/2013	
359	2338	951.65	951.42	-0.23	65.9	72.4	65.9	10/30/2013	
360	1991	951.40	951.16	-0.24	65.9	72.4	65.9	10/30/2013	
361	1536	950.48	950.53	0.05	65.9	72.4	65.9	10/30/2013	
362	1172	949.94	950.07	0.13	65.9	72.4	65.9	10/30/2013	
363	825	949.59	949.69	0.11	65.9	72.4	65.9	10/30/2013	
364	386	948.36	948.24	-0.12	65.9	72.4	65.9	10/30/2013	
365	0	947.16	946.66	-0.50	65.9	72.4	65.9	10/30/2013	Downstream boundary effect

Notes: [1] The daily flows from Cross Sections 69342 to 50800 were based on preliminary data recorded at Bow River below Bearspaw Dam (05BH008).

[2] The daily flows from Cross Sections 50706 to 0 were based on preliminary data recorded at Bow River at Calgary (05BH004).

"-" =Not available

Table A.2: Comparison of Simulated and Surveyed Water Levels along the Elbow River during the 2013 Survey

Station in Flood Mapping	HEC-RAS Station (m)	Surveyed Water Level (m)	Simulated Water Level (m)	Difference (Simulated - Surveyed) (m)	Simulated Discharge (m^3/s)	Daily Discharge from Gauge[1,2] (m^3/s)	Surveyed Discharge (m^3/s)	Surveyed Date	Notes
366	11343	1057.56	1057.39	-0.17	3.9	3.9	2.6	9/12/2013	Downstream of Glenmore Dam
367	11303	1057.58	1057.39	-0.20	3.9	3.9	2.6	9/12/2013	
368	11267	1057.55	1057.38	-0.17	3.9	3.9	2.6	9/12/2013	
369	11241	1057.30	1057.32	0.01	3.9	3.9	2.6	9/12/2013	
370	11204	1057.01	1056.91	-0.10	3.9	3.9	2.6	9/12/2013	
371	11153	1056.70	1056.55	-0.14	3.9	3.9	2.6	9/12/2013	
372	11099	1056.66	1056.48	-0.18	3.9	3.9	2.6	9/12/2013	
373	11048	1056.55	1056.25	-0.29	3.9	3.9	2.6	9/12/2013	
374	10989	1056.42	1056.19	-0.22	3.9	3.9	2.6	9/12/2013	High control point located downstream
375	10947	1056.30	1056.16	-0.14	3.9	3.9	2.6	9/12/2013	
376	10889	1056.18	1056.15	-0.03	3.9	3.9	2.6	9/12/2013	
377	10844	1056.20	1056.14	-0.06	3.9	3.9	2.6	9/12/2013	
378	10797	1056.16	1056.12	-0.04	3.9	3.9	2.6	9/12/2013	
379	10757	1056.12	1056.05	-0.06	3.9	3.9	2.6	9/12/2013	
380	10705	1055.99	1055.95	-0.04	3.9	3.9	2.6	9/12/2013	
381	10657	1055.92	1055.74	-0.18	3.9	3.9	2.6	9/12/2013	
382	10611	1055.72	1055.47	-0.25	3.9	3.9	2.6	9/12/2013	
383	10542	1055.66	1055.44	-0.22	3.9	3.9	2.6	9/12/2013	
384	10500	1055.64	1055.42	-0.21	3.9	3.9	2.6	9/12/2013	
385	10427	1055.54	1055.35	-0.18	3.9	3.9	2.6	9/12/2013	
386	10382	1055.45	1055.19	-0.26	3.9	3.9	2.6	9/12/2013	High control point located downstream
387	10307	1055.19	1055.17	-0.02	3.9	3.9	2.6	9/12/2013	
388	10253	1055.20	1055.14	-0.06	3.9	3.9	2.6	9/12/2013	
389	10194	1055.07	1054.97	-0.10	3.9	3.9	2.6	9/12/2013	
390	10149	1054.77	1054.67	-0.11	3.9	3.9	2.6	9/12/2013	
391	10091	1054.71	1054.61	-0.10	3.9	3.9	2.6	9/12/2013	
392	10013	1054.52	1054.42	-0.10	3.9	3.9	2.6	9/12/2013	
393	9916	1054.53	1054.44	-0.09	3.9	3.9	2.6	9/12/2013	
394	9873	1054.55	1054.44	-0.11	3.9	3.9	2.6	9/12/2013	
395	9791	1054.47	1054.42	-0.05	3.9	3.9	2.6	9/12/2013	
396	9707	1054.37	1054.11	-0.26	3.9	3.9	2.6	9/12/2013	High control point located downstream
397	9618	1053.68	1053.53	-0.15	3.9	3.9	2.6	9/12/2013	
398	9540	1053.61	1053.50	-0.11	3.9	3.9	2.6	9/12/2013	
399	9484	1053.56	1053.39	-0.17	3.9	3.9	2.6	9/12/2013	
400	9462	1053.56	1053.38	-0.18	3.9	3.9	2.6	9/12/2013	
401	9442	1053.50	1053.36	-0.14	3.9	3.9	2.6	9/12/2013	
402	9426	1053.57	1053.34	-0.23	3.9	3.9	2.6	9/12/2013	High control point located downstream
403	9375	1053.44	1053.31	-0.13	3.9	3.9	2.6	9/12/2013	
404	9323	1053.41	1053.28	-0.13	3.9	3.9	2.6	9/12/2013	
405	9294	1053.35	1053.25	-0.10	3.9	3.9	2.6	9/12/2013	
406	9263	1053.25	1053.13	-0.12	2.3	2.7	2.3	9/11/2013	
407	9221	1053.24	1053.07	-0.18	2.3	2.7	2.3	9/11/2013	
408	9147	1053.15	1052.90	-0.24	2.3	2.7	2.3	9/11/2013	
409	9083	1053.05	1052.87	-0.18	2.3	2.7	2.3	9/11/2013	
410	9031	1053.10	1052.86	-0.24	2.3	2.7	2.3	9/11/2013	
411	8957	1053.05	1052.83	-0.22	2.3	2.7	2.3	9/11/2013	High control point located downstream
412	8899	1052.83	1052.74	-0.09	2.3	2.7	2.3	9/11/2013	
413	8854	1052.61	1052.47	-0.14	2.3	2.7	2.3	9/11/2013	Upstream of Sandy Beach Pedestrian Bridge
414	8850	1052.55	1052.37	-0.19	2.3	2.7	2.3	9/11/2013	
415	8745	1052.30	1052.22	-0.08	2.3	2.7	2.3	9/11/2013	
416	8696	1052.37	1052.22	-0.15	2.3	2.7	2.3	9/11/2013	
417	8601	1052.36	1052.21	-0.14	2.3	2.7	2.3	9/11/2013	
418	8535	1052.28	1052.16	-0.12	2.3	2.7	2.3	9/11/2013	
419	8486	1052.22	1052.08	-0.14	2.3	2.7	2.3	9/11/2013	
420	8423	1052.07	1051.95	-0.12	2.3	2.7	2.3	9/11/2013	
422	8326	1051.86	1051.71	-0.15	2.3	2.7	2.3	9/11/2013	
423	8251	1051.83	1051.61	-0.22	2.3	2.7	2.3	9/11/2013	
425	8217	1051.77	1051.55	-0.21	2.3	2.7	2.3	9/11/2013	
426	8181	1051.68	1051.48	-0.19	2.3	2.7	2.3	9/11/2013	
427	8121	1051.63	1051.44	-0.19	2.3	2.7	2.3	9/11/2013	
429	8068	1051.63	1051.42	-0.21	2.3	2.7	2.3	9/11/2013	
430	8023	1051.58	1051.39	-0.19	2.3	2.7	2.3	9/11/2013	
431	7985	1051.52	1051.37	-0.15	2.3	2.7	2.3	9/11/2013	
433	7916	1051.52	1051.35	-0.17	2.3	2.7	2.3	9/11/2013	
434	7849	1051.41	1051.27	-0.14	2.3	2.7	2.3	9/11/2013	
436	7813	1050.77	1050.69	-0.08	2.3	2.7	2.3	9/11/2013	
437	7746	1050.67	1050.63	-0.04	2.3	2.7	2.3	9/11/2013	
438	7710	1050.72	1050.61	-0.11	2.3	2.7	2.3	9/11/2013	
439	7658	1050.65	1050.51	-0.14	2.3	2.7	2.3	9/11/2013	
440	7614	1050.48	1050.23	-0.25	2.3	2.7	2.3	9/11/2013	
441	7605	1050.44	1050.23	-0.21	2.3	2.7	2.3	9/11/2013	Upstream of Riverdale Ave Pedestrian Bridge
442	7596	1050.46	1050.23	-0.23	2.3	2.7	2.3	9/11/2013	
444	7577	1050.47	1050.23	-0.24	2.3	2.7	2.3	9/11/2013	High control point located downstream
445	7518	1050.41	1050.22	-0.19	2.3	2.7	2.3	9/11/2013	
446	7480	1050.36	1050.22	-0.14	2.3	2.7	2.3	9/11/2013	
447	7426	1050.38	1050.21	-0.16	2.3	2.7	2.3	9/11/2013	
448	7390	1050.36	1050.21	-0.15	2.3	2.7	2.3	9/11/2013	High control point located downstream
449	7345	1050.25	1050.18	-0.07	2.3	2.7	2.3	9/11/2013	
450	7321	1050.17	1050.01	-0.16	2.3	2.7	2.3	9/11/2013	
451	7282	1049.83	1049.63	-0.20	2.3	2.7	2.3	9/11/2013	
452	7238	1049.60	1049.58	-0.02	2.3	2.7	2.3	9/11/2013	
453	7221	1049.58	1049.56	-0.02	2.3	2.7	2.3	9/11/2013	Upstream of Elbow Drive (Elboya) Bridge
454	7195	1049.48	1049.47	-0.01	2.3	2.7	2.3	9/11/2013	
455	7181	1049.49	1049.43	-0.06	2.3	2.7	2.3	9/11/2013	

Station in Flood Mapping	HEC-RAS Station (m)	Surveyed Water Level (m)	Simulated Water Level (m)	Difference (Simulated - Surveyed) (m)	Simulated Discharge (m^3/s)	Daily Discharge from Gauge[1,2] (m^3/s)	Surveyed Discharge (m^3/s)	Surveyed Date	Notes
456	7146	1049.47	1049.32	-0.15	2.3	2.7	2.3	9/11/2013	
457	7104	1049.36	1049.17	-0.20	2.3	2.7	2.3	9/11/2013	
458	7063	1049.30	1049.14	-0.16	2.3	2.7	2.3	9/11/2013	
459	7012	1049.32	1049.12	-0.20	2.3	2.7	2.3	9/11/2013	
460	6985	1049.31	1049.11	-0.20	2.3	2.7	2.3	9/11/2013	
461	6935	1049.29	1049.09	-0.20	2.3	2.7	2.3	9/11/2013	
462	6881	1049.29	1049.07	-0.22	2.3	2.7	2.3	9/11/2013	
463	6837	1049.26	1049.05	-0.21	2.3	2.7	2.3	9/11/2013	
464	6800	1049.29	1049.04	-0.25	2.3	2.7	2.3	9/11/2013	
465	6748	1049.23	1049.03	-0.20	2.3	2.7	2.3	9/11/2013	
466	6710	1049.24	1049.03	-0.21	2.3	2.7	2.3	9/11/2013	High control point located downstream
467	6602	1049.03	1048.97	-0.06	2.3	2.7	2.3	9/11/2013	
468	6557	1048.89	1048.67	-0.22	2.3	2.7	2.3	9/11/2013	
469	6521	1048.90	1048.68	-0.22	2.3	2.7	2.3	9/11/2013	
470	6498	1048.86	1048.68	-0.19	2.3	2.7	2.3	9/11/2013	
471	6470	1048.89	1048.72	-0.18	2.8	2.8	2.8	9/10/2013	
472	6427	1048.92	1048.72	-0.20	2.8	2.8	2.8	9/10/2013	
473	6381	1048.92	1048.71	-0.20	2.8	2.8	2.8	9/10/2013	
474	6339	1048.90	1048.71	-0.19	2.8	2.8	2.8	9/10/2013	
475	6287	1048.82	1048.69	-0.13	2.8	2.8	2.8	9/10/2013	
476	6230	1048.86	1048.70	-0.17	2.8	2.8	2.8	9/10/2013	
477	6181	1048.83	1048.70	-0.13	2.8	2.8	2.8	9/10/2013	
478	6112	1048.73	1048.70	-0.03	2.8	2.8	2.8	9/10/2013	
479	6034	-	1048.70	-	2.8	-	-	-	
480	5953	1048.86	1048.69	-0.17	2.8	2.8	2.8	9/10/2013	
481	5887	1048.72	1048.53	-0.19	2.8	2.8	2.8	9/10/2013	
482	5785	1048.31	1048.23	-0.08	2.8	2.8	2.8	9/10/2013	
483	5709	1048.15	1048.22	0.07	2.8	2.8	2.8	9/10/2013	
484	5658	-	1048.22	-	2.8	-	-	-	
485	5582	1048.27	1048.22	-0.04	2.8	2.8	2.8	9/10/2013	
486	5513	1048.27	1048.22	-0.05	2.8	2.8	2.8	9/10/2013	Upstream of Rideau Park Pedestrian Bridge
487	5495	1048.13	1048.22	0.09	2.8	2.8	2.8	9/10/2013	
488	5428	1048.26	1048.21	-0.05	2.8	2.8	2.8	9/10/2013	
489	5392	1048.23	1048.21	-0.02	2.8	2.8	2.8	9/10/2013	
490	5337	1048.22	1048.20	-0.02	2.8	2.8	2.8	9/10/2013	
491	5303	1048.20	1048.19	-0.01	2.8	2.8	2.8	9/10/2013	
493	5259	1048.19	1048.19	-0.01	2.8	2.8	2.8	9/10/2013	
494	5216	1048.18	1048.16	-0.01	2.8	2.8	2.8	9/10/2013	
496	5172	1047.95	1047.76	-0.18	2.8	2.8	2.8	9/10/2013	
498	5124	1047.69	1047.64	-0.06	2.8	2.8	2.8	9/10/2013	
500	5073	1047.67	1047.62	-0.05	2.8	2.8	2.8	9/10/2013	
502	5032	1047.64	1047.57	-0.07	2.8	2.8	2.8	9/10/2013	
503	4984	1047.55	1047.54	-0.01	2.8	2.8	2.8	9/10/2013	
504	4931	1047.56	1047.53	-0.03	2.8	2.8	2.8	9/10/2013	
506	4877	1047.82	1047.80	-0.02	10.5	10.5	-	9/8/2013	
507	4830	1047.87	1047.79	-0.08	10.5	10.5	-	9/8/2013	
508	4795	1047.85	1047.78	-0.07	10.5	10.5	-	9/8/2013	Upstream of Mission (4 Street SW) Bridge
509	4768	1047.83	1047.78	-0.05	10.5	10.5	-	9/8/2013	
511	4708	1047.02	1046.92	-0.10	3.7	3.0	3.7	9/6/2013	
513	4652	1046.97	1046.84	-0.13	3.7	3.0	3.7	9/6/2013	
514	4573	1046.95	1046.83	-0.13	3.7	3.0	3.7	9/6/2013	
516	4520	1046.90	1046.82	-0.08	3.7	3.0	3.7	9/6/2013	
517	4473	1046.78	1046.76	-0.02	3.7	3.0	3.7	9/6/2013	
519	4417	1046.32	1046.25	-0.07	3.7	3.0	3.7	9/6/2013	
522	4365	1046.10	1045.89	-0.21	3.7	3.0	3.7	9/6/2013	
525	4323	1045.90	1045.85	-0.05	3.7	3.0	3.7	9/6/2013	
527	4281	1045.88	1045.81	-0.07	3.7	3.0	3.7	9/6/2013	
529	4223	1046.04	1045.75	-0.29	3.7	3.0	3.7	9/6/2013	
531	4168	1045.91	1045.68	-0.23	3.7	3.0	3.7	9/6/2013	
538	4098	1045.95	1045.69	-0.27	3.7	3.0	3.7	9/6/2013	
539	4083	1045.85	1045.68	-0.17	3.7	3.0	3.7	9/6/2013	
540	4052	1045.88	1045.68	-0.20	3.7	3.0	3.7	9/6/2013	Upstream of 25th Ave Bridge
541	4034	1045.88	1045.67	-0.21	3.7	3.0	3.7	9/6/2013	High control point located downstream
542	3989	1045.80	1045.58	-0.22	3.7	3.0	3.7	9/6/2013	
543	3931	1045.76	1045.53	-0.23	3.7	3.0	3.7	9/6/2013	
544	3889	-	1045.53	-	3.7	-	-	-	
545	3869	1045.81	1045.53	-0.27	3.7	3.0	3.7	9/6/2013	
546	3851	1045.81	1045.53	-0.28	3.7	3.0	3.7	9/6/2013	
547	3834	1045.76	1045.53	-0.23	3.7	3.0	3.7	9/6/2013	
548	3809	1045.81	1045.53	-0.28	3.7	3.0	3.7	9/6/2013	
549	3777	1045.82	1045.53	-0.29	3.7	3.0	3.7	9/6/2013	
550	3738	1045.71	1045.53	-0.18	3.7	3.0	3.7	9/6/2013	High control point locates downstream
556	3671	1045.64	1045.44	-0.20	3.7	3.0	3.7	9/6/2013	
557	3610	1044.97	1045.26	0.29	3.7	3.0	3.7	9/6/2013	
558	3568	1044.56	1045.26	0.70	3.7	3.0	3.7	9/6/2013	
559	3498	1044.40	1045.26	0.85	3.7	3.0	3.7	9/6/2013	Upstream of 21 Ave (Lindsay Park) Pedestrian Bridge
560	3478	1044.46	1045.13	0.67	3.7	3.0	3.7	9/6/2013	
561	3455	-	1044.29	-	3.7	-	-	-	Flow split
562	3438	1044.41	1044.27	-0.14	3.7	3.0	3.7	9/6/2013	
563	3386	1044.36	1044.20	-0.16	3.7	3.0	3.7	9/6/2013	
564	3346	1044.24	1044.03	-0.21	3.7	3.0	3.7	9/6/2013	
565	3297	1044.11	1043.91	-0.20	3.7	3.0	3.7	9/6/2013	
566	3271	1044.04	1043.85	-0.19	3.7	3.0	3.7	9/6/2013	
567	3251	1044.06	1043.82	-0.24	3.7	3.0	3.7	9/6/2013	Upstream of Lindsay Park CNR Bridge
568	3236	1043.76	1043.81	0.04	3.7	3.0	3.7	9/6/2013	
569	3224	1043.85	1043.80	-0.05	3.7	3.0	3.7	9/6/2013	

Station in Flood Mapping	HEC-RAS Station (m)	Surveyed Water Level (m)	Simulated Water Level (m)	Difference (Simulated - Surveyed) (m)	Simulated Discharge (m^3/s)	Daily Discharge from Gauge[1,2] (m^3/s)	Surveyed Discharge (m^3/s)	Surveyed Date	Notes
570	3188	1043.72	1043.76	0.04	3.7	3.0	3.7	9/6/2013	
571	3146	1043.48	1043.39	-0.09	2.6	2.9	2.6	9/5/2013	
572	3073	1042.90	1042.80	-0.11	2.6	2.9	2.6	9/5/2013	
573	3027	1042.83	1042.72	-0.11	2.6	2.9	2.6	9/5/2013	
574	2982	1042.84	1042.68	-0.17	2.6	2.9	2.6	9/5/2013	
575	2966	1042.82	1042.68	-0.15	2.6	2.9	2.6	9/5/2013	Upstream of Pattison (1 St) Bridge
576	2939	1042.84	1042.68	-0.16	2.6	2.9	2.6	9/5/2013	
577	2911	1042.79	1042.65	-0.14	2.6	2.9	2.6	9/5/2013	
578	2882	1042.74	1042.56	-0.18	2.6	2.9	2.6	9/5/2013	
579	2840	1042.49	1042.27	-0.22	2.6	2.9	2.6	9/5/2013	
580	2802	1042.33	1042.21	-0.11	2.6	2.9	2.6	9/5/2013	
581	2766	1042.29	1042.16	-0.13	2.6	2.9	2.6	9/5/2013	
582	2742	1042.28	1041.99	-0.29	2.6	2.9	2.6	9/5/2013	Upstream of Victoria (Macleod Trail) Bridge
583	2699	1041.92	1041.75	-0.17	2.6	2.9	2.6	9/5/2013	Upstream of LRT Bridge
584	2656	1041.61	1041.47	-0.14	2.6	2.9	2.6	9/5/2013	
585	2636	1041.21	1041.25	0.04	2.6	2.9	2.6	9/5/2013	
587	2608	1041.24	1041.06	-0.19	2.6	2.9	2.6	9/5/2013	
588	2588	1041.23	1041.04	-0.19	2.6	2.9	2.6	9/5/2013	
593	2536	1041.22	1040.99	-0.23	2.6	2.9	2.6	9/5/2013	
594	2483	-	1040.97	-	2.6	-	-	-	
595	2469	1041.23	1040.96	-0.28	2.6	2.9	2.6	9/5/2013	Upstream of Stampede Park (25 Ave/3 ST) Access
596	2443	1041.32	1040.96	-0.36	2.6	2.9	2.6	9/5/2013	Water level higher than upstream
597	2424	1041.22	1040.96	-0.26	2.6	2.9	2.6	9/5/2013	
598	2387	1041.22	1040.96	-0.26	2.6	2.9	2.6	9/5/2013	
599	2332	1041.16	1040.90	-0.26	2.6	2.9	2.6	9/5/2013	High control point located downstream
601	2272	1040.88	1040.72	-0.17	2.6	2.9	2.6	9/5/2013	
602	2212	1040.59	1040.33	-0.26	2.6	2.9	2.6	9/5/2013	
603	2146	1040.27	1040.11	-0.16	2.6	2.9	2.6	9/5/2013	
605	2090	1040.23	1040.08	-0.15	2.6	2.9	2.6	9/5/2013	
606	2048	1040.22	1040.08	-0.14	2.6	2.9	2.6	9/5/2013	
607	2020	1040.24	1040.08	-0.17	2.6	2.9	2.6	9/5/2013	
608	1999	1040.24	1040.07	-0.16	2.6	2.9	2.6	9/5/2013	
609	1969	1040.24	1040.07	-0.16	2.6	2.9	2.6	9/5/2013	
610	1944	1040.23	1040.07	-0.16	2.6	2.9	2.6	9/5/2013	
611	1910	1040.26	1040.07	-0.19	2.6	2.9	2.6	9/5/2013	Upstream of Horse Barn Bridge (New)
612	1894	1040.22	1040.06	-0.16	2.6	2.9	2.6	9/5/2013	
613	1861	1040.20	1040.05	-0.15	2.6	2.9	2.6	9/5/2013	Upstream of Horse Barn Bridge (Old)
614	1848	1040.11	1040.05	-0.06	2.7	2.9	2.7	9/4/2013	
615	1755	1040.12	1040.01	-0.11	2.7	2.9	2.7	9/4/2013	
617	1698	1040.07	1039.67	-0.40	2.7	2.9	2.7	9/4/2013	
618	1621	1040.00	1039.53	-0.48	2.7	2.9	2.7	9/4/2013	High control point located downstream
619	1561	1039.92	1039.26	-0.67	2.7	2.9	2.7	9/4/2013	Flow split due to a sand bar
621	1530	1039.35	1039.15	-0.20	2.7	2.9	2.7	9/4/2013	
622	1506	1039.30	1039.10	-0.21	2.7	2.9	2.7	9/4/2013	
624	1448	1039.14	1039.09	-0.06	2.7	2.9	2.7	9/4/2013	
626	1374	1039.14	1039.07	-0.07	2.7	2.9	2.7	9/4/2013	
627	1303	1039.10	1039.04	-0.06	2.7	2.9	2.7	9/4/2013	
627.1	1249	1039.21	1038.97	-0.24	2.7	2.9	2.7	9/4/2013	
628	1238	-	1038.89	-	2.7	-	-	-	
629	1205	1038.98	1038.79	-0.19	2.7	2.9	2.7	9/4/2013	Upstream of Stampede Park (S) Saddledome Access
630	1193	1038.98	1038.75	-0.23	2.7	2.9	2.7	9/4/2013	
631	1135	1038.79	1038.71	-0.08	2.7	2.9	2.7	9/4/2013	
632	1085	1038.81	1038.57	-0.24	2.7	2.9	2.7	9/4/2013	
633	999	1038.52	1038.32	-0.20	2.7	2.9	2.7	9/4/2013	Upstream of Stampede Park (N) Saddledome Access
634	979	1038.58	1038.32	-0.26	2.7	2.9	2.7	9/4/2013	
635	955	1038.58	1038.31	-0.27	2.7	2.9	2.7	9/4/2013	
636	918	-	1038.28	-	2.7	-	-	-	
637	858	1038.52	1038.26	-0.26	2.7	2.9	2.7	9/4/2013	
638	800	1038.56	1038.25	-0.31	2.7	2.9	2.7	9/4/2013	High control point located downstream
639	755	1038.19	1038.19	0.00	2.7	2.9	2.7	9/4/2013	
640	659	1037.93	1037.66	-0.27	2.7	2.9	2.7	9/4/2013	
641	588	1037.52	1037.41	-0.11	2.7	2.9	2.7	9/4/2013	Upstream of MacDonald Bridge
642	568	1037.58	1037.35	-0.23	2.7	2.9	2.7	9/4/2013	
643	464	1037.25	1036.99	-0.27	2.7	2.9	2.7	9/4/2013	
644	457	1037.16	1037.00	-0.16	2.7	2.9	2.7	9/4/2013	
645	343	1037.02	1037.03	0.00	2.6	2.9	2.6	9/3/2013	Upstream of 9 Ave Train Bridge
646	324	1037.08	1037.02	-0.06	2.6	2.9	2.6	9/3/2013	
647	295	1037.08	1037.02	-0.06	2.6	2.9	2.6	9/3/2013	Upstream of Inglewood (9 Ave) Bridge
648	275	1037.08	1037.02	-0.07	2.6	2.9	2.6	9/3/2013	
649	171	1036.97	1036.98	0.01	2.6	2.9	2.6	9/3/2013	
649.1	156	-	1036.98	-	2.6	-	-	-	
650	84	1036.88	1036.97	0.09	2.6	2.9	2.6	9/3/2013	

Note: [1]The daily flows were based on preliminary data recorded at Elbow River below Glenmore Dam (05BJ001)

Table A.3: Comparison of Simulated and Surveyed Water Levels along the Bow River for the June 2013 Flood Event - AEP HWMs

Distance from the Bearspaw Dam (km)	Interpolated Station in HEC-RAS	Surveyed HWM (m)	Simulated Water Level (m)	Difference (Simulated Water Level - Surveyed HWM) (m)	Simulated Discharge (m^3/s)	Surveyed Date	Surveyed Time	Description
5.26	64227	1071.70	1071.94	0.24	1750	1/28/2014	-	Approximately 20 m upstream of 85 St SW Bridge
5.28	64208	1071.27	1071.88	0.62	1750	1/28/2014	-	Approximately 5 m downstream of 85 St SW Bridge (HWM from The City is approximate 1071.4 m)
10.33	59166	1063.35	1063.60	0.25	1750	7/4/2013	-	Approximately 20 m downstream of Trans-Canada Highway Bridge
10.33	59164	1063.25	1063.59	0.34	1750	7/4/2013	-	Downstream of Trans-Canada Highway Bridge
16.37	53118	1052.50	1052.61	0.10	1750	7/4/2013	-	Downstream of Crowchild Trail Bridge
17.69	51802	1049.76	1049.93	0.17	1750	7/4/2013	-	Upstream of 14th St SW (Mewata) Bridge
18.39	51100	1048.47	1048.66	0.19	1750	7/4/2013	-	Upstream of Louise (Hillhurst) Bridge
20.60	48891	1044.37	1044.65	0.28	1750	7/4/2013	-	Downstream of Centre St Bridge
23.44	46048	1039.28	1039.30	0.02	1837	7/3/2013	-	Near 15 Street SE
25.17	44325	1035.89	1035.61	-0.28	2395	7/3/2013	-	Upstream of 17 Ave (Cushing) Bridge
28.64	40850	1029.92	1030.09	0.17	2395	7/3/2013	-	Upstream of Bonnybrook (Ogden Road) Bridge
32.40	37093	1022.85	1022.35	-0.51	2395	7/3/2013	-	Downstream of Graves (Glenmore Trail) Bridges
37.98	31510	1013.37	1013.58	0.22	2395	7/18/2013	-	Near Douglasdale Range Road
45.84	23655	999.32	998.62	-0.70	2593	7/18/2013	-	Approximately 30 m upstream of Marquis de Lorne (Highway 22X) Bridge (HWM is not connect to main channel)

Table A.4: Comparison of Simulated and Surveyed Water Levels along the Bow River for the June 2013 Flood Event - City of Calgary HWMs

Distance from the Bearspaw Dam (km)	Interpolated HEC-RAS Station	Surveyed HWM (m)	Simulated Water Level (m)	Difference (Simulated Water Level - Surveyed HWM) (m)	Simulated Discharge (m^3/s)	Surveyed Date	Surveyed Time	Description
0.32	69176.5	1079.56	1079.52	-0.05	1750	6/24/2013	12:32 PM	
0.32	69169.7	1079.54	1079.51	-0.03	1750	6/24/2013	12:33 PM	
0.34	69154.7	1079.41	1079.48	0.08	1750	6/24/2013	12:33 PM	
0.36	69130.6	1079.70	1079.44	-0.26	1750	6/24/2013	12:35 PM	Water level higher than upstream
0.38	69108.3	1079.43	1079.40	-0.02	1750	6/24/2013	12:36 PM	
0.40	69088.4	1079.15	1079.36	0.21	1750	6/24/2013	12:36 PM	
0.44	69053.1	1079.22	1079.30	0.07	1750	6/24/2013	12:37 PM	
0.52	68974.7	1078.30	1079.15	0.84	1750	6/24/2013	12:43 PM	Water level lower than downstream
0.62	68867.8	1078.25	1078.96	0.71	1750	6/24/2013	12:46 PM	Water level lower than downstream
0.67	68824.6	1078.19	1078.93	0.74	1750	6/24/2013	12:49 PM	Water level lower than downstream
0.70	68793.3	1078.24	1078.90	0.66	1750	6/24/2013	12:51 PM	Water level lower than downstream
0.73	68760.2	1078.37	1078.87	0.50	1750	6/24/2013	12:52 PM	
0.76	68734.3	1078.32	1078.85	0.52	1750	6/24/2013	12:54 PM	
0.79	68699.9	1078.33	1078.82	0.49	1750	6/24/2013	12:55 PM	
0.84	68654.3	1078.24	1078.75	0.51	1750	6/24/2013	12:57 PM	
0.87	68621.0	1078.40	1078.71	0.31	1750	6/24/2013	12:58 PM	
0.95	68541.4	1078.40	1078.60	0.20	1750	6/24/2013	1:00 PM	
1.03	68464.5	1078.14	1078.49	0.35	1750	6/24/2013	1:03 PM	
1.12	68368.4	1077.84	1078.30	0.46	1750	6/24/2013	1:06 PM	
1.17	68320.8	1077.88	1078.20	0.32	1750	6/24/2013	1:10 PM	
3.58	65915.4	1074.17	1074.28	0.11	1750	6/27/2013	12:08 PM	
3.60	65891.8	1073.88	1074.29	0.41	1750	6/23/2013	10:36 AM	
3.62	65872.4	1073.98	1074.29	0.32	1750	6/27/2013	12:22 PM	60 m Upstream of Stony Trail Bridge
3.63	65859.2	1073.84	1074.30	0.46	1750	6/23/2013	10:36 AM	
3.64	65851.4	1074.05	1074.30	0.25	1750	6/23/2013	10:35 AM	
3.64	65851.3	1074.18	1074.30	0.12	1750	6/23/2013	10:35 AM	
3.64	65851.1	1074.14	1074.30	0.16	1750	6/23/2013	10:32 AM	
3.66	65834.0	1074.24	1074.31	0.07	1750	6/27/2013	12:26 PM	
3.88	65608.8	1074.11	1074.08	-0.03	1750	6/27/2013	12:06 PM	
3.95	65538.7	1074.32	1073.83	-0.49	1750	6/27/2013	12:10 PM	Water level higher than upstream
3.95	65537.3	1074.13	1073.82	-0.31	1750	6/27/2013	11:53 AM	
3.97	65526.8	1073.88	1073.78	-0.11	1750	6/23/2013	10:22 AM	
3.97	65526.7	1073.97	1073.78	-0.19	1750	6/23/2013	10:22 AM	
3.98	65510.3	1073.17	1073.71	0.54	1750	6/27/2013	11:48 AM	Water level lower than downstream
4.00	65487.3	1073.54	1073.67	0.13	1750	6/27/2013	12:12 PM	
4.01	65477.8	1073.44	1073.66	0.22	1750	6/27/2013	12:13 PM	
4.02	65474.3	1073.35	1073.65	0.30	1750	6/27/2013	12:13 PM	
4.02	65467.3	1073.33	1073.65	0.32	1750	6/27/2013	12:13 PM	
4.07	65423.2	1073.34	1073.60	0.26	1750	6/23/2013	10:18 AM	
4.07	65418.7	1073.16	1073.60	0.43	1750	6/27/2013	11:43 AM	
4.09	65400.7	1073.31	1073.58	0.26	1750	6/23/2013	10:17 AM	
4.09	65400.1	1073.26	1073.58	0.31	1750	6/23/2013	10:17 AM	
4.09	65399.9	1073.32	1073.58	0.25	1750	6/23/2013	10:16 AM	
4.10	65392.8	1073.27	1073.57	0.30	1750	6/23/2013	10:16 AM	
4.10	65390.5	1073.09	1073.57	0.48	1750	6/27/2013	12:25 PM	
4.10	65388.0	1073.12	1073.57	0.45	1750	6/27/2013	12:15 PM	
4.32	65171.4	1072.84	1073.29	0.46	1750	6/27/2013	1:14 PM	
4.32	65168.9	1072.84	1073.29	0.45	1750	6/27/2013	1:14 PM	
4.41	65077.8	1072.97	1073.19	0.21	1750	6/27/2013	1:08 PM	
4.58	64914.0	1072.73	1073.01	0.29	1750	6/27/2013	1:24 PM	
4.62	64874.1	1072.58	1072.98	0.40	1750	6/27/2013	1:28 PM	
4.63	64862.0	1072.68	1072.97	0.28	1750	6/23/2013	10:05 AM	
4.63	64860.2	1072.64	1072.97	0.33	1750	6/23/2013	10:04 AM	
4.64	64852.8	1072.69	1072.96	0.27	1750	6/23/2013	10:04 AM	
4.65	64842.6	1072.63	1072.95	0.32	1750	6/27/2013	1:28 PM	
4.65	64839.2	1072.54	1072.95	0.40	1750	6/23/2013	10:04 AM	
4.66	64830.4	1072.66	1072.94	0.28	1750	6/23/2013	10:03 AM	
4.66	64827.4	1072.73	1072.94	0.21	1750	6/21/2013	3:09 PM	
4.67	64823.7	1072.63	1072.93	0.30	1750	6/23/2013	10:03 AM	
4.68	64814.8	1072.61	1072.92	0.32	1750	6/23/2013	10:03 AM	
4.69	64804.1	1072.71	1072.91	0.21	1750	6/23/2013	10:03 AM	
4.69	64797.9	1072.70	1072.91	0.21	1750	6/23/2013	10:03 AM	
4.70	64795.6	1072.63	1072.91	0.27	1750	6/23/2013	10:02 AM	
4.82	64673.9	1072.55	1072.83	0.29	1750	6/27/2013	2:19 PM	
4.86	64629.6	1072.56	1072.81	0.25	1750	6/27/2013	1:34 PM	
4.98	64515.2	1071.76	1072.74	0.98	1750	6/27/2013	2:06 PM	Water level lower than downstream
5.19	64303.4	1071.74	1072.24	0.50	1750	6/23/2013	11:06 AM	
5.20	64289.2	1071.65	1072.18	0.53	1750	6/23/2013	11:05 AM	
5.24	64253.9	1071.64	1072.04	0.41	1750	6/23/2013	11:03 AM	
5.24	64248.9	1071.52	1072.02	0.51	1750	6/23/2013	11:02 AM	
5.25	64246.9	1071.59	1072.02	0.43	1750	6/23/2013	11:03 AM	
5.26	64231.3	1071.19	1071.96	0.76	1750	6/23/2013	10:59 AM	Water level lower than downstream
5.27	64224.8	1071.93	1071.93	0.00	1750	6/23/2013	10:59 AM	
5.27	64222.6	1071.10	1071.92	0.83	1750	6/23/2013	12:13 PM	10 m Upstream of 85 St SW Bridge (Water level lower than downstream)
5.27	64219.9	1071.96	1071.91	-0.05	1750	6/23/2013	12:08 PM	
5.27	64219.5	1072.13	1071.91	-0.21	1750	6/23/2013	12:08 PM	
5.27	64219.1	1072.21	1071.91	-0.29	1750	6/27/2013	1:44 PM	
5.27	64218.1	1072.30	1071.91	-0.39	1750	6/23/2013	12:06 PM	
5.29	64199.3	1071.43	1071.86	0.43	1750	6/27/2013	1:47 PM	
5.30	64195.3	1071.41	1071.85	0.44	1750	6/23/2013	11:26 AM	
5.30	64193.5	1071.48	1071.84	0.36	1750	6/23/2013	12:03 PM	
5.30	64193.5	1071.48	1071.84	0.36	1750	6/23/2013	12:03 PM	
5.30	64192.9	1071.34	1071.84	0.50	1750	6/23/2013	11:26 AM	

Distance from the Bearspaw Dam (km)	Interpolated HEC-RAS Station	Surveyed HWM (m)	Simulated Water Level (m)	Difference (Simulated Water Level - Surveyed HWM) (m)	Simulated Discharge (m^3/s)	Surveyed Date	Surveyed Time	Description
5.30	64192.2	1071.21	1071.84	0.63	1750	6/23/2013	12:01 PM	
5.30	64192.1	1071.29	1071.84	0.56	1750	6/23/2013	12:00 PM	
5.30	64190.9	1071.14	1071.85	0.70	1750	6/23/2013	12:03 PM	
5.30	64190.8	1071.24	1071.85	0.60	1750	6/23/2013	11:59 AM	
5.30	64190.7	1071.35	1071.85	0.50	1750	6/23/2013	12:02 PM	
5.30	64190.6	1071.16	1071.85	0.68	1750	6/23/2013	12:03 PM	
5.30	64189.5	1071.26	1071.85	0.59	1750	6/23/2013	12:03 PM	
5.30	64188.7	1071.08	1071.85	0.77	1750	6/23/2013	11:27 AM	
5.30	64188.1	1071.30	1071.85	0.55	1750	6/23/2013	11:58 AM	
5.32	64176.6	1071.12	1071.87	0.75	1750	6/23/2013	11:58 AM	
5.32	64170.8	1070.91	1071.87	0.96	1750	6/23/2013	11:28 AM	Water level lower than downstream
5.37	64124.7	1071.45	1071.91	0.46	1750	6/23/2013	11:23 AM	
5.45	64039.0	1071.63	1071.81	0.18	1750	6/23/2013	11:36 AM	
5.49	64001.5	1071.60	1071.77	0.17	1750	6/23/2013	11:43 AM	
5.92	63570.3	1070.55	1071.23	0.69	1750	6/23/2013	3:14 PM	Water level lower than downstream
5.93	63561.9	1071.01	1071.20	0.19	1750	6/24/2013	1:48 PM	
5.98	63512.7	1070.62	1071.06	0.45	1750	6/23/2013	3:13 PM	
6.00	63495.5	1070.98	1071.02	0.04	1750	6/24/2013	1:50 PM	
6.00	63489.8	1070.81	1071.01	0.19	1750	6/23/2013	3:17 PM	
6.01	63482.3	1070.84	1070.96	0.12	1750	6/23/2013	3:10 PM	
6.01	63482.0	1070.90	1070.96	0.07	1750	6/23/2013	3:10 PM	
6.59	62906.5	1069.30	1069.91	0.62	1750	6/28/2013	12:50 PM	
6.61	62882.0	1069.23	1069.87	0.64	1750	6/28/2013	12:47 PM	
6.78	62716.9	1068.88	1069.50	0.62	1750	6/28/2013	12:55 PM	
6.87	62625.7	1068.67	1069.29	0.62	1750	6/28/2013	12:58 PM	
6.95	62540.8	1068.48	1069.20	0.73	1750	6/28/2013	1:01 PM	
6.95	62539.7	1068.44	1069.20	0.77	1750	6/28/2013	1:01 PM	
7.22	62275.3	1068.48	1068.89	0.41	1750	6/28/2013	1:07 PM	
7.22	62275.3	1068.45	1068.89	0.44	1750	6/28/2013	1:07 PM	
7.26	62234.4	1068.12	1068.83	0.71	1750	6/28/2013	1:14 PM	
7.44	62050.9	1068.38	1068.51	0.12	1750	6/28/2013	1:19 PM	
7.46	62033.9	1068.18	1068.47	0.29	1750	6/28/2013	1:20 PM	
7.47	62024.6	1068.27	1068.45	0.18	1750	6/28/2013	1:23 PM	
7.47	62021.3	1068.33	1068.44	0.11	1750	6/28/2013	1:23 PM	
7.64	61849.6	1067.59	1068.08	0.49	1750	6/28/2013	1:29 PM	on side channel
7.72	61770.8	1067.69	1067.96	0.27	1750	6/28/2013	1:27 PM	
7.73	61763.4	1067.57	1067.95	0.38	1750	6/28/2013	1:29 PM	
7.74	61753.6	1067.75	1067.94	0.19	1750	6/28/2013	11:13 AM	
7.74	61749.3	1067.27	1067.93	0.66	1750	6/28/2013	11:12 AM	on side channel
7.85	61646.6	1067.39	1067.80	0.41	1750	6/28/2013	11:08 AM	on side channel
8.00	61492.4	1066.68	1067.59	0.91	1750	6/28/2013	1:36 PM	Water level Lower than downstream
8.00	61492.4	1066.68	1067.59	0.92	1750	6/28/2013	1:37 PM	Water level Lower than downstream
8.00	61491.4	1066.87	1067.59	0.72	1750	6/28/2013	1:37 PM	Water level Lower than downstream
8.01	61482.3	1067.24	1067.58	0.34	1750	6/28/2013	1:38 PM	
8.01	61477.3	1067.29	1067.57	0.28	1750	6/28/2013	1:39 PM	
8.01	61477.3	1067.30	1067.57	0.27	1750	6/28/2013	1:39 PM	
8.02	61468.6	1067.16	1067.56	0.40	1750	6/28/2013	1:37 PM	
8.05	61439.5	1067.10	1067.52	0.42	1750	6/28/2013	11:00 AM	
8.07	61426.3	1067.19	1067.50	0.31	1750	6/28/2013	11:00 AM	
8.08	61415.5	1067.09	1067.48	0.39	1750	6/28/2013	11:01 AM	
8.17	61319.7	1066.95	1067.34	0.39	1750	6/28/2013	10:53 AM	
8.32	61174.0	1066.69	1067.13	0.44	1750	6/28/2013	1:50 PM	
8.32	61172.0	1066.57	1067.13	0.56	1750	6/28/2013	1:50 PM	
8.33	61161.7	1066.69	1067.11	0.42	1750	6/28/2013	1:49 PM	
8.35	61142.2	1066.70	1067.08	0.38	1750	6/28/2013	10:49 AM	
8.36	61134.0	1066.75	1067.07	0.33	1750	6/28/2013	10:49 AM	
8.36	61128.9	1066.48	1067.07	0.59	1750	6/28/2013	10:48 AM	
8.36	61128.5	1066.35	1067.06	0.71	1750	6/28/2013	10:44 AM	
8.36	61128.5	1066.34	1067.06	0.73	1750	6/28/2013	10:43 AM	
8.39	61097.8	1066.42	1067.02	0.60	1750	6/28/2013	1:52 PM	
8.41	61082.1	1066.40	1067.00	0.60	1750	6/28/2013	1:53 PM	
8.41	61082.1	1066.40	1067.00	0.60	1750	6/28/2013	1:54 PM	
8.43	61064.7	1066.84	1066.97	0.13	1750	6/28/2013	10:42 AM	
8.48	61015.6	1066.46	1066.94	0.49	1750	6/28/2013	10:39 AM	
8.51	60987.2	1066.40	1066.93	0.53	1750	6/28/2013	10:38 AM	
8.51	60987.1	1066.51	1066.93	0.42	1750	6/28/2013	1:57 PM	
8.51	60983.0	1066.42	1066.92	0.51	1750	6/28/2013	10:37 AM	
8.51	60978.9	1066.34	1066.92	0.58	1750	6/28/2013	10:38 AM	
8.52	60975.3	1066.37	1066.92	0.55	1750	6/28/2013	1:57 PM	
8.52	60968.0	1066.39	1066.91	0.53	1750	6/28/2013	1:57 PM	
8.53	60962.5	1066.43	1066.91	0.48	1750	6/28/2013	1:58 PM	
8.54	60950.2	1066.34	1066.90	0.56	1750	6/28/2013	10:33 AM	
8.55	60944.4	1066.42	1066.90	0.48	1750	6/28/2013	10:34 AM	
8.57	60925.3	1066.32	1066.89	0.56	1750	6/28/2013	2:03 PM	
8.57	60924.2	1066.25	1066.89	0.64	1750	6/28/2013	2:03 PM	
8.57	60923.7	1065.81	1066.89	1.08	1750	6/28/2013	2:04 PM	
8.57	60922.3	1066.13	1066.88	0.75	1750	6/28/2013	2:11 PM	
8.57	60921.1	1066.32	1066.88	0.56	1750	6/28/2013	2:09 PM	
8.58	60909.6	1066.34	1066.88	0.53	1750	6/28/2013	2:12 PM	
8.60	60890.1	1066.40	1066.86	0.47	1750	6/28/2013	10:31 AM	
8.72	60774.8	1066.33	1066.79	0.46	1750	6/28/2013	10:28 AM	
8.91	60579.8	1066.09	1066.66	0.57	1750	6/28/2013	10:26 AM	
9.05	60442.5	1065.77	1066.39	0.61	1750	6/28/2013	10:22 AM	
9.06	60436.0	1065.57	1066.37	0.80	1750	6/28/2013	10:20 AM	

Distance from the Bearspaw Dam (km)	Interpolated HEC-RAS Station	Surveyed HWM (m)	Simulated Water Level (m)	Difference (Simulated Water Level - Surveyed HWM) (m)	Simulated Discharge (m^3/s)	Surveyed Date	Surveyed Time	Description
9.07	60423.9	1065.83	1066.34	0.51	1750	6/28/2013	10:20 AM	
9.74	59754.7	1064.65	1065.24	0.58	1750	6/23/2013	2:11 PM	
9.75	59742.6	1064.59	1065.22	0.64	1750	6/23/2013	2:12 PM	
9.76	59734.5	1064.61	1065.21	0.60	1750	6/23/2013	2:12 PM	
9.80	59697.1	1064.59	1065.17	0.58	1750	6/23/2013	2:13 PM	
9.80	59688.1	1064.58	1065.16	0.57	1750	6/23/2013	2:13 PM	
9.88	59613.9	1064.42	1064.92	0.51	1750	6/23/2013	1:01 PM	
9.88	59612.5	1064.49	1064.90	0.41	1750	6/23/2013	1:02 PM	
9.88	59612.4	1064.62	1064.90	0.28	1750	6/23/2013	1:02 PM	
9.88	59612.4	1064.53	1064.90	0.37	1750	6/23/2013	1:02 PM	
9.88	59612.0	1064.46	1064.89	0.43	1750	6/23/2013	12:39 PM	
9.88	59611.0	1064.61	1064.87	0.26	1750	6/23/2013	12:40 PM	
9.88	59610.6	1064.65	1064.86	0.22	1750	6/23/2013	12:40 PM	
9.88	59609.2	1064.62	1064.84	0.21	1750	6/23/2013	12:38 PM	
9.88	59607.8	1064.44	1064.81	0.37	1750	6/23/2013	12:38 PM	
9.89	59598.9	1064.69	1064.65	-0.04	1750	6/23/2013	12:37 PM	
9.90	59595.0	1064.58	1064.58	0.00	1750	6/23/2013	12:37 PM	
9.90	59593.5	1064.53	1064.56	0.03	1750	6/23/2013	12:36 PM	
9.90	59593.5	1064.54	1064.56	0.02	1750	6/23/2013	12:37 PM	
9.91	59586.6	1064.51	1064.55	0.04	1750	6/23/2013	1:04 PM	
9.92	59573.1	1064.26	1064.52	0.27	1750	6/24/2013	2:12 PM	
9.92	59572.4	1064.31	1064.52	0.21	1750	6/23/2013	12:33 PM	
9.93	59565.0	1063.98	1064.51	0.53	1750	6/23/2013	1:04 PM	
9.93	59564.8	1064.42	1064.51	0.08	1750	6/23/2013	1:05 PM	
9.93	59562.5	1064.05	1064.50	0.45	1750	6/23/2013	12:42 PM	
9.93	59558.6	1064.27	1064.50	0.22	1750	6/23/2013	12:43 PM	
9.93	59557.7	1064.07	1064.50	0.43	1750	6/23/2013	12:43 PM	
9.95	59545.3	1064.08	1064.48	0.40	1750	6/23/2013	1:05 PM	
9.97	59524.4	1064.21	1064.45	0.24	1750	6/23/2013	12:44 PM	
9.98	59510.1	1064.20	1064.43	0.24	1750	6/23/2013	1:05 PM	
9.99	59499.6	1064.08	1064.42	0.34	1750	6/23/2013	1:06 PM	
10.00	59487.7	1064.14	1064.40	0.26	1750	6/23/2013	1:07 PM	
10.01	59482.7	1064.07	1064.39	0.33	1750	6/23/2013	12:47 PM	
10.04	59450.2	1064.08	1064.35	0.27	1750	6/23/2013	12:47 PM	
10.04	59450.1	1064.04	1064.35	0.31	1750	6/23/2013	1:08 PM	
10.06	59434.1	1064.09	1064.32	0.24	1750	6/23/2013	2:41 PM	
10.06	59428.0	1064.10	1064.32	0.22	1750	6/23/2013	12:48 PM	
10.07	59427.0	1064.08	1064.31	0.23	1750	6/23/2013	12:49 PM	
10.07	59424.2	1064.05	1064.31	0.26	1750	6/23/2013	2:41 PM	
10.08	59410.5	1064.11	1064.29	0.19	1750	6/23/2013	12:49 PM	
10.09	59399.3	1063.97	1064.28	0.31	1750	6/23/2013	12:49 PM	
10.10	59393.0	1064.06	1064.27	0.20	1750	6/23/2013	12:49 PM	
10.11	59381.8	1064.04	1064.25	0.21	1750	6/23/2013	2:41 PM	
10.12	59370.4	1063.99	1064.24	0.25	1750	6/23/2013	12:50 PM	
10.14	59351.1	1064.02	1064.21	0.19	1750	6/23/2013	12:50 PM	
10.14	59351.0	1064.00	1064.21	0.21	1750	6/23/2013	12:50 PM	
10.28	59210.5	1063.83	1063.89	0.06	1750	6/23/2013	12:51 PM	
10.28	59207.2	1063.58	1063.88	0.29	1750	6/23/2013	12:51 PM	
10.29	59207.1	1063.64	1063.88	0.23	1750	6/23/2013	12:51 PM	
10.29	59206.6	1063.53	1063.87	0.34	1750	6/23/2013	2:42 PM	
10.29	59206.1	1063.58	1063.87	0.29	1750	6/23/2013	2:42 PM	
10.29	59206.1	1063.58	1063.87	0.29	1750	6/23/2013	2:42 PM	
10.29	59205.3	1063.46	1063.86	0.40	1750	6/23/2013	2:42 PM	
10.29	59205.3	1063.56	1063.86	0.30	1750	6/23/2013	2:43 PM	
10.29	59204.3	1063.57	1063.86	0.29	1750	6/23/2013	2:43 PM	
10.29	59203.0	1063.59	1063.85	0.26	1750	6/23/2013	2:43 PM	
10.29	59203.0	1063.53	1063.85	0.32	1750	6/23/2013	2:43 PM	
10.29	59202.2	1063.49	1063.84	0.35	1750	6/23/2013	2:44 PM	
10.29	59201.4	1063.44	1063.84	0.40	1750	6/23/2013	2:44 PM	
10.29	59200.9	1063.44	1063.83	0.40	1750	6/23/2013	2:44 PM	
10.29	59200.0	1063.37	1063.83	0.46	1750	6/23/2013	2:44 PM	
10.29	59199.4	1063.46	1063.82	0.36	1750	6/23/2013	2:54 PM	
10.32	59173.9	1063.15	1063.65	0.50	1750	6/23/2013	3:30 PM	
10.32	59168.3	1063.13	1063.61	0.48	1750	6/23/2013	3:31 PM	
10.33	59163.8	1063.19	1063.58	0.39	1750	6/23/2013	3:32 PM	
10.33	59159.5	1063.12	1063.55	0.43	1750	6/23/2013	3:33 PM	
10.33	59159.4	1063.06	1063.55	0.50	1750	6/23/2013	3:32 PM	
10.33	59158.7	1063.05	1063.55	0.50	1750	6/23/2013	3:32 PM	
10.33	59158.4	1063.11	1063.55	0.44	1750	6/23/2013	3:32 PM	
10.33	59157.3	1063.14	1063.54	0.40	1750	6/23/2013	3:32 PM	
10.34	59150.3	1063.12	1063.51	0.39	1750	6/23/2013	3:32 PM	
10.43	59066.7	1062.86	1063.47	0.61	1750	6/23/2013	2:31 PM	
10.46	59028.9	1062.63	1063.41	0.77	1750	6/23/2013	2:30 PM	
10.64	58855.2	1063.15	1062.90	-0.25	1750	7/2/2013	10:04 AM	
10.94	58547.9	1061.47	1062.24	0.77	1750	7/2/2013	10:10 AM	Water level lower than downstream
11.02	58471.4	1061.70	1062.22	0.53	1750	7/2/2013	10:11 AM	
11.33	58164.2	1061.52	1061.83	0.31	1750	7/2/2013	10:23 AM	
11.52	57970.7	1061.00	1061.31	0.31	1750	7/2/2013	10:26 AM	
11.78	57710.3	1060.45	1060.87	0.42	1750	7/2/2013	10:28 AM	
12.08	57416.3	1060.02	1060.47	0.45	1750	7/2/2013	10:31 AM	
12.40	57094.3	1059.46	1059.96	0.49	1750	7/2/2013	10:37 AM	
12.77	56722.2	1059.12	1058.94	-0.19	1750	7/2/2013	10:43 AM	
12.84	56654.6	1058.46	1058.77	0.31	1750	7/2/2013	12:43 PM	
13.11	56385.2	1058.23	1058.41	0.19	1750	7/2/2013	12:50 PM	

Distance from the Bearspaw Dam (km)	Interpolated HEC-RAS Station	Surveyed HWM (m)	Simulated Water Level (m)	Difference (Simulated Water Level - Surveyed HWM) (m)	Simulated Discharge (m^3/s)	Surveyed Date	Surveyed Time	Description
13.21	56284.1	1057.87	1058.30	0.43	1750	7/2/2013	12:53 PM	
13.36	56134.2	1057.93	1058.18	0.25	1750	7/2/2013	10:51 AM	
13.80	55688.7	1057.04	1057.17	0.12	1750	7/2/2013	10:55 AM	
14.02	55473.6	1057.62	1056.65	-0.96	1750	7/2/2013	10:59 AM	Water level higher than upstream
14.30	55188.6	1055.89	1056.16	0.26	1750	7/2/2013	11:05 AM	
14.59	54897.6	1055.84	1055.74	-0.10	1750	7/2/2013	11:12 AM	
14.75	54745.9	1055.37	1055.50	0.13	1750	7/2/2013	11:17 AM	
14.92	54571.5	1054.78	1055.20	0.42	1750	7/2/2013	11:21 AM	
15.06	54430.0	1054.58	1054.86	0.28	1750	7/2/2013	11:26 AM	
15.09	54401.2	1054.44	1054.77	0.33	1750	7/2/2013	9:29 AM	
15.23	54260.6	1054.28	1054.37	0.08	1750	7/2/2013	11:29 AM	
15.26	54233.1	1054.19	1054.30	0.11	1750	7/2/2013	9:33 AM	
15.26	54233.1	1054.18	1054.30	0.12	1750	7/2/2013	9:33 AM	
15.32	54171.2	1053.72	1054.16	0.44	1750	7/3/2013	9:45 AM	
15.42	54069.6	1054.04	1053.93	-0.12	1750	7/2/2013	9:37 AM	
15.43	54065.3	1053.49	1053.92	0.44	1750	7/2/2013	11:32 AM	
15.56	53933.1	1053.55	1053.89	0.34	1750	7/3/2013	9:41 AM	
15.56	53933.0	1053.66	1053.89	0.24	1750	7/3/2013	9:39 AM	
15.56	53930.8	1053.62	1053.89	0.27	1750	7/2/2013	9:40 AM	
15.61	53884.9	1053.44	1053.88	0.45	1750	7/2/2013	11:34 AM	
15.69	53798.2	1053.79	1053.86	0.07	1750	7/2/2013	9:44 AM	
15.71	53783.4	1053.52	1053.85	0.34	1750	7/2/2013	9:43 AM	
15.73	53762.5	1053.30	1053.84	0.54	1750	7/2/2013	9:45 AM	Water level lower than downstream
15.74	53750.7	1053.69	1053.83	0.15	1750	7/2/2013	9:45 AM	
15.77	53724.5	1053.67	1053.81	0.14	1750	7/3/2013	9:29 AM	
15.77	53723.0	1053.62	1053.81	0.19	1750	7/3/2013	9:30 AM	
15.77	53721.7	1053.58	1053.81	0.23	1750	7/3/2013	9:33 AM	
15.93	53560.7	1053.38	1053.62	0.24	1750	7/2/2013	9:49 AM	
15.97	53520.1	1053.22	1053.51	0.29	1750	7/2/2013	9:50 AM	
16.05	53439.9	1053.23	1053.29	0.06	1750	7/2/2013	9:51 AM	
16.15	53340.3	1053.11	1053.00	-0.10	1750	7/2/2013	2:19 PM	
16.19	53301.7	1052.58	1052.84	0.27	1750	6/25/2013	1:26 PM	
16.22	53267.6	1052.42	1052.70	0.29	1750	6/25/2013	1:24 PM	
16.24	53249.6	1052.82	1052.63	-0.19	1750	6/21/2013	9:56 AM	
16.26	53229.9	1052.34	1052.61	0.27	1750	6/25/2013	1:22 PM	10 m Upstream of Crowchild Trail Bridge
16.37	53125.7	1051.61	1052.63	1.01	1750	6/25/2013	1:19 PM	Water level lower than downstream
16.37	53122.9	1052.63	1052.62	-0.01	1750	6/21/2013	9:58 AM	
16.40	53092.7	1052.21	1052.55	0.34	1750	6/25/2013	1:16 PM	
16.43	53061.9	1052.16	1052.48	0.32	1750	6/25/2013	1:15 PM	
16.48	53008.1	1052.34	1052.36	0.02	1750	7/2/2013	2:03 PM	
16.50	52991.9	1052.42	1052.32	-0.09	1750	7/2/2013	2:05 PM	
16.61	52881.3	1051.64	1051.96	0.32	1750	7/2/2013	2:07 PM	
16.68	52815.7	1051.74	1051.73	-0.01	1750	7/2/2013	2:09 PM	
16.68	52815.7	1051.75	1051.73	-0.02	1750	7/2/2013	2:09 PM	
16.70	52797.1	1051.81	1051.66	-0.15	1750	7/2/2013	9:57 AM	
16.82	52676.0	1051.80	1051.52	-0.28	1750	7/2/2013	10:00 AM	
16.86	52629.7	1051.56	1051.47	-0.09	1750	7/2/2013	10:01 AM	
17.06	52434.6	1050.91	1051.15	0.23	1750	7/2/2013	1:52 PM	
17.19	52303.6	1050.75	1050.88	0.14	1750	7/2/2013	1:49 PM	
17.25	52240.3	1050.71	1050.76	0.05	1750	7/2/2013	1:48 PM	
17.28	52211.2	1050.60	1050.70	0.10	1750	7/2/2013	1:40 PM	
17.29	52201.2	1050.69	1050.68	-0.01	1750	7/2/2013	1:40 PM	
17.37	52120.1	1051.05	1050.53	-0.52	1750	7/2/2013	1:42 PM	Water level higher than upstream
17.42	52071.3	1050.38	1050.44	0.07	1750	7/2/2013	1:45 PM	
17.68	51811.5	1049.93	1049.95	0.02	1750	6/25/2013	12:51 PM	
17.73	51766.9	1049.88	1049.85	-0.03	1750	6/25/2013	12:47 PM	
17.74	51755.8	1049.44	1049.83	0.38	1750	7/2/2013	10:26 AM	
17.76	51731.0	1049.51	1049.76	0.25	1750	6/25/2013	12:45 PM	
17.80	51694.6	1049.17	1049.65	0.48	1750	6/25/2013	12:43 PM	
17.81	51687.0	1049.23	1049.63	0.40	1750	7/2/2013	10:20 AM	14th St SW (Mewata) Bridge
17.81	51678.5	1049.34	1049.62	0.27	1750	7/2/2013	10:21 AM	
17.85	51639.8	1049.37	1049.55	0.18	1750	7/2/2013	1:33 PM	
17.87	51625.9	1049.38	1049.53	0.15	1750	6/25/2013	12:40 PM	
17.89	51603.8	1049.33	1049.49	0.17	1750	6/25/2013	12:39 PM	
17.90	51595.7	1049.29	1049.48	0.19	1750	7/2/2013	1:32 PM	
17.91	51580.7	1049.26	1049.46	0.19	1750	6/25/2013	12:38 PM	
17.94	51555.2	1049.22	1049.42	0.19	1750	7/2/2013	1:32 PM	
18.15	51343.6	1048.52	1049.06	0.55	1750	7/2/2013	1:28 PM	Water level lower than downstream
18.20	51287.4	1048.81	1048.97	0.16	1750	7/2/2013	1:23 PM	
18.22	51273.6	1048.63	1048.95	0.32	1750	7/2/2013	1:23 PM	
18.24	51253.6	1048.53	1048.91	0.38	1750	7/2/2013	1:25 PM	
18.39	51097.2	1048.43	1048.65	0.22	1750	6/25/2013	1:38 PM	
18.40	51089.7	1048.31	1048.64	0.33	1750	6/25/2013	1:38 PM	
18.41	51083.7	1048.36	1048.63	0.27	1750	6/25/2013	1:37 PM	
18.42	51070.0	1048.34	1048.61	0.27	1750	6/25/2013	1:34 PM	
18.42	51068.6	1048.44	1048.61	0.17	1750	6/25/2013	1:34 PM	
18.53	50962.8	1048.60	1048.45	-0.15	1750	6/21/2013	11:18 AM	
18.53	50960.7	1048.53	1048.45	-0.08	1750	6/25/2013	1:45 PM	
18.54	50955.5	1048.45	1048.44	-0.02	1750	6/25/2013	1:45 PM	
18.54	50950.8	1048.48	1048.43	-0.05	1750	6/25/2013	1:45 PM	10 m Upstream of Louise (Hillhurst) Bridge
18.59	50897.4	1048.19	1048.28	0.09	1750	6/25/2013	1:51 PM	
18.60	50894.7	1048.24	1048.27	0.03	1750	6/25/2013	1:51 PM	
18.61	50886.8	1048.18	1048.24	0.06	1750	6/25/2013	12:11 PM	
18.61	50881.9	1048.19	1048.23	0.04	1750	6/21/2013	11:10 AM	

Distance from the Bearspaw Dam (km)	Interpolated HEC-RAS Station	Surveyed HWM (m)	Simulated Water Level (m)	Difference (Simulated Water Level - Surveyed HWM) (m)	Simulated Discharge (m^3/s)	Surveyed Date	Surveyed Time	Description
18.63	50861.4	1048.08	1048.16	0.08	1750	6/21/2013	11:16 AM	
18.65	50847.0	1048.46	1048.11	-0.35	1750	6/25/2013	1:51 PM	Water level higher than left bank
18.65	50840.6	1048.37	1048.09	-0.28	1750	6/25/2013	12:10 PM	Water level higher than left bank
18.66	50835.3	1048.53	1048.08	-0.45	1750	6/25/2013	12:10 PM	Water level higher than left bank
18.66	50833.3	1048.28	1048.07	-0.21	1750	6/25/2013	1:52 PM	Water level higher than left bank
18.66	50833.0	1047.93	1048.07	0.14	1750	6/25/2013	12:09 PM	
18.66	50830.1	1047.86	1048.06	0.20	1750	6/25/2013	1:57 PM	
18.66	50827.9	1048.09	1048.05	-0.04	1750	6/25/2013	12:08 PM	
18.69	50805.0	1047.86	1047.97	0.10	1750	6/25/2013	12:08 PM	
18.71	50785.7	1047.91	1047.90	0.00	1750	6/25/2013	1:57 PM	
18.72	50772.9	1047.49	1047.86	0.38	1750	6/25/2013	1:58 PM	
18.73	50762.2	1047.56	1047.83	0.27	1750	6/25/2013	1:59 PM	
18.77	50721.0	1047.53	1047.70	0.17	1750	6/25/2013	12:00 PM	
18.79	50703.6	1047.46	1047.65	0.19	1750	6/25/2013	12:18 PM	
18.83	50658.4	1047.15	1047.64	0.49	1750	6/25/2013	12:19 PM	
18.86	50636.5	1047.21	1047.64	0.43	1750	6/25/2013	12:23 PM	
18.87	50618.3	1047.20	1047.63	0.43	1750	6/25/2013	12:23 PM	
18.88	50607.9	1047.32	1047.63	0.31	1750	6/25/2013	12:23 PM	
18.90	50593.1	1047.33	1047.63	0.30	1750	6/25/2013	12:24 PM	
19.03	50465.7	1047.26	1047.46	0.20	1750	6/25/2013	11:33 AM	
19.06	50433.8	1047.02	1047.40	0.38	1750	6/25/2013	11:48 AM	
19.06	50428.7	1047.09	1047.39	0.31	1750	6/25/2013	11:30 AM	
19.07	50421.4	1047.27	1047.38	0.11	1750	6/25/2013	11:46 AM	
19.07	50419.1	1047.18	1047.38	0.20	1750	6/25/2013	11:32 AM	
19.08	50413.6	1047.42	1047.37	-0.05	1750	6/25/2013	11:46 AM	
19.10	50395.0	1047.12	1047.35	0.23	1750	6/25/2013	11:39 AM	
19.10	50393.3	1047.13	1047.35	0.22	1750	6/25/2013	11:39 AM	
19.10	50391.1	1047.23	1047.35	0.12	1750	6/25/2013	11:40 AM	
19.11	50385.9	1047.20	1047.36	0.16	1750	6/25/2013	11:40 AM	
19.11	50384.2	1047.17	1047.36	0.19	1750	6/25/2013	11:27 AM	
19.11	50378.0	1047.23	1047.36	0.13	1750	6/25/2013	11:40 AM	
19.13	50366.0	1047.21	1047.37	0.17	1750	6/25/2013	11:40 AM	
19.13	50358.5	1047.17	1047.38	0.21	1750	6/25/2013	11:40 AM	
19.15	50341.5	1047.07	1047.40	0.32	1750	6/25/2013	11:42 AM	
19.16	50332.3	1047.14	1047.40	0.26	1750	6/25/2013	11:43 AM	
19.18	50316.4	1047.14	1047.42	0.27	1750	6/25/2013	11:43 AM	
19.28	50213.1	1046.13	1047.19	1.06	1507	7/2/2013	11:37 AM	
19.46	50033.8	1045.70	1047.06	1.36	1507	7/2/2013	11:29 AM	
19.55	49938.4	1045.22	1047.01	1.80	1507	7/2/2013	11:17 AM	behind the dyke
19.57	49923.2	1045.22	1047.01	1.79	1507	7/2/2013	11:12 AM	behind the dyke
19.82	49674.7	1045.37	1046.60	1.23	1507	6/25/2013	11:08 AM	behind the dyke
19.82	49674.0	1045.25	1046.60	1.35	1507	6/25/2013	11:07 AM	behind the dyke
19.83	49665.9	1045.23	1046.58	1.35	1507	6/25/2013	11:07 AM	behind the dyke
19.84	49655.0	1045.29	1046.55	1.26	1507	6/25/2013	11:06 AM	behind the dyke
19.85	49645.6	1045.27	1046.53	1.26	1507	6/25/2013	10:55 AM	behind the dyke
19.85	49641.1	1045.27	1046.52	1.24	1507	6/25/2013	10:55 AM	behind the dyke
19.86	49633.8	1045.35	1046.47	1.12	1507	6/25/2013	10:56 AM	behind the dyke
20.06	49427.8	1045.77	1046.04	0.28	1507	7/2/2013	10:42 AM	
20.07	49418.8	1045.79	1046.02	0.24	1507	7/2/2013	10:43 AM	
20.08	49411.6	1045.78	1046.01	0.23	1507	7/2/2013	10:43 AM	
20.12	49375.6	1045.75	1045.92	0.18	1507	7/2/2013	10:44 AM	
20.13	49359.3	1045.88	1045.89	0.01	1507	7/2/2013	11:03 AM	
20.17	49325.4	1045.66	1045.81	0.15	1507	7/2/2013	10:45 AM	
20.17	49322.6	1045.85	1045.80	-0.05	1507	7/2/2013	11:02 AM	Water level higher than upstream
20.22	49270.4	1045.67	1045.68	0.01	1507	7/2/2013	11:00 AM	
20.24	49248.2	1045.63	1045.63	0.00	1507	7/2/2013	11:00 AM	
20.35	49138.0	1045.12	1045.38	0.26	1507	7/2/2013	10:53 AM	
20.47	49018.0	1044.56	1045.11	0.55	1507	6/21/2013	12:17 PM	30 m Upstream of Centre St Bridge
20.53	48966.5	1044.72	1045.01	0.29	1750	6/21/2013	12:26 PM	
20.62	48876.4	1044.47	1044.62	0.15	1750	6/21/2013	12:31 PM	
20.76	48730.4	1044.08	1044.36	0.29	1750	7/3/2013	10:19 AM	
20.77	48720.4	1044.06	1044.33	0.27	1750	7/2/2013	12:48 PM	
20.88	48612.3	1043.84	1043.97	0.13	1750	7/3/2013	10:22 AM	
20.94	48552.7	1043.78	1043.84	0.06	1750	7/2/2013	12:43 PM	
20.96	48530.9	1043.77	1043.80	0.03	1750	7/2/2013	12:44 PM	
21.09	48405.7	1043.29	1043.56	0.28	1750	7/2/2013	12:40 PM	
21.15	48343.1	1043.16	1043.44	0.28	1750	7/2/2013	12:38 PM	
21.16	48332.4	1043.24	1043.42	0.18	1750	7/2/2013	12:38 PM	
21.22	48276.7	1043.37	1043.31	-0.06	1750	6/25/2013	10:41 AM	
21.31	48184.5	1042.89	1043.09	0.20	1750	6/25/2013	10:32 AM	
21.31	48182.8	1042.85	1043.08	0.23	1750	6/25/2013	10:44 AM	10 m Upstream of Old Langevin Bridge
21.35	48143.1	1043.03	1042.96	-0.07	1750	6/25/2013	10:30 AM	
21.37	48117.3	1043.02	1042.96	-0.05	1750	6/25/2013	10:28 AM	
21.39	48098.3	1042.66	1042.93	0.26	1750	6/25/2013	10:26 AM	
21.40	48092.3	1042.28	1042.91	0.63	1750	6/25/2013	10:48 AM	Water level lower than downstream
21.42	48076.9	1042.71	1042.88	0.17	1750	6/25/2013	10:25 AM	
21.43	48059.1	1042.66	1042.84	0.18	1750	6/25/2013	10:23 AM	
21.43	48059.1	1042.66	1042.84	0.18	1750	6/25/2013	10:50 AM	
21.48	48010.8	1042.51	1042.68	0.18	1750	6/25/2013	10:54 AM	
21.52	47973.0	1042.33	1042.68	0.35	1750	6/25/2013	10:21 AM	
21.54	47953.3	1042.13	1042.68	0.55	1750	6/25/2013	10:19 AM	
21.55	47943.4	1042.24	1042.67	0.43	1750	6/25/2013	10:18 AM	
21.57	47925.5	1042.29	1042.66	0.37	1750	6/25/2013	10:58 AM	
21.59	47904.9	1042.43	1042.64	0.21	1750	6/25/2013	10:16 AM	

Distance from the Bearspaw Dam (km)	Interpolated HEC-RAS Station	Surveyed HWM (m)	Simulated Water Level (m)	Difference (Simulated Water Level - Surveyed HWM) (m)	Simulated Discharge (m^3/s)	Surveyed Date	Surveyed Time	Description
21.62	47876.7	1042.22	1042.61	0.39	1750	6/25/2013	10:15 AM	
21.62	47868.5	1042.62	1042.61	-0.02	1750	6/25/2013	10:13 AM	Water level higher than upstream
21.64	47855.6	1042.27	1042.59	0.32	1750	7/3/2013	10:35 AM	
21.66	47836.6	1042.23	1042.58	0.35	1750	6/25/2013	10:11 AM	
21.69	47804.1	1042.24	1042.55	0.31	1750	6/25/2013	10:09 AM	
21.71	47783.6	1042.15	1042.53	0.38	1138	6/25/2013	10:05 AM	
21.72	47776.2	1042.02	1042.53	0.51	1138	7/3/2013	10:38 AM	on side channel
21.74	47747.2	1042.04	1042.51	0.47	1138	6/25/2013	10:03 AM	
21.92	47568.6	1041.15	1041.26	0.11	1138	7/3/2013	10:43 AM	on side channel
22.22	47269.9	1040.81	1041.06	0.26	1138	7/3/2013	11:00 AM	
22.52	46975.0	1039.91	1040.84	0.93	1837	7/3/2013	11:05 AM	on side channel
22.84	46652.9	1039.69	1040.55	0.86	1837	7/3/2013	11:55 AM	on side channel
22.87	46626.5	1039.51	1040.52	1.01	1837	7/3/2013	11:56 AM	on side channel
22.87	46626.5	1039.48	1040.52	1.04	1837	7/3/2013	11:56 AM	on side channel
22.94	46550.2	1040.14	1040.39	0.26	1837	6/25/2013	12:07 PM	St. George's Island Bridge
22.96	46536.1	1040.29	1040.35	0.05	1837	6/25/2013	12:06 PM	
23.76	45734.9	1038.30	1038.97	0.67	2360	7/3/2013	11:27 AM	Water level lower than downstream
23.82	45674.9	1038.61	1038.93	0.32	2360	7/3/2013	11:25 AM	
23.87	45625.4	1038.56	1038.89	0.33	2360	7/3/2013	11:24 AM	Nose Creek Confluence
24.13	45364.7	1038.28	1038.58	0.30	2395	7/3/2013	1:55 PM	
24.13	45364.7	1038.28	1038.58	0.30	2395	7/3/2013	1:55 PM	
24.17	45319.0	1038.30	1038.58	0.28	2395	7/3/2013	1:53 PM	
24.21	45282.3	1038.20	1038.58	0.38	2395	7/3/2013	1:53 PM	
24.29	45200.7	1037.13	1037.65	0.53	2395	7/3/2013	1:51 PM	Water level lower than downstream
24.30	45193.3	1037.33	1037.45	0.12	2395	7/3/2013	1:51 PM	
24.38	45115.0	1037.39	1037.27	-0.12	2395	7/3/2013	1:49 PM	
24.41	45084.1	1037.52	1037.20	-0.31	2395	7/3/2013	1:48 PM	Water level higher than upstream
24.42	45071.6	1037.39	1037.17	-0.22	2395	7/3/2013	1:47 PM	
24.46	45033.8	1037.01	1037.07	0.06	2395	7/3/2013	1:46 PM	
24.51	44980.3	1037.00	1036.93	-0.07	2395	7/3/2013	1:45 PM	
24.57	44924.9	1036.88	1036.78	-0.10	2395	7/3/2013	1:44 PM	
24.61	44886.7	1036.87	1036.68	-0.19	2395	7/3/2013	1:43 PM	
24.64	44847.8	1036.83	1036.58	-0.24	2395	7/3/2013	1:42 PM	
24.75	44740.4	1036.71	1036.35	-0.36	2395	7/3/2013	1:40 PM	
24.83	44659.6	1036.30	1036.23	-0.08	2395	7/3/2013	2:08 PM	
24.88	44609.1	1035.96	1036.15	0.19	2395	7/3/2013	2:10 PM	Water level lower than downstream
24.90	44590.9	1036.40	1036.12	-0.28	2395	7/3/2013	2:33 PM	
24.91	44586.6	1036.37	1036.11	-0.26	2395	7/3/2013	2:18 PM	
24.92	44572.4	1036.33	1036.09	-0.24	2395	7/3/2013	2:17 PM	
24.99	44501.6	1036.21	1035.97	-0.23	2395	7/3/2013	2:40 PM	
25.13	44359.0	1035.46	1035.68	0.23	2395	7/3/2013	2:39 PM	Water level lower than downstream
25.13	44358.4	1035.78	1035.68	-0.10	2395	7/3/2013	2:41 PM	
25.17	44323.9	1035.62	1035.61	-0.02	2395	7/3/2013	2:17 PM	10 m Upstream of 17 Ave (Cushing) Bridge
26.14	43350.3	1033.64	1033.92	0.28	2395	7/3/2013	12:28 PM	
26.18	43310.3	1033.44	1033.83	0.39	2395	7/3/2013	12:31 PM	
26.19	43305.5	1033.67	1033.82	0.15	2395	7/3/2013	11:56 AM	
26.20	43293.5	1033.71	1033.80	0.09	2395	7/3/2013	11:57 AM	
26.21	43279.9	1033.63	1033.77	0.14	2395	7/3/2013	12:00 PM	
26.32	43170.6	1033.61	1033.64	0.03	2395	7/3/2013	12:02 PM	
26.43	43060.4	1033.79	1033.51	-0.28	2395	7/3/2013	12:05 PM	
26.59	42899.8	1033.77	1033.44	-0.33	2395	7/3/2013	12:08 PM	
26.70	42793.8	1033.51	1033.34	-0.17	2395	7/3/2013	12:11 PM	
26.75	42739.3	1033.51	1033.28	-0.22	2395	7/3/2013	9:32 AM	
26.76	42733.2	1033.54	1033.28	-0.26	2395	7/3/2013	9:32 AM	
26.78	42715.0	1033.46	1033.26	-0.20	2395	7/3/2013	12:15 PM	
26.78	42707.2	1033.37	1033.25	-0.12	2395	7/3/2013	12:17 PM	
26.83	42667.1	1033.37	1033.21	-0.16	2395	7/3/2013	9:35 AM	
26.85	42645.0	1033.23	1033.18	-0.05	2395	7/3/2013	9:36 AM	
26.86	42628.3	1033.24	1033.15	-0.09	2395	7/3/2013	9:37 AM	
26.86	42628.3	1033.26	1033.15	-0.11	2395	7/3/2013	12:19 PM	
27.05	42446.8	1032.61	1032.85	0.24	2395	7/2/2013	1:07 PM	
27.10	42387.2	1032.59	1032.75	0.16	2395	7/3/2013	12:26 PM	
27.15	42339.2	1032.48	1032.67	0.19	2395	7/2/2013	12:59 PM	
27.21	42280.7	1032.59	1032.56	-0.02	2395	7/2/2013	1:01 PM	
27.23	42260.2	1032.29	1032.53	0.24	2395	7/2/2013	1:02 PM	
27.24	42257.0	1032.39	1032.52	0.13	2395	7/2/2013	1:04 PM	
27.50	41987.3	1032.02	1032.18	0.16	2395	7/3/2013	12:34 PM	
27.51	41979.6	1032.18	1032.17	-0.01	2395	7/2/2013	11:12 AM	
27.54	41949.0	1032.19	1032.13	-0.06	2395	7/2/2013	11:13 AM	
27.60	41895.5	1032.17	1032.07	-0.10	2395	7/2/2013	11:14 AM	
27.64	41854.2	1032.19	1032.02	-0.17	2395	7/2/2013	11:16 AM	
27.66	41834.1	1032.28	1031.99	-0.29	2395	7/2/2013	11:17 AM	
27.70	41794.7	1032.54	1031.94	-0.60	2395	7/2/2013	11:19 AM	Water level higher than upstream
27.70	41788.7	1032.25	1031.94	-0.31	2395	7/2/2013	11:19 AM	
27.77	41720.2	1032.11	1031.87	-0.24	2395	7/2/2013	11:25 AM	
27.79	41700.1	1031.81	1031.85	0.03	2395	7/2/2013	11:24 AM	
27.87	41617.4	1032.13	1031.77	-0.36	2395	7/2/2013	11:28 AM	
27.90	41595.1	1031.84	1031.75	-0.09	2395	7/2/2013	11:29 AM	
27.92	41572.2	1031.79	1031.73	-0.05	2395	7/2/2013	11:30 AM	
27.94	41550.9	1031.80	1031.72	-0.09	2395	7/2/2013	11:31 AM	
27.96	41535.0	1031.78	1031.70	-0.08	2395	7/2/2013	11:32 AM	
28.08	41411.8	1031.71	1031.55	-0.15	2395	7/2/2013	11:34 AM	
28.15	41341.6	1031.45	1031.46	0.01	2395	7/2/2013	11:36 AM	
28.27	41224.1	1031.43	1031.30	-0.12	2395	7/2/2013	11:38 AM	

Distance from the Bearspaw Dam (km)	Interpolated HEC-RAS Station	Surveyed HWM (m)	Simulated Water Level (m)	Difference (Simulated Water Level - Surveyed HWM) (m)	Simulated Discharge (m^3/s)	Surveyed Date	Surveyed Time	Description
28.34	41157.0	1031.59	1031.21	-0.38	2395	7/2/2013	11:40 AM	
28.39	41098.6	1031.41	1031.13	-0.27	2395	7/2/2013	11:41 AM	
28.44	41049.4	1031.28	1031.07	-0.21	2395	7/2/2013	11:42 AM	
28.46	41036.9	1031.38	1031.05	-0.34	2395	7/2/2013	11:43 AM	
28.46	41029.1	1031.64	1031.01	-0.63	2395	7/2/2013	11:46 AM	Water level higher than upstream
28.49	40997.6	1030.22	1030.84	0.62	2395	7/2/2013	11:48 AM	
28.61	40878.8	1030.19	1030.23	0.04	2395	7/2/2013	11:54 AM	
28.62	40872.6	1030.27	1030.20	-0.07	2395	7/2/2013	11:54 AM	
28.65	40845.8	1029.91	1030.07	0.16	2395	7/2/2013	11:57 AM	Bonnybrook (Ogden Road) Bridge
28.70	40795.0	1029.80	1029.86	0.06	2395	7/2/2013	11:58 AM	
28.74	40754.3	1029.77	1029.73	-0.04	2395	7/2/2013	12:00 PM	
29.13	40361.0	1028.72	1028.89	0.17	2395	6/26/2013	12:35 PM	Water level lower than Downstream
29.17	40317.9	1029.24	1028.82	-0.42	2395	6/26/2013	12:38 PM	
29.19	40298.9	1029.20	1028.80	-0.40	2395	6/26/2013	12:39 PM	
29.22	40272.1	1029.24	1028.76	-0.47	2395	6/26/2013	12:39 PM	
29.23	40258.3	1029.18	1028.74	-0.44	2395	6/26/2013	12:39 PM	
29.24	40257.1	1029.03	1028.74	-0.29	2395	6/26/2013	12:39 PM	
29.30	40188.3	1028.27	1028.65	0.38	2395	6/26/2013	12:42 PM	CN Rail Bridge Embankment was eroded
29.31	40187.1	1028.19	1028.65	0.46	2395	6/26/2013	12:42 PM	CN Rail Bridge Embankment was eroded
29.31	40184.8	1028.26	1028.65	0.39	2395	6/26/2013	1:36 PM	20 m Upstream of Calf Robe (Deerfoot Trail) Bridge
29.31	40180.3	1028.03	1028.64	0.61	2395	6/26/2013	1:36 PM	CN Rail Bridge Embankment was eroded
29.32	40171.9	1028.12	1028.62	0.50	2395	6/26/2013	1:37 PM	CN Rail Bridge Embankment was eroded
29.38	40112.6	1028.13	1028.50	0.37	2395	6/26/2013	1:33 PM	CN Rail Bridge Embankment was eroded
29.38	40108.1	1028.10	1028.50	0.40	2395	6/26/2013	1:31 PM	CN Rail Bridge Embankment was eroded
29.39	40104.7	1028.23	1028.49	0.26	2395	6/26/2013	1:38 PM	CN Rail Bridge Embankment was eroded
29.40	40091.3	1028.04	1028.48	0.44	2395	6/26/2013	1:39 PM	CN Rail Bridge Embankment was eroded
29.44	40054.7	1028.11	1028.45	0.34	2395	6/26/2013	1:40 PM	CN Rail Bridge Embankment was eroded
29.54	39955.9	1027.97	1028.35	0.38	2395	7/3/2013	9:59 AM	CN Rail Bridge Embankment was eroded
29.56	39929.1	1027.98	1028.32	0.34	2395	7/3/2013	9:57 AM	CN Rail Bridge Embankment was eroded
29.58	39912.5	1027.80	1028.29	0.49	2395	7/3/2013	10:01 AM	CN Rail Bridge Embankment was eroded
29.67	39818.8	1027.62	1028.04	0.42	2395	7/3/2013	10:11 AM	CN Rail Bridge Embankment was eroded
29.75	39739.8	1027.60	1027.83	0.22	2395	7/3/2013	10:10 AM	CN Rail Bridge Embankment was eroded
29.82	39671.9	1027.60	1027.70	0.10	2395	7/3/2013	10:08 AM	CN Rail Bridge Embankment was eroded
29.82	39671.9	1027.60	1027.70	0.09	2395	7/3/2013	10:08 AM	CN Rail Bridge Embankment was eroded
29.88	39616.6	1027.55	1027.48	-0.07	2395	7/3/2013	10:16 AM	
31.99	37499.6	1022.96	1023.78	0.82	2395	6/21/2013	1:00 PM	
32.17	37321.7	1022.98	1023.32	0.34	2395	6/21/2013	12:58 PM	
32.23	37265.7	1022.93	1023.14	0.22	2395	6/21/2013	12:55 PM	50 m Upstream of Graves (Glenmore Trail) Bridges
32.40	37090.8	1022.76	1022.34	-0.41	2395	6/21/2013	1:11 PM	
32.42	37075.9	1022.75	1022.31	-0.44	2395	6/21/2013	1:11 PM	
32.46	37036.2	1022.91	1022.20	-0.70	2395	6/21/2013	12:37 PM	Water level higher than upstream
33.26	36233.8	1021.27	1021.07	-0.21	2395	6/28/2013	12:54 PM	
33.28	36216.6	1021.07	1021.04	-0.03	2395	6/28/2013	12:45 PM	
33.31	36185.4	1021.18	1020.99	-0.20	2395	6/28/2013	12:44 PM	
33.31	36180.9	1021.02	1020.98	-0.04	2395	6/28/2013	12:44 PM	
33.36	36135.7	1020.84	1020.91	0.07	2395	6/28/2013	12:43 PM	
33.40	36089.3	1020.78	1020.83	0.05	2395	6/28/2013	12:42 PM	
33.45	36038.5	1020.75	1020.75	0.01	2395	6/28/2013	12:40 PM	
34.71	34781.3	1019.24	1019.36	0.11	2395	6/28/2013	2:15 PM	
34.73	34761.1	1019.20	1019.31	0.10	2395	6/28/2013	2:12 PM	
34.76	34733.6	1018.74	1019.24	0.50	2395	6/28/2013	2:10 PM	Water level lower than Downstream
34.82	34669.5	1019.50	1019.09	-0.41	2395	6/28/2013	1:58 PM	
34.92	34569.1	1019.23	1018.85	-0.38	2395	6/28/2013	1:55 PM	
35.01	34485.0	1019.14	1018.59	-0.55	2395	6/28/2013	1:48 PM	
35.18	34311.9	1018.53	1018.37	-0.17	2395	6/28/2013	1:44 PM	
35.21	34281.0	1018.30	1018.31	0.01	2395	6/28/2013	1:39 PM	
35.24	34251.4	1018.27	1018.25	-0.01	2395	6/28/2013	1:38 PM	
35.27	34217.6	1018.23	1018.19	-0.04	2395	6/28/2013	1:37 PM	
35.29	34203.6	1018.28	1018.17	-0.10	2395	6/28/2013	1:37 PM	
35.34	34154.5	1018.16	1018.10	-0.06	2395	6/28/2013	1:35 PM	
35.37	34127.0	1018.20	1018.06	-0.14	2395	6/28/2013	1:34 PM	
35.43	34058.0	1018.04	1017.96	-0.07	2395	6/28/2013	1:32 PM	
35.45	34040.3	1018.14	1017.93	-0.21	2395	6/28/2013	1:31 PM	
35.45	34038.6	1018.17	1017.93	-0.24	2395	6/28/2013	1:31 PM	
35.54	33952.2	1017.62	1017.77	0.15	2395	6/28/2013	1:29 PM	
35.61	33879.4	1017.60	1017.64	0.03	2395	6/28/2013	1:28 PM	
37.10	32396.3	1014.95	1015.05	0.10	2395	6/21/2013	12:01 PM	Ivor Strong (Deerfoot Trail) Bridge
37.33	32162.3	1013.88	1014.80	0.93	2395	7/2/2013	2:21 PM	
37.33	32160.9	1014.03	1014.80	0.77	2395	7/2/2013	2:20 PM	
37.34	32151.4	1014.26	1014.79	0.53	2395	7/2/2013	2:19 PM	
37.34	32149.6	1013.97	1014.79	0.82	2395	7/2/2013	2:17 PM	
37.49	32004.6	1013.78	1014.57	0.79	2395	7/2/2013	2:18 PM	
37.53	31963.8	1013.78	1014.50	0.72	2395	7/2/2013	2:16 PM	
37.56	31933.4	1013.66	1014.44	0.79	2395	7/2/2013	2:16 PM	
37.60	31887.5	1013.68	1014.36	0.67	2395	7/2/2013	2:17 PM	
37.65	31838.2	1013.76	1014.26	0.50	2395	7/2/2013	2:15 PM	
37.80	31690.1	1013.73	1013.98	0.25	2395	7/2/2013	2:12 PM	
37.83	31657.4	1013.64	1013.92	0.28	2395	7/2/2013	2:11 PM	
37.87	31622.6	1013.21	1013.86	0.65	2395	7/2/2013	2:10 PM	
37.92	31569.8	1013.25	1013.74	0.49	2395	7/2/2013	2:09 PM	
37.99	31497.7	1013.20	1013.55	0.35	2395	7/2/2013	2:08 PM	
38.01	31486.9	1012.96	1013.52	0.56	2395	7/2/2013	2:07 PM	
38.14	31350.0	1012.67	1013.15	0.48	2395	7/2/2013	2:03 PM	
38.19	31305.5	1012.16	1013.03	0.87	2395	7/2/2013	2:01 PM	

Distance from the Bearspaw Dam (km)	Interpolated HEC-RAS Station	Surveyed HWM (m)	Simulated Water Level (m)	Difference (Simulated Water Level - Surveyed HWM) (m)	Simulated Discharge (m^3/s)	Surveyed Date	Surveyed Time	Description
38.27	31218.8	1012.26	1012.80	0.54	2395	6/28/2013	10:16 AM	
38.27	31217.5	1012.53	1012.79	0.27	2395	6/28/2013	10:17 AM	
38.29	31200.9	1012.61	1012.75	0.14	2395	7/2/2013	1:58 PM	
38.31	31179.7	1012.29	1012.69	0.40	2395	7/2/2013	1:56 PM	
38.33	31158.1	1012.37	1012.63	0.26	2395	6/28/2013	10:18 AM	
38.35	31142.6	1012.05	1012.59	0.53	2395	6/28/2013	10:18 AM	
38.35	31139.9	1012.20	1012.58	0.38	2395	7/2/2013	1:53 PM	
38.38	31115.3	1012.08	1012.51	0.43	2395	6/28/2013	10:19 AM	
38.40	31095.3	1012.14	1012.46	0.31	2395	6/28/2013	10:19 AM	
38.42	31074.6	1011.98	1012.40	0.42	2395	6/28/2013	10:20 AM	
38.43	31061.3	1011.74	1012.36	0.62	2395	7/2/2013	1:52 PM	
38.43	31059.8	1011.93	1012.36	0.43	2395	6/28/2013	10:20 AM	
38.45	31047.1	1011.69	1012.32	0.63	2395	6/28/2013	10:21 AM	
38.46	31034.4	1011.98	1012.29	0.31	2395	6/28/2013	10:21 AM	
38.48	31011.0	1011.88	1012.22	0.34	2395	6/28/2013	10:22 AM	
38.50	30990.5	1011.90	1012.19	0.29	2395	6/28/2013	10:22 AM	
38.55	30942.7	1011.56	1012.12	0.56	2395	6/28/2013	10:24 AM	
38.61	30879.1	1011.63	1011.96	0.34	2395	7/2/2013	1:50 PM	
38.62	30872.3	1011.45	1011.90	0.45	2395	7/2/2013	1:49 PM	
38.64	30855.1	1011.49	1011.74	0.25	2395	6/28/2013	10:26 AM	
38.65	30840.3	1011.41	1011.67	0.26	2395	7/2/2013	1:48 PM	
38.67	30824.7	1011.36	1011.63	0.27	2395	6/28/2013	10:27 AM	
38.73	30758.3	1011.39	1011.46	0.07	2395	7/2/2013	1:44 PM	
38.78	30714.0	1010.87	1011.34	0.48	2395	6/28/2013	10:34 AM	
38.84	30656.8	1010.84	1011.19	0.35	2395	7/2/2013	1:42 PM	
38.86	30636.2	1010.82	1011.14	0.32	2395	6/28/2013	11:03 AM	
38.90	30594.8	1010.45	1011.06	0.61	2395	6/28/2013	10:43 AM	Water level lower than Downstream
38.91	30586.3	1010.33	1011.04	0.71	2395	6/28/2013	10:45 AM	Water level lower than downstream
38.92	30572.5	1010.86	1011.01	0.15	2395	6/28/2013	10:48 AM	
38.96	30534.6	1010.66	1010.93	0.28	2395	7/2/2013	1:40 PM	
39.01	30484.1	1010.50	1010.83	0.33	2395	6/28/2013	10:52 AM	
39.08	30407.8	1010.24	1010.67	0.43	2395	6/28/2013	10:54 AM	on side channel
39.13	30366.0	1009.85	1010.56	0.71	2395	6/28/2013	10:55 AM	on side channel
39.26	30237.1	1009.63	1010.25	0.62	2395	6/28/2013	11:38 AM	on side channel
39.31	30184.1	1009.54	1010.12	0.58	2395	6/28/2013	11:39 AM	on side channel
39.55	29943.8	1009.49	1009.63	0.14	2395	6/28/2013	11:43 AM	
39.60	29896.7	1009.30	1009.55	0.25	2395	6/28/2013	11:44 AM	
39.68	29813.8	1009.04	1009.42	0.39	2395	6/28/2013	11:47 AM	
39.70	29790.4	1009.25	1009.39	0.14	2395	7/2/2013	2:45 PM	
39.80	29695.6	1008.99	1009.26	0.27	2395	6/28/2013	11:50 AM	
39.84	29656.5	1009.02	1009.20	0.18	2395	7/2/2013	2:38 PM	
39.95	29541.3	1008.99	1009.00	0.01	2395	7/2/2013	2:37 PM	
40.11	29380.3	1008.62	1008.72	0.10	2395	7/3/2013	9:28 AM	
40.14	29349.0	1008.43	1008.66	0.23	2395	7/3/2013	9:32 AM	
40.17	29326.3	1008.48	1008.62	0.14	2395	7/3/2013	9:36 AM	
41.16	28329.6	1006.52	1006.81	0.29	2395	6/28/2013	12:18 PM	
41.17	28317.8	1006.66	1006.80	0.14	2395	7/3/2013	9:55 AM	
41.19	28300.8	1006.43	1006.78	0.35	2395	7/3/2013	9:56 AM	
41.20	28294.7	1006.40	1006.78	0.38	2395	7/3/2013	9:57 AM	
41.22	28272.1	1006.57	1006.76	0.19	2395	7/3/2013	9:58 AM	
41.23	28258.4	1006.45	1006.75	0.30	2395	7/3/2013	9:59 AM	
41.29	28201.6	1006.30	1006.70	0.40	2395	7/3/2013	10:00 AM	on side channel
41.52	27973.6	1005.87	1006.42	0.55	2395	6/28/2013	12:22 PM	on side channel
41.82	27670.7	1005.43	1005.92	0.49	2395	6/28/2013	12:31 PM	
41.85	27642.5	1005.46	1005.87	0.41	2395	6/28/2013	12:32 PM	
41.88	27608.5	1004.93	1005.81	0.88	2395	6/28/2013	12:37 PM	
42.02	27473.8	1005.08	1005.56	0.48	2395	6/28/2013	12:40 PM	
42.18	27316.7	1004.52	1005.21	0.69	2395	6/28/2013	1:47 PM	
42.20	27294.1	1004.51	1005.17	0.66	2395	6/28/2013	1:48 PM	
42.22	27274.5	1004.41	1005.12	0.72	2395	6/28/2013	1:48 PM	
42.26	27235.0	1004.52	1005.04	0.52	2395	6/28/2013	1:49 PM	
42.36	27135.8	1004.42	1004.82	0.41	2395	6/28/2013	1:52 PM	
42.41	27083.6	1004.69	1004.71	0.02	2395	7/3/2013	10:33 AM	
42.47	27026.5	1004.38	1004.59	0.21	2395	6/28/2013	1:55 PM	
42.55	26937.4	1004.17	1004.39	0.23	2395	6/28/2013	1:57 PM	
42.93	26561.9	1003.62	1003.49	-0.13	2395	7/2/2013	1:16 PM	
42.98	26516.3	1003.16	1003.41	0.25	2395	7/2/2013	1:15 PM	
42.98	26510.6	1003.60	1003.40	-0.19	2395	6/28/2013	2:50 PM	
43.01	26478.5	1003.13	1003.35	0.21	2395	7/2/2013	1:13 PM	
43.02	26471.5	1003.64	1003.33	-0.31	2395	6/28/2013	2:51 PM	
43.08	26416.3	1003.20	1003.24	0.04	2395	6/28/2013	2:52 PM	
43.09	26401.2	1003.56	1003.21	-0.35	2395	7/2/2013	1:10 PM	
43.13	26364.2	1003.39	1003.27	-0.11	2395	7/2/2013	1:06 PM	
43.15	26344.9	1003.26	1003.25	-0.01	2395	7/2/2013	1:05 PM	
43.18	26315.2	1003.31	1003.21	-0.10	2395	7/2/2013	1:05 PM	
43.23	26262.5	1002.91	1003.11	0.20	2395	7/2/2013	1:02 PM	
43.27	26222.4	1002.76	1003.01	0.26	2395	7/2/2013	1:01 PM	
43.52	25973.4	1002.79	1002.49	-0.30	2395	6/28/2013	2:27 PM	
43.68	25817.0	1002.49	1002.22	-0.27	2395	6/28/2013	2:31 PM	
43.69	25799.1	1002.42	1002.19	-0.22	2395	6/28/2013	2:32 PM	
43.77	25722.3	1002.19	1002.06	-0.12	2395	7/2/2013	12:08 PM	
43.81	25682.1	1002.27	1002.00	-0.27	2395	7/2/2013	12:05 PM	
43.93	25565.5	1002.11	1001.80	-0.31	2395	7/2/2013	12:02 PM	
44.40	25096.7	1001.24	1001.12	-0.13	2593	7/3/2013	1:03 PM	Fish Creek Confluence

Distance from the Bearspaw Dam (km)	Interpolated HEC-RAS Station	Surveyed HWM (m)	Simulated Water Level (m)	Difference (Simulated Water Level - Surveyed HWM) (m)	Simulated Discharge (m^3/s)	Surveyed Date	Surveyed Time	Description
44.48	25012.2	1000.67	1000.93	0.26	2593	7/3/2013	12:57 PM	
44.52	24970.1	1000.62	1000.94	0.32	2593	7/3/2013	1:11 PM	
44.55	24946.0	1000.74	1000.94	0.19	2593	7/3/2013	1:14 PM	
44.59	24903.7	1000.64	1000.92	0.28	2593	7/3/2013	1:17 PM	
44.59	24902.7	1000.75	1000.92	0.16	2593	7/3/2013	12:54 PM	
44.59	24899.8	1000.73	1000.91	0.18	2593	7/3/2013	12:52 PM	
44.60	24889.1	1000.70	1000.88	0.18	2593	7/3/2013	1:18 PM	
44.62	24874.7	1000.53	1000.83	0.30	2593	7/3/2013	1:20 PM	
44.62	24868.9	1000.59	1000.81	0.22	2593	7/3/2013	1:23 PM	
44.63	24863.1	1000.70	1000.80	0.10	2593	7/3/2013	11:38 AM	
44.65	24847.0	1000.56	1000.75	0.19	2593	7/3/2013	11:37 AM	
44.65	24840.3	1000.56	1000.73	0.17	2593	7/3/2013	11:31 AM	
44.66	24827.4	1000.37	1000.69	0.32	2593	7/3/2013	11:30 AM	
44.67	24824.7	1000.59	1000.68	0.09	2593	7/3/2013	11:30 AM	
44.68	24811.7	1000.56	1000.64	0.09	2593	7/3/2013	11:28 AM	
44.70	24793.7	1000.41	1000.59	0.18	2593	7/3/2013	11:29 AM	
44.73	24766.8	1000.36	1000.53	0.17	2593	7/3/2013	11:29 AM	
44.80	24696.4	1000.24	1000.47	0.23	2593	7/3/2013	11:27 AM	
44.80	24695.8	1000.40	1000.47	0.07	2593	7/3/2013	11:16 AM	
44.80	24690.9	1000.46	1000.47	0.01	2593	7/3/2013	11:17 AM	
44.80	24689.7	1000.37	1000.47	0.10	2593	7/3/2013	11:17 AM	
44.81	24680.9	1000.42	1000.46	0.03	2593	7/3/2013	11:18 AM	
44.85	24641.5	1000.34	1000.41	0.07	2593	7/3/2013	11:19 AM	
44.87	24622.5	1000.38	1000.39	0.01	2593	7/3/2013	11:20 AM	
44.88	24616.7	1000.44	1000.38	-0.06	2593	7/3/2013	11:22 AM	
44.89	24605.2	1000.44	1000.36	-0.08	2593	7/3/2013	11:22 AM	
45.01	24479.4	1000.12	1000.19	0.08	2593	7/3/2013	1:26 PM	
45.16	24328.8	999.62	1000.06	0.43	2593	7/3/2013	1:29 PM	
45.18	24311.2	999.52	1000.02	0.50	2593	7/3/2013	1:32 PM	
45.43	24066.1	999.16	999.53	0.37	2593	7/2/2013	11:20 AM	
45.47	24027.0	999.21	999.46	0.24	2593	7/2/2013	11:18 AM	
45.47	24024.8	998.78	999.45	0.68	2593	7/2/2013	11:17 AM	on floodplain
45.48	24011.7	999.15	999.43	0.27	2593	7/2/2013	11:29 AM	
45.51	23982.5	998.75	999.39	0.64	2593	7/2/2013	11:31 AM	on floodplain
45.53	23962.5	998.68	999.36	0.68	2593	7/2/2013	11:32 AM	on floodplain
45.54	23954.1	998.92	999.35	0.43	2593	7/2/2013	11:34 AM	on floodplain
45.58	23910.2	999.58	999.30	-0.29	2593	6/27/2013	1:24 PM	
45.59	23898.9	999.21	999.28	0.08	2593	7/2/2013	11:36 AM	
45.59	23897.8	999.21	999.28	0.07	2593	6/27/2013	1:24 PM	
45.65	23847.0	998.76	999.22	0.45	2593	7/2/2013	11:39 AM	on floodplain
45.67	23819.5	998.74	999.18	0.44	2593	7/2/2013	11:05 AM	on floodplain
45.67	23817.3	998.73	999.18	0.45	2593	7/2/2013	11:07 AM	Left bank is 1000.1 m
45.71	23784.6	998.57	999.14	0.57	2593	7/2/2013	11:00 AM	Left bank is 1000.1 m
45.72	23776.1	998.40	999.13	0.73	2593	7/2/2013	11:00 AM	Left bank is 1000.1 m
45.74	23756.5	998.40	999.05	0.65	2593	7/2/2013	10:55 AM	Left bank is 1000.1 m
45.75	23744.4	998.33	999.00	0.67	2593	7/2/2013	10:53 AM	Left bank is 1000.1 m
45.78	23714.8	998.92	998.87	-0.05	2593	6/26/2013	12:33 PM	
45.79	23702.1	998.81	998.82	0.01	2593	6/26/2013	12:33 PM	
45.81	23679.1	998.59	998.72	0.12	2593	6/26/2013	12:19 PM	
45.82	23674.4	998.38	998.70	0.32	2593	6/26/2013	12:19 PM	Right bank is 998.593 m
45.82	23674.1	998.67	998.70	0.03	2593	6/26/2013	12:19 PM	
45.83	23663.1	998.72	998.65	-0.07	2593	6/26/2013	12:32 PM	
45.83	23660.6	998.40	998.64	0.24	2593	6/26/2013	12:20 PM	
45.84	23648.8	998.54	998.59	0.05	2593	6/26/2013	12:34 PM	
45.85	23644.2	998.09	998.57	0.48	2593	6/26/2013	12:35 PM	Right bank is 998.45 m
45.85	23643.9	998.09	998.57	0.48	2593	6/26/2013	12:17 PM	Right bank is 998.45 m
45.85	23639.7	998.01	998.55	0.54	2593	6/26/2013	12:20 PM	Right bank is 998.45 m
45.86	23631.6	998.43	998.52	0.09	2593	6/26/2013	12:21 PM	
45.89	23600.1	998.04	998.42	0.37	2593	6/26/2013	12:39 PM	Marquis de Lorne (Highway 22X) Bridge
45.90	23589.5	998.23	998.38	0.14	2593	6/26/2013	12:39 PM	
45.91	23583.9	998.05	998.36	0.31	2593	6/26/2013	12:14 PM	
45.93	23564.5	998.05	998.29	0.24	2593	6/26/2013	12:40 PM	
45.93	23559.5	998.22	998.27	0.05	2593	6/26/2013	12:13 PM	
45.94	23553.4	997.66	998.25	0.59	2593	6/26/2013	12:40 PM	Water level Lower than downstream
45.94	23550.5	998.22	998.24	0.02	2593	6/26/2013	12:13 PM	
45.94	23548.9	998.39	998.24	-0.15	2593	6/28/2013	10:52 AM	
45.94	23547.7	997.81	998.24	0.43	2593	6/26/2013	12:41 PM	Water level Lower than downstream
45.96	23535.7	998.39	998.24	-0.15	2593	6/26/2013	12:13 PM	
45.98	23512.6	997.96	998.25	0.29	2593	6/26/2013	12:42 PM	
45.99	23501.0	997.82	998.24	0.42	2593	6/28/2013	10:57 AM	
46.00	23494.2	998.11	998.22	0.11	2593	6/28/2013	10:55 AM	
46.05	23444.5	997.75	998.10	0.35	2593	6/26/2013	12:43 PM	
46.06	23431.4	997.77	998.06	0.30	2593	6/27/2013	1:19 PM	
46.09	23405.8	997.94	998.00	0.06	2593	6/26/2013	12:44 PM	
46.09	23397.7	997.89	997.98	0.09	2593	6/27/2013	1:17 PM	
46.11	23381.1	997.56	997.94	0.38	2593	6/27/2013	1:12 PM	
46.15	23346.3	997.68	997.84	0.17	2593	6/26/2013	12:45 PM	
46.18	23309.1	997.76	997.63	-0.13	2593	6/28/2013	10:59 AM	
46.19	23306.7	997.29	997.62	0.32	2593	6/26/2013	12:47 PM	
46.19	23306.0	997.24	997.61	0.37	2593	6/28/2013	11:00 AM	
46.35	23147.0	997.63	996.99	-0.65	2593	6/27/2013	1:10 PM	Water level higher than upstream
46.36	23127.2	997.27	996.96	-0.31	2593	6/28/2013	11:05 AM	
46.48	23014.7	996.92	996.83	-0.10	2593	6/28/2013	11:07 AM	
46.57	22922.2	996.78	996.72	-0.06	2593	6/27/2013	1:07 PM	

Distance from the Bearspaw Dam (km)	Interpolated HEC-RAS Station	Surveyed HWM (m)	Simulated Water Level (m)	Difference (Simulated Water Level - Surveyed HWM) (m)	Simulated Discharge (m^3/s)	Surveyed Date	Surveyed Time	Description
46.60	22891.1	996.66	996.68	0.03	2593	6/28/2013	11:10 AM	
46.69	22798.5	996.83	996.57	-0.26	2593	6/27/2013	1:06 PM	
47.10	22389.7	995.79	996.14	0.35	2593	6/28/2013	11:19 AM	Water level lower than downstream
47.21	22283.6	996.24	996.04	-0.20	2593	6/28/2013	11:23 AM	
48.06	21432.9	994.19	994.41	0.22	2593	6/28/2013	11:39 AM	
48.80	20695.7	992.02	992.60	0.58	2593	6/24/2013	11:29 AM	
48.81	20678.6	991.86	992.57	0.71	2593	6/24/2013	11:30 AM	
48.83	20666.0	991.84	992.55	0.71	2593	6/27/2013	11:52 AM	
48.84	20649.7	991.81	992.53	0.73	2593	6/27/2013	11:52 AM	
48.86	20631.6	991.87	992.50	0.63	2593	6/24/2013	11:30 AM	
48.87	20617.7	992.63	992.48	-0.14	2593	6/24/2013	11:31 AM	
48.87	20617.7	992.63	992.48	-0.14	2593	6/24/2013	11:32 AM	
48.88	20610.8	991.70	992.47	0.78	2593	6/24/2013	11:25 AM	
48.91	20581.3	992.28	992.43	0.15	2593	6/24/2013	11:23 AM	
48.99	20501.9	992.23	992.31	0.08	2593	6/24/2013	11:21 AM	
49.06	20430.6	992.14	992.17	0.03	2593	6/24/2013	11:19 AM	
49.14	20354.8	992.15	992.01	-0.13	2593	6/27/2013	11:47 AM	
49.22	20272.3	991.56	991.84	0.28	2593	6/24/2013	11:15 AM	
49.34	20150.0	991.57	991.58	0.02	2593	6/27/2013	11:44 AM	
49.35	20142.5	991.39	991.57	0.18	2593	6/24/2013	11:37 AM	
49.52	19972.9	991.07	991.24	0.17	2593	6/27/2013	11:35 AM	
49.84	19648.8	990.55	990.64	0.09	2593	6/27/2013	11:29 AM	
49.94	19547.4	990.31	990.46	0.15	2593	6/27/2013	11:27 AM	
49.99	19501.9	990.27	990.38	0.11	2593	6/24/2013	12:24 PM	
50.01	19479.1	990.21	990.34	0.13	2593	6/24/2013	12:23 PM	
50.04	19451.2	990.27	990.29	0.02	2593	6/24/2013	12:23 PM	
50.05	19438.4	990.20	990.26	0.07	2593	6/24/2013	12:21 PM	
50.07	19422.0	990.24	990.23	-0.01	2593	6/24/2013	12:19 PM	
50.07	19417.7	990.27	990.23	-0.05	2593	6/24/2013	12:22 PM	
50.08	19410.6	990.35	990.21	-0.13	2593	6/24/2013	12:16 PM	
50.09	19401.0	990.25	990.20	-0.06	2593	6/27/2013	11:23 AM	
50.15	19346.6	989.78	990.10	0.32	2593	6/24/2013	12:14 PM	
50.23	19262.0	989.70	989.95	0.25	2593	6/24/2013	12:13 PM	
50.23	19261.5	988.93	989.95	1.02	2593	6/27/2013	11:20 AM	Water level Lower than downstream
50.32	19174.2	988.76	989.75	0.99	2593	6/24/2013	12:08 PM	
50.36	19131.2	988.95	989.64	0.69	2593	6/24/2013	12:06 PM	
50.40	19092.9	989.02	989.54	0.52	2593	6/27/2013	11:12 AM	
50.41	19082.8	989.28	989.52	0.24	2593	6/24/2013	12:05 PM	
50.44	19051.8	988.89	989.44	0.55	2593	6/24/2013	12:04 PM	
50.56	18928.7	989.06	989.16	0.10	2593	6/24/2013	1:45 PM	
51.19	18302.2	987.11	988.01	0.91	2593	6/24/2013	11:46 AM	
51.25	18241.7	987.17	987.80	0.63	2593	6/24/2013	11:49 AM	
51.29	18198.2	987.43	987.65	0.22	2593	6/24/2013	11:51 AM	
51.41	18086.1	986.97	987.25	0.28	2593	6/26/2013	11:18 AM	
51.42	18072.6	987.08	987.20	0.12	2593	6/26/2013	11:10 AM	
51.42	18072.5	987.01	987.20	0.19	2593	6/26/2013	11:11 AM	
51.43	18059.0	986.83	987.15	0.33	2593	6/26/2013	10:33 AM	
51.44	18051.4	986.88	987.12	0.24	2593	6/26/2013	10:27 AM	
51.47	18018.2	986.73	987.00	0.28	2593	6/26/2013	10:29 AM	Dunbow Road (Highway 2) Bridge
51.51	17983.4	986.78	986.88	0.10	2593	6/26/2013	10:30 AM	
51.51	17977.7	986.25	986.85	0.60	2593	6/26/2013	11:28 AM	
51.52	17972.2	986.10	986.83	0.74	2593	6/26/2013	11:28 AM	
51.52	17970.5	986.64	986.83	0.19	2593	6/26/2013	11:27 AM	
51.52	17970.4	986.18	986.83	0.65	2593	6/26/2013	10:42 AM	
51.53	17964.3	986.20	986.82	0.61	2593	6/26/2013	11:26 AM	
51.53	17963.7	986.05	986.81	0.77	2593	6/26/2013	11:27 AM	
51.53	17963.5	986.10	986.81	0.71	2593	6/26/2013	11:27 AM	

Table A.5: Comparison of Simulated and Surveyed Water Levels along the Elbow River for the June 2013 Flood Event - AEP HWMs

Distance from the Glenmore Dam	Interpolated HEC-RAS Station	Surveyed HWM (m)	Simulated Water Level (m)	Difference (Simulated Water Level - Surveyed HWM) (m)	Simulated Discharge (m^3/s)	Surveyed Date	Surveyed Time	Description
4.17	7245	1055.13	1055.21	0.08	699	7/3/2013	-	Upstream of Elbow Drive (Elboya) Bridge
4.23	7192	1054.90	1054.83	-0.07	699	7/3/2013	-	Downstream of Elbow Drive (Elboya) Bridge
4.23	7189	1054.87	1054.83	-0.05	699	7/3/2013	-	Downstream of Elbow Drive (Elboya) Bridge
7.76	3660	1049.21	1048.91	-0.31	541	7/3/2013	-	Near Holy Cross Lane and 1 Street SW
7.77	3650	1049.14	1048.90	-0.23	541	7/3/2013	-	Near Holy Cross Lane and 1 Street SW
8.65	2763	1046.50	1047.10	0.60	447	7/3/2013	-	Upstream of Victoria (Macleod Trail) Bridge
8.67	2751	1046.97	1047.13	0.15	447	7/3/2013	-	Upstream of Victoria (Macleod Trail) Bridge
8.73	2692	1046.28	1046.84	0.57	447	7/3/2013	-	Downstream of Victoria (Macleod Trail) Bridge
11.12	293	1041.12	1041.04	-0.08	605	7/3/2013	-	Upstream of Inglewood (9 Ave)Bridge

Table A.6: Comparison of Simulated and Surveyed Water Levels along the Elbow River for the June 2013 Flood Event - City of Calgary HWMs

Distance from the Glenmore Dam (km)	Interpolated HEC-RAS Station	Surveyed HWM (m)	Simulated Water Level (m)	Difference (Simulated Water Level - Surveyed HWM) (m)	Simulated Discharge (m^3/s)	Surveyed Date	Surveyed Time	Description
0.09	11328	1062.38	1062.31	-0.07	699	7/3/2013	10:13 AM	Downstream of Glenmore Dam
0.11	11307	1062.60	1062.27	-0.33	699	7/3/2013	10:14 AM	
0.12	11297	1062.24	1062.26	0.02	699	7/3/2013	10:15 AM	
0.27	11150	1061.44	1061.82	0.39	699	7/3/2013	10:21 AM	
0.49	10926	1060.78	1061.13	0.34	699	7/3/2013	10:28 AM	
0.51	10907	1060.82	1061.09	0.27	699	7/3/2013	10:28 AM	
0.54	10877	1060.83	1061.06	0.23	699	7/3/2013	10:29 AM	
0.58	10839	1060.55	1061.06	0.51	699	7/3/2013	10:30 AM	Water level lower than downstream
0.63	10788	1060.74	1060.99	0.25	699	6/25/2013	10:16 AM	
0.65	10771	1060.78	1060.98	0.19	699	6/25/2013	10:16 AM	
0.68	10738	1060.79	1060.94	0.15	699	6/25/2013	10:15 AM	
0.70	10717	1060.77	1060.91	0.14	699	6/25/2013	10:14 AM	
0.73	10692	1060.76	1060.90	0.14	699	6/25/2013	10:14 AM	
0.74	10675	1060.73	1060.90	0.17	699	6/25/2013	10:14 AM	
0.77	10651	1060.71	1060.88	0.17	699	6/25/2013	10:14 AM	
0.78	10638	1060.66	1060.83	0.17	699	6/25/2013	10:12 AM	
0.83	10591	1060.46	1060.71	0.24	699	6/25/2013	10:11 AM	
0.85	10567	1060.70	1060.68	-0.02	699	6/25/2013	10:25 AM	
1.03	10387	1059.91	1059.98	0.07	699	6/25/2013	10:07 AM	
1.08	10340	1059.54	1059.97	0.43	699	6/25/2013	10:04 AM	
1.08	10339	1059.59	1059.97	0.38	699	6/25/2013	10:04 AM	
1.08	10338	1059.56	1059.97	0.41	699	6/25/2013	10:04 AM	
1.09	10332	1059.56	1059.97	0.42	699	6/25/2013	10:04 AM	
1.13	10289	1059.47	1059.87	0.40	699	6/25/2013	10:03 AM	
1.19	10232	1059.53	1059.63	0.10	699	6/25/2013	10:02 AM	
1.21	10205	1059.56	1059.63	0.07	699	6/25/2013	10:01 AM	
1.23	10184	1059.48	1059.62	0.13	699	6/25/2013	9:59 AM	
1.23	10183	1059.92	1059.62	-0.30	699	6/25/2013	9:59 AM	
1.24	10173	1059.45	1059.61	0.15	699	6/25/2013	9:59 AM	
1.30	10121	1059.39	1059.56	0.18	699	6/23/2013	11:21 AM	
1.31	10104	1059.39	1059.55	0.17	699	6/23/2013	11:22 AM	
1.32	10100	1059.54	1059.55	0.01	699	6/25/2013	9:58 AM	
1.33	10090	1059.57	1059.55	-0.02	699	6/23/2013	11:22 AM	
1.35	10066	1059.39	1059.53	0.14	699	6/23/2013	11:23 AM	
1.36	10055	1059.50	1059.52	0.02	699	6/23/2013	11:24 AM	
1.37	10051	1059.36	1059.52	0.15	699	6/23/2013	11:26 AM	
1.37	10048	1059.55	1059.52	-0.03	699	6/25/2013	9:57 AM	
1.40	10018	1059.22	1059.49	0.28	699	6/23/2013	11:28 AM	
1.43	9985	1059.15	1059.40	0.25	699	6/23/2013	11:29 AM	
1.50	9920	1058.85	1059.20	0.35	699	6/23/2013	11:30 AM	
1.51	9903	1058.59	1059.17	0.59	699	6/23/2013	11:31 AM	Water level lower than downstream
1.53	9885	1058.58	1059.15	0.57	699	6/23/2013	11:32 AM	Water level lower than downstream
1.56	9857	1058.72	1059.11	0.39	699	6/23/2013	11:33 AM	
1.58	9833	1059.02	1059.06	0.04	699	6/23/2013	11:36 AM	
1.79	9629	1058.43	1058.82	0.39	699	6/23/2013	11:58 AM	
1.81	9603	1058.49	1058.78	0.29	699	6/23/2013	12:00 PM	
1.85	9568	1058.11	1058.70	0.60	699	6/23/2013	12:02 PM	Water level lower than downstream
1.87	9544	1058.37	1058.65	0.28	699	6/23/2013	12:04 PM	due to sharp bend
1.91	9508	1058.41	1058.60	0.19	699	6/23/2013	12:05 PM	due to sharp bend
1.95	9472	1058.21	1058.55	0.34	699	6/23/2013	12:06 PM	due to sharp bend
1.97	9446	1057.98	1058.55	0.56	699	6/23/2013	12:07 PM	due to sharp bend
2.06	9354	1057.91	1058.29	0.38	699	6/23/2013	12:08 PM	due to sharp bend
2.14	9278	1057.58	1058.09	0.51	699	6/23/2013	12:10 PM	due to sharp bend
2.21	9205	1057.63	1057.97	0.34	699	6/23/2013	12:11 PM	due to sharp bend
2.27	9144	1056.78	1057.95	1.17	699	6/23/2013	12:13 PM	Water level lower than downstream
2.31	9107	1057.14	1057.94	0.80	699	6/23/2013	12:16 PM	Water level lower than downstream
2.33	9087	1056.98	1057.93	0.95	699	6/23/2013	12:17 PM	Water level lower than downstream
2.34	9074	1057.55	1057.92	0.37	699	6/25/2013	1:14 PM	
2.45	8972	1057.81	1057.88	0.07	699	6/23/2013	12:39 PM	
2.49	8923	1057.61	1057.85	0.23	699	6/25/2013	1:09 PM	
2.57	8851	1057.40	1057.69	0.29	699	6/25/2013	12:55 PM	Upstream of Sandy Beach Pedestrian Bridge
2.63	8790	1057.18	1057.63	0.45	699	6/25/2013	1:00 PM	
2.85	8564	1056.80	1057.06	0.26	699	6/25/2013	12:49 PM	
2.92	8493	1056.70	1056.83	0.14	699	6/25/2013	12:47 PM	
2.98	8441	1056.48	1056.71	0.23	699	6/25/2013	12:45 PM	
2.99	8425	1056.39	1056.68	0.29	699	6/25/2013	12:44 PM	
3.04	8379	1055.98	1056.57	0.59	699	6/26/2013	9:41 AM	Water level lower than downstream
3.12	8299	1055.85	1056.45	0.61	662	6/26/2013	9:39 AM	Water level lower than downstream, on the side channel
3.15	8265	1055.93	1056.45	0.53	662	6/26/2013	9:38 AM	Water level lower than downstream, on the side channel
3.17	8252	1056.06	1056.45	0.39	662	6/26/2013	9:38 AM	
3.18	8233	1056.22	1056.37	0.15	662	6/26/2013	9:37 AM	
3.30	8118	1056.20	1056.14	-0.06	662	6/26/2013	9:36 AM	
3.35	8067	1056.31	1056.10	-0.21	662	6/26/2013	9:34 AM	
3.42	8000	1056.12	1056.06	-0.06	662	6/26/2013	9:33 AM	
3.46	7961	1055.83	1056.02	0.19	662	6/26/2013	9:32 AM	
3.46	7957	1055.74	1056.02	0.28	662	6/26/2013	9:57 AM	
3.48	7934	1055.71	1055.99	0.28	662	6/26/2013	9:55 AM	
3.53	7884	1055.75	1055.95	0.20	662	6/26/2013	9:30 AM	
3.57	7852	1055.65	1055.92	0.27	662	6/26/2013	9:29 AM	
3.60	7822	1055.52	1055.89	0.37	662	6/26/2013	9:27 AM	
3.62	7796	1055.62	1055.86	0.24	662	6/26/2013	9:45 AM	
3.67	7747	1055.60	1055.77	0.18	662	6/26/2013	9:43 AM	
3.67	7743	1055.78	1055.77	-0.01	662	6/23/2013	1:20 PM	
3.69	7725	1055.86	1055.74	-0.12	662	6/23/2013	1:21 PM	

Distance from the Glenmore Dam (km)	Interpolated HEC-RAS Station	Surveyed HWM (m)	Simulated Water Level (m)	Difference (Simulated Water Level - Surveyed HWM) (m)	Simulated Discharge (m^3/s)	Surveyed Date	Surveyed Time	Description
3.70	7718	1055.31	1055.73	0.42	662	6/26/2013	9:26 AM	
3.70	7718	1055.49	1055.73	0.25	662	6/26/2013	9:42 AM	
3.72	7698	1055.75	1055.69	-0.06	662	6/23/2013	1:25 PM	
3.74	7674	1055.81	1055.63	-0.18	662	6/23/2013	1:26 PM	
3.76	7653	1055.62	1055.58	-0.04	662	6/23/2013	1:27 PM	
3.77	7647	1055.60	1055.56	-0.04	662	6/23/2013	1:30 PM	
3.78	7635	1055.47	1055.52	0.05	662	6/23/2013	1:33 PM	
3.80	7621	1055.30	1055.48	0.17	662	6/23/2013	1:33 PM	
3.80	7620	1055.20	1055.47	0.27	662	6/23/2013	1:35 PM	Upstream of Riverdale Ave Pedestrian Bridge
3.81	7610	1054.92	1055.46	0.54	662	6/26/2013	9:23 AM	Water level lower than downstream, on the side channel
3.82	7599	1055.17	1055.47	0.30	662	6/26/2013	9:40 AM	
3.84	7576	1055.49	1055.50	0.01	662	6/26/2013	9:39 AM	
3.84	7574	1055.70	1055.49	-0.20	662	6/23/2013	1:39 PM	
3.90	7517	1055.38	1055.41	0.03	699	6/26/2013	9:22 AM	
3.93	7484	1055.52	1055.33	-0.19	699	6/23/2013	1:43 PM	
3.96	7453	1055.36	1055.32	-0.03	699	6/26/2013	9:19 AM	
3.98	7434	1055.32	1055.33	0.00	699	6/26/2013	9:18 AM	
3.99	7425	1055.40	1055.33	-0.07	699	6/26/2013	9:18 AM	
4.08	7342	1055.45	1055.31	-0.13	699	6/26/2013	9:16 AM	
4.09	7326	1055.21	1055.29	0.08	699	6/26/2013	9:15 AM	
4.13	7288	1055.00	1055.28	0.28	699	6/26/2013	9:14 AM	
4.15	7266	1055.13	1055.25	0.12	699	6/26/2013	9:12 AM	
4.18	7236	1055.05	1055.19	0.14	699	6/26/2013	9:10 AM	Upstream of Elbow Drive (Elboya) Bridge
4.52	6899	1054.62	1054.67	0.06	699	6/25/2013	1:52 PM	
4.78	6642	1054.64	1054.63	-0.01	699	6/25/2013	1:44 PM	
4.94	6482	1054.47	1054.45	-0.02	699	6/25/2013	1:39 PM	
4.96	6462	1054.17	1054.40	0.23	699	6/25/2013	1:38 PM	
4.98	6439	1054.45	1054.30	-0.15	699	6/25/2013	1:37 PM	
5.00	6420	1054.24	1054.23	-0.02	699	6/25/2013	1:37 PM	
5.02	6402	1054.37	1054.16	-0.21	699	6/25/2013	1:36 PM	
5.05	6368	1053.90	1054.06	0.16	699	6/25/2013	1:35 PM	
5.36	6060	1053.42	1053.65	0.24	699	6/25/2013	1:26 PM	
5.47	5952	1053.51	1053.59	0.08	699	6/25/2013	1:22 PM	
5.74	5680	1053.10	1053.28	0.18	699	6/25/2013	1:10 PM	
5.79	5624	1052.96	1053.16	0.20	699	6/25/2013	1:06 PM	
5.83	5586	1053.27	1053.07	-0.20	699	6/24/2013	11:32 AM	
5.84	5574	1053.21	1053.05	-0.15	699	6/24/2013	11:33 AM	Upstream of Rideau Park Pedestrian Bridge
5.86	5560	1053.30	1053.04	-0.26	699	6/24/2013	11:33 AM	
5.87	5543	1053.26	1053.03	-0.24	699	6/24/2013	11:33 AM	
5.88	5535	1053.28	1053.02	-0.26	699	6/24/2013	11:34 AM	
5.88	5533	1053.26	1053.02	-0.24	699	6/24/2013	11:34 AM	
5.90	5517	1053.11	1053.01	-0.10	699	6/24/2013	11:36 AM	
5.90	5514	1053.19	1053.00	-0.18	699	6/24/2013	11:36 AM	
5.91	5507	1053.07	1052.98	-0.09	699	6/24/2013	11:37 AM	
5.92	5495	1053.15	1052.93	-0.22	699	6/24/2013	11:37 AM	
5.94	5481	1053.18	1052.91	-0.27	699	6/24/2013	11:37 AM	
5.94	5481	1052.79	1052.91	0.12	699	6/25/2013	12:58 PM	
5.95	5470	1053.06	1052.90	-0.17	699	6/24/2013	11:39 AM	
5.98	5441	1053.14	1052.86	-0.28	699	6/24/2013	11:39 AM	
6.01	5411	1052.88	1052.86	-0.02	699	6/24/2013	11:41 AM	
6.02	5399	1052.60	1052.86	0.27	699	6/24/2013	2:20 PM	
6.06	5359	1052.80	1052.82	0.03	699	6/25/2013	12:52 PM	
6.10	5313	1052.86	1052.77	-0.09	699	6/24/2013	2:22 PM	
6.11	5309	1052.64	1052.77	0.13	699	6/24/2013	2:27 PM	
6.12	5295	1052.80	1052.77	-0.03	699	6/24/2013	2:28 PM	
6.14	5282	1052.81	1052.77	-0.04	652	6/24/2013	2:29 PM	
6.14	5276	1052.80	1052.78	-0.02	652	6/24/2013	2:29 PM	
6.16	5260	1052.61	1052.79	0.17	652	6/24/2013	2:32 PM	
6.16	5256	1052.66	1052.79	0.13	652	6/24/2013	1:36 PM	
6.16	5256	1052.72	1052.79	0.07	652	6/24/2013	1:34 PM	
6.19	5229	1052.45	1052.79	0.34	652	6/24/2013	2:33 PM	
6.20	5215	1052.24	1052.79	0.55	652	6/24/2013	2:34 PM	
6.22	5195	1052.74	1052.78	0.04	652	6/24/2013	2:35 PM	
6.23	5191	1052.45	1052.78	0.33	652	6/24/2013	1:31 PM	
6.25	5163	1052.66	1052.77	0.11	652	6/24/2013	2:36 PM	
6.33	5092	1052.50	1052.67	0.18	652	6/24/2013	1:22 PM	
6.45	4967	1052.09	1052.47	0.38	652	6/25/2013	11:28 AM	
6.76	4662	1051.47	1051.60	0.13	652	6/24/2013	1:57 PM	
6.79	4624	1051.38	1051.50	0.12	652	6/24/2013	1:56 PM	
6.89	4532	1051.08	1051.34	0.26	652	6/25/2013	11:09 AM	
6.89	4523	1051.06	1051.33	0.27	652	6/24/2013	2:03 PM	
7.07	4348	1050.99	1051.00	0.01	586	6/25/2013	11:00 AM	
7.08	4334	1051.00	1051.01	0.01	586	6/25/2013	10:53 AM	
7.09	4325	1050.98	1051.01	0.03	586	6/25/2013	10:59 AM	
7.19	4232	1050.55	1050.57	0.03	634	6/25/2013	10:46 AM	
7.23	4187	1050.32	1050.42	0.10	634	6/25/2013	10:43 AM	Upstream of 25th Ave Bridge
7.49	3922	1049.50	1049.56	0.06	601	6/24/2013	2:07 PM	
7.53	3886	1049.05	1049.43	0.38	601	6/24/2013	2:07 PM	
7.72	3699	1049.51	1048.93	-0.59	541	6/24/2013	1:47 PM	
7.73	3688	1049.15	1048.92	-0.23	541	6/24/2013	1:47 PM	
7.75	3664	1049.45	1048.91	-0.54	541	6/24/2013	1:45 PM	
7.78	3638	1048.86	1048.90	0.03	541	6/24/2013	1:42 PM	
7.80	3616	1048.83	1048.89	0.07	541	6/24/2013	1:42 PM	
7.84	3581	1049.36	1048.89	-0.47	541	6/24/2013	1:41 PM	
7.91	3505	1048.75	1048.80	0.05	541	6/25/2013	10:04 AM	

Distance from the Glenmore Dam (km)	Interpolated HEC-RAS Station	Surveyed HWM (m)	Simulated Water Level (m)	Difference (Simulated Water Level - Surveyed HWM) (m)	Simulated Discharge (m^3/s)	Surveyed Date	Surveyed Time	Description
7.92	3497	1048.80	1048.79	-0.01	541	6/25/2013	10:07 AM	Upstream of 21 Ave (Lindsay Park) Pedestrian Bridge
7.94	3477	1049.18	1048.76	-0.42	541	6/25/2013	10:08 AM	
7.97	3449	1048.77	1048.71	-0.06	541	6/24/2013	1:40 PM	
8.04	3376	1048.40	1048.52	0.12	541	6/24/2013	1:38 PM	
8.06	3360	1048.35	1048.48	0.13	541	6/24/2013	1:37 PM	
8.07	3350	1048.33	1048.46	0.13	541	6/24/2013	1:37 PM	
8.14	3279	1048.36	1048.30	-0.06	541	6/24/2013	1:37 PM	
8.19	3229	1048.07	1048.18	0.11	541	6/24/2013	1:35 PM	Upstream of Lindsay Park CNR Bridge
8.24	3182	1047.85	1048.12	0.27	541	6/24/2013	1:34 PM	
8.25	3163	1047.86	1048.00	0.15	541	6/25/2013	10:39 AM	
8.28	3133	1047.77	1047.82	0.05	541	6/25/2013	10:40 AM	
8.31	3111	1047.76	1047.69	-0.07	541	6/25/2013	10:38 AM	
8.32	3100	1047.62	1047.62	0.00	541	6/24/2013	1:32 PM	
8.32	3096	1047.62	1047.60	-0.02	541	6/24/2013	1:32 PM	
8.33	3092	1047.51	1047.58	0.07	541	6/24/2013	1:32 PM	
8.35	3071	1047.57	1047.46	-0.11	541	6/24/2013	1:31 PM	
8.36	3054	1047.32	1047.50	0.18	541	6/24/2013	1:31 PM	
8.40	3015	1047.37	1047.58	0.21	541	6/25/2013	10:36 AM	
8.42	3002	1047.35	1047.62	0.27	541	6/24/2013	1:29 PM	
8.43	2987	1047.56	1047.66	0.11	541	6/25/2013	10:35 AM	
8.45	2971	1046.91	1047.64	0.73	541	6/25/2013	10:34 AM	
8.45	2970	1047.34	1047.64	0.29	541	6/25/2013	10:33 AM	
8.45	2968	1047.16	1047.63	0.47	541	6/24/2013	1:27 PM	Upstream of Pattison (1 St) Bridge
8.47	2944	1047.07	1047.35	0.28	541	6/24/2013	1:25 PM	
8.47	2943	1046.87	1047.34	0.47	541	6/24/2013	1:25 PM	
8.49	2931	1046.87	1047.26	0.39	541	6/24/2013	1:24 PM	
8.56	2857	1047.39	1047.20	-0.19	447	6/24/2013	1:24 PM	
8.59	2832	1047.00	1047.17	0.17	447	6/24/2013	1:23 PM	
8.60	2816	1046.75	1047.14	0.38	447	6/24/2013	1:23 PM	
8.61	2803	1046.90	1047.11	0.21	447	6/24/2013	1:22 PM	
8.63	2786	1046.98	1047.10	0.13	447	6/24/2013	1:22 PM	
8.65	2767	1046.91	1047.10	0.18	447	6/24/2013	1:20 PM	
8.66	2760	1046.71	1047.11	0.39	447	6/24/2013	1:20 PM	Upstream of Victoria (Macleod Trail) Bridge
8.66	2754	1046.74	1047.12	0.38	447	6/25/2013	11:17 AM	
8.67	2750	1047.22	1047.13	-0.09	447	6/24/2013	1:19 PM	Water level higher than upstream
8.77	2649	1046.24	1046.75	0.52	447	6/24/2013	1:19 PM	Upstream of LRT Bridge
8.94	2477	1046.13	1045.74	-0.39	605	6/24/2013	12:58 PM	Upstream of Stampede Park (25 Ave/3 ST) Access Bridge
9.12	2296	1045.56	1045.46	-0.10	605	6/24/2013	12:49 PM	
9.14	2281	1045.58	1045.48	-0.10	605	6/24/2013	12:49 PM	
9.15	2267	1045.55	1045.49	-0.05	605	6/24/2013	12:49 PM	
9.17	2247	1045.56	1045.50	-0.06	605	6/24/2013	12:50 PM	
9.19	2232	1045.49	1045.50	0.01	605	6/24/2013	12:50 PM	
9.19	2224	1045.64	1045.50	-0.14	605	6/24/2013	12:51 PM	
9.19	2224	1045.64	1045.50	-0.14	605	6/24/2013	12:52 PM	
9.20	2220	1045.53	1045.50	-0.03	605	6/24/2013	12:51 PM	
9.44	1978	1045.57	1045.33	-0.24	605	6/24/2013	12:33 PM	
9.44	1973	1045.68	1045.33	-0.35	605	6/24/2013	12:33 PM	
9.47	1946	1045.68	1045.33	-0.35	605	6/24/2013	12:36 PM	Upstream of Horse Barn Bridge (New)
10.21	1205	1043.47	1043.52	0.05	605	6/24/2013	11:34 AM	Upstream of Stampede Park (S) Saddledome Access Bridge
10.25	1167	1043.13	1043.45	0.33	605	6/24/2013	11:33 AM	
10.34	1077	1042.95	1043.30	0.35	605	6/24/2013	11:30 AM	
10.35	1064	1042.90	1043.28	0.39	605	6/24/2013	11:30 AM	
10.37	1046	1042.95	1043.26	0.31	605	6/24/2013	11:27 AM	
10.38	1037	1042.95	1043.25	0.30	605	6/24/2013	11:27 AM	
10.39	1029	1042.94	1043.24	0.30	605	6/24/2013	11:26 AM	Upstream of Stampede Park (N) Saddledome Access Bridge
10.40	1013	1042.93	1043.22	0.29	605	6/24/2013	11:26 AM	
10.42	999	1043.09	1043.21	0.11	605	6/24/2013	11:21 AM	
10.45	965	1042.91	1043.07	0.16	605	6/24/2013	11:25 AM	
10.46	955	1042.93	1043.01	0.08	605	6/24/2013	11:21 AM	
10.48	941	1042.84	1042.94	0.10	605	6/24/2013	11:20 AM	
10.48	935	1042.63	1042.92	0.28	605	6/25/2013	11:39 AM	
10.48	933	1042.87	1042.91	0.03	605	6/25/2013	11:39 AM	
10.49	931	1042.99	1042.90	-0.09	605	6/24/2013	11:20 AM	
10.49	924	1043.01	1042.86	-0.15	605	6/25/2013	11:39 AM	
10.52	898	1042.49	1042.82	0.33	605	6/24/2013	11:18 AM	
10.54	876	1042.42	1042.79	0.37	605	6/24/2013	11:18 AM	
10.57	844	1042.48	1042.74	0.26	605	6/24/2013	11:16 AM	
10.60	813	1042.54	1042.67	0.13	605	6/24/2013	11:15 AM	
10.66	753	1042.31	1042.60	0.29	605	6/24/2013	11:12 AM	
10.68	734	1042.29	1042.54	0.25	605	6/24/2013	11:12 AM	
10.70	718	1042.28	1042.50	0.21	605	6/24/2013	11:11 AM	
10.71	706	1042.29	1042.46	0.17	605	6/24/2013	11:11 AM	
10.73	685	1042.28	1042.41	0.12	605	6/24/2013	11:10 AM	
10.75	669	1041.96	1042.36	0.41	605	6/24/2013	11:10 AM	
10.77	648	1041.55	1042.30	0.75	605	6/24/2013	11:08 AM	Water level lower than downstream
10.78	634	1041.94	1042.26	0.32	605	6/24/2013	11:08 AM	
10.81	610	1041.99	1042.19	0.20	605	6/24/2013	11:05 AM	
10.83	586	1042.09	1042.10	0.01	605	6/24/2013	11:03 AM	Upstream of MacDonald Bridge
10.86	557	1042.00	1041.96	-0.04	605	6/25/2013	11:49 AM	
10.95	464	1041.37	1041.74	0.38	605	6/25/2013	11:51 AM	
10.99	426	1041.38	1041.73	0.35	605	6/25/2013	11:56 AM	
11.04	375	1041.00	1041.60	0.60	605	6/25/2013	11:57 AM	
11.07	349	1041.18	1041.54	0.36	605	6/25/2013	11:58 AM	
11.07	347	1040.20	1041.53	1.33	605	6/24/2013	10:54 AM	Upstream of CPR Bridge (Water level lower than downstream)
11.11	310	1040.63	1041.16	0.53	605	6/25/2013	11:59 AM	Upstream of Inglewood (9 Ave)Bridge

Distance from the Glenmore Dam (km)	Interpolated HEC-RAS Station	Surveyed HWM (m)	Simulated Water Level (m)	Difference (Simulated Water Level - Surveyed HWM) (m)	Simulated Discharge (m^3/s)	Surveyed Date	Surveyed Time	Description
11.15	269	1041.07	1041.06	-0.01	605	6/25/2013	12:00 PM	
11.18	237	1040.98	1041.10	0.11	605	6/25/2013	12:01 PM	
11.21	204	1040.96	1041.13	0.18	605	6/25/2013	12:02 PM	
11.24	177	1040.88	1041.17	0.29	605	6/24/2013	10:46 AM	
11.29	125	1040.65	1041.15	0.50	605	6/24/2013	10:41 AM	backwater due to Bow River
11.33	88	1040.65	1041.15	0.51	605	6/24/2013	10:40 AM	backwater due to Bow River
11.34	79	1040.55	1041.14	0.60	605	6/24/2013	10:38 AM	backwater due to Bow River
11.35	65	1040.48	1041.11	0.63	605	6/24/2013	10:37 AM	backwater due to Bow River

Table A.7: Comparison of Simulated and Surveyed Water Levels along the Bow River for the June 2005 Flood Event - AEP HWMs

Distance from the Bearspaw Dam (km)	Station in Flood Mapping	Station in HEC-RAS	Surveyed HWM (m)	Simulated Water Level (m)	Difference (Simulated Water Level - Surveyed HWM) (m)	Simulated Discharge (m^3/s)	Surveyed Date	Surveyed Time	Description
5.27	24	64223	1070.35	1070.39	0.04	791	-	-	3m upstream of 85 St SW Bridge
10.34	58	59153	1062.07	1061.99	-0.08	791	-	-	Immediately downstream of 16 Ave (Trans-Canada Highway) Bridge
16.35	91	53140	1051.15	1050.76	-0.39	791	-	-	Immediately downstream of Crowchild Trail Bridge
17.80	100	51688	1048.03	1048.12	0.09	791	-	-	Under 14th St SW (Mewata) Bridge
18.38	103	51114	1047.00	1046.88	-0.12	791	-	-	60 m upstream of Louise (Hillhurst) Bridge
20.54	134	48953	1043.05	1042.94	-0.11	791	-	-	Immediately upstream of Centre St Bridge
23.47	166	46024	1037.76	1037.75	-0.01	807	-	-	Intersection between 15th St and Bow River
25.18	178	44309	1034.16	1034.09	-0.07	1080	-	-	20 m upstream of 17 Ave (Cushing) Bridge
28.64	193	40852	1028.86	1028.45	-0.41	1080	-	-	10 m upstream of Bonnybrook (Ogden Road) Bridge
28.71	194	40787	1028.57	1028.24	-0.33	1080	-	-	10 m downstream of Bonnybrook (Ogden Road) Bridge
32.31	223	37185	1021.96	1021.48	-0.48	1080	-	-	15 m upstream of Graves (Glenmore Trail) Bridge
45.72	288	23774	997.01	997.42	0.41	1360	-	-	100 m upstream of Marquis de Lorne (Highway 22X) Bridge

Table A.8: Comparison of Simulated and Surveyed Water Levels along the Bow River for the June 2005 Flood Event - City of Calgary HWMs

Distance from the Bearspaw Dam (km)	Interpolated HEC-RAS Station	Surveyed HWM (m)	Simulated Water Level (m)	Difference (Simulated Water Level - Surveyed HWM) (m)	Simulated Discharge (m^3/s)	Surveyed Date	Surveyed Time	Description
2.16	67328	1075.12	1075.32	0.21	791	INTERPRETED	-	
2.46	67032	1074.84	1074.78	-0.07	791	INTERPRETED	-	
4.63	64861	1071.44	1071.31	-0.14	791	INTERPRETED	-	
5.26	64236	1070.35	1070.41	0.06	791	INTERPRETED	-	Downstream of 85 St SW Bridge
5.96	63530	1069.35	1069.23	-0.12	791	INTERPRETED	-	Upstream of CP Rail Twin Bridges
6.29	63201	1068.52	1068.67	0.15	791	INTERPRETED	-	
6.42	63075	1068.32	1068.52	0.20	791	INTERPRETED	-	
6.52	62970	1067.85	1068.36	0.52	791	INTERPRETED	-	
6.61	62883	1067.62	1068.24	0.62	791	INTERPRETED	-	
6.64	62856	1067.92	1068.20	0.27	791	INTERPRETED	-	
6.67	62820	1067.86	1068.14	0.29	791	INTERPRETED	-	
7.82	61675	1066.24	1066.35	0.11	490	INTERPRETED	-	
8.26	61236	1065.22	1065.66	0.44	791	INTERPRETED	-	
8.87	60620	1063.99	1064.72	0.74	791	INTERPRETED	-	
9.36	60133	1063.57	1063.97	0.40	791	INTERPRETED	-	
9.43	60062	1063.15	1063.86	0.71	791	INTERPRETED	-	
9.48	60017	1063.38	1063.79	0.41	791	INTERPRETED	-	
9.78	59714	1063.03	1063.34	0.31	791	INTERPRETED	-	
9.95	59537	1062.10	1062.82	0.72	791	INTERPRETED	-	
9.96	59536	1062.66	1062.81	0.16	791	INTERPRETED	-	
10.02	59472	1062.60	1062.67	0.07	791	INTERPRETED	-	
10.15	59342	1062.28	1062.37	0.09	791	INTERPRETED	-	
10.29	59203	1062.06	1062.13	0.08	791	INTERPRETED	-	Upstream of 16 Ave (Trans-Canada Highway) Bridge
10.31	59178	1061.92	1062.06	0.14	791	INTERPRETED	-	Downstream of 16 Ave (Trans-Canada Highway) Bridge
10.40	59094	1061.54	1061.94	0.40	791	INTERPRETED	-	
10.65	58843	1060.63	1061.30	0.67	791	INTERPRETED	-	
10.84	58657	1060.57	1060.78	0.21	791	INTERPRETED	-	
11.19	58301	1060.80	1060.20	-0.60	791	INTERPRETED	-	
11.45	58041	1059.27	1059.78	0.51	791	INTERPRETED	-	
11.78	57709	1059.35	1059.24	-0.10	791	INTERPRETED	-	
12.09	57401	1058.78	1058.74	-0.04	791	INTERPRETED	-	
12.39	57098	1058.54	1058.10	-0.44	791	INTERPRETED	-	
12.79	56702	1057.45	1057.15	-0.31	791	INTERPRETED	-	Downstream of Harry Boothman Pedestrian Bridge
12.97	56526	1057.29	1056.91	-0.38	791	INTERPRETED	-	
13.37	56121	1056.32	1056.19	-0.13	791	INTERPRETED	-	
13.85	55645	1055.50	1055.48	-0.02	791	INTERPRETED	-	
14.07	55421	1055.26	1055.18	-0.09	791	INTERPRETED	-	
14.29	55198	1054.83	1054.85	0.01	791	INTERPRETED	-	
14.57	54925	1054.65	1054.40	-0.25	791	INTERPRETED	-	
14.60	54890	1054.38	1054.33	-0.05	791	INTERPRETED	-	
14.72	54772	1055.06	1054.09	-0.96	791	INTERPRETED	-	
14.90	54588	1053.77	1053.73	-0.04	791	INTERPRETED	-	
15.21	54286	1053.36	1053.08	-0.28	791	INTERPRETED	-	
15.42	54073	1052.62	1052.48	-0.15	791	INTERPRETED	-	
15.63	53865	1051.79	1052.10	0.31	791	INTERPRETED	-	
15.72	53772	1052.14	1051.95	-0.19	791	INTERPRETED	-	
15.96	53537	1051.93	1051.60	-0.33	791	INTERPRETED	-	
16.13	53366	1051.38	1051.22	-0.16	791	INTERPRETED	-	
16.36	53136	1051.04	1050.75	-0.29	791	INTERPRETED	-	Downstream of Crowchild Trail Bridge
16.36	53131	1051.03	1050.73	-0.30	791	INTERPRETED	-	
16.69	52797	1050.35	1049.99	-0.36	791	INTERPRETED	-	
17.13	52359	1049.82	1049.34	-0.48	791	INTERPRETED	-	
17.49	52006	1049.06	1048.75	-0.31	791	INTERPRETED	-	
17.87	51624	1047.97	1048.00	0.03	791	INTERPRETED	-	
17.96	51527	1048.12	1047.80	-0.32	791	INTERPRETED	-	
18.21	51282	1046.93	1047.28	0.35	791	INTERPRETED	-	
18.46	51034	1047.02	1046.71	-0.31	791	INTERPRETED	-	
18.59	50906	1046.46	1046.44	-0.02	791	INTERPRETED	-	Downstream of Louise (Hillhurst) Bridge
18.64	50854	1046.76	1046.32	-0.44	791	INTERPRETED	-	
18.72	50773	1046.73	1046.10	-0.63	791	INTERPRETED	-	
19.86	49635	1044.53	1044.66	0.13	765	INTERPRETED	-	
20.22	49272.2	1044.76	1043.74	-1.02*	765	INTERPRETED	-	
20.49	49001	1043.02	1043.03	0.01	791	INTERPRETED	-	Upstream of Centre St Bridge
21.39	48101	1041.46	1041.48	0.02	791	INTERPRETED	-	Downstream of Old Langevin Bridge
21.44	48053	1042.12	1041.43	-0.70	791	INTERPRETED	-	
21.49	47999	1041.83	1041.35	-0.48	791	INTERPRETED	-	
22.32	47174	1039.27	1039.22	-0.05	807	INTERPRETED	-	
22.33	47163	1039.19	1039.21	0.02	807	INTERPRETED	-	
22.35	47142	1040.03	1039.18	-0.85	807	INTERPRETED	-	
22.39	47099	1039.02	1039.13	0.11	807	INTERPRETED	-	
22.96	46532	1038.77	1038.62	-0.15	807	INTERPRETED	-	Upstream of St. Georges Island Bridge
23.87	45619	1037.17	1037.42	0.25	1050	INTERPRETED	-	
25.18	44315	1034.44	1034.10	-0.35	1080	INTERPRETED	-	Upstream of 17 Ave (Cushing) Bridge
25.70	43796	1032.78	1033.39	0.62	1080	INTERPRETED	-	

Distance from the Bearspaw Dam (km)	Interpolated HEC-RAS Station	Surveyed HWM (m)	Simulated Water Level (m)	Difference (Simulated Water Level - Surveyed HWM) (m)	Simulated Discharge (m^3/s)	Surveyed Date	Surveyed Time	Description
25.70	43796	1032.78	1033.39	0.62	1080	INTERPRETED	-	
26.21	43278	1032.12	1032.53	0.42	1080	INTERPRETED	-	
26.44	43047	1031.27	1032.26	1.00	1080	INTERPRETED	-	
26.94	42554	1031.63	1031.69	0.06	1080	INTERPRETED	-	
27.74	41751.6	1028.88	1030.03	1.15*	1080	INTERPRETED	-	
28.40	41088.9	1027.87	1029.03	1.16*	1080	INTERPRETED	-	
28.60	40891	1029.09	1028.57	-0.52	1080	INTERPRETED	-	Upstream of Bonnybrook (Ogden Road) Bridge
28.79	40707	1028.50	1028.00	-0.50	1080	INTERPRETED	-	
29.35	40143	1027.05	1027.20	0.14	1080	INTERPRETED	-	Upstream of Calf Robe (Deerfoot Trail) Bridge
29.77	39723	1025.52	1026.47	0.95	1080	INTERPRETED	-	Upstream of CN Rail Bridge
30.35	39139	1025.31	1025.50	0.19	1080	INTERPRETED	-	
30.79	38699	1024.67	1024.64	-0.02	1080	INTERPRETED	-	
31.10	38393	1024.11	1024.06	-0.05	1080	INTERPRETED	-	
31.37	38127	1023.66	1023.57	-0.09	1080	INTERPRETED	-	
32.02	37467	1022.03	1022.20	0.17	1080	INTERPRETED	-	
32.38	37111	1021.78	1021.17	-0.61	1080	INTERPRETED	-	Downstream of Graves (Glenmore Trail) Bridge
32.86	36634	1020.90	1020.34	-0.56	1080	INTERPRETED	-	
33.33	36163	1019.48	1019.79	0.30	1080	INTERPRETED	-	
33.60	35896	1019.12	1019.43	0.31	1080	INTERPRETED	-	
33.92	35569	1019.54	1018.93	-0.61	1080	INTERPRETED	-	
34.29	35199	1018.01	1018.44	0.43	1080	INTERPRETED	-	
34.98	34510.6	1018.04	1017.37	-0.67	1080	INTERPRETED	-	
35.00	34494.4	1018.07	1017.35	-0.72	1080	INTERPRETED	-	
35.07	34423	1016.56	1017.22	0.67	1080	6/19/2005	17:30	
35.45	34040	1017.31	1016.59	-0.72	1080	INTERPRETED	-	
36.93	32562	1014.44	1014.07	-0.37	1080	INTERPRETED	-	
37.06	32435	1013.93	1013.82	-0.10	1080	INTERPRETED	-	Upstream of Ivor Strong (Deerfoot Trail) Bridge
37.16	32330	1013.91	1013.67	-0.24	1080	INTERPRETED	-	
37.94	31549	1011.67	1012.20	0.52	1080	INTERPRETED	-	
38.04	31451	1012.23	1011.95	-0.28	1080	INTERPRETED	-	
38.92	30567	1009.78	1009.96	0.18	1080	INTERPRETED	-	
39.02	30475	1009.15	1009.76	0.62	1080	INTERPRETED	-	
39.07	30424	1009.72	1009.66	-0.06	1080	INTERPRETED	-	
39.14	30349	1008.90	1009.52	0.62	1080	INTERPRETED	-	
39.95	29547	1007.52	1008.02	0.50	1080	INTERPRETED	-	
40.87	28622	1006.43	1006.00	-0.43	1080	INTERPRETED	-	
40.98	28515	1005.28	1005.63	0.36	1080	INTERPRETED	-	
41.26	28233	1004.52	1005.15	0.63	1080	INTERPRETED	-	
41.84	27653	1003.73	1004.30	0.57	1080	INTERPRETED	-	
42.26	27228	1003.77	1003.76	-0.01	1080	INTERPRETED	-	
43.09	26401	1002.62	1002.22	-0.40	1080	INTERPRETED	-	
43.45	26046	1001.83	1001.79	-0.04	1080	INTERPRETED	-	
46.19	23302	996.43	996.41	-0.02	1360	INTERPRETED	-	Upstream of Marquis de Lorne (Highway 22X) Bridge
46.89	22602	995.02	995.30	0.28	1360	INTERPRETED	-	
47.55	21938	993.04	993.94	0.90	1360	INTERPRETED	-	
48.27	21220	992.48	992.51	0.03	1360	INTERPRETED	-	Upstream of removed bridge (LaFarge)
49.43	20057	989.77	990.25	0.48	1360	INTERPRETED	-	
50.13	19358	988.85	989.12	0.27	1360	INTERPRETED	-	
50.63	18861	987.40	987.84	0.44	1360	INTERPRETED	-	
50.94	18550	986.97	987.18	0.21	1360	INTERPRETED	-	
51.34	18149	986.50	986.31	-0.19	1360	INTERPRETED	-	

* Not included in statistics as HWMs are considered to not reflect maximum water level during 2005 flood event

Table A.9: Comparison of Simulated and Surveyed Water Levels along the Elbow River for the June 2005 Flood Event - AEP HWMs

Distance from the Glenmore Dam (km)	Station in Flood Mapping	Station in HEC-RAS	Surveyed HWM (m)	Simulated Water Level (m)	Difference (Simulated Water Level - Surveyed HWM) (m)	Simulated Discharge (m^3/s)	Surveyed Date	Surveyed Time	Description
4.22	454	7195	1052.99	1053.26	0.27	300	-	-	Elbow Drive (Elboya) Bridge along 40th Avenue SW
8.45	575	2966	1045.85	1045.89	0.04	290	-	-	10 m upstream of Pattison (1 St) Bridge
8.48	576	2939	1045.80	1045.86	0.06	290	-	-	Immediately downstream of Pattison (1 St) Bridge
8.68	582	2742	1045.09	1045.34	0.25	290	-	-	15 m upstream of Victoria (Macleod Trail) Bridge
8.72	583	2699	1045.02	1045.28	0.26	290	-	-	8 m downstream of Victoria (Macleod Trail) Bridge
11.12	647	295	1039.68	1039.70	0.02	300	-	-	Immediately upstream of Inglewood (9 Ave)Bridge
11.14	648	275	1039.49	1039.62	0.13	300	-	-	35 m downstream of Inglewood (9 Ave)Bridge

Table A.10: Comparison of Simulated and Surveyed Water Levels along the Elbow River for the June 2005 Flood Event - City of Calgary HWMs

Distance from the Glenmore Dam (km)	Interpolated HEC-RAS Station	Surveyed HWM (m)	Simulated Water Level (m)	Difference (Simulated Water Level - Surveyed HWM) (m)	Simulated Discharge (m^3/s)	Surveyed Date	Surveyed Time	Description
0.08	11335	1060.19	1060.36	0.18	300	6/19/2005	11:20	Downstream of Glenmore Dam
0.45	10971	1059.06	1059.32	0.26	300	6/19/2005	11:27	
0.62	10800	1058.84	1059.12	0.28	300	6/19/2005	11:36	
0.68	10734	1058.65	1059.01	0.36	300	6/19/2005	11:44	
1.01	10406	1058.03	1058.41	0.38	300	INTERPRETED	-	
1.28	10140	1058.21	1057.75	-0.46	300	INTERPRETED	-	
1.54	9882	1057.45	1057.37	-0.08	300	INTERPRETED	-	
1.97	9452	1056.13	1056.77	0.64	300	6/19/2005	12:18	
2.05	9365	1055.92	1056.59	0.66	300	6/19/2005	12:23	
2.35	9069	1055.57	1056.14	0.57	300	6/19/2005	12:36	
2.75	8668	1055.07	1055.65	0.58	300	6/19/2005	12:51	
3.16	8254	1054.54	1054.77	0.23	300	INTERPRETED	-	
3.48	7941	1053.77	1054.24	0.47	300	6/19/2005	14:31	
3.77	7652	1053.33	1053.79	0.46	300	6/19/2005	15:45	
3.77	7651	1053.84	1053.79	-0.05	300	6/18/2005	6:00	
3.83	7587	1053.22	1053.68	0.46	300	6/19/2005	14:41	Downstream of Riverdale Ave Pedestrian Bridge
4.21	7210	1052.67	1053.29	0.61	300	6/19/2005	15:20	Elbow Drive (Elboya) Bridge
4.23	7191	1052.67	1053.24	0.57	300	6/19/2005	15:17	Downstream of Elbow Drive (Elboya) Bridge
4.36	7054	1052.69	1053.08	0.39	300	INTERPRETED	-	
4.54	6878	1052.35	1052.99	0.64	300	6/19/2005	2:50	
4.54	6875	1052.33	1052.99	0.65	300	6/19/2005	2:50	
4.54	6873	1052.35	1052.98	0.63	300	6/19/2005	15:21	
4.55	6869	1052.31	1052.97	0.66	300	6/19/2005	15:20	
4.55	6866	1052.24	1052.97	0.72	300	6/19/2005	15:17	
4.57	6850	1052.36	1052.93	0.57	300	6/19/2005	15:15	
4.60	6817	1052.26	1052.87	0.61	300	6/19/2005	2:50	
4.61	6807	1052.28	1052.86	0.57	300	6/19/2005	2:50	
4.64	6775	1052.35	1052.81	0.46	300	6/19/2005	2:50	
4.68	6734	1052.29	1052.78	0.49	300	6/19/2005	2:50	
4.93	6484	1052.39	1052.52	0.13	300	INTERPRETED	-	
5.14	6275	1051.68	1052.18	0.50	300	6/19/2005	16:21	
5.35	6064	1052.20	1052.04	-0.15	300	INTERPRETED	-	
5.41	6007	1051.94	1052.02	0.08	300	INTERPRETED	-	
6.16	5256	1050.65	1051.42	0.77	300	6/19/2005	16:45	
6.63	4790	1049.39	1050.33	0.94	300	6/19/2005	17:28	Upstream of Mission (4 Street SW)Bridge
6.90	4522	1049.17	1049.65	0.48	300	6/19/2005	17:00	
7.36	4056	1048.25	1048.76	0.51	300	6/19/2005	17:10	
7.36	4053	1048.50	1048.76	0.26	300	6/19/2005	17:09	Upstream of 25th Ave Bridge
7.37	4049	1048.29	1048.75	0.46	300	6/19/2005	17:08	
7.37	4045	1048.21	1048.74	0.53	300	6/19/2005	17:08	
7.38	4042	1048.20	1048.73	0.53	300	6/19/2005	17:11	
7.38	4038	1048.14	1048.72	0.57	300	6/19/2005	17:11	
7.38	4035	1048.18	1048.71	0.54	300	6/19/2005	17:12	
7.38	4033	1048.24	1048.70	0.46	300	6/19/2005	17:12	
7.69	3723	1047.78	1048.16	0.39	300	6/19/2005	17:45	
7.93	3486	1046.87	1047.68	0.81	290	6/19/2005	17:56	Upstream of 21 Ave (Lindsay Park) Pedestrian Bridge
7.93	3484	1047.04	1047.66	0.62	290	6/19/2005	17:55	
7.94	3481	1047.10	1047.63	0.53	290	6/19/2005	17:57	
8.15	3271	1046.23	1046.79	0.55	290	6/19/2005	18:05	
8.16	3254	1046.31	1046.82	0.50	290	6/19/2005	18:07	Upstream of Lindsay Park CNR Bridge
8.16	3253	1046.30	1046.82	0.52	290	6/19/2005	18:10	
8.17	3247	1046.43	1046.78	0.35	290	6/19/2005	18:07	
8.17	3246	1046.25	1046.78	0.53	290	6/19/2005	18:09	
8.18	3239	1046.27	1046.70	0.43	290	6/19/2005	18:08	
8.18	3239	1046.29	1046.70	0.40	290	6/19/2005	18:09	
8.19	3231	1046.33	1046.66	0.34	290	6/19/2005	18:08	
8.26	3158	1046.59	1046.33	-0.27	290	INTERPRETED	-	
8.45	2967	1045.21	1045.89	0.68	290	6/19/2005	18:20	Upstream of Pattison (1 St) Bridge
8.45	2964	1045.19	1045.89	0.70	290	6/19/2005	18:21	
8.46	2959	1045.08	1045.88	0.81	290	6/19/2005	18:22	
8.47	2948	1045.20	1045.87	0.67	290	6/19/2005	18:20	
8.47	2944	1045.18	1045.87	0.69	290	6/19/2005	18:20	
8.48	2940	1044.96	1045.86	0.90	290	6/19/2005	18:20	
8.66	2759	1044.41	1045.28	0.87	290	6/19/2005	18:35	
8.67	2748	1044.44	1045.31	0.88	290	6/19/2005	18:35	Upstream of Victoria (Macleod Trail) Bridge
8.68	2739	1045.04	1045.33	0.29	290	INTERPRETED	-	
8.69	2732	1044.37	1045.32	0.96	290	6/19/2005	18:35	
8.69	2726	1044.50	1045.31	0.82	290	6/19/2005	18:35	
8.70	2721	1044.35	1045.31	0.96	290	6/19/2005	18:35	
8.71	2709	1044.37	1045.29	0.92	290	6/19/2005	18:35	
8.72	2699	1044.41	1045.28	0.86	290	6/19/2005	18:35	Upstream of LRT Bridge
8.73	2683	1044.43	1045.26	0.83	290	6/19/2005	18:35	
8.94	2477	1043.88	1044.52	0.64	300	6/19/2005	19:56	
8.95	2470	1044.12	1044.54	0.43	300	6/19/2005	19:56	Upstream of Stampede Park (25 Ave/3 ST) Access Bridge

Distance from the Glenmore Dam (km)	Interpolated HEC-RAS Station	Surveyed HWM (m)	Simulated Water Level (m)	Difference (Simulated Water Level - Surveyed HWM) (m)	Simulated Discharge (m^3/s)	Surveyed Date	Surveyed Time	Description
8.96	2462	1044.07	1044.53	0.47	300	6/19/2005	19:55	
8.96	2457	1043.91	1044.53	0.62	300	6/19/2005	19:55	
8.96	2457	1043.91	1044.53	0.62	300	6/19/2005	19:57	
8.97	2451	1043.89	1044.52	0.63	300	6/19/2005	19:57	
8.97	2443	1043.94	1044.51	0.56	300	6/19/2005	19:57	
8.98	2439	1043.91	1044.48	0.57	300	6/19/2005	19:58	
9.30	2117	1043.27	1043.92	0.65	300	6/19/2005	19:45	
9.90	1516	1042.19	1042.68	0.48	300	6/19/2005	19:40	
10.21	1207	1041.57	1042.07	0.51	300	6/19/2005	19:26	
10.22	1197	1041.55	1042.03	0.48	300	6/19/2005	19:25	
10.22	1195	1041.36	1042.02	0.66	300	6/19/2005	19:26	Downstream of Stampede Park (S) Saddledome Access
10.41	1006	1040.99	1041.58	0.59	300	6/19/2005	19:21	
10.42	998	1040.98	1041.58	0.60	300	6/19/2005	19:20	Upstream of Stampede Park (N) Saddledome Access
10.43	991	1040.96	1041.58	0.62	300	6/19/2005	19:22	
10.43	990	1040.94	1041.58	0.64	300	6/19/2005	19:20	
10.43	985	1040.95	1041.58	0.63	300	6/19/2005	19:23	
10.44	976	1040.90	1041.56	0.65	300	6/19/2005	19:23	
10.83	589	1042.65	1040.48	-2.17*	300	INTERPRETED	-	Upstream of MacDonald Bridge
10.84	579	1042.55	1040.48	-2.07*	300	INTERPRETED	-	
10.84	573	1042.57	1040.49	-2.09*	300	INTERPRETED	-	
11.08	342	1039.42	1040.02	0.60	300	6/19/2005	19:04	Upstream of 9 Ave Train Bridge
11.08	340	1039.64	1040.01	0.36	300	6/19/2005	19:04	
11.08	338	1039.25	1039.98	0.74	300	6/19/2005	19:04	
11.09	329	1039.27	1039.90	0.63	300	6/19/2005	19:05	
11.09	328	1039.13	1039.89	0.76	300	6/19/2005	19:06	
11.09	325	1039.14	1039.86	0.72	300	6/19/2005	19:07	
11.12	294	1039.14	1039.69	0.56	300	6/19/2005	19:00	Upstream of Inglewood (9 Ave)Bridge
11.13	292	1039.06	1039.69	0.63	300	6/19/2005	18:59	
11.14	280	1039.12	1039.63	0.52	300	6/19/2005	18:58	
11.14	276	1039.11	1039.62	0.51	300	6/19/2005	18:57	

* Not included in statistics as HWMs are considered to not reflect maximum water level during 2005 flood event

APPENDIX B

Sensitivity Analysis

July 2015
Report No. 13-1326-0054

Golder Associates

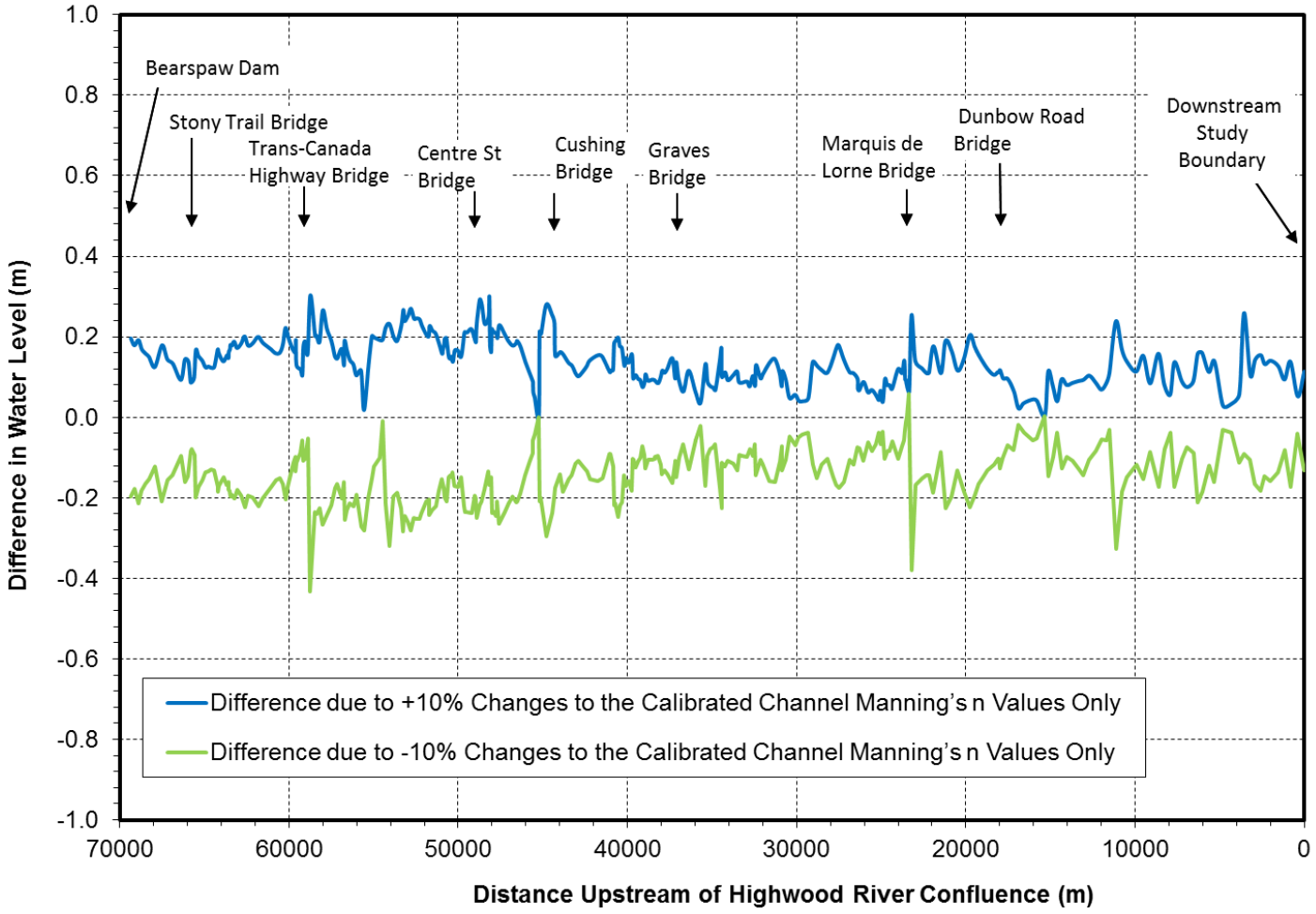

Figure B.1: Sensitivity of Simulated Water Level along the Bow River for the 100 -year Flood Event (Channel Only)

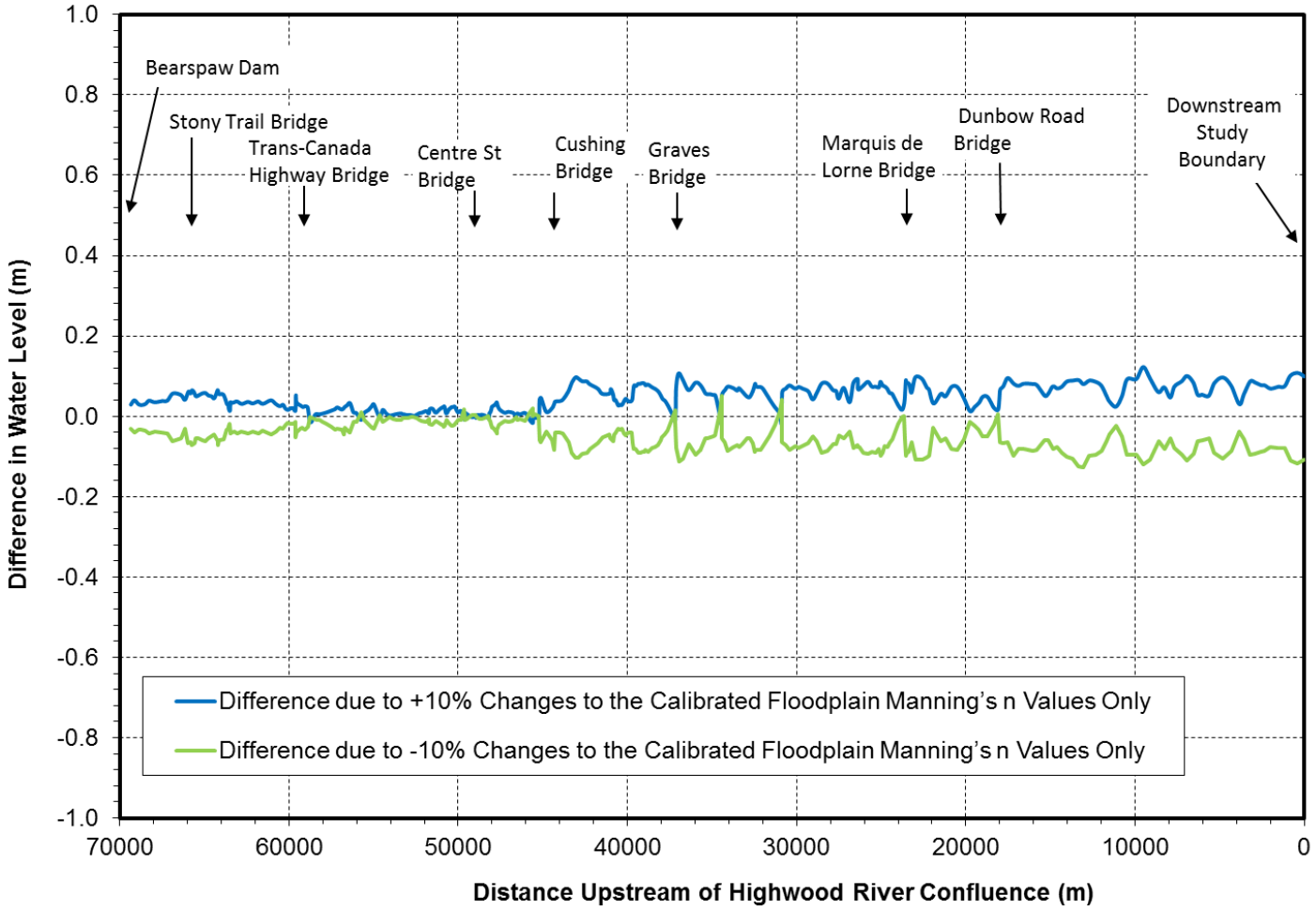

Figure B.2: Sensitivity of Simulated Water Level along the Bow River for the 100 -year Flood Event (Floodplain Only)

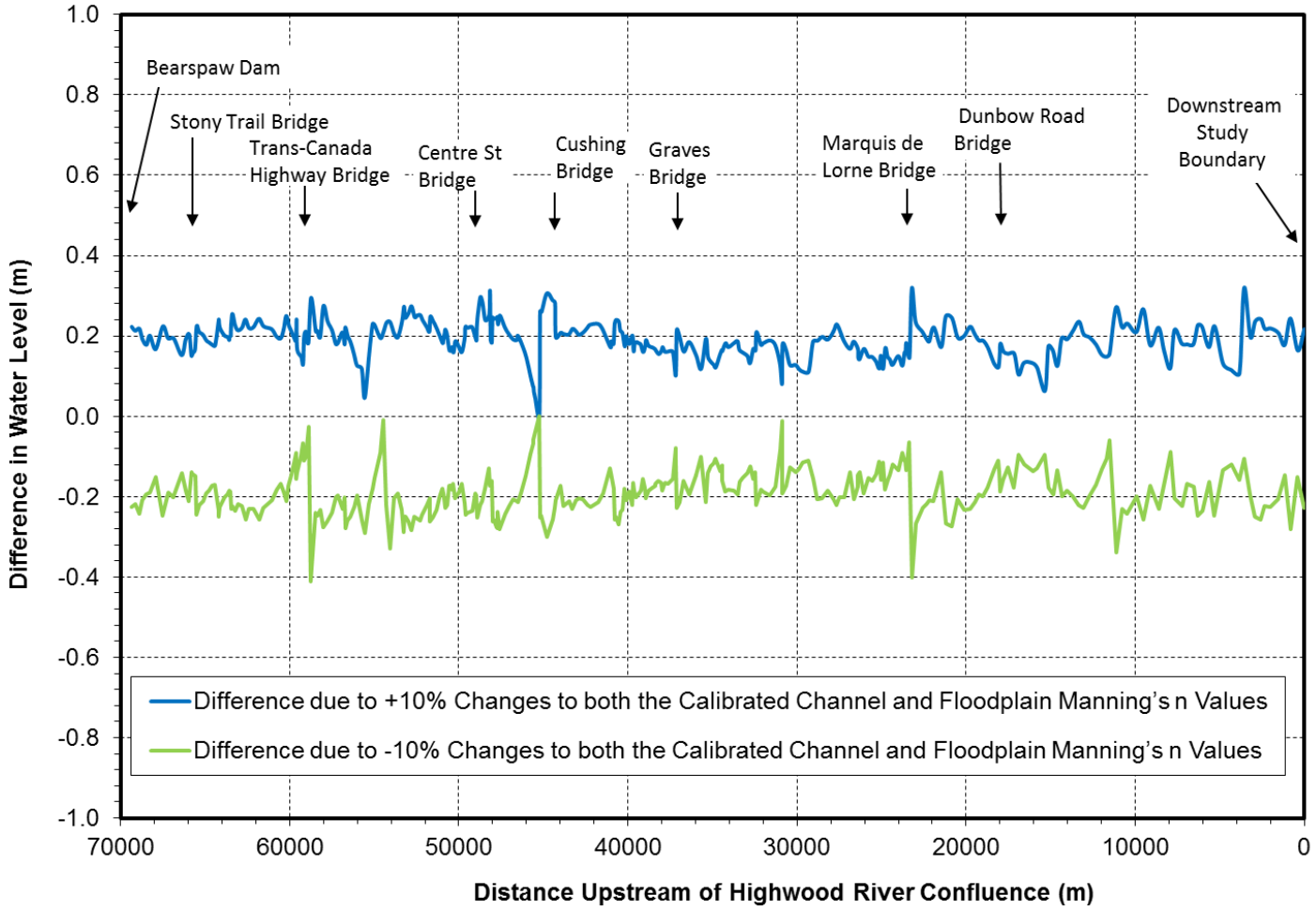

Figure B.3: Sensitivity of Simulated Water Level along the Bow River for the 100 -year Flood Event (both Channel and Floodplain)

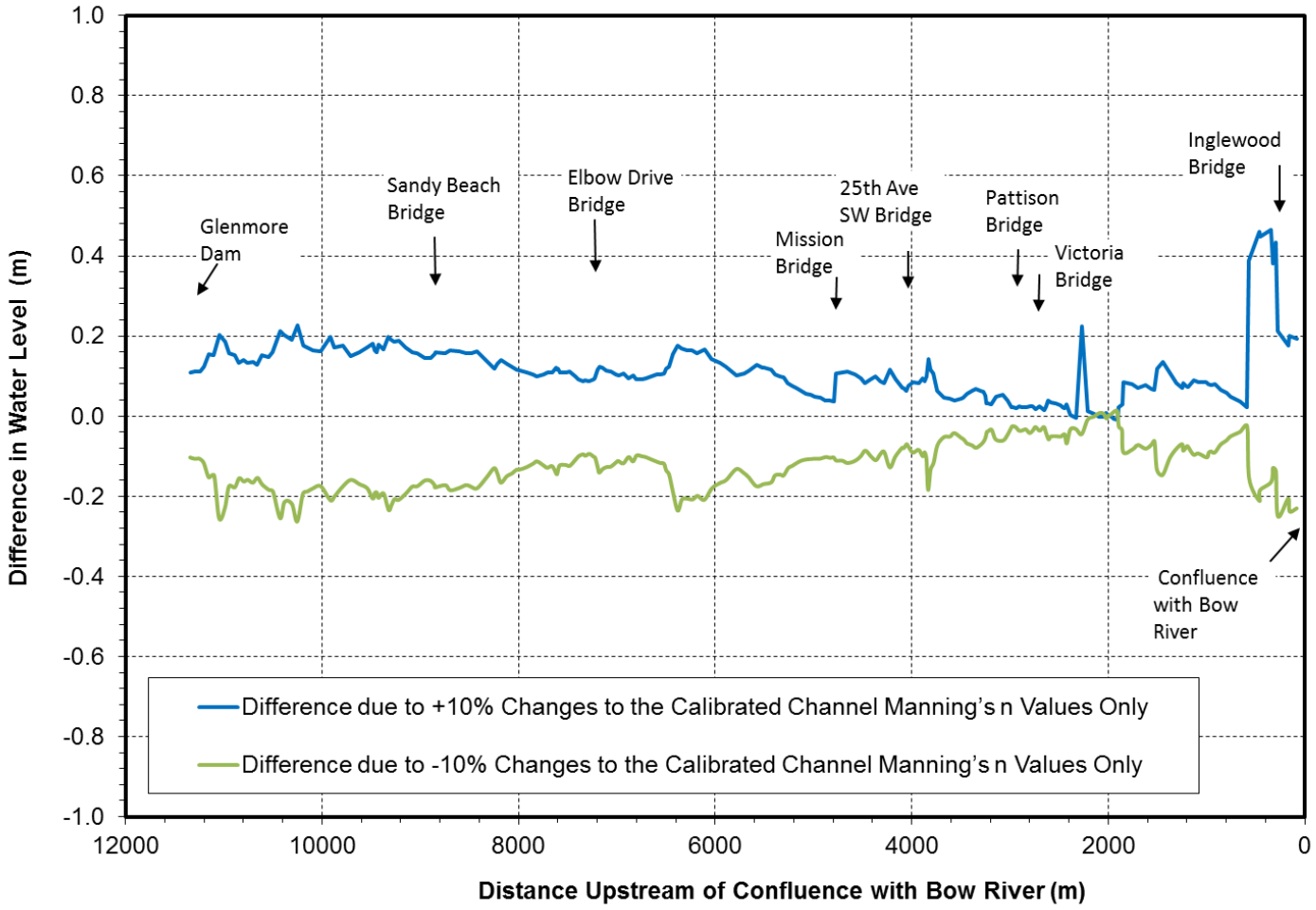

Figure B.4: Sensitivity of Simulated Water Level along the Elbow River for the 100 -year Flood Event (Channel Only)

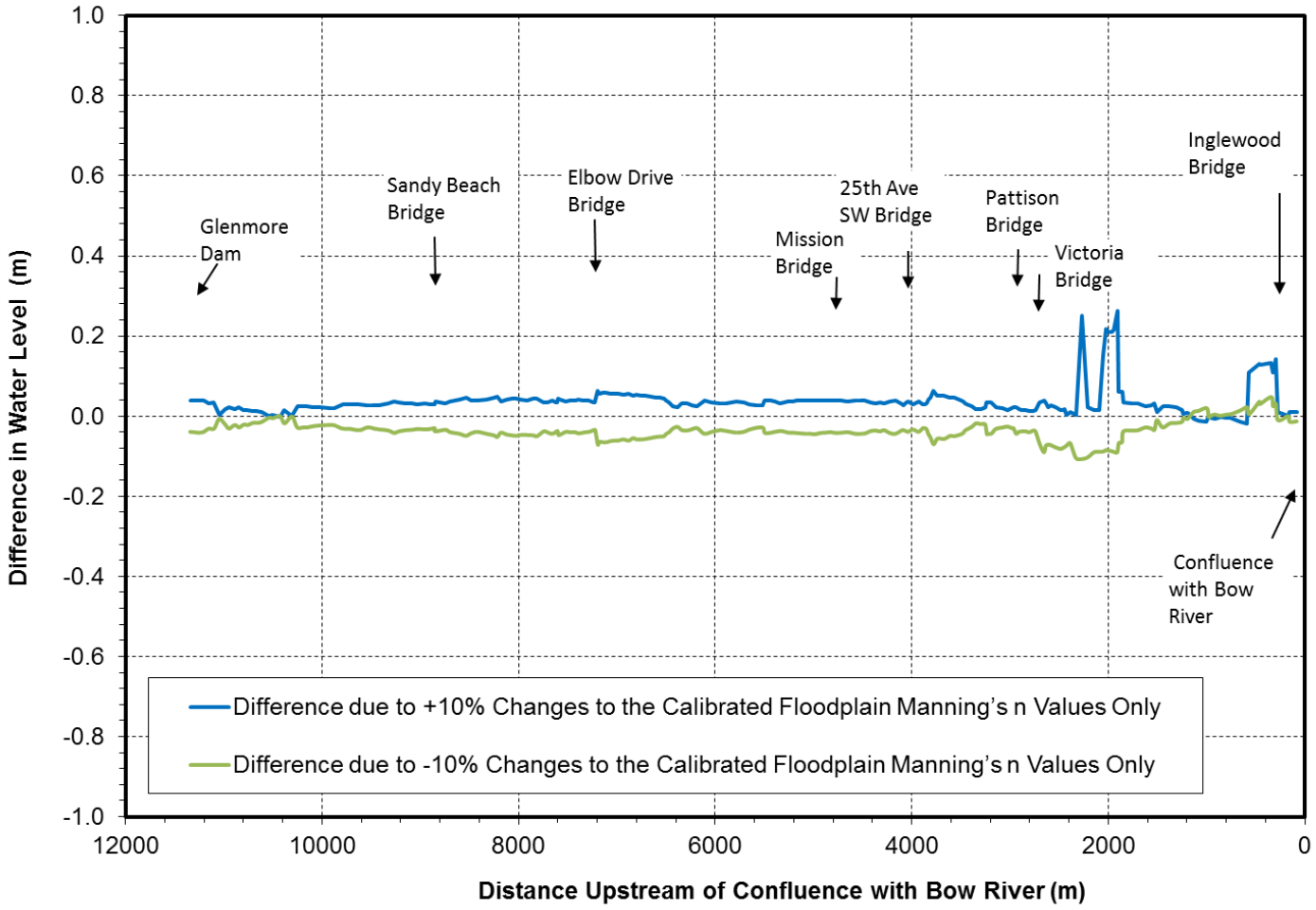

Figure B.5: Sensitivity of Simulated Water Level along the Elbow River for the 100 -year Flood Event (Floodplain Only)

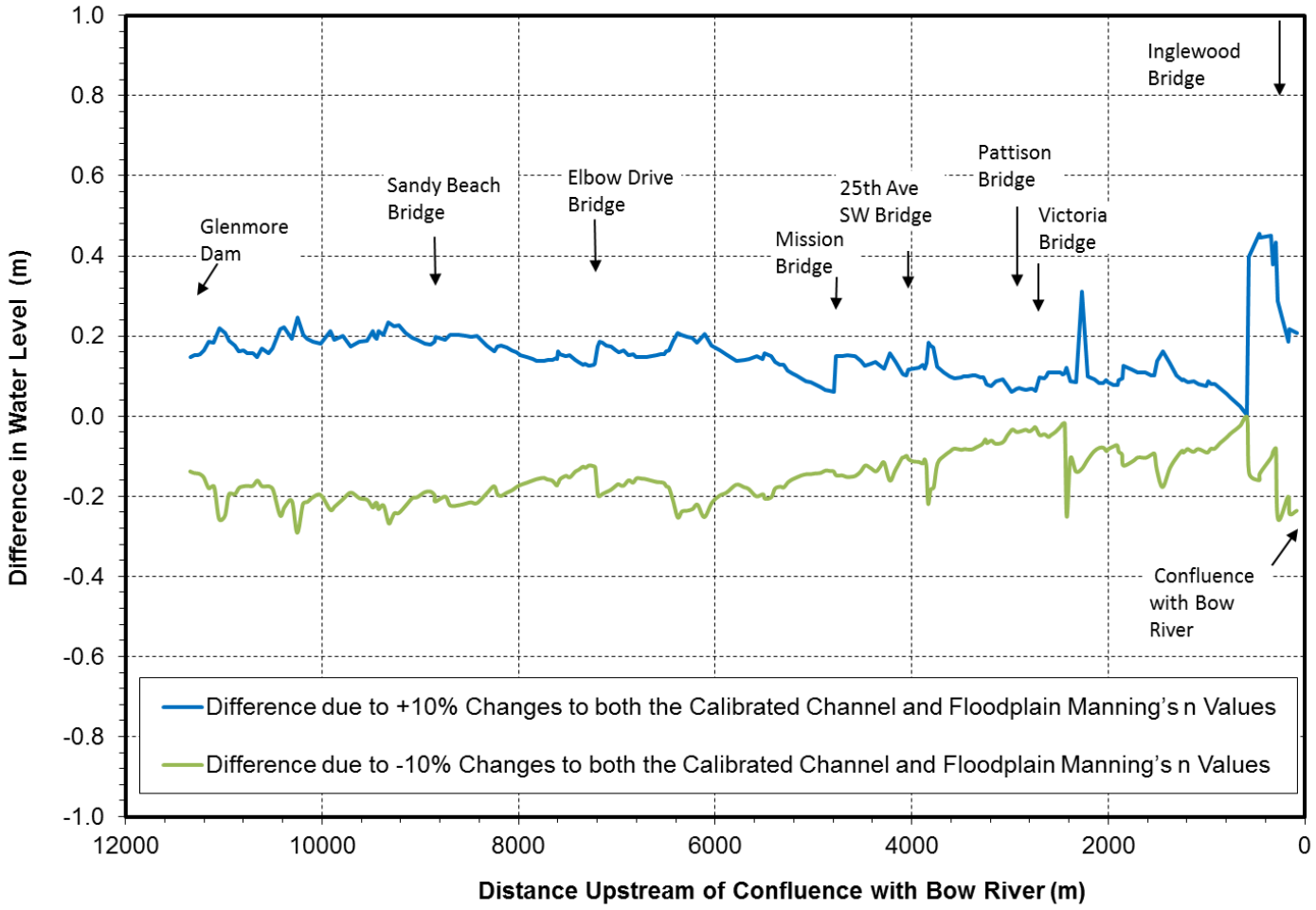

Figure B.6: Sensitivity of Simulated Water Level along the Elbow River for the 100 -year Flood Event (both Channel and Floodplain)

APPENDIX C

Flood Profiles

July 2015
Report No. 13-1326-0054

Table C.1 (a): Simulation Results along the Bow River for 2- to 10-year Flood Events

Distance from the Bearspaw Dam (km)	Station in Flood Mapping	Station in HEC-RAS	Channel Thalweg (m)	2-Year Flood Event			5-Year Flood Event			8-Year Flood Event			10-Year Flood Event			Notes
				Water Level (m)	Channel Velocity (m/s)	Froude Number	Water Level (m)	Channel Velocity (m/s)	Froude Number	Water Level (m)	Channel Velocity (m/s)	Froude Number	Water Level (m)	Channel Velocity (m/s)	Froude Number	
0.15	1	69342	1074.20	1077.25	1.43	0.27	1078.04	1.90	0.32	1078.43	2.14	0.34	1078.62	2.24	0.35	Bearspaw Dam
0.36	2	69135	1074.40	1077.05	1.51	0.35	1077.80	1.92	0.38	1078.18	2.14	0.39	1078.35	2.23	0.40	
0.60	3	68889	1074.20	1076.72	1.64	0.36	1077.36	2.24	0.43	1077.67	2.55	0.47	1077.82	2.69	0.48	
0.79	4	68700	1074.40	1076.36	1.85	0.50	1077.06	2.06	0.46	1077.40	2.15	0.44	1077.58	2.18	0.44	
1.03	5	68467	1073.41	1075.72	1.79	0.48	1076.56	1.95	0.44	1076.98	1.98	0.41	1077.18	2.01	0.40	
1.22	6	68272	1073.00	1075.46	1.39	0.31	1076.29	1.76	0.33	1076.71	1.95	0.34	1076.90	2.03	0.35	
1.56	7	67927	1072.00	1074.99	1.67	0.40	1075.87	1.94	0.38	1076.29	2.11	0.39	1076.48	2.19	0.39	
1.99	8	67498	1070.80	1074.58	1.50	0.28	1075.33	2.13	0.36	1075.67	2.43	0.39	1075.83	2.57	0.41	
2.30	9	67187	1072.00	1074.23	1.70	0.41	1074.87	2.21	0.46	1075.18	2.44	0.48	1075.33	2.54	0.49	
2.63	10	66863	1071.00	1073.47	1.93	0.52	1074.18	2.17	0.49	1074.50	2.36	0.50	1074.64	2.45	0.50	
3.11	11	66385	1070.00	1072.54	1.71	0.38	1073.43	1.99	0.37	1073.85	2.04	0.36	1074.00	2.10	0.36	
3.34	12	66149	1068.80	1072.16	1.92	0.40	1072.96	2.51	0.45	1073.37	2.69	0.46	1073.49	2.82	0.47	
3.55	13	65945	1068.80	1071.80	1.98	0.50	1072.66	2.23	0.46	1073.09	2.35	0.45	1073.19	2.50	0.47	
3.68	14	65813	1069.20	1071.59	1.63	0.40	1072.52	1.76	0.37	1073.06	1.44	0.29	1073.16	1.53	0.30	Upstream of Stoney Trail Bridge
3.77	15	65727	1068.80	1071.55	1.17	0.26	1072.47	1.36	0.28	1072.91	1.42	0.27	1073.09	1.46	0.27	
3.89	16	65600	1068.60	1071.46	1.34	0.28	1072.35	1.67	0.30	1072.78	1.82	0.30	1072.95	1.89	0.31	
3.99	17	65502	1068.00	1071.26	1.89	0.38	1072.04	2.52	0.44	1072.41	2.82	0.47	1072.56	2.95	0.48	
4.14	18	65352	1067.80	1071.09	1.70	0.37	1071.88	2.17	0.40	1072.25	2.37	0.41	1072.41	2.46	0.42	
4.36	19	65132	1068.40	1070.82	1.58	0.36	1071.60	1.97	0.38	1071.95	2.18	0.41	1072.10	2.28	0.42	
4.56	20	64931	1068.32	1070.38	1.90	0.47	1071.13	2.12	0.47	1071.51	2.22	0.46	1071.67	2.26	0.45	
4.72	21	64768	1067.80	1070.12	1.51	0.37	1070.87	1.77	0.36	1071.26	1.90	0.36	1071.44	1.94	0.36	
4.91	22	64580	1068.00	1069.85	1.54	0.37	1070.68	1.68	0.34	1071.10	1.76	0.33	1071.29	1.78	0.32	
5.08	23	64415	1067.23	1069.56	1.73	0.41	1070.45	1.90	0.37	1070.90	1.97	0.35	1071.10	1.97	0.34	
5.27	24	64223	1066.40	1069.27	1.76	0.37	1070.10	2.28	0.42	1070.48	2.55	0.44	1070.66	2.68	0.45	Upstream of 85 St SW Bridge
5.30	25	64193	1066.40	1069.23	1.71	0.37	1070.05	2.22	0.41	1070.43	2.49	0.44	1070.60	2.62	0.45	
5.36	26	64135	1066.72	1069.16	1.62	0.36	1069.99	1.97	0.37	1070.39	2.13	0.37	1070.57	2.19	0.38	
5.62	27	63877	1065.84	1068.68	1.60	0.38	1069.58	1.77	0.35	1070.01	1.88	0.35	1070.21	1.93	0.34	
5.84	28	63657	1064.80	1068.15	1.93	0.40	1069.10	2.22	0.39	1069.58	2.31	0.38	1069.80	2.35	0.37	
5.92	29	63576	1064.20	1067.99	1.83	0.36	1068.99	2.05	0.34	1069.47	2.15	0.34	1069.70	2.17	0.33	Upstream of Bowmont Pedestrian Bridge
5.93	30	63557	1064.20	1067.98	1.72	0.32	1068.93	2.07	0.34	1069.37	2.26	0.35	1069.58	2.33	0.35	
6.00	31	63489	1063.20	1067.92	1.51	0.27	1068.86	1.89	0.31	1069.31	2.07	0.33	1069.52	2.14	0.33	Upstream of CP Rail Twin Bridges
6.03	32	63460	1062.40	1067.89	1.32	0.22	1068.80	1.71	0.26	1069.23	1.90	0.28	1069.43	1.98	0.29	
6.11	33	63386	1064.60	1067.82	1.46	0.30	1068.73	1.74	0.30	1069.15	1.90	0.31	1069.35	1.97	0.31	
6.25	34	63240	1065.00	1067.58	1.59	0.35	1068.44	2.01	0.38	1068.82	2.25	0.40	1069.00	2.35	0.40	
6.42	35	63069	1064.87	1067.31	1.50	0.35	1068.19	1.81	0.35	1068.62	1.87	0.34	1068.80	1.94	0.34	
6.68	36	62817	1063.20	1067.04	1.52	0.29	1067.83	2.08	0.36	1068.24	2.28	0.37	1068.41	2.38	0.38	
6.87	37	62619	1063.60	1066.79	1.79	0.40	1067.50	2.37	0.45	1067.88	2.61	0.47	1068.03	2.74	0.48	
7.08	38	62411	1064.80	1066.44	1.77	0.47	1067.20	2.03	0.44	1067.60	2.15	0.43	1067.76	2.23	0.43	
7.35	40	62142	1063.80	1065.93	1.68	0.40	1066.77	2.04	0.40	1067.18	2.23	0.41	1067.33	2.33	0.42	
7.67	42	61820	1062.60	1065.42	1.77	0.39	1066.26	2.19	0.41	1066.69	2.37	0.42	1066.79	2.53	0.44	
7.95	44	61544	1061.14	1065.07	1.63	0.35	1065.85	2.14	0.40	1066.22	2.41	0.42	1066.38	2.38	0.41	
8.43	45	61067	1061.60	1064.29	1.71	0.42	1065.10	1.94	0.41	1065.47	2.10	0.41	1065.64	2.17	0.41	
8.70	46	60789	1061.60	1063.81	1.61	0.39	1064.66	1.94	0.38	1065.05	2.08	0.38	1065.25	2.09	0.37	
8.96	47	60533	1060.60	1063.35	1.79	0.43	1064.24	2.12	0.41	1064.75	2.07	0.37	1064.97	2.06	0.36	
9.14	48	60353	1058.60	1063.17	1.51	0.30	1064.03	2.00	0.35	1064.47	2.25	0.37	1064.67	2.36	0.38	
9.29	49	60206	1057.37	1063.02	1.65	0.30	1063.79	2.33	0.38	1064.19	2.66	0.42	1064.37	2.81	0.43	
9.45	50	60047	1060.00	1062.78	1.92	0.45	1063.53	2.41	0.48	1063.94	2.63	0.49	1064.13	2.71	0.49	
9.58	51	59916	1060.20	1062.54	1.74	0.43	1063.33	2.11	0.43	1063.76	2.28	0.43	1063.96	2.36	0.43	
9.74	52	59754	1060.00	1062.30	1.60	0.37	1063.09	2.00	0.40	1063.52	2.17	0.40	1063.73	2.24	0.40	
9.87	53	59622	1060.00	1062.05	1.73	0.42	1062.84	2.12	0.43	1063.27	2.30	0.43	1063.47	2.37	0.43	Upstream of Hextall Bridge
9.90	54	59594	1060.00	1061.89	2.06	0.52	1062.65	2.49	0.53	1063.06	2.67	0.52	1063.25	2.76	0.52	
9.93	55	59558	1059.90	1061.77	1.99	0.51	1062.55	2.36	0.50	1062.97	2.52	0.49	1063.17	2.60	0.49	Downstream of Shouldice Bridge
10.18	56	59316	1058.80	1061.14	2.12	0.52	1061.98	2.50	0.51	1062.43	2.68	0.50	1062.64	2.74	0.50	
10.28	57	59210	1058.01	1061.01	1.83	0.39	1061.83	2.37	0.43	1062.26	2.60	0.45	1062.48	2.68	0.44	Upstream of 16 Ave (Trans-Canada Highway) Bridge
10.34	58	59153	1056.60	1060.94	1.87	0.38	1061.70	2.52	0.45	1062.09	2.84	0.48	1062.27	2.99	0.49	
10.44	59	59057	1058.00	1060.85	1.74	0.38	1061.61	2.26	0.42	1062.01	2.51	0.44	1062.19	2.63	0.45	
10.60	60	58896	1057.40	1060.55	2.12	0.50	1061.24	2.72	0.55	1061.60	3.02	0.58	1061.76	3.15	0.58	
10.76	61	58736	1057.22	1060.15	2.38	0.58	1060.68	3.20	0.68	1060.97	3.59	0.72	1061.11	3.75	0.74	
11.04	62	58454	1057.60	1059.52	1.88	0.53	1060.18	2.18	0.51	1060.57	2.30	0.49	1060.75	2.35	0.48	
11.13	63	58367	1057.00	1059.24	2.05	0.59	1059.98	2.30	0.52	1060.38	2.42	0.50	1060.57	2.47	0.50	
11.30	64	58196	1056.40	1058.90	1.81	0.47	1059.74	2.04	0.44	1060.18	2.16	0.43	1060.39	2.22	0.42	
11.49	65	58000	1055.00	1058.61	1.79	0.40	1059.40	2.31	0.44	1059.80	2.57	0.46	1059.99	2.69	0.47	
11.74	66	57756	1055.60	1058.31	1.76	0.41	1059.04	2.27	0.45	1059.42	2.52	0.47	1059.60	2.62	0.47	
12.00	67	57497	1055.80	1057.91	1.81	0.45	1058.62	2.27	0.47	1059.00	2.48	0.48	1059.19	2.57	0.48	
12.22	68	57275	1055.40	1057.36	1.99	0.54	1058.17	2.14	0.51	1058.64	2.16	0.46	1058.87	2.17	0.44	
12.35	69	57146	1055.00	1057.00	2.02	0.52	1057.85	2.29	0.48	1058.32	2.41	0.47	1058.55	2.44	0.48	
12.61	70	56884	1053.80	1056.47	1.95	0.44	1057.32	2.41	0.46	1057.74	2.65	0.47	1057.93	2.75	0.48	
12.75	71	56746	1053.56	1056.22	1.94	0.46	1057.02	2.38	0.48	1057.42	2.59	0.49	1057.61	2.69	0.50	Upstream of Harry Boothman Pedestrian Bridge
12.78	72	56714	1053.00	1056.15	2.00	0.45	1056.89	2.58	0.50	1057.26	2.87	0.52	1057.43	3.00	0.53	
12.92	73	56577	1053.00	1056.02	1.66	0.35	1056.72	2.26	0.41	1057.08	2.56	0.44	1057.25	2.69	0.45	
13.10	74	56396	1053.43	1055.77	1.85	0.45	1056.44	2.35	0.49	1056.80	2.60	0.50	1056.96	2.70	0.51	
13.30	75	56194	1052.80	1055.25	2.37	0.54	1055.95	2.82	0.55	1056.38	2.93	0.53	1056.58	2.97	0.52	
13.47	76	56019	1052.80	1054.82	2.35	0.61	1055.73	2.31	0.47	1056.21	2.35	0.44	1056.43	2.38	0.43	
13.75	77	55741	1051.40	1054.44	1.89	0.39	1055.31	2.47	0.43	1055.73	2.77	0.46	1055.92	2.91	0.47	
13.92	78	55568	1050.40	1054.27	1.86	0.37	1055.08	2.51	0.44	1055.46	2.85	0.48	1055.63	3.01	0.49	
14.20	79	55296	1051.60	1054.02	1.58	0.35	1054.74	2.09	0.40	1055.10	2.35	0.43	1055.27	2.46	0.44	
14.39	80	55099	1051.80	1053.73	1.65	0.43	1054.40	2.03	0.44	1054.77	2.20	0.44	1054.93	2.29	0.45	
14.51	81	54987	1051.00	1053.49	1.74	0.51	1054.24	1.90	0.44	1054.63	2.00	0.42	1054.80	2.06	0.42	
14.86	82	54636	1050.00	1052.90	1.71	0.39	1053.56	2.29	0.45	1053.91	2.57	0.48	1054.06	2.71	0.49	
15.03	83	54464	1050.20	1052.64	1.66	0.44	1053.26	2.06	0.46	1053.60	2.24	0.47	1053.75	2.33	0.47	
15.21	84	54278	1050.40	1052.27	1.66	0.43	1052.84	2.16	0.48	1053.13	2.41	0.50	1053.27	2.52	0.51	
15.42	85	54068	1049.60	1051.76	1.92	0.55	1052.27	2.41	0.59	1052.53	2.66	0.60	1052.66	2.76	0.61	
15.69	86	53806	1049.00	1051.16	1.46	0.45	1051.72	1.69	0.43	1052.09	1.73	0.40	1052.27	1.75	0.39	
15.89	87	53605	1048.20	1050.72	1.47	0.47	1051.44	1.52	0.37	1051.87	1.54	0.34	1052.07	1.56	0.33	
16.14	88	53355	1047.80	1050.13	1.95	0.48	1050.88	2.41	0.49	1051.30	2.61	0.49	1051.50	2.70	0.49	
16.25	89	53240	1047.60	1049.85	2.17	0.52	1050.54	2.78	0.57	1050.94	3.04	0.57	1051.12	3.16	0.58	
16.30	90	53188	1047.40	1049.78	1.98	0.50	1050.51	2.42	0.51	1050.93	2.60	0.50	1051.13	2.69	0.50	Upstream of Crowchild Trail Bridge
16.35	91	53140	1047.60	1049.69	1.91	0.48	1050.43	2.32	0.49	1050.86	2.46	0.48	1051.06	2.54	0.48	
16.53	92	52964	1047.14	1049.00	2.65	0.76	1049.91	2.73	0.60	1050.36	2.85	0.57	1050.57	2.91	0.56	
16.70	93	52792	1044.00	1048.87	1.73	0.33	1049.68	2.38	0.40	1050.08	2.71	0.44	1050.26	2.86	0.45	
16.88	94	52609	1044.66	1048.75	1.61	0.33	1049.53	2.17	0.39	1049.92	2.46	0.42	1050.09	2.59	0.43	

Distance from the Bearspaw Dam (km)	Station in Flood Mapping	Station in HEC-RAS	Channel Thalweg (m)	2-Year Flood Event			5-Year Flood Event			8-Year Flood Event			10-Year Flood Event			Notes
				Water Level (m)	Channel Velocity (m/s)	Froude Number	Water Level (m)	Channel Velocity (m/s)	Froude Number	Water Level (m)	Channel Velocity (m/s)	Froude Number	Water Level (m)	Channel Velocity (m/s)	Froude Number	
17.04	95	52456	1045.44	1048.52	1.95	0.47	1049.28	2.42	0.49	1049.66	2.66	0.50	1049.84	2.77	0.51	
17.13	95.1	52366	1045.40	1048.23	2.35	0.62	1049.02	2.71	0.59	1049.40	2.92	0.59	1049.58	3.02	0.59	New Cross Section
17.21	96	52279	1045.05	1048.05	2.05	0.51	1048.87	2.41	0.50	1049.26	2.63	0.51	1049.44	2.73	0.51	
17.34	97	52149	1045.20	1047.91	1.67	0.37	1048.69	2.17	0.41	1049.07	2.44	0.43	1049.24	2.56	0.44	
17.60	98	51893	1045.40	1047.54	1.86	0.46	1048.30	2.28	0.47	1048.66	2.53	0.48	1048.82	2.63	0.49	
17.75	99	51741	1045.02	1047.27	1.91	0.46	1048.00	2.37	0.49	1048.35	2.62	0.50	1048.51	2.74	0.51	Upstream of 14th St SW (Mewata) Bridge
17.80	100	51688	1045.20	1047.16	1.88	0.45	1047.87	2.36	0.48	1048.21	2.63	0.50	1048.37	2.74	0.51	
17.97	101	51519	1044.66	1046.81	2.01	0.53	1047.53	2.32	0.52	1047.87	2.52	0.52	1048.04	2.60	0.52	
18.16	102	51328	1043.15	1046.50	1.65	0.38	1047.13	2.13	0.43	1047.48	2.34	0.45	1047.65	2.43	0.45	
18.38	103	51114	1043.80	1045.97	1.72	0.48	1046.59	2.07	0.48	1046.98	2.18	0.46	1047.17	2.23	0.45	
18.54	104	50951	1042.60	1045.29	2.07	0.59	1046.18	2.09	0.47	1046.65	2.16	0.44	1046.86	2.19	0.43	Upstream of Louise (Hillhurst) Bridge
18.58	105	50910	1042.60	1045.07	2.05	0.57	1046.08	2.02	0.44	1046.56	2.10	0.41	1046.77	2.14	0.40	
18.66	106	50831	1042.38	1044.84	2.08	0.53	1045.90	2.18	0.44	1046.37	2.33	0.43	1046.58	2.40	0.43	Upstream of NW LRT Bridge
18.69	107	50800	1041.81	1044.74	2.15	0.52	1045.80	2.32	0.46	1046.27	2.48	0.45	1046.48	2.56	0.45	
18.79	108	50706	1041.40	1044.54	2.03	0.43	1045.53	2.44	0.45	1046.02	2.61	0.44	1046.23	2.70	0.45	
18.94	109	50553	1040.60	1044.53	1.19	0.23	1045.51	1.57	0.26	1046.00	1.76	0.27	1046.21	1.85	0.28	
19.05	109.1	50438	1041.20	1044.43	1.45	0.30	1045.39	1.82	0.33	1045.87	2.01	0.34	1046.07	2.10	0.34	Upstream of Peace Bridge
19.09	110	50403	1041.53	1044.38	1.54	0.34	1045.34	1.89	0.35	1045.82	2.08	0.35	1046.02	2.17	0.36	The HEC-RAS cross section is 50405.09 in 2012 Model
19.18	112	50312	1039.42	1044.39	1.05	0.19	1045.35	1.44	0.22	1045.83	1.64	0.24	1046.04	1.73	0.25	
19.29	115	50204	1041.60	1044.21	1.83	0.41	1045.13	2.21	0.42	1045.59	2.40	0.42	1045.79	2.48	0.42	
19.47	117	50021	1040.60	1043.90	2.04	0.43	1044.87	2.39	0.42	1045.36	2.56	0.42	1045.56	2.64	0.42	
19.67	120	49822	1041.17	1043.63	1.73	0.40	1044.66	1.99	0.37	1045.15	2.14	0.37	1045.42	2.05	0.34	
19.85	123	49642	1039.31	1043.39	1.84	0.34	1044.31	2.43	0.39	1044.76	2.71	0.41	1044.97	2.83	0.42	Upstream of Prince's Island Pedestrian Bridge
19.88	125	49613	1039.00	1043.35	1.84	0.34	1044.27	2.41	0.40	1044.72	2.68	0.42	1044.93	2.79	0.43	
20.03	127	49464	1039.34	1043.14	1.94	0.41	1044.04	2.39	0.43	1044.48	2.63	0.44	1044.68	2.75	0.45	
20.15	127.1	49338	1038.94	1042.80	2.07	0.43	1043.69	2.54	0.46	1044.12	2.77	0.48	1044.31	2.91	0.49	New Cross Section
20.27	132	49218	1039.20	1042.38	2.15	0.48	1043.21	2.68	0.51	1043.66	2.88	0.51	1043.87	2.95	0.50	
20.36	132.1	49130	1039.20	1042.03	2.26	0.51	1042.88	2.76	0.52	1043.34	2.97	0.52	1043.55	3.05	0.52	New Cross Section
20.49	133	49003	1039.33	1041.80	1.57	0.34	1042.68	1.99	0.36	1043.15	2.19	0.37	1043.36	2.28	0.38	
20.54	134	48953	1038.20	1041.74	1.67	0.36	1042.59	2.12	0.39	1043.06	2.34	0.40	1043.27	2.43	0.41	Upstream of Centre St Bridge
20.58	135	48912	1038.39	1041.50	2.02	0.49	1042.37	2.40	0.48	1042.83	2.58	0.48	1043.04	2.66	0.48	
20.76	136	48730	1038.78	1041.15	1.88	0.46	1042.02	2.21	0.45	1042.48	2.36	0.45	1042.68	2.44	0.45	
20.89	137	48603	1038.62	1040.89	1.89	0.44	1041.72	2.31	0.46	1042.13	2.53	0.46	1042.33	2.63	0.47	
21.06	138	48431	1038.11	1040.54	1.94	0.46	1041.36	2.38	0.47	1041.78	2.61	0.48	1041.97	2.71	0.48	
21.29	139	48200	1037.35	1040.21	1.80	0.39	1040.99	2.36	0.44	1041.38	2.65	0.46	1041.56	2.78	0.47	Upstream of 4th Ave Flyover Bridge
21.34	140	48153	1036.60	1040.14	1.80	0.38	1040.87	2.43	0.45	1041.24	2.74	0.48	1041.40	2.89	0.49	Upstream of Old Langevin Bridge
21.38	141	48115	1036.20	1040.13	1.62	0.32	1040.85	2.23	0.40	1041.21	2.54	0.44	1041.38	2.68	0.45	
21.44	142	48050	1037.19	1040.06	1.66	0.34	1040.76	2.28	0.42	1041.10	2.60	0.46	1041.25	2.74	0.47	Upstream of New Langevin (Edmonton Trail) Bridge
21.49	143	48007	1037.20	1039.99	1.76	0.38	1040.64	2.40	0.46	1040.97	2.73	0.50	1041.11	2.88	0.51	Upstream of LRT (Harry Kroeger) Bridge
21.54	144	47955	1037.20	1039.95	1.63	0.37	1040.60	2.19	0.43	1040.93	2.48	0.46	1041.07	2.61	0.47	
21.71	145	47785	1037.41	1039.52	2.32	0.62	1040.15	2.74	0.61	1040.46	2.96	0.62	1040.61	3.05	0.62	
21.77	147	47727	1037.20	1039.35	2.20	0.56	1039.98	2.67	0.59	1040.30	2.90	0.60	1040.45	2.98	0.60	Upstream of St. Patrick's Island Pedestrian Bridge
21.81	148	47677	1036.28	1039.37	1.70	0.37	1039.98	2.27	0.44	1040.29	2.53	0.46	1040.45	2.64	0.47	The HEC-RAS cross section is 47636.58 in 2012 Model
21.92	149	47572	1036.60	1039.20	1.85	0.41	1039.75	2.48	0.49	1040.03	2.77	0.52	1040.18	2.88	0.53	
22.22	151	47272	1036.00	1038.21	2.65	0.81	1038.92	2.73	0.65	1039.36	2.69	0.57	1039.56	2.68	0.55	
22.44	153	47047	1034.20	1037.70	1.47	0.37	1038.61	1.67	0.35	1039.10	1.74	0.35	1039.31	1.80	0.34	Elbow River Confluence
22.72	157	46775	1033.46	1037.45	1.12	0.27	1038.41	1.29	0.26	1038.92	1.38	0.25	1039.13	1.44	0.25	
22.93	159	46564	1033.60	1037.27	1.28	0.28	1038.21	1.61	0.30	1038.71	1.76	0.30	1038.92	1.85	0.31	Upstream of St. George's Island Bridge
22.97	161	46518	1034.60	1037.20	1.43	0.32	1038.12	1.76	0.34	1038.62	1.92	0.34	1038.82	2.02	0.35	
23.16	162	46329	1034.80	1036.98	1.48	0.34	1037.88	1.82	0.36	1038.35	1.98	0.36	1038.55	2.08	0.37	
23.47	166	46024	1034.40	1036.44	1.83	0.48	1037.31	2.09	0.44	1037.72	2.29	0.45	1037.90	2.38	0.45	
23.75	168	45743	1033.40	1036.23	1.29	0.27	1037.06	1.73	0.31	1037.44	1.97	0.34	1037.63	2.06	0.34	
23.89	169	45598	1032.42	1036.19	1.12	0.21	1037.01	1.55	0.26	1037.38	1.79	0.28	1037.56	1.88	0.29	Nose Creek Confluence
23.91	170	45580	1032.00	1036.19	1.08	0.19	1037.00	1.55	0.25	1037.37	1.81	0.28	1037.54	1.92	0.29	Upstream of CP Rail Bridge
23.93	171	45561	1031.45	1036.19	0.96	0.17	1036.99	1.42	0.22	1037.35	1.69	0.26	1037.53	1.81	0.27	
24.01	172	45479	1031.80	1036.16	1.02	0.19	1036.95	1.50	0.24	1037.30	1.77	0.28	1037.47	1.90	0.29	
24.26	173	45235	1031.20	1036.14	0.70	0.13	1036.93	1.03	0.17	1037.28	1.22	0.19	1037.45	1.31	0.20	Upstream of Western Headworks
24.30	174	45190	1032.00	1034.12	1.39	0.33	1035.05	1.69	0.33	1035.53	1.85	0.34	1035.75	1.91	0.34	
24.39	175	45105	1031.40	1033.94	1.64	0.40	1034.86	1.99	0.39	1035.33	2.18	0.40	1035.54	2.27	0.40	
24.70	176	44793	1029.52	1033.24	1.90	0.40	1034.15	2.43	0.43	1034.63	2.65	0.44	1034.84	2.75	0.44	
25.04	177	44457	1029.60	1032.81	1.35	0.29	1033.72	1.76	0.32	1034.19	1.98	0.33	1034.39	2.08	0.34	
25.18	178	44309	1028.80	1032.73	1.12	0.21	1033.60	1.62	0.26	1034.06	1.88	0.29	1034.25	2.01	0.30	Upstream of 17 Ave (Cushing) Bridge
25.23	179	44265	1028.00	1032.70	1.12	0.19	1033.55	1.66	0.26	1033.99	1.95	0.29	1034.18	2.09	0.30	
25.35	179.1	44139	1023.93	1032.66	1.04	0.17	1033.48	1.59	0.24	1033.90	1.89	0.27	1034.08	2.03	0.28	New Cross Section
25.51	180	43980	1027.71	1032.57	1.18	0.25	1033.37	1.61	0.30	1033.78	1.84	0.32	1033.94	1.95	0.33	
25.68	181	43808	1029.16	1032.27	1.71	0.44	1033.01	2.13	0.46	1033.39	2.35	0.47	1033.54	2.46	0.48	
25.83	181.1	43657	1029.80	1031.95	1.47	0.40	1032.76	1.68	0.37	1033.17	1.81	0.37	1033.33	1.88	0.38	New Cross Section
26.00	182	43493	1029.20	1031.55	1.63	0.43	1032.45	1.82	0.39	1032.86	1.99	0.40	1033.00	2.10	0.41	
26.22	183	43272	1028.55	1031.18	1.34	0.32	1032.10	1.64	0.32	1032.50	1.84	0.34	1032.61	1.97	0.36	
26.38	183.1	43115	1027.60	1030.81	1.92	0.52	1031.77	2.02	0.43	1032.17	2.17	0.43	1032.24	2.33	0.45	New Cross Section
26.43	184	43061	1025.40	1030.89	0.75	0.13	1031.84	1.05	0.16	1032.24	1.23	0.18	1032.33	1.34	0.20	
26.59	185	42900	1027.11	1030.77	1.29	0.28	1031.69	1.62	0.30	1032.06	1.83	0.32	1032.27	1.35	0.23	
26.83	186	42662	1027.60	1030.40	1.66	0.36	1031.41	1.80	0.33	1031.87	1.64	0.28	1032.09	1.67	0.27	
27.08	187	42409	1026.20	1029.96	1.55	0.33	1030.93	1.99	0.36	1031.36	2.26	0.39	1031.56	2.37	0.40	
27.26	188	42230	1026.80	1029.52	2.10	0.44	1030.42	2.62	0.47	1030.89	2.77	0.46	1031.11	2.81	0.46	
27.59	188.1	41903	1026.20	1028.85	1.89	0.41	1029.83	2.27	0.41	1030.35	2.39	0.40	1030.58	2.49	0.40	New Cross Section
27.73	189	41759	1025.60	1028.55	1.90	0.41	1029.53	2.36	0.42	1030.01	2.61	0.44	1030.22	2.72	0.44	
27.85	189.1	41643	1025.40	1028.26	2.08	0.46	1029.20	2.63	0.48	1029.66	2.92	0.50	1029.85	3.08	0.51	New Cross Section
28.00	190	41493	1024.61	1027.93	2.09	0.42	1028.91	2.56	0.44	1029.43	2.67	0.43	1029.68	2.64	0.41	
28.19	190.1	41303	1024.74	1027.19	2.70	0.62	1028.52	2.50	0.45	1029.12	2.51	0.42	1029.38	2.53	0.41	New Cross Section
28.45	191	41038	1022.23	1027.15	1.09	0.19	1028.37	1.46	0.22	1028.93	1.68	0.24	1029.17	1.78	0.25	
28.51	192	40985	1021.00	1027.10	1.22	0.21	1028.28	1.68	0.26	1028.80	1.95	0.29	1029.03	2.06	0.30	Upstream of CP Rail Bridge
28.64	193	40852	1023.40	1026.89	1.72	0.34	1027.94	2.21	0.38	1028.42	2.50	0.40	1028.62	2.62	0.41	Upstream of Bonnybrook (Ogden Road) Bridge
28.71	194	40787	1023.80	1026.68	2.09	0.47	1027.74	2.48	0.45	1028.20	2.77	0.47	1028.40	2.90	0.48	
28.79	195	40703	1023.60	1026.43	2.09	0.44	1027.49	2.50	0.46	1027.95	2.74	0.47	1028.14	2.86	0.48	
28.95	196	40543	1022.40	1026.22	1.61	0.31	1027.18	2.17	0.36	1027.60	2.49	0.39	1027.77	2.65	0.40	
29.04	197	40453	1022.96	1026.11	1.59	0.34	1027.08	1.97	0.36	1027.50	2.23	0.38	1027.67	2.37	0.39	
29.16	198	40328	1023.08	1025.91	1.59	0.36	1026.91	1.93	0.36	1027.32	2.17	0.38	1027.47	2.29	0.39	
29.31	199	40183	1021.86	1025.86	1.02	0.19	1026.85	1.41	0.23	1027.25	1.66	0.25	1027.40	1.78	0.27	Upstream of Calf Robe (Deerfoot Trail) Bridge
29.39	200	40105	1021.44	1025.78	1.25	0.24	1026.72	1.73	0.29	1027.09	2.00	0.32	1027.23	2.13	0.33	
29.46	201	40036	1020.40	1025.69	1.47	0.30	1026.61	1.92	0.34	1026.97	2.20	0.37	1027.13	2.24	0.37	
29.57	202	39919	1022.20	1025.52	1.58	0.35	1026.41	2.04	0.38	1026.72	2.38	0.42	1026.90	2.37	0.41	

Distance from the Bearspaw Dam (km)	Station in Flood Mapping	Station in HEC-RAS	Channel Thalweg (m)	2-Year Flood Event			5-Year Flood Event			8-Year Flood Event			10-Year Flood Event			Notes
				Water Level (m)	Channel Velocity (m/s)	Froude Number	Water Level (m)	Channel Velocity (m/s)	Froude Number	Water Level (m)	Channel Velocity (m/s)	Froude Number	Water Level (m)	Channel Velocity (m/s)	Froude Number	
29.76	203	39730	1021.00	1025.33	1.26	0.26	1026.21	1.70	0.31	1026.46	2.04	0.35	1026.62	2.16	0.36	
29.83	204	39663	1020.60	1025.31	1.02	0.20	1026.19	1.42	0.24	1026.43	1.72	0.28	1026.58	1.84	0.30	Upstream of CN Rail Bridge
29.88	205	39608	1019.44	1025.29	0.93	0.16	1026.14	1.38	0.21	1026.36	1.71	0.26	1026.50	1.85	0.27	
29.99	206	39506	1021.80	1025.15	1.59	0.33	1025.92	2.16	0.39	1026.09	2.52	0.44	1026.24	2.61	0.45	
30.13	207	39363	1021.00	1024.88	1.74	0.37	1025.64	2.18	0.40	1025.77	2.42	0.43	1025.94	2.43	0.43	
30.24	208	39252	1021.40	1024.46	2.15	0.49	1025.48	1.65	0.34	1025.58	1.86	0.37	1025.74	1.93	0.37	
30.39	209	39101	1021.00	1024.39	1.03	0.22	1025.36	1.33	0.24	1025.45	1.42	0.25	1025.62	1.50	0.26	
30.51	210	38978	1020.20	1024.23	1.38	0.27	1025.12	1.94	0.33	1025.23	2.03	0.34	1025.39	2.11	0.34	
30.56	211	38927	1019.80	1024.13	1.63	0.32	1024.94	2.30	0.40	1025.07	2.35	0.40	1025.23	2.44	0.40	
30.71	212	38785	1020.00	1023.79	1.91	0.45	1024.58	2.22	0.47	1024.77	2.13	0.43	1024.96	2.13	0.41	
30.96	213	38530	1020.40	1023.09	1.82	0.45	1023.87	2.09	0.43	1024.30	1.90	0.36	1024.53	1.91	0.35	
31.10	214	38390	1020.00	1022.69	1.83	0.44	1023.50	2.21	0.44	1024.02	2.15	0.39	1024.25	2.18	0.38	
31.14	215	38348	1019.80	1022.57	1.86	0.44	1023.39	2.28	0.45	1023.91	2.27	0.41	1024.15	2.31	0.40	
31.31	216	38178	1019.80	1022.08	1.93	0.44	1023.11	1.90	0.36	1023.66	2.06	0.35	1023.90	2.13	0.35	
31.46	217	38032	1018.60	1021.78	1.77	0.37	1022.78	2.24	0.40	1023.30	2.48	0.41	1023.52	2.60	0.42	
31.54	218	37948	1018.40	1021.64	1.75	0.36	1022.64	2.22	0.39	1023.16	2.45	0.40	1023.39	2.56	0.41	
31.63	219	37862	1017.20	1021.50	1.78	0.35	1022.46	2.33	0.39	1022.97	2.60	0.41	1023.18	2.73	0.42	
31.70	220	37790	1017.80	1021.41	1.71	0.34	1022.34	2.28	0.41	1022.82	2.56	0.44	1023.03	2.69	0.45	
31.85	221	37647	1017.40	1021.24	1.53	0.32	1022.13	2.03	0.37	1022.60	2.29	0.39	1022.80	2.40	0.40	
32.14	222	37348	1017.20	1020.68	1.80	0.43	1021.45	2.33	0.47	1021.88	2.59	0.49	1022.07	2.71	0.49	
32.31	223	37185	1016.20	1020.35	1.65	0.38	1021.06	2.26	0.44	1021.44	2.55	0.47	1021.62	2.68	0.48	Upstream of Graves (Glenmore Trail) Bridges
32.35	224	37145	1016.60	1020.24	1.70	0.40	1020.89	2.33	0.47	1021.26	2.64	0.50	1021.43	2.77	0.52	
32.38	225	37112	1016.80	1020.16	1.73	0.41	1020.78	2.36	0.51	1021.13	2.63	0.53	1021.30	2.75	0.54	
32.53	226	36967	1017.75	1019.30	2.90	0.97	1020.19	2.58	0.64	1020.57	2.72	0.62	1020.75	2.78	0.61	
32.80	227	36694	1017.40	1019.18	0.63	0.19	1020.02	0.88	0.21	1020.37	1.04	0.22	1020.53	1.10	0.23	
32.95	227.1	36547	1017.53	1019.09	0.70	0.21	1019.92	1.07	0.25	1020.26	1.29	0.27	1020.42	1.38	0.28	New Cross Section
33.11	228	36379	1014.95	1019.01	1.16	0.22	1019.78	1.64	0.28	1020.07	1.95	0.32	1020.21	2.08	0.33	
33.52	229	35968	1017.00	1018.62	1.18	0.34	1019.34	1.46	0.34	1019.49	1.77	0.40	1019.63	1.83	0.40	
33.82	230	35673	1015.40	1017.97	1.65	0.47	1018.87	1.58	0.39	1019.15	1.38	0.32	1019.31	1.40	0.31	
34.10	231	35388	1013.80	1017.57	1.57	0.31	1018.34	2.19	0.38	1018.49	2.70	0.46	1018.59	2.91	0.49	
34.22	232	35268	1014.20	1017.42	1.63	0.37	1018.12	2.23	0.44	1018.48	1.85	0.34	1018.60	1.93	0.35	
34.41	233	35084	1014.40	1017.04	1.74	0.47	1017.95	1.41	0.33	1018.35	1.40	0.30	1018.50	1.34	0.28	
34.55	234	34940	1014.60	1016.62	1.79	0.46	1017.58	1.72	0.43	1018.09	1.64	0.36	1018.29	1.55	0.32	
34.69	235	34801	1013.88	1016.41	1.43	0.39	1017.42	1.37	0.33	1017.96	1.37	0.28	1018.20	1.23	0.24	
34.94	236	34553	1012.00	1015.88	2.04	0.43	1016.89	2.50	0.44	1017.40	2.75	0.45	1017.64	2.85	0.45	
35.05	237	34446	1012.08	1015.76	1.67	0.33	1016.75	2.23	0.38	1017.24	2.53	0.40	1017.47	2.65	0.41	Upstream of Eric Harvie Pedestrian Bridge
35.07	238	34424	1012.20	1015.73	1.68	0.34	1016.70	2.23	0.38	1017.19	2.54	0.41	1017.42	2.66	0.41	
35.27	239	34222	1012.01	1015.45	1.73	0.41	1016.43	2.10	0.40	1016.90	2.34	0.41	1017.12	2.43	0.42	
35.43	240	34061	1012.01	1015.09	1.80	0.44	1016.12	2.00	0.40	1016.60	2.18	0.40	1016.81	2.26	0.41	
35.76	241	33737	1012.00	1014.44	1.81	0.39	1015.38	2.29	0.42	1015.83	2.55	0.44	1016.03	2.67	0.45	
35.97	242	33519	1011.20	1014.05	2.01	0.42	1014.85	2.69	0.49	1015.26	3.02	0.52	1015.43	3.18	0.53	
36.07	243	33419	1011.60	1013.99	1.39	0.33	1014.88	1.65	0.32	1015.33	1.79	0.32	1015.52	1.85	0.32	
36.27	244	33222	1011.00	1013.53	2.17	0.51	1014.50	2.35	0.45	1015.01	2.39	0.42	1015.23	2.40	0.41	
36.56	245	32932	1009.60	1012.97	2.00	0.41	1013.93	2.56	0.45	1014.45	2.76	0.45	1014.65	2.86	0.46	
36.72	246	32776	1009.60	1012.85	1.41	0.31	1013.88	1.68	0.30	1014.42	1.83	0.30	1014.63	1.91	0.31	
36.90	247	32588	1009.70	1012.61	1.63	0.35	1013.59	2.09	0.37	1014.09	2.34	0.39	1014.26	2.48	0.40	
37.04	248	32456	1007.81	1012.46	1.70	0.33	1013.38	2.31	0.39	1013.83	2.64	0.42	1013.98	2.82	0.44	Upstream of Ivor Strong (Deerfoot Trail) Bridge
37.09	249	32397	1007.20	1012.38	1.69	0.34	1013.27	2.30	0.40	1013.72	2.62	0.42	1013.85	2.81	0.45	
37.36	250	32136	1008.40	1011.96	1.60	0.38	1012.96	1.35	0.28	1013.43	1.39	0.27	1013.54	1.47	0.28	The HEC-RAS cross section is 32109.19 in 2012 Model
37.50	251	31996	1007.00	1011.75	1.23	0.26	1012.76	1.53	0.27	1013.23	1.63	0.27	1013.33	1.75	0.29	The HEC-RAS cross section is 32005.19 in 2012 Model
37.90	252	31595	1007.65	1010.93	2.17	0.49	1011.86	2.52	0.50	1012.29	2.78	0.51	1012.51	2.62	0.46	
38.20	253	31294	1007.60	1010.33	1.80	0.42	1011.21	2.27	0.44	1011.57	2.60	0.47	1011.71	2.76	0.49	
38.48	254	31013	1006.60	1010.01	1.45	0.30	1010.86	1.98	0.35	1011.16	2.28	0.39	1011.28	2.44	0.41	
38.61	255	30885	1006.20	1009.86	1.63	0.33	1010.68	2.14	0.38	1010.96	2.45	0.41	1011.05	2.63	0.44	Upstream of Sue Higgins Pedestrian Bridge
38.64	256	30851	1006.20	1009.79	1.69	0.34	1010.51	2.42	0.43	1010.66	2.99	0.52	1010.65	3.35	0.58	
38.85	257	30640	1007.60	1009.29	2.14	0.57	1009.95	2.67	0.59	1010.07	2.92	0.63	1010.21	2.63	0.55	
39.07	258	30422	1005.80	1008.57	2.06	0.55	1009.35	2.18	0.50	1009.64	2.00	0.43	1009.76	2.09	0.43	
39.40	259	30090	1005.20	1008.10	1.55	0.31	1008.78	2.04	0.37	1009.03	2.29	0.40	1009.14	2.42	0.41	
39.62	260	29873	1004.80	1007.82	1.67	0.41	1008.46	1.94	0.41	1008.69	2.17	0.44	1008.77	2.27	0.45	
39.84	261	29655	1005.20	1007.30	1.83	0.51	1007.89	2.25	0.53	1008.20	2.27	0.49	1008.35	2.21	0.46	
40.18	262	29312	1003.62	1006.46	1.79	0.46	1007.18	2.10	0.44	1007.53	2.29	0.45	1007.68	2.38	0.46	
40.44	263	29053	1001.60	1006.14	1.58	0.32	1006.74	2.23	0.41	1006.99	2.60	0.46	1007.10	2.77	0.48	
40.70	264	28790	1003.40	1005.79	1.52	0.43	1006.33	1.83	0.47	1006.55	2.04	0.49	1006.64	2.16	0.50	
40.98	265	28513	1002.40	1004.71	2.20	0.70	1005.27	2.33	0.67	1005.61	2.22	0.62	1005.74	2.22	0.59	
41.31	266	28184	1002.00	1003.75	1.40	0.41	1004.60	1.60	0.36	1005.03	1.70	0.35	1005.22	1.72	0.34	
41.64	267	27849	1000.00	1003.15	1.92	0.42	1004.06	2.31	0.43	1004.53	2.44	0.42	1004.73	2.50	0.42	
41.82	268	27669	1000.00	1002.91	1.67	0.36	1003.82	2.04	0.37	1004.28	2.23	0.39	1004.48	2.32	0.39	
41.97	269	27518	999.90	1002.72	1.63	0.35	1003.66	1.94	0.35	1004.12	2.12	0.36	1004.32	2.21	0.37	
42.27	270	27220	998.60	1002.35	1.53	0.35	1003.28	1.89	0.36	1003.72	2.12	0.38	1003.90	2.23	0.39	
42.62	271	26870	999.60	1001.80	1.76	0.40	1002.70	2.24	0.43	1003.08	2.54	0.46	1003.24	2.66	0.47	
42.84	272	26652	999.00	1001.43	1.85	0.42	1002.29	2.37	0.46	1002.61	2.72	0.50	1002.74	2.87	0.52	
43.09	273	26397	997.80	1001.11	1.76	0.34	1001.95	2.28	0.39	1002.29	2.48	0.40	1002.42	2.58	0.41	Upstream of Mackenzie Pedestrian Bridge
43.11	274	26381	997.60	1001.11	1.57	0.31	1001.99	1.88	0.32	1002.27	2.16	0.36	1002.47	2.07	0.34	
43.19	275	26305	998.00	1000.99	1.78	0.37	1001.81	2.27	0.41	1002.11	2.46	0.42	1002.27	2.52	0.42	
43.45	276	26045	998.40	1000.60	1.78	0.42	1001.49	2.01	0.39	1001.72	2.32	0.43	1001.89	2.37	0.43	
43.70	277	25787	997.44	1000.10	1.72	0.42	1001.06	2.05	0.40	1001.49	1.72	0.31	1001.69	1.74	0.31	
43.93	278	25559	995.61	999.75	1.71	0.33	1000.58	2.44	0.41	1000.90	2.85	0.46	1001.07	2.99	0.47	
44.16	279	25337	996.20	999.42	1.86	0.41	1000.22	2.30	0.46	1000.56	2.49	0.47	1000.76	2.52	0.46	
44.36	280	25134	996.62	999.03	1.87	0.47	999.90	2.09	0.42	1000.27	2.22	0.42	1000.48	2.30	0.42	Fish Creek Confluence
44.44	281	25048	996.80	998.84	1.84	0.45	999.77	2.06	0.41	1000.13	2.23	0.42	1000.32	2.39	0.43	
44.58	282	24910	995.80	998.55	1.97	0.43	999.52	2.33	0.42	999.87	2.55	0.44	1000.05	2.70	0.45	
44.71	283	24779	994.41	998.35	1.99	0.38	999.25	2.59	0.44	999.61	2.79	0.45	999.79	2.92	0.46	
44.84	284	24653	994.60	997.99	2.53	0.54	998.74	3.29	0.64	999.04	3.58	0.66	999.24	3.69	0.66	
44.99	285	24507	994.40	997.63	2.39	0.53	998.32	3.00	0.59	998.68	3.14	0.58	998.91	3.16	0.56	
45.13	286	24361	994.80	997.19	2.25	0.59	998.02	2.45	0.52	998.43	2.52	0.50	998.69	2.54	0.48	
45.48	287	24008	993.20	996.10	2.32	0.52	997.05	2.83	0.52	997.50	3.04	0.52	997.78	3.16	0.52	
45.72	288	23774	992.40	995.65	2.02	0.43	996.61	2.60	0.47	997.06	2.85	0.48	997.35	2.97	0.48	
45.85	289	23642	992.60	995.42	1.95	0.44	996.39	2.45	0.46	996.84	2.70	0.47	997.12	2.85	0.48	Upstream of Marquis de Lorne (Highway 22X) Bridge
45.90	290	23590	992.60	995.31	1.95	0.44	996.27	2.46	0.47	996.71	2.70	0.48	997.00	2.83	0.49	
45.94	291	23549	992.40	995.22	1.90	0.43	996.19	2.40	0.46	996.62	2.64	0.47	996.91	2.78	0.48	
45.98	292	23509	992.40	995.18	1.70	0.36	996.14	2.23	0.41	996.57	2.48	0.43	996.86	2.62	0.44	
46.14	293	23349	992.21	994.78	2.23	0.52	995.80	2.55	0.48	996.27	2.70	0.47	996.59	2.77	0.46	

Distance from the Bearspaw Dam (km)	Station in Flood Mapping	Station in HEC-RAS	Channel Thalweg (m)	2-Year Flood Event			5-Year Flood Event			8-Year Flood Event			10-Year Flood Event			Notes
				Water Level (m)	Channel Velocity (m/s)	Froude Number	Water Level (m)	Channel Velocity (m/s)	Froude Number	Water Level (m)	Channel Velocity (m/s)	Froude Number	Water Level (m)	Channel Velocity (m/s)	Froude Number	
46.28	294	23212	991.40	994.37	2.45	0.52	995.28	3.19	0.57	995.64	3.60	0.61	995.89	3.83	0.63	
46.50	295	22989	991.68	994.06	1.75	0.38	995.00	2.27	0.42	995.46	2.34	0.40	995.75	2.43	0.40	
46.89	296	22597	990.00	993.27	2.29	0.47	994.36	2.55	0.44	994.88	2.65	0.42	995.21	2.70	0.41	
47.18	297	22312	989.40	992.97	1.66	0.33	994.05	2.15	0.36	994.55	2.37	0.37	994.88	2.50	0.38	
47.31	298	22180	988.60	992.65	2.35	0.47	993.65	3.01	0.51	994.11	3.32	0.53	994.38	3.53	0.54	
47.58	299	21914	988.60	992.19	2.19	0.45	993.12	2.91	0.50	993.56	3.21	0.52	993.83	3.41	0.54	
48.02	300	21473	988.80	991.42	1.92	0.44	992.36	2.40	0.45	992.81	2.62	0.46	993.08	2.76	0.47	
48.29	301	21204	987.60	991.02	1.88	0.37	991.83	2.65	0.46	992.19	3.02	0.49	992.42	3.24	0.52	
48.65	302	20840	988.00	990.58	1.74	0.38	991.25	2.41	0.46	991.56	2.71	0.49	991.75	2.91	0.51	
49.01	303	20486	988.40	989.98	1.68	0.47	990.61	2.06	0.47	990.94	2.22	0.47	991.14	2.30	0.47	
49.38	304	20116	987.43	989.00	1.79	0.50	989.71	2.17	0.50	990.08	2.33	0.49	990.30	2.44	0.49	
49.74	305	19755	986.00	988.28	1.60	0.39	989.05	2.02	0.41	989.47	2.17	0.41	989.69	2.29	0.42	
50.01	306	19480	985.34	987.76	1.71	0.46	988.62	1.95	0.42	989.10	2.03	0.40	989.32	2.14	0.40	
50.26	307	19229	984.40	987.25	1.75	0.41	988.09	2.24	0.47	988.58	2.25	0.51	988.82	2.27	0.51	
50.49	308	19002	984.41	986.67	2.05	0.54	987.48	2.39	0.56	987.86	2.52	0.56	988.08	2.59	0.57	
50.78	309	18716	983.60	986.00	1.75	0.44	986.87	2.09	0.43	987.26	2.26	0.44	987.49	2.36	0.44	
51.14	310	18350	982.00	985.29	1.96	0.42	986.09	2.58	0.48	986.46	2.80	0.49	986.69	2.94	0.50	
51.39	311	18101	982.20	984.89	1.80	0.41	985.62	2.42	0.48	985.95	2.71	0.50	986.16	2.86	0.52	Upstream of Dunbow Road (Highway 2) Bridge
51.47	312	18017	982.05	984.75	1.76	0.40	985.44	2.40	0.47	985.76	2.68	0.50	985.96	2.85	0.51	
51.52	313	17974	982.00	984.69	1.67	0.37	985.36	2.29	0.45	985.67	2.57	0.47	985.85	2.76	0.49	
51.70	314	17788	981.60	984.29	1.82	0.42	984.88	2.41	0.48	985.17	2.63	0.50	985.35	2.71	0.50	
51.96	315	17528	981.60	983.90	1.33	0.34	984.40	1.78	0.39	984.69	1.93	0.40	984.87	2.02	0.40	
52.33	316	17163	979.80	982.98	1.99	0.48	983.51	2.13	0.45	983.73	2.41	0.49	983.87	2.58	0.51	
52.60	317	16891	979.80	982.76	1.14	0.25	983.27	1.39	0.28	983.50	1.51	0.29	983.64	1.59	0.30	
52.91	318	16585	979.40	982.15	1.89	0.44	982.71	2.23	0.46	982.81	2.63	0.53	982.93	2.72	0.53	Pine Creek Confluence
53.42	319	16067	978.00	980.79	2.23	0.53	981.26	2.89	0.61	981.54	2.60	0.52	981.66	2.72	0.53	
53.69	320	15801	977.56	979.95	2.09	0.51	980.65	2.02	0.42	981.02	2.06	0.40	981.21	1.99	0.37	
54.16	321	15337	975.40	978.09	2.40	0.54	979.04	3.01	0.56	979.44	3.29	0.57	979.69	3.42	0.57	
54.35	322	15137	972.80	977.83	1.68	0.31	978.61	2.52	0.43	978.90	2.98	0.48	979.08	3.25	0.52	
54.62	323	14868	973.80	977.51	1.59	0.32	978.24	1.96	0.36	978.47	2.26	0.40	978.64	2.41	0.42	
54.89	324	14601	974.20	977.11	1.64	0.35	977.87	1.82	0.34	977.97	2.19	0.40	978.16	2.22	0.40	
55.15	325	14345	974.20	976.67	1.63	0.37	977.19	2.45	0.50	977.42	2.28	0.45	977.59	2.41	0.46	
55.45	326	14038	973.41	975.98	1.77	0.44	976.68	1.64	0.34	976.79	1.97	0.40	976.95	2.07	0.41	
55.78	327	13712	972.60	975.35	1.59	0.34	975.96	2.24	0.43	976.12	2.18	0.40	976.28	2.26	0.41	
56.17	328	13326	971.80	974.51	1.88	0.46	975.06	2.11	0.47	975.29	2.19	0.46	975.45	2.26	0.46	
56.44	329	13050	971.00	973.86	1.75	0.40	974.42	2.09	0.42	974.72	2.10	0.40	974.91	2.15	0.40	
56.79	330	12701	970.41	973.02	1.70	0.45	973.78	1.76	0.38	974.13	1.86	0.37	974.34	1.92	0.37	
57.17	331	12318	969.57	972.16	1.77	0.38	973.03	2.13	0.39	973.41	2.27	0.39	973.62	2.36	0.40	
57.50	332	11995	968.80	971.27	2.27	0.51	972.22	2.60	0.49	972.67	2.68	0.47	972.97	2.63	0.44	
57.79	333	11701	967.40	970.34	2.35	0.49	971.48	2.63	0.46	971.99	2.74	0.44	972.32	2.80	0.43	
57.97	334	11521	963.60	970.17	1.60	0.28	971.23	2.23	0.34	971.70	2.55	0.37	971.97	2.77	0.39	
58.36	335	11135	965.20	969.63	1.87	0.40	970.56	2.45	0.44	970.98	2.72	0.46	971.22	2.90	0.47	
58.71	336	10780	964.45	969.13	1.36	0.32	970.13	1.68	0.32	970.54	1.87	0.33	970.77	2.00	0.34	
59.02	337	10471	966.00	968.45	1.88	0.47	969.59	1.88	0.43	970.05	1.91	0.42	970.29	1.95	0.41	
59.56	338	9936	963.60	967.64	1.53	0.29	968.60	2.13	0.35	968.92	2.46	0.39	969.15	2.62	0.41	
59.97	339	9519	963.80	967.18	1.43	0.30	968.05	1.87	0.33	968.23	2.21	0.38	968.43	2.35	0.40	
60.38	340	9109	963.60	966.42	1.55	0.39	967.33	1.86	0.37	967.68	1.60	0.30	967.87	1.66	0.30	
60.87	341	8623	962.20	965.21	1.91	0.42	966.12	2.50	0.46	966.54	2.78	0.48	966.80	2.80	0.47	
61.21	342	8278	961.80	964.52	1.62	0.38	965.49	2.01	0.38	965.91	2.22	0.40	966.16	2.36	0.40	
61.56	343	7928	960.60	963.66	2.14	0.45	964.70	2.58	0.45	965.19	2.69	0.44	965.48	2.74	0.43	
61.82	344	7676	959.60	963.41	1.58	0.27	964.33	2.32	0.36	964.74	2.67	0.39	964.95	2.90	0.42	
62.25	345	7246	959.24	962.81	1.93	0.43	963.68	2.30	0.43	964.10	2.42	0.42	964.33	2.48	0.42	
62.56	346	6932	959.80	962.05	1.79	0.43	963.12	1.99	0.38	963.59	2.12	0.37	963.82	2.23	0.38	
62.93	347	6560	957.00	961.12	2.22	0.44	962.34	2.63	0.43	962.83	2.81	0.43	963.11	2.86	0.43	
63.19	348	6300	956.20	960.56	2.40	0.44	961.60	3.26	0.52	962.08	3.51	0.53	962.36	3.64	0.54	
63.45	349	6047	955.60	960.32	1.55	0.29	961.32	2.17	0.35	961.77	2.46	0.38	962.04	2.60	0.39	
63.85	350	5643	957.20	959.83	1.54	0.36	960.81	1.91	0.36	961.26	2.09	0.36	961.52	2.21	0.37	
64.18	351	5308	956.20	959.31	1.60	0.34	960.23	2.16	0.38	960.65	2.40	0.40	960.91	2.52	0.41	
64.68	352	4811	955.80	958.36	1.91	0.43	959.34	2.11	0.39	959.81	2.20	0.38	960.08	2.27	0.37	
65.17	353	4323	954.61	957.37	1.80	0.38	958.51	2.17	0.37	959.03	2.32	0.37	959.34	2.37	0.36	
65.65	354	3840	951.40	956.68	1.79	0.33	957.60	2.57	0.41	958.00	2.95	0.45	958.24	3.17	0.47	
65.93	355	3566	953.20	956.22	1.93	0.44	957.10	2.43	0.46	957.44	2.74	0.49	957.66	2.91	0.50	
66.30	356	3195	952.61	955.28	1.74	0.44	956.36	1.72	0.41	956.84	1.73	0.36	957.14	1.74	0.34	
66.58	357	2910	950.81	954.44	2.04	0.44	955.54	2.50	0.44	956.08	2.70	0.44	956.39	2.85	0.45	
66.92	358	2571	950.40	953.62	2.07	0.44	954.78	2.59	0.44	955.32	2.84	0.45	955.61	3.00	0.46	
67.15	359	2338	949.00	953.39	1.48	0.28	954.55	1.97	0.32	955.09	2.22	0.33	955.37	2.38	0.35	
67.50	360	1991	949.21	952.97	1.72	0.34	954.04	2.32	0.39	954.50	2.63	0.41	954.72	2.86	0.44	
67.96	361	1536	949.00	952.30	1.75	0.36	953.32	2.25	0.39	953.78	2.44	0.40	953.91	2.66	0.43	
68.32	362	1172	948.60	951.75	1.75	0.35	952.62	2.45	0.42	952.98	2.81	0.46	953.21	2.75	0.44	
68.67	363	825	948.60	951.09	2.02	0.44	951.92	2.51	0.46	952.15	2.89	0.51	952.38	3.02	0.52	
69.11	364	386	947.49	949.99	1.94	0.50	951.06	2.10	0.42	951.51	1.92	0.35	951.77	1.97	0.35	
69.49	365	0	945.00	948.96	2.38	0.45	950.10	2.96	0.47	950.58	3.19	0.48	950.84	3.32	0.48	

Table C.1 (b): Simulation Results along the Bow River for 20- to 75-year Flood Events

Distance from the Bearspaw Dam (km)	Station in Flood Mapping	Station in HEC-RAS	Channel Thalweg (m)	20-Year Flood Event			35-Year Flood Event			50-Year Flood Event			75-Year Flood Event			Notes
				Water Level (m)	Channel Velocity (m/s)	Froude Number	Water Level (m)	Channel Velocity (m/s)	Froude Number	Water Level (m)	Channel Velocity (m/s)	Froude Number	Water Level (m)	Channel Velocity (m/s)	Froude Number	
0.15	1	69342	1074.20	1079.10	2.61	0.38	1079.46	2.89	0.41	1079.67	3.06	0.43	1079.91	3.27	0.44	Bearspaw Dam
0.36	2	69135	1074.40	1078.79	2.57	0.43	1079.14	2.81	0.45	1079.35	2.95	0.46	1079.59	3.11	0.47	
0.60	3	68889	1074.20	1078.29	2.91	0.49	1078.65	3.08	0.49	1078.87	3.17	0.49	1079.13	3.28	0.50	
0.79	4	68700	1074.40	1078.07	2.33	0.42	1078.46	2.42	0.42	1078.70	2.49	0.41	1078.97	2.56	0.41	
1.03	5	68467	1073.41	1077.71	2.15	0.40	1078.13	2.24	0.39	1078.37	2.30	0.38	1078.66	2.37	0.38	
1.22	6	68272	1073.00	1077.38	2.35	0.38	1077.76	2.56	0.39	1077.99	2.68	0.40	1078.25	2.84	0.41	
1.56	7	67927	1072.00	1077.01	2.31	0.38	1077.41	2.43	0.38	1077.65	2.50	0.38	1077.91	2.61	0.39	
1.99	8	67498	1070.80	1076.20	3.06	0.46	1076.51	3.37	0.49	1076.69	3.57	0.51	1076.91	3.75	0.53	
2.30	9	67187	1072.00	1075.77	2.57	0.46	1076.10	2.73	0.46	1076.29	2.81	0.47	1076.51	2.92	0.47	
2.63	10	66863	1071.00	1075.08	2.70	0.51	1075.42	2.86	0.51	1075.63	2.92	0.51	1075.87	3.00	0.50	
3.11	11	66385	1070.00	1074.49	2.25	0.36	1074.85	2.37	0.37	1075.08	2.43	0.37	1075.33	2.52	0.37	
3.34	12	66149	1068.80	1073.99	3.03	0.48	1074.34	3.20	0.48	1074.54	3.35	0.49	1074.80	3.44	0.49	
3.55	13	65945	1068.80	1073.65	2.78	0.49	1073.97	3.02	0.50	1074.17	3.15	0.51	1074.40	3.32	0.52	
3.68	14	65813	1069.20	1073.66	1.64	0.30	1074.01	1.75	0.30	1074.21	1.83	0.30	1074.46	1.90	0.31	Upstream of Stoney Trail Bridge
3.77	15	65727	1068.80	1073.58	1.62	0.28	1073.93	1.74	0.28	1074.13	1.82	0.29	1074.38	1.91	0.29	
3.89	16	65600	1068.60	1073.43	2.09	0.32	1073.76	2.25	0.33	1073.96	2.35	0.34	1074.20	2.45	0.35	
3.99	17	65502	1068.00	1073.01	3.23	0.50	1073.36	3.37	0.50	1073.57	3.43	0.50	1073.83	3.48	0.49	
4.14	18	65352	1067.80	1072.85	2.73	0.44	1073.20	2.87	0.44	1073.42	2.92	0.44	1073.69	2.97	0.43	
4.36	19	65132	1068.40	1072.54	2.51	0.43	1072.89	2.63	0.43	1073.12	2.68	0.43	1073.41	2.71	0.42	
4.56	20	64931	1068.32	1072.20	2.20	0.40	1072.63	2.13	0.36	1072.89	2.09	0.34	1073.22	2.05	0.32	
4.72	21	64768	1067.80	1072.01	2.01	0.34	1072.46	2.02	0.32	1072.74	2.03	0.31	1073.08	2.04	0.30	
4.91	22	64580	1068.00	1071.88	1.82	0.30	1072.35	1.84	0.29	1072.64	1.85	0.28	1072.99	1.86	0.27	
5.08	23	64415	1067.23	1071.73	1.98	0.32	1072.22	2.00	0.30	1072.52	2.01	0.29	1072.87	2.03	0.29	
5.27	24	64223	1066.40	1071.17	3.08	0.48	1071.57	3.38	0.51	1071.80	3.56	0.52	1072.08	3.79	0.54	Upstream of 85 St SW Bridge
5.30	25	64193	1066.40	1071.11	3.03	0.48	1071.50	3.33	0.51	1071.73	3.52	0.52	1072.00	3.73	0.54	
5.36	26	64135	1066.72	1071.11	2.38	0.38	1071.54	2.50	0.38	1071.80	2.57	0.38	1072.10	2.64	0.38	
5.62	27	63877	1065.84	1070.78	2.05	0.34	1071.23	2.14	0.33	1071.50	2.20	0.33	1071.81	2.27	0.33	
5.84	28	63657	1064.80	1070.41	2.50	0.37	1070.88	2.60	0.37	1071.15	2.67	0.37	1071.48	2.74	0.37	
5.92	29	63576	1064.20	1070.33	2.29	0.32	1070.82	2.30	0.31	1071.11	2.29	0.30	1071.46	2.27	0.29	Upstream of Bowmont Pedestrian Bridge
5.93	30	63557	1064.20	1070.20	2.53	0.36	1070.71	2.51	0.34	1071.02	2.47	0.32	1071.39	2.43	0.31	
6.00	31	63489	1063.20	1070.12	2.37	0.34	1070.59	2.54	0.35	1070.86	2.64	0.36	1071.19	2.76	0.36	Upstream of CP Rail Twin Bridges
6.03	32	63460	1062.40	1070.00	2.23	0.31	1070.43	2.41	0.32	1070.69	2.53	0.33	1070.99	2.65	0.33	
6.11	33	63386	1064.60	1069.90	2.21	0.33	1070.33	2.39	0.34	1070.59	2.49	0.35	1070.89	2.60	0.35	
6.25	34	63240	1065.00	1069.59	2.47	0.39	1070.04	2.58	0.39	1070.31	2.64	0.39	1070.62	2.72	0.39	
6.42	35	63069	1064.87	1069.38	2.17	0.35	1069.82	2.32	0.36	1070.09	2.41	0.36	1070.40	2.51	0.36	
6.68	36	62817	1063.20	1068.96	2.67	0.40	1069.37	2.89	0.41	1069.62	3.03	0.42	1069.91	3.18	0.43	
6.87	37	62619	1063.60	1068.54	3.07	0.50	1068.93	3.30	0.51	1069.15	3.45	0.52	1069.42	3.61	0.53	
7.08	38	62411	1064.80	1068.29	2.46	0.43	1068.71	2.60	0.43	1068.96	2.67	0.43	1069.25	2.75	0.43	
7.35	40	62142	1063.80	1067.88	2.56	0.42	1068.31	2.71	0.42	1068.56	2.80	0.42	1068.87	2.90	0.42	
7.67	42	61820	1062.60	1067.30	2.86	0.46	1067.69	3.11	0.48	1067.91	3.28	0.49	1068.17	3.47	0.51	
7.95	44	61544	1061.14	1066.91	2.61	0.42	1067.33	2.76	0.42	1067.55	2.88	0.43	1067.82	3.00	0.43	
8.43	45	61067	1061.60	1066.16	2.40	0.42	1066.56	2.60	0.43	1066.84	2.58	0.42	1067.16	2.60	0.40	
8.70	46	60789	1061.60	1065.87	2.08	0.34	1066.35	2.07	0.32	1066.65	2.06	0.31	1067.00	2.05	0.29	
8.96	47	60533	1060.60	1065.66	2.06	0.32	1066.16	2.07	0.31	1066.47	2.09	0.30	1066.83	2.11	0.29	
9.14	48	60353	1058.60	1065.28	2.67	0.40	1065.73	2.89	0.41	1066.01	3.01	0.42	1066.33	3.16	0.42	
9.29	49	60206	1057.37	1064.90	3.25	0.47	1065.30	3.56	0.49	1065.54	3.74	0.51	1065.82	3.95	0.52	
9.45	50	60047	1060.00	1064.72	2.89	0.48	1065.17	3.01	0.47	1065.44	3.09	0.47	1065.76	3.18	0.46	
9.58	51	59916	1060.20	1064.56	2.57	0.43	1065.02	2.73	0.43	1065.29	2.83	0.43	1065.61	2.94	0.43	
9.74	52	59754	1060.00	1064.34	2.42	0.40	1064.81	2.55	0.40	1065.09	2.63	0.40	1065.42	2.72	0.40	
9.87	53	59622	1060.00	1064.11	2.53	0.41	1064.62	2.58	0.40	1064.92	2.62	0.39	1065.27	2.66	0.38	Upstream of Hextall Bridge
9.90	54	59594	1060.00	1063.79	3.07	0.54	1064.20	3.32	0.55	1064.43	3.47	0.56	1064.72	3.62	0.56	
9.93	55	59558	1059.90	1063.71	2.88	0.50	1064.13	3.09	0.51	1064.36	3.23	0.52	1064.65	3.36	0.52	Downstream of Shouldice Bridge
10.18	56	59316	1058.80	1063.24	2.96	0.49	1063.66	3.17	0.50	1063.95	3.15	0.48	1064.38	2.91	0.42	
10.28	57	59210	1058.01	1063.09	2.92	0.45	1063.51	3.14	0.46	1063.75	3.28	0.47	1064.04	3.43	0.48	Upstream of 16 Ave (Trans-Canada Highway) Bridge
10.34	58	59153	1056.60	1062.78	3.42	0.53	1063.15	3.71	0.55	1063.37	3.89	0.56	1063.64	4.07	0.57	
10.44	59	59057	1058.00	1062.70	3.02	0.48	1063.08	3.28	0.50	1063.32	3.34	0.50	1063.61	3.43	0.49	
10.60	60	58896	1057.40	1062.24	3.51	0.61	1062.62	3.74	0.61	1062.90	3.77	0.60	1063.26	3.73	0.56	
10.76	61	58736	1057.22	1061.57	4.12	0.75	1061.96	4.34	0.74	1062.20	4.47	0.74	1062.48	4.66	0.74	
11.04	62	58454	1057.60	1061.33	2.52	0.46	1061.79	2.64	0.45	1062.07	2.72	0.45	1062.40	2.81	0.44	
11.13	63	58367	1057.00	1061.16	2.65	0.48	1061.63	2.79	0.47	1061.91	2.88	0.47	1062.24	2.98	0.47	
11.30	64	58196	1056.40	1061.00	2.41	0.41	1061.48	2.56	0.41	1061.77	2.65	0.41	1062.11	2.75	0.41	
11.49	65	58000	1055.00	1060.54	3.06	0.50	1060.97	3.32	0.51	1061.23	3.48	0.52	1061.54	3.65	0.53	
11.74	66	57756	1055.60	1060.14	2.97	0.49	1060.56	3.23	0.51	1060.81	3.39	0.52	1061.11	3.57	0.53	
12.00	67	57497	1055.80	1059.73	2.89	0.49	1060.15	3.12	0.50	1060.40	3.26	0.51	1060.71	3.42	0.52	
12.22	68	57275	1055.40	1059.47	2.33	0.42	1059.93	2.45	0.42	1060.21	2.53	0.41	1060.54	2.62	0.41	
12.35	69	57146	1055.00	1059.18	2.60	0.47	1059.65	2.73	0.46	1059.94	2.81	0.45	1060.27	2.91	0.45	
12.61	70	56884	1053.80	1058.53	3.07	0.49	1059.00	3.29	0.50	1059.29	3.40	0.50	1059.64	3.53	0.50	
12.75	71	56746	1053.56	1058.22	2.95	0.50	1058.71	3.11	0.49	1059.02	3.18	0.49	1059.39	3.25	0.48	Upstream of Harry Boothman Pedestrian Bridge
12.78	72	56714	1053.00	1057.99	3.37	0.55	1058.43	3.63	0.56	1058.71	3.76	0.56	1059.04	3.89	0.56	
12.92	73	56577	1053.00	1057.80	3.06	0.48	1058.23	3.33	0.50	1058.51	3.48	0.51	1058.84	3.64	0.51	
13.10	74	56396	1053.43	1057.54	2.98	0.51	1057.98	3.18	0.51	1058.28	3.28	0.51	1058.62	3.38	0.51	
13.30	75	56194	1052.80	1057.23	3.10	0.50	1057.72	3.22	0.49	1058.04	3.27	0.48	1058.42	3.32	0.47	
13.47	76	56019	1052.80	1057.12	2.48	0.41	1057.63	2.60	0.40	1057.96	2.66	0.39	1058.34	2.72	0.39	
13.75	77	55741	1051.40	1056.51	3.33	0.50	1056.91	3.68	0.53	1057.19	3.88	0.54	1057.50	4.10	0.56	
13.92	78	55568	1050.40	1056.16	3.51	0.54	1056.47	3.96	0.59	1056.70	4.21	0.61	1056.95	4.50	0.63	
14.20	79	55296	1051.60	1055.79	2.82	0.46	1056.04	3.19	0.51	1056.26	3.37	0.53	1056.50	3.59	0.55	
14.39	80	55099	1051.80	1055.46	2.53	0.45	1055.66	2.88	0.50	1055.87	3.01	0.51	1056.12	3.17	0.52	
14.51	81	54987	1051.00	1055.36	2.23	0.41	1055.53	2.54	0.45	1055.76	2.64	0.45	1056.01	2.76	0.46	
14.86	82	54636	1050.00	1054.53	3.12	0.53	1054.97	2.85	0.46	1055.21	2.94	0.46	1055.48	3.05	0.46	
15.03	83	54464	1050.20	1054.23	2.57	0.48	1054.61	2.75	0.49	1054.84	2.86	0.49	1055.15	2.88	0.47	
15.21	84	54278	1050.40	1053.71	2.85	0.53	1054.06	3.08	0.54	1054.28	3.22	0.55	1054.57	3.35	0.55	
15.42	85	54068	1049.60	1053.12	3.00	0.60	1053.53	3.13	0.58	1053.78	3.22	0.57	1054.11	3.28	0.56	
15.69	86	53806	1049.00	1052.87	1.80	0.35	1053.37	1.83	0.33	1053.70	1.79	0.30	1054.08	1.80	0.29	
15.89	87	53605	1048.20	1052.72	1.61	0.30	1053.24	1.66	0.29	1053.58	1.69	0.28	1053.96	1.73	0.27	
16.14	88	53355	1047.80	1052.11	2.97	0.50	1052.59	3.17	0.50	1052.91	3.27	0.50	1053.26	3.41	0.50	
16.25	89	53240	1047.60	1051.68	3.53	0.59	1052.14	3.78	0.60	1052.45	3.91	0.60	1052.78	4.08	0.60	
16.30	90	53188	1047.40	1051.72	2.96	0.50	1052.21	3.15	0.50	1052.53	3.24	0.50	1052.88	3.38	0.50	Upstream of Crowchild Trail Bridge
16.35	91	53140	1047.60	1051.67	2.77	0.47	1052.17	2.93	0.47	1052.50	3.00	0.46	1052.86	3.12	0.46	
16.53	92	52964	1047.14	1051.22	3.12	0.54	1051.74	3.26	0.53	1052.10	3.32	0.51	1052.46	3.44	0.51	
16.70	93	52792	1044.00	1050.81	3.34	0.49	1051.24	3.69	0.53	1051.52	3.88	0.54	1051.81	4.13	0.56	
16.88	94	52609	1044.66	1050.64	2.99	0.46	1051.06	3.28	0.48	1051.32	3.45	0.49	1051.62	3.65	0.51	

Distance from the Bearspaw Dam (km)	Station in Flood Mapping	Station in HEC-RAS	Channel Thalweg (m)	20-Year Flood Event			35-Year Flood Event			50-Year Flood Event			75-Year Flood Event			Notes
				Water Level (m)	Channel Velocity (m/s)	Froude Number	Water Level (m)	Channel Velocity (m/s)	Froude Number	Water Level (m)	Channel Velocity (m/s)	Froude Number	Water Level (m)	Channel Velocity (m/s)	Froude Number	
17.04	95	52456	1045.44	1050.37	3.12	0.53	1050.79	3.38	0.54	1051.05	3.52	0.55	1051.36	3.69	0.55	
17.13	95.1	52366	1045.40	1050.12	3.34	0.59	1050.54	3.57	0.60	1050.81	3.70	0.60	1051.12	3.87	0.60	New Cross Section
17.21	96	52279	1045.05	1050.00	3.04	0.52	1050.42	3.27	0.53	1050.70	3.41	0.53	1051.01	3.57	0.54	
17.34	97	52149	1045.20	1049.78	2.94	0.47	1050.19	3.22	0.49	1050.45	3.38	0.51	1050.75	3.56	0.52	
17.60	98	51893	1045.40	1049.34	2.96	0.51	1049.75	3.20	0.52	1050.00	3.35	0.53	1050.29	3.51	0.54	
17.75	99	51741	1045.02	1049.02	3.07	0.53	1049.42	3.32	0.54	1049.67	3.46	0.55	1049.96	3.63	0.55	Upstream of 14th St SW (Mewata) Bridge
17.80	100	51688	1045.20	1048.87	3.09	0.53	1049.26	3.34	0.54	1049.50	3.49	0.55	1049.79	3.66	0.56	
17.97	101	51519	1044.66	1048.56	2.85	0.52	1048.97	3.03	0.52	1049.22	3.13	0.52	1049.53	3.25	0.51	
18.16	102	51328	1043.15	1048.20	2.68	0.46	1048.63	2.86	0.46	1048.90	2.96	0.46	1049.22	3.07	0.46	
18.38	103	51114	1043.80	1047.78	2.37	0.43	1048.24	2.49	0.42	1048.53	2.56	0.42	1048.86	2.64	0.41	
18.54	104	50951	1042.60	1047.52	2.34	0.41	1047.99	2.48	0.41	1048.28	2.57	0.40	1048.62	2.67	0.40	Upstream of Louise (Hillhurst) Bridge
18.58	105	50910	1042.60	1047.43	2.29	0.39	1047.89	2.43	0.39	1048.17	2.52	0.39	1048.50	2.63	0.39	
18.66	106	50831	1042.38	1047.21	2.65	0.43	1047.65	2.87	0.44	1047.92	2.99	0.45	1048.23	3.14	0.46	Upstream of NW LRT Bridge
18.69	107	50800	1041.81	1047.11	2.81	0.46	1047.54	3.03	0.47	1047.81	3.16	0.47	1048.11	3.31	0.48	
18.79	108	50706	1041.40	1046.86	2.98	0.46	1047.27	3.25	0.48	1047.52	3.41	0.49	1047.80	3.60	0.50	
18.94	109	50553	1040.60	1046.83	2.15	0.30	1047.24	2.41	0.33	1047.48	2.56	0.34	1047.76	2.75	0.36	
19.05	109.1	50438	1041.20	1046.68	2.41	0.36	1047.06	2.68	0.39	1047.29	2.85	0.40	1047.55	3.05	0.42	Upstream of Peace Bridge
19.09	110	50403	1041.53	1046.62	2.48	0.38	1046.99	2.76	0.41	1047.22	2.93	0.42	1047.48	3.12	0.44	The HEC-RAS cross section is 50405.09 in 2012 Model
19.18	112	50312	1039.42	1046.65	1.97	0.27	1047.04	2.16	0.28	1047.28	2.24	0.29	1047.57	2.32	0.29	
19.29	115	50204	1041.60	1046.40	2.70	0.42	1046.78	2.86	0.43	1047.03	2.92	0.43	1047.32	2.97	0.42	
19.47	117	50021	1040.60	1046.18	2.85	0.42	1046.64	2.80	0.40	1046.90	2.82	0.39	1047.22	2.83	0.38	
19.67	120	49822	1041.17	1046.09	2.12	0.32	1046.53	2.19	0.32	1046.81	2.21	0.31	1047.14	2.21	0.30	
19.85	123	49642	1039.31	1045.53	3.19	0.45	1046.09	3.11	0.42	1046.37	3.15	0.41	1046.71	3.17	0.40	Upstream of Prince's Island Pedestrian Bridge
19.88	125	49613	1039.00	1045.50	3.11	0.45	1045.93	3.32	0.46	1046.19	3.40	0.46	1046.51	3.46	0.45	
20.03	127	49464	1039.34	1045.25	3.02	0.46	1045.70	3.16	0.46	1045.98	3.20	0.45	1046.32	3.21	0.44	
20.15	127.1	49338	1038.94	1044.93	3.08	0.48	1045.42	3.14	0.46	1045.73	3.14	0.45	1046.10	3.12	0.43	New Cross Section
20.27	132	49218	1039.20	1044.53	3.10	0.48	1045.06	3.16	0.47	1045.39	3.17	0.45	1045.79	3.16	0.43	
20.36	132.1	49130	1039.20	1044.22	3.25	0.51	1044.76	3.35	0.49	1045.10	3.37	0.48	1045.52	3.37	0.46	New Cross Section
20.49	133	49003	1039.33	1044.04	2.57	0.39	1044.57	2.76	0.40	1044.91	2.87	0.40	1045.31	3.00	0.40	
20.54	134	48953	1038.20	1043.95	2.69	0.41	1044.48	2.89	0.42	1044.81	3.01	0.42	1045.22	3.12	0.42	Upstream of Centre St Bridge
20.58	135	48912	1038.39	1043.68	2.92	0.48	1044.17	3.13	0.48	1044.47	3.26	0.48	1044.82	3.40	0.49	
20.76	136	48730	1038.78	1043.32	2.65	0.45	1043.82	2.82	0.45	1044.12	2.91	0.45	1044.48	3.02	0.45	
20.89	137	48603	1038.62	1042.92	2.94	0.48	1043.38	3.18	0.49	1043.67	3.32	0.50	1044.01	3.47	0.50	
21.06	138	48431	1038.11	1042.56	3.03	0.49	1043.02	3.27	0.51	1043.30	3.42	0.51	1043.64	3.58	0.52	
21.29	139	48200	1037.35	1042.10	3.20	0.51	1042.51	3.52	0.53	1042.76	3.71	0.54	1043.07	3.92	0.56	Upstream of 4th Ave Flyover Bridge
21.34	140	48153	1036.60	1041.90	3.34	0.54	1042.27	3.69	0.57	1042.50	3.90	0.58	1042.79	4.12	0.60	Upstream of Old Langevin Bridge
21.38	141	48115	1036.20	1041.88	3.11	0.50	1042.25	3.43	0.52	1042.49	3.62	0.54	1042.78	3.82	0.55	
21.44	142	48050	1037.19	1041.72	3.19	0.52	1042.07	3.54	0.56	1042.29	3.74	0.58	1042.56	3.97	0.59	Upstream of New Langevin (Edmonton Trail) Bridge
21.49	143	48007	1037.20	1041.54	3.37	0.56	1041.86	3.75	0.60	1042.05	3.99	0.63	1042.28	4.25	0.65	Upstream of LRT (Harry Kroeger) Bridge
21.54	144	47955	1037.20	1041.51	3.03	0.51	1041.84	3.36	0.54	1042.03	3.56	0.56	1042.28	3.78	0.58	
21.71	145	47785	1037.41	1041.05	3.36	0.63	1041.36	3.62	0.65	1041.57	3.75	0.65	1041.86	3.85	0.65	
21.77	147	47727	1037.20	1040.89	3.29	0.61	1041.21	3.55	0.62	1041.42	3.68	0.63	1041.72	3.76	0.61	Upstream of St. Patrick's Island Pedestrian Bridge
21.81	148	47677	1036.28	1040.89	2.96	0.50	1041.21	3.22	0.52	1041.43	3.36	0.53	1041.74	3.46	0.52	The HEC-RAS cross section is 47636.58 in 2012 Model
21.92	149	47572	1036.60	1040.60	3.23	0.56	1040.91	3.49	0.58	1041.13	3.61	0.58	1041.52	3.55	0.54	
22.22	151	47272	1036.00	1040.04	2.85	0.54	1040.46	2.85	0.50	1040.80	2.75	0.46	1041.36	2.47	0.39	
22.44	153	47047	1034.20	1039.83	1.92	0.34	1040.34	1.81	0.30	1040.65	1.93	0.31	1041.19	2.02	0.30	Elbow River Confluence
22.72	157	46775	1033.46	1039.66	1.57	0.26	1040.15	1.70	0.26	1040.46	1.80	0.27	1041.01	1.91	0.27	
22.93	159	46564	1033.60	1039.42	2.05	0.32	1039.87	2.27	0.34	1040.19	2.36	0.34	1040.74	2.48	0.34	Upstream of St. Georges Island Bridge
22.97	161	46518	1034.60	1039.31	2.23	0.36	1039.75	2.46	0.38	1040.08	2.53	0.37	1040.55	2.69	0.38	
23.16	162	46329	1034.80	1039.03	2.28	0.38	1039.45	2.52	0.40	1039.79	2.59	0.39	1040.26	2.78	0.40	
23.47	166	46024	1034.40	1038.41	2.56	0.45	1038.77	2.84	0.47	1039.05	3.06	0.49	1039.48	3.30	0.50	
23.75	168	45743	1033.40	1038.16	2.23	0.35	1038.50	2.50	0.38	1038.78	2.68	0.39	1039.25	2.80	0.39	
23.89	169	45598	1032.42	1038.09	2.11	0.31	1038.41	2.40	0.34	1038.67	2.60	0.36	1039.13	2.79	0.37	Nose Creek Confluence
23.91	170	45580	1032.00	1038.04	2.22	0.32	1038.34	2.57	0.36	1038.58	2.83	0.38	1039.00	3.10	0.40	Upstream of CP Rail Bridge
23.93	171	45561	1031.45	1038.01	2.13	0.30	1038.30	2.48	0.34	1038.52	2.74	0.37	1038.93	3.01	0.39	
24.01	172	45479	1031.80	1037.95	2.21	0.32	1038.21	2.59	0.36	1038.42	2.87	0.40	1038.81	3.17	0.42	
24.26	173	45235	1031.20	1037.93	1.53	0.22	1038.19	1.80	0.26	1038.40	2.00	0.28	1038.80	2.22	0.30	Upstream of Western Headworks
24.30	174	45190	1032.00	1036.29	2.12	0.35	1036.79	2.31	0.36	1037.16	2.45	0.37	1037.64	2.63	0.37	
24.39	175	45105	1031.40	1036.16	2.17	0.38	1036.66	2.32	0.38	1037.04	2.44	0.38	1037.53	2.60	0.39	
24.70	176	44793	1029.52	1035.41	3.01	0.45	1035.89	3.27	0.47	1036.24	3.48	0.48	1036.70	3.72	0.50	
25.04	177	44457	1029.60	1034.94	2.36	0.36	1035.38	2.64	0.39	1035.71	2.83	0.40	1036.15	3.07	0.42	
25.18	178	44309	1028.80	1034.76	2.35	0.33	1035.15	2.70	0.37	1035.42	2.97	0.40	1035.77	3.35	0.43	Upstream of 17 Ave (Cushing) Bridge
25.23	179	44265	1028.00	1034.66	2.47	0.34	1035.02	2.86	0.38	1035.26	3.17	0.41	1035.56	3.59	0.46	
25.35	179.1	44139	1023.93	1034.55	2.39	0.32	1034.89	2.73	0.36	1035.12	2.97	0.38	1035.42	3.28	0.41	New Cross Section
25.51	180	43980	1027.71	1034.40	2.22	0.35	1034.74	2.47	0.38	1034.98	2.63	0.39	1035.28	2.84	0.41	
25.68	181	43808	1029.16	1034.00	2.66	0.49	1034.34	2.83	0.49	1034.59	2.93	0.49	1034.91	3.06	0.50	
25.83	181.1	43657	1029.80	1033.83	1.98	0.36	1034.19	2.13	0.37	1034.43	2.24	0.37	1034.75	2.37	0.38	New Cross Section
26.00	182	43493	1029.20	1033.47	2.28	0.46	1033.83	2.40	0.45	1034.09	2.49	0.45	1034.42	2.59	0.44	
26.22	183	43272	1028.55	1032.98	2.25	0.38	1033.34	2.44	0.40	1033.60	2.55	0.40	1033.98	2.60	0.39	
26.38	183.1	43115	1027.60	1032.57	2.62	0.48	1032.97	2.69	0.46	1033.27	2.70	0.45	1033.69	2.68	0.42	New Cross Section
26.43	184	43061	1025.40	1032.66	1.60	0.23	1033.05	1.69	0.23	1033.34	1.79	0.24	1033.74	1.91	0.25	
26.59	185	42900	1027.11	1032.60	1.56	0.25	1032.98	1.69	0.26	1033.27	1.77	0.26	1033.67	1.86	0.26	
26.83	186	42662	1027.60	1032.38	1.93	0.30	1032.75	2.13	0.32	1033.03	2.21	0.32	1033.44	2.31	0.32	
27.08	187	42409	1026.20	1031.97	2.23	0.35	1032.31	2.42	0.37	1032.61	2.49	0.37	1033.03	2.55	0.36	
27.26	188	42230	1026.80	1031.57	2.80	0.43	1031.94	2.91	0.43	1032.27	2.90	0.41	1032.75	2.87	0.39	
27.59	188.1	41903	1026.20	1031.13	2.47	0.37	1031.50	2.60	0.38	1031.88	2.58	0.36	1032.42	2.53	0.34	New Cross Section
27.73	189	41759	1025.60	1030.61	3.19	0.49	1031.23	2.82	0.41	1031.65	2.77	0.38	1032.23	2.70	0.36	
27.85	189.1	41643	1025.40	1030.53	2.67	0.41	1031.12	2.61	0.37	1031.55	2.58	0.35	1032.14	2.56	0.33	New Cross Section
28.00	190	41493	1024.61	1030.35	2.58	0.37	1030.96	2.58	0.35	1031.40	2.60	0.34	1032.00	2.63	0.33	
28.19	190.1	41303	1024.74	1030.07	2.62	0.39	1030.67	2.73	0.38	1031.11	2.82	0.38	1031.70	2.93	0.37	New Cross Section
28.45	191	41038	1022.23	1029.83	2.05	0.27	1030.40	2.31	0.29	1030.81	2.50	0.30	1031.35	2.77	0.32	
28.51	192	40985	1021.00	1029.65	2.36	0.33	1030.18	2.65	0.35	1030.56	2.86	0.37	1031.04	3.15	0.39	Upstream of CP Rail Bridge
28.64	193	40852	1023.40	1029.18	2.97	0.44	1029.62	3.32	0.47	1029.93	3.60	0.49	1030.31	3.97	0.52	Upstream of Bonnybrook (Ogden Road) Bridge
28.71	194	40787	1023.80	1028.93	3.24	0.50	1029.37	3.55	0.52	1029.66	3.80	0.54	1030.03	4.14	0.57	
28.79	195	40703	1023.60	1028.66	3.20	0.50	1029.10	3.44	0.51	1029.41	3.57	0.52	1029.81	3.70	0.51	
28.95	196	40543	1022.40	1028.23	3.05	0.44	1028.63	3.37	0.47	1028.92	3.55	0.48	1029.34	3.70	0.48	
29.04	197	40453	1022.96	1028.12	2.70	0.42	1028.54	2.92	0.44	1028.85	3.03	0.44	1029.27	3.13	0.43	
29.16	198	40328	1023.08	1027.92	2.60	0.42	1028.33	2.78	0.43	1028.65	2.87	0.42	1029.10	2.95	0.42	
29.31	199	40183	1021.86	1027.82	2.09	0.30	1028.20	2.37	0.33	1028.48	2.58	0.35	1028.87	2.85	0.37	Upstream of Calf Robe (Deerfoot Trail) Bridge
29.39	200	40105	1021.44	1027.63	2.43	0.36	1028.02	2.65	0.38	1028.33	2.78	0.39	1028.72	2.93	0.39	
29.46	201	40036	1020.40	1027.55	2.42	0.38	1027.96	2.54	0.38	1028.27	2.62	0.38	1028.67	2.72	0.38	
29.57	202	39919	1022.20	1027.41	2.30	0.37	1027.82	2.40	0.37	1028.14	2.44	0.36	1028.56	2.52	0.36	

Distance from the Bearspaw Dam (km)	Station in Flood Mapping	Station in HEC-RAS	Channel Thalweg (m)	20-Year Flood Event			35-Year Flood Event			50-Year Flood Event			75-Year Flood Event			Notes
				Water Level (m)	Channel Velocity (m/s)	Froude Number	Water Level (m)	Channel Velocity (m/s)	Froude Number	Water Level (m)	Channel Velocity (m/s)	Froude Number	Water Level (m)	Channel Velocity (m/s)	Froude Number	
29.76	203	39730	1021.00	1027.04	2.47	0.39	1027.37	2.76	0.42	1027.66	2.94	0.44	1028.03	3.15	0.45	
29.83	204	39663	1020.60	1026.99	2.17	0.34	1027.30	2.51	0.37	1027.56	2.75	0.40	1027.87	3.09	0.43	Upstream of CN Rail Bridge
29.88	205	39608	1019.44	1026.87	2.23	0.32	1027.13	2.63	0.36	1027.34	2.92	0.40	1027.58	3.34	0.44	
29.99	206	39506	1021.80	1026.64	2.81	0.45	1026.93	3.05	0.48	1027.17	3.19	0.48	1027.48	3.19	0.47	
30.13	207	39363	1021.00	1026.37	2.50	0.41	1026.64	2.72	0.43	1026.88	2.83	0.44	1027.20	2.88	0.43	
30.24	208	39252	1021.40	1026.17	2.11	0.38	1026.40	2.41	0.42	1026.62	2.59	0.43	1026.94	2.73	0.44	
30.39	209	39101	1021.00	1026.03	1.71	0.28	1026.23	2.00	0.32	1026.44	2.17	0.34	1026.73	2.34	0.35	
30.51	210	38978	1020.20	1025.79	2.32	0.36	1025.95	2.62	0.40	1026.15	2.76	0.41	1026.44	2.90	0.42	
30.56	211	38927	1019.80	1025.63	2.67	0.42	1025.77	2.96	0.46	1025.97	3.10	0.47	1026.27	3.23	0.47	
30.71	212	38785	1020.00	1025.39	2.21	0.40	1025.49	2.41	0.43	1025.69	2.50	0.43	1026.00	2.58	0.42	
30.96	213	38530	1020.40	1024.98	2.08	0.36	1025.04	2.16	0.37	1025.23	2.28	0.38	1025.57	2.33	0.37	
31.10	214	38390	1020.00	1024.68	2.43	0.40	1024.76	2.41	0.39	1025.06	2.16	0.34	1025.42	2.18	0.33	
31.14	215	38348	1019.80	1024.65	2.23	0.36	1024.74	2.07	0.33	1025.00	2.10	0.32	1025.36	2.12	0.32	
31.31	216	38178	1019.80	1024.44	2.11	0.33	1024.58	1.89	0.29	1024.84	1.94	0.29	1025.21	2.00	0.28	
31.46	217	38032	1018.60	1024.14	2.53	0.38	1024.34	2.37	0.35	1024.62	2.40	0.34	1025.01	2.42	0.33	
31.54	218	37948	1018.40	1023.90	2.87	0.43	1024.11	2.82	0.41	1024.42	2.79	0.40	1024.84	2.75	0.37	
31.63	219	37862	1017.20	1023.77	2.82	0.41	1024.03	2.60	0.37	1024.35	2.61	0.36	1024.78	2.60	0.34	
31.70	220	37790	1017.80	1023.68	2.62	0.41	1023.94	2.48	0.38	1024.27	2.46	0.36	1024.70	2.45	0.34	
31.85	221	37647	1017.40	1023.35	2.72	0.43	1023.67	2.60	0.39	1023.97	2.70	0.40	1024.39	2.81	0.40	
32.14	222	37348	1017.20	1022.54	3.06	0.52	1022.93	3.10	0.50	1023.23	3.24	0.50	1023.62	3.45	0.51	
32.31	223	37185	1016.20	1022.15	2.83	0.48	1022.45	3.16	0.51	1022.73	3.34	0.52	1023.11	3.56	0.53	Upstream of Graves (Glenmore Trail) Bridges
32.35	224	37145	1016.60	1021.99	2.87	0.49	1022.23	3.25	0.54	1022.49	3.44	0.56	1022.84	3.69	0.57	
32.38	225	37112	1016.80	1021.75	3.05	0.56	1022.05	3.31	0.58	1022.27	3.54	0.60	1022.57	3.83	0.63	
32.53	226	36967	1017.75	1021.22	2.96	0.59	1021.65	2.81	0.52	1021.89	2.91	0.52	1022.23	3.02	0.51	
32.80	227	36694	1017.40	1020.99	1.29	0.25	1021.36	1.49	0.27	1021.70	1.42	0.24	1022.02	1.59	0.26	
32.95	227.1	36547	1017.53	1020.88	1.61	0.30	1021.25	1.81	0.32	1021.52	1.94	0.33	1021.84	2.13	0.35	New Cross Section
33.11	228	36379	1014.95	1020.61	2.41	0.37	1020.93	2.69	0.40	1021.17	2.88	0.41	1021.47	3.05	0.43	
33.52	229	35968	1017.00	1020.02	2.00	0.40	1020.30	2.19	0.41	1020.52	2.31	0.42	1020.80	2.46	0.43	
33.82	230	35673	1015.40	1019.75	1.44	0.29	1020.03	1.55	0.29	1020.27	1.62	0.29	1020.55	1.72	0.30	
34.10	231	35388	1013.80	1018.84	3.53	0.57	1019.26	3.50	0.54	1019.46	3.71	0.56	1019.83	3.68	0.53	
34.22	232	35268	1014.20	1018.93	2.14	0.37	1019.32	2.18	0.35	1019.53	2.29	0.36	1019.88	2.36	0.36	
34.41	233	35084	1014.40	1018.84	1.42	0.28	1019.25	1.43	0.26	1019.47	1.51	0.26	1019.82	1.56	0.26	
34.55	234	34940	1014.60	1018.70	1.42	0.27	1019.14	1.41	0.25	1019.35	1.48	0.26	1019.71	1.53	0.25	
34.69	235	34801	1013.88	1018.60	1.34	0.25	1019.03	1.40	0.24	1019.24	1.50	0.25	1019.62	1.51	0.24	
34.94	236	34553	1012.00	1018.09	2.92	0.44	1018.54	3.03	0.43	1018.65	3.36	0.48	1019.01	3.54	0.49	
35.05	237	34446	1012.08	1017.90	2.83	0.41	1018.33	3.02	0.42	1018.34	3.48	0.49	1018.63	3.77	0.51	Upstream of Eric Harvie Pedestrian Bridge
35.07	238	34424	1012.20	1017.86	2.76	0.41	1018.29	2.95	0.42	1018.43	2.73	0.38	1018.75	2.89	0.39	
35.27	239	34222	1012.01	1017.61	2.44	0.40	1018.03	2.60	0.40	1018.07	2.86	0.44	1018.36	3.07	0.46	
35.43	240	34061	1012.01	1017.37	2.21	0.37	1017.79	2.38	0.37	1017.82	2.49	0.39	1018.15	2.53	0.38	
35.76	241	33737	1012.00	1016.51	3.02	0.47	1016.80	3.40	0.52	1017.20	2.89	0.42	1017.60	2.90	0.41	
35.97	242	33519	1011.20	1015.89	3.50	0.55	1016.40	3.38	0.50	1016.77	3.31	0.47	1017.29	3.13	0.43	
36.07	243	33419	1011.60	1016.03	1.99	0.32	1016.47	2.10	0.33	1016.82	2.13	0.32	1017.30	2.15	0.30	
36.27	244	33222	1011.00	1015.79	2.42	0.38	1016.27	2.44	0.36	1016.65	2.42	0.35	1017.15	2.38	0.33	
36.56	245	32932	1009.60	1015.28	2.93	0.43	1015.87	2.84	0.40	1016.32	2.75	0.37	1016.89	2.64	0.34	
36.72	246	32776	1009.60	1015.25	2.07	0.31	1015.81	2.18	0.31	1016.24	2.24	0.30	1016.79	2.32	0.30	
36.90	247	32588	1009.70	1014.78	2.84	0.43	1015.26	3.12	0.45	1015.61	3.32	0.46	1016.11	3.55	0.47	
37.04	248	32456	1007.81	1014.43	3.28	0.49	1014.82	3.69	0.53	1015.12	3.98	0.55	1015.51	4.36	0.58	Upstream of Ivor Strong (Deerfoot Trail) Bridge
37.09	249	32397	1007.20	1014.26	3.27	0.50	1014.63	3.67	0.54	1014.90	3.97	0.56	1015.26	4.35	0.60	
37.36	250	32136	1008.40	1013.96	1.58	0.28	1014.33	1.68	0.28	1014.61	1.75	0.28	1014.98	1.84	0.28	The HEC-RAS cross section is 32109.19 in 2012 Model
37.50	251	31996	1007.00	1013.73	1.92	0.30	1014.11	2.04	0.31	1014.39	2.12	0.31	1014.77	2.21	0.31	The HEC-RAS cross section is 32005.19 in 2012 Model
37.90	252	31595	1007.65	1012.88	2.85	0.48	1013.31	2.91	0.46	1013.62	2.97	0.45	1014.04	3.05	0.45	
38.20	253	31294	1007.60	1012.12	2.90	0.49	1012.53	3.11	0.49	1012.83	3.25	0.50	1013.22	3.45	0.51	
38.48	254	31013	1006.60	1011.51	2.94	0.48	1011.84	3.27	0.51	1012.09	3.50	0.53	1012.41	3.82	0.56	
38.61	255	30885	1006.20	1011.12	3.33	0.55	1011.47	3.57	0.56	1011.72	3.78	0.58	1012.21	3.53	0.52	Upstream of Sue Higgins Pedestrian Bridge
38.64	256	30851	1006.20	1011.05	3.00	0.51	1011.34	3.30	0.54	1011.58	3.49	0.56	1011.86	3.77	0.58	
38.85	257	30640	1007.60	1010.55	2.86	0.56	1010.82	3.10	0.58	1011.03	3.34	0.60	1011.29	3.58	0.62	
39.07	258	30422	1005.80	1010.11	2.29	0.45	1010.38	2.50	0.46	1010.59	2.66	0.48	1010.83	2.86	0.49	
39.40	259	30090	1005.20	1009.41	2.73	0.45	1009.62	2.98	0.48	1009.79	3.14	0.49	1010.01	3.32	0.51	
39.62	260	29873	1004.80	1009.01	2.51	0.48	1009.25	2.58	0.47	1009.42	2.69	0.48	1009.64	2.83	0.49	
39.84	261	29655	1005.20	1008.63	2.28	0.45	1008.90	2.34	0.44	1009.09	2.38	0.43	1009.34	2.44	0.43	
40.18	262	29312	1003.62	1007.95	2.63	0.48	1008.26	2.74	0.48	1008.47	2.80	0.47	1008.75	2.89	0.47	
40.44	263	29053	1001.60	1007.39	2.93	0.49	1007.66	3.19	0.51	1007.86	3.33	0.52	1008.12	3.53	0.54	
40.70	264	28790	1003.40	1006.88	2.43	0.53	1007.13	2.63	0.54	1007.34	2.75	0.55	1007.63	2.82	0.53	
40.98	265	28513	1002.40	1006.14	2.19	0.52	1006.51	2.20	0.47	1006.80	2.19	0.44	1007.19	2.17	0.41	
41.31	266	28184	1002.00	1005.73	1.79	0.32	1006.16	1.86	0.31	1006.48	1.91	0.31	1006.91	1.95	0.30	
41.64	267	27849	1000.00	1005.26	2.67	0.42	1005.72	2.76	0.41	1006.05	2.83	0.40	1006.50	2.92	0.40	
41.82	268	27669	1000.00	1004.99	2.55	0.40	1005.41	2.78	0.42	1005.71	2.94	0.43	1006.14	3.15	0.44	
41.97	269	27518	999.90	1004.81	2.48	0.39	1005.19	2.77	0.41	1005.48	2.97	0.43	1005.86	3.31	0.46	
42.27	270	27220	998.60	1004.33	2.56	0.42	1004.64	2.89	0.45	1004.87	3.13	0.48	1005.17	3.44	0.51	
42.62	271	26870	999.60	1003.56	3.07	0.51	1003.89	3.26	0.52	1004.12	3.43	0.53	1004.41	3.64	0.55	
42.84	272	26652	999.00	1003.04	3.21	0.55	1003.32	3.47	0.58	1003.53	3.64	0.59	1003.81	3.86	0.60	
43.09	273	26397	997.80	1002.61	3.04	0.47	1002.85	3.35	0.51	1003.08	3.45	0.51	1003.37	3.61	0.52	Upstream of Mackenzie Pedestrian Bridge
43.11	274	26381	997.60	1002.69	2.41	0.38	1002.94	2.63	0.40	1003.17	2.74	0.41	1003.45	2.90	0.42	
43.19	275	26305	998.00	1002.62	2.31	0.37	1002.86	2.55	0.40	1003.08	2.66	0.40	1003.36	2.86	0.42	
43.45	276	26045	998.40	1002.07	2.84	0.50	1002.30	3.00	0.51	1002.50	3.16	0.52	1002.77	3.31	0.53	
43.70	277	25787	997.44	1001.76	2.20	0.38	1001.90	2.55	0.44	1002.08	2.72	0.45	1002.34	2.90	0.47	
43.93	278	25559	995.61	1001.54	2.32	0.34	1001.56	2.84	0.42	1001.73	3.04	0.44	1002.00	3.21	0.45	
44.16	279	25337	996.20	1001.07	2.85	0.50	1001.30	2.58	0.43	1001.44	2.77	0.46	1001.73	2.88	0.46	
44.36	280	25134	996.62	1000.73	2.69	0.47	1001.13	2.19	0.36	1001.23	2.49	0.41	1001.51	2.62	0.41	Fish Creek Confluence
44.44	281	25048	996.80	1000.45	2.98	0.53	1000.58	3.48	0.61	1000.92	3.10	0.52	1001.22	3.20	0.51	
44.58	282	24910	995.80	1000.54	1.78	0.28	1000.71	2.04	0.32	1000.92	2.25	0.34	1001.22	2.38	0.35	
44.71	283	24779	994.41	1000.29	2.63	0.39	1000.36	3.10	0.46	1000.55	3.31	0.49	1000.83	3.53	0.51	
44.84	284	24653	994.60	999.73	3.70	0.62	1000.28	2.55	0.40	1000.45	2.77	0.43	1000.73	2.90	0.44	
44.99	285	24507	994.40	999.45	3.22	0.53	1000.14	2.28	0.35	1000.25	2.68	0.40	1000.53	2.82	0.41	
45.13	286	24361	994.80	999.27	2.63	0.45	999.77	2.82	0.45	1000.17	2.02	0.31	1000.45	2.14	0.32	
45.48	287	24008	993.20	998.34	3.48	0.54	998.81	3.75	0.55	999.28	3.80	0.53	999.90	3.26	0.43	
45.72	288	23774	992.40	997.97	3.16	0.47	998.54	3.19	0.45	999.05	3.22	0.43	999.70	2.92	0.37	
45.85	289	23642	992.60	997.65	3.25	0.51	998.10	3.56	0.53	998.50	3.83	0.55	998.91	4.19	0.57	Upstream of Marquis de Lorne (Highway 22X) Bridge
45.90	290	23590	992.60	997.51	3.23	0.52	997.94	3.55	0.54	998.32	3.82	0.56	998.73	4.14	0.58	
45.94	291	23549	992.40	997.39	3.19	0.51	997.81	3.52	0.54	998.18	3.79	0.56	998.58	4.11	0.58	
45.98	292	23509	992.40	997.36	2.96	0.47	997.79	3.19	0.48	998.20	3.34	0.48	998.63	3.51	0.49	
46.14	293	23349	992.21	997.05	3.13	0.49	997.43	3.48	0.52	997.79	3.75	0.54	998.31	3.76	0.52	

Distance from the Bearspaw Dam (km)	Station in Flood Mapping	Station in HEC-RAS	Channel Thalweg (m)	20-Year Flood Event			35-Year Flood Event			50-Year Flood Event			75-Year Flood Event			Notes
				Water Level (m)	Channel Velocity (m/s)	Froude Number	Water Level (m)	Channel Velocity (m/s)	Froude Number	Water Level (m)	Channel Velocity (m/s)	Froude Number	Water Level (m)	Channel Velocity (m/s)	Froude Number	
46.28	294	23212	991.40	996.51	3.90	0.59	996.77	4.41	0.65	997.02	4.84	0.69	997.36	5.25	0.73	
46.50	295	22989	991.68	996.34	2.67	0.41	996.54	3.09	0.46	996.74	3.46	0.51	997.10	3.73	0.53	
46.89	296	22597	990.00	995.84	2.85	0.41	996.14	2.74	0.38	996.28	3.06	0.42	996.74	3.02	0.40	
47.18	297	22312	989.40	995.72	2.11	0.29	995.94	2.43	0.33	996.00	2.81	0.38	996.45	2.90	0.38	
47.31	298	22180	988.60	994.99	3.97	0.57	995.87	2.53	0.34	995.91	2.91	0.38	996.38	2.95	0.37	
47.58	299	21914	988.60	994.40	3.84	0.57	994.84	4.24	0.60	995.31	3.64	0.49	995.75	3.83	0.50	
48.02	300	21473	988.80	993.66	3.08	0.48	994.14	3.27	0.49	994.49	3.49	0.50	994.88	3.74	0.52	
48.29	301	21204	987.60	992.90	3.70	0.56	993.26	4.11	0.60	993.58	4.37	0.61	993.93	4.64	0.63	
48.65	302	20840	988.00	992.16	3.32	0.55	992.48	3.62	0.57	992.77	3.86	0.59	993.09	4.14	0.61	
49.01	303	20486	988.40	991.58	2.51	0.47	991.93	2.67	0.47	992.24	2.80	0.47	992.58	2.96	0.48	
49.38	304	20116	987.43	990.75	2.67	0.50	991.12	2.84	0.50	991.46	2.98	0.50	991.84	3.10	0.49	
49.74	305	19755	986.00	990.12	2.58	0.44	990.47	2.82	0.46	990.78	3.01	0.47	991.13	3.23	0.48	
50.01	306	19480	985.34	989.71	2.46	0.44	990.03	2.72	0.46	990.30	2.96	0.48	990.60	3.22	0.50	
50.26	307	19229	984.40	989.23	2.43	0.51	989.57	2.56	0.50	989.85	2.71	0.50	990.16	2.87	0.51	
50.49	308	19002	984.41	988.53	2.73	0.57	988.93	2.78	0.56	989.26	2.84	0.55	989.63	2.92	0.53	
50.78	309	18716	983.60	987.93	2.62	0.45	988.30	2.82	0.47	988.66	2.96	0.47	989.09	3.05	0.46	
51.14	310	18350	982.00	987.23	3.05	0.48	987.70	3.09	0.46	988.11	3.14	0.45	988.59	3.21	0.44	
51.39	311	18101	982.20	986.59	3.23	0.55	986.94	3.55	0.57	987.24	3.84	0.60	987.60	4.14	0.62	Upstream of Dunbow Road (Highway 2) Bridge
51.47	312	18017	982.05	986.35	3.25	0.55	986.67	3.61	0.59	986.94	3.94	0.62	987.26	4.28	0.65	
51.52	313	17974	982.00	986.23	3.17	0.54	986.52	3.54	0.58	986.77	3.88	0.61	987.07	4.24	0.65	
51.70	314	17788	981.60	985.74	2.82	0.49	986.03	2.91	0.48	986.27	3.02	0.49	986.59	3.08	0.48	
51.96	315	17528	981.60	985.26	2.21	0.41	985.54	2.36	0.42	985.76	2.52	0.43	986.03	2.82	0.47	
52.33	316	17163	979.80	984.17	2.94	0.55	984.41	3.18	0.57	984.64	3.26	0.56	984.86	3.42	0.57	
52.60	317	16891	979.80	983.94	1.75	0.31	984.17	1.91	0.33	984.38	2.05	0.34	984.59	2.18	0.35	
52.91	318	16585	979.40	983.21	2.90	0.54	983.40	3.09	0.56	983.56	3.27	0.58	983.74	3.42	0.59	Pine Creek Confluence
53.42	319	16067	978.00	981.94	3.00	0.56	982.17	3.11	0.56	982.36	3.21	0.56	982.59	3.35	0.56	
53.69	320	15801	977.56	981.46	2.21	0.40	981.65	2.44	0.42	981.83	2.61	0.44	982.08	2.71	0.44	
54.16	321	15337	975.40	980.03	3.45	0.55	980.41	3.27	0.50	980.77	3.09	0.45	981.09	3.13	0.44	
54.35	322	15137	972.80	979.51	3.27	0.49	979.81	3.48	0.51	980.09	3.71	0.53	980.29	4.06	0.57	
54.62	323	14868	973.80	978.99	2.74	0.45	979.22	3.01	0.48	979.43	3.31	0.51	979.69	3.33	0.50	
54.89	324	14601	974.20	978.55	2.29	0.39	978.84	2.26	0.37	979.10	2.27	0.36	979.39	2.27	0.35	
55.15	325	14345	974.20	977.94	2.66	0.48	978.21	2.87	0.50	978.45	3.03	0.51	978.71	3.25	0.53	
55.45	326	14038	973.41	977.29	2.27	0.42	977.55	2.43	0.43	977.79	2.55	0.44	978.06	2.67	0.44	
55.78	327	13712	972.60	976.64	2.41	0.41	976.92	2.51	0.41	977.19	2.54	0.41	977.50	2.58	0.40	
56.17	328	13326	971.80	975.84	2.41	0.45	976.18	2.45	0.44	976.51	2.47	0.42	976.84	2.56	0.42	
56.44	329	13050	971.00	975.35	2.25	0.39	975.73	2.31	0.38	976.09	2.42	0.38	976.45	2.50	0.37	
56.79	330	12701	970.41	974.80	2.08	0.37	975.22	2.18	0.37	975.56	2.34	0.38	975.91	2.50	0.38	
57.17	331	12318	969.57	974.14	2.48	0.39	974.58	2.62	0.39	974.99	2.62	0.38	975.36	2.71	0.38	
57.50	332	11995	968.80	973.63	2.56	0.40	974.13	2.55	0.37	974.59	2.54	0.36	974.96	2.66	0.36	
57.79	333	11701	967.40	972.98	3.05	0.44	973.50	3.16	0.43	973.99	3.24	0.43	974.39	3.33	0.42	
57.97	334	11521	963.60	972.54	3.17	0.42	973.04	3.41	0.44	973.48	3.65	0.45	973.90	3.75	0.45	
58.36	335	11135	965.20	971.63	3.39	0.52	972.00	3.76	0.56	972.31	4.13	0.59	972.65	4.39	0.61	
58.71	336	10780	964.45	971.06	2.42	0.40	971.41	2.67	0.42	971.70	2.89	0.44	972.03	3.08	0.45	
59.02	337	10471	966.00	970.36	2.49	0.52	970.72	2.62	0.51	971.02	2.75	0.50	971.38	2.84	0.49	
59.56	338	9936	963.60	969.62	2.11	0.31	970.00	2.24	0.32	970.27	2.42	0.33	970.67	2.53	0.34	
59.97	339	9519	963.80	968.89	2.60	0.41	969.20	2.86	0.44	969.22	3.36	0.51	969.59	3.56	0.52	
60.38	340	9109	963.60	968.37	1.76	0.30	968.63	1.95	0.32	969.02	1.46	0.23	969.42	1.53	0.23	
60.87	341	8623	962.20	967.28	3.08	0.48	967.66	3.31	0.50	967.98	3.54	0.51	968.31	3.80	0.53	
61.21	342	8278	961.80	966.67	2.53	0.41	967.09	2.63	0.40	967.42	2.76	0.41	967.75	2.93	0.42	
61.56	343	7928	960.60	965.99	2.97	0.44	966.40	3.17	0.45	966.75	3.28	0.45	967.04	3.51	0.47	
61.82	344	7676	959.60	965.25	3.49	0.49	965.53	3.89	0.53	965.80	4.17	0.55	966.15	4.27	0.55	
62.25	345	7246	959.24	964.54	2.77	0.45	964.85	2.85	0.45	965.14	2.98	0.45	965.47	3.15	0.46	
62.56	346	6932	959.80	964.11	2.07	0.34	964.42	2.21	0.35	964.69	2.34	0.36	965.01	2.49	0.36	
62.93	347	6560	957.00	963.63	2.67	0.38	963.94	2.80	0.39	964.22	2.92	0.39	964.56	3.01	0.39	
63.19	348	6300	956.20	962.84	3.94	0.55	963.27	3.93	0.53	963.67	3.84	0.50	964.10	3.79	0.48	
63.45	349	6047	955.60	962.45	2.99	0.43	962.84	3.18	0.44	963.23	3.32	0.44	963.66	3.42	0.44	
63.85	350	5643	957.20	961.96	2.30	0.36	962.33	2.49	0.38	962.73	2.61	0.38	963.15	2.75	0.38	
64.18	351	5308	956.20	961.11	3.11	0.49	961.25	3.65	0.56	961.58	3.91	0.58	961.92	4.19	0.60	
64.68	352	4811	955.80	960.26	0.90	0.14	960.72	1.00	0.15	961.14	1.09	0.16	961.51	1.21	0.17	
65.17	353	4323	954.61	959.92	1.96	0.28	960.38	2.03	0.28	960.80	2.12	0.28	961.16	2.21	0.29	
65.65	354	3840	951.40	958.72	3.67	0.52	959.14	3.93	0.53	959.56	4.10	0.54	960.11	3.93	0.49	
65.93	355	3566	953.20	957.97	3.49	0.58	958.26	3.94	0.63	958.53	4.33	0.67	958.80	4.83	0.72	
66.30	356	3195	952.61	957.47	1.91	0.36	957.83	2.01	0.35	958.16	2.11	0.35	958.52	2.22	0.35	
66.58	357	2910	950.81	956.75	3.01	0.45	957.14	3.15	0.46	957.49	3.24	0.45	957.89	3.33	0.45	
66.92	358	2571	950.40	956.01	3.13	0.46	956.46	3.20	0.45	956.85	3.30	0.45	957.27	3.40	0.45	
67.15	359	2338	949.00	955.79	2.44	0.34	956.24	2.57	0.35	956.62	2.71	0.35	957.03	2.86	0.36	
67.50	360	1991	949.21	955.27	2.77	0.40	955.70	2.96	0.41	956.06	3.13	0.42	956.44	3.33	0.43	
67.96	361	1536	949.00	954.46	2.90	0.44	954.84	3.15	0.45	955.19	3.31	0.46	955.54	3.51	0.47	
68.32	362	1172	948.60	953.72	3.07	0.46	954.10	3.26	0.47	954.48	3.34	0.46	954.82	3.53	0.47	
68.67	363	825	948.60	952.76	3.48	0.57	953.12	3.71	0.58	953.41	4.04	0.61	953.76	4.20	0.61	
69.11	364	386	947.49	952.31	1.94	0.32	952.69	2.05	0.32	953.00	2.16	0.32	953.35	2.29	0.33	
69.49	365	0	945.00	951.40	3.57	0.49	951.79	3.74	0.50	952.11	3.88	0.50	952.46	4.03	0.51	

Table C.1 (c): Simulation Results along the Bow River for 100- to 1000-year Flood Events

Distance from the Bearspaw Dam (km)	Station in Flood Mapping	Station in HEC-RAS	Channel Thalweg (m)	100-Year Flood Event			200-Year Flood Event			350-Year Flood Event			500-Year Flood Event			1000-Year Flood Event			Notes
				Water Level (m)	Channel Velocity (m/s)	Froude Number	Water Level (m)	Channel Velocity (m/s)	Froude Number	Water Level (m)	Channel Velocity (m/s)	Froude Number	Water Level (m)	Channel Velocity (m/s)	Froude Number	Water Level (m)	Channel Velocity (m/s)	Froude Number	
0.15	1	69342	1074.20	1080.08	3.41	0.46	1080.46	3.76	0.49	1080.77	4.01	0.51	1080.95	4.16	0.52	1081.31	4.46	0.54	Bearspaw Dam
0.36	2	69135	1074.40	1079.75	3.21	0.48	1080.12	3.48	0.50	1080.42	3.68	0.51	1080.61	3.80	0.52	1080.97	3.99	0.53	
0.60	3	68889	1074.20	1079.30	3.36	0.50	1079.68	3.56	0.51	1079.98	3.72	0.51	1080.18	3.80	0.52	1080.52	4.04	0.53	
0.79	4	68700	1074.40	1079.15	2.62	0.41	1079.54	2.78	0.42	1079.84	2.91	0.42	1080.03	3.00	0.43	1080.41	3.13	0.43	
1.03	5	68467	1073.41	1078.84	2.43	0.38	1079.23	2.59	0.39	1079.53	2.73	0.40	1079.72	2.81	0.40	1080.08	2.98	0.41	
1.22	6	68272	1073.00	1078.41	2.95	0.42	1078.79	3.13	0.43	1079.08	3.30	0.44	1079.26	3.40	0.45	1079.61	3.57	0.46	
1.56	7	67927	1072.00	1078.07	2.69	0.39	1078.47	2.79	0.39	1078.78	2.89	0.39	1078.97	2.95	0.39	1079.33	3.09	0.40	
1.99	8	67498	1070.80	1077.05	3.86	0.54	1077.39	4.11	0.55	1077.66	4.28	0.56	1077.83	4.39	0.57	1078.16	4.58	0.58	
2.30	9	67187	1072.00	1076.66	2.99	0.47	1077.02	3.13	0.48	1077.30	3.24	0.48	1077.48	3.31	0.48	1077.82	3.43	0.48	
2.63	10	66863	1071.00	1076.02	3.06	0.50	1076.39	3.21	0.50	1076.69	3.30	0.50	1076.88	3.35	0.50	1077.25	3.44	0.49	
3.11	11	66385	1070.00	1075.49	2.59	0.37	1075.86	2.75	0.38	1076.17	2.86	0.39	1076.35	2.96	0.39	1076.75	3.05	0.39	
3.34	12	66149	1068.80	1074.95	3.52	0.50	1075.33	3.65	0.50	1075.65	3.77	0.50	1075.87	3.77	0.49	1076.35	3.70	0.46	
3.55	13	65945	1068.80	1074.57	3.34	0.52	1075.01	3.36	0.49	1075.36	3.37	0.48	1075.60	3.36	0.47	1076.12	3.29	0.44	
3.68	14	65813	1069.20	1074.63	1.95	0.31	1075.05	2.06	0.31	1075.39	2.14	0.31	1075.62	2.18	0.31	1076.12	2.23	0.30	Upstream of Stoney Trail Bridge
3.77	15	65727	1068.80	1074.55	1.96	0.30	1074.96	2.07	0.30	1075.30	2.16	0.30	1075.53	2.21	0.30	1076.04	2.26	0.30	
3.89	16	65600	1068.60	1074.37	2.51	0.35	1074.79	2.63	0.35	1075.13	2.71	0.35	1075.36	2.75	0.35	1075.89	2.76	0.34	
3.99	17	65502	1068.00	1074.02	3.50	0.49	1074.47	3.54	0.47	1074.84	3.54	0.46	1075.10	3.53	0.45	1075.68	3.41	0.41	
4.14	18	65352	1067.80	1073.88	2.98	0.43	1074.35	3.01	0.41	1074.73	3.04	0.40	1074.99	3.04	0.39	1075.59	2.98	0.37	
4.36	19	65132	1068.40	1073.61	2.73	0.41	1074.11	2.76	0.39	1074.51	2.78	0.38	1074.79	2.78	0.37	1075.42	2.73	0.35	
4.56	20	64931	1068.32	1073.44	2.02	0.31	1073.98	1.98	0.29	1074.40	1.97	0.27	1074.69	1.96	0.26	1075.35	1.89	0.24	
4.72	21	64768	1067.80	1073.31	2.04	0.29	1073.87	2.06	0.28	1074.30	2.09	0.27	1074.59	2.10	0.27	1075.27	2.07	0.25	
4.91	22	64580	1068.00	1073.23	1.87	0.27	1073.80	1.90	0.26	1074.23	1.94	0.25	1074.53	1.96	0.25	1075.21	1.94	0.23	
5.08	23	64415	1067.23	1073.12	2.04	0.28	1073.69	2.07	0.27	1074.13	2.12	0.27	1074.43	2.14	0.26	1075.13	2.12	0.25	
5.27	24	64223	1066.40	1072.28	3.92	0.55	1072.75	4.20	0.56	1073.08	4.47	0.58	1073.33	4.59	0.59	1074.04	4.64	0.56	Upstream of 85 St SW Bridge
5.30	25	64193	1066.40	1072.19	3.87	0.55	1072.65	4.17	0.56	1072.96	4.46	0.59	1073.20	4.60	0.59	1073.82	4.73	0.58	
5.36	26	64135	1066.72	1072.31	2.69	0.38	1072.83	2.77	0.37	1073.19	2.88	0.37	1073.45	2.92	0.37	1074.12	2.90	0.35	
5.62	27	63877	1065.84	1072.03	2.31	0.33	1072.57	2.40	0.32	1072.92	2.52	0.33	1073.19	2.56	0.33	1073.90	2.56	0.31	
5.84	28	63657	1064.80	1071.71	2.78	0.36	1072.27	2.86	0.36	1072.62	2.99	0.36	1072.91	3.02	0.36	1073.68	2.93	0.33	
5.92	29	63576	1064.20	1071.70	2.24	0.28	1072.29	2.18	0.26	1072.65	2.21	0.26	1072.95	2.18	0.25	1073.73	1.99	0.22	Upstream of Bowmont Pedestrian Bridge
5.93	30	63557	1064.20	1071.63	2.40	0.30	1072.22	2.31	0.28	1072.59	2.33	0.27	1072.89	2.29	0.26	1073.69	2.06	0.22	
6.00	31	63489	1063.20	1071.41	2.84	0.36	1071.94	3.01	0.37	1072.25	3.22	0.39	1072.53	3.30	0.39	1073.31	3.32	0.37	Upstream of CP Rail Twin Bridges
6.03	32	63460	1062.40	1071.20	2.74	0.34	1071.70	2.92	0.35	1072.10	3.07	0.36	1072.35	3.16	0.36	1072.83	3.33	0.37	
6.11	33	63386	1064.60	1071.10	2.67	0.36	1071.64	2.54	0.32	1072.07	2.56	0.31	1072.33	2.57	0.31	1072.83	2.60	0.30	
6.25	34	63240	1065.00	1070.84	2.76	0.38	1071.34	2.86	0.38	1071.76	2.94	0.38	1072.02	2.98	0.37	1072.52	3.05	0.37	
6.42	35	63069	1064.87	1070.62	2.56	0.36	1071.13	2.69	0.36	1071.55	2.78	0.36	1071.81	2.84	0.36	1072.30	2.95	0.36	
6.68	36	62817	1063.20	1070.10	3.29	0.44	1070.57	3.52	0.45	1070.95	3.70	0.46	1071.18	3.81	0.47	1071.63	4.02	0.48	
6.87	37	62619	1063.60	1069.61	3.72	0.54	1070.05	3.97	0.55	1070.41	4.15	0.55	1070.64	4.27	0.56	1071.06	4.50	0.57	
7.08	38	62411	1064.80	1069.46	2.81	0.43	1069.95	2.92	0.42	1070.35	3.01	0.42	1070.60	3.07	0.41	1071.06	3.19	0.42	
7.35	40	62142	1063.80	1069.08	2.96	0.43	1069.57	3.11	0.42	1069.98	3.22	0.42	1070.23	3.30	0.43	1070.69	3.46	0.43	
7.67	42	61820	1062.60	1068.35	3.60	0.52	1068.78	3.89	0.53	1069.14	4.11	0.55	1069.36	4.24	0.55	1069.76	4.49	0.57	
7.95	44	61544	1061.14	1068.01	3.08	0.44	1068.50	3.21	0.44	1068.90	3.30	0.43	1069.15	3.36	0.43	1069.60	3.48	0.43	
8.43	45	61067	1061.60	1067.38	2.61	0.39	1067.96	2.57	0.37	1068.43	2.55	0.35	1068.71	2.56	0.35	1069.20	2.59	0.34	
8.70	46	60789	1061.60	1067.24	2.04	0.29	1067.86	1.99	0.26	1068.35	1.99	0.25	1068.63	1.99	0.25	1069.14	2.04	0.24	
8.96	47	60533	1060.60	1067.07	2.12	0.29	1067.71	2.14	0.28	1068.20	2.16	0.27	1068.49	2.19	0.27	1068.98	2.27	0.27	
9.14	48	60353	1058.60	1066.55	3.25	0.43	1067.15	3.41	0.43	1067.60	3.56	0.43	1067.86	3.67	0.44	1068.28	3.91	0.45	
9.29	49	60206	1057.37	1066.02	4.09	0.53	1066.59	4.30	0.54	1067.01	4.51	0.55	1067.23	4.68	0.56	1067.53	5.08	0.59	
9.45	50	60047	1060.00	1065.99	3.23	0.46	1066.63	3.27	0.44	1067.10	3.35	0.43	1067.35	3.43	0.43	1067.70	3.66	0.45	
9.58	51	59916	1060.20	1065.83	3.01	0.43	1066.49	3.08	0.42	1066.95	3.19	0.41	1067.20	3.29	0.42	1067.54	3.54	0.44	
9.74	52	59754	1060.00	1065.65	2.78	0.40	1066.34	2.82	0.38	1066.82	2.91	0.37	1067.07	2.99	0.38	1067.47	3.00	0.37	
9.87	53	59622	1060.00	1065.51	2.69	0.38	1066.25	2.62	0.35	1066.75	2.65	0.34	1067.01	2.70	0.34	1067.49	2.43	0.30	Upstream of Hextall Bridge
9.90	54	59594	1060.00	1064.94	3.68	0.56	1065.64	3.62	0.51	1066.33	3.21	0.43	1066.70	3.08	0.40	1067.30	2.90	0.36	
9.93	55	59558	1059.90	1064.85	3.42	0.52	1065.31	3.53	0.51	1065.65	3.63	0.50	1065.86	3.70	0.51	1066.42	2.83	0.37	Downstream of Shouldice Bridge
10.18	56	59316	1058.80	1064.64	2.80	0.39	1065.21	2.61	0.35	1065.59	2.56	0.33	1065.82	2.55	0.32	1066.29	2.51	0.31	
10.28	57	59210	1058.01	1064.22	3.55	0.49	1064.78	3.59	0.47	1065.57	2.39	0.29	1065.80	2.38	0.29	1066.28	2.36	0.27	Upstream of 16 Ave (Trans-Canada Highway) Bridge
10.34	58	59153	1056.60	1063.79	4.22	0.58	1064.13	4.59	0.61	1064.44	4.68	0.61	1064.49	4.97	0.65	1064.68	5.37	0.69	
10.44	59	59057	1058.00	1063.83	3.35	0.47	1064.28	3.22	0.43	1064.61	3.17	0.41	1064.70	3.30	0.43	1064.94	3.44	0.44	
10.60	60	58896	1057.40	1063.46	3.74	0.56	1064.03	3.48	0.49	1064.45	3.28	0.44	1064.52	3.44	0.46	1064.76	3.56	0.47	
10.76	61	58736	1057.22	1062.71	4.64	0.72	1063.19	4.76	0.70	1063.57	4.83	0.68	1063.88	4.52	0.62	1064.40	4.13	0.54	
11.04	62	58454	1057.60	1062.63	2.86	0.44	1063.12	3.01	0.44	1063.52	3.08	0.43	1063.76	3.09	0.42	1064.22	3.07	0.40	
11.13	63	58367	1057.00	1062.47	3.05	0.46	1062.94	3.23	0.47	1063.33	3.32	0.46	1063.57	3.35	0.46	1064.07	3.29	0.43	
11.30	64	58196	1056.40	1062.35	2.82	0.41	1062.82	3.00	0.42	1063.21	3.11	0.42	1063.58	2.78	0.36	1064.08	2.71	0.34	
11.49	65	58000	1055.00	1061.74	3.78	0.54	1062.28	3.86	0.52	1062.76	3.83	0.50	1063.05	3.81	0.48	1063.59	3.77	0.46	
11.74	66	57756	1055.60	1061.31	3.70	0.53	1061.75	4.00	0.55	1062.10	4.23	0.57	1062.31	4.37	0.58	1062.73	4.60	0.59	
12.00	67	57497	1055.80	1060.90	3.54	0.52	1061.33	3.83	0.54	1061.68	4.04	0.55	1061.88	4.19	0.56	1062.29	4.43	0.57	
12.22	68	57275	1055.40	1060.76	2.69	0.41	1061.22	2.85	0.41	1061.61	2.96	0.41	1061.84	3.03	0.41	1062.30	3.14	0.41	
12.35	69	57146	1055.00	1060.48	2.99	0.45	1060.94	3.17	0.46	1061.35	3.27	0.45	1061.57	3.33	0.45	1062.06	3.42	0.44	
12.61	70	56884	1053.80	1059.87	3.57	0.50	1060.43	3.63	0.48	1060.90	3.65	0.46	1061.17	3.66	0.45	1061.71	3.69	0.44	
12.75	71	56746	1053.56	1059.64	3.28	0.47	1060.22	3.31	0.45	1060.75	3.21	0.42	1061.04	3.20	0.41	1061.59	3.24	0.40	Upstream of Harry Boothman Pedestrian Bridge
12.78	72	56714	1053.00	1059.26	3.97	0.56	1059.75	4.17	0.56	1060.19	4.23	0.55	1060.49	4.22	0.53	1061.14	4.11	0.50	
12.92	73	56577	1053.00	1059.06	3.74	0.51	1059.54	3.97	0.52	1059.98	4.10	0.52	1060.26	4.15	0.52	1060.84	4.24	0.51	
13.10	74	56396	1053.43	1058.86	3.43	0.50	1059.39	3.54	0.49	1059.88	3.54	0.47	1060.20	3.52	0.45	1060.84	3.48	0.43	
13.30	75	56194	1052.80	1058.67	3.36	0.46	1059.23	3.45	0.45	1059.74	3.47	0.44	1060.06	3.49	0.43	1060.70	3.50	0.41	
13.47	76	56019	1052.80	1058.60	2.78	0.39	1059.15	2.92	0.39	1059.65	3.00	0.38	1059.97	3.05	0.38	1060.61	3.13	0.37	
13.75	77	55741	1051.40	1057.72	4.24	0.57	1058.13	4.62	0.60	1058.59	4.81	0.60	1058.89	4.90	0.60	1059.51	5.04	0.59	
13.92	78	55568	1050.40	1057.09	4.72	0.65	1057.16	5.51	0.76	1057.36	6.01	0.81	1057.48	6.33	0.85	1057.69	6.96	0.91	
14.20	79	55296	1051.60	1056.63	3.77	0.57	1056.93	3.77	0.55	1057.23	3.96	0.56	1057.42	4.08	0.57	1057.81	4.27	0.57	
14.39	80	55099	1051.80	1056.23	3.31	0.53	1056.65	3.15	0.48	1056.96	3.29	0.49	1057.16	3.37	0.49	1057.60	3.48	0.48	
14.51	81	54987	1051.00	1056.12	2.89	0.47	1056.56	2.77	0.43	1056.89	2.88	0.43	1057.10	2.94	0.43	1057.55	3.03	0.42	
14.86	82	54636	1050.00	1055.54	3.23	0.48	1055.93	3.41	0.49	1056.29	3.49	0.48	1056.53	3.52	0.48	1057.06	3.51	0.45	
15.03	83	54464	1050.20	1055.15	3.11	0.51	1055.59	3.18	0.49	1056.00	3.15	0.47	1056.28	3.12	0.45	1056.88	2.99	0.41	
15.21	84	54278	1050.40	1054.75	3.18	0.51	1055.28	3.13	0.47	1055.74	3.07	0.44	1056.05	3.04	0.42	1056.70	2.93	0.38	
15.42	85	54068	1049.60	1054.42	2.98	0.49	1055.01	2.95	0.45	1055.51	2.94	0.42	1055.82	2.94	0.41	1056.49	2.92	0.38	
15.69	86	53806	1049.00	1054.34	1.81	0.28	1054.96	1.84	0.27	1055.47	1.87	0.26	1055.79	1.89	0.25	1056.48	1.90	0.24	
15.89	87	53605	1048.20	1054.23	1.75	0.27	1054.85	1.81	0.26	1055.37	1.86	0.25	1055.69	1.88	0.25	1056.39	1.92	0.24	
16.14	88	53355	1047.80	1053.51	3.50	0.50	1054.08	3.70	0.50	1054.56	3.85	0.50	1054.85	3.95	0.50	1055.52	4.07	0.49	
16.25	89	53240	1047.60	1053.00	4.20	0.60	1053.53	4.48	0.61	1053.97	4.68	0.62	1054.24	4.82	0.62	1054.91	4.95	0.60	
16.30	90	53188	1047.40	1053.12	3.47	0.50	1053.69	3.67	0.50	1054.15	3.83	0.50	1054.44	3.93	0.50	1055.12	4.04	0.49	Upstream of Crowchild Trail Bridge
16.35	91	53140	1047.60	1053.11	3.20	0.46	1053.68	3.37	0.46	1054.15	3.51	0.46	1054.45	3.60	0.46	1055.00	3.77	0.46	
16.53	92	52964	1047.14	1052.71	3.52	0.51	1053.30	3.68	0.50	1053.80	3.79	0.49	1054.11	3.85	0.49	1054.71	3.96	0.48	
16.70	93	52792	1044.00	1052.01	4.30	0.58	1052.46	4.69	0.61	1052.84	5.00	0.63	1053.08	5.19	0.64	1053.53	5.52	0.66	
16.88	94	52609	1044.66	1051.82	3.78	0.52	1052.30	4.09	0.54	1052.70	4.33	0.55	1052.95	4.47	0.56	1053.44	4.72	0.57	

Distance from the Bearspaw Dam (km)	Station in Flood Mapping	Station in HEC-RAS	Channel Thalweg (m)	100-Year Flood Event			200-Year Flood Event			350-Year Flood Event			500-Year Flood Event			1000-Year Flood Event			Notes
				Water Level (m)	Channel Velocity (m/s)	Froude Number	Water Level (m)	Channel Velocity (m/s)	Froude Number	Water Level (m)	Channel Velocity (m/s)	Froude Number	Water Level (m)	Channel Velocity (m/s)	Froude Number	Water Level (m)	Channel Velocity (m/s)	Froude Number	
17.04	95	52456	1045.44	1051.57	3.81	0.56	1052.06	4.06	0.57	1052.48	4.25	0.57	1052.74	4.35	0.57	1053.26	4.53	0.57	
17.13	95.1	52366	1045.40	1051.32	3.98	0.60	1051.82	4.23	0.61	1052.22	4.42	0.61	1052.49	4.52	0.61	1053.00	4.70	0.61	New Cross Section
17.21	96	52279	1045.05	1051.22	3.68	0.54	1051.72	3.93	0.55	1052.13	4.13	0.56	1052.39	4.24	0.56	1052.96	4.33	0.55	
17.34	97	52149	1045.20	1050.95	3.69	0.53	1051.44	3.96	0.54	1051.86	4.16	0.55	1052.12	4.27	0.55	1052.72	4.33	0.54	
17.60	98	51893	1045.40	1050.50	3.62	0.54	1050.99	3.86	0.55	1051.41	4.03	0.56	1051.68	4.13	0.56	1052.29	4.26	0.55	
17.75	99	51741	1045.02	1050.16	3.74	0.56	1050.65	3.98	0.56	1051.08	4.15	0.57	1051.36	4.25	0.56	1052.00	4.35	0.55	Upstream of 14th St SW (Mewata) Bridge
17.80	100	51688	1045.20	1049.99	3.77	0.56	1050.49	4.00	0.57	1050.94	4.15	0.56	1051.23	4.23	0.56	1051.89	4.31	0.54	
17.97	101	51519	1044.66	1049.74	3.33	0.51	1050.27	3.48	0.51	1050.74	3.58	0.50	1051.06	3.62	0.49	1051.79	3.56	0.45	
18.16	102	51328	1043.15	1049.44	3.15	0.46	1050.00	3.28	0.45	1050.51	3.35	0.44	1050.84	3.40	0.44	1051.60	3.40	0.41	
18.38	103	51114	1043.80	1049.10	2.70	0.41	1049.69	2.80	0.40	1050.24	2.84	0.38	1050.61	2.83	0.37	1051.43	2.75	0.34	
18.54	104	50951	1042.60	1048.85	2.75	0.40	1049.45	2.88	0.40	1050.01	2.93	0.39	1050.38	2.96	0.38	1051.25	2.86	0.34	Upstream of Louise (Hillhurst) Bridge
18.58	105	50910	1042.60	1048.72	2.70	0.39	1049.30	2.83	0.39	1049.82	2.91	0.38	1050.14	2.96	0.38	1050.85	3.03	0.37	
18.66	106	50831	1042.38	1048.44	3.24	0.46	1049.02	3.37	0.45	1049.55	3.45	0.44	1049.87	3.49	0.44	1050.64	3.47	0.41	Upstream of NW LRT Bridge
18.69	107	50800	1041.81	1048.32	3.41	0.49	1048.80	3.65	0.50	1049.18	3.83	0.50	1049.40	3.95	0.51	1049.88	4.12	0.51	
18.79	108	50706	1041.40	1047.99	3.74	0.51	1048.43	4.05	0.53	1048.77	4.29	0.55	1048.97	4.45	0.56	1049.48	4.59	0.55	
18.94	109	50553	1040.60	1047.95	2.87	0.37	1048.39	3.16	0.39	1048.72	3.40	0.41	1048.91	3.56	0.42	1049.41	3.74	0.43	
19.05	109.1	50438	1041.20	1047.72	3.18	0.43	1048.15	3.46	0.45	1048.49	3.64	0.47	1048.70	3.75	0.47	1049.28	3.79	0.46	Upstream of Peace Bridge
19.09	110	50403	1041.53	1047.65	3.25	0.45	1048.07	3.52	0.47	1048.41	3.70	0.48	1048.61	3.82	0.49	1049.17	3.87	0.47	The HEC-RAS cross section is 50405.09 in 2012 Model
19.18	112	50312	1039.42	1047.77	2.37	0.29	1048.23	2.45	0.29	1048.60	2.51	0.29	1048.81	2.58	0.30	1049.35	2.63	0.29	
19.29	115	50204	1041.60	1047.53	2.99	0.42	1048.02	3.00	0.40	1048.40	3.03	0.39	1048.61	3.08	0.39	1049.18	3.07	0.37	
19.47	117	50021	1040.60	1047.44	2.83	0.37	1047.95	2.80	0.35	1048.35	2.80	0.34	1048.57	2.84	0.34	1049.17	2.80	0.32	
19.67	120	49822	1041.17	1047.36	2.21	0.30	1047.89	2.19	0.28	1048.30	2.19	0.27	1048.52	2.23	0.27	1049.13	2.20	0.26	
19.85	123	49642	1039.31	1046.94	3.17	0.40	1047.51	3.14	0.38	1047.93	3.15	0.37	1048.14	3.23	0.37	1048.76	3.21	0.35	Upstream of Prince's Island Pedestrian Bridge
19.88	125	49613	1039.00	1046.74	3.48	0.45	1047.27	3.53	0.44	1047.70	3.49	0.42	1047.91	3.53	0.42	1048.56	3.43	0.39	
20.03	127	49464	1039.34	1046.56	3.21	0.43	1047.13	3.17	0.40	1047.60	3.07	0.38	1047.81	3.11	0.38	1048.48	3.01	0.35	
20.15	127.1	49338	1038.94	1046.36	3.10	0.42	1046.98	3.02	0.39	1047.44	3.00	0.37	1047.66	3.06	0.37	1048.34	3.00	0.35	New Cross Section
20.27	132	49218	1039.20	1046.07	3.13	0.42	1046.73	3.06	0.39	1047.21	3.05	0.37	1047.42	3.12	0.38	1048.13	3.07	0.35	
20.36	132.1	49130	1039.20	1045.81	3.35	0.45	1046.50	3.28	0.41	1047.00	3.28	0.40	1047.19	3.36	0.40	1047.92	3.31	0.38	New Cross Section
20.49	133	49003	1039.33	1045.59	3.09	0.40	1046.33	3.07	0.38	1046.82	3.16	0.38	1047.00	3.29	0.39	1047.75	3.30	0.37	
20.54	134	48953	1038.20	1045.51	3.19	0.42	1046.16	3.36	0.42	1046.75	3.25	0.39	1046.93	3.38	0.40	1047.68	3.38	0.38	Upstream of Centre St Bridge
20.58	135	48912	1038.39	1045.07	3.49	0.49	1045.67	3.50	0.46	1046.07	3.63	0.47	1046.38	3.67	0.46	1047.03	3.71	0.44	
20.76	136	48730	1038.78	1044.73	3.09	0.45	1045.46	2.83	0.39	1045.90	2.86	0.38	1046.24	2.84	0.36	1046.93	2.78	0.34	
20.89	137	48603	1038.62	1044.24	3.58	0.50	1044.97	3.54	0.47	1045.41	3.62	0.46	1045.78	3.60	0.44	1046.54	3.49	0.41	
21.06	138	48431	1038.11	1043.87	3.69	0.52	1044.54	3.83	0.51	1044.93	4.02	0.52	1045.32	4.02	0.50	1046.13	3.93	0.46	
21.29	139	48200	1037.35	1043.28	4.06	0.56	1044.18	3.92	0.50	1044.59	4.06	0.50	1045.04	3.98	0.48	1045.93	3.84	0.44	Upstream of 4th Ave Flyover Bridge
21.34	140	48153	1036.60	1042.98	4.27	0.61	1043.78	4.32	0.57	1044.30	4.35	0.55	1044.82	4.21	0.51	1045.77	4.00	0.46	Upstream of Old Langevin Bridge
21.38	141	48115	1036.20	1042.97	3.96	0.56	1043.50	4.22	0.57	1043.72	4.59	0.61	1043.98	4.72	0.61	1044.55	4.78	0.59	
21.44	142	48050	1037.19	1042.74	4.11	0.60	1043.26	4.38	0.61	1043.57	4.56	0.62	1043.88	4.56	0.60	1044.53	4.39	0.55	Upstream of New Langevin (Edmonton Trail) Bridge
21.49	143	48007	1037.20	1042.44	4.42	0.66	1042.93	4.71	0.67	1043.52	4.33	0.58	1043.85	4.28	0.56	1044.44	4.26	0.53	Upstream of LRT (Harry Kroeger) Bridge
21.54	144	47955	1037.20	1042.45	3.92	0.59	1042.91	4.20	0.60	1043.28	4.37	0.61	1043.56	4.43	0.60	1044.23	4.31	0.55	
21.71	145	47785	1037.41	1042.05	3.94	0.65	1042.54	4.03	0.64	1042.96	4.06	0.61	1043.32	3.95	0.58	1044.10	3.62	0.49	
21.77	147	47727	1037.20	1041.92	3.83	0.61	1042.44	3.89	0.58	1042.95	3.73	0.53	1043.36	3.50	0.48	1044.21	2.97	0.38	Upstream of St. Patrick's Island Pedestrian Bridge
21.81	148	47677	1036.28	1041.94	3.53	0.52	1042.52	3.51	0.49	1043.03	3.36	0.45	1043.44	3.11	0.40	1044.28	2.57	0.31	The HEC-RAS cross section is 47636.58 in 2012 Model
21.92	149	47572	1036.60	1041.78	3.51	0.52	1042.49	3.27	0.45	1043.02	3.09	0.41	1043.42	2.92	0.37	1044.22	2.59	0.31	
22.22	151	47272	1036.00	1041.67	2.38	0.36	1042.45	2.15	0.30	1043.00	2.03	0.27	1043.40	1.95	0.25	1044.21	1.75	0.21	
22.44	153	47047	1034.20	1041.50	2.06	0.30	1042.23	2.20	0.30	1042.73	2.35	0.30	1043.11	2.43	0.31	1043.87	2.58	0.31	Elbow River Confluence
22.72	157	46775	1033.46	1041.32	1.97	0.27	1042.05	2.13	0.27	1042.55	2.29	0.28	1042.93	2.39	0.29	1043.69	2.56	0.29	
22.93	159	46564	1033.60	1041.05	2.55	0.34	1041.79	2.72	0.34	1042.28	2.89	0.35	1042.65	2.99	0.35	1043.42	3.16	0.35	Upstream of St. Georges Island Bridge
22.97	161	46518	1034.60	1040.84	2.75	0.38	1041.61	2.90	0.37	1042.09	3.07	0.38	1042.46	3.16	0.38	1043.23	3.31	0.38	
23.16	162	46329	1034.80	1040.54	2.86	0.40	1041.32	3.03	0.40	1041.74	3.29	0.42	1042.09	3.43	0.42	1042.81	3.68	0.43	
23.47	166	46024	1034.40	1039.77	3.38	0.50	1040.58	3.54	0.48	1040.87	3.96	0.53	1041.14	4.19	0.54	1041.75	4.58	0.57	
23.75	168	45743	1033.40	1039.59	2.80	0.38	1040.50	2.80	0.35	1040.80	3.09	0.38	1041.11	3.20	0.38	1041.80	3.38	0.38	
23.89	169	45598	1032.42	1039.46	2.87	0.37	1040.33	3.04	0.37	1040.55	3.47	0.41	1040.80	3.69	0.43	1041.39	4.12	0.46	Nose Creek Confluence
23.91	170	45580	1032.00	1039.30	3.25	0.41	1040.32	3.06	0.36	1040.60	3.26	0.38	1040.93	3.21	0.36	1041.66	3.07	0.33	Upstream of CP Rail Bridge
23.93	171	45561	1031.45	1039.17	3.18	0.41	1039.75	3.53	0.43	1040.35	3.41	0.40	1040.71	3.33	0.38	1041.52	3.09	0.34	
24.01	172	45479	1031.80	1039.03	3.35	0.44	1039.53	3.84	0.48	1039.95	4.11	0.50	1040.31	4.11	0.49	1041.23	3.78	0.42	
24.26	173	45235	1031.20	1039.02	2.35	0.31	1039.54	2.71	0.34	1039.93	3.02	0.37	1040.21	3.23	0.39	1040.89	3.61	0.41	Upstream of Western Headworks
24.30	174	45190	1032.00	1037.93	2.73	0.38	1038.73	2.95	0.38	1039.00	3.31	0.42	1039.51	3.28	0.40	1040.89	2.99	0.33	
24.39	175	45105	1031.40	1037.82	2.68	0.39	1038.63	2.88	0.38	1038.86	3.28	0.43	1039.38	3.26	0.41	1040.81	2.96	0.34	
24.70	176	44793	1029.52	1037.00	3.84	0.50	1037.85	4.05	0.49	1038.89	2.27	0.26	1039.43	2.22	0.24	1040.87	2.05	0.21	
25.04	177	44457	1029.60	1036.45	3.17	0.42	1037.37	3.33	0.41	1038.22	3.41	0.39	1039.27	2.22	0.24	1040.76	2.02	0.20	
25.18	178	44309	1028.80	1036.01	3.54	0.45	1036.80	3.92	0.47	1037.56	4.17	0.47	1038.18	4.28	0.47	1040.49	2.83	0.28	Upstream of 17 Ave (Cushing) Bridge
25.23	179	44265	1028.00	1035.72	3.85	0.48	1036.11	4.53	0.55	1036.42	5.11	0.61	1036.65	5.49	0.65	1036.97	6.43	0.74	
25.35	179.1	44139	1023.93	1035.59	3.46	0.43	1036.00	3.89	0.47	1036.36	4.25	0.50	1036.66	4.35	0.50	1037.16	4.67	0.52	New Cross Section
25.51	180	43980	1027.71	1035.45	2.95	0.42	1035.97	2.98	0.40	1036.41	2.98	0.39	1036.75	2.94	0.37	1037.32	3.00	0.36	
25.68	181	43808	1029.16	1035.10	3.12	0.49	1035.61	3.22	0.48	1036.05	3.28	0.47	1036.41	3.23	0.46	1037.07	3.07	0.41	
25.83	181.1	43657	1029.80	1034.95	2.44	0.38	1035.45	2.60	0.38	1035.90	2.71	0.38	1036.26	2.73	0.37	1036.91	2.80	0.36	New Cross Section
26.00	182	43493	1029.20	1034.63	2.63	0.44	1035.21	2.64	0.41	1035.73	2.54	0.37	1036.15	2.40	0.34	1036.85	2.31	0.30	
26.22	183	43272	1028.55	1034.21	2.61	0.38	1034.90	2.50	0.34	1035.55	2.17	0.28	1036.01	2.02	0.25	1036.75	1.93	0.23	
26.38	183.1	43115	1027.60	1033.96	2.63	0.40	1034.73	2.40	0.34	1035.42	2.19	0.29	1035.91	2.06	0.26	1036.67	1.99	0.24	New Cross Section
26.43	184	43061	1025.40	1033.98	1.98	0.25	1034.73	1.99	0.24	1035.41	1.93	0.22	1035.90	1.88	0.21	1036.66	1.89	0.20	
26.59	185	42900	1027.11	1033.92	1.90	0.26	1034.68	1.91	0.25	1035.36	1.87	0.23	1035.86	1.83	0.22	1036.61	1.86	0.21	
26.83	186	42662	1027.60	1033.69	2.35	0.32	1034.48	2.31	0.30	1035.20	2.23	0.27	1035.72	2.16	0.25	1036.49	2.20	0.25	
27.08	187	42409	1026.20	1033.31	2.56	0.35	1034.20	2.42	0.31	1035.01	2.23	0.27	1035.55	2.13	0.25	1036.34	2.13	0.23	
27.26	188	42230	1026.80	1033.05	2.84	0.38	1034.03	2.60	0.32	1034.87	2.45	0.28	1035.43	2.38	0.27	1036.22	2.44	0.26	
27.59	188.1	41903	1026.20	1032.76	2.50	0.32	1033.85	2.23	0.27	1034.75	2.00	0.23	1035.34	1.89	0.20	1036.15	1.89	0.20	New Cross Section
27.73	189	41759	1025.60	1032.58	2.67	0.34	1033.72	2.44	0.29	1034.66	2.20	0.24	1035.26	2.08	0.22	1036.07	2.09	0.21	
27.85	189.1	41643	1025.40	1032.49	2.56	0.32	1033.65	2.41	0.28	1034.59	2.25	0.25	1035.21	2.15	0.23	1036.02	2.17	0.22	New Cross Section
28.00	190	41493	1024.61	1032.36	2.65	0.32	1033.54	2.55	0.29	1034.50	2.41	0.26	1035.13	2.29	0.23	1035.96	2.28	0.22	
28.19	190.1	41303	1024.74	1032.06	2.98	0.37	1033.28	2.95	0.34	1034.30	2.79	0.30	1034.97	2.62	0.27	1035.83	2.57	0.25	New Cross Section
28.45	191	41038	1022.23	1031.68	2.92	0.33	1032.86	3.13	0.33	1033.87	3.20	0.32	1034.61	3.08	0.30	1035.54	3.01	0.28	
28.51	192	40985	1021.00	1031.33	3.31	0.40	1032.46	3.52	0.40	1033.33	3.84	0.41	1034.19	3.56	0.36	1035.39	3.22	0.31	Upstream of CP Rail Bridge
28.64	193	40852	1023.40	1030.54	4.18	0.54	1031.08	4.71	0.58	1031.57	5.12	0.61	1031.90	5.37	0.63	1032.56	5.92	0.66	Upstream of Bonnybrook (Ogden Road) Bridge
28.71	194	40787	1023.80	1030.25	4.33	0.59	1030.76	4.85	0.63	1031.23	5.23	0.65	1031.55	5.48	0.67	1032.37	5.83	0.67	
28.79	195	40703	1023.60	1030.05	3.79	0.51	1030.68	3.80	0.49	1031.28	3.62	0.44	1031.70	3.49	0.42	1032.69	3.09	0.35	
28.95	196	40543	1022.40	1029.60	3.73	0.48	1030.26	3.82	0.47	1030.87	3.82	0.45	1031.29	3.81	0.43	1032.32	3.66	0.39	
29.04	197	40453	1022.96	1029.55	3.13	0.42	1030.22	3.21	0.41	1030.86	3.11	0.38	1031.31	3.01	0.35	1032.37	2.78	0.31	
29.16	198	40328	1023.08	1029.39	2.94	0.40	1030.08	2.97	0.38	1030.78	2.79	0.34	1031.27	2.60	0.31	1032.36	2.27	0.25	
29.31	199	40183	1021.86	1029.10	3.00	0.39	1029.65	3.40	0.42	1030.19	3.69	0.44	1030.57	3.86	0.45	1031.53	4.15	0.45	Upstream of Calf Robe (Deerfoot Trail) Bridge
29.39	200	40105	1021.44	1028.97	3.00	0.39	1029.69	2.66	0.33	1030.29	2.64	0.31	1030.72	2.62	0.30	1031.78	2.51	0.27	
29.46	201	40036	1020.40	1028.92	2.77	0.38	1029.63	2.70	0.35	1030.24	2.68	0.33	1030.67	2.66	0.31	1031.74	2.53	0.28	
29.57	202	39919	1022.20	1028.82	2.54	0.35	1029.50	2.63	0.34	1030.13	2.63	0.33	1030.57	2.60	0.31	1031.67	2.47	0.28	

Distance from the Bearspaw Dam (km)	Station in Flood Mapping	Station in HEC-RAS	Channel Thalweg (m)	100-Year Flood Event			200-Year Flood Event			350-Year Flood Event			500-Year Flood Event			1000-Year Flood Event			Notes
				Water Level (m)	Channel Velocity (m/s)	Froude Number	Water Level (m)	Channel Velocity (m/s)	Froude Number	Water Level (m)	Channel Velocity (m/s)	Froude Number	Water Level (m)	Channel Velocity (m/s)	Froude Number	Water Level (m)	Channel Velocity (m/s)	Froude Number	
29.76	203	39730	1021.00	1028.29	3.22	0.45	1029.04	3.26	0.43	1029.76	3.14	0.39	1030.26	3.07	0.37	1031.46	2.82	0.31	
29.83	204	39663	1020.60	1028.06	3.28	0.45	1028.57	3.76	0.50	1029.02	4.14	0.53	1029.35	4.38	0.54	1030.27	4.73	0.55	Upstream of CN Rail Bridge
29.88	205	39608	1019.44	1027.73	3.59	0.47	1028.07	4.25	0.54	1028.34	4.82	0.60	1028.51	5.22	0.64	1028.85	6.08	0.73	
29.99	206	39506	1021.80	1027.66	3.23	0.46	1028.11	3.31	0.46	1028.49	3.37	0.45	1028.75	3.41	0.44	1029.31	3.49	0.44	
30.13	207	39363	1021.00	1027.38	2.92	0.43	1027.85	2.98	0.42	1028.24	3.03	0.41	1028.51	3.05	0.40	1029.08	3.11	0.39	
30.24	208	39252	1021.40	1027.12	2.81	0.44	1027.58	2.99	0.45	1027.98	3.12	0.45	1028.25	3.19	0.44	1028.82	3.32	0.44	
30.39	209	39101	1021.00	1026.90	2.44	0.36	1027.34	2.70	0.38	1027.73	2.87	0.39	1028.00	2.97	0.40	1028.59	3.14	0.40	
30.51	210	38978	1020.20	1026.62	2.97	0.42	1027.09	3.12	0.42	1027.49	3.24	0.42	1027.78	3.28	0.42	1028.39	3.39	0.41	
30.56	211	38927	1019.80	1026.45	3.30	0.47	1026.93	3.43	0.47	1027.34	3.53	0.47	1027.63	3.61	0.47	1028.24	3.70	0.45	
30.71	212	38785	1020.00	1026.20	2.61	0.42	1026.70	2.69	0.41	1027.12	2.77	0.40	1027.42	2.84	0.40	1028.06	2.91	0.39	
30.96	213	38530	1020.40	1025.79	2.36	0.37	1026.33	2.42	0.35	1026.79	2.50	0.35	1027.10	2.54	0.34	1027.77	2.63	0.34	
31.10	214	38390	1020.00	1025.64	2.19	0.32	1026.21	2.24	0.31	1026.67	2.28	0.30	1026.99	2.31	0.30	1027.67	2.37	0.29	
31.14	215	38348	1019.80	1025.59	2.13	0.31	1026.16	2.16	0.30	1026.62	2.22	0.29	1026.94	2.28	0.29	1027.63	2.30	0.28	
31.31	216	38178	1019.80	1025.44	2.02	0.28	1026.01	2.09	0.28	1026.48	2.15	0.27	1026.80	2.19	0.27	1027.49	2.27	0.27	
31.46	217	38032	1018.60	1025.25	2.43	0.33	1025.84	2.46	0.31	1026.32	2.52	0.31	1026.64	2.56	0.31	1027.34	2.63	0.30	
31.54	218	37948	1018.40	1025.10	2.72	0.36	1025.72	2.72	0.34	1026.20	2.76	0.34	1026.53	2.78	0.33	1027.25	2.82	0.32	
31.63	219	37862	1017.20	1025.03	2.59	0.33	1025.66	2.62	0.32	1026.14	2.69	0.32	1026.47	2.73	0.32	1027.19	2.81	0.31	
31.70	220	37790	1017.80	1024.97	2.45	0.33	1025.60	2.49	0.32	1026.08	2.56	0.32	1026.41	2.62	0.32	1027.12	2.70	0.31	
31.85	221	37647	1017.40	1024.66	2.86	0.39	1025.27	3.01	0.40	1025.75	3.16	0.40	1026.05	3.30	0.41	1026.77	3.44	0.41	
32.14	222	37348	1017.20	1023.84	3.59	0.52	1024.44	3.85	0.53	1024.99	3.88	0.50	1025.33	3.94	0.50	1026.13	3.99	0.48	
32.31	223	37185	1016.20	1023.33	3.68	0.54	1023.88	4.00	0.55	1024.36	4.23	0.56	1024.63	4.44	0.57	1025.33	4.72	0.58	Upstream of Graves (Glenmore Trail) Bridges
32.35	224	37145	1016.60	1023.05	3.83	0.58	1023.53	4.21	0.60	1023.96	4.49	0.62	1024.14	4.79	0.65	1024.78	5.14	0.66	
32.38	225	37112	1016.80	1022.75	3.98	0.64	1023.13	4.48	0.69	1023.47	4.87	0.72	1023.71	5.12	0.74	1024.07	5.77	0.80	
32.53	226	36967	1017.75	1022.44	3.08	0.50	1022.83	3.38	0.53	1023.23	3.50	0.52	1023.51	3.60	0.52	1023.91	3.97	0.55	
32.80	227	36694	1017.40	1022.21	1.70	0.27	1022.55	2.00	0.31	1022.96	2.16	0.32	1023.23	2.27	0.32	1023.57	2.66	0.37	
32.95	227.1	36547	1017.53	1022.03	2.23	0.35	1022.33	2.58	0.40	1022.72	2.78	0.41	1023.00	2.90	0.41	1023.26	3.39	0.47	New Cross Section
33.11	228	36379	1014.95	1021.64	3.18	0.44	1021.73	3.87	0.53	1022.06	4.16	0.55	1022.30	4.31	0.56	1022.94	3.88	0.48	
33.52	229	35968	1017.00	1020.96	2.55	0.43	1021.44	1.96	0.31	1021.77	2.11	0.32	1022.04	2.18	0.33	1022.61	2.31	0.33	
33.82	230	35673	1015.40	1020.72	1.78	0.30	1021.20	1.89	0.30	1021.53	2.03	0.31	1021.80	2.09	0.31	1022.39	2.20	0.31	
34.10	231	35388	1013.80	1020.05	3.67	0.52	1020.63	3.59	0.48	1020.95	3.76	0.49	1021.26	3.77	0.48	1021.90	3.80	0.46	
34.22	232	35268	1014.20	1020.09	2.40	0.36	1020.65	2.48	0.35	1020.96	2.68	0.37	1021.26	2.74	0.36	1021.90	2.84	0.36	
34.41	233	35084	1014.40	1020.03	1.59	0.26	1020.60	1.66	0.25	1020.92	1.80	0.26	1021.22	1.84	0.26	1021.86	1.94	0.26	
34.55	234	34940	1014.60	1019.93	1.56	0.25	1020.51	1.62	0.24	1020.81	1.76	0.25	1021.12	1.80	0.25	1021.77	1.90	0.25	
34.69	235	34801	1013.88	1019.83	1.55	0.24	1020.42	1.62	0.24	1020.71	1.78	0.25	1021.02	1.83	0.25	1021.66	1.95	0.25	
34.94	236	34553	1012.00	1019.21	3.65	0.49	1019.78	3.85	0.49	1019.89	4.41	0.56	1020.21	4.47	0.55	1020.89	4.55	0.54	
35.05	237	34446	1012.08	1018.79	3.96	0.53	1019.68	3.38	0.42	1019.75	3.93	0.49	1020.08	3.96	0.48	1020.77	4.03	0.47	Upstream of Eric Harvie Pedestrian Bridge
35.07	238	34424	1012.20	1018.93	2.99	0.40	1019.40	3.22	0.41	1019.82	3.37	0.42	1020.15	3.42	0.41	1020.80	3.57	0.41	
35.27	239	34222	1012.01	1018.54	3.16	0.46	1019.07	3.23	0.45	1019.56	3.19	0.42	1019.92	3.14	0.40	1020.62	3.10	0.38	
35.43	240	34061	1012.01	1018.36	2.50	0.37	1018.95	2.39	0.33	1019.48	2.30	0.31	1019.85	2.24	0.29	1020.58	2.21	0.27	
35.76	241	33737	1012.00	1017.84	2.88	0.39	1018.55	2.77	0.36	1019.14	2.72	0.33	1019.55	2.70	0.32	1020.33	2.66	0.30	
35.97	242	33519	1011.20	1017.59	3.01	0.40	1018.38	2.79	0.35	1018.99	2.75	0.33	1019.42	2.70	0.31	1020.23	2.61	0.29	
36.07	243	33419	1011.60	1017.59	2.14	0.29	1018.36	2.09	0.27	1018.98	2.06	0.25	1019.41	2.05	0.24	1020.21	2.04	0.23	
36.27	244	33222	1011.00	1017.46	2.36	0.31	1018.25	2.33	0.29	1018.84	2.50	0.30	1019.30	2.41	0.28	1020.13	2.33	0.26	
36.56	245	32932	1009.60	1017.22	2.61	0.32	1018.05	2.55	0.30	1018.69	2.48	0.28	1019.12	2.61	0.29	1019.93	2.75	0.29	
36.72	246	32776	1009.60	1017.11	2.37	0.30	1017.96	2.43	0.29	1018.58	2.52	0.29	1019.04	2.50	0.28	1019.87	2.50	0.26	
36.90	247	32588	1009.70	1016.42	3.63	0.47	1017.25	3.76	0.46	1017.99	3.67	0.42	1018.47	3.67	0.41	1019.65	2.97	0.31	
37.04	248	32456	1007.81	1015.75	4.57	0.60	1016.36	5.09	0.64	1016.87	5.46	0.66	1017.22	5.70	0.67	1017.88	6.27	0.71	Upstream of Ivor Strong (Deerfoot Trail) Bridge
37.09	249	32397	1007.20	1015.47	4.57	0.62	1016.01	5.11	0.66	1016.49	5.47	0.68	1016.83	5.70	0.69	1017.48	6.21	0.72	
37.36	250	32136	1008.40	1015.21	1.89	0.28	1015.79	2.02	0.29	1016.29	2.14	0.29	1016.65	2.21	0.29	1017.34	2.33	0.29	The HEC-RAS cross section is 32109.19 in 2012 Model
37.50	251	31996	1007.00	1015.00	2.27	0.31	1015.59	2.39	0.31	1016.09	2.50	0.31	1016.45	2.58	0.31	1017.15	2.70	0.31	The HEC-RAS cross section is 32005.19 in 2012 Model
37.90	252	31595	1007.65	1014.28	3.10	0.44	1014.90	3.24	0.44	1015.41	3.39	0.44	1015.76	3.53	0.44	1016.47	3.70	0.44	
38.20	253	31294	1007.60	1013.45	3.57	0.51	1014.03	3.87	0.52	1014.49	4.13	0.54	1014.81	4.30	0.55	1015.48	4.61	0.56	
38.48	254	31013	1006.60	1012.58	4.01	0.58	1013.03	4.48	0.62	1013.34	4.93	0.66	1013.54	5.25	0.69	1013.83	6.04	0.77	
38.61	255	30885	1006.20	1012.39	3.67	0.53	1012.85	4.04	0.56	1013.18	4.37	0.59	1013.38	4.62	0.61	1013.67	5.28	0.68	Upstream of Sue Higgins Pedestrian Bridge
38.64	256	30851	1006.20	1012.01	3.94	0.60	1012.40	4.36	0.63	1012.70	4.72	0.66	1012.92	4.94	0.68	1013.33	5.45	0.72	
38.85	257	30640	1007.60	1011.42	3.74	0.63	1011.76	4.13	0.67	1012.04	4.44	0.69	1012.22	4.69	0.72	1012.58	5.13	0.75	
39.07	258	30422	1005.80	1010.96	2.98	0.50	1011.29	3.28	0.53	1011.55	3.52	0.55	1011.72	3.68	0.57	1012.07	4.01	0.59	
39.40	259	30090	1005.20	1010.13	3.43	0.52	1010.42	3.67	0.54	1010.65	3.90	0.56	1010.80	4.04	0.57	1011.12	4.31	0.59	
39.62	260	29873	1004.80	1009.76	2.89	0.49	1010.06	3.02	0.49	1010.28	3.19	0.51	1010.43	3.30	0.51	1010.76	3.44	0.51	
39.84	261	29655	1005.20	1009.47	2.48	0.43	1009.82	2.52	0.41	1010.04	2.65	0.42	1010.20	2.72	0.43	1010.55	2.86	0.43	
40.18	262	29312	1003.62	1008.89	2.95	0.47	1009.28	3.06	0.47	1009.52	3.16	0.47	1009.68	3.22	0.47	1010.09	3.24	0.45	
40.44	263	29053	1001.60	1008.24	3.64	0.55	1008.65	3.84	0.55	1008.98	3.77	0.52	1009.23	3.63	0.49	1009.75	3.48	0.45	
40.70	264	28790	1003.40	1007.82	2.77	0.50	1008.33	2.72	0.46	1008.74	2.60	0.41	1009.03	2.51	0.39	1009.59	2.46	0.36	
40.98	265	28513	1002.40	1007.42	2.16	0.39	1008.03	2.10	0.35	1008.48	2.10	0.33	1008.76	2.24	0.34	1009.36	2.19	0.31	
41.31	266	28184	1002.00	1007.16	1.99	0.30	1007.79	2.07	0.29	1008.24	2.18	0.29	1008.52	2.27	0.30	1009.08	2.50	0.31	
41.64	267	27849	1000.00	1006.75	2.98	0.40	1007.36	3.27	0.42	1007.81	3.41	0.42	1008.08	3.51	0.42	1008.64	3.70	0.43	
41.82	268	27669	1000.00	1006.38	3.24	0.44	1007.01	3.46	0.45	1007.45	3.63	0.45	1007.72	3.74	0.46	1008.26	3.97	0.47	
41.97	269	27518	999.90	1006.08	3.46	0.47	1006.64	3.89	0.50	1007.08	4.08	0.51	1007.34	4.20	0.52	1007.87	4.45	0.53	
42.27	270	27220	998.60	1005.36	3.59	0.52	1005.79	4.00	0.56	1006.13	4.32	0.58	1006.41	4.42	0.58	1006.87	4.76	0.60	
42.62	271	26870	999.60	1004.57	3.82	0.57	1005.02	4.07	0.57	1005.39	4.25	0.58	1005.77	4.18	0.55	1006.19	4.52	0.58	
42.84	272	26652	999.00	1003.97	3.99	0.61	1004.36	4.31	0.63	1004.69	4.55	0.65	1004.90	4.92	0.69	1005.49	4.92	0.65	
43.09	273	26397	997.80	1003.53	3.71	0.52	1003.94	3.93	0.53	1004.32	4.05	0.53	1004.50	4.36	0.56	1005.14	4.42	0.54	Upstream of Mackenzie Pedestrian Bridge
43.11	274	26381	997.60	1003.62	2.99	0.43	1004.03	3.21	0.44	1004.39	3.36	0.45	1004.58	3.58	0.47	1005.18	3.72	0.46	
43.19	275	26305	998.00	1003.52	2.95	0.43	1003.93	3.14	0.44	1004.30	3.27	0.44	1004.48	3.52	0.47	1005.11	3.49	0.44	
43.45	276	26045	998.40	1002.94	3.37	0.53	1003.36	3.56	0.53	1003.74	3.68	0.53	1004.02	3.54	0.49	1004.73	3.48	0.45	
43.70	277	25787	997.44	1002.51	3.02	0.48	1002.93	3.23	0.49	1003.34	3.33	0.48	1003.62	3.40	0.48	1004.41	3.38	0.44	
43.93	278	25559	995.61	1002.18	3.27	0.46	1002.63	3.45	0.46	1003.08	3.50	0.45	1003.39	3.54	0.44	1004.25	3.43	0.40	
44.16	279	25337	996.20	1001.94	2.88	0.45	1002.43	2.92	0.43	1002.93	2.85	0.40	1003.26	2.83	0.38	1004.17	2.66	0.33	
44.36	280	25134	996.62	1001.71	2.72	0.42	1002.20	2.90	0.42	1002.71	2.95	0.41	1003.07	2.89	0.39	1004.04	2.69	0.33	Fish Creek Confluence
44.44	281	25048	996.80	1001.43	3.27	0.51	1001.98	3.26	0.48	1002.56	3.14	0.43	1002.96	3.01	0.40	1003.98	2.69	0.33	
44.58	282	24910	995.80	1001.42	2.47	0.35	1001.97	2.57	0.35	1002.54	2.59	0.33	1002.94	2.51	0.31	1003.97	2.33	0.27	
44.71	283	24779	994.41	1001.07	3.50	0.49	1001.73	3.30	0.43	1002.37	3.07	0.38	1002.81	2.90	0.35	1003.89	2.53	0.29	
44.84	284	24653	994.60	1000.98	2.92	0.43	1001.66	2.80	0.38	1002.32	2.64	0.34	1002.76	2.55	0.32	1003.86	2.27	0.26	
44.99	285	24507	994.40	1000.81	2.78	0.39	1001.53	2.69	0.36	1002.22	2.61	0.33	1002.68	2.46	0.30	1003.81	2.19	0.25	
45.13	286	24361	994.80	1000.72	2.19	0.32	1001.46	2.15	0.29	1002.16	2.13	0.27	1002.64	2.04	0.25	1003.78	1.92	0.22	
45.48	287	24008	993.20	1000.26	3.11	0.40	1001.15	2.82	0.34	1001.93	2.62	0.30	1002.44	2.52	0.28	1003.65	2.30	0.24	
45.72	288	23774	992.40	1000.07	2.87	0.36	1001.10	2.21	0.25	1001.89	2.10	0.23	1002.40	2.03	0.22	1003.61	1.98	0.20	
45.85	289	23642	992.60	999.21	4.35	0.58	1000.08	4.57	0.57	1000.75	4.87	0.58	1001.26	4.93	0.56	1002.44	5.05	0.54	Upstream of Marquis de Lorne (Highway 22X) Bridge
45.90	290	23590	992.60	998.99	4.37	0.60	999.66	4.84	0.63	1000.05	5.47	0.69	1000.45	5.67	0.69	1001.41	6.08	0.70	
45.94	291	23549	992.40	998.82	4.34	0.60	999.47	4.81	0.63	999.70	5.59	0.72	1000.12	5.75	0.71	1000.03	7.31	0.91	
45.98	292	23509	992.40	998.90	3.64	0.49	999.73	3.40	0.43	1000.06	3.95	0.48	1000.60	3.60	0.43	1000.94	4.00	0.46	
46.14	293	23349	992.21	998.61	3.84	0.51	999.20	4.36	0.56	1000.21	2.52	0.30	1000.70	2.36	0.27	1001.05	2.64	0.30	

Distance from the Bearspaw Dam (km)	Station in Flood Mapping	Station in HEC-RAS	Channel Thalweg (m)	100-Year Flood Event			200-Year Flood Event			350-Year Flood Event			500-Year Flood Event			1000-Year Flood Event			Notes
				Water Level (m)	Channel Velocity (m/s)	Froude Number	Water Level (m)	Channel Velocity (m/s)	Froude Number	Water Level (m)	Channel Velocity (m/s)	Froude Number	Water Level (m)	Channel Velocity (m/s)	Froude Number	Water Level (m)	Channel Velocity (m/s)	Froude Number	
46.28	294	23212	991.40	997.61	5.44	0.74	998.09	6.06	0.79	998.33	6.81	0.87	998.77	6.99	0.86	999.86	6.09	0.70	
46.50	295	22989	991.68	997.35	3.89	0.54	997.73	4.53	0.60	998.00	5.15	0.67	998.24	5.42	0.69	999.00	5.47	0.66	
46.89	296	22597	990.00	997.06	3.00	0.39	997.50	3.24	0.40	997.80	3.56	0.43	998.13	3.56	0.42	998.94	3.55	0.40	
47.18	297	22312	989.40	996.78	2.92	0.37	997.10	3.42	0.42	997.25	3.99	0.49	997.59	4.05	0.48	998.44	4.14	0.47	
47.31	298	22180	988.60	996.72	2.94	0.36	997.04	3.39	0.41	997.17	3.97	0.48	997.52	4.01	0.47	998.38	4.06	0.45	
47.58	299	21914	988.60	996.03	4.03	0.51	996.89	2.84	0.34	996.95	3.39	0.40	997.33	3.40	0.39	998.27	3.24	0.35	
48.02	300	21473	988.80	995.13	3.91	0.53	995.73	4.31	0.55	996.73	2.48	0.30	997.10	2.53	0.29	997.98	2.97	0.33	
48.29	301	21204	987.60	994.17	4.83	0.64	994.72	5.25	0.67	995.23	5.61	0.68	995.52	5.83	0.70	996.18	6.34	0.72	
48.65	302	20840	988.00	993.31	4.31	0.62	993.83	4.70	0.64	994.36	4.99	0.65	994.60	5.25	0.67	995.20	5.81	0.71	
49.01	303	20486	988.40	992.81	3.07	0.48	993.37	3.35	0.49	993.87	3.70	0.52	994.19	3.76	0.51	994.99	3.78	0.48	
49.38	304	20116	987.43	992.10	3.17	0.49	992.68	3.38	0.49	993.21	3.58	0.49	993.52	3.69	0.49	994.32	3.88	0.49	
49.74	305	19755	986.00	991.38	3.36	0.49	992.01	3.54	0.49	992.60	3.66	0.48	992.96	3.72	0.47	993.82	3.89	0.46	
50.01	306	19480	985.34	990.82	3.39	0.52	991.35	3.77	0.54	991.83	4.11	0.57	992.13	4.29	0.57	992.88	4.65	0.59	
50.26	307	19229	984.40	990.39	2.99	0.51	990.97	3.19	0.50	991.54	3.30	0.49	991.89	3.35	0.48	992.78	3.43	0.45	
50.49	308	19002	984.41	989.89	2.98	0.52	990.54	3.12	0.50	991.16	3.22	0.48	991.54	3.27	0.47	992.47	3.37	0.44	
50.78	309	18716	983.60	989.38	3.11	0.45	990.10	3.24	0.44	990.76	3.35	0.43	991.17	3.40	0.42	992.16	3.51	0.41	
51.14	310	18350	982.00	988.92	3.24	0.43	989.72	3.28	0.41	990.59	2.87	0.34	991.07	2.73	0.31	992.17	2.50	0.27	
51.39	311	18101	982.20	987.83	4.35	0.63	988.39	4.86	0.67	988.99	5.21	0.68	989.36	5.39	0.68	990.21	5.78	0.69	Upstream of Dunbow Road (Highway 2) Bridge
51.47	312	18017	982.05	987.46	4.53	0.67	987.93	5.13	0.72	988.54	5.47	0.73	988.88	5.67	0.73	989.69	6.12	0.74	
51.52	313	17974	982.00	987.24	4.52	0.67	987.62	5.21	0.75	987.82	6.02	0.85	987.99	6.43	0.89	988.54	7.13	0.94	
51.70	314	17788	981.60	986.76	3.17	0.48	987.11	3.46	0.51	987.06	4.30	0.63	987.14	4.62	0.67	987.60	4.59	0.64	
51.96	315	17528	981.60	986.18	2.92	0.47	986.44	3.32	0.52	986.80	2.48	0.37	986.82	2.74	0.41	987.21	2.99	0.43	
52.33	316	17163	979.80	985.02	3.50	0.57	985.39	3.75	0.59	985.72	3.90	0.59	985.96	3.40	0.50	986.33	3.61	0.51	
52.60	317	16891	979.80	984.74	2.29	0.36	985.09	2.52	0.39	985.40	2.73	0.40	985.57	2.86	0.41	985.95	3.00	0.42	
52.91	318	16585	979.40	983.86	3.53	0.60	984.18	3.73	0.60	984.41	4.00	0.63	984.55	4.13	0.64	984.89	4.39	0.65	Pine Creek Confluence
53.42	319	16067	978.00	982.72	3.44	0.57	983.06	3.71	0.59	983.37	3.76	0.57	983.54	3.81	0.57	983.93	3.96	0.57	
53.69	320	15801	977.56	982.22	2.77	0.44	982.56	2.95	0.45	982.88	3.13	0.46	983.07	3.19	0.46	983.50	3.28	0.46	
54.16	321	15337	975.40	981.27	3.12	0.44	981.63	3.25	0.44	981.95	3.38	0.44	982.11	3.52	0.46	982.50	3.82	0.48	
54.35	322	15137	972.80	980.44	4.22	0.58	980.83	4.42	0.59	981.14	4.64	0.60	981.34	4.67	0.59	981.79	4.78	0.59	
54.62	323	14868	973.80	979.87	3.35	0.50	980.28	3.48	0.49	980.64	3.50	0.48	980.88	3.48	0.47	981.35	3.56	0.46	
54.89	324	14601	974.20	979.58	2.29	0.34	980.00	2.39	0.34	980.35	2.51	0.35	980.60	2.54	0.34	981.06	2.72	0.35	
55.15	325	14345	974.20	978.90	3.36	0.53	979.32	3.53	0.53	979.69	3.65	0.53	979.91	3.83	0.54	980.43	3.85	0.52	
55.45	326	14038	973.41	978.24	2.75	0.44	978.73	2.85	0.43	979.14	2.92	0.43	979.37	2.97	0.42	979.94	3.06	0.41	
55.78	327	13712	972.60	977.71	2.60	0.39	978.25	2.64	0.37	978.67	2.78	0.38	978.92	2.85	0.38	979.51	3.00	0.38	
56.17	328	13326	971.80	977.09	2.60	0.41	977.64	2.85	0.42	978.09	2.93	0.41	978.35	2.97	0.41	978.97	3.08	0.40	
56.44	329	13050	971.00	976.71	2.54	0.37	977.25	2.78	0.38	977.72	2.86	0.38	978.00	2.90	0.38	978.65	3.01	0.37	
56.79	330	12701	970.41	976.15	2.64	0.40	976.72	2.75	0.39	977.22	2.84	0.38	977.51	2.90	0.38	978.18	3.03	0.38	
57.17	331	12318	969.57	975.59	2.80	0.38	976.16	3.01	0.39	976.65	3.20	0.40	976.93	3.31	0.40	977.58	3.54	0.41	
57.50	332	11995	968.80	975.20	2.75	0.36	975.75	2.97	0.38	976.23	3.18	0.39	976.50	3.30	0.40	977.14	3.55	0.41	
57.79	333	11701	967.40	974.62	3.43	0.43	975.15	3.70	0.45	975.62	3.92	0.46	975.88	4.04	0.46	976.52	4.29	0.47	
57.97	334	11521	963.60	974.11	3.90	0.46	974.60	4.25	0.49	975.01	4.58	0.51	975.27	4.73	0.52	975.90	5.00	0.53	
58.36	335	11135	965.20	972.90	4.47	0.61	973.49	4.60	0.59	974.05	4.63	0.57	974.37	4.65	0.56	975.09	4.75	0.55	
58.71	336	10780	964.45	972.25	3.21	0.46	972.81	3.47	0.47	973.35	3.68	0.48	973.68	3.77	0.48	974.40	4.00	0.48	
59.02	337	10471	966.00	971.64	2.90	0.48	972.25	3.04	0.47	972.83	3.17	0.46	973.19	3.22	0.45	973.90	3.49	0.46	
59.56	338	9936	963.60	970.95	2.59	0.34	971.61	2.74	0.34	972.24	2.86	0.34	972.63	2.92	0.34	973.35	3.15	0.35	
59.97	339	9519	963.80	969.84	3.68	0.53	970.45	3.98	0.54	970.97	4.35	0.56	971.22	4.72	0.60	971.93	4.93	0.59	
60.38	340	9109	963.60	969.70	1.57	0.23	970.35	1.71	0.23	970.95	1.81	0.23	971.26	1.86	0.23	972.01	1.97	0.23	
60.87	341	8623	962.20	968.53	4.01	0.55	969.05	4.42	0.58	969.48	4.87	0.62	969.73	5.08	0.63	970.35	5.48	0.65	
61.21	342	8278	961.80	967.97	3.05	0.42	968.49	3.32	0.44	968.92	3.60	0.46	969.15	3.77	0.47	969.78	4.08	0.49	
61.56	343	7928	960.60	967.25	3.64	0.48	967.69	4.05	0.51	968.12	4.27	0.52	968.35	4.41	0.53	968.89	4.89	0.57	
61.82	344	7676	959.60	966.32	4.43	0.56	966.75	4.76	0.59	967.17	5.00	0.60	967.44	5.06	0.59	968.06	5.26	0.59	
62.25	345	7246	959.24	965.71	3.12	0.45	966.22	3.14	0.43	966.72	3.17	0.41	967.03	3.15	0.40	967.71	3.23	0.39	
62.56	346	6932	959.80	965.23	2.62	0.38	965.81	2.64	0.36	966.35	2.67	0.35	966.69	2.67	0.34	967.46	2.57	0.31	
62.93	347	6560	957.00	964.81	3.05	0.39	965.43	3.10	0.38	966.00	3.15	0.37	966.33	3.28	0.38	967.11	3.33	0.36	
63.19	348	6300	956.20	964.39	3.77	0.46	965.10	3.71	0.43	965.72	3.71	0.42	966.04	3.88	0.43	966.86	3.87	0.41	
63.45	349	6047	955.60	963.94	3.49	0.44	964.65	3.63	0.43	965.28	3.72	0.42	965.62	3.79	0.42	966.40	4.05	0.43	
63.85	350	5643	957.20	963.44	2.84	0.39	964.12	3.11	0.40	964.76	3.26	0.40	965.09	3.37	0.40	965.83	3.70	0.42	
64.18	351	5308	956.20	962.14	4.40	0.62	962.62	4.94	0.66	963.04	5.44	0.71	963.31	5.65	0.72	963.97	6.02	0.73	
64.68	352	4811	955.80	961.76	1.30	0.18	962.32	1.48	0.19	962.84	1.64	0.21	963.14	1.73	0.21	963.85	1.95	0.23	
65.17	353	4323	954.61	961.39	2.29	0.29	961.92	2.47	0.30	962.42	2.63	0.31	962.71	2.71	0.31	963.40	2.89	0.32	
65.65	354	3840	951.40	960.34	4.03	0.50	960.85	4.28	0.51	961.34	4.46	0.51	961.63	4.56	0.51	962.35	4.72	0.51	
65.93	355	3566	953.20	959.03	4.92	0.71	959.63	5.05	0.69	960.20	5.14	0.67	960.53	5.19	0.66	961.30	5.33	0.64	
66.30	356	3195	952.61	958.77	2.29	0.36	959.39	2.46	0.36	959.98	2.61	0.36	960.32	2.69	0.36	961.11	2.89	0.36	
66.58	357	2910	950.81	958.16	3.40	0.45	958.81	3.56	0.44	959.41	3.71	0.44	959.76	3.80	0.44	960.56	4.00	0.44	
66.92	358	2571	950.40	957.55	3.48	0.45	958.21	3.67	0.45	958.82	3.86	0.45	959.17	3.97	0.45	959.97	4.22	0.46	
67.15	359	2338	949.00	957.30	2.97	0.36	957.96	3.21	0.38	958.56	3.43	0.39	958.90	3.56	0.39	959.70	3.85	0.41	
67.50	360	1991	949.21	956.69	3.47	0.44	957.29	3.80	0.46	957.84	4.09	0.48	958.16	4.25	0.49	958.88	4.63	0.51	
67.96	361	1536	949.00	955.77	3.65	0.48	956.32	3.99	0.50	956.82	4.29	0.52	957.11	4.46	0.53	957.79	4.84	0.55	
68.32	362	1172	948.60	955.03	3.68	0.49	955.54	4.01	0.51	956.02	4.29	0.52	956.30	4.44	0.53	956.97	4.77	0.55	
68.67	363	825	948.60	954.00	4.25	0.60	954.57	4.41	0.59	955.11	4.56	0.58	955.41	4.65	0.58	956.12	4.87	0.58	
69.11	364	386	947.49	953.58	2.38	0.34	954.16	2.58	0.35	954.69	2.76	0.35	955.00	2.86	0.36	955.73	3.09	0.37	
69.49	365	0	945.00	952.69	4.12	0.51	953.26	4.36	0.52	953.79	4.57	0.52	954.09	4.68	0.53	954.80	4.95	0.53	

Table C.2 (a): Simulation Results along the Side Channels of Bow River for 2- to 10-year Flood Events

Side Channel	Station in Flood Mapping	Station in HEC-RAS	Channel Thalweg (m)	2-Year Flood Event			5-Year Flood Event			8-Year Flood Event			10-Year Flood Event			Notes
				Water Level (m)	Channel Velocity (m/s)	Froude Number	Water Level (m)	Channel Velocity (m/s)	Froude Number	Water Level (m)	Channel Velocity (m/s)	Froude Number	Water Level (m)	Channel Velocity (m/s)	Froude Number	
Bowmont Island Side Channel	39	759	1064.20	1066.43	1.81	0.41	1067.12	2.34	0.46	1067.47	2.64	0.49	1067.60	2.78	0.50	
	41	535	1063.80	1065.86	1.89	0.47	1066.54	2.28	0.48	1066.90	2.46	0.48	1067.02	2.57	0.49	
	43	152	1062.60	1065.45	0.82	0.21	1066.33	0.89	0.18	1066.76	0.91	0.17	1066.88	0.95	0.18	
Prince's Island Side Channel	111	979	1042.20	1044.43	0.55	0.13	1045.44	0.47	0.10	1045.95	0.52	0.10	1046.18	0.42	0.08	
	113	930	1042.25	1044.21	0.70	0.18	1044.51	1.16	0.27	1044.68	1.47	0.33	1044.81	1.69	0.37	
	114	884	1042.40	1044.21	0.26	0.08	1044.52	0.40	0.11	1044.71	0.49	0.13	1044.85	0.55	0.14	
	116	724	1042.60	1044.20	0.25	0.07	1044.50	0.40	0.10	1044.68	0.50	0.12	1044.81	0.57	0.13	
	118	635	1042.60	1044.20	0.22	0.06	1044.49	0.35	0.09	1044.67	0.44	0.11	1044.80	0.50	0.12	
	119	573	1042.40	1044.20	0.21	0.06	1044.49	0.34	0.08	1044.67	0.42	0.10	1044.79	0.48	0.11	
	121	482	1042.40	1044.19	0.21	0.06	1044.48	0.35	0.09	1044.66	0.43	0.11	1044.78	0.49	0.12	
	122	470	1042.40	1044.19	0.19	0.05	1044.48	0.32	0.08	1044.66	0.41	0.09	1044.78	0.47	0.10	
	124	417	1042.40	1044.19	0.15	0.04	1044.48	0.25	0.06	1044.65	0.31	0.08	1044.77	0.35	0.08	
	126	371	1042.20	1044.18	0.47	0.12	1044.47	0.52	0.15	1044.63	0.63	0.17	1044.75	0.71	0.19	
	128	354	1040.80	1042.95	0.42	0.14	1043.33	0.56	0.17	1043.73	0.57	0.15	1043.95	0.60	0.15	
	129	312	1041.40	1042.89	0.95	0.36	1043.23	1.21	0.42	1043.66	1.09	0.32	1043.88	1.10	0.30	
	130	304	1041.00	1042.90	0.70	0.28	1043.25	0.88	0.30	1043.67	0.82	0.23	1043.89	0.86	0.22	
	131	201	1041.59	1042.42	1.66	0.99	1043.06	0.85	0.30	1043.59	0.65	0.18	1043.82	0.66	0.17	
St. Patrick's Island (zoo) Side Channel	146	1928	1038.22	1039.67	1.49	0.50	1040.38	1.64	0.42	1040.74	1.77	0.41	1040.90	1.85	0.41	
	146.1	1889	1036.60	1039.64	0.99	0.27	1040.34	1.28	0.30	1040.70	1.43	0.30	1040.86	1.51	0.31	
	146.2	1844	1036.84	1039.58	1.07	0.31	1040.28	1.35	0.31	1040.63	1.49	0.33	1040.80	1.56	0.34	
	150	1740	1036.80	1039.46	1.01	0.23	1040.09	1.50	0.30	1040.41	1.74	0.32	1040.56	1.84	0.33	
	152	1478	1036.87	1039.12	0.84	0.26	1039.69	1.06	0.27	1040.02	1.12	0.26	1040.18	1.15	0.26	
	154	1182	1036.80	1038.22	1.37	0.44	1038.89	1.63	0.41	1039.25	1.77	0.40	1039.43	1.84	0.40	
	155	1132	1036.03	1038.09	1.26	0.39	1038.79	1.48	0.37	1039.16	1.60	0.37	1039.33	1.65	0.37	
	156	1103	1036.00	1037.98	1.47	0.45	1038.62	1.79	0.44	1038.99	1.93	0.43	1039.17	2.00	0.42	
	158	884	1036.20	1037.52	1.21	0.36	1038.28	1.46	0.34	1038.68	1.60	0.34	1038.87	1.67	0.34	
	160	708	1035.62	1036.98	1.62	0.52	1037.94	1.61	0.38	1038.36	1.72	0.37	1038.56	1.79	0.37	
	163	462	1034.00	1036.70	1.11	0.27	1037.66	1.38	0.28	1038.07	1.57	0.29	1038.27	1.67	0.30	
	164	443	1034.20	1036.67	1.24	0.30	1037.62	1.57	0.31	1038.02	1.79	0.33	1038.21	1.90	0.34	
	165	420	1034.00	1036.65	1.15	0.27	1037.60	1.40	0.29	1038.01	1.59	0.30	1038.20	1.68	0.31	
	167	214	1034.60	1036.42	1.08	0.31	1037.35	1.18	0.27	1037.78	1.26	0.26	1037.98	1.29	0.25	

Table C.2 (b): Simulation Results along the Side Channels of Bow River for 20- to 75-year Flood Events

Side Channel	Station in Flood Mapping	Station in HEC-RAS	Channel Thalweg (m)	20-Year Flood Event			35-Year Flood Event			50-Year Flood Event			75-Year Flood Event			Notes
				Water Level (m)	Channel Velocity (m/s)	Froude Number	Water Level (m)	Channel Velocity (m/s)	Froude Number	Water Level (m)	Channel Velocity (m/s)	Froude Number	Water Level (m)	Channel Velocity (m/s)	Froude Number	
Bowmont Island Side Channel	39	759	1064.20	1068.05	3.21	0.55	1068.38	3.53	0.58	1068.58	3.72	0.60	1068.80	3.94	0.62	
	41	535	1063.80	1067.52	2.73	0.48	1067.93	2.82	0.47	1068.16	2.88	0.47	1068.44	2.95	0.46	
	43	152	1062.60	1067.44	1.00	0.17	1067.87	1.04	0.17	1068.12	1.07	0.17	1068.41	1.09	0.17	
Prince's Island Side Channel	111	979	1042.20	1046.83	0.67	0.12	1047.22	0.96	0.16	1047.47	1.17	0.19	1047.75	1.43	0.23	
	113	930	1042.25	1045.35	1.24	0.27	1045.81	1.68	0.33	1046.19	1.49	0.29	1046.67	1.74	0.31	
	114	884	1042.40	1045.32	0.87	0.20	1045.79	1.16	0.24	1046.15	1.36	0.26	1046.63	1.59	0.28	
	116	724	1042.60	1045.24	0.95	0.20	1045.67	1.27	0.24	1046.01	1.49	0.27	1046.47	1.73	0.29	
	118	635	1042.60	1045.21	0.83	0.18	1045.62	1.16	0.23	1045.97	1.32	0.24	1046.43	1.52	0.26	
	119	573	1042.40	1045.20	0.81	0.17	1045.60	1.10	0.21	1045.94	1.30	0.24	1046.40	1.51	0.26	
	121	482	1042.40	1045.17	0.81	0.19	1045.56	1.11	0.24	1045.88	1.32	0.26	1046.33	1.54	0.28	
	122	470	1042.40	1045.16	0.80	0.17	1045.54	1.14	0.22	1045.85	1.39	0.25	1046.27	1.67	0.29	
	124	417	1042.40	1045.16	0.57	0.13	1045.54	0.78	0.16	1045.86	0.93	0.18	1046.29	1.09	0.19	
	126	371	1042.20	1045.13	0.83	0.20	1045.50	1.11	0.24	1045.80	1.29	0.26	1046.23	1.46	0.27	
	128	354	1040.80	1044.70	0.84	0.17	1045.31	1.09	0.20	1045.72	1.27	0.22	1046.16	1.48	0.24	
	129	312	1041.40	1044.61	1.42	0.31	1045.18	1.76	0.34	1045.56	2.05	0.37	1045.98	2.33	0.40	
	130	304	1041.00	1044.62	1.17	0.25	1045.20	1.49	0.28	1045.55	1.77	0.32	1045.98	2.05	0.34	
	131	201	1041.59	1044.56	0.87	0.19	1045.13	1.13	0.21	1045.48	1.35	0.24	1045.89	1.61	0.27	
St. Patrick's Island (Zoo) Side Channel	146	1928	1038.22	1041.38	2.09	0.42	1041.75	2.28	0.43	1041.98	2.39	0.43	1042.27	2.52	0.43	
	146.1	1889	1036.60	1041.35	1.76	0.33	1041.72	1.94	0.34	1041.95	2.05	0.35	1042.25	2.17	0.36	
	146.2	1844	1036.84	1041.29	1.78	0.35	1041.66	1.95	0.36	1041.89	2.05	0.36	1042.19	2.16	0.36	
	150	1740	1036.80	1041.02	2.13	0.36	1041.38	2.33	0.38	1041.61	2.45	0.38	1041.92	2.56	0.39	
	152	1478	1036.87	1040.69	1.22	0.24	1041.08	1.27	0.24	1041.33	1.30	0.23	1041.67	1.31	0.22	
	154	1182	1036.80	1039.98	2.03	0.40	1040.39	2.18	0.40	1040.66	2.25	0.39	1041.04	2.30	0.38	
	155	1132	1036.03	1039.89	1.81	0.36	1040.32	1.91	0.36	1040.61	1.97	0.35	1040.99	2.00	0.34	
	156	1103	1036.00	1039.71	2.22	0.42	1040.13	2.38	0.42	1040.41	2.46	0.42	1040.79	2.53	0.41	
	158	884	1036.20	1039.43	1.90	0.35	1039.85	2.06	0.35	1040.15	2.13	0.35	1040.55	2.17	0.34	
	160	708	1035.62	1039.12	2.03	0.38	1039.54	2.21	0.38	1039.83	2.29	0.38	1040.25	2.36	0.37	
	163	462	1034.00	1038.80	1.98	0.33	1039.20	2.22	0.35	1039.50	2.33	0.35	1039.93	2.42	0.35	
	164	443	1034.20	1038.72	2.28	0.38	1039.10	2.56	0.40	1039.38	2.69	0.41	1039.81	2.80	0.41	
	165	420	1034.00	1038.71	1.99	0.34	1039.10	2.22	0.36	1039.39	2.33	0.36	1039.83	2.40	0.36	
	167	214	1034.60	1038.53	1.38	0.25	1038.94	1.43	0.24	1039.27	1.41	0.23	1039.76	1.35	0.21	

Table C.2 (c): Simulation Results along the Side Channels of Bow River for 100- to 1000-year Flood Events

Side Channel	Station in Flood Mapping	Station in HEC-RAS	Channel Thalweg (m)	100-Year Flood Event			200-Year Flood Event			350-Year Flood Event			500-Year Flood Event			1000-Year Flood Event			Notes
				Water Level (m)	Channel Velocity (m/s)	Froude Number	Water Level (m)	Channel Velocity (m/s)	Froude Number	Water Level (m)	Channel Velocity (m/s)	Froude Number	Water Level (m)	Channel Velocity (m/s)	Froude Number	Water Level (m)	Channel Velocity (m/s)	Froude Number	
Bowmont Island Side Channel	39	759	1064.20	1068.95	4.09	0.63	1069.32	4.43	0.65	1069.62	4.69	0.67	1069.81	4.84	0.68	1070.15	5.14	0.70	
	41	535	1063.80	1068.63	2.99	0.46	1069.10	3.07	0.45	1069.49	3.13	0.44	1069.74	3.17	0.43	1070.18	3.26	0.43	
	43	152	1062.60	1068.61	1.11	0.17	1069.11	1.15	0.16	1069.52	1.18	0.16	1069.77	1.20	0.16	1070.23	1.24	0.16	
Prince's Island Side Channel	111	979	1042.20	1047.93	1.61	0.25	1048.37	1.97	0.29	1048.72	2.19	0.31	1048.92	2.28	0.32	1049.47	2.35	0.31	
	113	930	1042.25	1047.02	1.91	0.32	1047.82	2.20	0.34	1048.42	2.29	0.33	1048.71	2.35	0.33	1049.34	2.42	0.32	
	114	884	1042.40	1046.97	1.75	0.29	1047.76	2.12	0.32	1048.33	2.32	0.33	1048.60	2.44	0.34	1049.21	2.63	0.35	
	116	724	1042.60	1046.82	1.87	0.30	1047.61	2.18	0.32	1048.19	2.37	0.33	1048.46	2.48	0.34	1049.07	2.67	0.34	
	118	635	1042.60	1046.77	1.66	0.27	1047.57	1.92	0.29	1048.15	2.09	0.29	1048.42	2.20	0.30	1049.03	2.37	0.31	
	119	573	1042.40	1046.74	1.64	0.27	1047.53	1.88	0.28	1048.11	2.05	0.29	1048.38	2.16	0.30	1048.99	2.34	0.30	
	121	482	1042.40	1046.66	1.67	0.29	1047.46	1.88	0.30	1048.04	2.01	0.30	1048.31	2.10	0.30	1048.93	2.23	0.30	
	122	470	1042.40	1046.57	1.86	0.31	1047.26	2.24	0.34	1047.78	2.46	0.35	1048.03	2.59	0.36	1048.71	2.71	0.36	
	124	417	1042.40	1046.60	1.19	0.20	1047.31	1.41	0.22	1047.84	1.56	0.23	1048.09	1.66	0.24	1048.77	1.77	0.24	
	126	371	1042.20	1046.53	1.57	0.28	1047.22	1.85	0.30	1047.73	2.04	0.31	1047.97	2.16	0.32	1048.64	2.30	0.32	
	128	354	1040.80	1046.47	1.62	0.25	1047.15	1.94	0.28	1047.65	2.15	0.29	1047.88	2.28	0.31	1048.55	2.42	0.31	
	129	312	1041.40	1046.27	2.50	0.41	1046.94	2.87	0.44	1047.42	3.14	0.45	1047.63	3.33	0.47	1048.31	3.47	0.46	
	130	304	1041.00	1046.27	2.20	0.36	1046.92	2.57	0.38	1047.40	2.82	0.40	1047.61	2.99	0.42	1048.29	3.10	0.41	
	131	201	1041.59	1046.18	1.77	0.29	1046.80	2.14	0.32	1047.26	2.40	0.34	1047.46	2.57	0.36	1048.14	2.70	0.36	
St. Patrick's Island (Zoo) Side Channel	146	1928	1038.22	1042.48	2.59	0.43	1042.95	2.80	0.44	1043.42	2.75	0.41	1043.73	2.74	0.40	1044.37	2.77	0.38	
	146.1	1889	1036.60	1042.45	2.25	0.36	1042.93	2.46	0.37	1043.42	2.32	0.33	1043.74	2.31	0.32	1044.39	2.32	0.30	
	146.2	1844	1036.84	1042.40	2.22	0.37	1042.96	2.14	0.33	1043.41	2.14	0.31	1043.72	2.12	0.30	1044.35	2.13	0.28	
	150	1740	1036.80	1042.13	2.63	0.39	1042.76	2.51	0.35	1043.23	2.50	0.33	1043.55	2.49	0.32	1044.21	2.52	0.31	
	152	1478	1036.87	1041.91	1.32	0.22	1042.60	1.28	0.19	1043.10	1.28	0.18	1043.43	1.27	0.18	1044.11	1.30	0.17	
	154	1182	1036.80	1041.31	2.32	0.37	1042.11	2.28	0.33	1042.65	2.30	0.32	1043.02	2.30	0.31	1043.72	2.35	0.30	
	155	1132	1036.03	1041.27	2.01	0.33	1042.09	1.97	0.29	1042.63	1.99	0.28	1043.00	1.99	0.27	1043.72	2.04	0.26	
	156	1103	1036.00	1041.04	2.57	0.40	1041.74	2.64	0.38	1042.17	2.78	0.39	1042.50	2.82	0.38	1043.20	2.92	0.37	
	158	884	1036.20	1040.82	2.20	0.33	1041.57	2.23	0.31	1042.00	2.36	0.32	1042.34	2.41	0.31	1043.05	2.54	0.31	
	160	708	1035.62	1040.53	2.41	0.37	1041.30	2.46	0.35	1041.72	2.63	0.36	1042.05	2.69	0.35	1042.76	2.86	0.35	
	163	462	1034.00	1040.23	2.45	0.35	1041.06	2.48	0.32	1041.47	2.65	0.34	1041.81	2.71	0.33	1042.53	2.88	0.34	
	164	443	1034.20	1040.10	2.85	0.40	1040.92	2.91	0.38	1041.30	3.16	0.40	1041.64	3.24	0.40	1042.34	3.44	0.40	
	165	420	1034.00	1040.13	2.43	0.35	1040.95	2.48	0.33	1041.31	2.67	0.35	1041.64	2.75	0.35	1042.34	2.92	0.35	
	167	214	1034.60	1040.08	1.32	0.19	1040.94	1.26	0.17	1041.32	1.35	0.18	1041.64	1.37	0.17	1042.37	1.44	0.17	

Table C.3 (a): Simulation Results along the Elbow River for 2- to 10-year Flood Events

Distance from the Glenmore Dam (km)	Station in Flood Mapping	Station in HEC-RAS	Channel Thalweg (m)	2-Year Flood Event			5-Year Flood Event			8-Year Flood Event			10-Year Flood Event			Notes
				Water Level (m)	Channel Velocity (m/s)	Froude Number	Water Level (m)	Channel Velocity (m/s)	Froude Number	Water Level (m)	Channel Velocity (m/s)	Froude Number	Water Level (m)	Channel Velocity (m/s)	Froude Number	
0.07	366	11343	1056.08	1058.25	0.52	0.15	1059.13	0.63	0.15	1059.65	0.67	0.14	1059.91	0.70	0.14	Downstream of Glenmore Dam
0.11	367	11303	1056.12	1058.24	0.54	0.15	1059.11	0.74	0.16	1059.63	0.84	0.16	1059.88	0.89	0.17	
0.15	368	11267	1056.48	1058.20	0.83	0.28	1059.07	0.96	0.23	1059.59	1.05	0.22	1059.85	1.10	0.22	
0.18	369	11241	1056.74	1058.12	1.20	0.45	1059.03	1.14	0.30	1059.56	1.18	0.27	1059.81	1.22	0.26	
0.21	370	11204	1056.69	1058.01	1.25	0.41	1058.94	1.35	0.34	1059.47	1.42	0.31	1059.72	1.48	0.31	
0.26	371	11153	1055.55	1057.95	1.01	0.26	1058.84	1.42	0.29	1059.35	1.65	0.31	1059.59	1.77	0.32	
0.32	372	11099	1055.94	1057.80	1.37	0.40	1058.69	1.73	0.40	1059.19	1.91	0.41	1059.42	2.01	0.41	
0.37	373	11048	1055.80	1057.61	1.65	0.46	1058.43	2.22	0.51	1058.87	2.49	0.54	1059.09	2.62	0.54	
0.43	374	10989	1055.50	1057.47	1.61	0.46	1058.27	2.11	0.50	1058.70	2.37	0.51	1058.92	2.50	0.51	
0.47	375	10947	1055.49	1057.35	1.59	0.50	1058.17	1.85	0.47	1058.63	2.02	0.45	1058.87	2.10	0.45	
0.53	376	10889	1054.93	1057.31	1.04	0.27	1058.10	1.50	0.32	1058.56	1.72	0.33	1058.80	1.82	0.34	
0.57	377	10844	1055.17	1057.28	0.92	0.25	1058.07	1.30	0.28	1058.53	1.50	0.30	1058.77	1.59	0.30	
0.62	378	10797	1055.62	1057.19	1.17	0.34	1057.97	1.55	0.35	1058.43	1.74	0.36	1058.67	1.83	0.36	
0.66	379	10757	1055.68	1057.07	1.41	0.46	1057.89	1.63	0.40	1058.36	1.77	0.39	1058.60	1.85	0.38	
0.71	380	10705	1055.56	1056.99	1.18	0.34	1057.81	1.55	0.35	1058.29	1.75	0.35	1058.53	1.86	0.36	
0.76	381	10657	1055.43	1056.88	1.28	0.41	1057.75	1.54	0.36	1058.23	1.71	0.36	1058.47	1.80	0.36	
0.81	382	10611	1054.99	1056.84	1.06	0.28	1057.70	1.48	0.31	1058.17	1.71	0.33	1058.41	1.83	0.34	
0.88	383	10542	1054.48	1056.77	1.11	0.28	1057.62	1.57	0.32	1058.09	1.83	0.34	1058.32	1.97	0.35	
0.92	384	10500	1054.68	1056.70	1.29	0.36	1057.53	1.75	0.39	1057.98	2.02	0.41	1058.21	2.16	0.41	
0.99	385	10427	1054.72	1056.58	1.30	0.36	1057.40	1.77	0.40	1057.85	2.04	0.41	1058.07	2.18	0.42	
1.04	386	10382	1054.81	1056.48	1.37	0.39	1057.30	1.85	0.41	1057.74	2.14	0.43	1057.96	2.28	0.44	
1.11	387	10307	1054.25	1056.36	1.33	0.35	1057.16	1.82	0.41	1057.61	2.02	0.41	1057.85	2.10	0.41	
1.16	388	10253	1054.62	1056.19	1.68	0.48	1056.86	2.43	0.58	1057.27	2.71	0.63	1057.48	2.82	0.64	
1.22	389	10194	1054.55	1055.97	1.66	0.58	1056.71	1.85	0.50	1057.16	1.97	0.46	1057.40	2.04	0.45	
1.27	390	10149	1054.24	1055.88	1.18	0.37	1056.65	1.52	0.36	1057.10	1.70	0.36	1057.34	1.79	0.36	
1.33	391	10091	1053.73	1055.81	1.03	0.29	1056.57	1.46	0.33	1057.02	1.67	0.34	1057.25	1.76	0.35	
1.40	392	10013	1054.21	1055.60	1.53	0.53	1056.41	1.62	0.43	1056.88	1.73	0.40	1057.13	1.78	0.38	
1.50	393	9916	1052.96	1055.53	0.95	0.23	1056.30	1.46	0.30	1056.75	1.72	0.33	1056.99	1.85	0.34	
1.54	394	9873	1053.08	1055.51	0.96	0.24	1056.26	1.45	0.31	1056.71	1.69	0.33	1056.95	1.80	0.34	
1.63	395	9791	1053.86	1055.35	1.44	0.47	1056.08	1.81	0.45	1056.54	1.98	0.44	1056.78	2.06	0.44	
1.71	396	9707	1053.69	1055.13	1.33	0.45	1055.96	1.53	0.38	1056.45	1.67	0.36	1056.70	1.74	0.36	
1.80	397	9618	1052.76	1054.92	1.32	0.40	1055.83	1.53	0.36	1056.33	1.67	0.35	1056.58	1.75	0.35	
1.88	398	9540	1052.21	1054.87	0.98	0.24	1055.75	1.43	0.29	1056.24	1.67	0.31	1056.49	1.78	0.32	
1.93	399	9484	1053.01	1054.75	1.40	0.40	1055.62	1.77	0.42	1056.11	1.95	0.42	1056.36	2.04	0.41	
1.96	400	9462	1052.84	1054.75	1.08	0.29	1055.62	1.49	0.32	1056.11	1.70	0.34	1056.36	1.81	0.34	
1.98	401	9442	1052.58	1054.73	1.11	0.29	1055.59	1.52	0.33	1056.08	1.73	0.36	1056.33	1.82	0.36	
1.99	402	9426	1052.84	1054.69	1.20	0.33	1055.55	1.59	0.36	1056.03	1.80	0.37	1056.28	1.90	0.37	
2.04	403	9375	1052.48	1054.63	1.14	0.32	1055.47	1.50	0.34	1055.96	1.68	0.35	1056.20	1.76	0.36	
2.09	404	9323	1052.61	1054.52	1.31	0.38	1055.34	1.75	0.40	1055.80	1.97	0.42	1056.04	2.07	0.43	
2.12	405	9294	1052.66	1054.47	1.24	0.36	1055.30	1.61	0.38	1055.76	1.81	0.38	1056.00	1.91	0.39	
2.15	406	9263	1052.63	1054.43	1.16	0.33	1055.25	1.54	0.35	1055.72	1.75	0.36	1055.95	1.85	0.37	
2.20	407	9221	1052.67	1054.34	1.31	0.40	1055.17	1.67	0.39	1055.63	1.87	0.40	1055.87	1.97	0.40	
2.27	408	9147	1052.53	1054.22	1.25	0.38	1055.06	1.56	0.37	1055.54	1.74	0.37	1055.78	1.84	0.37	
2.33	409	9083	1052.21	1054.17	0.95	0.26	1055.02	1.29	0.28	1055.50	1.48	0.29	1055.74	1.57	0.30	
2.39	410	9031	1052.08	1054.12	1.02	0.28	1054.96	1.39	0.30	1055.43	1.60	0.32	1055.66	1.70	0.32	
2.46	411	8957	1052.40	1054.00	1.07	0.35	1054.88	1.25	0.30	1055.36	1.38	0.29	1055.61	1.44	0.29	
2.52	412	8899	1052.40	1053.91	1.01	0.30	1054.80	1.24	0.29	1055.29	1.38	0.29	1055.54	1.45	0.29	
2.56	413	8854	1052.19	1053.86	1.01	0.28	1054.74	1.36	0.30	1055.21	1.55	0.31	1055.45	1.65	0.32	Upstream of Sandy Beach Pedestrian Bridge
2.57	414	8850	1052.16	1053.85	1.03	0.28	1054.73	1.39	0.31	1055.20	1.59	0.32	1055.44	1.69	0.33	
2.67	415	8745	1051.53	1053.81	0.79	0.18	1054.68	1.15	0.22	1055.15	1.35	0.24	1055.38	1.45	0.25	
2.72	416	8696	1051.22	1053.78	0.86	0.21	1054.63	1.27	0.26	1055.08	1.51	0.29	1055.31	1.63	0.30	
2.82	417	8601	1051.57	1053.65	1.07	0.29	1054.44	1.49	0.34	1054.87	1.70	0.36	1055.09	1.80	0.36	
2.88	418	8535	1051.74	1053.51	1.09	0.31	1054.26	1.51	0.34	1054.68	1.76	0.36	1054.89	1.87	0.37	
2.93	419	8486	1051.59	1053.34	1.34	0.40	1054.10	1.73	0.41	1054.53	1.92	0.41	1054.75	2.01	0.41	
2.99	420	8423	1051.68	1053.19	1.33	0.38	1053.95	1.75	0.40	1054.38	1.94	0.40	1054.61	2.03	0.40	
3.09	422	8326	1051.35	1052.99	1.34	0.38	1053.76	1.75	0.39	1054.19	1.97	0.40	1054.42	2.07	0.40	
3.17	423	8251	1051.22	1052.91	1.08	0.32	1053.68	1.43	0.33	1054.12	1.63	0.34	1054.36	1.72	0.34	
3.20	425	8217	1051.15	1052.83	1.26	0.37	1053.59	1.67	0.39	1054.03	1.89	0.40	1054.25	1.99	0.41	
3.24	426	8181	1051.14	1052.78	1.27	0.34	1053.52	1.80	0.39	1053.94	2.07	0.41	1054.16	2.20	0.42	
3.30	427	8121	1050.96	1052.71	1.19	0.34	1053.44	1.65	0.38	1053.87	1.90	0.40	1054.09	2.01	0.40	
3.35	429	8068	1050.89	1052.62	1.24	0.37	1053.36	1.67	0.40	1053.78	1.88	0.41	1054.01	1.98	0.41	
3.39	430	8023	1050.80	1052.55	1.20	0.37	1053.30	1.55	0.38	1053.73	1.74	0.38	1053.96	1.82	0.38	
3.43	431	7985	1050.77	1052.49	1.21	0.35	1053.21	1.67	0.39	1053.65	1.87	0.39	1053.89	1.95	0.39	
3.50	433	7916	1050.78	1052.36	1.31	0.39	1053.08	1.72	0.41	1053.54	1.83	0.39	1053.79	1.87	0.38	
3.57	434	7849	1051.07	1052.21	1.31	0.43	1052.96	1.57	0.39	1053.45	1.68	0.37	1053.70	1.74	0.36	
3.60	436	7813	1050.33	1052.04	1.59	0.59	1052.88	1.62	0.42	1053.39	1.70	0.39	1053.65	1.74	0.37	
3.67	437	7746	1049.81	1051.96	1.08	0.27	1052.79	1.55	0.32	1053.28	1.80	0.34	1053.54	1.91	0.34	
3.71	438	7710	1050.26	1051.87	1.39	0.39	1052.69	1.84	0.41	1053.18	2.06	0.41	1053.44	2.15	0.41	
3.76	439	7658	1050.12	1051.74	1.46	0.45	1052.60	1.75	0.41	1053.11	1.92	0.40	1053.36	2.02	0.40	
3.80	440	7614	1049.95	1051.61	1.53	0.45	1052.47	1.95	0.44	1052.97	2.19	0.44	1053.22	2.30	0.44	
3.81	441	7605	1049.73	1051.60	1.44	0.41	1052.46	1.89	0.42	1052.96	2.13	0.42	1053.21	2.24	0.42	Upstream of Riverdale Ave Pedestrian Bridge
3.82	442	7596	1049.57	1051.59	1.35	0.37	1052.46	1.81	0.39	1052.96	2.00	0.39	1053.23	2.08	0.38	
3.84	444	7577	1049.19	1051.57	1.21	0.31	1052.45	1.65	0.34	1052.97	1.81	0.33	1053.24	1.89	0.33	
3.90	445	7518	1049.12	1051.49	1.30	0.34	1052.35	1.79	0.37	1052.87	1.97	0.37	1053.12	2.08	0.37	
3.94	446	7480	1049.16	1051.46	1.17	0.30	1052.32	1.66	0.35	1052.82	1.90	0.36	1053.07	2.03	0.37	
3.99	447	7426	1049.41	1051.39	1.23	0.34	1052.26	1.61	0.35	1052.78	1.80	0.35	1053.04	1.86	0.35	
4.03	448	7390	1049.33	1051.36	1.08	0.31	1052.24	1.39	0.32	1052.77	1.53	0.31	1053.03	1.61	0.31	
4.07	449	7345	1049.68	1051.26	1.31	0.42	1052.19	1.47	0.34	1052.73	1.53	0.31	1053.00	1.57	0.30	
4.10	450	7321	1049.75	1051.20	1.40	0.45	1052.14	1.58	0.37	1052.68	1.69	0.35	1052.95	1.74	0.34	
4.14	451	7282	1049.02	1051.14	1.13	0.33	1052.11	1.35	0.29	1052.66	1.49	0.29	1052.92	1.57	0.29	
4.18	452	7238	1049.21	1051.06	1.14	0.32	1052.05	1.40	0.29	1052.60	1.57	0.30	1052.87	1.64	0.30	
4.20	453	7221	1049.15	1051.05	1.04	0.28	1052.05	1.33	0.27	1052.59	1.50	0.28	1052.86	1.59	0.28	Upstream of Elbow Drive (Elboya) Bridge
4.22	454	7195	1049.11	1051.02	1.12	0.29	1052.01	1.43	0.29	1052.55	1.61	0.29	1052.82	1.70	0.30	
4.24	455	7181	1048.99	1050.97	1.32	0.34	1051.96	1.67	0.34	1052.49	1.90	0.35	1052.74	2.04	0.36	
4.27	456	7146	1049.02	1050.94	1.24	0.32	1051.92	1.61	0.32	1052.45	1.83	0.33	1052.71	1.96	0.34	
4.31	457	7104	1048.74	1050.90	1.13	0.28	1051.89	1.54	0.30	1052.42	1.78	0.32	1052.67	1.94	0.34	
4.35	458	7063	1048.55	1050.87	1.15	0.27	1051.84	1.61	0.31	1052.38	1.84	0.32	1052.63	1.96	0.33	
4.41	459	7012	1048.51	1050.82	1.20	0.28	1051.80	1.63	0.31	1052.33	1.89	0.33	1052.60	1.93	0.32	
4.43	460	6985	1048.57	1050.79	1.27	0.30	1051.78	1.64	0.32	1052.31	1.89	0.33	1052.58	1.92	0.32	
4.48	461	6935	1048.31	1050.74	1.27	0.31	1051.74	1.62	0.31	1052.28	1.76	0.31	1052.55	1.83	0.31	
4.54	462	6881	1048.31	1050.68	1.17	0.28	1051.66	1.65	0.32	1052.20	1.83	0.32	1052.49	1.81	0.31	

Distance from the Glenmore Dam (km)	Station in Flood Mapping	Station in HEC-RAS	Channel Thalweg (m)	2-Year Flood Event			5-Year Flood Event			8-Year Flood Event			10-Year Flood Event			Notes
				Water Level (m)	Channel Velocity (m/s)	Froude Number	Water Level (m)	Channel Velocity (m/s)	Froude Number	Water Level (m)	Channel Velocity (m/s)	Froude Number	Water Level (m)	Channel Velocity (m/s)	Froude Number	
4.58	463	6837	1048.42	1050.59	1.44	0.38	1051.57	1.85	0.38	1052.11	2.02	0.37	1052.39	2.08	0.37	
4.62	464	6800	1048.15	1050.56	1.27	0.31	1051.54	1.74	0.34	1052.07	1.97	0.35	1052.35	2.03	0.35	
4.67	465	6748	1048.09	1050.50	1.21	0.29	1051.49	1.65	0.32	1052.02	1.88	0.33	1052.30	1.98	0.34	
4.71	466	6710	1047.97	1050.49	0.94	0.23	1051.48	1.33	0.25	1052.02	1.54	0.27	1052.30	1.64	0.28	
4.82	467	6602	1048.63	1050.35	1.25	0.34	1051.36	1.56	0.32	1051.89	1.76	0.33	1052.17	1.83	0.33	
4.86	468	6557	1048.31	1050.31	1.13	0.29	1051.32	1.49	0.30	1051.86	1.70	0.31	1052.14	1.77	0.31	
4.90	469	6521	1047.64	1050.28	1.10	0.28	1051.29	1.48	0.29	1051.81	1.71	0.31	1052.10	1.77	0.31	
4.92	470	6498	1047.47	1050.25	1.14	0.27	1051.25	1.58	0.30	1051.77	1.84	0.32	1052.06	1.93	0.32	
4.95	471	6470	1047.12	1050.22	1.24	0.26	1051.18	1.87	0.33	1051.70	2.13	0.35	1051.98	2.23	0.35	
4.99	472	6427	1046.63	1050.20	1.16	0.24	1051.14	1.85	0.32	1051.63	2.17	0.36	1051.91	2.30	0.36	
5.04	473	6381	1046.55	1050.17	1.16	0.24	1051.10	1.79	0.33	1051.58	2.16	0.37	1051.83	2.33	0.38	
5.08	474	6339	1047.06	1050.15	1.05	0.24	1051.08	1.55	0.30	1051.57	1.84	0.33	1051.83	1.98	0.34	
5.13	475	6287	1048.06	1050.06	1.36	0.39	1050.99	1.71	0.37	1051.48	1.95	0.38	1051.75	2.06	0.38	
5.19	476	6230	1047.37	1050.03	1.05	0.24	1050.95	1.56	0.30	1051.44	1.85	0.32	1051.70	1.98	0.34	
5.24	477	6181	1047.17	1050.02	0.84	0.17	1050.95	1.34	0.23	1051.43	1.62	0.26	1051.70	1.75	0.27	
5.31	478	6112	1047.50	1049.99	0.95	0.22	1050.90	1.44	0.27	1051.37	1.72	0.30	1051.63	1.85	0.31	
5.38	479	6034	1047.34	1049.97	0.76	0.16	1050.88	1.18	0.22	1051.35	1.42	0.24	1051.62	1.53	0.25	
5.46	480	5953	1048.09	1049.88	1.22	0.34	1050.78	1.52	0.33	1051.26	1.69	0.33	1051.53	1.76	0.33	
5.53	481	5887	1048.22	1049.76	1.25	0.40	1050.72	1.40	0.32	1051.20	1.55	0.32	1051.48	1.61	0.31	
5.63	482	5785	1047.84	1049.66	0.80	0.22	1050.64	0.91	0.22	1051.14	1.00	0.21	1051.43	1.03	0.20	
5.71	483	5709	1047.24	1049.63	0.72	0.17	1050.57	1.05	0.20	1051.06	1.25	0.22	1051.34	1.33	0.23	
5.76	484	5658	1046.72	1049.62	0.71	0.15	1050.55	1.12	0.20	1051.03	1.36	0.22	1051.30	1.45	0.23	
5.84	485	5582	1046.70	1049.60	0.78	0.16	1050.51	1.23	0.22	1050.97	1.53	0.25	1051.24	1.64	0.26	
5.90	486	5513	1047.01	1049.58	0.78	0.17	1050.49	1.19	0.22	1050.94	1.44	0.25	1051.21	1.54	0.25	Upstream of Rideau Park Pedestrian Bridge
5.92	487	5495	1047.44	1049.56	0.89	0.21	1050.46	1.32	0.25	1050.91	1.57	0.28	1051.18	1.68	0.29	
5.99	488	5428	1047.37	1049.51	1.02	0.25	1050.40	1.43	0.29	1050.84	1.66	0.31	1051.11	1.74	0.32	
6.03	489	5392	1047.64	1049.48	1.04	0.28	1050.37	1.41	0.30	1050.82	1.62	0.31	1051.09	1.70	0.31	
6.08	490	5337	1047.35	1049.44	1.04	0.27	1050.33	1.35	0.29	1050.77	1.55	0.30	1051.05	1.62	0.30	
6.11	491	5303	1047.45	1049.40	1.05	0.28	1050.30	1.34	0.29	1050.75	1.53	0.30	1051.02	1.60	0.30	
6.16	493	5259	1047.02	1049.36	0.96	0.29	1050.27	1.15	0.27	1050.73	1.30	0.27	1051.01	1.34	0.27	
6.20	494	5216	1047.68	1049.28	1.16	0.40	1050.23	1.17	0.29	1050.69	1.27	0.28	1050.98	1.29	0.27	
6.25	496	5172	1047.55	1049.15	1.32	0.42	1050.14	1.32	0.36	1050.62	1.34	0.33	1050.92	1.29	0.30	
6.29	498	5124	1046.55	1049.09	1.04	0.28	1050.00	1.23	0.31	1050.48	1.28	0.30	1050.79	1.23	0.31	
6.34	500	5073	1047.13	1049.01	1.07	0.31	1049.83	1.27	0.34	1050.33	1.26	0.33	1050.62	1.21	0.30	
6.39	502	5032	1047.14	1048.92	1.10	0.35	1049.71	1.30	0.33	1050.18	1.38	0.34	1050.47	1.35	0.33	
6.43	503	4984	1046.97	1048.79	1.20	0.37	1049.58	1.44	0.36	1050.02	1.57	0.36	1050.29	1.57	0.36	
6.49	504	4931	1046.72	1048.68	1.15	0.35	1049.46	1.39	0.35	1049.91	1.51	0.34	1050.16	1.55	0.33	
6.54	506	4877	1046.46	1048.59	1.03	0.32	1049.36	1.22	0.32	1049.82	1.25	0.30	1050.09	1.25	0.28	
6.59	507	4830	1046.20	1048.52	1.00	0.28	1049.25	1.33	0.33	1049.70	1.44	0.33	1049.96	1.45	0.35	
6.62	508	4795	1046.03	1048.47	0.88	0.28	1049.19	1.11	0.28	1049.65	1.21	0.27	1049.91	1.25	0.26	Upstream of Mission (4 St SW)Bridge
6.65	509	4768	1046.47	1048.43	1.03	0.31	1049.13	1.30	0.35	1049.58	1.38	0.32	1049.83	1.42	0.31	
6.67	509.1	4747	1047.03	1048.26	1.61	0.63	1048.98	1.59	0.45	1049.48	1.57	0.38	1049.74	1.58	0.35	New Cross Section
6.71	511	4708	1046.68	1048.01	1.38	0.46	1048.83	1.59	0.40	1049.34	1.68	0.38	1049.61	1.71	0.37	
6.77	513	4652	1046.16	1047.91	1.19	0.33	1048.72	1.61	0.37	1049.21	1.81	0.38	1049.46	1.89	0.39	
6.84	514	4573	1046.10	1047.82	1.14	0.31	1048.61	1.62	0.36	1049.08	1.85	0.38	1049.31	1.96	0.39	
6.90	516	4520	1046.26	1047.76	1.15	0.33	1048.55	1.55	0.35	1049.02	1.75	0.36	1049.25	1.86	0.37	
6.94	517	4473	1046.37	1047.61	1.51	0.55	1048.48	1.54	0.40	1048.96	1.63	0.38	1049.19	1.68	0.37	
7.00	519	4417	1046.06	1047.46	1.39	0.41	1048.35	1.73	0.39	1048.81	1.98	0.40	1049.02	2.10	0.41	
7.05	522	4365	1045.55	1047.39	1.31	0.34	1048.26	1.81	0.39	1048.69	2.12	0.41	1048.90	2.28	0.43	
7.09	525	4323	1045.26	1047.37	1.02	0.26	1048.25	1.47	0.30	1048.69	1.75	0.33	1048.90	1.90	0.34	
7.14	527	4281	1045.24	1047.32	1.16	0.31	1048.19	1.58	0.35	1048.63	1.84	0.37	1048.83	1.98	0.38	
7.19	529	4223	1044.96	1047.17	1.56	0.44	1048.00	2.05	0.47	1048.39	2.38	0.50	1048.57	2.58	0.52	
7.25	531	4168	1044.95	1047.02	1.59	0.49	1047.88	1.95	0.45	1048.28	2.24	0.47	1048.44	2.43	0.49	
7.32	538	4098	1043.99	1046.94	1.20	0.31	1047.83	1.52	0.32	1048.25	1.74	0.34	1048.42	1.88	0.35	
7.33	539	4083	1044.00	1046.92	1.17	0.31	1047.82	1.48	0.31	1048.24	1.71	0.33	1048.41	1.84	0.34	
7.36	540	4052	1044.88	1046.91	1.07	0.31	1047.81	1.34	0.30	1048.23	1.56	0.31	1048.40	1.69	0.33	Upstream of 25th Ave Bridge
7.38	541	4034	1044.97	1046.91	0.87	0.23	1047.81	1.18	0.24	1048.23	1.40	0.27	1048.40	1.53	0.28	
7.43	542	3989	1045.36	1046.80	1.35	0.41	1047.71	1.60	0.36	1048.12	1.82	0.37	1048.28	1.96	0.39	
7.49	543	3931	1044.62	1046.77	0.97	0.24	1047.67	1.41	0.28	1048.06	1.72	0.32	1048.21	1.90	0.35	
7.53	544	3889	1044.08	1046.75	0.93	0.21	1047.63	1.45	0.27	1048.01	1.78	0.31	1048.15	1.98	0.34	
7.55	545	3869	1043.86	1046.75	0.88	0.19	1047.62	1.41	0.26	1048.00	1.74	0.30	1048.14	1.93	0.33	
7.57	546	3851	1043.71	1046.74	0.92	0.20	1047.60	1.48	0.27	1047.97	1.83	0.32	1048.09	2.04	0.35	
7.58	547	3834	1043.73	1046.73	0.98	0.21	1047.58	1.55	0.29	1047.92	1.93	0.35	1048.04	2.17	0.38	
7.61	548	3809	1043.94	1046.72	0.92	0.20	1047.56	1.49	0.27	1047.91	1.87	0.33	1048.02	2.10	0.36	
7.64	549	3777	1043.88	1046.71	0.90	0.20	1047.55	1.42	0.27	1047.89	1.79	0.32	1048.00	2.01	0.35	
7.68	550	3738	1044.07	1046.69	0.88	0.23	1047.54	1.25	0.26	1047.89	1.51	0.29	1048.00	1.67	0.32	
7.75	556	3671	1045.11	1046.61	1.07	0.34	1047.49	1.25	0.29	1047.83	1.47	0.31	1047.94	1.61	0.34	
7.81	557	3610	1044.64	1046.53	1.17	0.30	1047.42	1.47	0.30	1047.78	1.64	0.31	1047.88	1.77	0.33	
7.85	558	3568	1044.11	1046.52	0.96	0.23	1047.41	1.29	0.25	1047.74	1.58	0.29	1047.87	1.54	0.28	
7.92	559	3498	1043.14	1046.45	1.15	0.24	1047.24	1.87	0.34	1047.59	2.06	0.35	1047.68	2.23	0.38	Upstream of 21 Ave (Lindsay Park) Pedestrian Bridge
7.94	560	3478	1044.64	1046.06	2.80	0.99	1046.65	3.64	0.98	1047.37	2.80	0.61	1047.45	2.95	0.63	
7.96	561	3455	1043.34	1045.46	1.77	0.47	1046.16	2.55	0.56	1046.55	2.97	0.60	1046.74	3.17	0.62	
7.98	562	3438	1043.59	1045.42	1.71	0.48	1046.13	2.38	0.54	1046.53	2.73	0.56	1046.73	2.90	0.58	
8.03	563	3386	1043.74	1045.31	1.55	0.44	1046.03	2.14	0.49	1046.44	2.45	0.51	1046.64	2.60	0.52	
8.07	564	3346	1043.69	1045.20	1.69	0.48	1045.88	2.36	0.54	1046.29	2.68	0.56	1046.50	2.79	0.56	
8.12	565	3297	1043.42	1045.07	1.64	0.47	1045.77	2.22	0.51	1046.20	2.45	0.51	1046.43	2.54	0.51	
8.15	566	3271	1043.37	1045.04	1.48	0.42	1045.76	1.97	0.45	1046.19	2.20	0.45	1046.42	2.30	0.45	
8.17	567	3251	1043.19	1045.03	1.20	0.33	1045.77	1.61	0.35	1046.22	1.81	0.36	1046.45	1.90	0.36	Upstream of Lindsay Park CNR Bridge
8.18	568	3236	1043.03	1044.93	1.40	0.38	1045.63	1.89	0.42	1046.07	2.05	0.41	1046.30	2.12	0.41	
8.19	569	3224	1042.73	1044.92	1.21	0.32	1045.62	1.69	0.37	1046.06	1.87	0.37	1046.29	1.95	0.37	
8.23	570	3188	1043.05	1044.85	1.33	0.41	1045.55	1.76	0.42	1045.99	1.96	0.42	1046.22	2.04	0.42	
8.27	571	3146	1043.08	1044.38	2.67	0.97	1045.13	2.91	0.75	1045.58	3.07	0.70	1045.81	3.15	0.68	
8.34	572	3073	1042.33	1044.11	1.87	0.53	1044.88	2.56	0.57	1045.33	2.89	0.59	1045.56	3.05	0.59	
8.39	573	3027	1042.42	1044.01	1.70	0.46	1044.80	2.33	0.51	1045.25	2.65	0.52	1045.50	2.77	0.52	
8.44	574	2982	1041.83	1043.94	1.51	0.40	1044.73	2.10	0.45	1045.21	2.36	0.46	1045.47	2.40	0.45	
8.45	575	2966	1041.42	1043.97	0.93	0.21	1044.79	1.44	0.27	1045.27	1.71	0.30	1045.53	1.83	0.31	Upstream of Pattison (1 St) Bridge
8.48	576	2939	1039.58	1043.97	0.62	0.12	1044.79	1.03	0.18	1045.27	1.25	0.20	1045.52	1.35	0.21	
8.51	577	2911	1042.16	1043.71	1.92	0.60	1044.40	2.50	0.60	1044.87	2.65	0.57	1045.13	2.69	0.54	
8.54	578	2882	1042.16	1043.53	2.13	0.66	1044.18	2.81	0.69	1044.62	3.06	0.67	1044.86	3.17	0.66	
8.58	579	2840	1042.02	1043.30	2.05	0.67	1044.06	2.45	0.60	1044.57	2.53	0.54	1044.84	2.56	0.52	
8.62	580	2802	1041.31	1043.20	1.63	0.50	1044.01	2.03	0.47	1044.54	2.18	0.45	1044.81	2.26	0.44	
8.65	581	2766	1041.62	1043.00	1.93	0.65	1043.92	2.04	0.48	1044.47	2.15	0.45	1044.75	2.22	0.44	

Distance from the Glenmore Dam (km)	Station in Flood Mapping	Station in HEC-RAS	Channel Thalweg (m)	2-Year Flood Event			5-Year Flood Event			8-Year Flood Event			10-Year Flood Event			Notes
				Water Level (m)	Channel Velocity (m/s)	Froude Number	Water Level (m)	Channel Velocity (m/s)	Froude Number	Water Level (m)	Channel Velocity (m/s)	Froude Number	Water Level (m)	Channel Velocity (m/s)	Froude Number	
8.68	582	2742	1041.70	1043.01	1.18	0.38	1043.98	1.31	0.30	1044.54	1.39	0.28	1044.82	1.43	0.27	Upstream of Victoria (Macleod Trail) Bridge
8.72	583	2699	1041.50	1042.90	1.10	0.32	1043.90	1.25	0.27	1044.47	1.34	0.26	1044.76	1.40	0.26	Upstream of LRT Bridge
8.76	584	2656	1041.14	1042.85	1.00	0.29	1043.85	1.16	0.25	1044.42	1.25	0.24	1044.70	1.30	0.23	
8.78	585	2636	1041.04	1042.69	1.72	0.45	1043.65	2.08	0.43	1044.20	2.24	0.41	1044.48	2.30	0.41	
8.81	587	2608	1040.65	1042.64	1.56	0.40	1043.56	2.10	0.44	1044.08	2.38	0.45	1044.33	2.52	0.45	
8.83	588	2588	1040.52	1042.66	1.20	0.29	1043.59	1.73	0.34	1044.10	2.02	0.36	1044.36	2.16	0.37	
8.88	593	2536	1040.20	1042.59	1.21	0.30	1043.51	1.69	0.34	1044.03	1.95	0.36	1044.28	2.08	0.37	
8.93	594	2483	1040.23	1042.47	1.54	0.38	1043.31	2.22	0.48	1043.79	2.52	0.51	1044.04	2.65	0.51	
8.95	595	2469	1040.28	1042.45	1.47	0.39	1043.31	2.00	0.43	1043.82	2.23	0.43	1044.07	2.34	0.43	Upstream of Stampede Park (25 Ave/3 ST) Access Bridge
8.97	596	2443	1039.10	1042.43	1.11	0.26	1043.29	1.64	0.32	1043.79	1.92	0.34	1044.04	2.06	0.35	
8.99	597	2424	1039.32	1042.42	1.10	0.24	1043.25	1.76	0.32	1043.72	2.13	0.36	1043.96	2.31	0.38	
9.03	598	2387	1039.20	1042.43	0.75	0.15	1043.28	1.25	0.22	1043.77	1.52	0.25	1044.02	1.66	0.26	
9.09	599	2332	1040.41	1042.31	1.51	0.45	1043.12	1.94	0.45	1043.59	2.17	0.45	1043.84	2.28	0.45	
9.15	601	2272	1040.16	1042.12	1.71	0.47	1042.94	2.21	0.49	1043.41	2.46	0.50	1043.67	2.55	0.49	
9.21	602	2212	1039.99	1041.78	2.16	0.69	1042.73	2.32	0.55	1043.28	2.33	0.49	1043.55	2.35	0.47	
9.27	603	2146	1039.70	1041.69	1.44	0.37	1042.63	1.92	0.40	1043.17	2.16	0.41	1043.43	2.28	0.42	
9.33	605	2090	1039.54	1041.66	1.07	0.27	1042.63	1.45	0.29	1043.17	1.66	0.30	1043.44	1.77	0.31	
9.37	606	2048	1038.54	1041.61	1.18	0.27	1042.55	1.70	0.32	1043.07	1.97	0.34	1043.33	2.11	0.35	
9.40	607	2020	1038.33	1041.58	1.27	0.27	1042.46	2.00	0.36	1042.96	2.32	0.39	1043.21	2.48	0.40	
9.42	608	1999	1038.53	1041.53	1.45	0.36	1042.41	2.06	0.41	1042.92	2.35	0.43	1043.17	2.50	0.44	
9.45	609	1969	1037.53	1041.54	1.00	0.21	1042.44	1.60	0.28	1042.95	1.90	0.31	1043.20	2.04	0.32	
9.47	610	1944	1038.62	1041.51	1.18	0.29	1042.39	1.70	0.35	1042.90	1.96	0.37	1043.15	2.09	0.38	
9.51	611	1910	1039.32	1041.45	1.31	0.34	1042.32	1.82	0.38	1042.82	2.08	0.40	1043.08	2.19	0.41	Upstream of Horse Barn Bridge (New)
9.52	612	1894	1039.46	1041.42	1.30	0.33	1042.28	1.83	0.39	1042.78	2.08	0.41	1043.03	2.20	0.41	
9.56	613	1861	1039.08	1041.38	1.32	0.34	1042.21	1.89	0.40	1042.69	2.19	0.42	1042.93	2.32	0.43	Upstream of Horse Barn Bridge (Old)
9.57	614	1848	1039.16	1041.37	1.02	0.24	1042.20	1.57	0.31	1042.67	1.86	0.33	1042.92	2.01	0.35	
9.66	615	1755	1039.72	1041.15	1.59	0.50	1041.96	1.98	0.47	1042.44	2.20	0.46	1042.69	2.31	0.46	
9.72	617	1698	1039.27	1041.06	1.29	0.36	1041.89	1.76	0.39	1042.37	2.00	0.40	1042.62	2.12	0.40	
9.80	618	1621	1038.70	1040.90	1.48	0.41	1041.69	2.06	0.46	1042.15	2.35	0.47	1042.39	2.50	0.48	
9.86	619	1561	1038.82	1040.77	1.41	0.45	1041.61	1.70	0.40	1042.11	1.87	0.39	1042.36	1.96	0.39	
9.89	621	1530	1038.28	1040.72	1.23	0.39	1041.60	1.46	0.34	1042.10	1.60	0.33	1042.36	1.68	0.33	
9.91	622	1506	1038.49	1040.61	1.59	0.45	1041.44	2.10	0.46	1041.91	2.38	0.47	1042.15	2.51	0.48	
9.97	624	1448	1038.06	1040.51	1.48	0.41	1041.34	2.01	0.44	1041.80	2.31	0.45	1042.04	2.45	0.46	
10.04	626	1374	1038.39	1040.39	1.39	0.36	1041.20	1.95	0.42	1041.67	2.23	0.44	1041.91	2.37	0.45	
10.11	627	1303	1038.33	1040.27	1.37	0.39	1041.08	1.85	0.41	1041.56	2.09	0.42	1041.80	2.21	0.42	
10.17	627.1	1249	1038.62	1040.16	1.49	0.43	1040.97	1.97	0.44	1041.45	2.21	0.45	1041.69	2.34	0.45	Upstream of Stampede Park (S) Saddledome Access Bridge
10.18	628	1238	1038.63	1040.15	1.46	0.42	1040.95	1.95	0.44	1041.43	2.20	0.44	1041.67	2.32	0.45	
10.21	629	1205	1038.38	1040.10	1.37	0.40	1040.92	1.80	0.40	1041.41	2.01	0.41	1041.66	2.13	0.41	
10.22	630	1193	1038.33	1040.04	1.57	0.48	1040.85	1.99	0.46	1041.34	2.19	0.45	1041.59	2.29	0.45	
10.28	631	1135	1038.12	1039.92	1.44	0.39	1040.71	2.04	0.44	1041.17	2.34	0.47	1041.40	2.49	0.48	
10.33	632	1085	1038.42	1039.74	1.78	0.53	1040.53	2.31	0.53	1040.98	2.59	0.54	1041.21	2.74	0.54	
10.42	633	999	1037.72	1039.66	1.15	0.30	1040.48	1.63	0.34	1040.94	1.89	0.36	1041.18	2.01	0.37	Upstream of Stampede Park (N) Saddledome Access Bridge
10.44	634	979	1036.47	1039.66	0.94	0.23	1040.48	1.42	0.28	1040.94	1.68	0.31	1041.18	1.81	0.32	
10.46	635	955	1037.38	1039.59	1.37	0.38	1040.36	1.91	0.42	1040.81	2.19	0.44	1041.04	2.33	0.45	
10.50	636	918	1037.74	1039.49	1.52	0.45	1040.26	2.02	0.47	1040.70	2.30	0.48	1040.92	2.45	0.49	
10.56	637	858	1037.85	1039.39	1.28	0.35	1040.16	1.79	0.40	1040.60	2.07	0.42	1040.83	2.20	0.43	
10.62	638	800	1037.23	1039.32	1.21	0.33	1040.06	1.72	0.39	1040.50	1.98	0.40	1040.73	2.11	0.41	
10.66	639	755	1037.83	1039.20	1.46	0.46	1039.95	1.85	0.45	1040.40	2.05	0.44	1040.63	2.16	0.44	
10.76	640	659	1037.22	1038.85	1.71	0.54	1039.68	2.04	0.49	1040.15	2.25	0.48	1040.38	2.36	0.48	
10.83	641	588	1036.72	1038.68	1.42	0.40	1039.54	1.89	0.41	1040.01	2.15	0.43	1040.24	2.29	0.44	Upstream of MacDonald Bridge
10.85	642	568	1036.95	1038.67	1.26	0.34	1039.53	1.74	0.37	1040.01	2.00	0.38	1040.24	2.14	0.39	
10.95	643	464	1036.66	1038.50	1.35	0.38	1039.37	1.79	0.39	1039.85	2.05	0.40	1040.07	2.20	0.41	
10.96	644	457	1036.31	1038.50	1.20	0.33	1039.38	1.63	0.35	1039.86	1.88	0.36	1040.09	2.01	0.37	
11.07	645	343	1035.92	1038.41	1.04	0.24	1039.26	1.60	0.30	1039.72	1.91	0.34	1039.94	2.07	0.35	Upstream of 9 Ave Train Bridge
11.09	646	324	1036.00	1038.38	1.11	0.26	1039.20	1.69	0.33	1039.64	2.03	0.37	1039.84	2.21	0.39	
11.12	647	295	1036.24	1038.32	1.33	0.36	1039.13	1.86	0.40	1039.57	2.16	0.42	1039.77	2.33	0.44	Upstream of Inglewood (9 Ave)Bridge
11.14	648	275	1036.20	1038.30	1.20	0.32	1039.11	1.69	0.36	1039.55	1.94	0.38	1039.75	2.09	0.39	
11.25	649	171	1036.44	1038.18	1.02	0.29	1039.03	1.28	0.28	1039.50	1.44	0.28	1039.71	1.51	0.29	
11.26	649.1	156	1036.17	1038.15	1.11	0.31	1038.99	1.39	0.30	1039.46	1.51	0.30	1039.66	1.59	0.30	
11.33	650	84	1035.76	1038.11	0.83	0.22	1038.96	1.09	0.23	1039.44	1.17	0.22	1039.65	1.22	0.22	

Table C.3(b): Simulation Results along the Elbow River for 20- to 75-year Flood Events

Distance from the Glenmore Dam (km)	Station in Flood Mapping	Station in HEC-RAS	Channel Thalweg (m)	20-Year Flood Event			35-Year Flood Event			50-Year Flood Event			75-Year Flood Event			Notes
				Water Level (m)	Channel Velocity (m/s)	Froude Number	Water Level (m)	Channel Velocity (m/s)	Froude Number	Water Level (m)	Channel Velocity (m/s)	Froude Number	Water Level (m)	Channel Velocity (m/s)	Froude Number	
0.07	366	11343	1056.08	1060.20	0.74	0.14	1060.81	0.82	0.14	1061.46	0.91	0.14	1062.34	1.06	0.15	Downstream of Glenmore Dam
0.11	367	11303	1056.12	1060.17	0.95	0.17	1060.77	1.08	0.18	1061.41	1.23	0.19	1062.27	1.44	0.20	
0.15	368	11267	1056.48	1060.14	1.15	0.22	1060.73	1.28	0.23	1061.37	1.42	0.23	1062.23	1.62	0.24	
0.18	369	11241	1056.74	1060.10	1.27	0.26	1060.70	1.39	0.25	1061.33	1.53	0.25	1062.19	1.72	0.26	
0.21	370	11204	1056.69	1060.01	1.54	0.31	1060.59	1.70	0.31	1061.22	1.87	0.31	1062.08	2.05	0.30	
0.26	371	11153	1055.55	1059.86	1.91	0.33	1060.41	2.20	0.35	1060.99	2.51	0.37	1061.84	2.79	0.38	
0.32	372	11099	1055.94	1059.70	2.11	0.41	1060.25	2.34	0.42	1060.86	2.54	0.42	1061.75	2.68	0.40	
0.37	373	11048	1055.80	1059.35	2.76	0.55	1059.89	3.02	0.54	1060.48	3.29	0.54	1061.31	3.63	0.54	
0.43	374	10989	1055.50	1059.18	2.64	0.52	1059.73	2.92	0.52	1060.33	3.20	0.52	1061.13	3.62	0.54	
0.47	375	10947	1055.49	1059.15	2.18	0.44	1059.73	2.35	0.43	1060.35	2.56	0.42	1061.17	2.93	0.44	
0.53	376	10889	1054.93	1059.08	1.94	0.34	1059.66	2.19	0.36	1060.28	2.45	0.37	1061.07	2.97	0.41	
0.57	377	10844	1055.17	1059.05	1.70	0.31	1059.64	1.91	0.32	1060.26	2.14	0.33	1061.08	2.49	0.35	
0.62	378	10797	1055.62	1058.95	1.94	0.36	1059.55	2.12	0.36	1060.18	2.32	0.36	1061.01	2.62	0.37	
0.66	379	10757	1055.68	1058.89	1.93	0.38	1059.49	2.10	0.37	1060.13	2.28	0.37	1060.98	2.50	0.37	
0.71	380	10705	1055.56	1058.81	1.98	0.36	1059.40	2.21	0.37	1060.04	2.40	0.37	1060.91	2.59	0.37	
0.76	381	10657	1055.43	1058.75	1.90	0.36	1059.36	2.07	0.35	1060.02	2.21	0.35	1060.92	2.28	0.32	
0.81	382	10611	1054.99	1058.69	1.96	0.35	1059.26	2.23	0.36	1059.87	2.52	0.38	1060.74	2.75	0.38	
0.88	383	10542	1054.48	1058.59	2.13	0.36	1059.14	2.50	0.40	1059.73	2.85	0.42	1060.68	2.87	0.39	
0.92	384	10500	1054.68	1058.46	2.32	0.43	1059.00	2.65	0.45	1059.59	2.95	0.46	1060.58	2.91	0.41	
0.99	385	10427	1054.72	1058.33	2.33	0.43	1058.85	2.67	0.46	1059.40	3.04	0.48	1060.32	3.27	0.47	
1.04	386	10382	1054.81	1058.20	2.45	0.46	1058.71	2.82	0.48	1059.24	3.24	0.52	1059.95	3.86	0.57	
1.11	387	10307	1054.25	1058.11	2.20	0.41	1058.67	2.39	0.41	1059.24	2.63	0.42	1060.00	3.13	0.46	
1.16	388	10253	1054.62	1057.73	2.94	0.64	1058.26	3.13	0.66	1058.83	3.31	0.63	1059.66	3.56	0.59	
1.22	389	10194	1054.55	1057.66	2.11	0.44	1058.22	2.30	0.43	1058.81	2.51	0.43	1059.65	2.83	0.44	
1.27	390	10149	1054.24	1057.61	1.89	0.37	1058.16	2.13	0.37	1058.76	2.36	0.38	1059.60	2.70	0.40	
1.33	391	10091	1053.73	1057.53	1.85	0.35	1058.10	2.03	0.35	1058.71	2.20	0.35	1059.57	2.47	0.36	
1.40	392	10013	1054.21	1057.41	1.85	0.37	1057.99	1.99	0.36	1058.63	2.12	0.35	1059.51	2.29	0.34	
1.50	393	9916	1052.96	1057.25	2.00	0.35	1057.80	2.30	0.38	1058.38	2.60	0.40	1059.21	2.96	0.41	
1.54	394	9873	1053.08	1057.21	1.94	0.35	1057.76	2.20	0.37	1058.35	2.48	0.39	1059.17	2.86	0.41	
1.63	395	9791	1053.86	1057.05	2.16	0.44	1057.60	2.38	0.44	1058.19	2.62	0.44	1059.01	2.97	0.45	
1.71	396	9707	1053.69	1056.98	1.83	0.36	1057.54	2.04	0.36	1058.14	2.27	0.37	1058.97	2.59	0.38	
1.80	397	9618	1052.76	1056.86	1.85	0.36	1057.42	2.08	0.37	1058.02	2.32	0.38	1058.85	2.65	0.39	
1.88	398	9540	1052.21	1056.76	1.91	0.33	1057.31	2.18	0.35	1057.91	2.44	0.37	1058.69	2.91	0.40	
1.93	399	9484	1053.01	1056.64	2.15	0.41	1057.18	2.38	0.42	1057.77	2.65	0.43	1058.59	2.99	0.44	
1.96	400	9462	1052.84	1056.63	1.94	0.35	1057.18	2.22	0.37	1057.76	2.51	0.39	1058.58	2.85	0.41	
1.98	401	9442	1052.58	1056.60	1.94	0.37	1057.15	2.18	0.38	1057.74	2.43	0.39	1058.59	2.65	0.39	
1.99	402	9426	1052.84	1056.55	2.02	0.38	1057.08	2.29	0.40	1057.66	2.58	0.41	1058.48	2.87	0.42	
2.04	403	9375	1052.48	1056.47	1.87	0.36	1057.01	2.11	0.37	1057.59	2.37	0.38	1058.43	2.65	0.39	
2.09	404	9323	1052.61	1056.30	2.19	0.43	1056.83	2.44	0.44	1057.40	2.73	0.45	1058.21	3.04	0.46	
2.12	405	9294	1052.66	1056.26	2.04	0.39	1056.79	2.29	0.41	1057.36	2.56	0.42	1058.17	2.90	0.43	
2.15	406	9263	1052.63	1056.21	1.98	0.37	1056.75	2.23	0.39	1057.32	2.51	0.40	1058.11	2.90	0.43	
2.20	407	9221	1052.67	1056.12	2.09	0.40	1056.66	2.34	0.41	1057.23	2.61	0.42	1058.03	2.98	0.44	
2.27	408	9147	1052.53	1056.04	1.96	0.37	1056.59	2.16	0.38	1057.18	2.36	0.38	1058.01	2.64	0.39	
2.33	409	9083	1052.21	1056.01	1.68	0.30	1056.57	1.85	0.31	1057.16	2.05	0.32	1057.99	2.35	0.33	
2.39	410	9031	1052.08	1055.95	1.75	0.32	1056.51	1.92	0.32	1057.11	2.10	0.32	1057.95	2.37	0.33	
2.46	411	8957	1052.40	1055.89	1.52	0.29	1056.47	1.58	0.28	1057.09	1.68	0.27	1057.94	1.85	0.27	
2.52	412	8899	1052.40	1055.83	1.49	0.28	1056.42	1.60	0.27	1057.03	1.72	0.27	1057.89	1.89	0.27	
2.56	413	8854	1052.19	1055.73	1.76	0.33	1056.30	1.91	0.33	1056.92	2.05	0.32	1057.78	2.22	0.32	Upstream of Sandy Beach Pedestrian Bridge
2.57	414	8850	1052.16	1055.71	1.79	0.34	1056.27	1.96	0.34	1056.87	2.11	0.34	1057.70	2.31	0.34	
2.67	415	8745	1051.53	1055.66	1.57	0.26	1056.21	1.82	0.28	1056.79	2.04	0.30	1057.60	2.37	0.32	
2.72	416	8696	1051.22	1055.57	1.76	0.31	1056.11	2.00	0.33	1056.68	2.25	0.34	1057.47	2.58	0.36	
2.82	417	8601	1051.57	1055.34	1.92	0.37	1055.87	2.16	0.38	1056.44	2.40	0.39	1057.22	2.72	0.40	
2.88	418	8535	1051.74	1055.15	1.99	0.37	1055.67	2.24	0.39	1056.22	2.52	0.40	1056.97	2.92	0.43	
2.93	419	8486	1051.59	1055.01	2.12	0.41	1055.55	2.34	0.41	1056.10	2.60	0.42	1056.84	3.01	0.45	
2.99	420	8423	1051.68	1054.88	2.13	0.40	1055.42	2.35	0.41	1055.97	2.62	0.42	1056.70	3.04	0.45	
3.09	422	8326	1051.35	1054.68	2.19	0.41	1055.21	2.44	0.42	1055.75	2.73	0.44	1056.49	3.05	0.45	
3.17	423	8251	1051.22	1054.62	1.82	0.34	1055.16	2.02	0.35	1055.72	2.22	0.36	1056.49	2.42	0.36	
3.20	425	8217	1051.15	1054.51	2.11	0.41	1055.03	2.37	0.42	1055.57	2.61	0.43	1056.33	2.83	0.43	
3.24	426	8181	1051.14	1054.41	2.34	0.43	1054.92	2.66	0.45	1055.47	2.87	0.45	1056.26	3.04	0.44	
3.30	427	8121	1050.96	1054.34	2.14	0.41	1054.86	2.39	0.42	1055.40	2.65	0.43	1056.19	2.85	0.42	
3.35	429	8068	1050.89	1054.27	2.09	0.41	1054.79	2.32	0.41	1055.33	2.55	0.42	1056.15	2.71	0.40	
3.39	430	8023	1050.80	1054.22	1.92	0.38	1054.75	2.16	0.39	1055.30	2.38	0.39	1056.12	2.51	0.38	
3.43	431	7985	1050.77	1054.15	2.06	0.39	1054.69	2.24	0.39	1055.26	2.38	0.38	1056.10	2.50	0.37	
3.50	433	7916	1050.78	1054.06	1.94	0.38	1054.62	2.10	0.37	1055.17	2.34	0.38	1056.03	2.44	0.36	
3.57	434	7849	1051.07	1053.98	1.83	0.36	1054.53	2.02	0.36	1055.10	2.20	0.36	1055.97	2.30	0.34	
3.60	436	7813	1050.33	1053.93	1.82	0.37	1054.49	1.97	0.36	1055.06	2.15	0.36	1055.94	2.24	0.34	
3.67	437	7746	1049.81	1053.80	2.04	0.35	1054.37	2.24	0.36	1054.95	2.42	0.36	1055.83	2.54	0.35	
3.71	438	7710	1050.26	1053.73	2.20	0.40	1054.32	2.32	0.38	1054.89	2.49	0.38	1055.78	2.61	0.37	
3.76	439	7658	1050.12	1053.66	2.10	0.39	1054.22	2.32	0.40	1054.78	2.55	0.41	1055.67	2.71	0.39	
3.80	440	7614	1049.95	1053.50	2.43	0.44	1054.07	2.66	0.45	1054.62	2.90	0.45	1055.53	3.02	0.43	
3.81	441	7605	1049.73	1053.50	2.36	0.43	1054.06	2.58	0.43	1054.62	2.81	0.43	1055.55	2.91	0.41	Upstream of Riverdale Ave Pedestrian Bridge
3.82	442	7596	1049.57	1053.52	2.18	0.38	1054.07	2.43	0.40	1054.61	2.70	0.41	1055.49	2.86	0.40	
3.84	444	7577	1049.19	1053.53	1.98	0.34	1054.09	2.20	0.35	1054.64	2.45	0.36	1055.51	2.64	0.36	
3.90	445	7518	1049.12	1053.41	2.21	0.38	1054.00	2.35	0.37	1054.55	2.57	0.38	1055.42	2.80	0.38	
3.94	446	7480	1049.16	1053.35	2.18	0.38	1053.90	2.44	0.39	1054.45	2.68	0.40	1055.33	2.88	0.40	
3.99	447	7426	1049.41	1053.33	1.93	0.35	1053.90	2.10	0.35	1054.45	2.33	0.36	1055.34	2.53	0.35	
4.03	448	7390	1049.33	1053.32	1.70	0.31	1053.88	1.91	0.32	1054.42	2.18	0.34	1055.31	2.39	0.34	
4.07	449	7345	1049.68	1053.29	1.64	0.30	1053.87	1.81	0.30	1054.42	2.01	0.32	1055.33	2.13	0.30	
4.10	450	7321	1049.75	1053.24	1.80	0.33	1053.82	1.96	0.33	1054.37	2.14	0.34	1055.29	2.25	0.32	
4.14	451	7282	1049.02	1053.22	1.64	0.29	1053.81	1.75	0.28	1054.37	1.88	0.29	1055.29	2.02	0.28	
4.18	452	7238	1049.21	1053.16	1.73	0.30	1053.74	1.89	0.30	1054.28	2.13	0.32	1055.20	2.28	0.31	
4.20	453	7221	1049.15	1053.15	1.71	0.29	1053.71	1.96	0.31	1054.24	2.21	0.33	1055.16	2.37	0.32	Upstream of Elbow Drive (Elboya) Bridge
4.22	454	7195	1049.11	1053.10	1.82	0.31	1053.65	2.11	0.33	1054.14	2.40	0.36	1054.85	2.81	0.39	
4.24	455	7181	1048.99	1053.03	2.13	0.36	1053.60	2.33	0.37	1054.07	2.67	0.40	1054.81	3.00	0.41	
4.27	456	7146	1049.02	1052.99	2.09	0.35	1053.56	2.28	0.36	1054.04	2.58	0.38	1054.77	2.92	0.40	
4.31	457	7104	1048.74	1052.96	2.04	0.34	1053.53	2.23	0.34	1054.01	2.49	0.37	1054.74	2.82	0.38	
4.35	458	7063	1048.55	1052.92	2.06	0.33	1053.50	2.22	0.33	1053.98	2.47	0.35	1054.71	2.77	0.37	
4.41	459	7012	1048.51	1052.90	1.96	0.31	1053.49	2.03	0.30	1053.98	2.25	0.32	1054.72	2.48	0.33	
4.43	460	6985	1048.57	1052.89	1.95	0.32	1053.49	1.97	0.30	1053.98	2.15	0.31	1054.73	2.32	0.31	
4.48	461	6935	1048.31	1052.85	1.88	0.31	1053.43	2.04	0.31	1053.90	2.27	0.33	1054.64	2.51	0.34	
4.54	462	6881	1048.31	1052.82	1.75	0.28	1053.44	1.65	0.25	1053.94	1.69	0.24	1054.71	1.71	0.23	

Distance from the Glenmore Dam (km)	Station in Flood Mapping	Station in HEC-RAS	Channel Thalweg (m)	20-Year Flood Event			35-Year Flood Event			50-Year Flood Event			75-Year Flood Event			Notes
				Water Level (m)	Channel Velocity (m/s)	Froude Number	Water Level (m)	Channel Velocity (m/s)	Froude Number	Water Level (m)	Channel Velocity (m/s)	Froude Number	Water Level (m)	Channel Velocity (m/s)	Froude Number	
4.58	463	6837	1048.42	1052.72	2.07	0.35	1053.34	2.03	0.32	1053.86	2.04	0.30	1054.65	2.03	0.28	
4.62	464	6800	1048.15	1052.67	2.06	0.34	1053.30	2.07	0.31	1053.93	1.12	0.16	1054.71	0.97	0.13	
4.67	465	6748	1048.09	1052.61	2.09	0.34	1053.21	2.20	0.33	1053.91	1.17	0.16	1054.70	1.01	0.13	
4.71	466	6710	1047.97	1052.61	1.71	0.28	1053.24	1.71	0.26	1053.89	1.19	0.17	1054.69	1.07	0.14	
4.82	467	6602	1048.63	1052.49	1.90	0.33	1053.10	2.02	0.32	1053.77	1.82	0.27	1054.62	1.58	0.21	
4.86	468	6557	1048.31	1052.46	1.83	0.30	1053.08	1.94	0.30	1053.75	1.81	0.26	1054.59	1.68	0.22	
4.90	469	6521	1047.64	1052.43	1.81	0.30	1053.07	1.86	0.28	1053.73	1.79	0.26	1054.55	1.77	0.23	
4.92	470	6498	1047.47	1052.38	2.01	0.32	1052.99	2.17	0.32	1053.65	2.19	0.31	1054.48	2.21	0.29	
4.95	471	6470	1047.12	1052.32	2.28	0.35	1052.95	2.38	0.34	1053.61	2.41	0.32	1054.45	2.43	0.30	
4.99	472	6427	1046.63	1052.22	2.44	0.37	1052.78	2.77	0.40	1053.38	3.02	0.41	1054.27	3.01	0.38	
5.04	473	6381	1046.55	1052.12	2.52	0.40	1052.62	2.97	0.44	1053.22	3.22	0.45	1054.10	3.30	0.43	
5.08	474	6339	1047.06	1052.12	2.14	0.35	1052.63	2.51	0.39	1053.20	2.85	0.41	1054.04	3.13	0.42	
5.13	475	6287	1048.06	1052.05	2.18	0.39	1052.56	2.52	0.42	1053.12	2.88	0.44	1053.96	3.13	0.44	
5.19	476	6230	1047.37	1051.99	2.14	0.35	1052.50	2.49	0.38	1053.04	2.86	0.41	1053.89	3.15	0.42	
5.24	477	6181	1047.17	1051.99	1.90	0.29	1052.49	2.29	0.33	1053.02	2.71	0.37	1053.85	3.11	0.39	
5.31	478	6112	1047.50	1051.91	2.01	0.32	1052.39	2.40	0.37	1052.89	2.84	0.41	1053.60	3.44	0.47	
5.38	479	6034	1047.34	1051.91	1.66	0.26	1052.39	1.97	0.29	1052.92	2.29	0.32	1053.71	2.59	0.34	
5.46	480	5953	1048.09	1051.83	1.84	0.33	1052.32	2.08	0.34	1052.85	2.33	0.36	1053.61	2.68	0.38	
5.53	481	5887	1048.22	1051.78	1.68	0.31	1052.26	1.93	0.33	1052.78	2.21	0.35	1053.55	2.51	0.37	
5.63	482	5785	1047.84	1051.74	1.07	0.20	1052.24	1.22	0.21	1052.77	1.38	0.22	1053.56	1.58	0.23	
5.71	483	5709	1047.24	1051.65	1.42	0.23	1052.12	1.67	0.26	1052.62	1.95	0.28	1053.35	2.31	0.31	
5.76	484	5658	1046.72	1051.61	1.55	0.24	1052.07	1.84	0.27	1052.55	2.15	0.30	1053.27	2.57	0.34	
5.84	485	5582	1046.70	1051.53	1.76	0.27	1051.97	2.09	0.31	1052.42	2.46	0.35	1053.08	2.98	0.39	
5.90	486	5513	1047.01	1051.51	1.66	0.26	1051.94	1.99	0.30	1052.38	2.37	0.34	1053.03	2.87	0.39	Upstream of Rideau Park Pedestrian Bridge
5.92	487	5495	1047.44	1051.47	1.80	0.30	1051.88	2.15	0.34	1052.30	2.55	0.38	1052.93	3.06	0.43	
5.99	488	5428	1047.37	1051.41	1.83	0.32	1051.82	2.16	0.36	1052.23	2.53	0.40	1052.85	3.02	0.44	
6.03	489	5392	1047.64	1051.39	1.75	0.31	1051.81	2.01	0.33	1052.23	2.30	0.36	1052.87	2.68	0.39	
6.08	490	5337	1047.35	1051.34	1.77	0.31	1051.75	2.03	0.34	1052.17	2.32	0.37	1052.80	2.69	0.40	
6.11	491	5303	1047.45	1051.31	1.73	0.31	1051.72	1.99	0.34	1052.13	2.28	0.36	1052.77	2.63	0.39	
6.16	493	5259	1047.02	1051.30	1.41	0.27	1051.71	1.64	0.29	1052.13	1.86	0.31	1052.79	2.04	0.31	
6.20	494	5216	1047.68	1051.28	1.32	0.26	1051.69	1.52	0.28	1052.12	1.68	0.29	1052.80	1.79	0.28	
6.25	496	5172	1047.55	1051.24	1.28	0.28	1051.65	1.42	0.28	1052.09	1.51	0.28	1052.78	1.50	0.25	
6.29	498	5124	1046.55	1051.13	1.16	0.28	1051.55	1.24	0.27	1052.00	1.31	0.26	1052.72	1.30	0.23	
6.34	500	5073	1047.13	1050.97	1.15	0.28	1051.42	1.21	0.27	1051.90	1.26	0.25	1052.65	1.24	0.22	
6.39	502	5032	1047.14	1050.82	1.30	0.32	1051.29	1.36	0.30	1051.79	1.41	0.28	1052.58	1.35	0.23	
6.43	503	4984	1046.97	1050.62	1.50	0.35	1051.14	1.52	0.32	1051.68	1.50	0.28	1052.51	1.42	0.23	
6.49	504	4931	1046.72	1050.43	1.59	0.35	1050.98	1.63	0.33	1051.55	1.62	0.30	1052.41	1.58	0.26	
6.54	506	4877	1046.46	1050.36	1.29	0.27	1050.92	1.37	0.26	1051.51	1.34	0.23	1052.40	1.27	0.19	
6.59	507	4830	1046.20	1050.24	1.46	0.33	1050.82	1.52	0.30	1051.42	1.54	0.28	1052.34	1.43	0.23	
6.62	508	4795	1046.03	1050.19	1.31	0.26	1050.76	1.45	0.26	1051.36	1.58	0.26	1052.27	1.58	0.23	Upstream of Mission (4 St SW)Bridge
6.65	509	4768	1046.47	1050.11	1.48	0.30	1050.64	1.63	0.30	1051.16	1.79	0.31	1051.94	1.92	0.30	
6.67	509.1	4747	1047.03	1050.02	1.66	0.35	1050.57	1.73	0.33	1051.11	1.79	0.31	1051.89	1.87	0.29	New Cross Section
6.71	511	4708	1046.68	1049.89	1.78	0.37	1050.42	1.96	0.37	1050.96	2.12	0.37	1051.75	2.25	0.35	
6.77	513	4652	1046.16	1049.73	1.99	0.39	1050.27	2.19	0.39	1050.80	2.38	0.40	1051.58	2.58	0.39	
6.84	514	4573	1046.10	1049.57	2.10	0.40	1050.08	2.36	0.42	1050.60	2.60	0.43	1051.37	2.85	0.43	
6.90	516	4520	1046.26	1049.51	1.97	0.38	1050.02	2.20	0.39	1050.55	2.41	0.39	1051.34	2.62	0.39	
6.94	517	4473	1046.37	1049.46	1.75	0.36	1049.99	1.91	0.36	1050.54	2.00	0.34	1051.38	2.04	0.31	
7.00	519	4417	1046.06	1049.28	2.23	0.41	1049.81	2.39	0.41	1050.37	2.49	0.40	1051.20	2.57	0.37	
7.05	522	4365	1045.55	1049.14	2.44	0.44	1049.65	2.69	0.45	1050.18	2.87	0.45	1051.01	3.01	0.43	
7.09	525	4323	1045.26	1049.14	2.06	0.36	1049.65	2.31	0.38	1050.19	2.50	0.38	1051.02	2.64	0.37	
7.14	527	4281	1045.24	1049.07	2.12	0.39	1049.62	2.24	0.38	1050.18	2.34	0.37	1051.04	2.40	0.35	
7.19	529	4223	1044.96	1048.78	2.78	0.54	1049.25	3.09	0.56	1049.71	3.42	0.57	1050.51	3.68	0.56	
7.25	531	4168	1044.95	1048.65	2.62	0.51	1049.14	2.88	0.52	1049.61	3.21	0.54	1050.40	3.55	0.54	
7.32	538	4098	1043.99	1048.65	2.00	0.36	1049.15	2.27	0.38	1049.69	2.39	0.38	1050.57	2.43	0.35	
7.33	539	4083	1044.00	1048.64	1.97	0.35	1049.14	2.25	0.38	1049.67	2.41	0.38	1050.55	2.46	0.35	
7.36	540	4052	1044.88	1048.63	1.83	0.34	1049.13	2.06	0.36	1049.65	2.20	0.35	1050.55	2.17	0.31	Upstream of 25th Ave Bridge
7.38	541	4034	1044.97	1048.60	1.68	0.30	1049.01	1.98	0.33	1049.39	2.22	0.36	1049.99	2.38	0.36	
7.43	542	3989	1045.36	1048.46	2.11	0.41	1048.87	2.41	0.43	1049.25	2.63	0.45	1049.81	2.87	0.45	
7.49	543	3931	1044.62	1048.37	2.12	0.37	1048.71	2.54	0.43	1049.06	2.84	0.46	1049.62	3.11	0.47	
7.53	544	3889	1044.08	1048.30	2.22	0.37	1048.60	2.72	0.44	1048.91	3.10	0.48	1049.46	3.39	0.50	
7.55	545	3869	1043.86	1048.28	2.16	0.36	1048.59	2.63	0.42	1048.90	2.98	0.46	1049.46	3.23	0.47	
7.57	546	3851	1043.71	1048.23	2.29	0.39	1048.50	2.82	0.46	1048.77	3.23	0.51	1049.32	3.51	0.52	
7.58	547	3834	1043.73	1048.15	2.45	0.42	1048.37	3.07	0.51	1048.58	3.60	0.59	1049.06	4.00	0.61	
7.61	548	3809	1043.94	1048.13	2.39	0.40	1048.33	3.02	0.49	1048.51	3.57	0.57	1048.89	4.17	0.64	
7.64	549	3777	1043.88	1048.10	2.29	0.39	1048.28	2.93	0.49	1048.43	3.51	0.57	1048.79	4.10	0.64	
7.68	550	3738	1044.07	1048.12	1.86	0.35	1048.34	2.27	0.41	1048.55	2.61	0.45	1049.01	2.86	0.47	
7.75	556	3671	1045.11	1048.05	1.77	0.36	1048.26	2.09	0.41	1048.48	2.33	0.44	1048.99	2.37	0.41	
7.81	557	3610	1044.64	1047.99	1.91	0.35	1048.20	2.21	0.39	1048.42	2.40	0.41	1048.97	2.31	0.37	
7.85	558	3568	1044.11	1047.98	1.66	0.29	1048.20	1.90	0.32	1048.42	2.04	0.34	1048.98	1.92	0.30	
7.92	559	3498	1043.14	1047.77	2.41	0.40	1047.95	2.75	0.45	1048.21	2.79	0.44	1048.89	2.30	0.34	Upstream of 21 Ave (Lindsay Park) Pedestrian Bridge
7.94	560	3478	1044.64	1047.55	3.05	0.64	1047.71	3.35	0.68	1048.13	2.79	0.52	1048.87	2.14	0.36	
7.96	561	3455	1043.34	1046.94	3.38	0.63	1047.47	3.18	0.55	1048.11	2.59	0.41	1048.84	2.22	0.32	
7.98	562	3438	1043.59	1046.93	3.10	0.59	1047.43	3.03	0.53	1048.06	2.60	0.42	1048.79	2.30	0.34	
8.03	563	3386	1043.74	1046.86	2.73	0.52	1047.35	2.81	0.50	1047.94	2.65	0.43	1048.67	2.53	0.38	
8.07	564	3346	1043.69	1046.75	2.87	0.55	1047.26	2.95	0.52	1047.86	2.82	0.46	1048.59	2.73	0.40	
8.12	565	3297	1043.42	1046.67	2.62	0.50	1047.17	2.78	0.49	1047.77	2.76	0.44	1048.49	2.76	0.41	
8.15	566	3271	1043.37	1046.66	2.41	0.45	1047.15	2.63	0.46	1047.74	2.71	0.43	1048.43	2.83	0.42	
8.17	567	3251	1043.19	1046.70	1.99	0.36	1047.20	2.19	0.37	1047.79	2.26	0.35	1048.48	2.37	0.34	Upstream of Lindsay Park CNR Bridge
8.18	568	3236	1043.03	1046.55	2.19	0.41	1047.04	2.36	0.41	1047.64	2.36	0.38	1048.34	2.42	0.36	
8.19	569	3224	1042.73	1046.54	2.02	0.37	1047.03	2.18	0.37	1047.64	2.16	0.34	1048.34	2.19	0.32	
8.23	570	3188	1043.05	1046.47	2.10	0.41	1046.99	2.20	0.39	1047.61	2.14	0.35	1048.32	2.14	0.32	
8.27	571	3146	1043.08	1046.10	3.14	0.64	1046.64	3.21	0.59	1047.35	2.98	0.49	1048.12	2.90	0.44	
8.34	572	3073	1042.33	1045.81	3.19	0.59	1046.20	3.66	0.64	1046.99	3.48	0.55	1047.79	3.45	0.49	
8.39	573	3027	1042.42	1045.78	2.85	0.51	1046.22	3.15	0.53	1047.06	2.89	0.44	1047.87	2.86	0.40	
8.44	574	2982	1041.83	1045.78	2.40	0.43	1046.26	2.55	0.42	1047.14	2.17	0.32	1047.98	1.94	0.27	
8.45	575	2966	1041.42	1045.82	1.93	0.31	1046.26	2.21	0.34	1047.08	2.18	0.31	1047.94	1.98	0.26	Upstream of Pattison (1 St) Bridge
8.48	576	2939	1039.58	1045.79	1.45	0.22	1046.22	1.71	0.25	1046.87	1.81	0.25	1047.86	1.62	0.20	
8.51	577	2911	1042.16	1045.45	2.66	0.51	1046.00	2.57	0.45	1046.79	2.26	0.36	1047.82	1.93	0.27	
8.54	578	2882	1042.16	1045.14	3.25	0.64	1045.95	2.62	0.45	1046.76	2.33	0.36	1047.81	1.86	0.26	
8.58	579	2840	1042.02	1045.16	2.59	0.49	1045.90	2.45	0.42	1046.72	2.22	0.34	1047.80	1.74	0.24	
8.62	580	2802	1041.31	1045.12	2.31	0.43	1045.85	2.36	0.39	1046.65	2.27	0.34	1047.72	2.01	0.27	
8.65	581	2766	1041.62	1045.07	2.27	0.42	1045.81	2.31	0.38	1046.63	2.20	0.33	1047.69	2.04	0.28	

Distance from the Glenmore Dam (km)	Station in Flood Mapping	Station in HEC-RAS	Channel Thalweg (m)	20-Year Flood Event			35-Year Flood Event			50-Year Flood Event			75-Year Flood Event			Notes
				Water Level (m)	Channel Velocity (m/s)	Froude Number	Water Level (m)	Channel Velocity (m/s)	Froude Number	Water Level (m)	Channel Velocity (m/s)	Froude Number	Water Level (m)	Channel Velocity (m/s)	Froude Number	
8.68	582	2742	1041.70	1045.15	1.46	0.26	1045.90	1.49	0.24	1046.71	1.45	0.21	1047.74	1.44	0.19	Upstream of Victoria (Macleod Trail) Bridge
8.72	583	2699	1041.50	1045.09	1.41	0.25	1045.77	1.46	0.23	1046.45	1.47	0.22	1047.36	1.47	0.20	Upstream of LRT Bridge
8.76	584	2656	1041.14	1045.04	1.32	0.23	1045.71	1.38	0.22	1046.42	1.38	0.20	1047.28	1.39	0.19	
8.78	585	2636	1041.04	1044.81	2.34	0.39	1045.48	2.45	0.38	1046.20	2.43	0.35	1047.22	1.95	0.25	
8.81	587	2608	1040.65	1044.63	2.67	0.46	1045.23	2.98	0.47	1045.92	3.11	0.46	1047.03	2.66	0.35	
8.83	588	2588	1040.52	1044.66	2.32	0.38	1045.26	2.64	0.41	1045.94	2.81	0.40	1047.02	2.55	0.33	
8.88	593	2536	1040.20	1044.58	2.23	0.38	1045.18	2.56	0.40	1045.80	2.93	0.43	1046.75	3.16	0.42	
8.93	594	2483	1040.23	1044.34	2.78	0.51	1044.92	3.08	0.52	1045.54	3.41	0.53	1046.56	3.51	0.49	
8.95	595	2469	1040.28	1044.37	2.46	0.43	1044.98	2.71	0.44	1045.62	2.98	0.45	1046.59	3.28	0.45	Upstream of Stampede Park (25 Ave/3 ST) Access Bridge
8.97	596	2443	1039.10	1044.34	2.19	0.36	1044.94	2.48	0.38	1045.56	2.78	0.40	1046.24	3.34	0.45	
8.99	597	2424	1039.32	1044.23	2.50	0.40	1044.78	2.91	0.44	1045.31	3.39	0.48	1045.88	4.24	0.57	
9.03	598	2387	1039.20	1044.31	1.81	0.27	1044.88	2.15	0.31	1045.44	2.53	0.34	1046.08	3.17	0.41	
9.09	599	2332	1040.41	1044.13	2.37	0.44	1044.75	2.51	0.42	1045.36	2.71	0.42	1046.03	3.16	0.46	
9.15	601	2272	1040.16	1043.97	2.64	0.48	1044.63	2.71	0.45	1045.29	2.75	0.42	1045.99	3.08	0.44	
9.21	602	2212	1039.99	1043.88	2.38	0.45	1044.53	2.57	0.44	1045.26	2.40	0.38	1046.01	2.51	0.36	
9.27	603	2146	1039.70	1043.74	2.40	0.42	1044.42	2.53	0.42	1045.19	2.37	0.36	1045.93	2.53	0.35	
9.33	605	2090	1039.54	1043.75	1.88	0.31	1044.41	2.11	0.32	1045.18	2.05	0.29	1045.92	2.23	0.29	
9.37	606	2048	1038.54	1043.63	2.25	0.36	1044.25	2.61	0.39	1045.06	2.50	0.34	1045.87	2.49	0.32	
9.40	607	2020	1038.33	1043.51	2.66	0.41	1044.11	3.03	0.44	1044.83	3.26	0.44	1045.79	2.89	0.36	
9.42	608	1999	1038.53	1043.46	2.65	0.44	1044.08	2.98	0.46	1044.84	3.03	0.43	1045.79	2.65	0.35	
9.45	609	1969	1037.53	1043.50	2.20	0.34	1044.11	2.56	0.37	1044.86	2.67	0.36	1045.79	2.48	0.31	
9.47	610	1944	1038.62	1043.45	2.23	0.38	1044.07	2.51	0.40	1044.84	2.53	0.37	1045.78	2.30	0.31	
9.51	611	1910	1039.32	1043.38	2.32	0.41	1044.01	2.57	0.42	1044.73	2.73	0.41	1045.72	2.46	0.33	Upstream of Horse Barn Bridge (New)
9.52	612	1894	1039.46	1043.33	2.32	0.41	1043.95	2.58	0.42	1044.52	2.88	0.44	1045.60	2.53	0.34	
9.56	613	1861	1039.08	1043.22	2.47	0.43	1043.82	2.78	0.45	1044.35	3.20	0.49	1045.48	2.79	0.38	Upstream of Horse Barn Bridge (Old)
9.57	614	1848	1039.16	1043.20	2.17	0.36	1043.79	2.50	0.39	1044.28	2.94	0.43	1045.24	2.92	0.39	
9.66	615	1755	1039.72	1042.98	2.43	0.46	1043.57	2.70	0.47	1044.15	2.84	0.45	1045.17	2.50	0.35	
9.72	617	1698	1039.27	1042.92	2.24	0.40	1043.57	2.33	0.38	1044.20	2.24	0.34	1045.19	2.08	0.28	
9.80	618	1621	1038.70	1042.67	2.66	0.49	1043.25	2.96	0.50	1043.97	2.81	0.43	1045.07	2.45	0.34	
9.86	619	1561	1038.82	1042.66	2.06	0.39	1043.27	2.27	0.39	1043.96	2.30	0.36	1045.03	2.22	0.31	
9.89	621	1530	1038.28	1042.66	1.76	0.33	1043.28	1.95	0.33	1043.94	2.16	0.34	1044.97	2.27	0.32	
9.91	622	1506	1038.49	1042.43	2.65	0.48	1043.01	2.96	0.49	1043.61	3.28	0.51	1044.56	3.65	0.51	
9.97	624	1448	1038.06	1042.32	2.61	0.47	1042.87	2.98	0.50	1043.42	3.40	0.53	1044.23	4.03	0.57	
10.04	626	1374	1038.39	1042.19	2.51	0.45	1042.74	2.87	0.48	1043.28	3.30	0.51	1044.13	3.75	0.53	
10.11	627	1303	1038.33	1042.09	2.35	0.43	1042.63	2.68	0.45	1043.17	3.08	0.48	1044.12	3.26	0.46	
10.17	627.1	1249	1038.62	1041.98	2.47	0.45	1042.52	2.80	0.47	1043.03	3.27	0.52	1044.08	3.20	0.45	Upstream of Stampede Park (S) Saddledome Access Bridge
10.18	628	1238	1038.63	1041.96	2.45	0.45	1042.50	2.79	0.47	1043.01	3.22	0.51	1043.98	3.27	0.46	
10.21	629	1205	1038.38	1041.95	2.24	0.41	1042.50	2.53	0.43	1043.04	2.87	0.45	1044.12	2.40	0.34	
10.22	630	1193	1038.33	1041.89	2.40	0.45	1042.45	2.65	0.45	1043.00	2.95	0.47	1044.11	2.35	0.33	
10.28	631	1135	1038.12	1041.69	2.63	0.48	1042.22	2.95	0.50	1042.84	3.11	0.49	1043.80	3.09	0.43	
10.33	632	1085	1038.42	1041.52	2.83	0.53	1042.08	3.08	0.53	1042.74	3.17	0.50	1043.78	2.95	0.41	
10.42	633	999	1037.72	1041.50	2.12	0.37	1042.06	2.40	0.39	1042.67	2.71	0.41	1043.63	2.89	0.40	Upstream of Stampede Park (N) Saddledome Access Bridge
10.44	634	979	1036.47	1041.49	1.93	0.32	1042.05	2.24	0.35	1042.65	2.58	0.38	1043.53	2.90	0.39	
10.46	635	955	1037.38	1041.34	2.45	0.44	1041.87	2.80	0.47	1042.45	3.15	0.49	1043.49	3.07	0.43	
10.50	636	918	1037.74	1041.23	2.56	0.48	1041.76	2.89	0.50	1042.37	3.16	0.50	1043.32	3.31	0.47	
10.56	637	858	1037.85	1041.14	2.30	0.44	1041.68	2.58	0.45	1042.30	2.85	0.46	1043.23	3.12	0.45	
10.62	638	800	1037.23	1041.05	2.21	0.41	1041.57	2.53	0.43	1042.17	2.85	0.45	1043.08	3.19	0.45	
10.66	639	755	1037.83	1040.97	2.22	0.43	1041.50	2.51	0.44	1042.11	2.77	0.45	1043.06	3.01	0.44	
10.76	640	659	1037.22	1040.75	2.39	0.45	1041.27	2.71	0.47	1041.87	3.00	0.48	1042.80	3.33	0.48	
10.83	641	588	1036.72	1040.63	2.35	0.42	1041.13	2.72	0.45	1041.70	3.10	0.48	1042.54	3.60	0.51	Upstream of MacDonald Bridge
10.85	642	568	1036.95	1040.64	2.20	0.38	1041.14	2.56	0.41	1041.62	2.99	0.46	1042.34	3.59	0.51	
10.95	643	464	1036.66	1040.48	2.25	0.40	1040.95	2.65	0.44	1041.39	3.11	0.48	1042.17	3.54	0.51	
10.96	644	457	1036.31	1040.50	2.07	0.36	1040.98	2.43	0.40	1041.44	2.83	0.43	1042.24	3.15	0.44	
11.07	645	343	1035.92	1040.37	2.12	0.34	1040.82	2.50	0.38	1041.23	2.98	0.44	1041.89	3.59	0.49	Upstream of 9 Ave Train Bridge
11.09	646	324	1036.00	1040.28	2.25	0.37	1040.71	2.67	0.42	1041.06	3.21	0.49	1041.62	3.94	0.56	
11.12	647	295	1036.24	1040.22	2.34	0.41	1040.62	2.79	0.46	1040.91	3.42	0.55	1041.34	4.34	0.66	Upstream of Inglewood (9 Ave)Bridge
11.14	648	275	1036.20	1040.22	2.07	0.36	1040.63	2.46	0.41	1040.93	2.99	0.47	1041.39	3.76	0.56	
11.25	649	171	1036.44	1040.22	1.42	0.25	1040.66	1.61	0.26	1041.00	1.88	0.30	1041.57	2.18	0.32	
11.26	649.1	156	1036.17	1040.18	1.48	0.26	1040.60	1.67	0.28	1040.92	1.95	0.31	1041.45	2.27	0.34	
11.33	650	84	1035.76	1040.17	1.13	0.19	1040.60	1.27	0.20	1040.93	1.48	0.23	1041.45	1.77	0.26	

Table C.3 (c): Simulation Results along the Elbow River for 100- to 1000-year Flood Events

Distance from the Glenmore Dam (km)	Station in Flood Mapping	Station in HEC-RAS	Channel Thalweg (m)	100-Year Flood Event			200-Year Flood Event			350-Year Flood Event			500-Year Flood Event			1000-Year Flood Event			Notes
				Water Level (m)	Channel Velocity (m/s)	Froude Number	Water Level (m)	Channel Velocity (m/s)	Froude Number	Water Level (m)	Channel Velocity (m/s)	Froude Number	Water Level (m)	Channel Velocity (m/s)	Froude Number	Water Level (m)	Channel Velocity (m/s)	Froude Number	
0.07	366	11343	1056.08	1062.68	1.13	0.16	1063.59	1.35	0.17	1064.24	1.55	0.19	1064.69	1.70	0.20	1065.60	2.01	0.22	Downstream of Glenmore Dam
0.11	367	11303	1056.12	1062.61	1.53	0.21	1063.50	1.81	0.23	1064.13	2.07	0.25	1064.57	2.25	0.26	1065.46	2.62	0.29	
0.15	368	11267	1056.48	1062.56	1.72	0.24	1063.44	2.00	0.26	1064.06	2.26	0.28	1064.50	2.44	0.30	1065.38	2.80	0.32	
0.18	369	11241	1056.74	1062.53	1.82	0.26	1063.41	2.08	0.28	1064.03	2.34	0.29	1064.47	2.52	0.31	1065.36	2.85	0.33	
0.21	370	11204	1056.69	1062.43	2.12	0.30	1063.33	2.34	0.31	1063.96	2.57	0.32	1064.41	2.73	0.33	1065.32	2.99	0.34	
0.26	371	11153	1055.55	1062.19	2.87	0.38	1063.11	3.08	0.38	1063.74	3.34	0.39	1064.19	3.51	0.40	1065.13	3.74	0.40	
0.32	372	11099	1055.94	1062.11	2.73	0.39	1063.07	2.82	0.37	1063.71	3.00	0.37	1064.17	3.13	0.38	1065.12	3.28	0.37	
0.37	373	11048	1055.80	1061.71	3.65	0.52	1062.73	3.72	0.48	1063.38	3.92	0.49	1063.83	4.09	0.49	1064.80	4.28	0.48	
0.43	374	10989	1055.50	1061.49	3.76	0.54	1062.35	4.22	0.56	1062.90	4.62	0.58	1063.30	4.89	0.60	1064.18	5.34	0.61	
0.47	375	10947	1055.49	1061.51	3.13	0.45	1062.39	3.49	0.47	1062.94	3.89	0.50	1063.33	4.16	0.51	1064.18	4.62	0.54	
0.53	376	10889	1054.93	1061.42	3.12	0.42	1062.28	3.58	0.45	1062.76	4.10	0.50	1063.08	4.51	0.53	1063.74	5.30	0.60	
0.57	377	10844	1055.17	1061.44	2.61	0.36	1062.30	3.00	0.38	1062.80	3.43	0.42	1063.13	3.76	0.45	1063.84	4.37	0.50	
0.62	378	10797	1055.62	1061.36	2.74	0.38	1062.24	3.10	0.40	1062.75	3.49	0.43	1063.09	3.75	0.45	1063.83	4.23	0.48	
0.66	379	10757	1055.68	1061.34	2.57	0.36	1062.24	2.86	0.37	1062.73	3.25	0.41	1063.06	3.55	0.43	1063.76	4.15	0.48	
0.71	380	10705	1055.56	1061.29	2.62	0.36	1062.21	2.81	0.35	1062.71	3.16	0.38	1063.05	3.44	0.41	1063.69	4.29	0.49	
0.76	381	10657	1055.43	1061.30	2.31	0.32	1062.22	2.50	0.32	1062.72	2.81	0.34	1063.06	3.08	0.37	1063.72	3.83	0.44	
0.81	382	10611	1054.99	1061.10	2.86	0.38	1062.04	3.04	0.38	1062.52	3.39	0.41	1062.85	3.65	0.43	1063.44	4.44	0.50	
0.88	383	10542	1054.48	1061.07	2.87	0.38	1062.01	3.06	0.37	1062.41	3.72	0.44	1062.75	3.95	0.46	1063.43	4.41	0.49	
0.92	384	10500	1054.68	1061.00	2.87	0.39	1061.95	3.02	0.38	1062.39	3.43	0.42	1062.69	3.84	0.45	1063.38	4.18	0.47	
0.99	385	10427	1054.72	1060.74	3.27	0.45	1061.81	3.22	0.40	1062.33	3.35	0.41	1062.68	3.44	0.41	1063.41	3.61	0.41	
1.04	386	10382	1054.81	1060.23	4.16	0.59	1060.87	4.97	0.67	1061.59	4.86	0.62	1062.09	4.76	0.58	1063.15	4.26	0.48	
1.11	387	10307	1054.25	1060.30	3.36	0.47	1061.22	3.37	0.44	1061.83	3.54	0.44	1062.30	3.45	0.41	1063.23	3.37	0.38	
1.16	388	10253	1054.62	1060.00	3.64	0.58	1060.96	3.63	0.52	1061.68	3.55	0.48	1062.20	3.38	0.43	1063.17	3.22	0.38	
1.22	389	10194	1054.55	1059.98	2.99	0.44	1060.86	3.34	0.46	1061.43	3.67	0.48	1061.95	3.60	0.45	1062.93	3.59	0.42	
1.27	390	10149	1054.24	1059.93	2.86	0.41	1060.75	3.39	0.45	1061.29	3.75	0.47	1061.69	3.99	0.49	1062.66	4.10	0.47	
1.33	391	10091	1053.73	1059.91	2.60	0.36	1060.75	3.02	0.39	1061.23	3.63	0.45	1061.61	3.88	0.47	1062.54	4.13	0.47	
1.40	392	10013	1054.21	1059.86	2.38	0.34	1060.75	2.59	0.34	1061.30	2.83	0.36	1061.71	2.99	0.37	1062.65	3.17	0.36	
1.50	393	9916	1052.96	1059.55	3.10	0.42	1060.41	3.41	0.43	1060.90	3.80	0.46	1061.31	3.97	0.47	1062.33	4.02	0.45	
1.54	394	9873	1053.08	1059.50	3.00	0.41	1060.35	3.37	0.43	1060.85	3.72	0.46	1061.28	3.81	0.46	1062.33	3.76	0.42	
1.63	395	9791	1053.86	1059.30	3.18	0.47	1060.07	3.67	0.50	1060.71	3.74	0.48	1061.20	3.64	0.45	1062.32	3.40	0.39	
1.71	396	9707	1053.69	1059.27	2.77	0.40	1060.09	3.10	0.41	1060.74	3.09	0.39	1061.23	3.04	0.37	1062.33	2.90	0.33	
1.80	397	9618	1052.76	1059.17	2.77	0.40	1060.05	2.87	0.38	1060.73	2.78	0.35	1061.22	2.71	0.33	1062.33	2.53	0.28	
1.88	398	9540	1052.21	1059.03	2.99	0.40	1059.96	3.02	0.38	1060.67	2.86	0.34	1061.18	2.76	0.32	1062.31	2.52	0.27	
1.93	399	9484	1053.01	1058.93	3.06	0.43	1059.87	3.11	0.41	1060.58	2.99	0.37	1061.11	2.84	0.34	1062.27	2.55	0.28	
1.96	400	9462	1052.84	1058.91	2.96	0.41	1059.82	3.13	0.40	1060.54	3.04	0.37	1061.07	2.93	0.34	1062.24	2.67	0.29	
1.98	401	9442	1052.58	1058.94	2.67	0.38	1059.88	2.65	0.34	1060.60	2.50	0.31	1061.12	2.36	0.28	1062.28	2.12	0.23	
1.99	402	9426	1052.84	1058.83	2.92	0.41	1059.80	2.87	0.37	1060.55	2.68	0.33	1061.09	2.52	0.30	1062.26	2.24	0.24	
2.04	403	9375	1052.48	1058.78	2.69	0.38	1059.73	2.80	0.36	1060.47	2.70	0.33	1061.02	2.57	0.30	1062.21	2.34	0.26	
2.09	404	9323	1052.61	1058.58	3.08	0.44	1059.58	3.13	0.41	1060.37	2.95	0.36	1060.95	2.74	0.32	1062.17	2.44	0.27	
2.12	405	9294	1052.66	1058.54	2.97	0.43	1059.53	3.06	0.40	1060.33	2.92	0.36	1060.92	2.73	0.32	1062.14	2.48	0.27	
2.15	406	9263	1052.63	1058.46	3.02	0.43	1059.42	3.24	0.42	1060.19	3.21	0.39	1060.81	3.03	0.35	1062.06	2.78	0.30	
2.20	407	9221	1052.67	1058.37	3.12	0.44	1059.33	3.35	0.44	1060.08	3.40	0.42	1060.71	3.23	0.38	1061.99	2.99	0.32	
2.27	408	9147	1052.53	1058.35	2.75	0.39	1059.28	3.11	0.40	1060.00	3.31	0.41	1060.58	3.34	0.39	1061.81	3.35	0.36	
2.33	409	9083	1052.21	1058.33	2.48	0.34	1059.24	2.91	0.37	1059.92	3.26	0.39	1060.42	3.48	0.40	1061.56	3.78	0.41	
2.39	410	9031	1052.08	1058.29	2.50	0.34	1059.20	2.91	0.37	1059.87	3.27	0.39	1060.36	3.51	0.41	1061.48	3.88	0.42	
2.46	411	8957	1052.40	1058.30	1.93	0.27	1059.23	2.20	0.28	1059.92	2.48	0.30	1060.42	2.69	0.32	1061.55	2.99	0.33	
2.52	412	8899	1052.40	1058.24	1.97	0.27	1059.18	2.24	0.29	1059.87	2.49	0.30	1060.38	2.66	0.31	1061.51	2.96	0.32	
2.56	413	8854	1052.19	1058.13	2.30	0.32	1059.07	2.55	0.33	1059.76	2.81	0.34	1060.26	2.98	0.35	1061.40	3.26	0.36	Upstream of Sandy Beach Pedestrian Bridge
2.57	414	8850	1052.16	1058.04	2.39	0.34	1058.97	2.65	0.34	1059.69	2.86	0.35	1060.21	3.02	0.36	1061.37	3.28	0.36	
2.67	415	8745	1051.53	1057.93	2.51	0.33	1058.82	2.87	0.35	1059.52	3.15	0.36	1060.03	3.34	0.37	1061.18	3.67	0.39	
2.72	416	8696	1051.22	1057.81	2.67	0.37	1058.72	2.95	0.37	1059.44	3.18	0.38	1059.95	3.34	0.39	1061.13	3.56	0.38	
2.82	417	8601	1051.57	1057.55	2.83	0.40	1058.43	3.18	0.42	1059.11	3.48	0.43	1059.64	3.62	0.43	1060.88	3.74	0.41	
2.88	418	8535	1051.74	1057.28	3.09	0.44	1058.11	3.52	0.46	1058.87	3.64	0.45	1059.48	3.59	0.43	1060.81	3.41	0.37	
2.93	419	8486	1051.59	1057.15	3.17	0.46	1058.01	3.50	0.47	1058.82	3.50	0.44	1059.44	3.43	0.41	1060.79	3.28	0.36	
2.99	420	8423	1051.68	1057.02	3.15	0.45	1057.96	3.26	0.43	1058.80	3.18	0.39	1059.43	3.12	0.37	1060.79	3.02	0.33	
3.09	422	8326	1051.35	1056.80	3.17	0.45	1057.59	3.59	0.48	1058.27	3.91	0.49	1058.80	4.13	0.50	1059.96	4.56	0.51	
3.17	423	8251	1051.22	1056.82	2.48	0.35	1057.65	2.74	0.36	1058.38	2.92	0.36	1058.94	3.04	0.36	1060.18	3.25	0.36	
3.20	425	8217	1051.15	1056.65	2.91	0.42	1057.46	3.22	0.43	1058.16	3.45	0.44	1058.70	3.60	0.44	1059.90	3.90	0.44	
3.24	426	8181	1051.14	1056.59	3.09	0.43	1057.41	3.38	0.44	1058.13	3.59	0.44	1058.67	3.74	0.44	1059.88	4.03	0.44	
3.30	427	8121	1050.96	1056.53	2.92	0.42	1057.34	3.21	0.42	1058.05	3.43	0.43	1058.60	3.56	0.43	1059.81	3.83	0.42	
3.35	429	8068	1050.89	1056.49	2.75	0.40	1057.32	2.99	0.40	1058.05	3.17	0.40	1058.61	3.28	0.39	1059.84	3.49	0.39	
3.39	430	8023	1050.80	1056.47	2.56	0.37	1057.31	2.78	0.37	1058.04	2.94	0.37	1058.61	3.04	0.37	1059.85	3.24	0.36	
3.43	431	7985	1050.77	1056.45	2.54	0.36	1057.28	2.78	0.36	1058.02	2.95	0.36	1058.58	3.06	0.36	1059.85	3.19	0.35	
3.50	433	7916	1050.78	1056.38	2.47	0.35	1057.22	2.70	0.36	1057.96	2.86	0.35	1058.54	2.94	0.35	1059.81	3.05	0.33	
3.57	434	7849	1051.07	1056.33	2.34	0.33	1057.18	2.55	0.34	1057.93	2.67	0.33	1058.52	2.73	0.32	1059.80	2.83	0.31	
3.60	436	7813	1050.33	1056.30	2.28	0.33	1057.15	2.48	0.33	1057.91	2.58	0.32	1058.50	2.63	0.32	1059.79	2.73	0.30	
3.67	437	7746	1049.81	1056.20	2.60	0.34	1057.05	2.80	0.35	1057.82	2.90	0.34	1058.41	2.96	0.33	1059.70	3.06	0.32	
3.71	438	7710	1050.26	1056.14	2.67	0.36	1057.00	2.88	0.36	1057.76	3.00	0.36	1058.35	3.06	0.35	1059.64	3.19	0.34	
3.76	439	7658	1050.12	1056.04	2.74	0.38	1056.90	2.94	0.38	1057.66	3.07	0.37	1058.25	3.14	0.37	1059.54	3.29	0.35	
3.80	440	7614	1049.95	1055.93	3.01	0.41	1056.81	3.16	0.40	1057.59	3.25	0.39	1058.19	3.31	0.38	1059.48	3.42	0.36	
3.81	441	7605	1049.73	1055.95	2.88	0.39	1056.83	3.03	0.38	1057.61	3.12	0.37	1058.21	3.18	0.36	1059.51	3.30	0.35	Upstream of Riverdale Ave Pedestrian Bridge
3.82	442	7596	1049.57	1055.85	2.87	0.39	1056.78	3.00	0.37	1057.57	3.10	0.36	1058.18	3.16	0.36	1059.49	3.30	0.35	
3.84	444	7577	1049.19	1055.87	2.68	0.35	1056.78	2.88	0.35	1057.57	3.01	0.35	1058.18	3.11	0.35	1059.48	3.30	0.34	
3.90	445	7518	1049.12	1055.76	2.91	0.39	1056.61	3.32	0.41	1057.34	3.61	0.42	1057.91	3.81	0.43	1059.13	4.17	0.44	
3.94	446	7480	1049.16	1055.68	2.98	0.40	1056.54	3.36	0.42	1057.28	3.64	0.43	1057.85	3.81	0.43	1059.08	4.14	0.44	
3.99	447	7426	1049.41	1055.69	2.63	0.36	1056.54	2.99	0.38	1057.29	3.25	0.39	1057.86	3.42	0.39	1059.10	3.74	0.40	
4.03	448	7390	1049.33	1055.66	2.49	0.34	1056.51	2.85	0.36	1057.26	3.12	0.38	1057.83	3.29	0.38	1059.07	3.61	0.39	
4.07	449	7345	1049.68	1055.68	2.20	0.30	1056.55	2.48	0.32	1057.31	2.68	0.32	1057.90	2.82	0.33	1059.17	3.07	0.33	
4.10	450	7321	1049.75	1055.65	2.30	0.32	1056.52	2.56	0.33	1057.29	2.74	0.33	1057.88	2.86	0.33	1059.15	3.08	0.33	
4.14	451	7282	1049.02	1055.66	2.03	0.27	1056.56	2.16	0.27	1057.34	2.25	0.26	1057.93	2.31	0.26	1059.23	2.43	0.25	
4.18	452	7238	1049.21	1055.58	2.29	0.30	1056.48	2.44	0.30	1057.26	2.55	0.30	1057.86	2.61	0.29	1059.15	2.75	0.29	
4.20	453	7221	1049.15	1055.53	2.43	0.32	1056.42	2.62	0.32	1057.20	2.74	0.32	1057.80	2.82	0.31	1059.10	2.97	0.31	Upstream of Elbow Drive (Elboya) Bridge
4.22	454	7195	1049.11	1055.20	2.92	0.39	1056.13	3.20	0.40	1056.92	3.34	0.39	1057.52	3.44	0.39	1058.81	3.62	0.38	
4.24	455	7181	1048.99	1055.14	3.13	0.42	1056.08	3.40	0.42	1056.87	3.57	0.42	1057.46	3.68	0.42	1058.74	3.89	0.41	
4.27	456	7146	1049.02	1055.10	3.06	0.41	1056.03	3.35	0.41	1056.82	3.53	0.41	1057.41	3.65	0.41	1058.69	3.88	0.41	
4.31	457	7104	1048.74	1055.07	2.95	0.39	1055.99	3.28	0.40	1056.78	3.48	0.41	1057.37	3.61	0.41	1058.64	3.86	0.40	
4.35	458	7063	1048.55	1055.05	2.89	0.38	1055.98	3.17	0.38	1056.77	3.36	0.38	1057.37	3.49	0.38	1058.65	3.72	0.38	
4.41	459	7012	1048.51	1055.07	2.55	0.33	1056.02	2.76	0.33	1056.81	2.92	0.33	1057.42	3.02	0.33	1058.71	3.22	0.33	
4.43	460	6985	1048.57	1055.08	2.38	0.31	1056.03	2.56	0.31	1056.83	2.71	0.31	1057.44	2.81	0.31	1058.73	3.00	0.31	
4.48	461	6935	1048.31	1054.99	2.59	0.34	1055.92	2.84	0.34	1056.71	3.03	0.35	1057.30	3.17	0.35	1058.57	3.43	0.35	
4.54	462	6881	1048.31	1055.06	1.72	0.22	1056.02	1.79	0.21	1056.82	1.86	0.21	1057.43	1.91	0.21	1058.73	2.02	0.21	

Distance from the Glenmore Dam (km)	Station in Flood Mapping	Station in HEC-RAS	Channel Thalweg (m)	100-Year Flood Event			200-Year Flood Event			350-Year Flood Event			500-Year Flood Event			1000-Year Flood Event			Notes
				Water Level (m)	Channel Velocity (m/s)	Froude Number	Water Level (m)	Channel Velocity (m/s)	Froude Number	Water Level (m)	Channel Velocity (m/s)	Froude Number	Water Level (m)	Channel Velocity (m/s)	Froude Number	Water Level (m)	Channel Velocity (m/s)	Froude Number	
4.58	463	6837	1048.42	1055.00	2.03	0.27	1055.97	2.10	0.26	1056.78	2.18	0.25	1057.38	2.23	0.25	1058.69	2.35	0.24	
4.62	464	6800	1048.15	1055.07	0.93	0.12	1056.05	0.89	0.11	1056.86	0.88	0.10	1057.47	0.88	0.10	1058.79	0.89	0.09	
4.67	465	6748	1048.09	1055.06	0.97	0.12	1056.04	0.93	0.11	1056.85	0.93	0.10	1057.47	0.93	0.10	1058.78	0.94	0.10	
4.71	466	6710	1047.97	1055.05	1.05	0.13	1056.03	1.03	0.12	1056.84	1.03	0.12	1057.46	1.03	0.11	1058.77	1.04	0.10	
4.82	467	6602	1048.63	1054.99	1.51	0.20	1055.98	1.43	0.17	1056.80	1.41	0.16	1057.42	1.41	0.15	1058.74	1.42	0.15	
4.86	468	6557	1048.31	1054.96	1.65	0.21	1055.95	1.63	0.19	1056.77	1.65	0.19	1057.38	1.66	0.18	1058.70	1.71	0.17	
4.90	469	6521	1047.64	1054.93	1.76	0.22	1055.91	1.79	0.21	1056.72	1.84	0.21	1057.33	1.86	0.20	1058.65	1.92	0.19	
4.92	470	6498	1047.47	1054.86	2.21	0.28	1055.83	2.31	0.27	1056.64	2.40	0.27	1057.25	2.47	0.26	1058.55	2.59	0.26	
4.95	471	6470	1047.12	1054.82	2.44	0.30	1055.80	2.55	0.29	1056.60	2.65	0.29	1057.21	2.73	0.29	1058.50	2.87	0.28	
4.99	472	6427	1046.63	1054.66	2.99	0.37	1055.65	3.09	0.35	1056.46	3.20	0.35	1057.06	3.27	0.34	1058.35	3.42	0.34	
5.04	473	6381	1046.55	1054.50	3.28	0.41	1055.50	3.37	0.39	1056.31	3.48	0.39	1056.91	3.55	0.38	1058.19	3.70	0.37	
5.08	474	6339	1047.06	1054.42	3.18	0.41	1055.39	3.41	0.41	1056.18	3.59	0.41	1056.77	3.70	0.41	1058.03	3.93	0.40	
5.13	475	6287	1048.06	1054.35	3.18	0.43	1055.30	3.45	0.43	1056.09	3.66	0.43	1056.67	3.80	0.43	1057.92	4.07	0.43	
5.19	476	6230	1047.37	1054.29	3.21	0.41	1055.25	3.46	0.41	1056.05	3.65	0.41	1056.65	3.77	0.41	1057.92	4.00	0.41	
5.24	477	6181	1047.17	1054.23	3.22	0.40	1055.15	3.59	0.42	1055.93	3.85	0.42	1056.51	4.00	0.43	1057.77	4.28	0.43	
5.31	478	6112	1047.50	1053.95	3.61	0.47	1054.80	4.13	0.51	1055.52	4.48	0.52	1056.09	4.68	0.53	1057.33	5.00	0.52	
5.38	479	6034	1047.34	1054.09	2.65	0.34	1055.01	2.89	0.34	1055.79	3.06	0.35	1056.39	3.16	0.34	1057.67	3.34	0.34	
5.46	480	5953	1048.09	1053.96	2.82	0.39	1054.77	3.34	0.43	1055.44	3.75	0.46	1055.95	4.03	0.47	1057.07	4.57	0.50	
5.53	481	5887	1048.22	1053.91	2.63	0.37	1054.72	3.08	0.40	1055.40	3.42	0.42	1055.94	3.63	0.43	1057.11	3.98	0.44	
5.63	482	5785	1047.84	1053.93	1.65	0.23	1054.78	1.87	0.24	1055.51	2.01	0.25	1056.08	2.09	0.25	1057.32	2.21	0.24	
5.71	483	5709	1047.24	1053.70	2.45	0.32	1054.44	2.97	0.37	1055.05	3.40	0.40	1055.53	3.68	0.42	1056.58	4.24	0.46	
5.76	484	5658	1046.72	1053.60	2.73	0.35	1054.35	3.22	0.39	1055.01	3.53	0.41	1055.52	3.73	0.41	1056.64	4.05	0.42	
5.84	485	5582	1046.70	1053.41	3.15	0.41	1054.11	3.71	0.45	1054.74	4.07	0.48	1055.24	4.28	0.48	1056.35	4.62	0.49	
5.90	486	5513	1047.01	1053.37	3.00	0.39	1054.07	3.49	0.43	1054.71	3.81	0.45	1055.22	3.99	0.46	1056.35	4.28	0.46	Upstream of Rideau Park Pedestrian Bridge
5.92	487	5495	1047.44	1053.24	3.20	0.44	1053.95	3.68	0.47	1054.57	4.00	0.49	1055.07	4.16	0.49	1056.22	4.38	0.48	
5.99	488	5428	1047.37	1053.16	3.14	0.45	1053.89	3.52	0.47	1054.53	3.73	0.47	1055.05	3.82	0.46	1056.24	3.94	0.44	
6.03	489	5392	1047.64	1053.18	2.82	0.40	1053.90	3.19	0.42	1054.55	3.39	0.42	1055.08	3.47	0.42	1056.27	3.56	0.40	
6.08	490	5337	1047.35	1053.11	2.82	0.40	1053.84	3.15	0.42	1054.50	3.31	0.42	1055.03	3.36	0.41	1056.25	3.42	0.38	
6.11	491	5303	1047.45	1053.09	2.72	0.39	1053.83	3.00	0.40	1054.48	3.16	0.40	1055.02	3.22	0.39	1056.23	3.31	0.37	
6.16	493	5259	1047.02	1053.13	2.05	0.30	1053.88	2.23	0.31	1054.54	2.34	0.30	1055.08	2.40	0.30	1056.30	2.48	0.28	
6.20	494	5216	1047.68	1053.13	1.80	0.27	1053.89	1.96	0.27	1054.55	2.07	0.27	1055.10	2.12	0.27	1056.31	2.22	0.26	
6.25	496	5172	1047.55	1053.13	1.47	0.23	1053.89	1.53	0.22	1054.56	1.58	0.21	1055.11	1.59	0.21	1056.34	1.62	0.19	
6.29	498	5124	1046.55	1053.08	1.28	0.22	1053.85	1.36	0.21	1054.52	1.43	0.20	1055.07	1.46	0.20	1056.30	1.51	0.18	
6.34	500	5073	1047.13	1053.02	1.22	0.20	1053.80	1.30	0.20	1054.48	1.36	0.19	1055.04	1.39	0.19	1056.28	1.44	0.17	
6.39	502	5032	1047.14	1052.96	1.31	0.21	1053.75	1.38	0.21	1054.43	1.44	0.20	1054.99	1.46	0.19	1056.23	1.50	0.18	
6.43	503	4984	1046.97	1052.90	1.38	0.22	1053.69	1.46	0.21	1054.37	1.52	0.21	1054.93	1.55	0.20	1056.18	1.61	0.19	
6.49	504	4931	1046.72	1052.81	1.55	0.24	1053.60	1.68	0.24	1054.29	1.78	0.24	1054.85	1.82	0.23	1056.11	1.91	0.22	
6.54	506	4877	1046.46	1052.81	1.23	0.18	1053.61	1.32	0.18	1054.30	1.37	0.18	1054.87	1.40	0.17	1056.14	1.43	0.16	
6.59	507	4830	1046.20	1052.76	1.38	0.21	1053.56	1.47	0.20	1054.25	1.53	0.20	1054.82	1.55	0.19	1056.09	1.60	0.18	
6.62	508	4795	1046.03	1052.69	1.57	0.22	1053.49	1.73	0.23	1054.17	1.83	0.23	1054.74	1.88	0.23	1056.00	1.96	0.22	Upstream of Mission (4 St SW)Bridge
6.65	509	4768	1046.47	1052.28	1.96	0.29	1053.27	2.08	0.28	1054.00	2.20	0.28	1054.59	2.26	0.28	1055.86	2.38	0.27	
6.67	509.1	4747	1047.03	1052.25	1.87	0.28	1053.24	1.90	0.26	1053.98	1.97	0.25	1054.56	2.01	0.24	1055.84	2.07	0.23	New Cross Section
6.71	511	4708	1046.68	1052.11	2.29	0.34	1053.09	2.46	0.33	1053.80	2.65	0.34	1054.37	2.76	0.34	1055.63	2.96	0.33	
6.77	513	4652	1046.16	1051.94	2.63	0.38	1052.93	2.81	0.37	1053.65	3.01	0.38	1054.23	3.12	0.37	1055.49	3.33	0.37	
6.84	514	4573	1046.10	1051.73	2.93	0.42	1052.73	3.12	0.41	1053.44	3.31	0.41	1054.03	3.40	0.40	1055.33	3.56	0.39	
6.90	516	4520	1046.26	1051.71	2.66	0.38	1052.73	2.81	0.37	1053.45	2.98	0.37	1054.05	3.06	0.36	1055.35	3.21	0.35	
6.94	517	4473	1046.37	1051.76	2.04	0.30	1052.79	2.13	0.29	1053.52	2.27	0.29	1054.13	2.35	0.28	1055.43	2.49	0.28	
7.00	519	4417	1046.06	1051.59	2.58	0.36	1052.61	2.73	0.35	1053.32	2.94	0.36	1053.90	3.06	0.35	1055.18	3.29	0.35	
7.05	522	4365	1045.55	1051.39	3.04	0.42	1052.39	3.27	0.41	1053.05	3.57	0.43	1053.61	3.74	0.43	1054.84	4.06	0.44	
7.09	525	4323	1045.26	1051.41	2.68	0.36	1052.42	2.89	0.36	1053.09	3.16	0.37	1053.66	3.31	0.38	1054.91	3.61	0.38	
7.14	527	4281	1045.24	1051.43	2.43	0.34	1052.46	2.58	0.33	1053.15	2.82	0.34	1053.73	2.95	0.34	1055.00	3.19	0.34	
7.19	529	4223	1044.96	1050.89	3.77	0.55	1051.80	4.17	0.56	1052.28	4.77	0.61	1052.74	5.09	0.63	1053.79	5.67	0.65	
7.25	531	4168	1044.95	1050.77	3.68	0.54	1051.61	4.25	0.57	1051.94	5.02	0.66	1052.30	5.49	0.70	1053.06	6.42	0.77	
7.32	538	4098	1043.99	1050.97	2.45	0.34	1051.94	2.67	0.34	1052.43	3.04	0.37	1052.90	3.23	0.38	1053.95	3.60	0.40	
7.33	539	4083	1044.00	1050.96	2.48	0.34	1051.92	2.70	0.34	1052.41	3.07	0.37	1052.88	3.27	0.38	1053.93	3.64	0.40	
7.36	540	4052	1044.88	1050.96	2.16	0.30	1051.93	2.31	0.30	1052.42	2.67	0.33	1052.89	2.85	0.34	1053.94	3.19	0.35	Upstream of 25th Ave Bridge
7.38	541	4034	1044.97	1050.24	2.48	0.36	1051.03	2.72	0.37	1051.80	2.96	0.37	1052.37	3.11	0.38	1053.45	3.47	0.39	
7.43	542	3989	1045.36	1050.06	2.98	0.46	1050.83	3.26	0.46	1051.58	3.53	0.47	1052.15	3.69	0.46	1053.19	4.11	0.48	
7.49	543	3931	1044.62	1049.86	3.22	0.47	1050.65	3.47	0.47	1051.43	3.68	0.47	1052.02	3.79	0.46	1053.09	4.14	0.47	
7.53	544	3889	1044.08	1049.71	3.49	0.50	1050.54	3.68	0.49	1051.34	3.87	0.48	1051.94	3.97	0.47	1053.03	4.31	0.48	
7.55	545	3869	1043.86	1049.71	3.32	0.47	1050.54	3.52	0.46	1051.34	3.71	0.46	1051.94	3.82	0.45	1053.03	4.16	0.46	
7.57	546	3851	1043.71	1049.57	3.59	0.52	1050.44	3.71	0.49	1051.26	3.86	0.48	1051.88	3.94	0.47	1052.97	4.26	0.47	
7.58	547	3834	1043.73	1049.35	4.03	0.60	1050.31	3.98	0.54	1051.17	4.06	0.51	1051.80	4.11	0.49	1052.90	4.41	0.49	
7.61	548	3809	1043.94	1049.05	4.44	0.67	1049.70	4.98	0.70	1050.31	5.48	0.73	1050.85	5.69	0.72	1051.17	7.06	0.88	
7.64	549	3777	1043.88	1048.94	4.35	0.67	1049.67	4.70	0.67	1050.41	4.92	0.65	1051.03	4.94	0.62	1051.60	5.80	0.70	
7.68	550	3738	1044.07	1049.22	2.96	0.47	1050.05	2.98	0.43	1050.84	3.01	0.40	1051.47	2.99	0.38	1052.24	3.34	0.40	
7.75	556	3671	1045.11	1049.22	2.38	0.40	1050.10	2.19	0.33	1050.92	2.10	0.29	1051.57	1.95	0.25	1052.38	2.10	0.26	
7.81	557	3610	1044.64	1049.22	2.25	0.35	1050.12	1.99	0.28	1050.94	1.93	0.25	1051.59	1.78	0.22	1052.41	1.91	0.22	
7.85	558	3568	1044.11	1049.22	1.88	0.28	1050.12	1.67	0.23	1050.95	1.57	0.20	1051.60	1.44	0.18	1052.42	1.54	0.18	
7.92	559	3498	1043.14	1049.16	2.20	0.31	1050.09	1.85	0.24	1050.93	1.71	0.21	1051.58	1.60	0.19	1052.39	1.73	0.19	Upstream of 21 Ave (Lindsay Park) Pedestrian Bridge
7.94	560	3478	1044.64	1049.14	2.03	0.33	1050.08	1.71	0.25	1050.92	1.59	0.21	1051.57	1.49	0.19	1052.39	1.62	0.19	
7.96	561	3455	1043.34	1049.11	2.16	0.31	1050.06	1.90	0.25	1050.90	1.80	0.22	1051.56	1.69	0.20	1052.37	1.84	0.20	
7.98	562	3438	1043.59	1049.06	2.25	0.32	1050.03	2.02	0.27	1050.87	1.97	0.24	1051.53	1.84	0.22	1052.34	2.00	0.22	
8.03	563	3386	1043.74	1048.94	2.53	0.37	1049.92	2.39	0.32	1050.77	2.34	0.29	1051.46	2.15	0.25	1052.28	2.27	0.25	
8.07	564	3346	1043.69	1048.86	2.75	0.40	1049.84	2.63	0.35	1050.69	2.64	0.32	1051.37	2.54	0.30	1052.15	2.83	0.32	
8.12	565	3297	1043.42	1048.75	2.81	0.40	1049.74	2.75	0.36	1050.59	2.76	0.34	1051.29	2.65	0.31	1052.04	3.01	0.34	
8.15	566	3271	1043.37	1048.68	2.92	0.42	1049.67	2.89	0.38	1050.53	2.90	0.36	1051.27	2.69	0.31	1052.04	2.95	0.33	
8.17	567	3251	1043.19	1048.73	2.45	0.35	1049.71	2.52	0.33	1050.55	2.63	0.32	1051.26	2.60	0.30	1051.97	3.03	0.34	Upstream of Lindsay Park CNR Bridge
8.18	568	3236	1043.03	1048.59	2.49	0.36	1049.33	2.62	0.35	1049.86	2.85	0.37	1050.32	2.92	0.36	1051.16	3.23	0.38	
8.19	569	3224	1042.73	1048.59	2.24	0.32	1049.33	2.33	0.31	1049.87	2.50	0.32	1050.33	2.54	0.31	1051.17	2.84	0.33	
8.23	570	3188	1043.05	1048.57	2.19	0.32	1049.32	2.27	0.31	1049.86	2.43	0.31	1050.32	2.47	0.31	1051.16	2.78	0.33	
8.27	571	3146	1043.08	1048.38	2.90	0.42	1049.17	2.86	0.39	1049.72	3.00	0.39	1050.19	2.99	0.37	1051.03	3.27	0.38	
8.34	572	3073	1042.33	1048.04	3.50	0.49	1048.83	3.58	0.47	1049.50	3.46	0.43	1050.06	3.26	0.39	1050.98	3.30	0.37	
8.39	573	3027	1042.42	1048.15	2.81	0.38	1049.00	2.59	0.33	1049.63	2.57	0.31	1050.16	2.46	0.29	1051.07	2.55	0.28	
8.44	574	2982	1041.83	1048.25	1.92	0.26	1049.06	1.86	0.23	1049.68	1.90	0.23	1050.20	1.87	0.22	1051.10	2.00	0.22	
8.45	575	2966	1041.42	1048.21	1.96	0.25	1049.03	1.89	0.23	1049.66	1.93	0.22	1050.18	1.89	0.21	1051.08	2.04	0.22	Upstream of Pattison (1 St) Bridge
8.48	576	2939	1039.58	1048.16	1.62	0.20	1049.00	1.62	0.19	1049.63	1.68	0.19	1050.16	1.68	0.18	1051.06	1.85	0.19	
8.51	577	2911	1042.16	1048.12	1.88	0.26	1048.99	1.78	0.23	1049.62	1.80	0.22	1050.15	1.77	0.21	1051.06	1.92	0.21	
8.54	578	2882	1042.16	1048.13	1.78	0.24	1048.99	1.66	0.21	1049.63	1.66	0.20	1050.16	1.58	0.18	1051.07	1.63	0.18	
8.58	579	2840	1042.02	1048.11	1.67	0.22	1048.98	1.56	0.19	1049.62	1.58	0.19	1050.16	1.50	0.17	1051.07	1.55	0.17	
8.62	580	2802	1041.31	1048.05	1.92	0.25	1048.94	1.75	0.21	1049.58	1.82	0.21	1050.12	1.72	0.19	1051.03	1.78	0.19	
8.65	581	2766	1041.62	1048.01	2.00	0.26	1048.90	1.87	0.23	1049.54	1.90	0.22	1050.07	1.90	0.21	1050.98	2.02	0.22	

Distance from the Glenmore Dam (km)	Station in Flood Mapping	Station in HEC-RAS	Channel Thalweg (m)	100-Year Flood Event			200-Year Flood Event			350-Year Flood Event			500-Year Flood Event			1000-Year Flood Event			Notes
				Water Level (m)	Channel Velocity (m/s)	Froude Number	Water Level (m)	Channel Velocity (m/s)	Froude Number	Water Level (m)	Channel Velocity (m/s)	Froude Number	Water Level (m)	Channel Velocity (m/s)	Froude Number	Water Level (m)	Channel Velocity (m/s)	Froude Number	
8.68	582	2742	1041.70	1048.05	1.43	0.19	1048.93	1.40	0.17	1049.57	1.46	0.17	1050.10	1.46	0.16	1051.00	1.61	0.17	Upstream of Victoria (Macleod Trail) Bridge
8.72	583	2699	1041.50	1047.83	1.50	0.19	1048.85	1.45	0.17	1049.51	1.49	0.17	1050.05	1.48	0.16	1050.96	1.63	0.17	Upstream of LRT Bridge
8.76	584	2656	1041.14	1047.75	1.32	0.17	1048.81	1.27	0.15	1049.48	1.31	0.15	1050.04	1.31	0.14	1050.94	1.45	0.15	
8.78	585	2636	1041.04	1047.71	1.79	0.22	1048.79	1.62	0.19	1049.46	1.66	0.18	1050.01	1.64	0.18	1050.91	1.81	0.19	
8.81	587	2608	1040.65	1047.56	2.46	0.31	1048.66	2.34	0.27	1049.31	2.52	0.28	1049.85	2.58	0.28	1050.72	2.86	0.30	
8.83	588	2588	1040.52	1047.54	2.40	0.30	1048.63	2.36	0.27	1049.27	2.56	0.28	1049.82	2.64	0.28	1050.68	2.94	0.30	
8.88	593	2536	1040.20	1047.25	3.17	0.40	1048.23	3.54	0.42	1048.75	4.02	0.46	1049.21	4.28	0.48	1049.77	5.17	0.56	
8.93	594	2483	1040.23	1047.12	3.38	0.45	1048.17	3.56	0.44	1048.73	3.86	0.45	1049.25	3.93	0.45	1049.91	4.47	0.49	
8.95	595	2469	1040.28	1047.16	3.13	0.41	1048.26	3.14	0.37	1048.88	3.19	0.36	1049.42	3.10	0.34	1050.16	3.33	0.35	Upstream of Stampede Park (25 Ave/3 ST) Access
8.97	596	2443	1039.10	1046.51	3.70	0.49	1047.74	3.71	0.44	1048.24	4.26	0.49	1049.04	3.81	0.42	1049.80	4.05	0.43	
8.99	597	2424	1039.32	1046.21	4.34	0.57	1045.84	6.88	0.93	1046.99	6.47	0.80	1047.49	6.73	0.80	1048.99	5.94	0.64	
9.03	598	2387	1039.20	1046.47	3.06	0.38	1046.54	4.23	0.52	1046.79	4.59	0.56	1047.06	5.06	0.60	1048.28	5.01	0.55	
9.09	599	2332	1040.41	1046.33	3.31	0.47	1046.30	5.29	0.78	1046.74	4.46	0.60	1047.10	4.65	0.61	1048.47	4.00	0.47	
9.15	601	2272	1040.16	1046.31	3.15	0.43	1046.54	2.49	0.34	1047.03	2.61	0.34	1047.41	2.70	0.34	1048.65	2.54	0.29	
9.21	602	2212	1039.99	1046.34	2.52	0.35	1046.56	1.81	0.25	1047.06	1.89	0.25	1047.44	1.94	0.25	1048.67	1.89	0.22	
9.27	603	2146	1039.70	1046.26	2.57	0.35	1046.54	1.65	0.22	1047.05	1.71	0.22	1047.43	1.75	0.21	1048.67	1.63	0.18	
9.33	605	2090	1039.54	1046.25	2.27	0.29	1046.53	1.64	0.21	1047.03	1.70	0.21	1047.42	1.73	0.20	1048.66	1.62	0.18	
9.37	606	2048	1038.54	1046.21	2.46	0.31	1046.52	1.70	0.21	1047.02	1.74	0.20	1047.41	1.76	0.20	1048.66	1.61	0.17	
9.40	607	2020	1038.33	1046.14	2.89	0.35	1046.50	1.91	0.23	1047.01	1.94	0.22	1047.40	1.96	0.22	1048.65	1.78	0.19	
9.42	608	1999	1038.53	1046.15	2.64	0.34	1046.50	1.74	0.22	1047.01	1.77	0.21	1047.40	1.79	0.21	1048.65	1.63	0.17	
9.45	609	1969	1037.53	1046.14	2.49	0.30	1046.49	1.73	0.20	1047.00	1.77	0.20	1047.39	1.79	0.20	1048.65	1.64	0.17	
9.47	610	1944	1038.62	1046.13	2.30	0.30	1046.49	1.53	0.19	1047.00	1.57	0.19	1047.39	1.59	0.19	1048.65	1.45	0.16	
9.51	611	1910	1039.32	1046.07	2.46	0.32	1046.48	1.61	0.20	1046.99	1.65	0.20	1047.37	1.67	0.20	1048.64	1.52	0.17	Upstream of Horse Barn Bridge (New)
9.52	612	1894	1039.46	1045.95	2.52	0.33	1046.45	1.59	0.20	1046.97	1.61	0.20	1047.36	1.63	0.19	1048.63	1.46	0.16	
9.56	613	1861	1039.08	1045.85	2.76	0.36	1046.43	1.68	0.21	1046.95	1.70	0.20	1047.35	1.71	0.20	1048.63	1.53	0.17	Upstream of Horse Barn Bridge (Old)
9.57	614	1848	1039.16	1045.65	2.87	0.37	1046.39	1.73	0.21	1046.93	1.74	0.20	1047.32	1.75	0.20	1048.62	1.57	0.17	
9.66	615	1755	1039.72	1045.59	2.41	0.33	1046.37	1.44	0.18	1046.91	1.50	0.18	1047.30	1.53	0.18	1048.60	1.43	0.16	
9.72	617	1698	1039.27	1045.60	2.03	0.27	1046.37	1.34	0.17	1046.90	1.42	0.17	1047.29	1.48	0.17	1048.59	1.43	0.15	
9.80	618	1621	1038.70	1045.50	2.36	0.31	1046.34	1.48	0.18	1046.87	1.56	0.18	1047.27	1.61	0.19	1048.57	1.55	0.16	
9.86	619	1561	1038.82	1045.46	2.20	0.30	1046.31	1.60	0.20	1046.84	1.68	0.20	1047.23	1.74	0.20	1048.55	1.65	0.18	
9.89	621	1530	1038.28	1045.38	2.33	0.31	1046.28	1.69	0.21	1046.81	1.79	0.22	1047.20	1.86	0.22	1048.52	1.77	0.19	
9.91	622	1506	1038.49	1045.01	3.63	0.49	1046.20	2.33	0.28	1046.74	2.41	0.28	1047.14	2.46	0.28	1048.48	2.25	0.24	
9.97	624	1448	1038.06	1044.66	4.11	0.56	1045.41	4.48	0.57	1046.35	3.74	0.45	1046.81	3.67	0.42	1048.30	3.09	0.33	
10.04	626	1374	1038.39	1044.59	3.76	0.51	1045.47	3.72	0.47	1046.33	3.35	0.40	1046.77	3.36	0.39	1048.26	2.93	0.31	
10.11	627	1303	1038.33	1044.61	3.22	0.43	1045.42	3.41	0.43	1046.25	3.24	0.39	1046.68	3.33	0.38	1048.18	3.04	0.32	
10.17	627.1	1249	1038.62	1044.71	2.58	0.34	1045.51	2.75	0.34	1046.29	2.81	0.33	1046.71	2.98	0.34	1048.17	2.94	0.31	Upstream of Stampede Park (S) Saddledome Access
10.18	628	1238	1038.63	1044.66	2.54	0.34	1045.47	2.73	0.34	1046.26	2.79	0.33	1046.67	2.96	0.34	1048.14	2.94	0.31	
10.21	629	1205	1038.38	1044.68	2.23	0.30	1045.48	2.44	0.30	1046.26	2.52	0.30	1046.67	2.68	0.31	1048.14	2.66	0.28	Bridge
10.22	630	1193	1038.33	1044.68	2.17	0.29	1045.48	2.37	0.30	1046.26	2.44	0.29	1046.67	2.60	0.30	1048.14	2.59	0.27	
10.28	631	1135	1038.12	1044.48	2.74	0.36	1045.28	2.94	0.36	1046.09	2.98	0.35	1046.49	3.16	0.36	1048.01	3.02	0.31	
10.33	632	1085	1038.42	1044.48	2.52	0.33	1045.30	2.66	0.33	1046.12	2.62	0.31	1046.52	2.75	0.31	1048.05	2.61	0.27	
10.42	633	999	1037.72	1044.36	2.57	0.33	1045.22	2.63	0.32	1046.07	2.52	0.29	1046.48	2.62	0.29	1048.04	2.41	0.25	Upstream of Stampede Park (N) Saddledome Access
10.44	634	979	1036.47	1044.24	2.69	0.34	1045.10	2.75	0.33	1045.99	2.61	0.29	1046.40	2.73	0.30	1047.98	2.51	0.25	
10.46	635	955	1037.38	1044.26	2.58	0.34	1045.09	2.72	0.33	1045.97	2.70	0.31	1046.36	2.87	0.32	1047.92	2.77	0.28	
10.50	636	918	1037.74	1044.18	2.71	0.36	1045.02	2.85	0.35	1045.91	2.81	0.33	1046.29	2.99	0.34	1047.87	2.87	0.30	
10.56	637	858	1037.85	1044.10	2.65	0.35	1044.91	2.89	0.36	1045.79	2.91	0.34	1046.16	3.12	0.36	1047.75	3.03	0.32	
10.62	638	800	1037.23	1044.00	2.76	0.36	1044.79	3.06	0.38	1045.69	3.08	0.36	1046.05	3.32	0.38	1047.67	3.22	0.33	
10.66	639	755	1037.83	1043.96	2.69	0.36	1044.71	3.13	0.39	1045.58	3.27	0.38	1045.91	3.56	0.41	1047.54	3.49	0.36	
10.76	640	659	1037.22	1043.81	2.90	0.38	1044.51	3.41	0.42	1045.39	3.55	0.41	1045.67	3.93	0.45	1047.33	3.90	0.41	
10.83	641	588	1036.72	1043.63	3.18	0.41	1044.24	3.85	0.47	1045.17	3.93	0.45	1045.40	4.37	0.49	1047.26	3.99	0.41	Upstream of MacDonald Bridge
10.85	642	568	1036.95	1042.66	3.85	0.53	1044.07	3.93	0.48	1045.02	4.07	0.47	1045.20	4.61	0.52	1047.06	4.40	0.45	
10.95	643	464	1036.66	1042.73	3.27	0.44	1044.48	2.31	0.27	1045.49	2.16	0.24	1045.81	2.33	0.25	1047.58	2.12	0.21	
10.96	644	457	1036.31	1042.74	3.09	0.42	1044.45	2.36	0.28	1045.46	2.26	0.25	1045.77	2.45	0.27	1047.55	2.27	0.22	
11.07	645	343	1035.92	1042.32	3.74	0.49	1043.90	3.83	0.45	1045.28	2.95	0.32	1045.59	3.13	0.33	1047.49	2.56	0.25	Upstream of 9 Ave Train Bridge
11.09	646	324	1036.00	1041.99	4.14	0.57	1042.71	4.96	0.64	1042.63	6.43	0.84	1042.85	7.20	0.92	1043.50	8.52	1.04	
11.12	647	295	1036.24	1041.66	4.61	0.68	1042.94	3.79	0.49	1043.14	4.37	0.56	1043.47	4.43	0.55	1044.22	4.34	0.51	Upstream of Inglewood (9 Ave)Bridge
11.14	648	275	1036.20	1041.62	4.06	0.59	1042.35	4.46	0.61	1043.00	3.99	0.51	1043.40	3.91	0.49	1044.23	3.63	0.43	
11.25	649	171	1036.44	1041.89	2.20	0.31	1042.62	2.41	0.32	1043.07	2.75	0.35	1043.43	2.84	0.35	1044.29	2.49	0.29	
11.26	649.1	156	1036.17	1041.76	2.27	0.33	1042.49	2.42	0.33	1043.01	2.62	0.34	1043.40	2.65	0.33	1044.17	2.78	0.33	
11.33	650	84	1035.76	1041.77	1.75	0.25	1042.50	1.90	0.25	1043.03	2.07	0.26	1043.41	2.14	0.26	1044.19	2.29	0.27	

Table C.4 (a): Simulation Results along the Side Channels of Elbow River for 2- to 10-year Flood Events

Side Channel	Station in Flood Mapping	Station in HEC-RAS	2-Year Flood Event			5-Year Flood Event			8-Year Flood Event			10-Year Flood Event			Notes
			Water Level (m)	Cross-Section Velocity (m/s)	Froude Number	Water Level (m)	Cross-Section Velocity (m/s)	Froude Number	Water Level (m)	Cross-Section Velocity (m/s)	Froude Number	Water Level (m)	Cross-Section Velocity (m/s)	Froude Number	
Riverdale Ave. SW	421	743	-	-	-	-	-	-	-	-	-	-	-	-	
	424	645	-	-	-	-	-	-	-	-	-	-	-	-	
	428	510	-	-	-	-	-	-	-	-	-	-	-	-	
	432	357	-	-	-	-	-	-	-	-	-	-	-	-	
	435	257	-	-	-	-	-	-	-	-	-	-	-	-	
	443	55	-	-	-	-	-	-	-	-	-	-	-	-	
Roxboro Rd. SW	492	915	-	-	-	-	-	-	-	-	-	-	-	-	
	495	832	-	-	-	-	-	-	-	-	-	-	-	-	
	497	770	-	-	-	-	-	-	-	-	-	-	-	-	
	499	716	-	-	-	-	-	-	-	-	-	-	-	-	
	501	671	-	-	-	-	-	-	-	-	-	-	-	-	
	505	569	-	-	-	-	-	-	-	-	-	-	-	-	
	510	444	-	-	-	-	-	-	-	-	-	-	-	-	
	512	367	-	-	-	-	-	-	-	-	-	-	-	-	
	515	254	-	-	-	-	-	-	-	-	-	-	-	-	
	518	169	-	-	-	-	-	-	-	-	-	-	-	-	
	521	116	-	-	-	-	-	-	-	-	-	-	-	-	
	524	44	-	-	-	-	-	-	-	-	-	-	-	-	
26 Ave. SW	520	235	-	-	-	-	-	-	-	-	-	-	-	-	
	523	198	-	-	-	-	-	-	-	-	-	-	-	-	
	526	161	-	-	-	-	-	-	-	-	-	-	-	-	
	528	118	-	-	-	-	-	-	-	-	-	-	-	-	
	530	78	-	-	-	-	-	-	-	-	-	-	-	-	
	532	44	-	-	-	-	-	-	-	-	-	-	-	-	
25Ave. SW	533	579	-	-	-	-	-	-	-	-	-	-	-	-	
	534	518	-	-	-	-	-	-	-	-	-	-	-	-	
	535	450	-	-	-	-	-	-	-	-	-	-	-	-	
	536	393	-	-	-	-	-	-	-	-	-	-	-	-	
	537	329	-	-	-	-	-	-	-	-	-	-	-	-	
	592	278	-	-	-	-	-	-	-	-	-	-	-	-	
	591	217	-	-	-	-	-	-	-	-	-	-	-	-	
	590	146	-	-	-	-	-	-	-	-	-	-	-	-	
	589	66	-	-	-	-	-	-	-	-	-	-	-	-	
22Ave. SW	550.1	449	-	-	-	-	-	-	1047.94	0.02	0.00	1048.07	0.04	0.00	
	550.2	441	-	-	-	-	-	-	1047.93	0.35	0.09	1048.06	0.33	0.05	
	551	394	-	-	-	-	-	-	1047.54	0.46	0.12	1047.33	2.54	0.59	
	552	314	-	-	-	-	-	-	1047.20	0.31	0.06	1047.43	0.25	0.03	
	553	254	-	-	-	-	-	-	1046.90	0.63	0.12	1047.27	1.14	0.22	
	554	202	-	-	-	-	-	-	1046.29	0.56	0.10	1047.19	0.28	0.03	
	555	116	-	-	-	-	-	-	1045.36	0.57	0.10	1046.99	0.64	0.10	
	586	32	-	-	-	-	-	-	1044.45	0.56	0.10	1044.64	1.48	0.26	

Note: "-" = Not applicable

Table C.4 (b): Simulation Results along the Side Channels of Elbow River for 20- to 75-year Flood Events

Side Channel	Station in Flood Mapping	Station in HEC-RAS	20-Year Flood Event			35-Year Flood Event			50-Year Flood Event			75-Year Flood Event			Notes
			Water Level (m)	Cross-Section Velocity (m/s)	Froude Number	Water Level (m)	Cross-Section Velocity (m/s)	Froude Number	Water Level (m)	Cross-Section Velocity (m/s)	Froude Number	Water Level (m)	Cross-Section Velocity (m/s)	Froude Number	
Riverdale Ave. SW	421	743	-	-	-	-	-	-	1056.08	0.15	0.01	1056.90	0.36	0.02	
	424	645	-	-	-	-	-	-	1056.02	0.46	0.03	1056.70	1.36	0.04	
	428	510	-	-	-	-	-	-	1055.52	1.16	0.13	1056.16	1.64	0.07	
	432	357	-	-	-	-	-	-	1054.97	0.53	0.04	1055.94	0.97	0.03	
	435	257	-	-	-	-	-	-	1054.94	0.28	0.01	1055.88	0.83	0.02	
	443	55	-	-	-	-	-	-	1054.93	0.17	0.01	1055.80	0.82	0.02	
Roxboro Rd. SW	492	915	-	-	-	1051.85	0.09	0.00	1052.29	0.33	0.01	1052.96	0.68	0.02	
	495	832	-	-	-	1051.84	0.24	0.02	1052.26	0.59	0.02	1052.88	1.07	0.03	
	497	770	-	-	-	1051.80	0.35	0.03	1052.16	0.83	0.04	1052.71	1.54	0.05	
	499	716	-	-	-	1051.73	0.28	0.03	1052.07	0.69	0.04	1052.61	1.27	0.04	
	501	671	-	-	-	1051.67	0.29	0.03	1052.01	0.61	0.04	1052.56	1.02	0.03	
	505	569	-	-	-	1051.42	0.46	0.06	1051.73	0.96	0.06	1051.95	2.32	0.10	
	510	444	-	-	-	1049.90	1.38	0.21	1050.58	1.58	0.12	1051.40	1.27	0.04	
	512	367	-	-	-	1049.93	0.16	0.01	1050.52	0.41	0.01	1051.39	0.77	0.02	
	515	254	-	-	-	1049.92	0.11	0.01	1050.50	0.36	0.01	1051.35	0.72	0.02	
	518	169	-	-	-	1049.92	0.10	0.01	1050.48	0.34	0.01	1051.33	0.68	0.02	
	521	116	-	-	-	1049.92	0.06	0.00	1050.48	0.23	0.01	1051.33	0.52	0.01	
	524	44	-	-	-	1049.92	0.01	0.00	1050.48	0.07	0.00	1051.34	0.19	0.00	
26 Ave. SW	520	235	1049.52	0.25	0.04	1050.07	0.50	0.02	1050.64	0.66	0.02	1051.47	0.84	0.02	
	523	198	1049.43	0.33	0.05	1049.99	0.90	0.04	1050.53	1.30	0.04	1051.30	1.72	0.04	
	526	161	1049.30	0.43	0.06	1049.81	1.32	0.06	1050.27	1.95	0.06	1050.96	2.60	0.06	
	528	118	1049.17	0.31	0.04	1049.72	0.97	0.04	1050.21	1.47	0.04	1050.95	1.97	0.04	
	530	78	1049.08	0.32	0.04	1049.58	1.18	0.05	1050.00	1.87	0.06	1050.70	2.48	0.06	
	532	44	1048.89	0.78	0.13	1049.41	1.09	0.10	1049.90	1.37	0.07	1050.72	1.60	0.06	
25Ave. SW	533	579	-	-	-	1049.29	0.87	0.11	1049.82	1.05	0.05	1050.68	1.26	0.04	
	534	518	-	-	-	1048.88	0.62	0.05	1049.50	1.57	0.06	1050.24	2.54	0.06	
	535	450	-	-	-	1048.60	0.61	0.06	1049.23	1.49	0.06	1049.67	2.99	0.08	
	536	393	-	-	-	1048.44	0.52	0.04	1048.90	1.68	0.07	1049.36	2.24	0.08	
	537	329	-	-	-	1047.53	2.97	0.49	1048.19	1.92	0.12	1048.64	2.70	0.10	
	592	278	-	-	-	1047.37	0.45	0.04	1048.00	0.44	0.02	1048.63	0.66	0.02	
	591	217	-	-	-	1047.26	0.34	0.03	1047.97	0.50	0.02	1048.58	0.80	0.02	
	590	146	-	-	-	1047.06	0.56	0.06	1047.91	0.63	0.02	1048.50	0.92	0.03	
	589	66	-	-	-	1045.26	2.61	0.40	1047.44	2.07	0.12	1047.95	2.47	0.10	
22Ave. SW	550.1	449	1048.20	0.14	0.01	1048.46	0.32	0.01	1048.72	0.46	0.02	1049.21	0.71	0.03	
	550.2	441	1048.15	0.79	0.09	1048.38	1.15	0.08	1048.62	1.28	0.07	1049.09	1.47	0.06	
	551	394	1047.80	0.97	0.10	1048.15	1.21	0.08	1048.42	1.40	0.07	1048.90	1.70	0.07	
	552	314	1047.69	0.48	0.03	1048.03	0.83	0.04	1048.29	1.10	0.05	1048.75	1.54	0.06	
	553	254	1047.53	1.09	0.10	1047.81	1.39	0.08	1048.03	1.71	0.08	1048.40	2.26	0.08	
	554	202	1047.41	0.55	0.03	1047.67	0.95	0.04	1047.87	1.29	0.05	1048.20	1.87	0.06	
	555	116	1047.17	0.75	0.06	1047.35	1.09	0.07	1047.50	1.35	0.06	1047.72	1.92	0.07	
	586	32	1045.76	1.96	0.22	1046.15	2.25	0.13	1046.44	2.46	0.10	1047.06	2.10	0.06	

Note: "-" = Not applicable

Table C.4 (c): Simulation Results along the Side Channels of Elbow River for 100- to 1000-year Flood Events

Side Channel	Station in Flood Mapping	Station in HEC-RAS	100-Year Flood Event			200-Year Flood Event			350-Year Flood Event			500-Year Flood Event			1000-Year Flood Event			Notes
			Water Level (m)	Cross-Section Velocity (m/s)	Froude Number	Water Level (m)	Cross-Section Velocity (m/s)	Froude Number	Water Level (m)	Cross-Section Velocity (m/s)	Froude Number	Water Level (m)	Cross-Section Velocity (m/s)	Froude Number	Water Level (m)	Cross-Section Velocity (m/s)	Froude Number	
Riverdale Ave. SW	421	743	1057.24	0.43	0.02	1058.15	0.49	0.02	1058.94	0.51	0.01	1059.54	0.53	0.01	1060.85	0.56	0.01	
	424	645	1056.99	1.71	0.05	1057.79	2.31	0.05	1058.49	2.67	0.04	1059.03	2.88	0.04	1060.23	3.24	0.04	
	428	510	1056.53	1.78	0.05	1057.46	2.20	0.05	1058.23	2.50	0.04	1058.80	2.70	0.04	1060.06	3.03	0.04	
	432	357	1056.33	1.21	0.03	1057.29	1.73	0.03	1058.08	2.07	0.04	1058.67	2.29	0.04	1059.96	2.66	0.03	
	435	257	1056.25	1.10	0.03	1057.20	1.68	0.03	1057.98	2.06	0.03	1058.56	2.31	0.03	1059.84	2.73	0.03	
	443	55	1056.12	1.19	0.03	1056.92	2.07	0.05	1057.56	2.70	0.05	1058.04	3.13	0.06	1059.14	3.86	0.06	
Roxboro Rd. SW	492	915	1053.28	0.84	0.02	1054.02	1.19	0.02	1054.67	1.42	0.02	1055.19	1.58	0.02	1056.38	1.84	0.02	
	495	832	1053.18	1.29	0.03	1053.86	1.75	0.03	1054.48	2.06	0.03	1054.98	2.25	0.03	1056.14	2.55	0.03	
	497	770	1052.96	1.87	0.05	1053.52	2.58	0.05	1054.07	3.01	0.05	1054.54	3.24	0.05	1055.68	3.58	0.05	
	499	716	1052.87	1.53	0.04	1053.46	2.08	0.04	1054.06	2.38	0.04	1054.57	2.54	0.04	1055.77	2.79	0.04	
	501	671	1052.83	1.21	0.04	1053.45	1.59	0.04	1054.07	1.79	0.03	1054.61	1.90	0.03	1055.85	2.07	0.03	
	505	569	1052.13	2.69	0.10	1052.86	2.79	0.07	1053.56	2.87	0.06	1054.14	2.94	0.05	1055.40	3.11	0.04	
	510	444	1051.80	1.37	0.03	1052.83	1.55	0.03	1053.56	1.79	0.03	1054.15	1.94	0.02	1055.44	2.20	0.02	
	512	367	1051.78	0.94	0.02	1052.81	1.25	0.02	1053.54	1.52	0.02	1054.14	1.70	0.02	1055.43	2.02	0.02	
	515	254	1051.74	0.89	0.02	1052.77	1.20	0.02	1053.50	1.48	0.02	1054.09	1.66	0.02	1055.38	1.98	0.02	
	518	169	1051.72	0.85	0.02	1052.75	1.14	0.02	1053.47	1.41	0.02	1054.06	1.58	0.02	1055.35	1.88	0.02	
	521	116	1051.71	0.66	0.01	1052.75	0.93	0.02	1053.47	1.17	0.02	1054.07	1.32	0.02	1055.37	1.60	0.02	
	524	44	1051.73	0.25	0.00	1052.77	0.36	0.01	1053.51	0.46	0.01	1054.12	0.52	0.01	1055.44	0.64	0.01	
26 Ave. SW	520	235	1051.85	0.91	0.02	1052.88	1.07	0.02	1053.62	1.20	0.02	1054.23	1.29	0.02	1055.55	1.45	0.02	
	523	198	1051.66	1.87	0.04	1052.63	2.24	0.04	1053.30	2.55	0.04	1053.86	2.75	0.04	1055.07	3.13	0.04	
	526	161	1051.29	2.80	0.06	1052.14	3.38	0.06	1052.65	3.95	0.06	1053.10	4.29	0.07	1054.10	4.92	0.07	
	528	118	1051.30	2.13	0.04	1052.21	2.58	0.04	1052.76	3.01	0.04	1053.26	3.27	0.05	1054.34	3.75	0.05	
	530	78	1051.05	2.66	0.06	1051.88	3.25	0.06	1052.26	3.94	0.07	1052.63	4.35	0.07	1053.44	5.15	0.07	
	532	44	1051.10	1.68	0.05	1052.02	1.99	0.05	1052.50	2.35	0.06	1052.96	2.55	0.06	1053.98	2.93	0.06	
25Ave. SW	533	579	1051.07	1.33	0.03	1052.04	1.54	0.03	1052.59	1.65	0.03	1053.10	1.74	0.03	1054.20	1.92	0.03	
	534	518	1050.57	2.85	0.06	1051.25	3.73	0.07	1051.62	4.18	0.07	1051.94	4.58	0.07	1052.56	5.47	0.08	
	535	450	1049.84	3.59	0.09	1050.51	4.35	0.09	1050.88	4.74	0.09	1051.21	5.07	0.08	1051.94	5.71	0.08	
	536	393	1049.55	2.45	0.08	1049.86	3.33	0.09	1050.08	3.66	0.09	1050.30	3.89	0.09	1050.74	4.41	0.09	
	537	329	1048.82	3.00	0.10	1049.35	0.48	0.01	1049.80	0.54	0.01	1050.27	0.58	0.01	1051.15	0.67	0.01	
	592	278	1048.84	0.76	0.02	1049.29	1.02	0.02	1049.74	1.05	0.02	1050.23	1.03	0.02	1051.10	1.09	0.02	
	591	217	1048.78	0.93	0.02	1049.21	1.25	0.03	1049.67	1.27	0.02	1050.16	1.26	0.02	1051.04	1.36	0.02	
	590	146	1048.69	1.06	0.03	1049.10	1.43	0.03	1049.58	1.41	0.03	1050.09	1.38	0.02	1050.98	1.47	0.02	
	589	66	1048.09	2.66	0.10	1048.44	2.90	0.09	1049.39	1.82	0.04	1049.96	1.69	0.03	1050.87	1.75	0.02	
22Ave. SW	550.1	449	1049.43	0.82	0.03	1050.22	1.17	0.04	1050.97	1.49	0.05	1051.55	1.72	0.05	1052.33	2.00	0.06	
	550.2	441	1049.30	1.55	0.06	1050.07	1.84	0.05	1050.78	2.15	0.05	1051.34	2.39	0.05	1052.08	2.66	0.05	
	551	394	1049.11	1.82	0.07	1049.86	2.18	0.07	1050.59	2.42	0.07	1051.15	2.62	0.06	1051.91	2.85	0.06	
	552	314	1048.94	1.72	0.06	1049.63	2.33	0.07	1050.25	2.85	0.07	1050.72	3.23	0.08	1051.39	3.59	0.08	
	553	254	1048.55	2.50	0.08	1049.13	3.18	0.09	1049.69	3.72	0.09	1050.14	4.05	0.09	1050.88	4.19	0.08	
	554	202	1048.32	2.15	0.06	1048.91	2.82	0.07	1049.46	3.39	0.07	1049.93	3.71	0.07	1050.82	3.52	0.06	
	555	116	1047.90	1.95	0.06	1048.86	1.71	0.04	1049.54	1.89	0.03	1050.10	2.03	0.03	1051.00	2.11	0.03	
	586	32	1047.66	1.58	0.04	1048.68	1.81	0.03	1049.27	2.32	0.04	1049.75	2.67	0.04	1050.59	2.95	0.04	

APPENDIX D

Bow and Elbow Rivers Flood Inundation Maps

July 2015
Report No. 13-1326-0054

Golder Associates

INUNDATION MAPS

The following maps are provided as a separate document:

- 100-Year Flood Inundation Extent (Sheets 1-28)
- 50-Year Flood Inundation Extent (Sheets 1-28)
- 20-Year Flood Inundation Extent (Sheets 1-28)
- 10-Year Flood Inundation Extent (Sheets 1-28)
- 5-Year Flood Inundation Extent (Sheets 1-28)

APPENDIX E

Model Comparison

July 2015
Report No. 13-1326-0054

Figure E.1: Comparison of Selected Cross-section Profiles along the Bow River

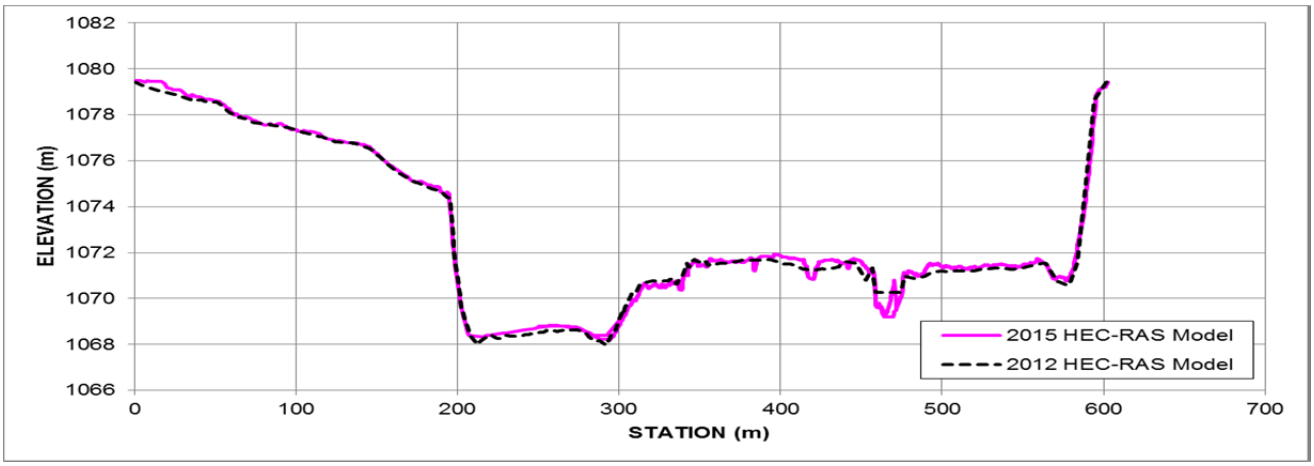

Figure E.1(a): Cross Section at Bowness Park (River Station: 64931)

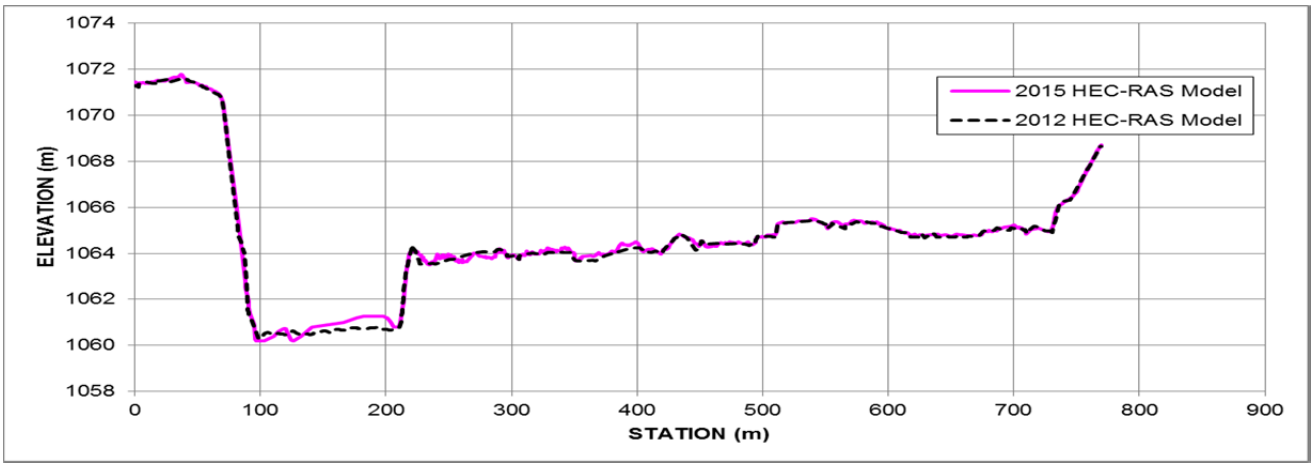

Figure E.1(b): Cross Section upstream of Shouldice Bridge (River Station: 59916)

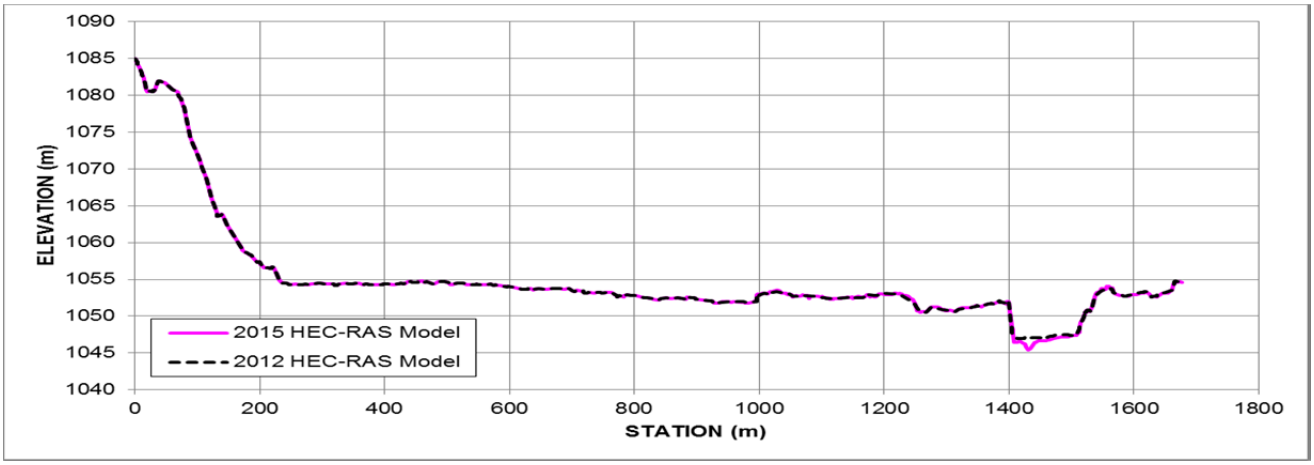

Figure E.1(c): Cross Section at 19th Street SW (River Station: 52456)

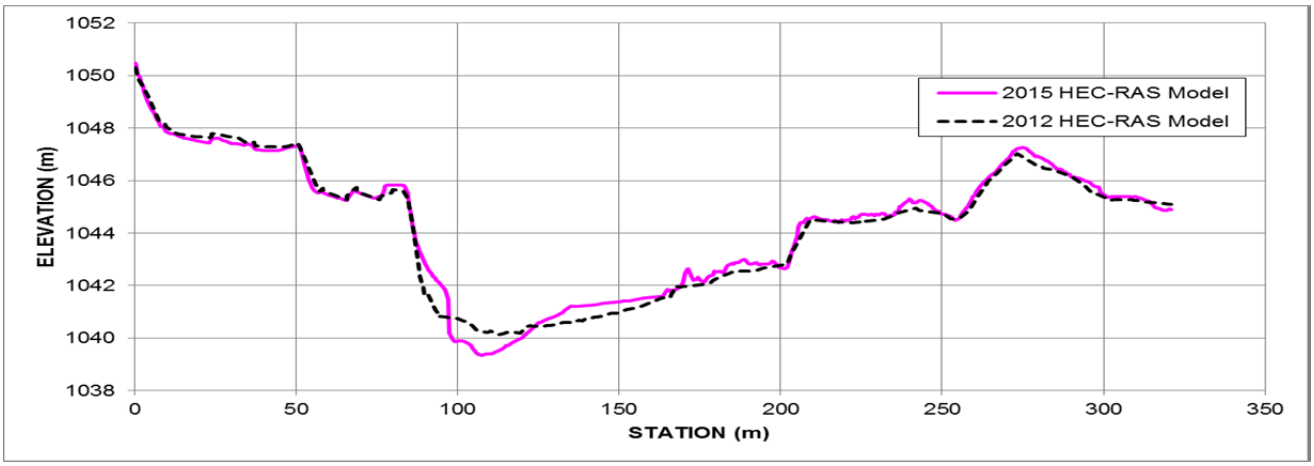

Figure E.1(d): Cross Section at Prince's Island (River Station: 49464)

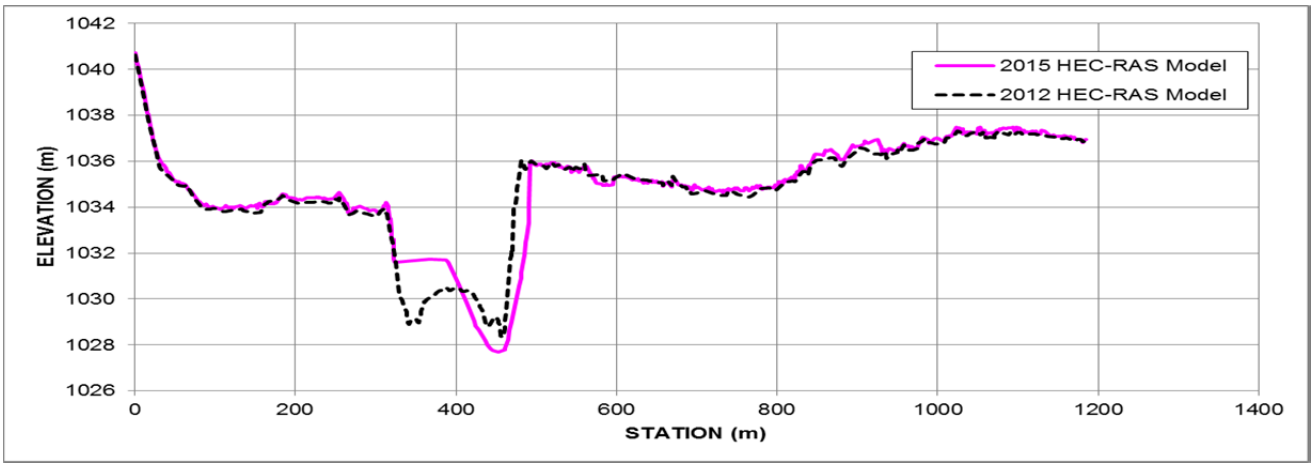

Figure E.1(e): Cross Section at Inglewood (River Station: 43980)

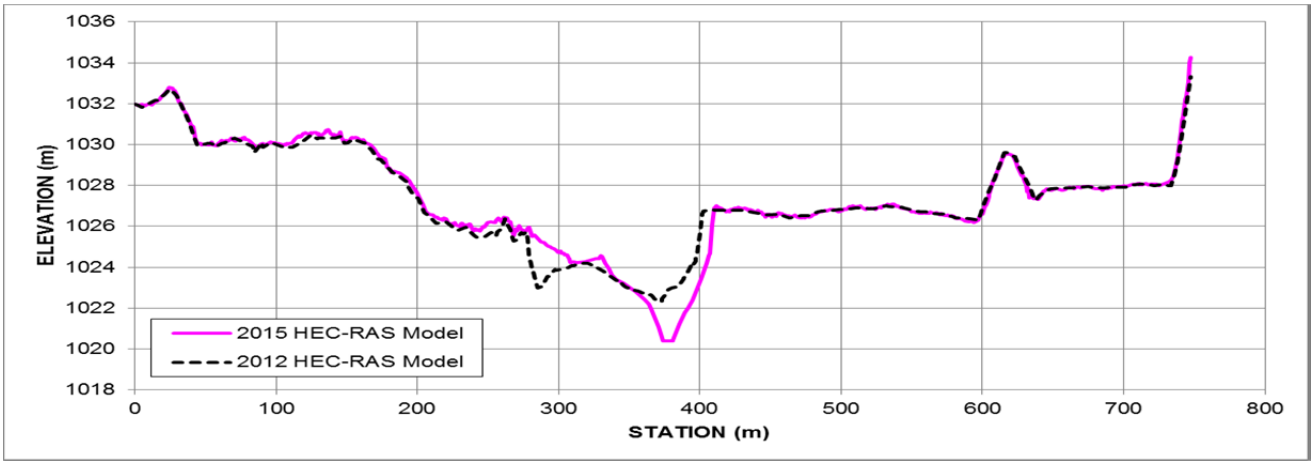

Figure E.1(f): Cross Section at Old Refinery Park (River Station: 40036)

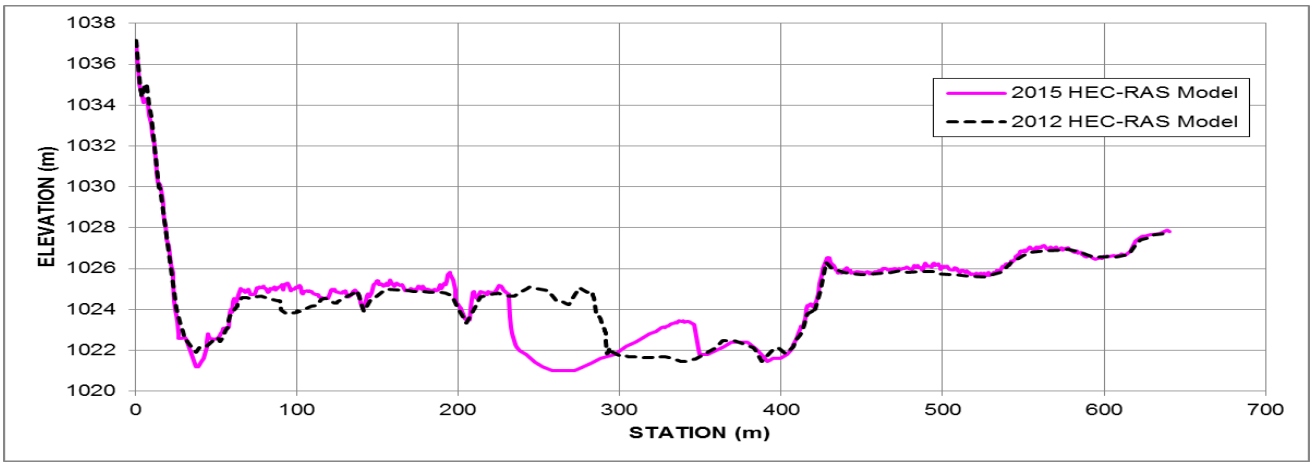

Figure E.1(g): Cross Section at Beaver Dam Flats Park (River Station: 39101)

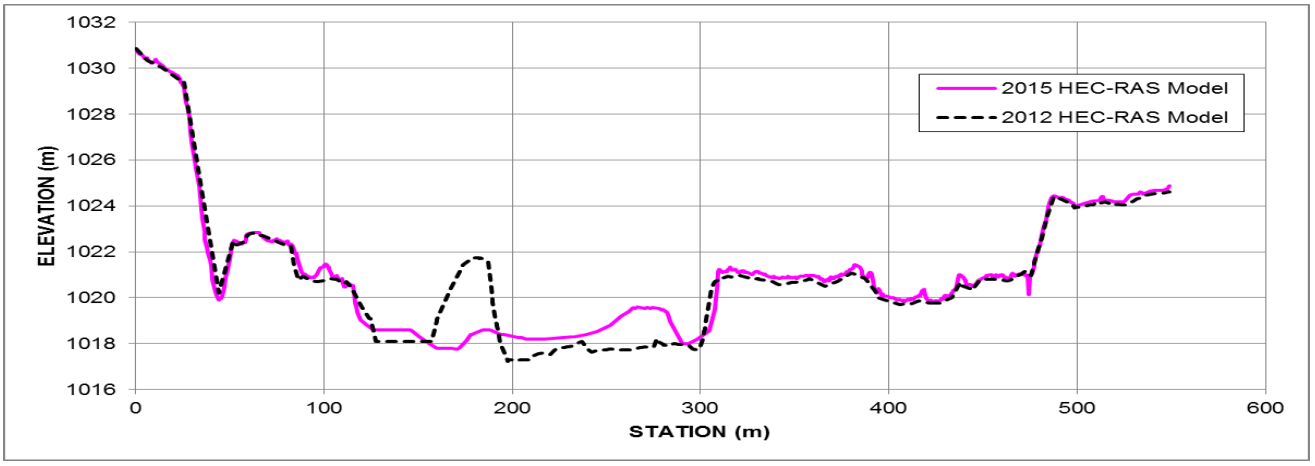

Figure E.1(h): Cross Section downstream of Glenmore Trail Bridges (River Station: 36967)

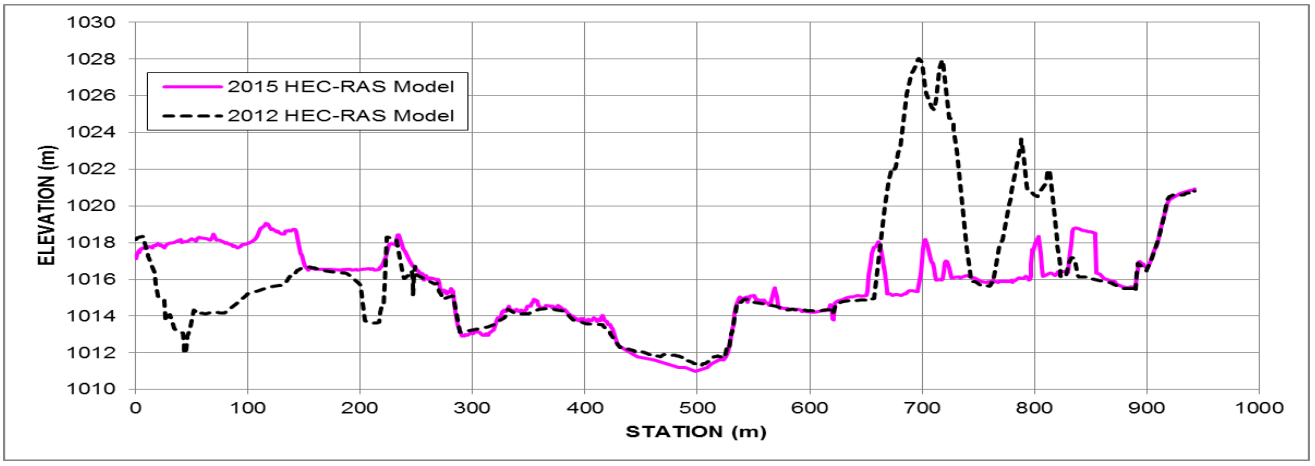

Figure E.1(i): Cross Section at Quarry Park (River Station: 33222)

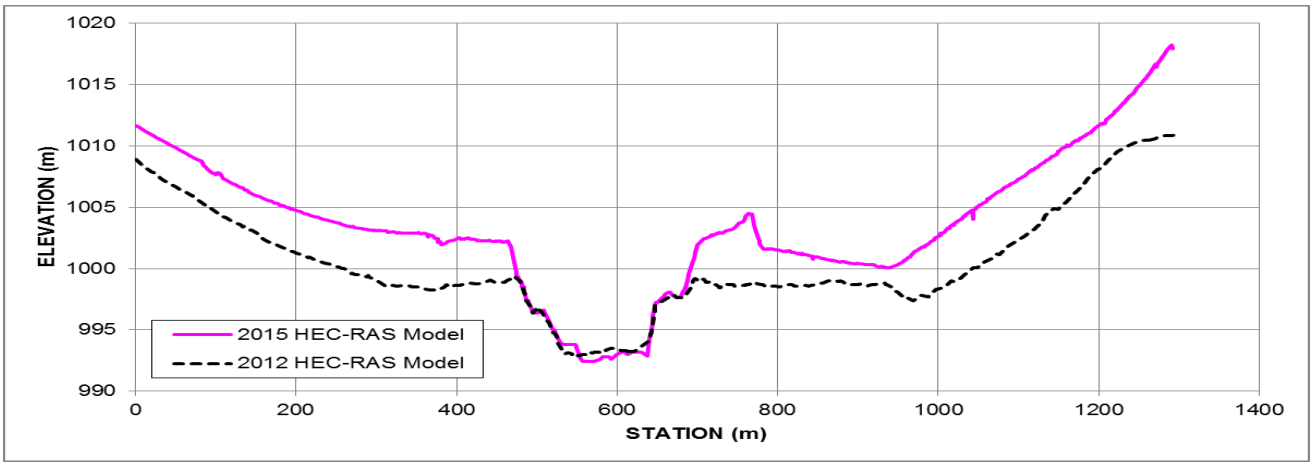

Figure E1(j): Cross Section downstream of Highway 22X Bridge (River Station: 23549)

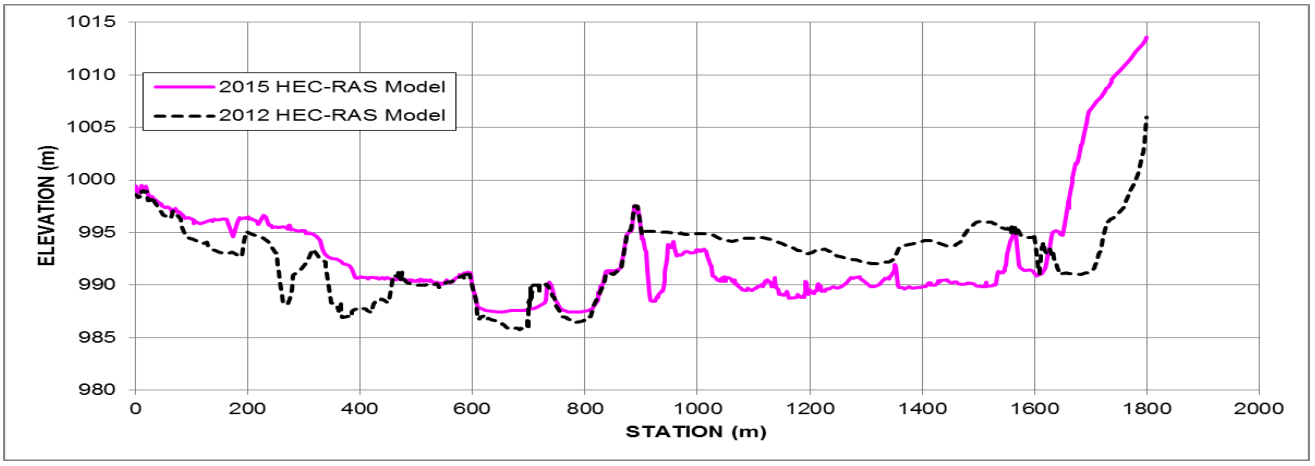

Figure E.1(k): Cross Section near Cranston Avenue SE (River Station: 20116)

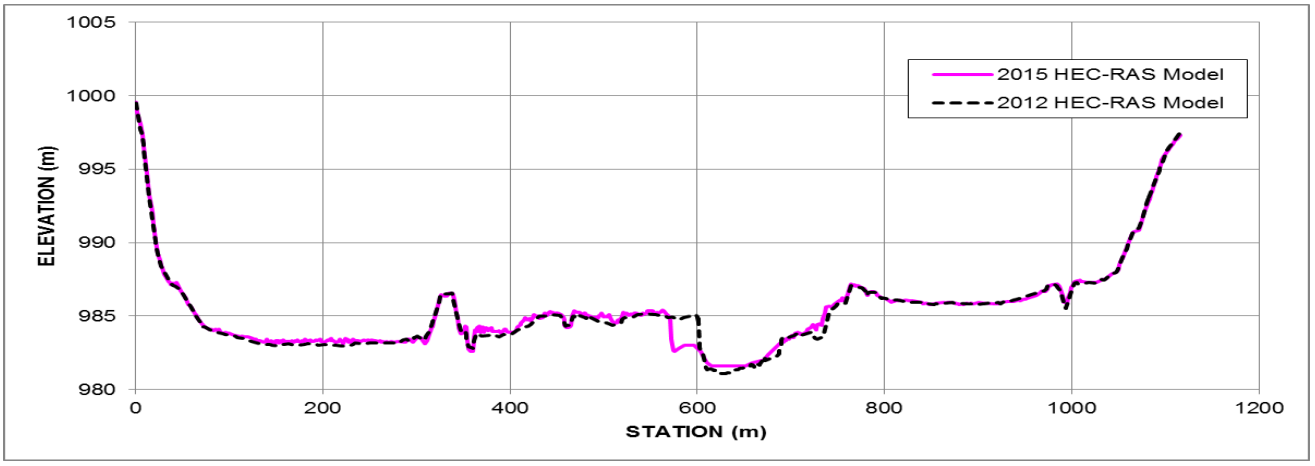

Figure E.1(l): Cross Section downstream of Dunbow Road Bridge (River Station: 17788)

Figure E.2: Comparison of Selected Cross-section Profiles along the Elbow River

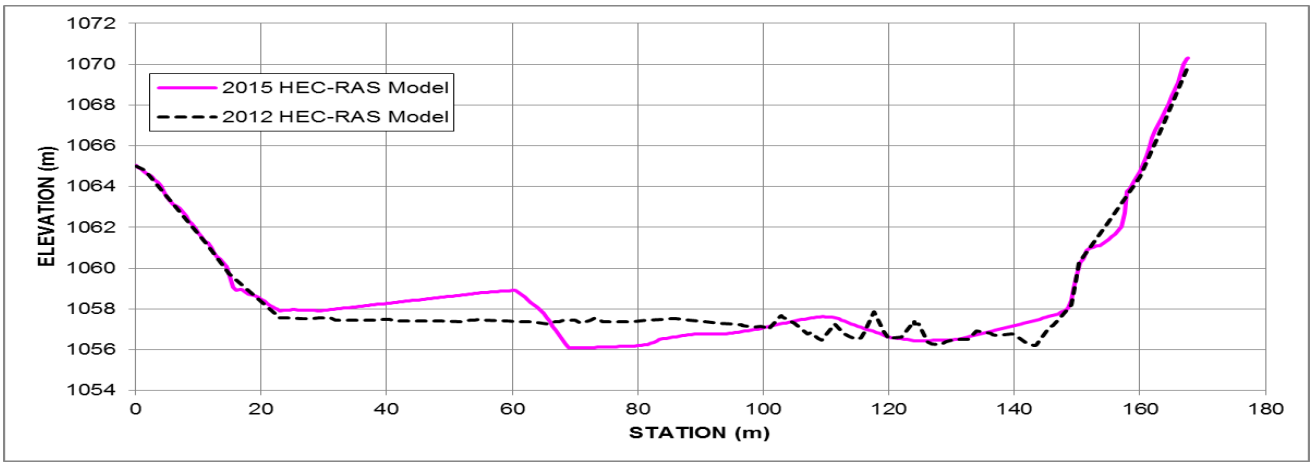

Figure E.2(a): Cross Section downstream of Glenmore Dam (River Station: 11343)

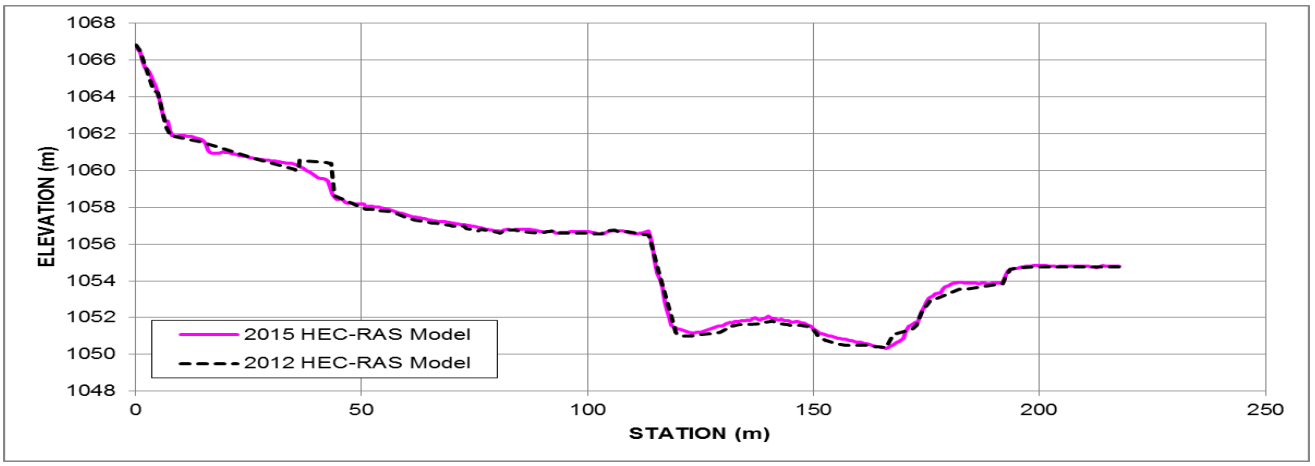

Figure E.2(b): Cross Section near 9th Street SW at Riverdale (River Station: 7813)

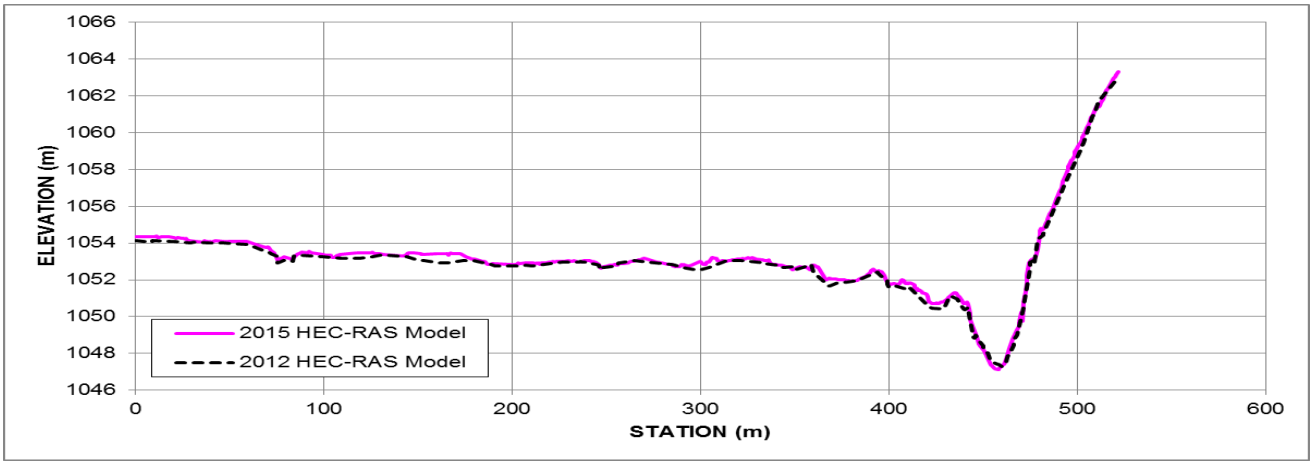

Figure E.2(c): Cross Section at Elbow Park (River Station: 6470)

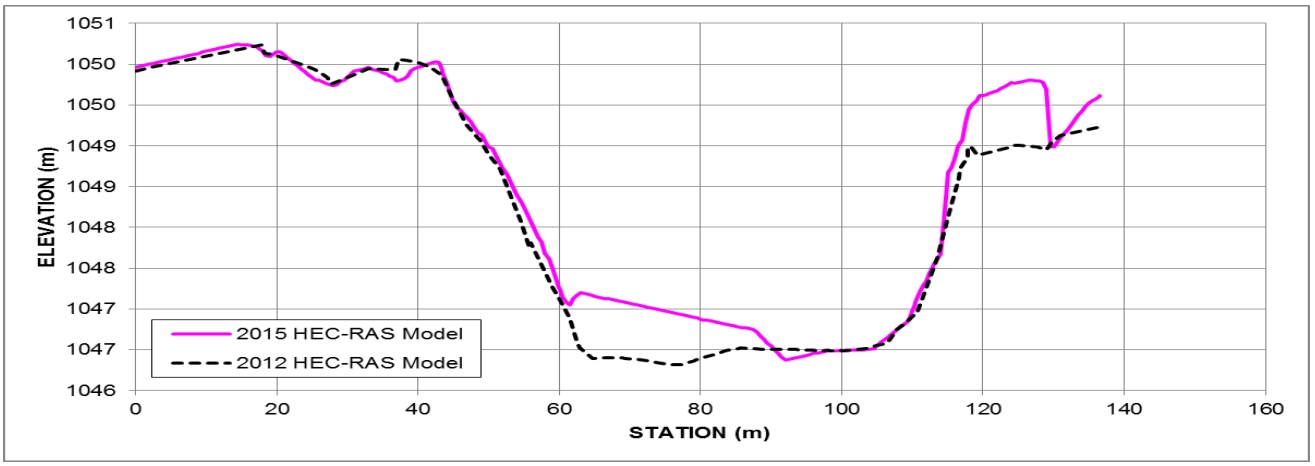

Figure E.2(d): Cross Section near 1th Street SW at Roxboro (River Station: 4473)

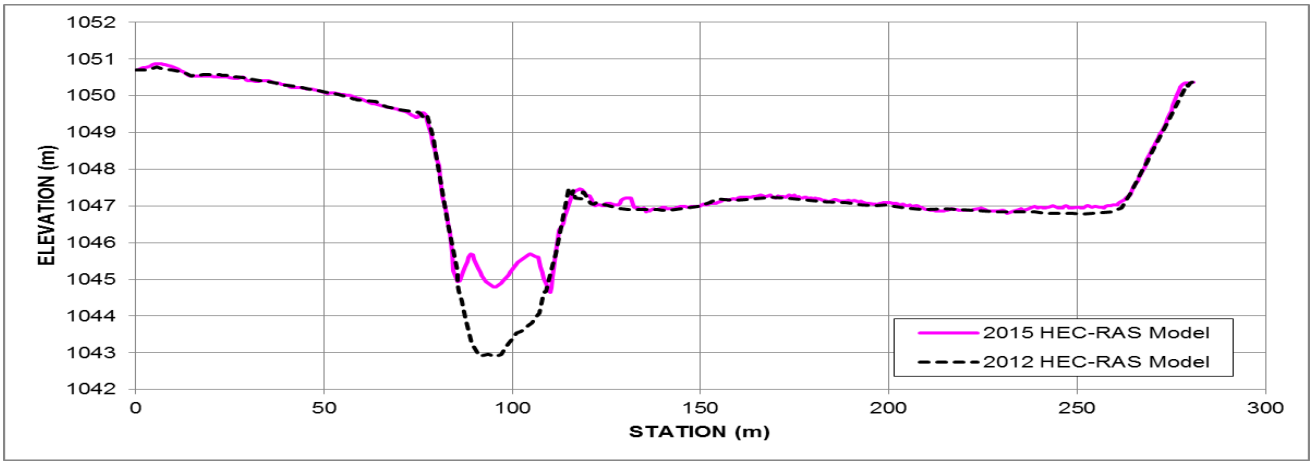

Figure E.2(e): Cross Section downstream of 21th Avenue SW Pedestrian Bridge (River Station: 3478)

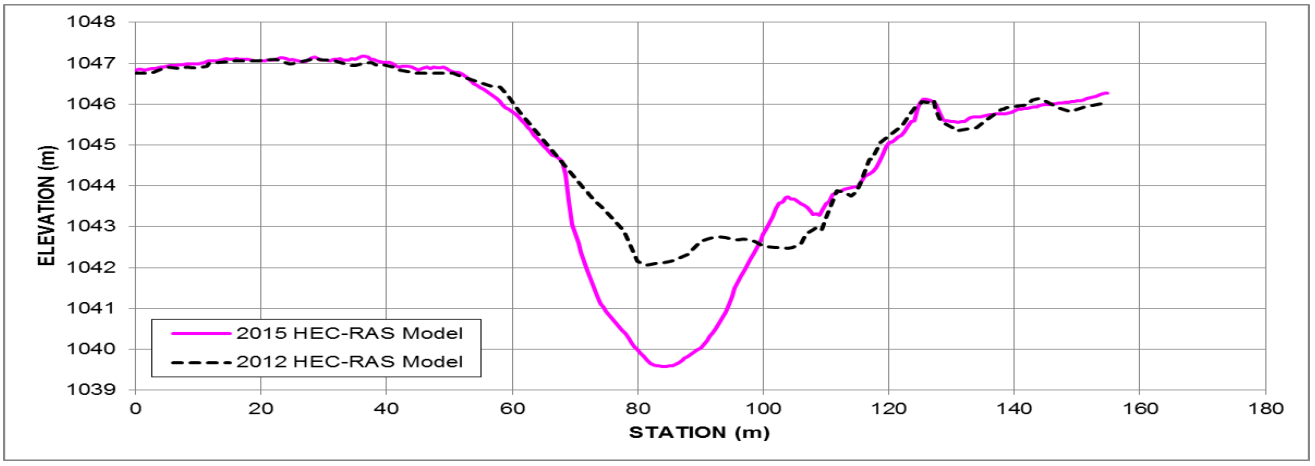

Figure E.2(f): Cross Section downstream of Pattison (1th Street SE) Bridge (River Station: 2939)

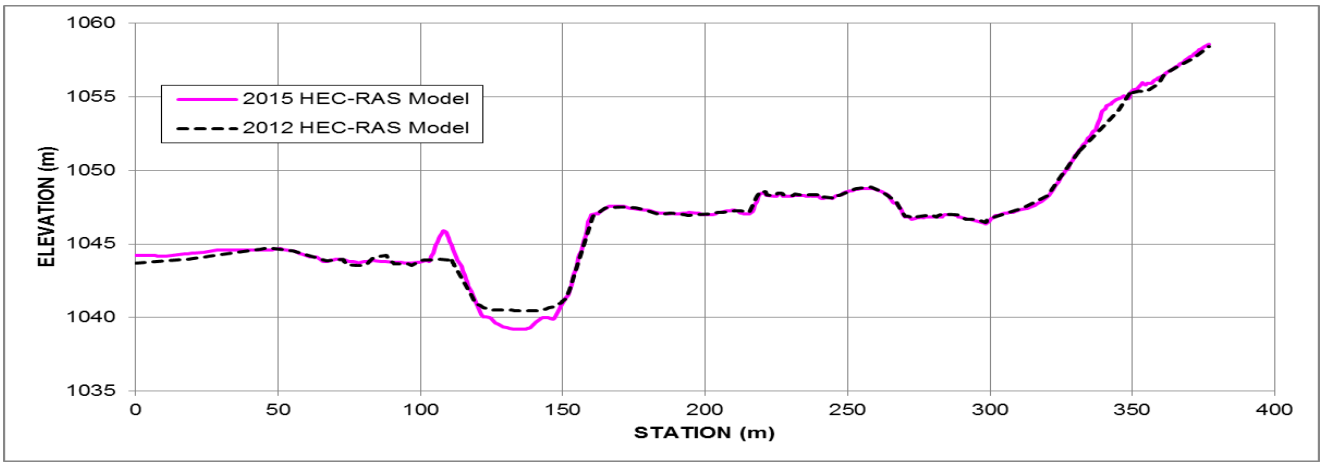

Figure E.2(g): Cross Section at Stampede Park (River Station: 2387)

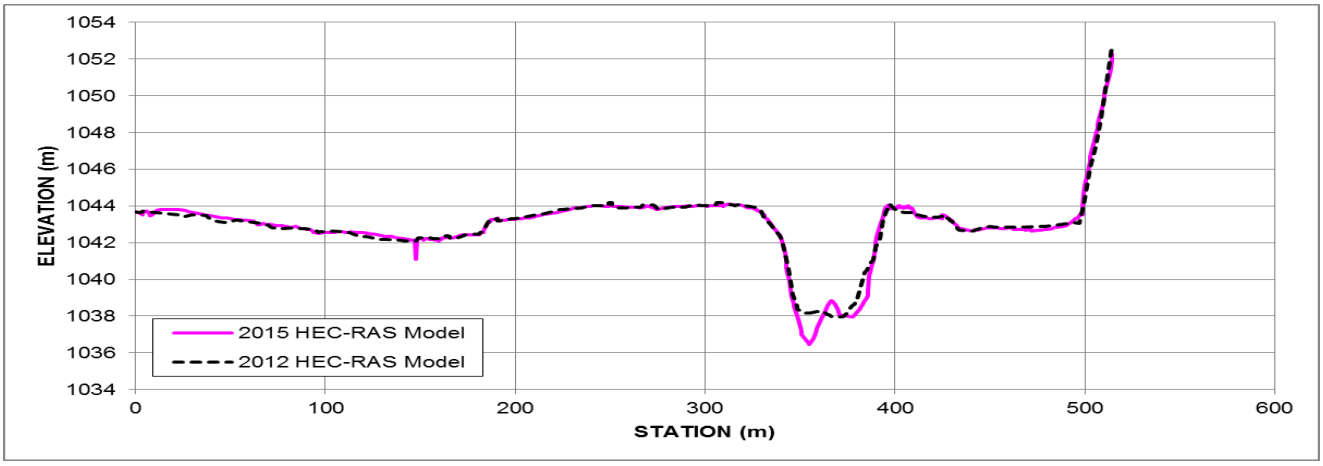

Figure E.2(h): Cross Section downstream of Stampede Park (N) Saddledome Access Bridge (River Station: 979)

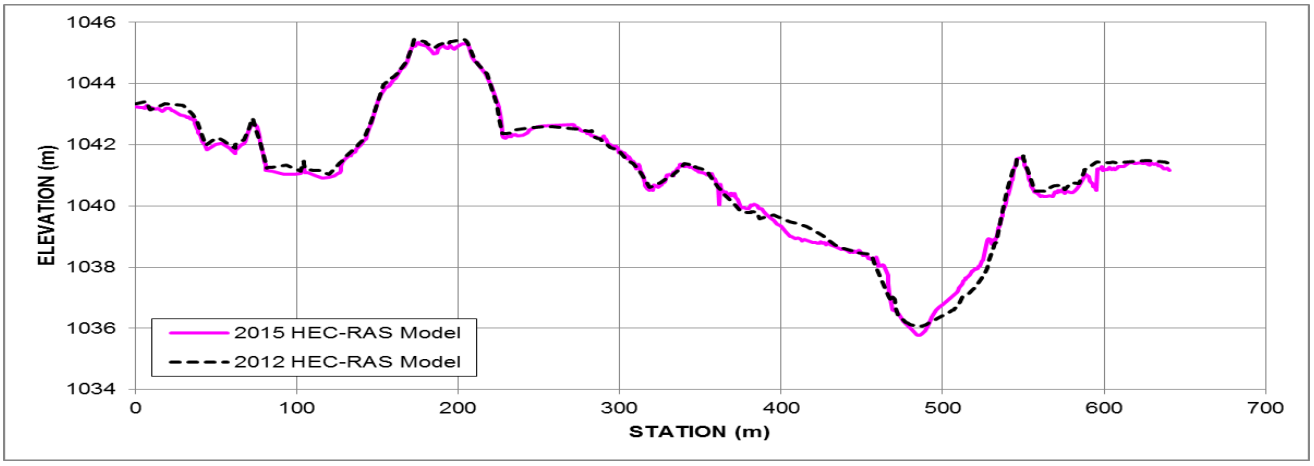

Figure E.2(i): Cross Section at Confluence with Bow River (River Station: 84)

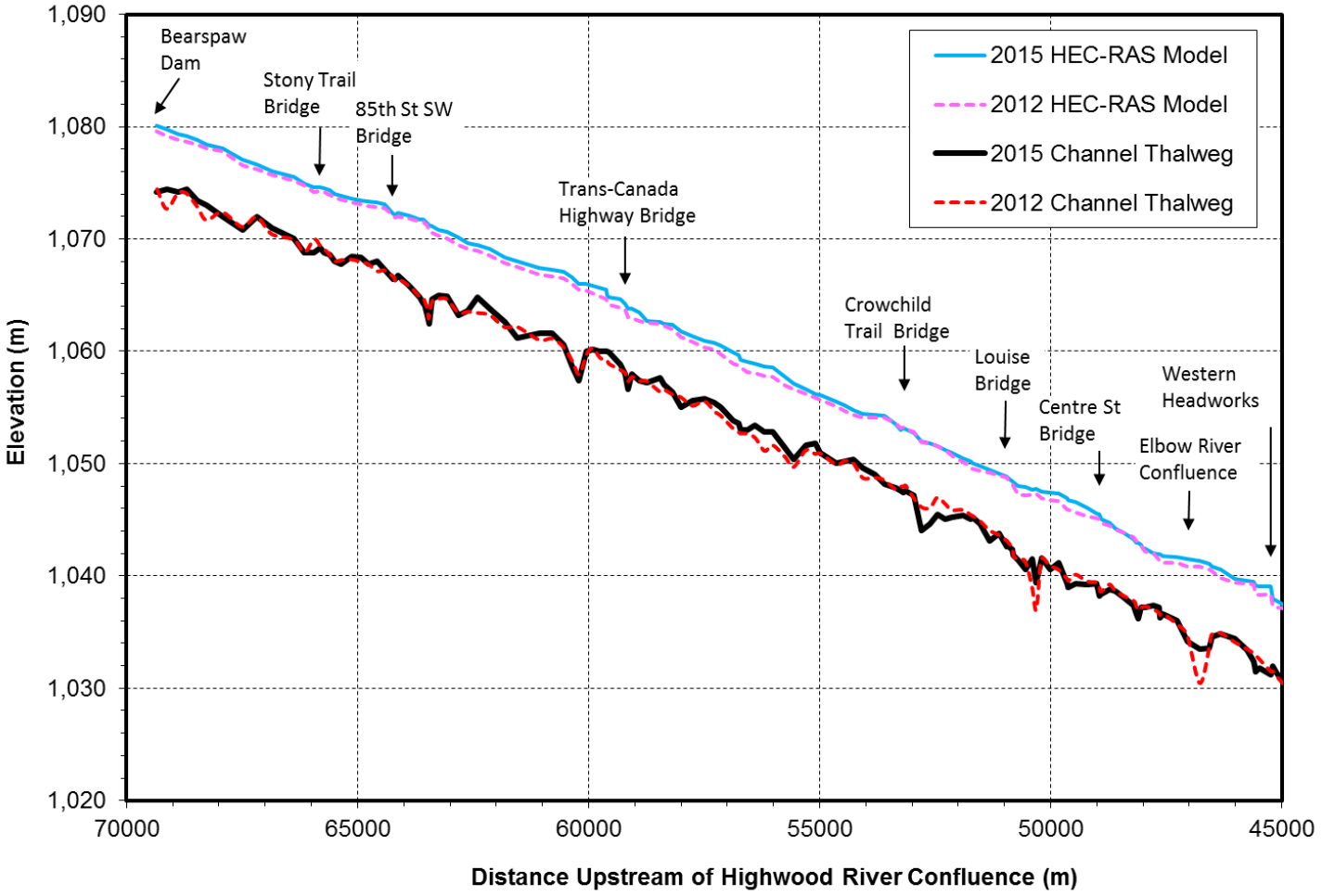

Figure E.3(a): Comparison of Thalweg Profiles and Simulated Water Surface Profiles for the 100-year Flood along the Bow River Study Reach - Part 1

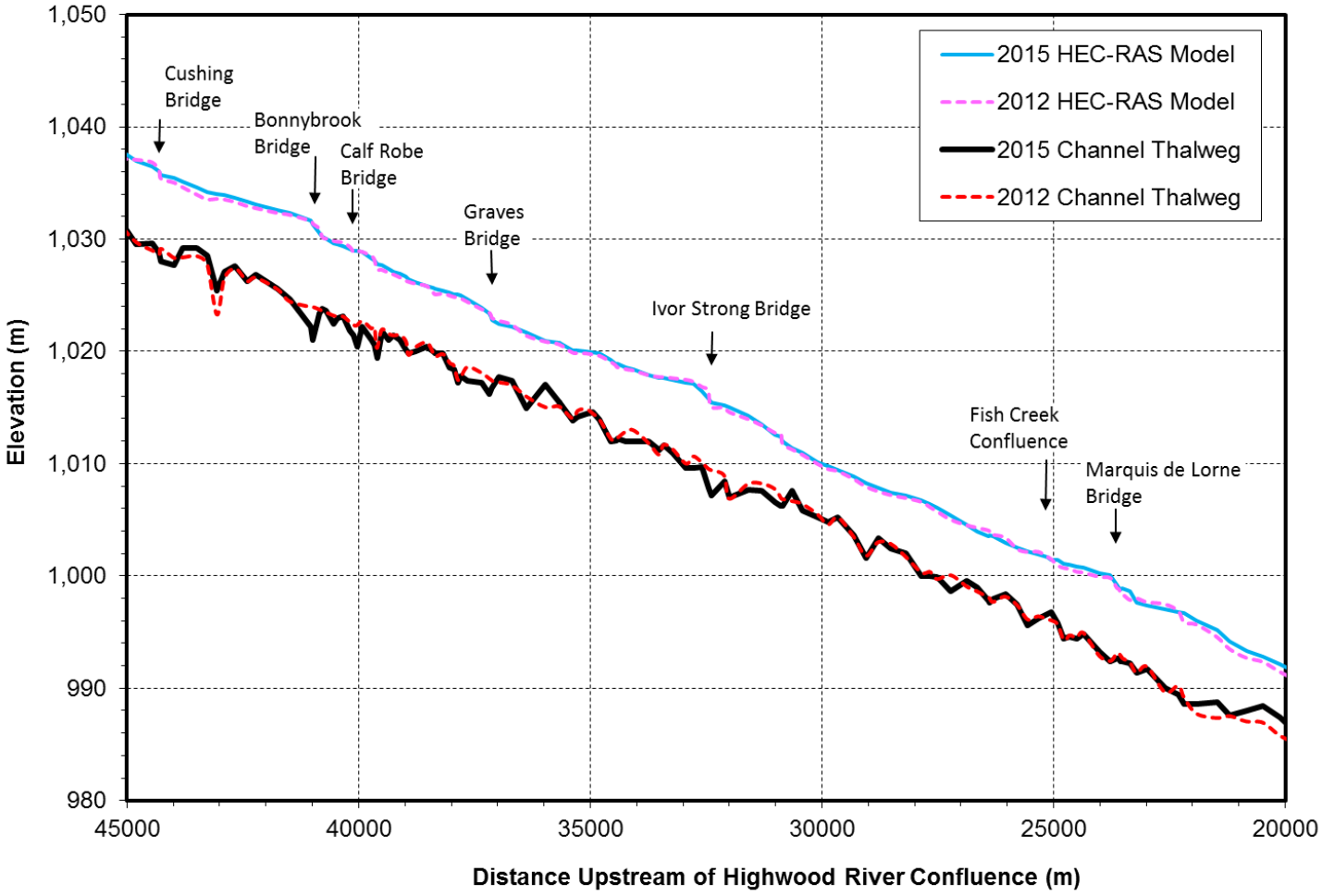

Figure E.3(b): Comparison of Thalweg Profiles and Simulated Water Surface Profiles for the 100-year Flood along the Bow River Study Reach - Part 2

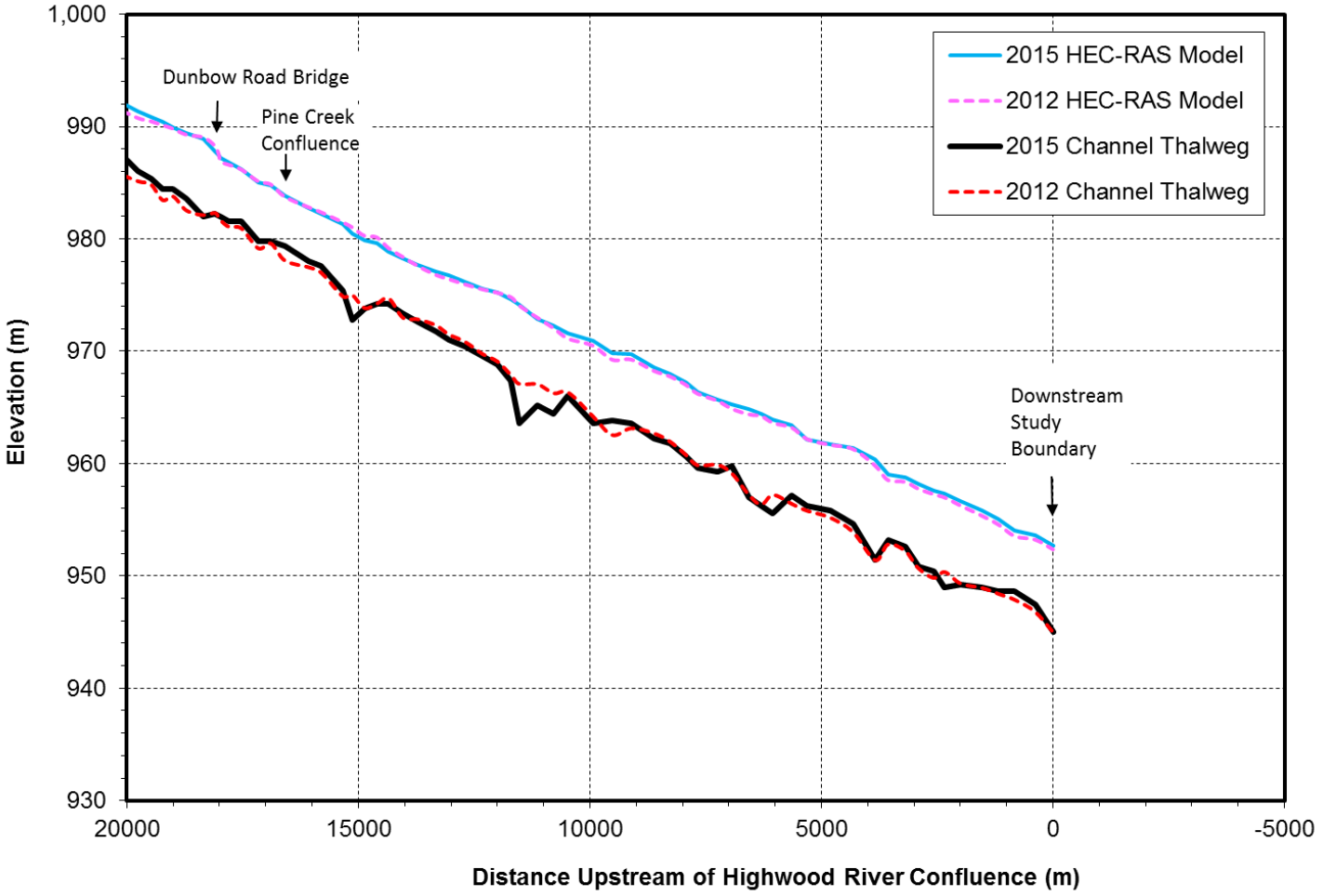

Figure E.3(c): Comparison of Thalweg Profiles and Simulated Water Surface Profiles for the 100-year Flood along the Bow River Study Reach - Part 3

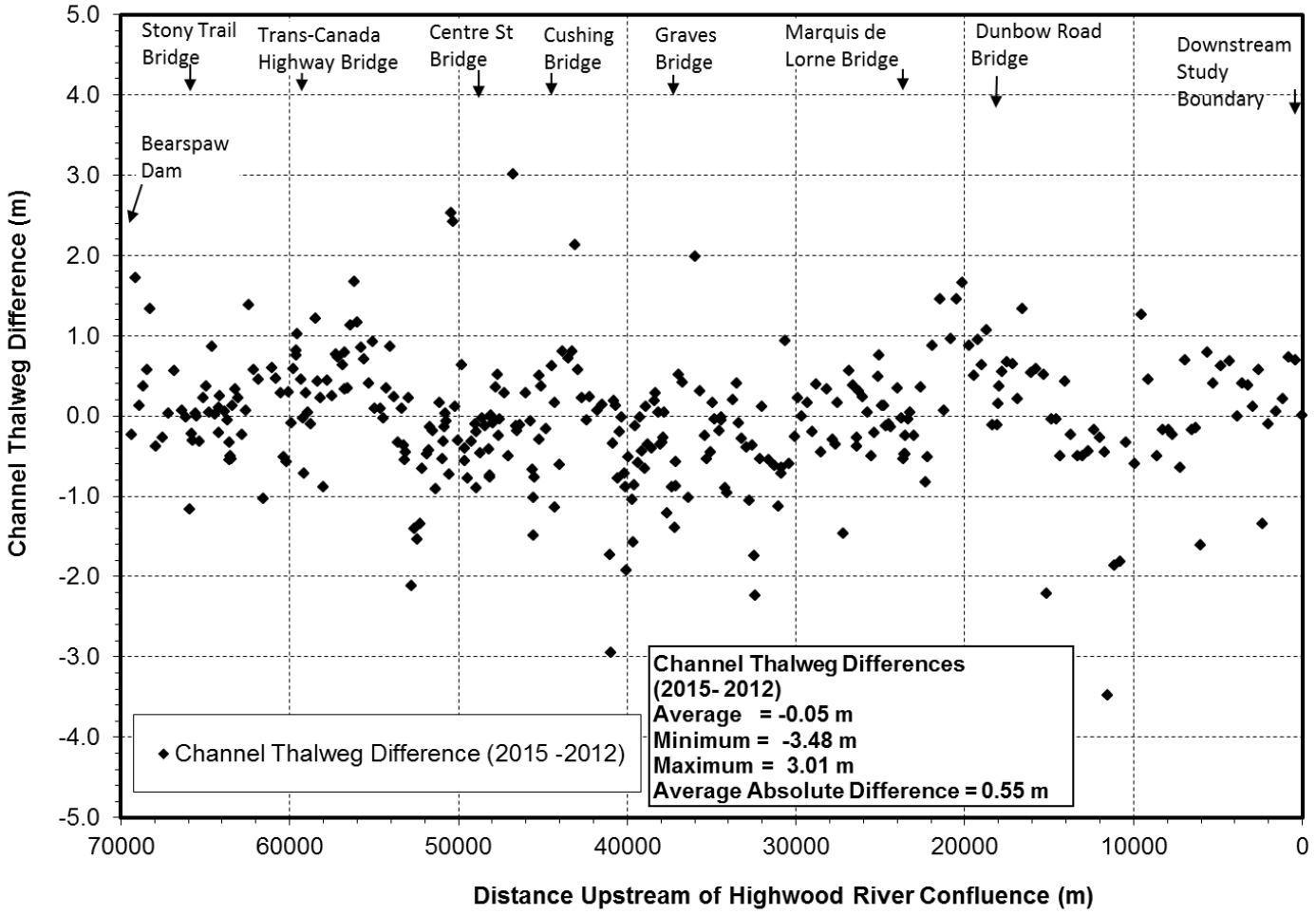

Figure E.4: Difference of Channel Thalweg along the Bow River between the 2012 HEC-RAS Model and the 2015 HEC-RAS Model

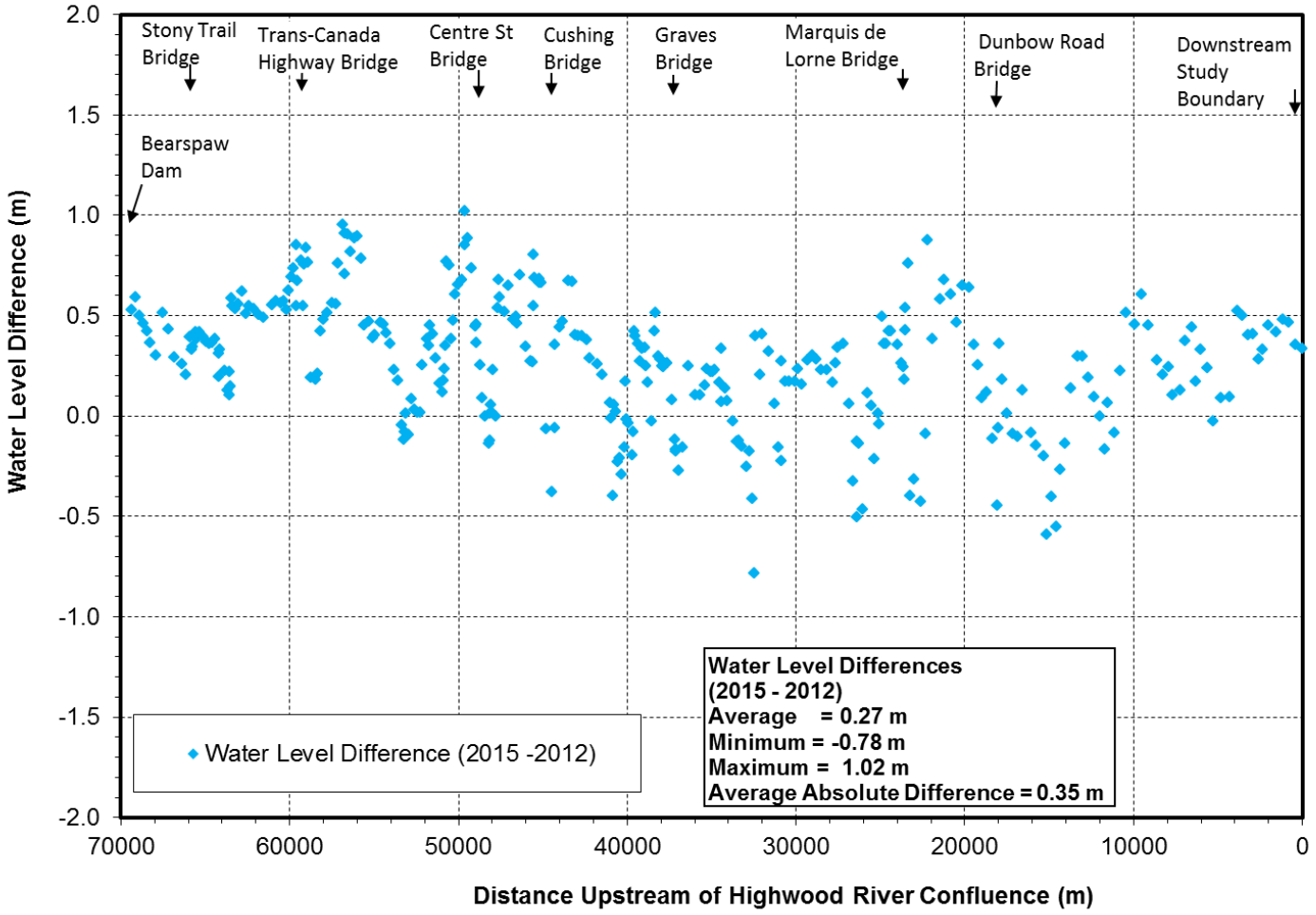

Figure E.5: Difference of Simulated Water Levels along the Bow River for the 100-year Flood between the 2012 HEC-RAS Model and the 2015 HEC-RAS Model

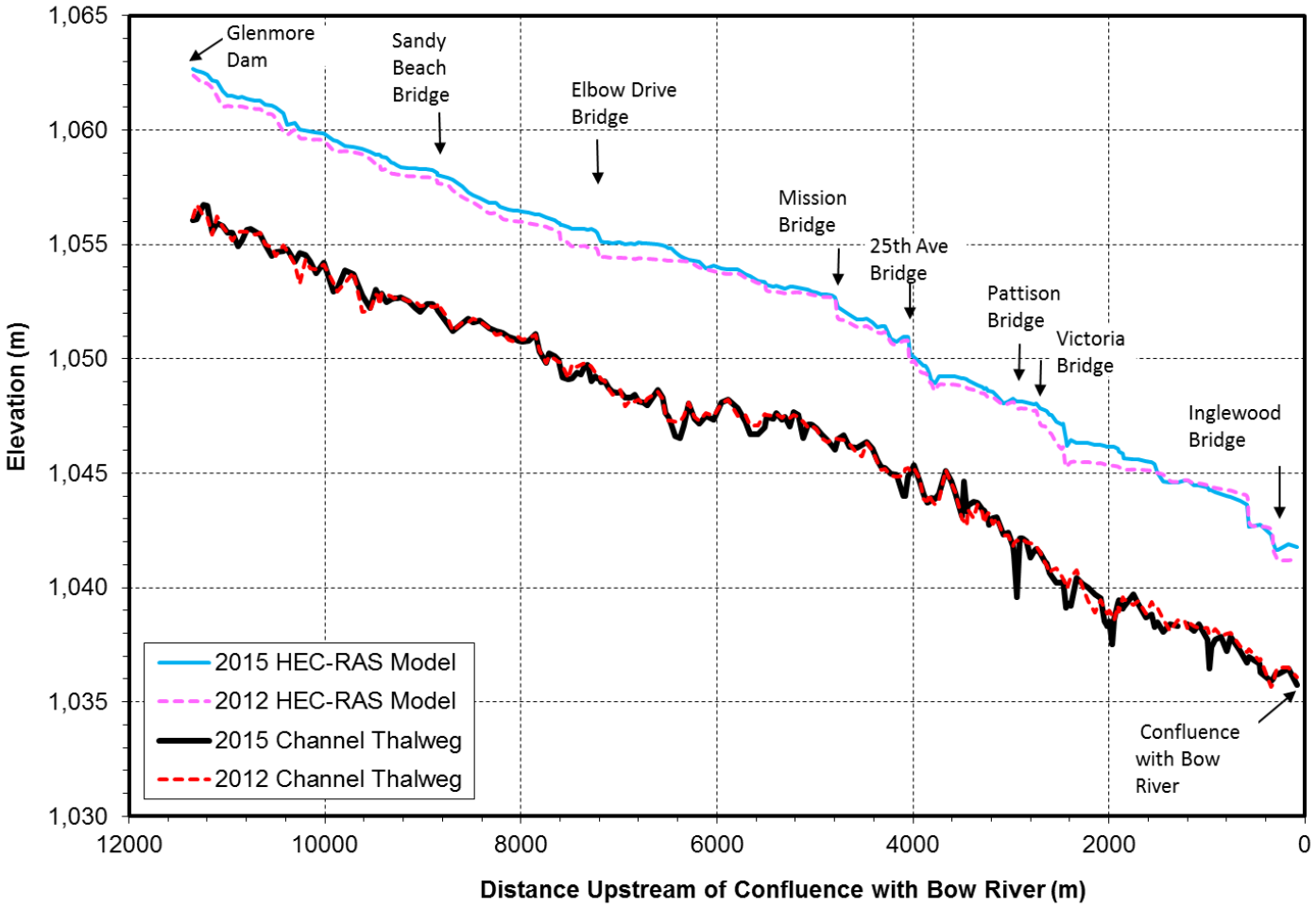

Figure E.6: Comparison of Thalweg Profiles and Simulated Water Surface Profiles for the 100-year Flood along the Elbow River Study Reach

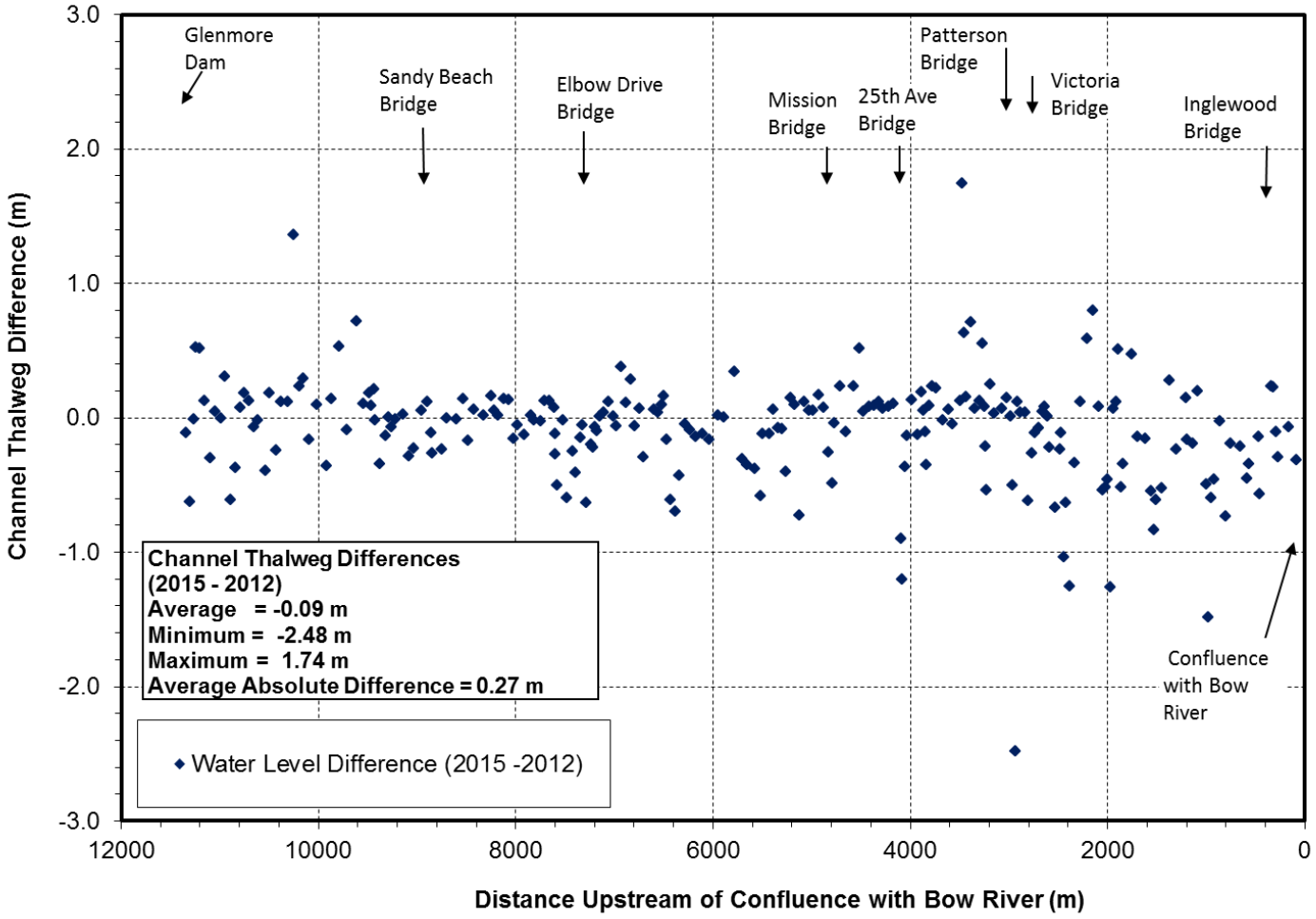

Figure E.7: Difference of Channel Thalweg along the Elbow River between the 2012 HEC-RAS Model and the 2015 HEC-RAS Model

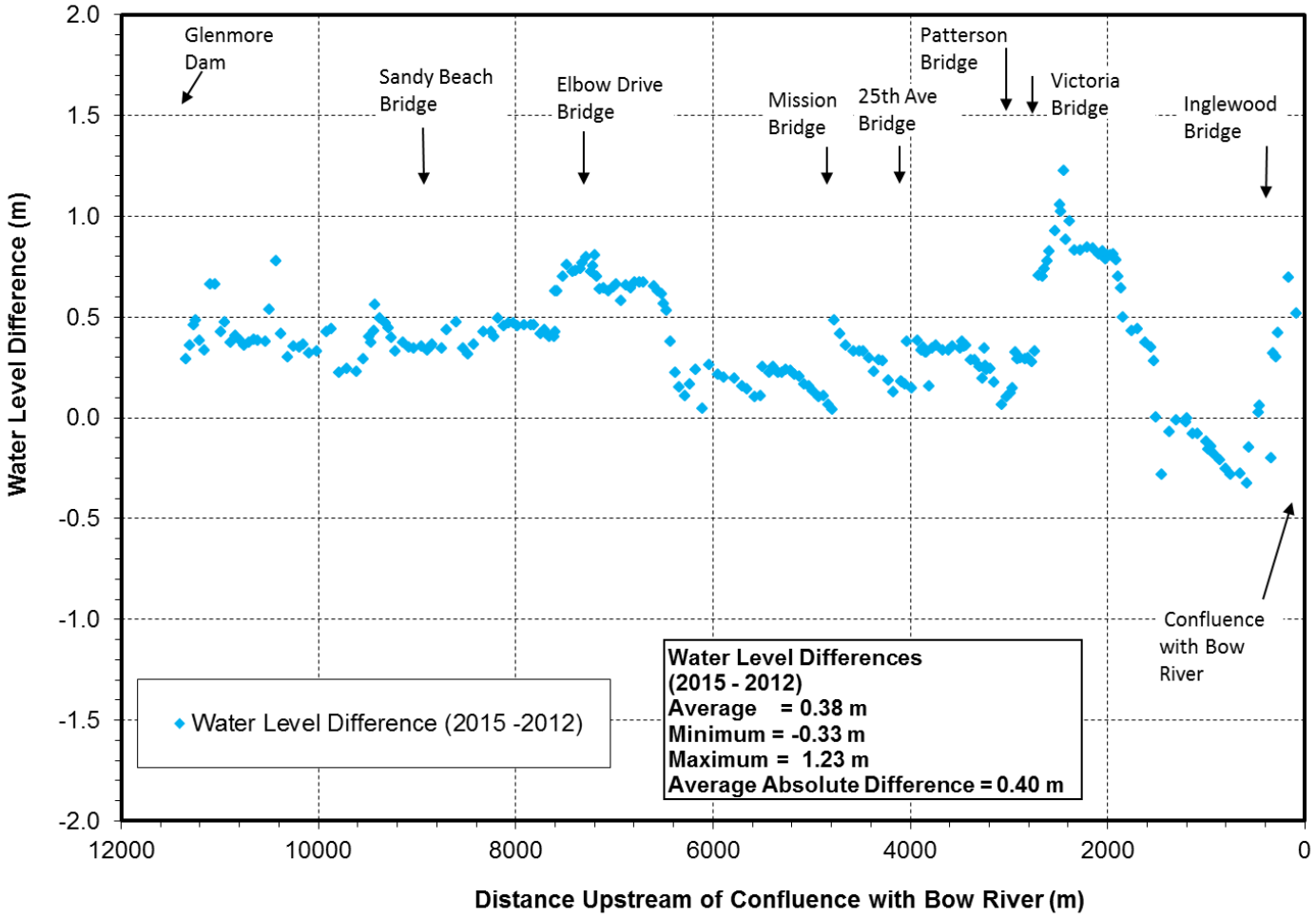

Figure E.8: Difference of Simulated Water Levels along the Elbow River for the 100-year Flood between the 2012 HEC-RAS Model and the 2015 HEC-RAS Model

APPENDIX F

Digital Deliverables

July 2015
Report No. 13-1326-0054

DIGITAL DATA DELIVERABLES

The following digital data is included on the attached DVD:

Report

- Digital version of the report (Microsoft Word 2007 format);
- Digital signed version of the report (Secured PDF format);
- Digital unsigned version of the report (PDF format); and
- Digital version of the inundation maps (PDF format).

Model

- HEC-RAS Model.

GIS Data

- Line-Shape file with all cross sections including simulated water levels as attributes;
- Line-Shape file with 0.5 m contour lines based on the created DEM;
- Polygon-Shape files with the inundation extents of the flood events; and
- ArcGIS 10.1 project file (MXD) for all inundation maps.

As a global, employee-owned organisation with over 50 years of experience, Golder Associates is driven by our purpose to engineer earth's development while preserving earth's integrity. We deliver solutions that help our clients achieve their sustainable development goals by providing a wide range of independent consulting, design and construction services in our specialist areas of earth, environment and energy.

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