June 2022

BOW AND ELBOW RIVER HAZARD STUDY

Hydraulic Model Creation and Calibration Report

Submitted to:
Alberta Environment and Parks
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DRAFT

Report Number: 1536673_R0002 Rev.0

Distribution:

5 Paper Copies: Alberta Environment and Parks
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REPORT

Golder Associates

Classification: Public

Executive Summary

Alberta Environment and Parks (AEP) commissioned Golder Associates Ltd. (Golder) in September 2015 to undertake the Bow and Elbow River Hazard Study. The primary purpose of the study is to identify and assess river and flood hazards along the Bow River (from Bearspaw Dam to the Highwood River confluence) and the Elbow River (from Bragg Creek to the Bow River confluence), including lengths of Bragg and Lott Creeks.

The study is conducted under the provincial Flood Hazard Identification Program (FHIP), the goals of which include enhancement of public safety and reduction of future flood damages through the identification of river and flood hazards. Project stakeholders include the Government of Alberta, local authorities, and the public. Key municipal stakeholders include the City of Calgary, Foothills County, and Rocky View County. The project includes working with Tsuut'ina Nation.

The Bow and Elbow River Hazard Study includes multiple components and deliverables. This report documents the methodology and results of the hydraulic model creation and calibration component, which supports the flood mapping and flood risk assessment components. The tasks associated with this component include a summary of flood history documentation, river and valley feature description, model setup, model calibration, open water flood frequency profile generation, and model sensitivity analysis.

The study area is divided into two hydraulic models for operational and reporting simplicity:

1) Bow and Lower Elbow Model – including the Bow River between Bearspaw Dam and the Highwood River confluence, and the Elbow River below Glenmore Dam

2) Upper Elbow Model – including the Elbow River above Glenmore Dam, and Bragg and Lott Creeks

The river reaches in each hydraulic model are described in Table i.

Table i: Hydraulic Models and River Reaches

Model	River Reach	Reach Description	Length (km)
Bow and Lower Elbow	Bow River	Bearspaw Dam to Highwood River confluence	72
	Lower Elbow River	Glenmore Dam to Bow River confluence	11
Upper Elbow	Upper Elbow River	Upstream of Bragg Creek to Glenmore Dam	55
	Bragg Creek	Upstream of Centre Avenue in Bragg Creek to Elbow River confluence	1
	Lott Creek	Upstream of Elbow Valley Residents Club to Elbow River confluence	7

There are 705 cross sections, 63 bridges, and 23 dedicated flood control structures in the Bow and Lower Elbow model reach. The average cross section spacing along the Bow River is about 191 m, with spacing is denser within Calgary, and the average cross section spacing along the lower Elbow River is about 47 m. In addition to the main river reaches, the Bow and Lower Elbow model includes two explicitly modelled side channel branches along the Bow River at Prince's Island and Zoo Island, and four explicitly modelled side channel branches along the Elbow River to reflect complicated flow patterns upstream of the Bow River confluence.

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There are 713 cross sections, 13 bridges, nine culverts, and nine dedicated flood control structures in the Upper Elbow model reach. The average upper Elbow River cross section spacing is about 50 m through the communities of Bragg Creek and Redwood Meadows, and ranges from 80 m to 130 m elsewhere. The average cross section spacing along Bragg Creek is about 84 m and the average cross section spacing along Lott Creek is about 65 m. In addition to the main Elbow River, Bragg Creek, and Lott Creek reaches, the model includes a Lott Creek side channel branch where flow is directed through a series of man-made structures and lakes.

The number of cross sections and other features in each model reach are summarized in Table ii.

Table ii: Hydraulic Model Reach Features

Model	Cross Sections	Bridges	Culverts	Flood Control Structures	Weirs, Dams, and Other Features	Side Channels
Bow and Lower Elbow	705	63	-	23	3	6
Upper Elbow	713	13	9	9	3	1

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The models were calibrated using the following flow and water level information:

- low flow conditions based on water levels measured during 2013, 2015, and 2016 surveys;
- high flow conditions based on highwater marks and levels collected by AEP and the City of Calgary during and after the 2005 and 2013 floods; and
- rating curves for Water Survey of Canada (WSC) gauging stations in the study area.

The models with Manning's *n* roughness values and other parameters calibrated and validated for high flow conditions were deemed the most appropriate to simulate water levels for the thirteen open water flood scenarios needed for flood mapping: the 2-, 5-, 10-, 20-, 35-, 50-, 75-, 100-, 200-, 350-, 500-, 750-, and 1,000-year floods.

Using the 2013 flood as the benchmark for calibration, the average difference between simulated and measured water levels along the Bow River was +0.06 m for AEP-collected highwater marks and +0.18 m for City of Calgary highwater marks. The average difference along the Elbow River below Glenmore Dam was +0.05 m for AEP-collected highwater marks and +0.13 m for City of Calgary highwater marks. The average difference between simulated and measured water levels along the Elbow River above Glenmore Dam was +0.12 m using AEP-collected highwater marks. All water levels were simulated based on subcritical flow conditions except along the Elbow River at the Highway 22 Bridge, where simulated water levels were based on supercritical flow conditions. Computed water levels for some flood scenarios at a very small subset of cross sections were manually adjusted to the nearest lower or higher flood level or interpolated to avoid crossing water level profiles.

Model sensitivity to roughness parameters was evaluated using 100-year flood simulation results. The results of the sensitivity analysis show that variation of main channel roughness has a much higher influence on simulated flood levels than variation of overbank roughness. On average, variation of the Manning's *n* values by ±10% resulted in water levels within ±0.15 m of base 100-year flood water levels along the Bow and lower Elbow Rivers, and ±0.05 m along the upper Elbow River, Bragg Creek, and Lott Creek. Model sensitivity to downstream boundary conditions was also assessed, but were determined to be generally negligible.

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Acknowledgements

This component of the Bow and Elbow River Hazard Study was managed by Dr. Wolf Ploeger. Overall direction and senior review for this component was provided by Dr. Dejiang Long and Dr. Wolf Ploeger. The hydraulic modelling was conducted by Gaven Tang, Nancy Guo, Hossein Kheirkhah Gildeh, and Wolf Ploeger.

The authors express their special thanks to Peter Onyshko, Lance Katan, and Abdullah Mamun, Project Managers for Alberta Environment and Parks, who provided overall study management, background data, and technical guidance.

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TABLES

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FIGURES

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APPENDICES

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1.0 INTRODUCTION

1.1 Study Objectives

Alberta Environment and Parks (AEP) commissioned Golder Associates Ltd. (Golder) in September 2015 to undertake the Bow and Elbow River Hazard Study (the study). The primary purpose of the study is to identify and assess river and flood hazards along the Bow River (from Bearspaw Dam to the Highwood River confluence) and the Elbow River (from Bragg Creek to the Bow River confluence), including lengths of Bragg and Lott Creeks.

The study is conducted under the provincial Flood Hazard Identification Program (FHIP), the goals of which include enhancement of public safety and reduction of future flood damages through the identification of river and flood hazards. Project stakeholders include the Government of Alberta, local authorities, and the public. Key municipal stakeholders include the City of Calgary, Foothills County, and Rocky View County. The project includes working with Tsuut'ina Nation.

The Bow and Elbow River Hazard Study includes multiple components and deliverables. This report documents the methodology and results of the hydraulic model creation and calibration component, which supports the flood mapping and flood risk assessment components. The tasks associated with this component include flood history documentation, river and valley feature description, model setup, model calibration, open water flood frequency profile generation, and model sensitivity analysis.

1.2 Study Area and Reaches

The study area includes approximately 72 km of the Bow River between Bearspaw Dam and the Highwood River confluence, approximately 66 km of the Elbow River from Bragg Creek to the Bow River confluence in Calgary, approximately 1 km of Bragg Creek upstream of the Elbow River confluence, and approximately 7 km of Lott Creek upstream of the Elbow River confluence (Figure 1).

The study area includes the following local authorities and communities: Bragg Creek, Calgary, Elbow Valley Residents Club, Foothills County, Redwood Meadows, Rocky View County, and Tsuut'ina Nation.

The study area is divided into two hydraulic models for operational and reporting simplicity:

1) Bow and Lower Elbow Model – including the Bow River between Bearspaw Dam and the Highwood River confluence, and the Elbow River below Glenmore Dam

2) Upper Elbow Model – including the Elbow River above Glenmore Dam, and Bragg and Lott Creeks

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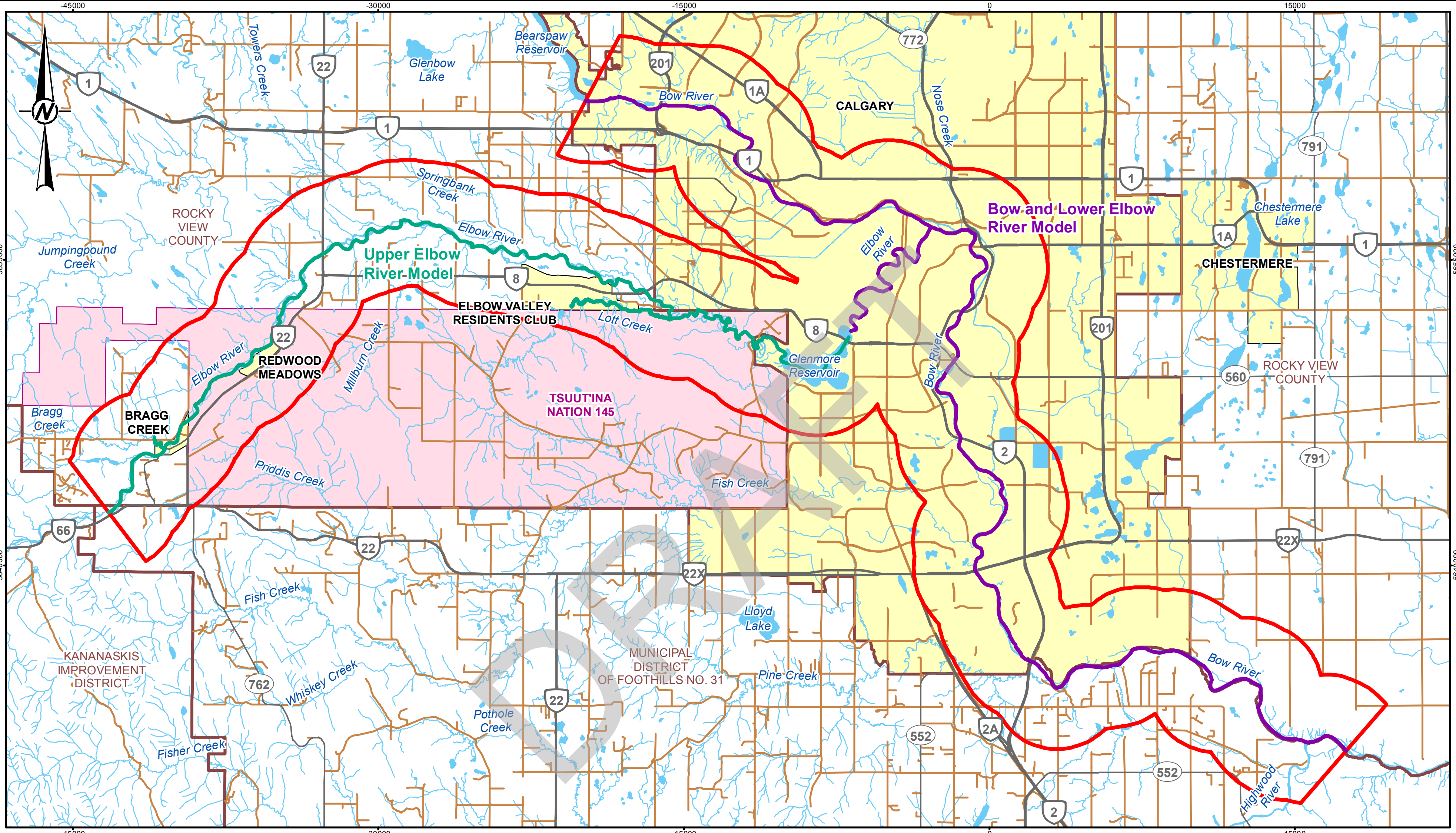

LEGEND

- PRIMARY HIGHWAY
- SECONDARY HIGHWAY
- LOCAL ROAD
- WATERCOURSE
- MUNICIPAL DISTRICT BOUNDARY
- URBAN AREA
- WATERBODY
- FIRST NATION RESERVE
- RIVER HAZARD STUDY AREA

HYDRAULIC MODEL

- BOW AND LOWER ELBOW
- UPPER ELBOW

0 5 10

1:275,000 KILOMETRES

CLIENT

ALBERTA ENVIRONMENT AND PARKS

Alberta Government

CONSULTANT

Golder Associates

YYYY-MM-DD	2018-11-05
DESIGNED	W.PLOEGER
PREPARED	P.THIEDE
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REFERENCE(S)

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DATUM: NAD 83 CSRS PROJECTION: 3TM 114

PROJECT

BOW AND ELBOW RIVER HAZARD STUDY

TITLE

STUDY AREA

PROJECT NO.	CONTROL	REV.	FIGURE
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1.3 Scope of Work

The scope of the hydraulic model creation and calibration component of the study includes:

- documentation of flooding history;
- summary of available data;
- description of river and valley features;
- hydraulic model setup;
- hydraulic model calibration;
- generation of open water flood frequency profiles; and
- hydraulic model sensitivity analysis.

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2.0 FLOODING HISTORY

2.1 General Information

High flows within the study area are commonly associated with high rainfall or rain-on-snow events between May and July, but the largest floods have been a result of significant late-spring to mid-summer storm events in June. High water levels can also occur due to freeze-up ice jam events, but significant ice jam-related flooding has not been a concern along the Bow River at Calgary since construction of Bearspaw Dam in 1954 (Golder 2020), or along the Elbow River upstream of Calgary since the late 1980s and early 1990s (AGRA 1996).

2.2 Open Water Floods

Open water flooding is the most common type of riverine flooding within the study area and occurs when an ice cover is not present or ice is not significantly affecting river hydraulics. A summary of estimated or recorded flows for major open water floods along the Bow and Elbow Rivers at three representative Water Survey of Canada (WSC) hydrometric gauging stations within the study area is provided in Table 2.

Table 2: Bow and Elbow River Flood Flows

WSC Station Name	WSC Station No.	Flood Year and Peak Flow (m^3/s)								
		2013	2005	1995	1932	1929	1915	1902	1897	1879
Bow River at Calgary	05BH004	1,840[1]	791[1]	499[1]	1,520[1]	1,320[1]	1,130[1]	1,557[3]	2,265[3]	2,265[3]
Elbow River at Bragg Creek	05BJ004	1,170	308	377	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Elbow River below Glenmore Dam	05BJ001	700[2]	301[2]	152[2]	320[2,4]	433	379	n.a.	n.a.	n.a.

Notes:
1) Bow River flows through Calgary have been regulated by Ghost Dam since 1929 and Bearspaw Dam since 1954 (AENV 1983).
2) Elbow River flows have been regulated downstream of Glenmore Dam since 1932 (AENV 1983).
3) Estimated historic flood flow (AENV 1983).
4) Estimated natural inflow into Glenmore Reservoir is 708 m^3/s, with recorded peak outflow of 320 m^3/s (AENV 1983).

2.2.1 Historic and Observed Floods

Historic floods are those documented to have occurred prior to the period of hydrometric data collection and systematic recording of water levels and flows. Observed floods can include both historic and recorded floods, but this section focuses on major floods documented prior to 1995, as described in previous provincial flood studies for Calgary (AENV 1983), Bragg Creek (UMA 1992), and Rocky View County (AGRA 1996).

Refer to Section 2.2.2 for a description of the most recent 2005 and 2013 flood events.

Bow River

Major floods occurred on the Bow River at Calgary in 1879, 1897, 1902, 1915, 1929, and 1932 (AENV 1983):

> "Major floods were experienced on the Bow River during the early settlement period at Fort Calgary. The flood of 1879 has been considered by the Water Survey of Canada as the largest known flood, however there is no discharge or stage record available for this flood and it was assumed equivalent to the 1897 flood. In recorded history, the flood of 1897 was the most destructive. This flood, caused by heavy June rains, had a magnitude

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> estimated to be 2265 cms. Highwater marks for this flood are available at CPR Twin Bridges and Langevin Bridge. The peak flow for the 1902 flood was much less than the earlier (1879, 1897) floods, but damage was reported to be extensive. Other major floods were experienced in 1915, 1929 and 1932."

Between 1932 and 2005 there have been no major summer floods on the Bow River. The Ghost Dam upstream of Cochrane was completed in 1929. While the main purpose of the Dam is electrical power generation, the reservoir also has sufficient capacity to support flood mitigation downstream. The Bearspaw Dam in Calgary was completed in 1954. The reservoir upstream of Bearspaw Dam has limited capacity and the dam is mostly used for meeting peak power demands

Elbow River

Major floods occurred on the Elbow River at Calgary in 1915, 1923, 1929, and 1932 (AENV 1983):

> "…major floods occurred in 1915, 1923, 1929 and 1932. The 1932 flood occurred just when the Glenmore Dam was completed and the reservoir was still empty. The storage available in the reservoir cut the flood peak from 708 cms (25,000 cfs) to 320 cms (11,300 cfs) downstream of the dam. Even with the reduced peak, severe flooding was witnessed and recorded. Old newspapers contain references to other floods in 1884, 1897 and 1902. (…) In 1923, a 1.2 m (4 ft) depth of flow was described as being a raging torrent along 40th Avenue. The 1929 flood submerged major areas of Mission District, Roxboro, Rideau, Riverdale, Victoria and Elbow Park. The 1929 flood caused considerable damage to properties from Mission Bridge to 25 Avenue Bridge and north to 2nd Street East Bridge. It also washed out the centre span of the 25 Ave. S.E. Bridge and CNR freight yard line. Recent highwater events have taken place in 1942, 1948, 1967 and 1981, but the flooding associated with these events has been relatively minor."

There was no flow regulation on the Elbow River prior to the construction of Glenmore Dam between 1932 and 1933. Flooding immediately upstream of Glenmore Dam, within current Calgary city limits and through portions of Tsuut'ina Nation and Rocky View County was also reported in 1915, 1923, 1929, and 1932 (AGRA 1996). Some sources also consider the Elbow River high flow event of 2008 to be significant (Golder 2020).

Farther upstream, major floods occurred on the Elbow River at Bragg Creek in 1932 and 1963 (UMA 1992):

> "The 1932 flood is the largest recorded flood, with an estimated peak instantaneous flow of 836 m^3/s at Bragg Creek. This flood had the widest impact on property and residents in the study area. In addition to the bridge, the flood also destroyed the post office, a two storey store and resulted in the death of one inhabitant. Since 1932, peak instantaneous flows on the river have been reported at 267 m^3/s in 1948 and 268 m^3/s in 1963.
>
> Following the 1963 flood, an artificial levee was constructed on the south bank of the river to protect the Bragg Creek Trading Post from future flooding and to protect the bank from erosion. This levee was constructed by piling up river gravel and covering it with a 1.5 m blanket of 0.5 m diameter riprap material."

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Bragg Creek

There are no records of severe open water flooding along Bragg Creek prior to 2013.

Lott Creek

There are no records of significant open water flooding along Lott Creek prior to 2013.

2.2.2 Recent and Recorded Floods

The most recent major floods along the Bow and Elbow Rivers occurred in 1995, 2005, and 2013. These floods yielded a large amount of flood imagery and surveyed highwater mark data, collected by AEP and flood-affected communities, with 2013 being the largest recorded flood for both the Bow and Elbow Rivers in the study area.

2.2.2.1 June 2013 Flood

Event Hydrology

The storm that caused the June 2013 flood event is considered the largest short duration storm (i.e., 6-hour, 12-hour, and 24-hour storms) observed within Alberta, among storms with coverage areas greater than 2,000 km^2. Although there was residual snow cover in the upper Bow and Elbow River watersheds, an assessment completed for the City of Calgary estimates that snowmelt contributed only between 9% and 17% to the total runoff volume and the flood was driven by precipitation and runoff processes (Golder 2014). Hydrological analyses from the same assessment suggest that the runoff depths (yields) ranged from 100 to 150 mm in the Elbow River basin and about 60 mm in the Bow River basin at Calgary. While it is not always the case during high flow events along the Bow and Elbow Rivers, the two flood peaks reached Calgary on the same day.

Peak (maximum instantaneous) recorded June 2013 flood flows are provided in Table 3.

Table 3: Peak Recorded 2013 Flood Flows

WSC Station No. and Name		Peak Flow (m^3/s)	Recorded Time and Date
05BH004	Bow River at Calgary	1,840	2013-06-21 02:45
05BJ004	Elbow River at Bragg Creek	1,170	2013-06-20 11:16
05BJ010	Elbow River at Sarcee Bridge	1,240	2013-06-20 22:01
05BJ001	Elbow River below Glenmore Dam	700	2013-06-21 20:00

It is challenging to assign return periods to the 2013 floods along the Bow and Elbow Rivers because of the effects of regulation on recorded flood peaks. If there had been no regulation of the Bow River and its tributaries by dams upstream of Calgary or of the Elbow River by Glenmore Dam, the 2013 flood at Calgary would have been significantly more severe than experienced. If Bow River flows were not regulated upstream of Calgary, the natural 2013 flood peak would have been in the order of a 200-year flood using recently-computed naturalized flood frequency estimates (Table 5). Likewise, if Elbow River flows were not regulated below Glenmore Dam, the natural 2013 flood peak would have been slightly higher than a 200-year flood, the same as from Bragg Creek to Glenmore Dam where there is no regulation. However, because flows that would naturally have occurred at Calgary were reduced because of regulation by dams and reservoirs, the apparent frequency of the recorded 2013 flood peaks is lower than they could have been. For example, the recorded peak 2013 flood flow for the Bow River at Calgary is slightly less than the naturalized 75-year flood flow of 1,880 m^3/s, and the recorded peak 2013 flood flow for the Elbow River below Glenmore Dam is slightly less than the naturalized 75-year flood flow of 738 m^3/s.

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Flood Emergency Measures

Rocky View County started voluntary evacuation of select residents in the Bragg Creek area at 1:30 am on June 20, 2013. At 2:45 pm on June 20, 2013, evacuation of all Bragg Creek residents was made mandatory with the County providing support to residents. At 9:30 am on June 21, 2013, the County informed Bragg Creek residents that the mandatory evacuation remained in effect. The Balsam Avenue Bridge was closed to traffic during the flood, limiting vehicular access to the West Bragg Creek and Wintergreen residential areas. Remaining residents in these areas chose either to leave on foot or shelter in place. At 6:30 pm on June 21, 2013, the mandatory evacuation was lifted and vehicular access over the Balsam Avenue Bridge was restored.

Following heavy rainfall forecasts for the foothills region upstream of Calgary and with flow forecast information provided by AEP in the days leading up to the 2013 flood, the City lowered Glenmore Reservoir water levels in anticipation of a potentially large flood peak to increase storage capacity and reduce potential dam outflows into the Elbow River. The Calgary Emergency Management Agency (CEMA) enacted its emergency response plan at 8:28 am June 20, 2013, and declared a state of local emergency at 10:16 am. Approximately 80,000 residents were evacuated from 32 low-lying neighbourhoods within the next 15 hours and the City informed residents via various traditional and social media (Calgary 2014 and Vroegop 2014). In addition to evacuations and ongoing communication, temporary flood barriers were constructed along the Bow and Elbow Rivers and the downtown core, 16 LRT stations, and more than 20 bridges were closed during the flood event.

Limited flood emergency measure information is available for Foothills County or Tsuut'ina Nation.

Elbow River Flooding in Bragg Creek

The 2013 flood caused widespread flooding throughout Bragg Creek, with several properties and both private and municipal infrastructure sustaining damage. The Balsam Avenue Bridge over the Elbow River was closed for some time due to erosion of the embankment and potential structural damage caused by a building that impacted the bridge as it was being washed away downstream. A recently buried gasoline tank at the Husky gas station floated to the surface due to buoyancy forces. The historic Trading Post (near the west end of White Avenue) sustained major damage and a large parcel of land along River Drive South was washed away. Highway 758 near the historic Trading Post was also severely damaged due to bank erosion.

The residential areas of West Bragg Creek and Wintergreen were not significantly impacted, with exception of properties along low-lying sections of Bracken Road in Bragg Creek. Photos 1, 2, 3 and 4 below were provided by Rocky View County and show the June 2013 flood at Bragg Creek.

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Photo 1: Downtown Bragg Creek on June 20, 2013 (Provided by Rocky View County)

Photo 2: Balsam Avenue Bridge at Bragg Creek on June 20, 2013 (Provided by Rocky View County)

Photo 3: Elbow River at Highway 758 in Bragg Creek on June 20, 2013 (Provided by Rocky View County)

Photo 4: Historic Trading Post at White Avenue in Bragg Creek on June 20, 2013 (Provided by Rocky View County)

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Bragg Creek Flooding in Bragg Creek

The Bracken Road Bridge was overtopped and some properties along Bragg Creek near the Elbow River confluence were flooded (Photo 5). The Centre Avenue Bridge was not overtopped and access was not affected by flooding (Photo 6).

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Photo 5: Bracken Road Bridge over Bragg Creek near the Elbow River confluence on June 20, 2013 (Provided by Rocky View County)

Photo 6: Centre Avenue Bridge over Bragg Creek on June 20, 2013 (Provided by Rocky View County)

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Elbow River Flooding in Tsuut'ina Nation

With the exception of the Redwood Meadows area, there is limited information about 2013 flooding in either the upstream (near Bragg Creek) or downstream (near Calgary) reaches of the Elbow River through Tsuut'ina Nation.

In the upstream reach, the Redwood Meadows Golf and County Club was affected when floodwaters inundated parts of the golf course.

The flood berm and emergency flood measures at Redwood Meadows protected the community from severe direct river flooding. However, due to high groundwater levels and local drainage problems, there was localized ponding in the streets and non-riverine residential and basement flooding. During the flood event, temporary measures were taken by the community to stabilize the Redwood Meadows berm against erosion at some locations. There is limited valley development in the downstream reach, and no reports of significant flooding.

Elbow River Flooding in Rocky View County

Flooding and bank erosion was experienced at several locations along the Elbow River through Rocky View County, including a shorter reach around Bragg Creek and the longer reach north of Tsuut'ina Nation along Highways 22 and 8. The main channel of the Elbow River shifted laterally within the valley at several locations, including along the right bank adjacent to the residential development north of Highway 8.

Widespread flooding occurred at Kamp Kiwanis west of Highway 22 and throughout the low-lying floodplains around the Highway 22 Bridge and along Highway 8, including parts of the Elbow Springs Golf Club, the River Spirit Golf Club, and the Glencoe Golf and Country Club. The access road to the Elbow Valley Residents Club residential area north of Highway 8 and upstream of the Highway 8 Bridge was flooded, as were a pond, several pathways, and a playground within that part of the community. Flood water levels encroached upon the houses along Clearwater Landing (Photo 7). Highway 8 was not overtopped (Photo 8) and the Elbow Valley Residents Club residential area south of Highway 8 was not affected by Elbow River floodwaters. However, the left abutment of the Highway 8 Bridge experienced severe erosion (see Figure 16 in Section 5.3.4.3).

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Photo 7: Elbow River at Clearwater Landing (Provided by Elbow Valley Residents Club)

Photo 8: Elbow River at Highway 8 Bridge (Provided by Elbow Valley Residents Club)

Lott Creek Flooding in Rocky View County

Lott Creek conveyed high flows and the flow diversion into Elbow Valley Lake through the drop-inlet structure on Lott Creek Drive was activated (Photo 9). A large portion of Lott Creek flows was conveyed through the lakes and over the Fisherman's Lake Weir (Photo 10). However, no direct overland flooding or damages to residential properties along Lott Creek were reported. Flooding occurred on parts of the Elbow Springs Golf Club. Flooding south of Lott Creek drive was attributed to high Lott Creek flows, while flooding north of Lott Creek Drive was likely caused by high Elbow River flows.

Photo 9: Drop-Inlet Structure at Lott Creek Drive on June 23, 2013 (Provided by the Elbow Valley Residents Club)

Photo 10: Fisherman's Lake Weir on June 21, 2013 (Provided by the Elbow Valley Residents Club)

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Elbow River Flooding in Calgary

Several neighbourhoods along the Elbow River in Calgary experienced severe flooding in 2013, including Discovery Ridge (above Glenmore Dam), and Britannia, Elbow Park, Rideau Park, Roxboro, Mission, Victoria Park, Erlton, and Stampede (below Glenmore Dam). The extent of flooding documented along the Elbow River below Glenmore Dam is shown in Figure 2. In addition to significant damage to residential, commercial, and municipal buildings and related infrastructure, three pedestrian bridges below Glenmore Dam were destroyed and severe bank erosion and channel avulsion destroyed a section of the LRT tracks north of the Erlton LRT Station.

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LEGEND

- 2013 FLOOD EXTENT BASED ON AIR PHOTO
- ▲ HIGH WATER MARK (COLLECTED BY THE CITY OF CALGARY)
- ▲ HIGH WATER MARK (COLLECTED BY AEP)

0 500 1,000

1:15,000 METRES

NOTE(S)

DIGITIZED FLOOD EXTENT PROVIDED BY THE CITY OF CALGARY BASED ON AERIAL PHOTOGRAPHY COLLCETED ON JUNE 22, 2013 (8:00 AM - 9:30 AM), APPROXIMATELY 12 HOURS AFTER THE PEAK.

REFERENCE(S)

2015 AERIAL IMAGERY AND FLOOD PHOTOS PROVIDED BY THE CITY OF CALGARY.
DATUM: NAD 1983 CSRS PROJECTION: 3TM 114

CLIENT
ALBERTA ENVIRONMENT AND PARKS

Alberta Government

CONSULTANT
Golder Associates

YYYY-MM-DD	2018-11-05
DESIGNED	W.PLOEGER
PREPARED	P.THIEDE
REVIEWED	W.PLOEGER
APPROVED	W.PLOEGER

PROJECT
BOW AND ELBOW RIVER FLOOD HAZARD STUDY

TITLE
ELBOW RIVER JUNE 2013 FLOOD EXTENT

PROJECT NO.	CONTROL	REV.	FIGURE
1536673	2000	0	2

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Bow River Flooding in Calgary

Several neighbourhoods along the Bow River in Calgary experienced severe flooding in 2013, including Bowness, Sunnyside, Downtown, East Village, and the Calgary Zoo. Downtown was essentially closed due to the flood, and power was shut off to all evacuated and some severely impacted areas. Power in downtown Calgary was restored on June 28, 2013, seven days after the flood peak.

Bank erosion threatened major infrastructure in a number of neighbourhoods along the Bow River. Severe bank erosion was noted along: the left bank in Bowmont Park near Home Road; the right bank and the CP Rail tracks from Shouldice Park to Edworthy Park; Memorial Drive at 19th Street in Westmount; Memorial Drive at Sunnyside; the right bank at 8th Avenue in Inglewood, the left bank at Enmax Substation No. 32 downstream of Deerfoot Trail in Douglasdale; and the right bank at Diamond Cove.

The new pedestrian bridge to St. Patrick's Island under construction at the time was damaged during the flood. The right bank immediately downstream of the Western Headworks (WH) Weir at Harvie Passage was eroded and subsequent avulsion created a new side channel that bypassed the lower portions of Harvie Passage. The Inglewood Golf and Curling Club was flooded. There was deep scouring at the CP Rail Bridge at Bonnybrook which led to subsequent failure of a pier and partial collapse of the bridge six days after the flood peak. The LaFarge Pipe Plant at Deerfoot Trail was flooded. Approximately 150 m of Glenmore Trail between Deerfoot Trail and the Graves Bridges over the Bow River was flooded.

The river bank that separated a lagoon at Riverbend from the Bow River was eroded and washed away, making the lagoon an actively flowing part of the river system. The LaFarge yard north of the Ivor Strong Bridge (Deerfoot Trail) was flooded.

The Enmax Substation No. 32 on the left river bank downstream of the Ivor Strong Bridge was surrounded by flood waters. Heavy bank erosion was threatening the integrity of the substation pad. There was wide spread flooding through Fish Creek Park and on the McKenzie Meadows Golf Club. Parts of the Blue Devil Golf Club were inundated. Downstream of Calgary parts of the Cottonwood Golf and Country Club and the Burnco Indus Pit Operation was flooded.

A large number of flood photos are available from the City of Calgary, some of which are shown in Photos 11 through 14.

Photo 11: Enmax Substation 32 Downstream of Deerfoot Trail on June 21, 2013 (Provided by the City of Calgary)

Photo 12: Flooding in Sunnyside on June 21, 2013 (Provided by the City of Calgary)

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Photo 13: Collapsed CP Rail Bridge at Bonnybrook after rail cars were removed on July 10, 2013 (Provided by the City of Calgary)

Photo 14: Centre Street Bridge in Calgary on June 22, 2013 (Provided by the City of Calgary)

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2.2.2.2 June 2005 Flood

Event Hydrology

At the time, the 2005 flood was the largest recorded in the Bow and Elbow River watersheds since 1932. The 24-hour rainfall amounts recorded on those days were about 46 mm at the Calgary Airport and about 97 mm at Elbow Ranger Station (Golder 2010). Recorded peak June 2005 flood flows are provided in Table 4.

Table 4: Peak Recorded 2005 Flood Flows

WSC Station No. and Name		Peak Flow (m^3/s)	Recorded Time and Date
05BH004	Bow River at Calgary	791	2005-06-18 18:15
05BJ004	Elbow River at Bragg Creek	308	2005-06-07 18:05
05BJ010	Elbow River at Sarcee Bridge	338	2005-06-18 13:00
05BJ001	Elbow River below Glenmore Dam	301	2005-06-19 04:05

If there had been no regulation of the Bow River and its tributaries by dams upstream of Calgary or of the Elbow River by Glenmore Dam, the 2005 flood at Calgary would have been more severe than experienced. If Bow River flows were not regulated upstream of Calgary, the natural 2005 flood peak would have been in the order of a 20-year flood using recently-computed naturalized flood frequency estimates (Table 5). Likewise, if Elbow River flows were not regulated below Glenmore Dam, the natural 2005 flood peak would have been slightly less than a 20-year flood, similar to upstream of Glenmore Dam where there is no regulation. However, because flows that would naturally have occurred at Calgary were reduced because of regulation by dams and reservoirs, the apparent frequency of the recorded 2013 flood peaks is lower than they could have been. For example, the recorded peak 2005 flood flow for the Bow River at Calgary is between a naturalized 5-year and 10-year flood flow, and the Elbow River below Glenmore Dam is in the order of a naturalized 15-year flood flows

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Elbow River and Bragg Creek Flooding in Bragg Creek and Calgary

Downtown Bragg Creek (Photo 15) and low-lying areas along Bragg Creek were flooded in 2005. High flows at the Balsam Avenue and Highway 22 Bridges are shown in Photo 16 and 17, respectively. Localized flooding also occurred at Griffith Woods Park and along low-lying areas along the Elbow River below Glenmore Dam in Calgary, including in the Elbow Park and Mission neighbourhoods.

Bow River Flooding in Calgary

Flooding along the Bow River occurred at the Bowness Park and Prince's Island neighbourhoods, and at the Calgary Zoo. The causeway to Prince's Island was washed away. Several pathways were inundated and closed (e.g., the pathway along the Bow River under the Centre Street Bridge, Photo 18). Parts of the Fish Creek Provincial Park were closed due to damaged pathways and washed-out bridges (Calgary 2014).

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Photo 15: Downtown Bragg Creek on June 7, 2005 (Provided by Rocky View County)

Photo 16: Balsam Avenue Bridge over the Elbow River at Bragg Creek on June 7, 2005 (Provided by Rocky View County)

Photo 17: Highway 22 Bridge over the Elbow River on June 7, 2005 (Provided by RVC)

Photo 18: Centre Street Bridge in Calgary on June 8, 2005 (Provided by the City of Calgary)

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2.3 Ice Jam Floods

2.3.1 Historic and Observed Floods

Bow River

Winter flooding due to ice jamming occurred on the Bow River in Calgary a number of times during the 1950s. These winter floods affected the neighbourhoods of Bowness, Hillhurst, and Sunnyside, and were believed to be caused by releasing water from the Ghost Dam in the winter to accommodate peak power (AENV 1983). However, since the 1960s there has been no significant winter flooding due to ice jamming. The following factors have reduced winter flooding in Calgary:

- construction of Bearspaw Dam in 1954 and different regional TransAlta dam operating rules to meet peak power demands;
- diking along the Bow River throughout the central parts of Calgary; and
- construction of ice anchors in Calgary, first downstream of Louise Bridge and later at Prince's Island.

Under current conditions, significant ice jam flooding in the study area is considered unlikely and typically less severe than open water flooding.

Elbow River

There have been reports of localized ice-related flooding along the Elbow River within Rocky View County north of Highway 8 (AGRA 1996), with documented high water levels caused by ice-related floods in 1987 and 1990 (HBT AGRA 1992). There is no further record of ice jam flooding along the Elbow River within the study area.

Bragg Creek

There is no record of ice jam flooding along Lott Creek within the study area.

Lott Creek

There is no record of ice jam flooding along Lott Creek within the study area.

2.3.2 Recent and Recorded Floods

There is no record of recent severe ice jam flooding within the study area.

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Classification: Public

3.0 AVAILABLE DATA

3.1 Hydrology Summary

The Bow River originates in the Rocky Mountains at the Bow Glacier. It flows mostly eastward through both mountain and foothills regions and communities (including Calgary), until it joins the Oldman River in the prairies and forms the South Saskatchewan River. It has a drainage area of 7,868 km^2 at Calgary (WSC Station No. 05BH004) and 19,160 km^2 near the mouth (WSC Station 05BN012). From upstream to downstream, the Bow River is joined by the Elbow River, and Nose, Fish, and Pine Creeks within Calgary and the study area.

The Bow River and several significant tributaries are heavily regulated by hydropower reservoirs and control structures upstream of Calgary, with more limited regulation downstream of Calgary. Within Calgary, water is also diverted from the Bow River to the Western Irrigation District (WID) at the Western Headworks (WH) Weir, located downstream of the Nose Creek confluence.

The Elbow River originates in the Kananaskis Country foothills region west of Bragg Creek. It flows mostly northeastward through Rocky View County (including Bragg Creek), Tsuut'ina Nation (including Redwood Meadows), and Calgary, where it joins the Bow River. It has a reported drainage area of 791 km^2 at Bragg Creek (WSC Station No. 05BJ004) and 1,236 km^2 below Glenmore Dam in Calgary (WSC Station No. 05BJ001). Glenmore Reservoir outflows are regulated to support water supply and flood control in Calgary.

Bragg and Lott Creeks are both tributaries to the Elbow River. Bragg Creek has a drainage area of about 50 km^2 at its confluence with the Elbow River in Bragg Creek, and Lott Creek has a drainage area of about 115 km^2 at its confluence with the Elbow River in Tsuut'ina Nation immediately west of Calgary.

Flood frequency flow estimates at key locations along the Bow and Elbow Rivers within the study area, and for Bragg and Lott Creeks, were calculated as part of a larger hydrology assessment undertaken to support this study (Golder 2020). The naturalized flood frequency flow estimates relevant to this study are summarized in Table 5.

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Table 5: Naturalized Flood Frequency Flow Estimates

Location	Peak Flood Flow for Various Return Periods (m^3/s)												
	2-Year	5-Year	10-Year	20-Year	35-Year	50-Year	75-Year	100-Year	200-Year	350-Year	500-Year	750-Year	1,000-Year
Bow River below Bearspaw Dam	401	627	845	1,120	1,400	1,610	1,880	2,090	2,710	3,330	3,790	4,400	4,880
Bow River below Elbow River	464	739	996	1,310	1,630	1,860	2,150	2,390	3,050	3,710	4,190	4,820	5,310
Bow River below Nose Creek	465	746	1,010	1,330	1,650	1,890	2,180	2,420	3,090	3,760	4,240	4,880	5,370
Bow River below Fish Creek	469	762	1,040	1,380	1,730	1,980	2,310	2,580	3,340	4,120	4,700	5,480	6,100
Bow River below Pine Creek	472	770	1,050	1,400	1,760	2,020	2,350	2,620	3,390	4,180	4,770	5,560	6,180
Bow River above Highwood River	478	780	1,070	1,420	1,780	2,040	2,380	2,660	3,440	4,240	4,830	5,630	6,260
Bow River below Highwood River	582	867	1,140	1,500	1,870	2,150	2,530	2,840	3,750	4,690	5,420	6,390	7,180
Elbow River above Springbank Creek	67.5	155	250	377	508	607	736	840	1,140	1,440	1,660	1,930	2,150
Elbow River below Springbank Creek	70.4	157	253	379	509	610	738	841	1,140	1,440	1,660	1,930	2,150
Elbow River below Glenmore Dam	70.4	157	253	379	509	610	738	841	1,140	1,440	1,660	1,930	2,150
Bragg Creek	5.59	12.0	18.0	25.2	32.0	37.0	43.2	48.1	61.4	74.3	83.5	94.6	103
Lott Creek	2.45	7.14	11.6	16.7	21.3	24.4	28.1	30.8	37.7	43.6	47.5	52.0	55.2

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3.2 DTM Data

As per FHIP specifications, a digital terrain model (DTM) used to describe floodplain topography must have a ±0.15 m minimum vertical accuracy, at 95% confidence.

The City of Calgary provided AEP with a city-wide DTM for use in this study that exceeds minimum provincial accuracy specifications. The Calgary-specific DTM is based on data acquired September 28, 2012, to June 14, 2013, and updated along the Bow and Elbow Rivers September 9 to October 7, 2013. Select areas with elevation changes along both the Bow and Elbow Rivers were captured May 2015. A one-mile buffer outside Calgary city limits was captured September 28 to October 19, 2015. The vertical accuracy is approximately ±0.05 m, at 95% confidence, and horizontal accuracy is approximately ±0.10 m on hard surfaces.

Outside of Calgary city limits, AEP commissioned a new DTM based on LiDAR data acquired in October 2015. Independent ground truth surveys were completed for quality assurance and control, and the accuracy of the new DTM along the Elbow River was determined to be within ±0.15 m, at 95% confidence, meeting AEP specifications.

A more detailed description of DTM data and specifications is provided in the survey and base data collection report prepared for this study (Golder 2017).

3.3 Survey Data

As per FHIP specifications, survey data collected using typical ground-based technologies must have an absolute positional accuracy of ±0.05 m, at 95% confidence. Final accuracy of bathymetric data collected using a combination of ground and acoustic-based technologies must be accurate to ±0.15 m, but it is expected that most data will maintain the ±0.05 m accuracy obtained from ground-based technologies.

Within Calgary city limits, most survey data along the Bow River and along the Elbow River downstream of Glenmore Dam was collected in late 2013 and early 2014, as part of a joint AEP and City of Calgary hydraulic project (Golder 2015a). This data was supplemented by additional survey work conducted between fall 2015 and summer 2016 for the present study. Outside of Calgary city limits and along the Elbow River upstream of Glenmore Dam, survey data was collected between June and August 2016. All survey data used in this study meets or exceeds minimum AEP accuracy specifications.

A more detailed description of the river, overbank, hydraulic structure, and flood control structure survey work is provided in the survey and base data collection report prepared for this study (Golder 2017).

3.4 Existing Models

Hydraulic models previously developed in the study area and referenced in the current work are listed in Table 6.

Table 6: Existing Hydraulic Models

No.	Description	Model Used	Source
1	City of Calgary Floodplain Study	HEC-2	AEP (AENV 1983, Revised 1996)
2	Elbow River at Bragg Creek Hydraulic Study	HEC-2	AEP (UMA 1992, Revised 1995)
3	Elbow River – M.D. of Rocky View Flood Risk Mapping Study	HEC-2	AEP (AGRA 1996, Revised 1998)

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Table 6: Existing Hydraulic Models

No.	Description	Model Used	Source
4	Bow and Elbow River Updated Hydraulic Model Project, Hydraulic Modelling and Inundation Mapping	HEC-RAS (Version 4.1)	AEP and City of Calgary (Golder 2012)
5	Bow River and Elbow River Hydraulic Model and Flood Inundation Mapping Update	HEC-RAS (Version 4.1)	AEP and City of Calgary (Golder 2015b)
6	Bow and Elbow River Hazard Study – Two-Dimensional Hydraulic Models for the Calgary and Lott Creek Study Areas	MIKE FLOOD (Version 2013)	AEP (Golder 2018a)

The 2015 model (Golder 2015b) is a core input for the hydraulic modelling work being undertaken as part of this study. The 2015 model includes the Bow River from Bearspaw Dam to the Highwood River confluence and the Elbow River below Glenmore Dam. As part of the current work, this model was reviewed and updated as required.

3.5 Highwater Marks

Available highwater mark reports and data are listed in Table 7.

Table 7: Available Highwater Mark Reports and Data

No.	Description	Flood	No. of Highwater Marks	Source
1	Bow River through Calgary	June 2013	12	AESRD 2014a
2	Bow and Elbow Rivers through Calgary		1,658	Calgary 2013
3	Elbow River below Glenmore Dam		9	AESRD 2014c
4	Elbow River above Glenmore Dam		16	AESRD 2014e
5	Lott Creek		3	AESRD 2014d
7	Elbow River from Bragg Creek through Calgary	May 2008	3	AENV 2008
8	Bow River through Calgary	June 2005	12	AENV 2006a
9	Bow and Elbow Rivers through Calgary		246	Calgary 2009
10	Elbow River below Glenmore Dam		5	AENV 2006b
11	Elbow River above Glenmore Dam		15	AENV 2006c
13	Elbow River above Glenmore Dam	June 1995	12	AENV 1995
14	Elbow River above Glenmore Dam	May 1990	11	AENV 1990
15	Bow River through Calgary	May 1981	58	AENV 1981a
16	Elbow River from Bragg Creek through Calgary		13	ANEV 1981b

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3.6 Gauge Data and Rating Curves

The following WSC hydrometric gauging stations are located within the study area:

- WSC Station No. 05BH004 – Bow River at Calgary
- WSC Station No. 05BJ004 – Elbow River at Bragg Creek
- WSC Station No. 05BJ010 – Elbow River at Sarcee Bridge
- WSC Station No. 05BJ001 – Elbow River below Glenmore Dam

In order to support low flow model calibration and verify preliminary WSC flows during the survey period, discharge measurements were also taken by Golder during the survey (Golder 2017). Locations where discharge measurements were taken include: On the Bow River above and below the Elbow River confluence, on the Elbow River above and below Glenmore Reservoir, at two locations on Lott Creek, and at one location on Bragg Creek. Survey crews adhered to WSC protocols for flow measurement, resulting in accuracies within ±5% of actual flow.

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3.7 Flood Photography

Table 8 below summarizes available flood photography.

Table 8: Available Flood Photography

<table>
<tr><th>No.</th><th>Description</th><th>Flood</th><th>Source</th></tr>
<tr><td>1</td><td>Aerial imagery of the flooding extents (June 22, 2013)</td><td rowspan="5">June 2013</td><td>AEP</td></tr>
<tr><td>2</td><td>Non aerial photos of flooding in Calgary</td><td>City of Calgary</td></tr>
<tr><td>3</td><td>Non aerial photos of flooding in Calgary</td><td>Golder Associates Ltd.</td></tr>
<tr><td>4</td><td>Non aerial and oblique aerial photos of flooding in Rocky View County</td><td>Rocky View County</td></tr>
<tr><td>5</td><td>Non aerial photos within the Elbow Valley Residents Club</td><td>Elbow Valley Residents Club</td></tr>
<tr><td>6</td><td>Flooding in Calgary</td><td rowspan="2">June 2005</td><td>City of Calgary</td></tr>
<tr><td>7</td><td>Flooding in Rocky View County</td><td>Rocky View County</td></tr>
<tr><td>8</td><td>Flooding in Rocky View County</td><td>June 1995</td><td>Rocky View County</td></tr>
</table>

This photography was used during the model calibration in addition to the available highwater marks to confirm the modelled extent of inundation in areas where there was limited highwater mark data and in areas further away from the main channels. For example, the non aerial and oblique aerial photos from Rocky View County were used to confirm the flood extents and flow conditions in Bragg Creek. The photos from the Elbow Valley Residents Club were used to confirm the flooding around Clearwater Drive and the activation of the drop-inlet structure on Lott Creek. The aerial imagery from AEP and non aerial flood photos from the City of Calgary and Golder combined with the large number of highwater marks provide an excellent basis for model calibration in Calgary.

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4.0 RIVER AND VALLEY FEATURES

4.1 General Description

The Bow and Elbow Rivers are the primary water courses for communities in the study area, with Calgary located at their confluence. In the study area, the Bow River flows eastward from Bearspaw Dam for approximately 25 km before being joined by Nose Creek. Downstream of Nose Creek, the Bow River flows southward for approximately 23 km and then turns in a southeasterly direction for approximately 15 km to the Highwood River confluence. Fish Creek and Pine Creek also join the Bow River in Calgary.

The upstream end of the Elbow River study reach is approximately 4 km upstream of the Hamlet of Bragg Creek where Bragg Creek enters the Elbow River. Downstream of the Hamlet of Bragg Creek, the Elbow River flows in northeastern direction through a portion of Tsuut'ina Nation at Redwood Meadows and then turns towards the east through Springbank, and again through Tsuut'ina Nation before it reaches Glenmore Reservoir at the Weaselhead Natural Area. The total length of the Elbow River study reach upstream of Glenmore Dam is approximately 55 km.

Downstream of Glenmore Dam, the Elbow River flows through Calgary and then joins the Bow River in downtown Calgary. The length of the Elbow River reach downstream of the Glenmore Dam is approximately 11 km.

4.2 Channel and Floodplain Characteristics

4.2.1 Bow River

Channel Characteristics

The study reach of the Bow River is situated in a wider post glacial valley. The top width of the valley varies from 400 to 2,000 m.

In the study area, the Bow River channel pattern is mainly sinuous to slightly meandering with a relatively constant average slope of 0.0022 m/m throughout the study area. There are frequent mid-channel, side and point gravel bars. The sediment bars and side channels are generally related to meander migration within the study area. Meander scrolls are visible on the earliest air photos of the area. The historical photo record shows relatively slow meander migration rates within the study area when compared with the more active braided reach of the Elbow River farther upstream. A reach of anabranches is located near the downstream end of Calgary, downstream of Carburn Park. The channel is partly entrenched and frequently confined by dikes, rock-armored or high banks. The river bed materials are mostly gravel and cobble with D_{50} of approximately 40 mm. The materials in the river banks are mostly alluvial sand and gravel. The banks are partly vegetated outside of downtown Calgary.

Three of the islands (i.e., Prince's, St. George's, and St. Patrick's Islands) of the Bow River have been developed for recreational purposes. St. George's and St. Patrick's Islands now form one combined island that is also known as Zoo Island.

Floodplain Characteristics

The Bow River floodplain in Calgary is highly urbanized and susceptible to flooding. Along the central parts of Calgary including the Hillhurst, Kensington, Sunnyside, Bridgeland, Downtown, and Inglewood neighbourhoods, there are extensive flood control structures. The prevalent land use on the floodplain outside of Calgary along the lower Bow River study reach is agriculture with two gravel pit operations, a golf course and a waterski club.

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4.2.2 Elbow River Downstream of Glenmore Dam

Channel Characteristics

This lower reach of the Elbow River channel is mainly sinuous with occasionally confined by high or rock-armored banks. The river bed materials mainly consist of gravel. The river channel has occasional side-channel, mid-channel, and point gravel bars. Glenmore Reservoir acts as a barrier for bed load transport from upstream. During the 2013 flood event, a relatively large amount of gravel was transported to the Bow River and thus bed rock was exposed in a few areas. Sediment supply to the lower Elbow River is limited by Glenmore Dam.

Floodplain Characteristics

The river floodplain in Calgary is mostly highly urbanized and susceptible to flooding.

4.2.3 Elbow River Upstream of Glenmore Reservoir

Channel Characteristics

This upper reach of the Elbow River is situated in a wide and deep glaciated valley. The valley is 500 m to 1,500 m wide and is flanked by alluvial fans and terraces. The Elbow River bed slope decreases from approximately 0.0070 m/m at Bragg Creek to approximately 0.0030 m/m upstream of Glenmore Reservoir. Upstream of Bragg Creek the channel is braided and meandering through a relatively wide active channel with many gravel bars and small islands. The channel is confined by some rock outcrops and bank protection at Bragg Creek, especially near the old trading post (White Avenue).

Downstream of Bragg Creek the channel is braided within a wide active channel which exhibits high lateral instability and frequent shifts in the main and side channel alignments. There are many gravel bars and partly vegetated islands. Downstream of the Highway 8 Bridge, the channel becomes more sinuous with the braided reach transitioning into a more single-thread meandering channel until the Elbow River forms a small delta into Glenmore Reservoir.

The river bed material ranges from dominantly cobbles at the upstream end to gravel downstream of Highway 8. The mobile river bed is shallow over moderately erodible bedrock (AGRA 1996). At and near Bragg Creek there are some locations with exposed bedrock.

Floodplain Characteristics

The Elbow River floodplain upstream of Bragg Creek is mostly undisturbed, heavily vegetated natural environment with remnants of historic channels. At Bragg Creek there is residential and commercial development on the floodplain. Downstream of Bragg Creek, there are numerous multi-thread braided channels on the vegetated uncultivated floodplains. Along Redwood Meadows there is flood control structure to protect the low lying parts of the community. There are numerous sub-channels or channel remnants on the floodplains. There are four golf courses along the Elbow River between Bragg Creek and Glenmore Reservoir.

4.2.4 Lott Creek

Channel Characteristics

The Lott Creek channel upstream of the Misty Morning Drive Culvert is meandering with a clearly defined 5 m to 10 m wide main channel. The river bed is mostly sand and small gravel. There is noticeable beaver activity that influences the low and normal flow water levels.

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Downstream of Misty Morning Drive, Lott Creek is a heavily modified and partly artificial creek with several structures and varying bed material. The original channel was meandering through the area which is now occupied by constructed lakes in the Elbow Valley Community. The channel stays mostly south of Lott Creek Drive under the current conditions. The flow diminishes along the Elbow Springs Golf Club and the creek bed can become dry.

Floodplain Characteristics

Upstream of Misty Morning Drive, Lott Creek is situated in a 100 m to 200 m wide glacial valley. The floodplain in the valley is mostly undisturbed and heavily vegetated. Near the Misty Morning Drive Culvert, the floodplain widens into the much larger Elbow River valley. The floodplain along Lott Creek is heavily modified with artificial lakes, flow diversions, residential development, and a golf course.

4.2.5 Bragg Creek

Channel Characteristics

Within the study area the upper 500 m reach of Bragg Creek is situated in an approximately 150 m wide valley. The lower 500 m reach is considered to be part of the larger Elbow River valley and floodplain. Bragg Creek has a bed slope of approximately 0.0070 m/m. The Bragg Creek channel is meandering and approximately 10 m wide. Immediately upstream of the Bracken Road Bridge there is some bank protection on the right bank. Otherwise, heavy vegetation on the banks is confining the channel. The river bed material consists of gravel and cobble.

Floodplain Characteristics

Between the upstream end of the study reach at the Centre Avenue Bridge and Bracken Road the floodplain within the creek valley is heavily vegetated. Downstream of Bracken Road, the Bragg Creek floodplain is part of the Elbow River floodplain with some residential development.

4.3 Large Tributaries

Bow River

Tributaries of Bow River (other than the Elbow River) entering within the study area are listed in Table 9.

Table 9: Bow River Tributaries within the Study Area

No.	Bow River Station (m)	Name	Catchment Area (km^2)	Comment
1	45,968	Nose Creek	878	Confluence immediately upstream of CP Rail Bridge. Inflow from the left (north).
2	25,469	Fish Creek	440	Inflow from the right (west).
3	17,050	Pine Creek	212	Pine Creek enters the Bow River floodplain upstream of the Dunbow Road Bridge (Highway 2) near river station 18,500 m from the right (west).

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Elbow River

The tributaries entering the Elbow River within the study area (except for Bragg and Lott Creeks) are listed in Table 10. All these tributaries are relatively small and the catchment area information was not readily available.

Table 10: Elbow River Tributaries within the Study Area

No.	Elbow River Station (m)	Name	Catchment Area (km^2)	Comment
1	52,125	Harris Creek	n.a.	Inflow from the left (west).
2	40,713	Millburn Creek	n.a.	Inflow from the right (south).
3	35,510	Springbank Creek	n.a.	Springbank Creek enters the wider Elbow River floodplain near river station 36,780 m from the left (north).
4	32,330	Cullen Creek	n.a.	Cullen Creek enters the wider Elbow River floodplain near river station 33,280 m from the left (north).

4.4 Bridges, Culverts, Weirs and Dams

A detailed description of the bridges, culverts, weirs, and dams and their locations within the study area is provided in the survey and base data collection report prepared for this study (Golder 2017). All features are summarized in the following sections.

4.4.1 Bridges

There are 43 bridges along the Bow River study reach (Table 11). During the 2013 flood, St. Patrick's Island Pedestrian Bridge was under construction, and the cofferdam influenced the local hydraulic condition. This temporary feature is not included in the bridge and cross section geometry.

Table 11: Bow River Bridges within the Study Area

No.	River	Station (m)	Name	Description	Type
1	Bow River	66,108	Stoney Trail Bridge	-	5-Span
2	Bow River	64,541	85th Street NW Bridge	-	4-Span
3	Bow River	63,899	Bowmont Bridge	Pedestrian Bridge, includes bridge over side channel	2-Span
4	Bow River	63,809	CP Rail Twin Bridges	Includes bridge over side channel	Clear-Span
5	Bow River	59,938	Hextall Bridge	Pedestrian Bridge Upstream of Bowness Road	3-Span
6	Bow River	59,917	Shouldice Bridge	Bowness Road	3-Span
7	Bow River	59,516	Trans-Canada Highway Bridge	16th Avenue NW	5-Span
8	Bow River	57,063	Harry Boothman Bridge	Edworthy Park Pedestrian Bridge	4-Span
9	Bow River	53,501	Crowchild Trail Bridge	-	5-Span
10	Bow River	52,040	Mewata Bridge	14th Street SW	3-Span
11	Bow River	51,264	Louise Bridge	9th and 10th Streets SW	5-Span
12	Bow River	51,148	North West LRT Bridge	-	4-Span
13	Bow River	50,745	Peace Bridge	Pedestrian Bridge	Clear-Span
14	Bow River	49,960	Prince's Island Bridge	Pedestrian Bridge	7-Span, Suspension

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Table 11: Bow River Bridges within the Study Area

No.	River	Station (m)	Name	Description	Type
15	Bow River	49,266	Centre Street Bridge	-	4-Span
16	Bow River	48,501	4th Avenue Flyover Bridge	-	4-Span
17	Bow River	48,466	Old Langevin Bridge	4th Street NE	2-Span
18	Bow River	48,357	New Langevin (Edmonton Trail) Bridge	Edmonton Trail	6-Span
19	Bow River	48,322	Harry Kroeger Bridge	LRT Bridge	5-Span
20	Bow River	48,039	St. Patrick's Island Pedestrian Bridge	Pedestrian Bridge	Clear-Span
21	Bow River	46,875	St. George's Island Bridge	12th Street SE	6-Span
22	Bow River	45,907	CP Rail Bridge	Rail Bridge near Nose Creek Confluence	5-Span
23	Bow River	44,622	Cushing Bridge	Blackfoot Trail, 17th Avenue SE Bridge	3-Span
24	Bow River	41,346	CN Rail Bridge (Bonnybrook)	Rail Bridge	3-Span
25	Bow River	41,283	CP Rail Bridge (Bonnybrook)	Rail Bridge	5-Span
26	Bow River	41,149	Bonnybrook Bridge	Ogden Road	5-Span
27	Bow River	40,475	Calf Robe Bridge	Deerfoot Trail	5-Span
28	Bow River	39,960	CN Rail Bridge	Rail Bridge	6-Span
29	Bow River	37,493	Graves Bridge (Upstream)	Glenmore Trail	6-Span
30	Bow River	37,472	Graves Bridge (Downstream)	Glenmore Trail	6-Span
31	Bow River	34,768	Eric Harvie Bridge	Pedestrian Bridge	3-Span
32	Bow River	32,758	Ivor Strong Bridge	Deerfoot Trail near Douglasdale	5-Span
33	Bow River	31,203	Sue Higgins Bridge	Pedestrian Bridge	5-Span, Suspension
34	Bow River	26,722	McKenzie Bridge	Pedestrian Bridge	5-Span
35	Bow River	23,949	Marquis of Lorne Bridge (Upstream)	Highway 22X	5-Span
36	Bow River	23,908	Marquis of Lorne Bridge (Downstream)	Highway 22X	6-Span
37	Bow River	18,365	Dunbow Road Bridge (Upstream)	Highway 2, Deerfoot Extension	4-Span
38	Bow River	18,333	Dunbow Road Bridge (Downstream)	Highway 2, Deerfoot Extension	4-Span
39	Prince's Island Side Channel	476	Jaipur Bridge	Prince's Island Pedestrian Bridge	3-Span
40	Prince's Island Side Channel	308	Prince's Island Bridge on Side Channel	Downstream of Prince's Island Lagoon Weirs	Clear-Span
41	Zoo Side Channel	1,868	St. Patrick's Island Pedestrian Bridge on Zoo Side Channel	-	Clear-Span
42	Zoo Side Channel	1,119	Baines Bridge	Zoo Road NE, 12th Street NE	3-Span
43	Zoo Side Channel	434	Zoo Service Bridge	Zoo Side Channel	3-Span

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There are 26 bridges along the Elbow River study reach (Table 12). Four of these bridges were damages or washed away during the 2013 flood, but rebuilt, repaired or rehabilitated: Sandy Beach Pedestrian Bridge, Riverdale Avenue Pedestrian Bridge, Rideau Park Pedestrian Bridge, and Stampede Park (S) Saddledome Access Bridge. A new bridge, Traverse Bridge, was constructed near the Elbow River confluence following the 2013 flood and prior to the current study being conducted.

There are five bridges along the Lott Creek study reach (Table 13) and two bridges along the Bragg Creek study reach (Table 14).

Table 12: Elbow River Bridges within the Study Area

No.	River	Station (m)	Name	Description	Type
1	Elbow River	60,538	Balsam Avenue	In Bragg Creek	2-Span
2	Elbow River	48,182	Highway 22 Bridge	Between Bragg Creek and Cochrane	2-Span
3	Elbow River	29,253	Highway 8 Bridge	-	3-Span
4	Elbow River	20,501	Grey Eagle Drive	In Tsuut'ina Nation	3-Span
5	Elbow River	18,229	Weaselhead Glenmore Pathway	Pedestrian Bridge	3-Span
6	Elbow River	12,319	Glenmore Trail Bridge	-	3-Span
7	Elbow River	8,851	Sandy Beach Bridge	Pedestrian Bridge	Clear-Span, Suspension
8	Elbow River	7,601	Riverdale Avenue Bridge	Pedestrian Bridge	Clear-Span, Suspension
9	Elbow River	7,206	Elboya Bridge	Elbow Drive Bridge	3-Span
10	Elbow River	5,506	Rideau Park Bridge	32nd Avenue Pedestrian Bridge	Clear-Span, Suspension
11	Elbow River	4,783	Mission Bridge	Mission Road,4th Street SW	4-Span
12	Elbow River	4,043	25th Avenue SW Bridge	-	4-Span
13	Elbow River	3,483	Lindsay Park Bridge	21st Avenue, Pedestrian Bridge	Clear-Span
14	Elbow River	3,243	Lindsay Park CN Rail Bridge	19th Avenue SW, St. Mary's High School	3-Span
15	Elbow River	2,954	Pattison Bridge	McLeod Trail South	2-Span
16	Elbow River	2,720	Victoria Bridge	McLeod Trail North	3-Span
17	Elbow River	2,677	LRT Bridge	-	3-Span
18	Elbow River	2,455	Stampede Park Access Bridge	3rd Street SE	3-Span
19	Elbow River	1,902	Horse Barn Bridge (New)	-	Clear-Span, Suspension
20	Elbow River	1,855	Horse Barn Bridge (Old)	-	3-Span
21	Elbow River	1,244	Weadick Crossing	Stampede Park South Saddledome Access Bridge	Clear-Span
22	Elbow River	991	Stampede Park North Saddledome Access Bridge	Saddledome Access Bridge	2-Span
23	Elbow River	576	MacDonald Bridge	MacDonald Avenue	Clear-Span
24	Elbow River	334	CP Rail Bridge	9th Avenue SE, Rail Bridge	2-Span
25	Elbow River	287	9th Avenue SE Bridge	In Inglewood	Clear-Span
26	Elbow River	165	Elbow River Traverse	Elbow River Confluence	Clear-Span

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Table 13: Lott Creek Bridges within the Study Area

No.	River	Station (m)	Name	Description	Type
1	Lott Creek	4,093	Fisherman's Lake Pedestrian Bridge	Pedestrian Bridge	Clear-Span
2	Lott Creek	3,861	Lott Creek Drive Bridge	-	Arch-Culvert
3	Lott Creek	3,530	Golf Course Bridge 1	Elbow Springs Golf Club	Clear-Span
4	Lott Creek	3,431	Golf Course Bridge 2	Elbow Springs Golf Club	Clear-Span
5	Lott Creek	3,389	Golf Course Bridge 3	Elbow Springs Golf Club	Clear-Span

Table 14: Bragg Creek Bridges within the Study Area

No.	River	Station (m)	Name	Description	Type
1	Bragg Creek	1,065	Centre Avenue Bridge	In Bragg Creek	Clear-Span
2	Bragg Creek	117	Bracken Road Bridge	In Bragg Creek	Clear-Span

4.4.2 Culverts

There is one culvert along the Elbow River and eight culverts along Lott Creek within the study area (Table 15).

Table 15: Culverts within the Study Area

No.	River / Branch	Station (m)	Name	Description
1	Elbow River	29,253	Highway 8 Culvert	Conveys flows of small tributary creek during normal flow and Elbow River flows during flood conditions
2	Lott Creek	5,240	Misty Morning Drive Culvert	-
3	Lott Creek	5,026	Elbow Valley Lake Culvert	-
4	Lott Creek	4,599	Lott Creek Hollow Culvert	-
5	Lott Creek	4,482	Wolfwillow Lane Culvert	-
6	Lott Creek	4,266	Coulee Ridge Culvert	-
7	Lott Creek	3,931	Owl Haven Culvert	-
8	Lott Creek Lakes Side Channel	1,027	Elbow Valley Lake Drop-Inlet Structure	-
9	Lott Creek Lakes Side Channel	605	Elbow Valley Lake Outlet Culvert	-

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4.4.3 Weirs and Dams

There are three weirs and one dam in the study area (Table 16).

Table 16: Weirs and Dams within the Study Area

No.	River / Branch	Station (m)	Name	Description
1	Bow River	362	Prince's Island Lagoon Weir	2 Obermeyer Gates
2	Bow River	45,547	Harvie Passage	Western Headworks Weir
3	Elbow River	11,417	Glenmore Dam	Impounds Glenmore Reservoir
4	Lott Creek Lakes Side Channel	49	Fisherman's Lake Weir	Weir conveys flow from the lakes back into the Lott Creek main channel

The weir at the downstream end of the Prince's Island Lagoon is comprised of two Obermeyer gates with widths of 5.5 m each. For this study, it is assumed that both gates will be fully opened during floods.

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The WH Weir include 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. For this study, it is assumed that all three sluice gates are closed during floods. The flow rating curve for the weir is based on the physical model study (NHC 2007).

Harvie Passage was constructed immediately downstream of the WH Weir in 2012. Harvie Passage was damaged during the June 2013 flood event, but it is being rebuilt to near pre-flood specifications.

Glenmore Dam impounds Glenmore Reservoir, which has limited operational capacity to provide Elbow River flood control as its primary purpose is water supply. The dam was constructed in 1932. The dam structure was not surveyed for this study, but relevant data (i.e. spillway curves) were obtained from the City of Calgary.

4.5 Flood Control Structures

A detailed description of the 20 flood control structures existing within the study area at the time of survey is provided in the survey and base data collection report prepared for this study (Golder 2017). Additional flood control structures have been constructed in Bragg Creek and Calgary since that time, some of which have upgraded or replaced previous flood control structures. This includes five flood barriers along the Elbow River in the Bragg Creek area (one of which replaced an earlier flood barrier), two flood barriers along Bragg Creek, and nine flood barriers along the Bow River in Calgary (including both new barriers and upgrades to previous barriers). A summary of all flood control structures in the study area at this time is provided in Table 17.

Table 17: Flood Control Structures in the Study Area

River	No.	Side of River (1)	Length (m)	Name	Description	Type
Bow River	1	Left	384	Montgomery Berm (2)	Montgomery Boulevard, Bow View Manor Nursing Home	Earthfill Barrier
	2	Left	929	West Hillhurst Berm	20th Street NW to 14th Street NW	Earthfill Barrier
	3	Left	590	Kensington Berm	14th Street NW to Poppy Plaza	Earthfill Barrier
	4	Left	1,950	Sunnyside Barrier	Poppy Plaza to Centre Street	Earthfill Barrier with Concrete Floodwall Elements
	5	Right	597	West Eau Clair Flood Barrier (2)	Peace Bridge to Jaipur Bridge	Pathway and Concrete Wall
	6	Right	622	Downtown Flood Barrier (2)	Eau Clair Promenade	Pathway and Concrete Wall
	7	Left/Right	24/24	Centre Street Bridge Barrier (2)	System of demountable barriers on north and south end of Centre Street Bridge lower deck	Demountable Flood Barrier
	8	Left	462	Memorial Drive Berm	Memorial Drive downstream of Centre Street Bridge	Earthfill Barrier
	9	Left	236	Langevin Bridge Berm	Memorial Drive at 4th Avenue Flyover Bridge	Earthfill Barrier
	10	Left	1,786	Riverwalk Berm (2)	Centre Street Bridge to Elbow River	Pathway
	11	Right	1,240	Bridgeland Berm	New Langevin Bridge to 12th Street NE	Earthfill Barrier
	12	Left/Right	1,896	Zoo Island Floodwall(2)	Zoo Island Flood Protection	Sheet Pile Wall

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Table 17: Flood Control Structures in the Study Area

River	No.	Side of River (1)	Length (m)	Name	Description	Type
	13	Right	835	West Inglewood Berm	Elbow River to 13th Street SE	Earthfill Barrier
	14	Right	460	Inglewood Flood Barrier	13th Street SE to 15th Street SE	Concrete Wall
	15	Right	385	Pearce Estate Park Berm	Pearce Estate Park	Pathway on Top of Earthfill Barrier
	16	Right	465	South Inglewood Berm	End of 8th Avenue SE	Pathway on top of Riprap Embankment
	17	Right	957	Bonnybrook Flood Berm (2)	Bonnybrook Waste Water Treatment Plant flood protection	Earthfill Barrier
	18	Right	2581	Heritage Drive Flood Barrier (2)	East of Deerfoot Trail and north of Glenmore Trail	Sheet Pile Wall and berm
	19	Right	372	Glenmore Trail Berm (2)	Along the La Farge access road	Earthfill Barrier
	20	Left	977	Quarry Park Berm	Elevated ground along new development at Quarry Park	Earthfill Barrier
Elbow River	21	Left	800	West Barrier South (3)	Along Bracken Road upstream of Bragg Creek confluence	Earthfill Barrier and Concrete Wall
	22	Left	358	West Barrier North (3)	Along Elbow River left bank downstream of Bragg Creek confluence	Riprap Embankment, Earthfill Barrier and Concrete Wall
	23	Right	1663	East Barrier South (3)	Along Elbow River right bank from White Avenue to Balsam Avenue Bridge	Earthfill Barrier and Concrete Wall
	24	Right	905	East Barrier North (3)	Along Elbow River right bank from Balsam Avenue Bridge to Burnside Drive	Riprap Embankment, Earthfill Barrier and Concrete Wall
	25	Left	650	Yoho Tinda Barrier (3)	Yoho Tinda Road	Riprap Embankment, Earthfill Barrier and Concrete Wall
	26	Right	1,139	Redwood Meadows Golf and Country Club Berm	Intermittent barrier that partly ties into higher ground on the upstream end of the barrier	Earthfill Barrier
	27	Right	3,050	Redwood Meadows Berm	Covers the full length along the Redwood Meadows community	Earthfill Barrier
	28	Right	77	Erlton Flood Control Weir	Buried weir to control flood flows into 22nd Avenue SW	Reinforced Below Grade Weir
	29	Left	676	Stampede Floodwall	Along the south end of Stampede race track	Earthfill Barrier and Concrete Wall
	30	Right	188	Deane House Flood Barrier	From 9th Avenue SE to the Bow and Elbow River confluence	Earthfill Barrier and Concrete Wall
Bragg Creek	31	Left	100	Bragg Creek North Setback Barrier (3)	Along Bragg Creek upstream of Bracken Road Bridge	Earthfill Barrier
	32	Right	118	Bragg Creek South Setback Barrier (3)	Along Bragg Creek upstream of Bracken Road Bridge	Earthfill Barrier

Notes:
1) Right and left side of the river are relative to an observer looking downstream.
2) New or upgraded flood control structure not included in hydraulic model, but considered for flood inundation mapping.
3) New or upgraded flood control structure included in hydraulic model based on detailed design or as-built information.

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Flood control structures constructed in the Bragg Creek area after initial project survey work was completed have been included in the Upper Elbow hydraulic model because their impact on flood levels was considered to be significant. New and upgraded flood control structures in Calgary have not been included in the Bow and Lower Elbow hydraulic model because their impact on flood levels was not assumed to be significant, but the protection they provide is being reflected in flood mapping.

4.6 Other Features

Prince's Island Park 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 than that prior to the 2013 flood.

The causeway was overtopped and damaged during the 2013 flood. It was rehabilitated after the flood.

There is a drop-inlet structure and culvert to divert high Lott Creek flows into the artificial lakes in the Elbow Valley Residents Club and to manage water levels in these lakes. These other features are listed in Table 18.

Table 18: Other Features within the Study Area

No.	River	River Station (m)	Name	Description
1	Bow River (Prince's Island Side Channel)	949	Prince's Island Causeway	Causeway with three box culverts
2	Lott Creek Lakes	1,027	Elbow Valley Lake Drop-Inlet Structure and culvert	Lott Creek Drive by Elbow Valley Lake

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5.0 MODEL CONSTRUCTION

5.1 HEC-RAS Program

5.1.1 Theoretical Aspects

HEC-RAS (Version 5.0.3) was used as the software platform for developing the one-dimensional (1D) hydraulic models in the study area.

HEC-RAS was developed by 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. HEC-RAS is a commonly-used program in North America and around the world.

HEC-RAS was designed to perform one-dimensional hydraulic calculations for a full network of natural and constructed channels. It is capable of simulating steady and unsteady flow conditions. The program can be used to calculate water surface profiles for gradually varied flow, as well as those associated with subcritical, supercritical, and mixed flow regimes. In this study, the program is used in subcritical mode for almost all areas, with the exception of the Elbow River reach around the Highway 22 Bridge, where super critical flow is expected and calculated subcritical water levels are replaced by calculated supercritical levels.

The basic computational procedure for steady-state simulation is based on the solution of the one-dimensional energy equation. Energy losses are evaluated by friction (Manning's equation) and contraction/expansion. The momentum equation is utilized in situation where the water surface profile is rapidly varied. The program can be used to simulate the effects of various obstructions such as bridges, culverts, weirs, spillways and other structures in the floodplain. For this study, HEC-RAS is run in steady state mode only.

The main assumptions in 1D modelling are listed below:

- Variation of the river channel and floodplain geometries is represented by a series of cross sections.
- Water levels are constant at and along each cross section.
- Flow is perpendicular to the cross section alignment.

HEC-GeoRAS (Version 10.2) was used to prepare cross sections based on DTM and survey data (Golder 2017). This software is an ArcGIS extension tool designed to create a HEC-RAS import file from geospatial data.

5.1.2 General Model Setup

5.1.2.1 Model Domains

The study area includes a large number of cross sections, branches, side channels, and flow change locations. The handling of such a large and complex model requires advanced expertise in the application of HEC-RAS and a thorough understanding of model limitations and considerations for the model creation and calibration.

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The study area is divided into two hydraulic models for operational and reporting simplicity:

1) Bow and Lower Elbow Model – including the Bow River between Bearspaw Dam and the Highwood River confluence, and the Elbow River below Glenmore Dam

3) Upper Elbow Model – including the Elbow River above Glenmore Dam, and Bragg and Lott Creeks

The Bow and Lower Elbow model includes geometry files that corresponds to the conditions during the 2005 flood, the 2013 flood, and to current conditions with an adjustment at the Erlton Flood Control Weir for low flow calibration. An overview of all model setups is provided in Table 19, with further details described in the following sections.

Table 19: Overview of Model Setups

Model	Model Geometry	Main Data Used for Model Setup
Bow and Lower Elbow	Low Flow Calibration	2013 post-flood river survey and 2013 LiDAR data, three pedestrian bridges on the Elbow River removed, no Traverse Bridge, and the Erlton Flood Control Weir removed
	2013 Flood Calibration	2013 post-flood river survey and 2013 LiDAR data, three pedestrian bridges and Stampede Park (S) Saddledome Access Bridge on the Elbow River removed, and no Traverse Bridge
	2005 Flood Calibration	2013 post-flood river survey and 2013 LiDAR data, three pedestrian bridges and Stampede Park (S) Saddledome Access Bridge on the Elbow River included, and the Traverse Bridge, Peace Bridge, and St. Patrick's Island Bridge removed
	Flood Profile Creation	2013 post-flood river survey and 2015 LiDAR data, all current bridges included, and flood control structures present in 2017
Upper Elbow	Low Flow Calibration	2015 survey and 2015 LiDAR data
	Flood Flows	2015 survey and 2015 LiDAR data
	Flood Profile Creation	2015 survey and 2015 LiDAR data, and new or upgraded flood control structures present in early 2022

5.1.2.2 Flow Separation

The HEC-RAS model is based on assumed constant water level at each cross section including both main channel and overbank areas. This assumption also applies to side channels, unless they are explicitly represented with separate branches in the model with separate cross sections.

All branches are connected to the main channels, resulting in integrated model setups for both models. The amount of flow separation is calculated by HEC-RAS using the optimized calculation method. Junction hydraulics and flow splits are modelled using the energy equation, which is the standard procedure in HEC-RAS for steady-state flow simulation (USACE 2016). The initial flow split estimates at the junctions are described in the next section. The optimization algorithm works best when the initial flow split ratios are close to the optimized solution. The optimized flow split estimates are provided in Section 5.4.5.

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5.1.2.2.1 Bow and Lower Elbow Model

Bow River

In the model setup, separate branches are introduced along the Bow River at Prince's Island and Zoo Island, because water level differences are expected to occur between the main and side channels and because there are separate structures along these side channels. These model branches are described below:

- Prince's Island Side Channel: The side channel along the south side of Prince's Island is also commonly referred to as the Prince's Island Lagoon. There are several structures along this side channel, including bridges, a causeway consisting of multiple culverts, and a weir. The hydraulic conditions along this side channel are influenced by the causeway structure at the upstream end and the weir at the downstream end. The initially-assumed flow split ratio for this side channel is 10%, and is further optimized by the model.
- Zoo Island Side Channel: There is a large side channel on the north side of Zoo Island. The Elbow River confluence is located to the south of the island. The hydraulic conditions in the channels north and south of Zoo Island are simulated separately in the model. The initially-assumed flow split ratio for this side channel is 10%, and is further optimized by the model.

Elbow River

There are no large islands along the Elbow River below Glenmore Dam. However, significant conveyance may occur through streets and the urbanized environment during large floods, in areas where flow conditions and water levels are different from those in the main channel. Therefore, streets that were observed or assumed to convey relatively large amount of flow are modelled as separate branches. They include Roxboro Road, Cliff Street, 25th Avenue SW, and 22nd Avenue SW. Selection and setup of these side channels, including establishing cross section extents and model subdomains, was supported by supplementary two-dimensional (2D) modelling undertaken specifically to support the primary 1D modelling (Golder 2018). The model branches are described below:

- Roxboro Road Side Channel: During large floods, Roxboro Road conveys flows parallel to the Elbow River from its west end across 4th Street SW to its east end at Roxboro Road/Roxboro Park. Residences between Roxboro Road and the Elbow River are assumed to form a "hydraulic divide" between the main Elbow River Channel and the Roxboro Road side channel. The initially-assumed flow split in this side channel is 1%.
- Cliff Street Side Channel: During large floods, the river water would overflow northward upstream of the Mission Bridge (4th Street Bridge) along 5th Street SW and Cliff Street SW. Between 12th and 17th Avenues SW the flow would turn towards the East and would eventually re-join the Elbow River upstream of the CP Rail Bridge. This potential flow path is supported by 2D modelling (Golder 2018). During the 2013 flood event, a temporary barrier was constructed by the City of Calgary to prevent river water from entering this overland flow path. The initially-assumed flow split in this side channel is 1%.
- 25th Avenue SW Side Channel: At the 25th Avenue Bridge, the river water may overflow into the Erlton neighbourhood along 25th Avenue SW during large flood events, and then flow towards Macleod Trail and back into the Elbow River at the Macleod Trail and LRT Bridges. This flow path was observed during the 2013 flood event. The initially-assumed flow split in this side channel is 1%.

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- 22nd Avenue SW Side Channel: The section of 22nd Avenue SW south of the Repsol Sport Centre was designed and constructed to convey excessive Elbow River flood flows eastward. Located at the west end of 22nd Avenue SW near the bank of the Elbow River, the buried Erlton Flood Control Weir was constructed to control overflow and fail when necessary to ensure flood flows are directed along 22nd Avenue SW. This section of roadway is included as a separate branch in the model with a downstream connection near the LRT Bridge. The initially-assumed flow split in this side channel is 1%.

The branches in the Bow and Lower Elbow model are shown in Figure 3.

5.1.2.2.2 Upper Elbow Model

There are no large islands along the Elbow River study reach upstream of the Glenmore Dam. However, along the Lott Creek tributary, there is a drop-inlet structure that diverts flood flows into Elbow Valley Lake and Fisherman's Lake away from the Lott Creek main channel. This model branch is described below:

- Lott Creek Lakes: This side channel runs through Elbow Valley Lake and Fisherman's Lake. Flows are diverted into this side channel through a drop-inlet structure on the upstream end of Elbow Valley Lake. Flows then exit Elbow Valley Lake through a culvert crossing into a canal that feeds Fisherman's Lake. Flows then exit Fisherman's Lake over a weir structure and rejoin with main Lott Creek channel flows immediately upstream of the Lott Creek Drive Bridge.

The model branch setup along Lott Creek is shown in Figure 4.

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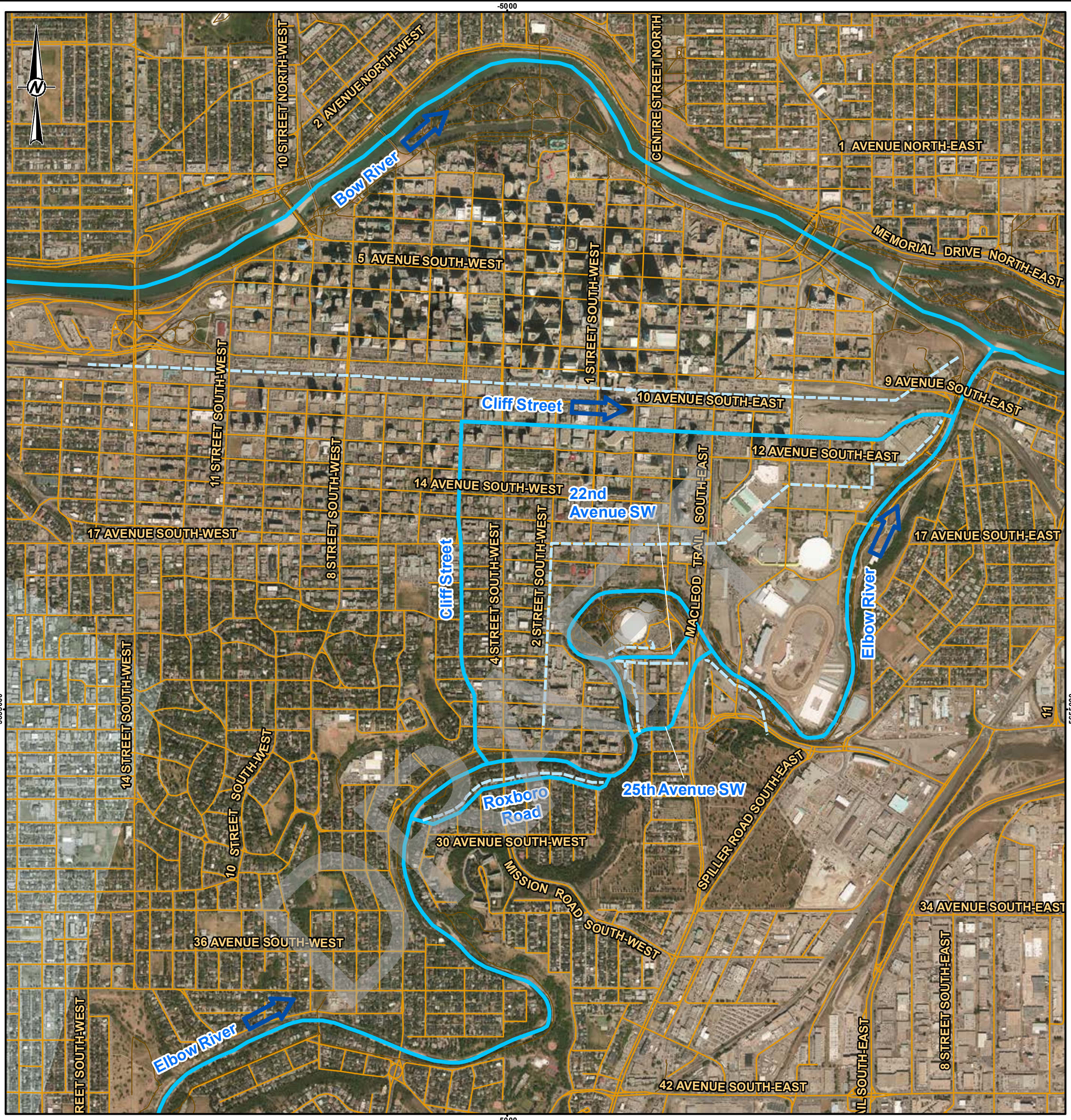

LEGEND

- LOCAL ROAD
- PATHWAY
- HYDRAULIC DIVIDE
- RIVER REACH

0 500 1,000
1:25,000 METRES

REFERENCE(S)
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DATUM: NAD 83 CSRS PROJECTION: 3TM 114

CLIENT	ALBERTA ENVIRONMENT AND PARKS (Alberta Government)
CONSULTANT	Golder Associates
YYYY-MM-DD	2018-12-05
DESIGNED	W. PLOEGER
PREPARED	P.THIEDE
REVIEWED	W. PLOEGER
APPROVED	W. PLOEGER

PROJECT
BOW AND ELBOW RIVER HAZARD STUDY

TITLE
RIVER REACHES ALONG THE LOWER ELBOW RIVER

PROJECT NO.	CONTROL	REV.	FIGURE
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Classification: Public

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-20000 -15000

LEGEND

- LOCAL ROAD
- PATHWAY
- PRIMARY HIGHWAY
- HYDRAULIC DIVIDE
- RIVER REACH

0 500 1,000

1:25,000 METRES

REFERENCE(S)

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DATUM: NAD 83 CSRS PROJECTION: 3TM 114

CLIENT
ALBERTA ENVIRONMENT AND PARKS

Alberta Government

PROJECT
BOW AND ELBOW RIVER HAZARD STUDY

CONSULTANT

Golder Associates

YYYY-MM-DD	2018-12-05
DESIGNED	W. PLOEGER
PREPARED	P.THIEDE
REVIEWED	W.PLOEGER
APPROVED	W. PLOEGER

TITLE
RIVER REACHES ALONG LOTT CREEK

PROJECT NO.	CONTROL	REVISION	FIGURE
1536673	2000	0	4

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET HAS BEEN MODIFIED FROM: ANSI A

25mm

0

5.1.2.3 Boundary Conditions

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

Bow and Lower Elbow Model

- Bow River inflow to this model reach, below Bearspaw Dam.
- Elbow River inflow to this model reach, below Glenmore Dam.
- A normal flow downstream boundary condition for the Bow River (estimated energy slope of 0.0022 m/m), about 2 km downstream of the Highwood River confluence.

Upper Elbow Model

- Elbow River inflow to this model reach, about 7 km upstream of the Hamlet of Bragg Creek.
- Bragg Creek inflow to this model reach, upstream of Centre Avenue.
- Lott Creek inflow to this model reach, near the north boundary of Tsuut'ina Nation.
- A water level downstream boundary condition for the Elbow River at Glenmore Dam.

Other than the Elbow River, Nose, Fish, and Pine Creeks are the most significant tributaries of the Bow River within the study area, and there are internal flow changes below each confluence: There is also an internal Elbow River flow change location below the Springbank Creek confluence. A schematic of the model setups is shown in Figure 5. A list of the external and internal boundary conditions is provided in Table 20 and Table 21.

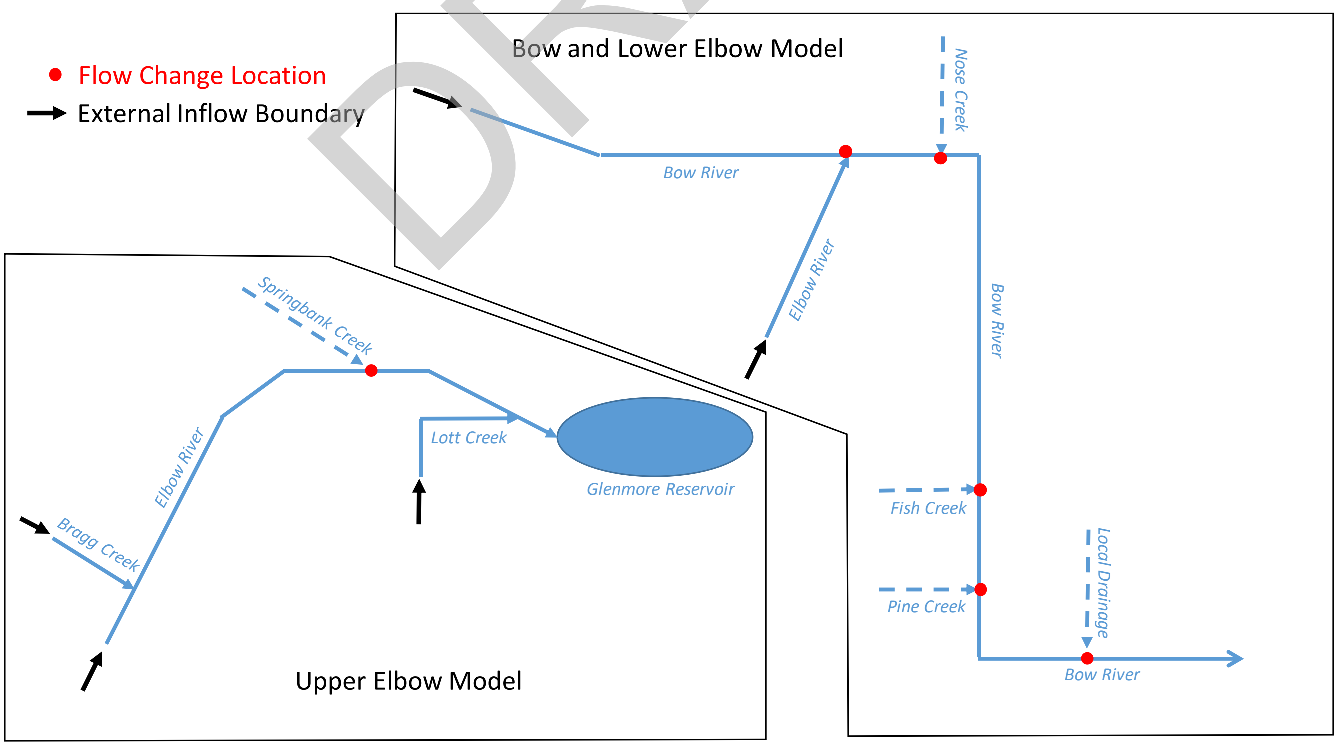

Figure 5: Flow Change Locations Used in Model Setup

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Table 20: Bow and Lower Elbow Model Boundary Conditions

No.	River	Station (m)	Description	Type
1	Bow River	69,677	Inflow at upstream boundary	External
2		50,647	Flow Split to Prince's Island Side Channel	Internal(1)
3		48,120	Flow Split to Zoo Island Side Channel	Internal(1)
4		47,382	Inflow from Elbow River	Internal
6		45,933	Inflow from Nose Creek	External
7		25,469	Inflow from Fish Creek	External
8		16,920	Inflow from Pine Creek	External
9		9,216	Inflow from local drainage	External
10		-2,225	Normal Flow Depth, with energy slope of 0.22%	External
14	Elbow River	11,417	Inflow from Glenmore Reservoir	External
15		5,259	Flow Split to Roxboro Road Side Channel	Internal(2)
17		4,830	Flow Split to Cliff Street Side Channel	Internal(2)
18		4,052	Flow Split to 25th Avenue SW Side Channel	Internal(2)
19		3,670	Flow Split to 22nd Avenue SW Side Channel	Internal(2)
20		1,381	Cliff Street Flow Transfer, based on supplementary 2D modelling	Internal(2)
21		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.

Table 21: Upper Elbow Model Boundary Conditions

No.	River	Station (m)	Description	Type
1	Elbow River	66,613	Inflow at upstream boundary	External
2		36,781	Inflow from Springbank Creek	External
3		11,417	Glenmore Dam	Internal
4	Bragg Creek	1,169	Inflow at upstream boundary	External
5	Lott Creek	7,278	Inflow at upstream boundary	External
6		5,043	Flow Split to Elbow Valley Lakes	Internal(1)

Notes:
1) Initial value assigned for side channels along Lott Creek: 1% of total flow is conveyed by side channels.

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5.2 Geometric Database

5.2.1 Cross Section Data

Locations of the cross sections in the model were selected based on the locations of surveyed cross sections and modelling requirements. The cross-sectional data were extracted from:

- 2012-2015 LiDAR-derived DTM within Calgary city limits;
- 2015 LiDAR-derived DTM outside of Calgary; and
- river survey data collected in 2015 and 2016.

Cross section alignments were selected based on a review of previous studies (Golder 2015), an examination of the topography, a review of the 2013 flood conditions, and professional judgement. The alignments of some cross section extensions through floodplains within central Calgary and along Lott Creek were further informed by supplementary 2D modelling (Golder 2018). HEC-GeoRAS was used to define the main channels, overbank flow paths, bank stations, cross section river stations, and the connections between the main and branch channels.

5.2.1.1 Bow and Lower Elbow Model

Table 22 provides an overview of the river and side channel reaches and the number of cross sections in each reach represented in the Bow and Lower Elbow model.

Table 22: Bow and Lower Elbow Model Reaches and Cross Sections

River / Branch	Model Reach	Reach Description	Upstream River Station (m)	Downstream River Station (m)	Reach Length (m)	No. of Cross Sections
Bow River	B6_USBC_Prince	Bearspaw Dam to Prince's Island (Upstream)	50,727	80,572	29,845	109
Bow River	B5_Prince	Prince's Island (Upstream) to Prince's Island (Downstream)	49,351	50,727	1,377	10
Bow River	B4_Prince_Zoo	Prince's Island (Downstream) to Zoo Island (Upstream)	48,236	49,351	1,115	12
Bow River	B3_Zoo	Zoo Island (Upstream) to Elbow River Confluence	47,519	48,236	717	5
Bow River	B2_Zoo	Elbow River Confluence to Zoo Island (Downstream)	46,119	47,519	1,400	6
Bow River	B1_Zoo_DSBC	Zoo Island (Downstream) to Downstream Boundary (downstream of the Highwood River confluence)	-2,617	46,119	48,737	235
BS1_Zoo	BS1_Zoo	Zoo Island Side Channel	0	2,064	2,064	14
BS2_Prince	BS2_Prince	Prince's Island Side Channel	0	1,130	1,130	14
Elbow River	E9_Dam_Roxboro	Glenmore Dam to Roxboro Road (Upstream)	5,281	11,420	6,140	121
Elbow River	E8_Roxboro_Cliff	Roxboro Road (Upstream) to Cliff Street (Upstream)	4,853	5,281	428	9
Elbow River	E7_Cliff_Roxboro	Cliff Street (Upstream) to Roxboro Road (Downstream)	4,298	4,853	555	12
Elbow River	E6_Roxboro_25AV	Roxboro Road (Downstream) to 25 Ave (Upstream)	4,072	4,298	225	5

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Table 22: Bow and Lower Elbow Model Reaches and Cross Sections

River / Branch	Model Reach	Reach Description	Upstream River Station (m)	Downstream River Station (m)	Reach Length (m)	No. of Cross Sections
Elbow River	E5_25AV_22AV	25th Avenue NW (Upstream) to 22nd Avenue NW (Upstream)	3,710	4,072	362	11
Elbow River	E4_Talisman	22nd Avenue (Upstream) to 22nd Avenue NW (Downstream)	2,754	3,710	957	26
Elbow River	E3_22AV_25AV	22nd Avenue NW (Downstream) to 25th Avenue NW (Downstream)	2,623	2,754	131	4
Elbow River	E2_Stampede_Clif	25th Avenue NW (Downstream) to Cliff Street (Downstream)	377	2,623	2,246	50
Elbow River	E1_Cliff_Bow	Cliff Street (Downstream) to Bow River	0	377	377	7
ES1_CliffST	ES1_CliffST	Cliff Street Side Channel	0	3,746	3,746	25
ES2_25AV	ES2_25AV	25th Avenue NW Side Channel	0	569	569	9
ES3_22AV	ES3_22AV	22nd Avenue NW Side Channel	0	475	475	9
ES4_Roxboro	ES4_Roxboro	Roxboro Road Side Channel	0	977	977	12
					TOTAL	**705**

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The length of the Bow River study reach is about 72 km. There are 377 main channel cross sections along this study reach, resulting in an average cross section spacing of 191 m. The cross section spacing is denser within Calgary and wider downstream of Calgary.

The length of the Elbow River study reach below Glenmore Dam is about 11 km, and the model includes 245 main channel cross sections. This results in an average spacing of 47 m between adjacent cross sections.

5.2.1.2 *Upper Elbow Model*

Table 23 provides an overview of the river and side channel reaches and the number of cross sections in each reach of the Upper Elbow River model.

Table 23: Upper Elbow River Model Reaches and Cross Sections

River / Branch	Model Reach	Reach Description	Upstream River Station (m)	Downstream River Station (m)	Reach Length (m)	No. of Cross Sections
Elbow River	E14_USBC_Bragg	Upstream Boundary to Bragg Creek	61,724	66,900	5,176	45
Elbow River	E13_Bragg_Lott	Bragg Creek to Lott Creek	27,052	61,724	34,671	435
Elbow River	E12_Lott_Dam	Lott Creek to Glenmore Dam	11,420	27,052	15,632	87
Bragg Creek	Bragg Creek	Bragg Creek Tributary	0	1,225	1,225	14
Lott Creek	L3_USBC_EVL	Upstream Boundary to Elbow Valley Lake	5,059	7,291	2,232	30
Lott Creek	L2_EVL_LCDrive	Elbow Valley Lake to Lott Creek Drive	3,894	5,059	1,164	26
Lott Creek	L1_LCDrive_Elbow	Lott Creek Drive to Elbow River confluence	0	3,894	3,894	56
Lott Creek Lakes	Lott Creek Lakes	Lott Creek Lakes Side Channel	0	1,112	1,112	20
					TOTAL	**713**

The length of the Elbow River study reach above Glenmore Dam is about 55 km. The model includes 567 main channel cross sections upstream of Glenmore Dam. The average cross section spacing is about 50 m for the cross sections through the communities of Bragg Creek and Redwood Meadows, and ranges from 80 to 130 m elsewhere, including within Glenmore Reservoir.

The length of the Bragg Creek study reach is about 1 km, and the model includes 14 main channel cross sections. The average cross section spacing is 84 m.

The length of the Lott Creek study reach is about 7 km, and the model includes 112 main channel cross sections. The average cross section spacing is 63 m.

5.2.1.3 Roughness Distribution

The left and right bank stations defining the main channel were determined using HEC-GeoRAS based on the LiDAR-derived DTM 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 specified based on:

- bank lines established from LiDAR data, aerial imagery and surveyed data to identify the main channels;
- land use information from the City of Calgary and Rocky View County; and
- street and cadastral data from the City of Calgary and Rocky View County.

Six roughness classes were defined, and roughness values (Manning's *n*) were assigned to each class (Table 24 and Figure 6). Initial values were based on previous modelling studies for portions of the study area (Golder 2015) and were modified during model calibration (see Section 5.3). The roughness values were applied to the cross sections using HEC-GeoRAS.

Table 24: Roughness Classes and Initial Manning's n Values

No.	Roughness Class Description	Initial Manning's *n*
1	Rivers	0.030
2	Urban Mixture, Residential and Small Commercial	0.080 - 0.150
3	Urban Mixture, Industrial	0.035
4	Urban Mixture, Downtown	0.040
5	Grassland	0.038
6	Trees/Bushes	0.100

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The central areas of Calgary include large buildings. These were blocked in the cross sections using obstructions (see Section 5.4.4). For smaller buildings and residential areas, a composite roughness approach was used that accounts for an approximate reduction in conveyance capacity by an increased Manning's *n* roughness value.

The side channels along the Elbow River are dry during normal flow and small flood events. They only convey water during large floods, when water overflows from the main channel. Dry reaches with no flow connection to adjacent reaches cannot be modelled using HEC-RAS. This model limitation was addressed by introducing a small deep slot in each side channel cross section using the "pilot channel" function in HEC-RAS. Each slot has a width of 0.1 m. The slot depths are 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.

The introduction of the pilot channels allows the use of automatic flow split optimization algorithm in HEC-RAS. The 0.1 m slot width is selected so that no more than 1% of the total river flow is conveyed in the slots during small floods, when the side channels are dry.

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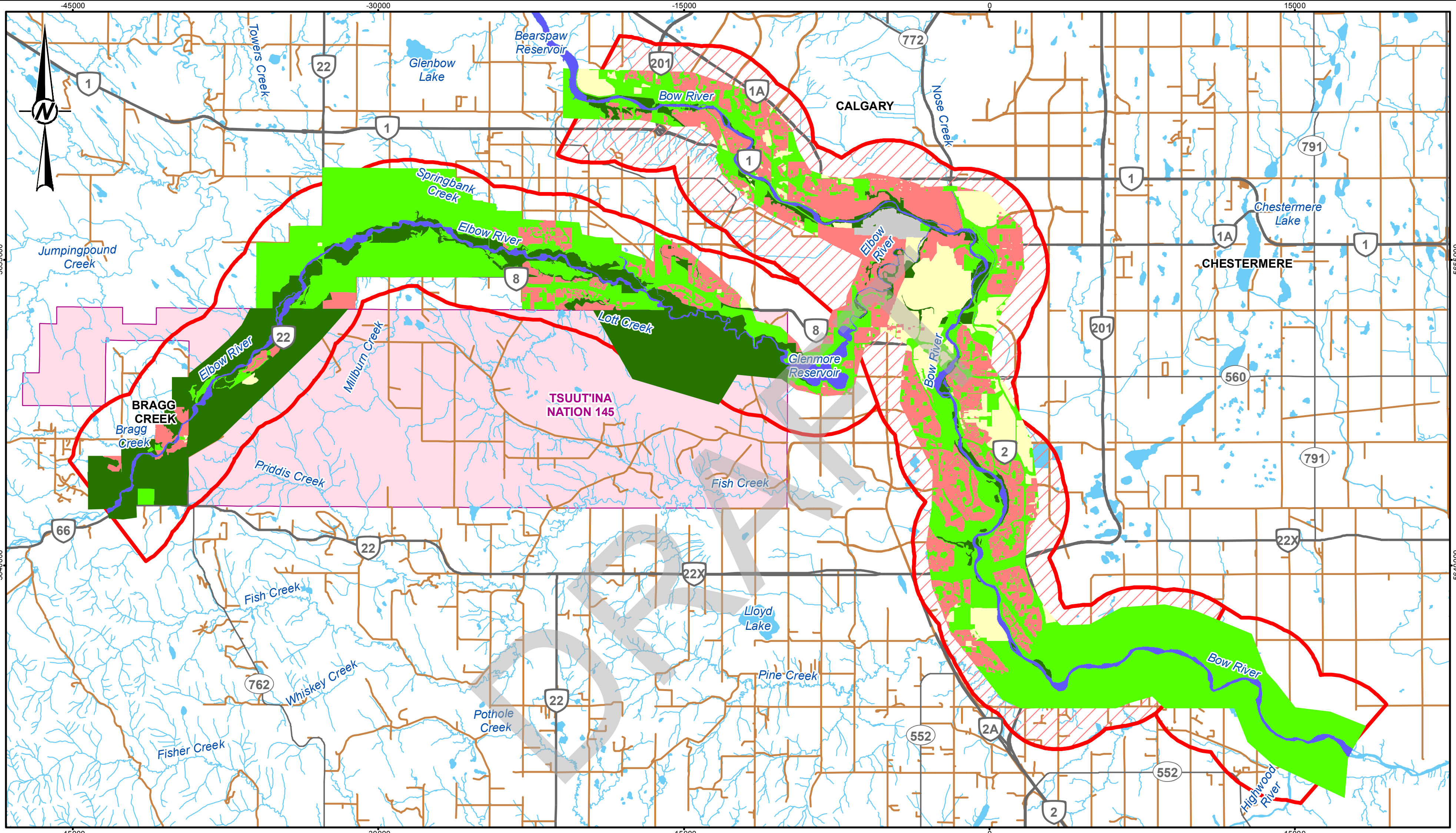

LEGEND

- PRIMARY HIGHWAY
- SECONDARY HIGHWAY
- LOCAL ROAD
- WATERCOURSE
- POPULATED PLACE
- WATERBODY
- FIRST NATION
- 2015 BOW AND ELBOW RIVER HYDRAULIC MODEL
- RIVER HAZARD STUDY AREA

ROUGHNESS CLASS

- RIVER
- RESIDENTIAL
- INDUSTRIAL
- DOWNTOWN
- GRASSLAND
- TREES/BUSHES

0 5 10

1:275,000 KILOMETRES

REFERENCE(S)

POPULATED PLACES AND HYDROGRAPHY OBTAINED FROM ALTALIS, © GOVERNMENT OF ALBERTA 2015. ALL RIGHTS RESERVED.
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DATUM: NAD 83 CSRS PROJECTION: 3TM 114

CLIENT
ALBERTA ENVIRONMENT AND PARKS

Alberta Government

CONSULTANT

Golder Associates

YYYY-MM-DD	2018-11-05
DESIGNED	W.PLOEGER
PREPARED	P.THIEDE
REVIEWED	W. PLOEGER
APPROVED	W. PLOEGER

PROJECT
BOW AND ELBOW RIVER HAZARD STUDY

TITLE
ROUGHNESS CLASSES

PROJECT NO.	CONTROL	REV.	FIGURE
1536673	2000	0	6

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Classification: Public

5.2.2 Bridges, Culverts, Weirs, and Dams

Bridges

The bridge geometries used in the HEC-RAS model are based on:

- river and bridge surveys completed in 2010;
- bridge surveys completed in 2015 and 2016; and
- as-built drawings and survey data for new and rehabilitated bridges along the Elbow River.

All bridges existing at the time of survey and base data collection are represented in the HEC-RAS models. They include those which may not affect water levels during floods (e.g., clear span bridges with sufficient freeboards). Losses through bridges are calculated in the model using the energy equation (i.e., standard step method).

Bridges are modelled using upstream and downstream cross sections. Internal cross sections cut along the centerlines of the bridges are typically not used because upstream and downstream cross section lengths can be different, which would result in levees and ineffective flow areas being misplaced along the bridge cross sections.

To properly model overland flows that can bypass bridges, the multiple flow analysis option in HEC-RAS is used for most bridges. This allows the HEC-RAS model to calculate a distribution of flows that are conveyed through the bridge openings and bypassed around the bridges. Not using the multiple flow analysis would result in bypassed flows being treated as flows over a broad-crested weir, which could overestimate head loss.

There are large variations of bridge types, abutments, approaches, and embankments within the study area. For each bridge ineffective areas upstream and downstream of the bridges were carefully selected on a case-by-case basis including the selection of permanent and non-permanent ineffective areas where appropriate.

Bridge are skewed in the model if they do not cross the river at a perpendicular angle. This is necessary to avoid underestimation of the water levels upstream and downstream of bridges during flood simulation.

The initial values of the contraction and expansion coefficients at the bridges are selected to be 0.3 and 0.5, respectively. These typical values were modified at some locations during the model calibration process.

Summaries of bridges included in both model are provided in Tables 25 and 26.

Culverts

Main channel culverts are modelled using upstream and downstream cross sections, based on surveyed culvert geometries. The top of the deck elevations were surveyed at the culvert crossing. The crossing cross section includes additional topography extracted from LiDAR-derived DTMs along the highest point of the crossing.

There is one culvert along the Elbow River at the Highway 8 crossing. The cross section where this culvert is located also contains a bridge. To properly simulate both the bridge and culvert at the same cross section, a multiple flow analysis is implemented. This allows multiple flow types to occur simultaneously based on a flow optimization between the different structures and overland conveyance.

There are six main channel culverts along the Lott Creek study reach. The culvert geometries used in the model are based on survey data. The multiple opening analysis option was used at most culverts to properly account for overland flood flows that may bypass the culvert openings.

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Summaries of culverts included in both models are provided in Tables 25 and 26.

Weirs and Dams

The WH Weir downstream of the Nose Creek confluence in Calgary is modelled using a rating curve provided by the City of Calgary. The Prince's Island Lagoon Weirs and the Fisherman's Lake Outlet Weir at the Lott Creek Lakes side channel are modelled as broad crested weirs.

Glenmore Dam is the only dam within the study area, and is the boundary between the Upper Elbow and the Bow and Lower Elbow models. The dam is modelled using a combination of a water level discharge rating curve provided the City of Calgary and full supply level for flows less than 350 m^3/s.

Summaries of weirs and dams included in both models are provided in Tables 25 and 26.

5.2.3 Flood Control Structures

All dedicated municipal and First Nation flood control structures existing at the time of survey and base data collection were included in the study models and considered during model calibration. New or upgraded flood control structures at Bragg Creek completed by 2021 were included for flood profile creation along the Upper Elbow River. Most modelled structures are dedicated flood barriers, except for the Erlton Flood Control Weir, which is a lateral overflow structure. The weir was designed to divert flow from the Elbow River and along 22nd Avenue SW during high flow events, and was removed in the low flow calibration model to allow a minimum flow through the 22nd Avenue SW side channel by a pilot channel.

Flood control structures are modelled using a combination of levees or ineffective flow areas. The specific approach for each flood control structure was based on professional judgement and suitability of use for the particular cross sections. If one approach was used for a particular flood control structure, the modelling approach details and assumptions are generally consistently applied along its entire length.

Summaries of flood control structures included in both models are provided in Tables 25 and 26.

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5.2.4 Other Features

At the upstream end of the Prince's Island side channel there is a flow control structure comprised of a causeway and three box culverts. The causeway consists of an earth embankment. The box culverts have a width of 2.40 m and a height of 1.20 m each. 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 than that prior to the 2013 flood. The structure is modelled as culverts in combination with a broad crested weir if the causeway is overtopped.

There is a drop-inlet structure on Lott Creek that is part of the water management of the artificial Elbow Valley and Fisherman's Lakes infrastructure in the Elbow Valley Residential Club community.

Summaries of other features included in both models are provided in Tables 25 and 26.

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Table 25: Hydraulic Structures in the Bow and Lower Elbow Model

River Reach	Bridges	Culverts	Weirs and Dams	Other Features
Bow River	38	-	1	-
Lower Elbow River	20	-	-	-
Prince's Island Side Channel	2	-	1	1
Zoo Island Side Channel	3	-	-	-

Table 26: Hydraulic Structures in the Upper Elbow Model

River Reach	Bridges	Culverts	Weirs and Dams	Other Features
Upper Elbow River	6	1	1	-
Bragg Creek	2	-	-	-
Lott Creek	5	8	1	1

5.3 Model Calibration and Validation

5.3.1 Methodology

The Manning's *n* roughness values and the bridge contraction and expansion coefficients are the two primary model parameters used in calibrating HEC-RAS models. Selection of initial Manning's *n* values included consideration of river bed and bank materials, vegetation cover, site information collected during the field inspection, and Golder's experience from previous Bow and Elbow River hydraulic modelling studies. Effective roughness when using Manning's *n* parameters may reduce with increased stage. Both low flow and high flow calibrations were performed to determine appropriate roughness values across a wide range of flows.

The model calibration process involved multiple iterations to adjust the model parameter values, conduct simulations, and compare the simulated water levels with the highwater marks (for high flow calibration) and surveyed water levels (for low flow calibration). The objective of the model calibration was to achieve good matches between the simulated water levels and the highwater marks and surveyed water levels.

The model validation process involved simulation of the flows not used in the model calibration by maintaining the calibrated model parameter values, and comparison of the simulated flood peak water levels with the highwater marks or recorded water levels. The objective of the model validation is to confirm if the calibrated model can be reliably used to simulate other flood flow conditions.

Model calibration and validation were performed on both the Bow and Lower Elbow and Upper Elbow models. The results are described in the following sections for each of the five main channel reaches: the Bow River, the lower Elbow River, the upper Elbow River, Bragg Creek, and Lott Creek.

5.3.2 Models

5.3.2.1 Bow and Lower Elbow Model

The following scenarios were used for model calibration and validation of the Bow and Lower Elbow model:

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- Low Flow Calibration: The surveyed water levels and measured flows during the river surveys were used for the low flow calibration. The model was set up based on a post-2013 flood river survey, supplemented by a 2015 survey of selected cross sections on the Bow River downstream of Calgary. The Erlton Flood Control Weir was removed because it would cause the upstream water level to be at least as high as the weir crest, which is not correct for low flow conditions.
- High Flow Calibration: The available highwater marks and peak flow estimates for the 2005 and 2013 flood events were used for high flow calibration. These two flood events were selected for high flow model calibration because they were the highest events in recent history and are well documented with peak flow estimates and available highwater marks. There were different hydraulic structures during each of these floods. Therefore, the following two separate high flow model geometries were prepared for the calibration:
  - **2005 Flood Geometry:** The bank topography was based on survey and LiDAR data collected after the 2013 flood. This model setup includes the three pedestrian and the Stampede Park Access (S) Saddledome Bridge on the Elbow River that were destroyed during the 2013 flood. The model does not include the new Peace Bridge, Traverse Bridge, and St. Patrick's Island Bridge.
  - **2013 Flood Geometry:** The three pedestrian bridges along the Elbow River below Glenmore Dam that were destroyed during the 2013 flood were removed in this model setup. The bank topography was based on survey and LiDAR data collected after the 2013 flood. The model includes some of the initial bank protection works completed by the City of Calgary as part of the immediate flood recovery.
- High Flow Validation: The available highwater marks and peak flow estimates for other historic flood events were used for additional model validation without changing the calibrated model parameters. It is important to note that the bank topography was based on survey and LiDAR data that was collected after the 2013 flood, and the model setup includes some of the initial bank protection works completed by the City of Calgary as part of the immediate flood recovery. The high flow validation model includes the three pedestrian and the Stampede Park Access (S) Saddledome Bridge on the Elbow River that were destroyed during the 2013 flood. The model does not include the new Peace Bridge, Traverse Bridge, and St. Patrick's Island Bridge. This is the same model geometry that was used for the 2005 flood calibration.

5.3.2.2 Upper Elbow Model

The following scenarios were used for model calibration and validation of the Upper Elbow model:

- Low Flow Calibration: The surveyed water levels and measured flows during the river surveys in 2015 and 2016 were used for the low flow calibration. The model setup was based on a 2016 river survey.
- High Flow Calibration: The available highwater marks and peak flow estimates for the 2005 and 2013 flood events were used for high flow calibration. These two flood events were selected for high flow model calibration because they were the highest events in recent history and well documented with peak flow estimates and available highwater marks.
- High Flow Validation: The available highwater marks and peak flow estimates for other historic flood events were used for additional model validation without changing the calibrated model parameters.

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5.3.3 Low Flow Calibration

The detailed low flow calibration results including tables and figures for the Bow River, lower Elbow River, upper Elbow River, Bragg Creek, and Lott Creek reaches are presented in Appendix A.

5.3.3.1 Bow River

Bow River channel roughness values were calibrated against measured discharges 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, which is in the range of 15% to 30% of the 2-year flood flow on the Bow River below Bearspaw Dam (405 m^3/s). A normal depth downstream boundary condition with a slope of 0.0018 m/m is applied at the downstream end of the Bow River model reach.

Figures A-1 to A-3 (Appendix A) show a comparison between the simulated water surface profile and measured water levels for the low flow calibration.

The average difference between the simulated and measured water levels is -0.05 m, with individual differences ranging from -0.48 m to +0.50 m (Figure 7). The standard deviation is 0.18 m and the average absolute difference is 0.15 m.

The calibrated channel Manning's *n* values for low flow conditions range from 0.030 to 0.040 (with the exception of Harvie Passage downstream of the WH Weir), which are within the expected range of roughness for large rivers with gravel and cobble beds (Chow 1959).

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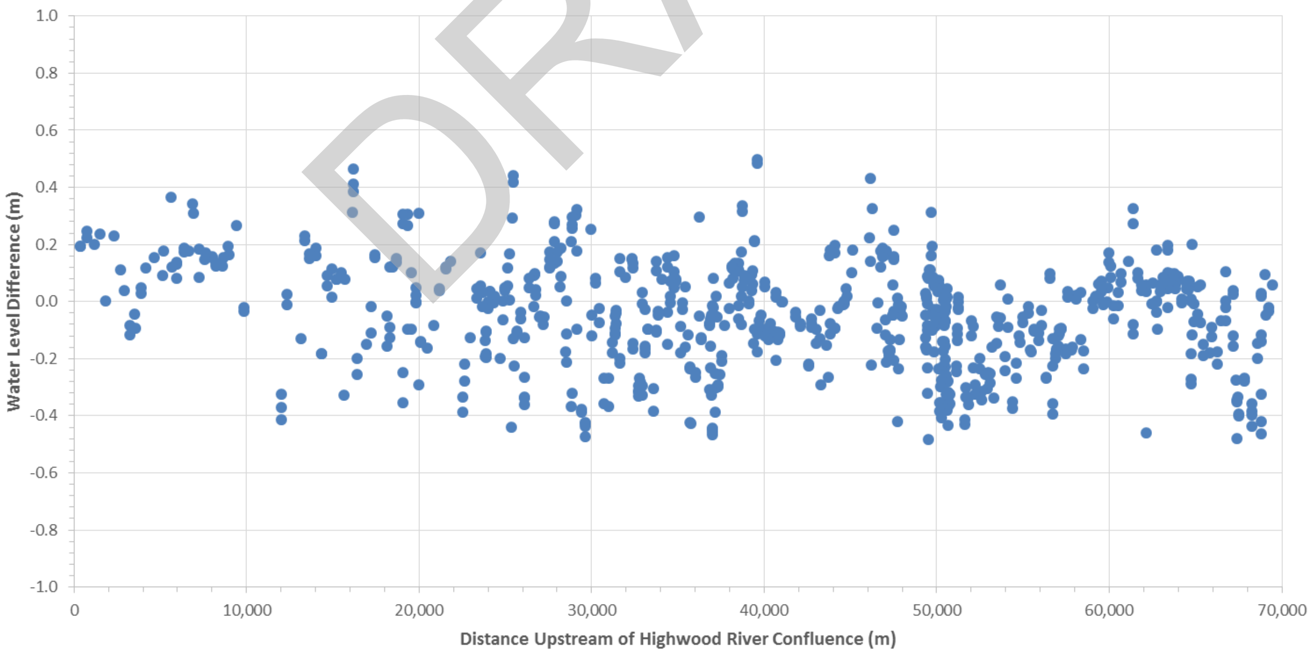

Figure 7: Difference between Simulated and Surveyed Water Levels for Low Flow Conditions – Bow River

5.3.3.2 Lower Elbow River

River flows varied between 2.3 m^3/s and 3.7 m^3/s during the 2013 low flow survey, which is only approximately 4% of the 2-year flood peak discharge of 67.9 m^3/s. The measured water level at the Bow River confluence is used as the downstream model boundary condition.

Figure A-4 (Appendix A) shows a comparison between the simulated water surface profile and measured water levels for the low flow calibration.

The average difference between the simulated and measured water levels is +0.01 m, with individual differences ranging from -0.53 to +0.53 m (Figure 8). The standard deviation is 0.13 m and the average absolute difference is 0.10 m.

The low flow model calibration resulted in relatively large Manning's *n* values for the main channel roughness in the range of 0.075 to 0.100, which are much higher than typical roughness values for similar rivers (Chow 1959).

Based on the results of previous modelling studies, and considering the extremely low flow during the survey, it appears that the Manning's *n* roughness values found for low flow conditions may not properly reflect actual roughness conditions during higher flows. The water levels are likely impacted by small disturbances like gravel bars, debris, pool-riffle sequences, and braiding, which all are not present or mobilized during higher flow events.

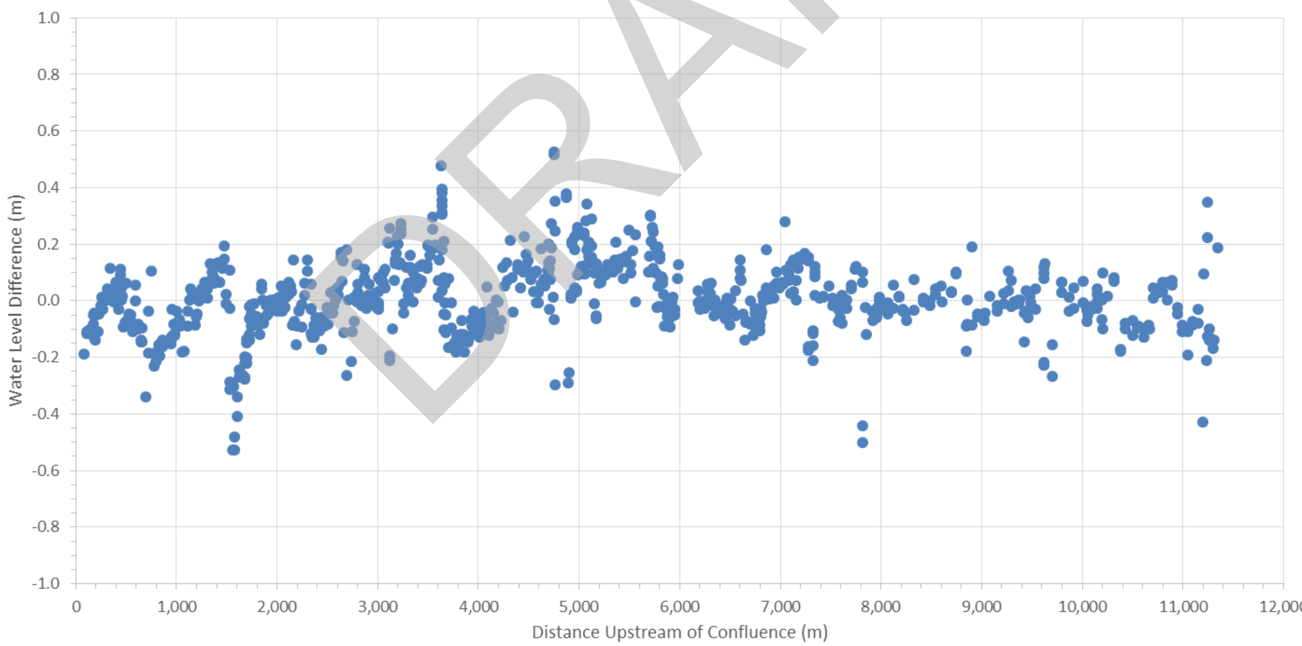

Figure 8: Difference between Simulated and Surveyed Water Levels for Low Flow Conditions – Lower Elbow River

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5.3.3.3 Upper Elbow River

River flows varied between 4.7 m^3/s and 8.1 m^3/s during the 2015 low flow survey. This is between 7% and 12% of the 2-year flood peak discharge of 65.2 m^3/s. The measured water level in Glenmore Reservoir was used as the downstream model boundary condition.

Figures A-5 to A-8 (Appendix A) show a comparison between the simulated water surface profile and measured water levels for the low flow calibration.

The average difference between the simulated and measured water levels is 0.00 m, with individual differences ranging from -1.12 to +0.61 m (see Figure 9). The standard deviation is 0.19 m and the average absolute difference is 0.14 m.

The low flow model calibration resulted in a relatively large Manning's *n* value of 0.070 for the main channel roughness for the Upper Elbow River reach, which is somewhat higher than typical roughness values for similar rivers (Chow 1959).

Based on the results of previous modelling studies, and considering the extremely low flow during the survey, it appears that the Manning's *n* roughness values found for low flow conditions may not properly reflect actual roughness conditions during higher flows. Local water levels are likely impacted by small disturbances like gravel bars, low flow channel braiding and meandering, debris, and small scale pool-riffle sequences which are likely not present or mobilized during higher flow events.

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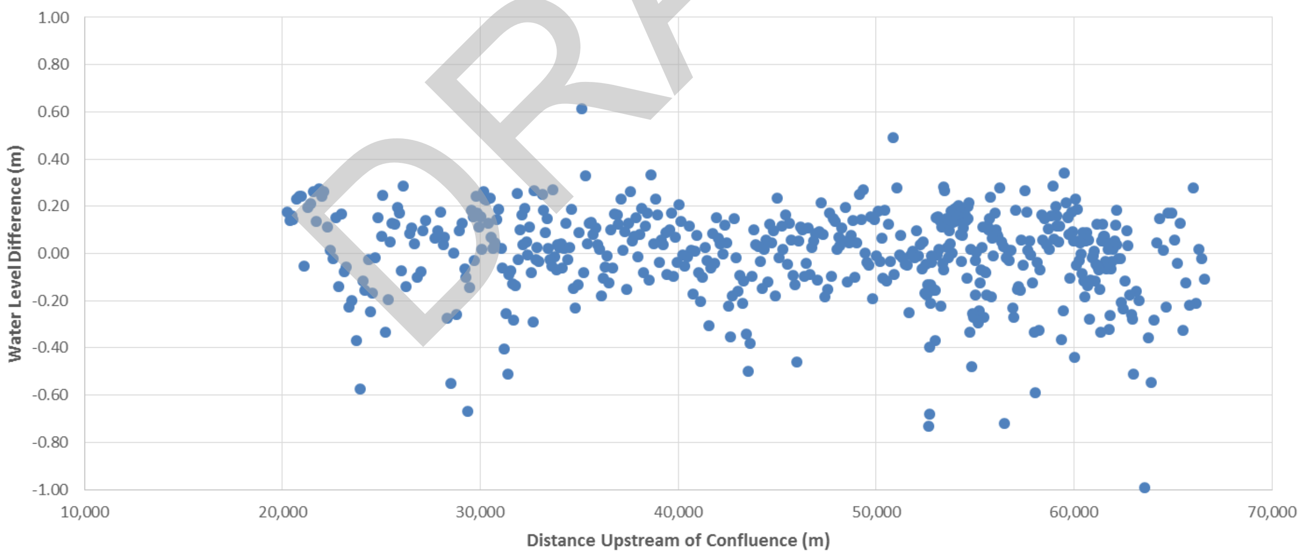

Figure 9: Difference between Simulated and Surveyed Water Levels for Low Flow Conditions – Upper Elbow River

5.3.3.4 Bragg Creek

There was no measurable flow present during the survey. Therefore, the Bragg Creek reach was not calibrated for low flows. A channel roughness Manning's *n* value of 0.050 was assumed based on professional judgement.

5.3.3.5 Lott Creek

River flows varied between 0.06 m^3/s and 0.24 m^3/s during the 2015 low flow survey. This is between 2.5% and 10% of the 2-year flood peak discharge of 2.39 m^3/s. The simulated low flow water level in the Elbow River at the Lott Creek confluence was used as the downstream model boundary condition.

Figure A-9 (Appendix A) shows a comparison between the simulated water surface profile and measured water levels for the low flow calibration.

The average difference between the simulated and measured water levels is -0.15 m, with individual differences ranging from -1.07 to +0.13 m (Figure 10). The standard deviation is 0.18 m and the average absolute difference is 0.16 m.

The low flow model calibration resulted in a relatively large Manning's *n* value of 0.06 for the main channel roughness for Lott Creek, which is somewhat higher than typical roughness values for similar rivers (Chow 1959).

Due to extremely low flows during the survey, it appears that the Manning's *n* roughness values found for low flow conditions may not properly reflect actual roughness conditions during higher flows. Local water levels are likely impacted by small disturbances like debris, vegetation, and beaver activity. Because of flow diversion into the Elbow Springs Golf course and a trout farm, parts of the lower Lott Creek channel were dry during the survey.

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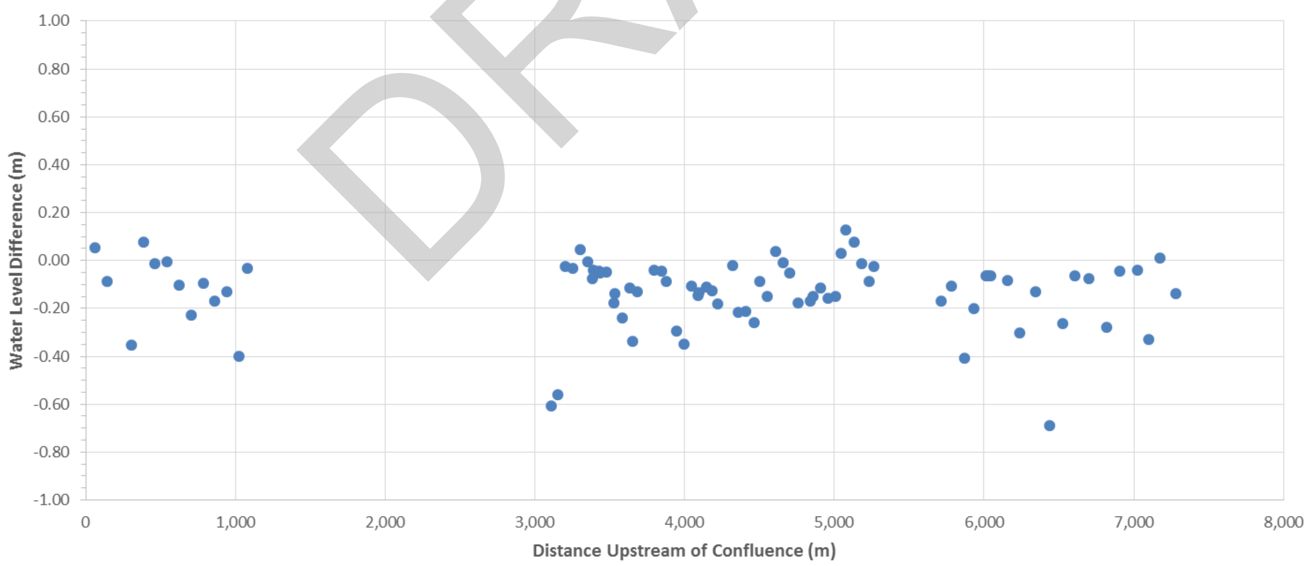

Figure 10: Difference between Simulated and Surveyed Water Levels for Low Flow Conditions – Lott Creek

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5.3.4 High Flow Calibration

High flow calibration results including tables and figures for the Bow River, lower Elbow River, upper Elbow River, Bragg Creek, and Lott Creek reaches are presented in Appendix B (2005 Flood) and Appendix C (2013 Flood).

5.3.4.1 Bow River

The Bow River model reach was calibrated using 2005 and 2013 highwater marks. In Calgary, the recorded 2005 and 2013 flood peaks on the Bow River correspond to naturalized return periods of 5-10 and 75 years, respectively.

The 2005 flood information was used first to adjust the initial values of the main channel Manning's *n* and bridge contraction/expansion coefficients, where necessary. The 2013 flood information was subsequently used to adjust the values of the floodplain Manning's *n* and to further adjust the values of the bridge contraction/expansion coefficients, where necessary. The model calibration was achieved by adjusting the model parameters in a way that the simulated water levels were in good match with the highwater marks.

The Bow River model calibration was based on the estimated peak 2005 and 2013 flood flows, the highwater mark data from AEP and the City of Calgary, and water edge data from the City of Calgary. A normal depth downstream boundary condition with an energy slope of 0.0018 m/m was applied to the Bow River model reach.

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. Flow distribution into the Prince's Island and Zoo Island side channels is automatically determined using the HEC-RAS flow optimization. Bow River flows used for the high flow model calibration (including the side channels) are based on the 2005 and 2013 flood flows provided in Table 27.

Table 27: Bow River Flows Used for High Flow Model Calibration

Reach	Description	River Station (m)	Model Flow (m^3/s)	
			2005 Flood	2013 Flood
B6_USBC_Prince	Bearspaw Dam to Prince's Island	69,677	791	1,840
B5_Prince	Prince's Island main channel	50,647	760	1,663
B4_Prince_Zoo	Prince's Island to Zoo Island	49,338	791	1,840
B3_Zoo	Upstream extent of Zoo Island to Elbow River confluence	48,120	528	1,183
B2_Zoo	Elbow River to the downstream end of Zoo Island	47,382	829	1,882
B1_Zoo_DSBC	Zoo Island to Nose Creek confluence	46,078	1,042	2,539
B1_Zoo_DSBC	Nose Creek confluence to Fish Creek confluence	45,933	1,080	2,574
B1_Zoo_DSBC	Fish Creek confluence to Pine Creek confluence	25,469	1,176	2,772
B1_Zoo_DSBC	Pine Creek confluence to Highwood River confluence	16,920	1,196	2,776
BS1_Zoo	Zoo Island side channel	1,928	263	657
BS2_Prince	Prince's Island side channel	979	31.3	177

Note: Peak flow estimates based on Golder (2014). Split flows rounded to three significant figures.

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Figures B-1 to B-3 in Appendix B and Figures C-1 to C-3 in Appendix C show the comparisons between the simulated water surface profiles and surveyed 2005 and 2013 flood highwater marks, respectively. During the 2013 flood event there was widespread flooding throughout the Bow River floodplain. Some highwater marks are located at large distances away from the main river channel, and may not accurately reflect water levels in the main channel. Highwater marks more than 50 m away from the main Bow River channel banks were not considered for the statistical analysis for evaluating the model calibration results.

The comparisons between the simulated water levels and 2005 and 2013 flood highwater marks are presented in Table B-1 in Appendix B and Table C-1 in Appendix C.

The calibrated main channel Manning's *n* values for high flow conditions range from 0.028 to 0.050 (with the exception of Harvie Passage downstream of the WH Weir), which are within the expected range of roughness values for large rivers with gravel and cobble bed during high flow conditions (Chow 1959) and similar to the roughness values used in previous modelling (Golder 2015b).

For the 2005 flood, the average difference between the simulated and measured water levels was +0.02 m for AEP highwater marks and -0.07 m for City of Calgary highwater marks, with individual differences ranging from -1.16 to +1.02 m (see Figure 11). The average absolute difference was 0.36 m for AEP highwater marks and 0.38 m for City of Calgary highwater marks.

For the 2013 flood, the average difference between the simulated and measured water levels was +0.06 m for AEP highwater marks and +0.18 m for City of Calgary highwater marks, with individual differences ranging from -0.73 to +1.35 m (see Figure 12). The average absolute difference was 0.20 m for AEP highwater marks and 0.26 m for City of Calgary highwater marks.

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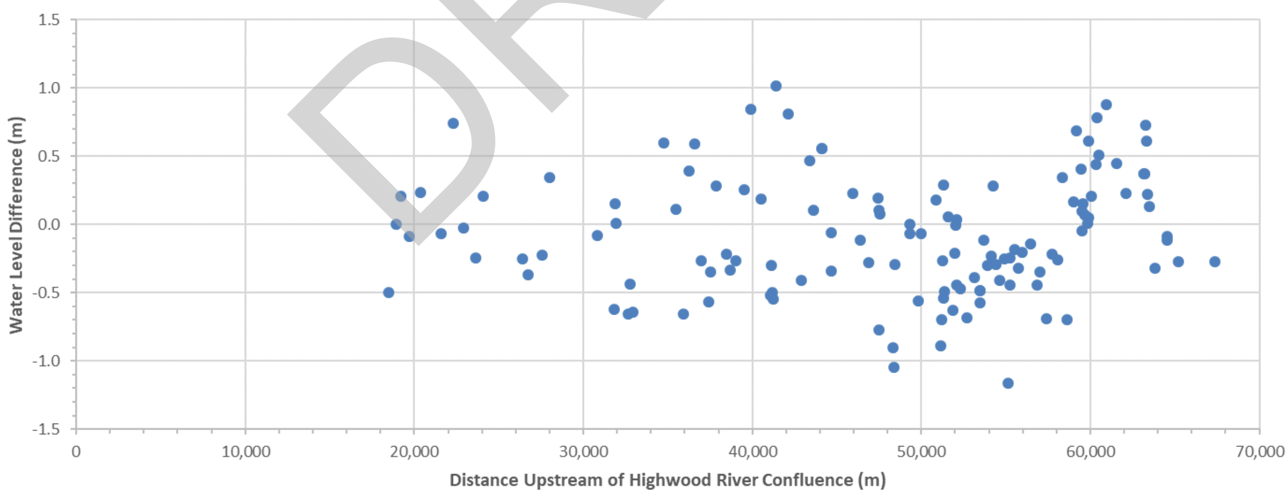

Figure 11: Difference between Simulated Water Levels and 2005 Flood Highwater Marks – Bow River

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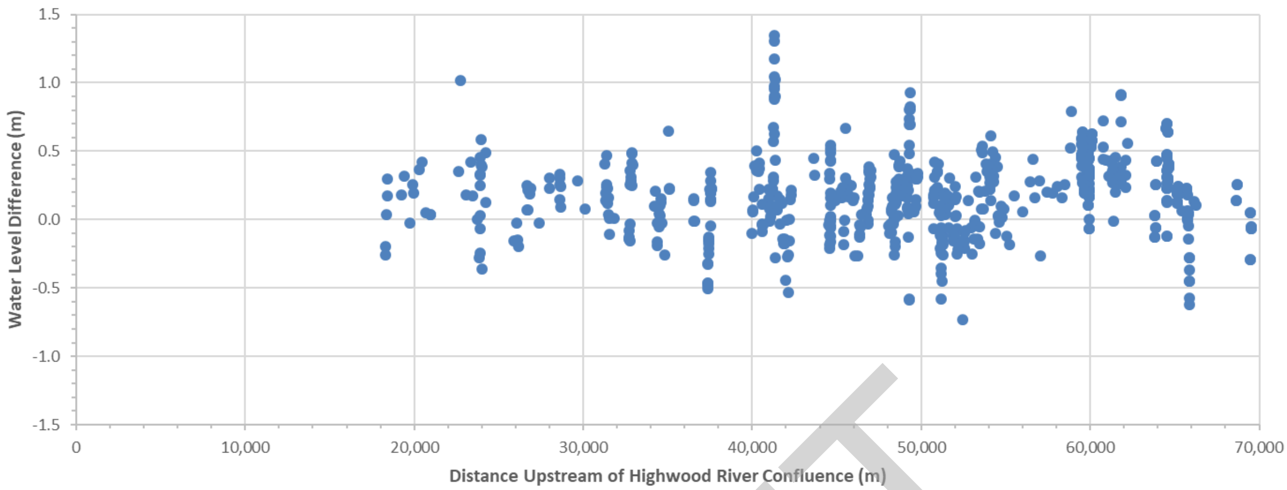

Figure 12: Difference between Simulated Water Levels and 2013 Flood Highwater Marks – Bow River

5.3.4.2 Lower Elbow River

In Calgary, the recorded 2005 and 2013 flood peaks on the Elbow River below Glenmore Dam correspond to naturalized return periods of approximately 15 and 75 years, respectively.

The 2005 flood information was used first to adjust initial main channel Manning's *n* roughness values and bridge contraction/expansion coefficients. The 2013 flood information was subsequently used to adjust the values of the floodplain Manning's *n* and to further adjust the values of bridge contraction and expansion coefficients.

Lower Elbow model calibration was based on the estimated peak 2005 and 2013 flood outflows from Glenmore Dam, highwater mark data from AEP and the City of Calgary, and water edge data from the City of Calgary. At the confluence with the Bow River, fixed water level boundary conditions were applied for both flood events.

The automatic flow split optimization algorithm in HEC-RAS was enabled for all side channels except the Cliff Street side channel for the 2013 model calibration. A temporary flood barrier (Mission Barrier) was constructed during the 2013 flood event to block Elbow River flow from entering Cliff Street and 4th Street SW on the left floodplain upstream of Mission Bridge. A manual flow transfer near Victoria Bridge was included to account for the spill flow from the Elbow River onto the left floodplain. The spill flow rate was estimated based on supplementary 2D modelling results (Golder 2018a).

Elbow River flows used for the high flow model calibration (including the side channels) are based on the peak 2005 and 2013 flood flows provided in Table 28.

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Table 28: Lower Elbow River Flows Used for High Flow Model Calibration

Model Reach	Description	River Station (m)	Model Flow (m^3/s)	
			2005 Flood	2013 Flood
E9_Dam_Roxboro	Glenmore Dam to Roxboro	11,417	301	700
E8_Roxboro_Cliff	Upstream extent of Roxboro to Cliff Street	5,259	301	666
E7_Cliff_Roxboro	Cliff Street to downstream extent of Roxboro	4,830	301	666
E6_Roxboro_25AV	Roxboro to 25th Avenue SW	4,281	301	700
E5_25AV_22AV	25th Avenue SW to 22nd Avenue SW	4,052	300	596
E4_Talisman	22nd Avenue SW to Spill Point downstream of Pattison Bridge	3,671	298	557
E4_Talisman	Spill Point downstream of Pattison Bridge to downstream extent of 22nd Avenue SW side channel	2,882	298	547
E3_22AV_25AV	Downstream extent of 22nd Avenue SW side channel to downstream extent of 25nd Avenue SW side channel	2,742	300	586
E2_Stampede_Clif	Downstream extent of 25nd Avenue SW side channel along Stampede to downstream extent of Cliff Street side channel	2,608	301	689
E1_Cliff_Bow	Downstream extent of Cliff Street side channel to Bow River confluence	343	301	700
ES1_CliffST	Cliff Street side channel (upstream end that was blocked by the Mission Barrier in 2013)	3,547	0.10	0.10
ES1_CliffST	Cliff Street side channel (below McLeod Trail Bridge where floodwaters spilled over from the Elbow River in 2013)	1,381	0.10	10.0
ES2_25AV	25th Avenue SW side channel	517	0.90	103
ES3_22AV	22nd Avenue SW side channel	443	1.74	39.1
ES4_Roxboro	Roxboro side channel	915	0.10	32.8

Note: Peak flow estimates based on Golder (2020). Split flows rounded to three significant figures.

Figure B-4 in Appendix B and Figure C-4 in Appendix C show the comparisons between the simulated water surface profile and surveyed 2005 and 2013 flood highwater marks, respectively. During the 2013 flood event there was wide spread flooding through the Elbow River floodplain. Some highwater marks are located at large distances away from the main channel, and may not accurately reflect the water levels in the main channel. High water marks more than 50 m away from the main Elbow River channel banks were not considered for the statistical analysis for evaluating the model calibration results.

The comparisons of the simulated water levels and 2005 and 2013 flood highwater marks are summarized in Table B-2 in Appendix B and Table C-2 in Appendix C.

The calibrated main channel Manning's n values for high flow conditions range from 0.030 to 0.040, which are within the expected range of roughness values for similar rivers during high flow conditions (Chow 1959) and similar to the roughness values used in previous modelling (Golder 2015b).

Classification: Public
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For the 2005 flood, the average difference between the simulated and measured water levels was +0.01 m for AEP highwater marks and +0.15 m for City of Calgary highwater marks, with individual differences ranging from -0.79 m to +0.58 m (see Figure 13). The average absolute difference was 0.08 m for AEP highwater marks and 0.29 m for City of Calgary highwater marks.

For the 2013 flood, the average difference between the simulated and measured water levels was +0.05 m for AEP highwater marks and +0.13 m for City of Calgary highwater marks, with individual differences ranging from -0.52 m to +0.61 m (see Figure 14). The average absolute difference was 0.10 m for AEP highwater marks and 0.23 m for City of Calgary highwater marks.

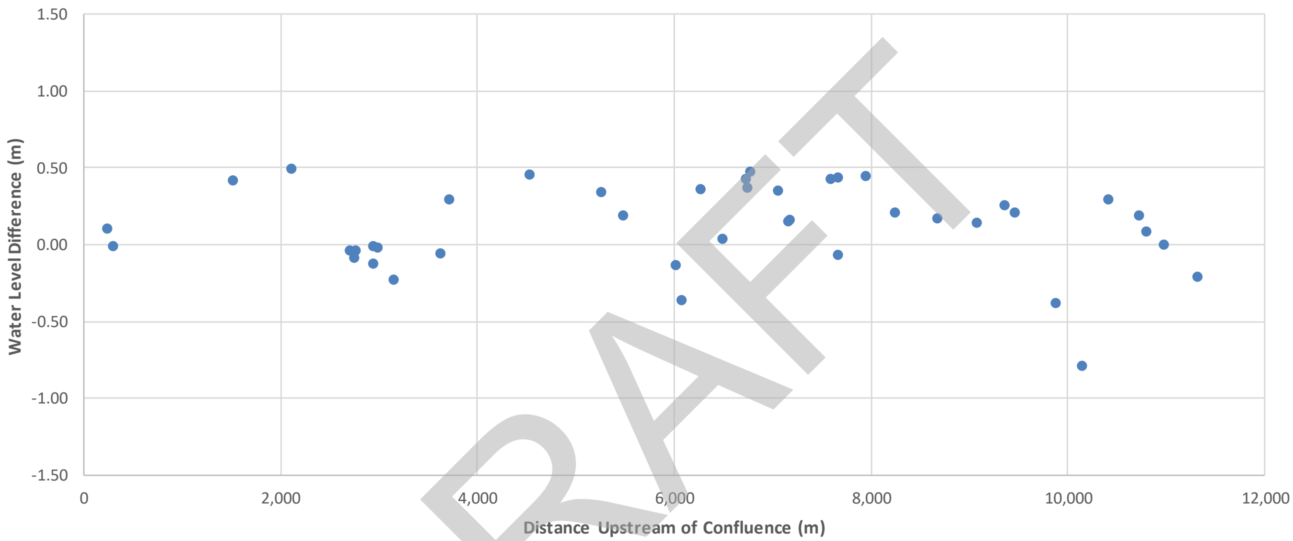

Figure 13: Difference between Simulated Water Levels and 2005 Flood Highwater Marks – Lower Elbow River

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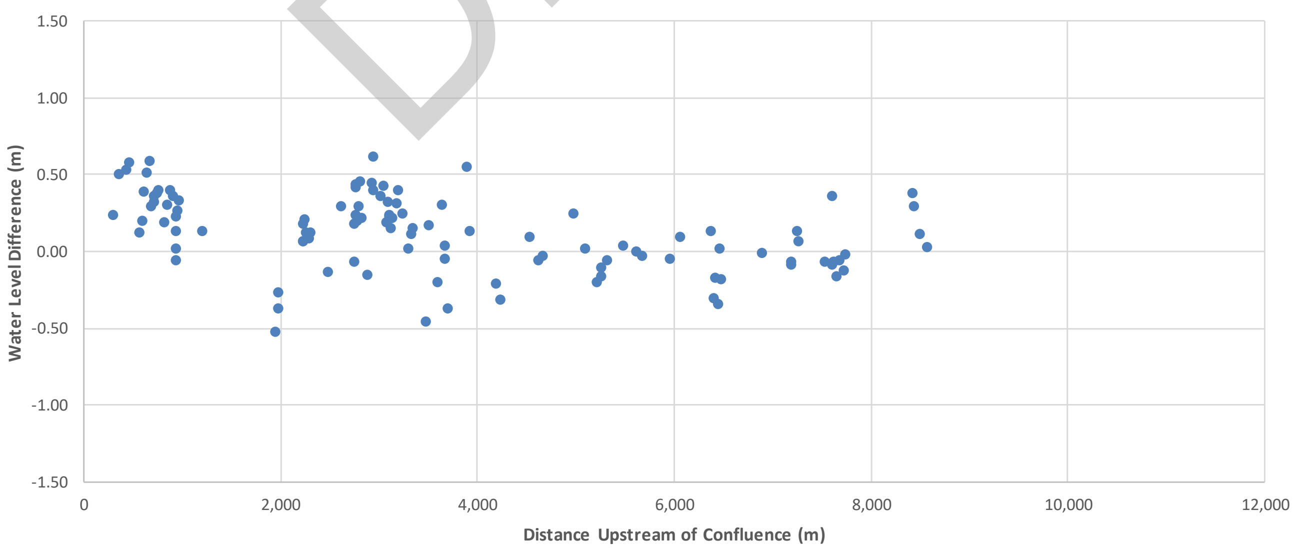

Figure 14: Difference between Simulated Water Levels and 2013 Flood Highwater Marks – Lower Elbow River

Classification: Public

5.3.4.3 Upper Elbow River

Along the Elbow River above Glenmore Dam, the recorded 2005 and 2013 flood peaks correspond to naturalized return periods of approximately 20 and 200 years, respectively.

The 2005 flood information was used first to adjust the initial values of main channel Manning's *n* roughness values and bridge contraction and expansion coefficients. The 2013 flood information was subsequently used to adjust floodplain Manning's *n* values and to further adjust the values of bridge contraction and expansion coefficients.

Upper Elbow model calibration was based on the estimated 2005 and 2013 flood peak flows at WSC Station Nos. 05BJ004 (Elbow River at Bragg Creek) and 05BJ010 (Elbow River at Sarcee Bridge), and surveyed 2005 and 2013 flood highwater mark data from AEP.

The fixed water level boundary conditions were applied at Glenmore Dam for both flood events.

Table 29: Upper Elbow River Flows Used for High Flow Model Calibration

Stream Reach	Model Flow (m^3/s)	
	2005 Flood	2013 Flood
Upstream of Bragg Creek	289	1,120
Bragg Creek to Highway 22 (Unnamed Creek)	308	1,170
Highway 22 (Unnamed Creek) to Millburn Creek	290	1,196
Milburn Creek to Springbank Creek	276	1,216
Springbank Creek to Lott Creek	263	1,235
Lott Creek to Glenmore Dam	244	1,240

Note: Peak flow estimates by Golder (2020).

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The Elbow River at Bragg Creek has a bed slope of approximately 0.008 m/m, and the bed slope gradually reduces to approximately 0.004 m/m at Highway 8. The active main channel during flood conditions is relatively wide and the width ranges from 100 m to over 300 m. The simulated mean flow velocities during the 2013 flood range from 2.5 m/s to 4.5 m/s upstream of Highway 22 and between 1.5 m/s and 3.0 m/s downstream of Highway 22. The average flow depths along the Elbow River from Bragg Creek to the Lott Creek confluence range from 1.5 m to 3.5 m. These hydraulic conditions correspond to relatively large Froude numbers in the range of 0.5 to 1.0.

HEC-RAS can be used to compute water level profiles in subcritical, supercritical and mixed flow regime mode. For relatively steep channels, such as the upper reach of the Elbow River, the selection of the appropriate flow regime is critically important. When a subcritical flow regime is selected in HEC-RAS, the program will default to critical depth at that cross sections that have supercritical flow conditions. When supercritical flow regime is selected, the program will default to critical depth at the cross sections that have subcritical flow conditions.

Classification: Public

Based on the simulation results for the 2013 flood, which had a natural return period of about 200 years, the flow conditions were subcritical for the majority of cross sections. Therefore, the subcritical flow regime was used for conducting the simulation. However, there are locations along the Elbow River above Glenmore Dam where highwater marks and 2013 flood observations (personal communication with Peter Onyshko from AEP) suggest that supercritical flow occurred. The selected modelling approaches at these locations are described below:

- **Balsam Avenue Bridge in Bragg Creek:** Under a subcritical flow regime, the model produced critical depth upstream of the bridge and through the bridge opening. The simulated water level at the upstream bridge face is 1297.84 m compared to the highwater mark of 1297.26 m. Under a supercritical flow regime, the simulated water level is 1297.59 m. These results and observations (see Figure 15) support that supercritical flow occurred at this bridge during the 2013 flood. However, for the purpose of this study, using subcritical flow results is considered sufficient and appropriate.

Figure 15: Flow Conditions at the Balsam Avenue Bridge in Bragg Creek during the 2013 Flood

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- **Highway 22 Bridge:** Under a subcritical flow regime, simulated water levels reach the underside of the bridge girder which causes an unrealistic high backwater effect not supported by highwater marks and observations. The supercritical flow results match the highwater marks well, with water levels below the low chord. Therefore, simulated subcritical water levels have been replaced with simulated supercritical water levels for the cross sections around the bridge from river station 48,133 m to 48,740 m.

- **Highway 8 Bridge:** The Highway 8 crossing comprises of a bridge over the main Elbow River channel and a 3.1 m by 4.8 m elliptical culvert that conveys additional flood flows. The highwater mark at the upstream bridge face is 1105.88 m which is slightly higher than the low chord of the bridge (1105.47 m). This implies that pressure flow conditions occurred at this crossing. However, there is no evidence that the bridge was overtopped in 2013 as Highway 8 remained open throughout the flood event.

  The simulated 2013 flood water level just upstream of the bridge is 1106.29 m using subcritical flow regime, which is higher than the highwater mark. This is likely due to the structural repairs at the left bridge abutments after the 2013 flood event (included in the 2015 survey and current model) that reduce the overall conveyance capacity and increase the upstream water level compared to 2013 flood conditions (see Figure 16). Therefore, using subcritical flow results is appropriate at the Highway 8 crossing.

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Figure 16: Highway 8 Bridge over the Elbow River after the 2013 Flood and in 2016

Figures B-5 to B-8 in Appendix B and Figures C-5 to C-8 in Appendix C show the comparisons between the simulated water surface profiles and surveyed 2005 and 2013 flood highwater marks.

The comparisons of the simulated water levels and 2005 and 2013 flood highwater marks are summarized in Table B-3 in Appendix B and Table C-3 in Appendix C.

The calibrated main channel roughness for high flow conditions was 0.045 upstream of Glenmore Reservoir and 0.030 within Glenmore Reservoir. This is within the expected range of roughness values for similar rivers during high flow conditions (Chow 1959).

For the 2005 flood, the average difference between the simulated and measured water levels was +0.18 m, with individual differences ranging from -1.33 to +1.60 m (see Figure 17). The average absolute difference was 0.60 m.

For the 2013 flood, the average difference between the simulated and measured water levels was +0.12 m, with individual differences ranging from -0.62 to +1.02 m (see Figure 18). The average absolute difference was 0.29 m.

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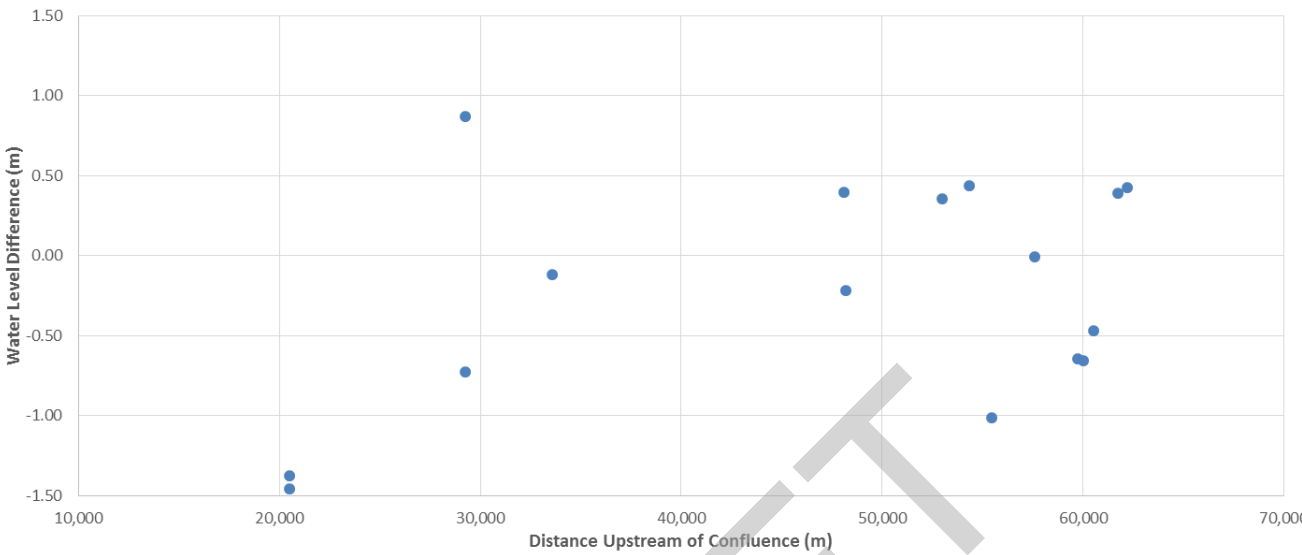

Figure 17: Difference between Simulated Water Levels and 2005 Flood Highwater Marks – Upper Elbow River

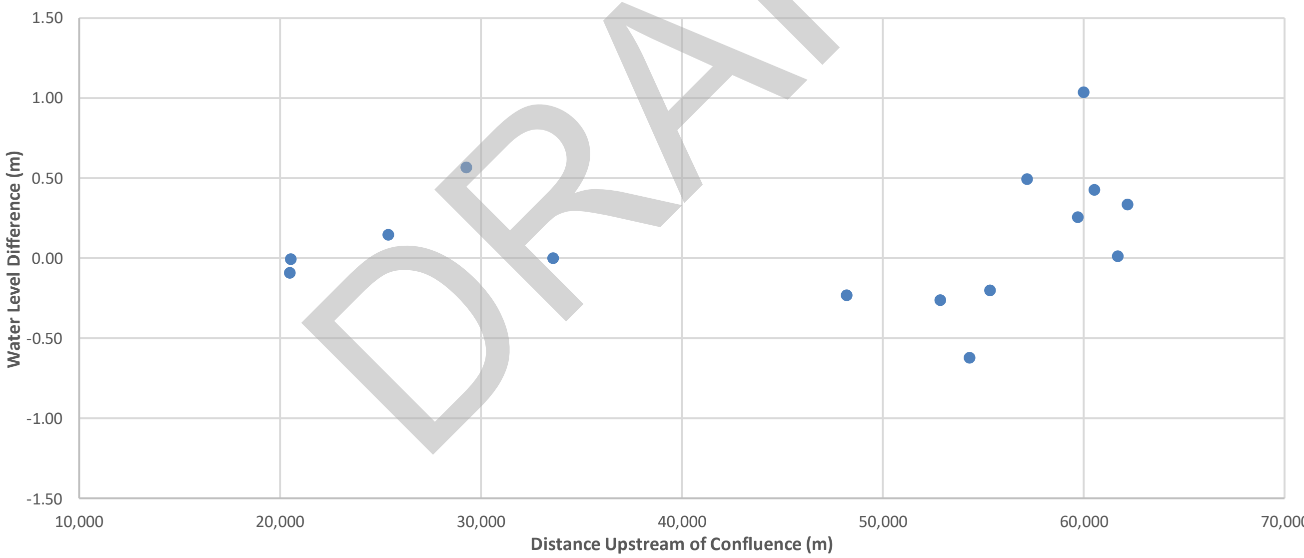

Figure 18: Difference between Simulated Water Levels and 2013 Flood Highwater Marks – Upper Elbow River

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5.3.4.4 Bragg Creek

Highwater marks or peak flow estimates were not available for Bragg Creek. Although a conventional high flow model calibration was not performed, a high flow model validation was performed (see Section 5.3.5.4).

Classification: Public

5.3.4.5 Lott Creek

Three highwater marks along Lott Creek were collected by AEP after the 2013 flood, but there is no gauge on Lott Creek and no reliable peak flow estimate is available for that event. Although a conventional high flow model calibration was not performed for Lott Creek, a high flow model validation was performed (see Section 5.3.5.4).

5.3.5 High Flow Validation

5.3.5.1 Bow River

The calibrated model was validated against six historical flood events that occurred in 1897, 1902, 1915, 1929, 1932, and 1981. This validation was conducted using the 2005 flood calibration model geometry without any modification (i.e. the hydraulic structures, flood control structures, and cross sections were not altered). Table 30 summarizes the peak flood flows of the validation flood events.

Table 30: Bow River Flows Used for Model Validation

Model Subreach	1897 Flood Model Flow (m^3/s)	1902 Flood Model Flow (m^3/s)	1915 Flood Model Flow (m^3/s)
Bearspaw Dam to Elbow River confluence	2,265	1,557	1,127
Elbow River confluence to Nose Creek confluence	3,130	2,270	1,506
Nose Creek confluence to Fish Creek confluence	3,130	2,270	1,506
Fish Creek confluence to Pine Creek confluence	3,520	2,600	1,816
Pine Creek confluence to Highwood River confluence	3,520	2,600	1,816

Model Subreach	1929 Flood Model Flow (m^3/s)	1932 Flood Model Flow (m^3/s)	1981 Flood Model Flow (m^3/s)
Bearspaw Dam to Elbow River confluence	1,322	1,518	413
Elbow River confluence to Nose Creek confluence	1,756	2,231	509
Nose Creek confluence to Fish Creek confluence	1,756	2,231	509
Fish Creek confluence to Pine Creek confluence	2,120	2,600	520
Pine Creek confluence to Highwood River confluence	2,120	2,600	520

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Water level difference statistics between the simulated water levels and highwater marks for each validation flood event are presented in Table 31.

Table 31: Bow River Model Validation Results

Validation Flood Event	Difference between Simulated Water Levels and Highwater Marks (m)				No. of Highwater Marks
	Minimum	Maximum	Average	Average Absolute	
1897	+0.30	+0.94	+0.62	0.62	2
1902	+0.49	+0.74	+0.63	0.63	4
1915	+0.43	+0.85	+0.64	0.64	2
1929	+0.49	+0.58	+0.53	0.53	4
1932	-0.46	+0.77	+0.07	0.39	9
1981	-0.42	+0.85	+0.21	0.30	58

5.3.5.2 Lower Elbow River

The calibrated model was validated against four historical flood events that occurred in 1915, 1932, 1964, and 1981. This validation was conducted using the 2005 flood calibration model geometry without any modification (i.e. the hydraulic structures, flood control structures, and cross-sections were not altered). Table 32 summarizes the peak flood peak flows of the validation flood events.

Table 32: Lower Elbow River Flows Used for Model Validation

Model Subreach	1915 Flood Model Flow (m^3/s)	1923 Flood Model Flow (m^3/s)	1964 Flood Model Flow (m^3/s)	1981 Flood Model Flow (m^3/s)
Elbow River below Glenmore Dam	379	402	142	96.0

Note: Peak flow estimates by Golder (2020).

Water level difference statistics between the simulated water levels and highwater marks for each validation flood event are presented in Table 33.

Table 33: Lower Elbow River Model Validation Results

Validation Flood Event	Difference between Simulated Water Levels and Highwater Marks (m)				No. of Highwater Marks
	Minimum	Maximum	Average	Average Absolute	
1915	-0.81	+1.69	+0.60	0.66	43
1923	-0.20	+0.84	+0.55	0.57	14
1964	-0.15	+1.08	+0.19	0.23	21
1981	-0.10	+1.15	+0.53	0.55	13

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5.3.5.3 Upper Elbow River

The calibrated model was validated against three historical flood events that occurred in 1981, 1990, and 1995. This validation was conducted using the 2013 flood calibration model geometry without any modification (i.e. the hydraulic structures, flood control structures, and cross sections were not altered). Table 34 summarizes the peak flood flows of the validation floods.

Table 34: Upper Elbow River Flows Used for Model Validation

Model Subreach	1981 Flood Model Flow (m^3/s)	1990 Flood Model Flow (m^3/s)	1995 Flood Model Flow (m^3/s)
Upstream of Bragg Creek	111	160	351
Bragg Creek to Highway 22 (Unnamed Creek)	123	172	377
Highway 22 (Unnamed Creek) to Millburn Creek	122	164	328
Milburn Creek to Springbank Creek	122	164	325
Springbank Creek to Lott Creek	122	162	315
Lott Creek to Glenmore Dam	121	158	291

Water level difference statistics between the simulated water levels and highwater marks for each validation flood event are presented in Table 35.

Table 35: Upper Elbow River Model Validation Results

Validation Flood Event	Difference between Simulated Water Levels and Highwater Marks (m)				No. of Highwater Marks
	Minimum	Maximum	Average	Average Absolute	
1981	-0.36	+0.74	+0.16	0.28	11
1990	-1.25	+0.94	+0.01	0.33	28
1995	-1.63	+2.14	-0.15	0.76	24

5.3.5.4 Bragg Creek

There are no gauges on Bragg Creek and no reliable observation or measurement of peak 2013 flood flows in the study area. The 2013 peak flow was estimated to be 50.3 m^3/s, which is in the order of a 100-year flood (Golder 2020). This estimate was based on the assumption that the Bragg Creek catchment received a similar amount of rainfall as the Elbow River catchment at the Hamlet of Bragg Creek.

Based on professional judgement and experience, the Manning's *n* value was selected to be 0.050, and the bridge contraction and expansion coefficients were selected as 0.1 and 0.3, respectively.

Figure D-1 in Appendix D shows the simulated water surface profile for the 2013 flood.

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5.3.5.5 Lott Creek

The model for the Lott Creek study reach was validated based on the 2013 highwater marks, available flood photography, and an estimated peak flow. There is no gauge on Lott Creek and no reliable observations or measurements of the peak 2013 flood flow in the study area. The 2013 flood peak flow was estimated to be 11.7 m^3/s, which is in the order of a 10-year flood (Golder 2020). The estimate was made based on a comparison of the peak flow estimates for other similar small creeks in central Alberta with catchment areas outside of the Rocky Mountains and foothills.

The automatic flow split optimization algorithm in HEC-RAS was enabled for the Lott Creek Lakes side channel. Lott Creek and Lott Creek Lakes flows used for high flow model validation are provided in Table 36.

Table 36: Optimized Lott Creek Flows – 2013 Flood High Flow Validation Model Runs

River / Branch	Model Reach	River Station (m)	2013 Flood Model Flow (m^3/s)
Lott Creek	L3_USBC_EVL	7,278	11.7
Lott Creek	L2_EVL_LCDrive	5,043	2.87
Lott Creek	L1_LCDrive_Elbow	3,877	11.7
Lott Creek Lakes	Lott Creek Lakes	1,071	8.83

For the model validation initial Manning's *n* values and contraction and expansion coefficients were selected based on the low flow calibration values, literature, and professional judgement. The model results were then compared to the observed high watermarks and available flood photography.

Figure D-2 in Appendix D shows a comparison between the simulated water surface profile and measured water levels for the 2013 flood. The simulated water levels and highwater mark comparison for the 2013 flood is summarized in Table D-1 in Appendix D.

The validated main channel Manning's *n* value for the high flow condition is 0.060, which is within the expected range of roughness values for similar creeks during high flow conditions (Chow 1959).

For the 2013 flood, the average difference between the simulated and measured water levels is +0.12 m, with individual differences ranging from -0.03 m to +0.38 m (see Figure 19). The average absolute difference is 0.14 m.

The statistics of the water level difference between the simulated water levels and highwater marks for the validation flood event are presented in Table 37.

Table 37: Lott Creek Model Validation Results

Validation Flood Event	Difference between Simulated Water Levels and Highwater Marks (m)				No. of Highwater Marks
	Minimum	Maximum	Average	Average Absolute	
2013	-0.03	+0.38	+0.12	0.14	3

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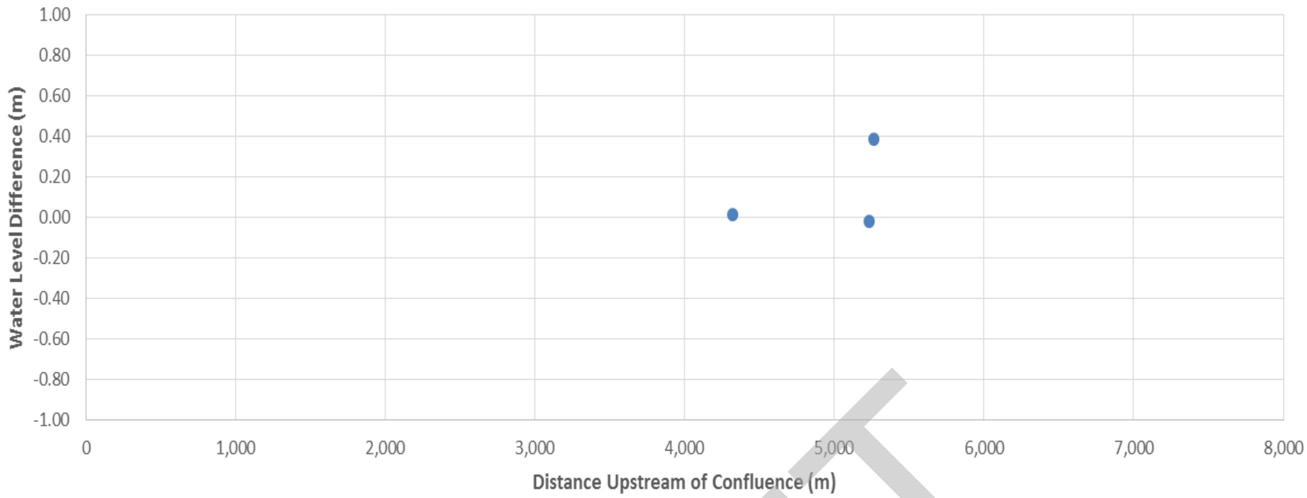

Figure 19: Difference between Simulated Water Levels and Highwater Marks for the 2013 Flood - Lott Creek

5.3.6 Gauge Data and Rating Curves

The calibrated model will be used to simulate a wide range of flood flows with return periods between 2 and 1,000 years. Due the large numbers of available highwater marks for the study area, the model calibration was mostly based on the simulated flood profiles. The gauge rating curve data was used to verify and confirm the calibration parameters found during the high flow calibration (see Section 5.3.4). The simulated water levels at the following WSC gauging stations were compared with the rating curves provided by WSC:

- 05BH004 – Bow River at Calgary
- 05BJ001 – Elbow River below Glenmore Dam
- 05BJ004 – Elbow River at Bragg Creek
- 05BJ010 – Elbow River at Sarcee Bridge

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Classification: Public

The comparisons are shown in Figure 20 to Figure 23. The results are summarized below:

- Bow River at Calgary: The calibrated model produces comparable water levels to the gauge rating curve for floods with low return periods (Figure 20). The calibrated model produces higher water levels at the Bow River gauge station for floods with high return periods. The high flow calibration is based primarily on 2013 flood highwater marks collected along the Bow River (peak flow of 1840 m^3/s), which are higher than the highest measured flow at the gauge. Therefore, the high flow calibration of the model is considered reliable.
- Elbow River below Glenmore Dam*:* The calibrated model produces comparable water levels to the gauge rating curve for the full range of flood flows. This validates that the calibrated model can be reliably used for simulating floods with return periods between 2 and 1,000 years.
- Elbow River at Bragg Creek*:* The calibrated model produces comparable water levels to the gauge rating curve for the full range of flood flows, with a slight tendency to overestimate water levels for very high flows.
- Elbow River at Sarcee Bridge: The datum provided by WSC resulted in a rating curve that did not correspond to either measured or simulated water levels. Therefore, the datum was manually adjusted to match the measured 2013 highwater mark immediately downstream of the Sarcee Bridge (1082.85 m) for the estimated peak flow of 1,240 m^3/s. The calibrated model produces comparable water levels to the adjusted gauge rating curve for the full range of flood flows.

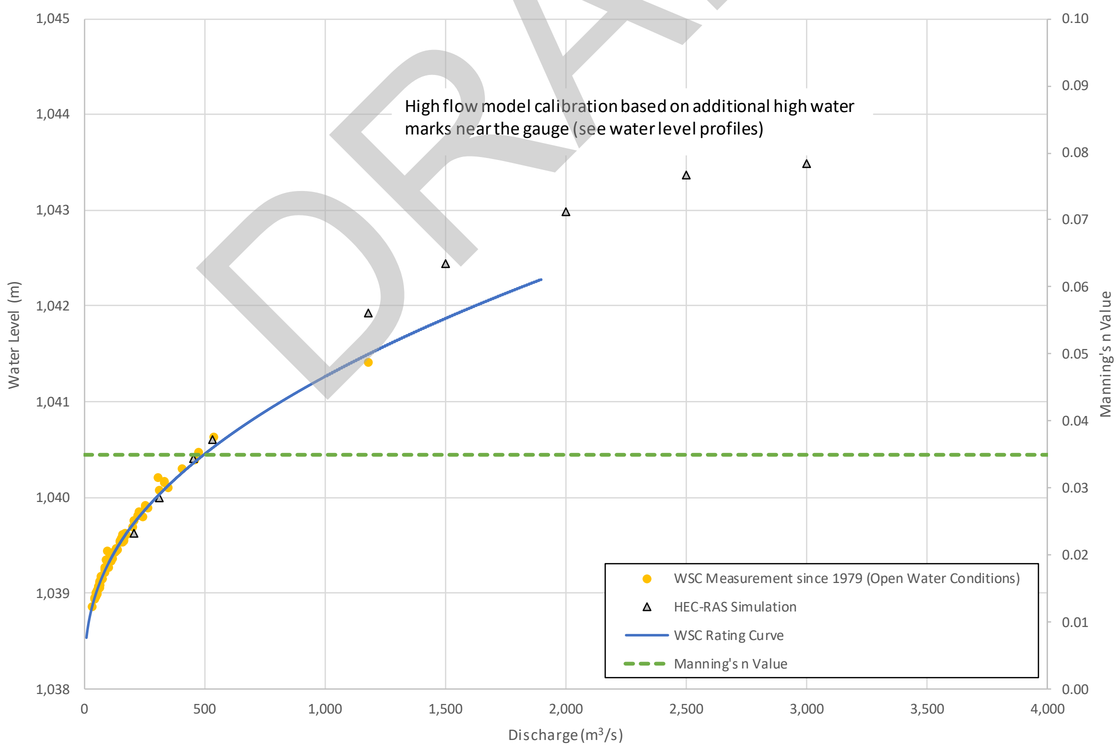

Figure 20: Rating Curve Comparison at WSC Station No 05BH004 – Bow River at Calgary

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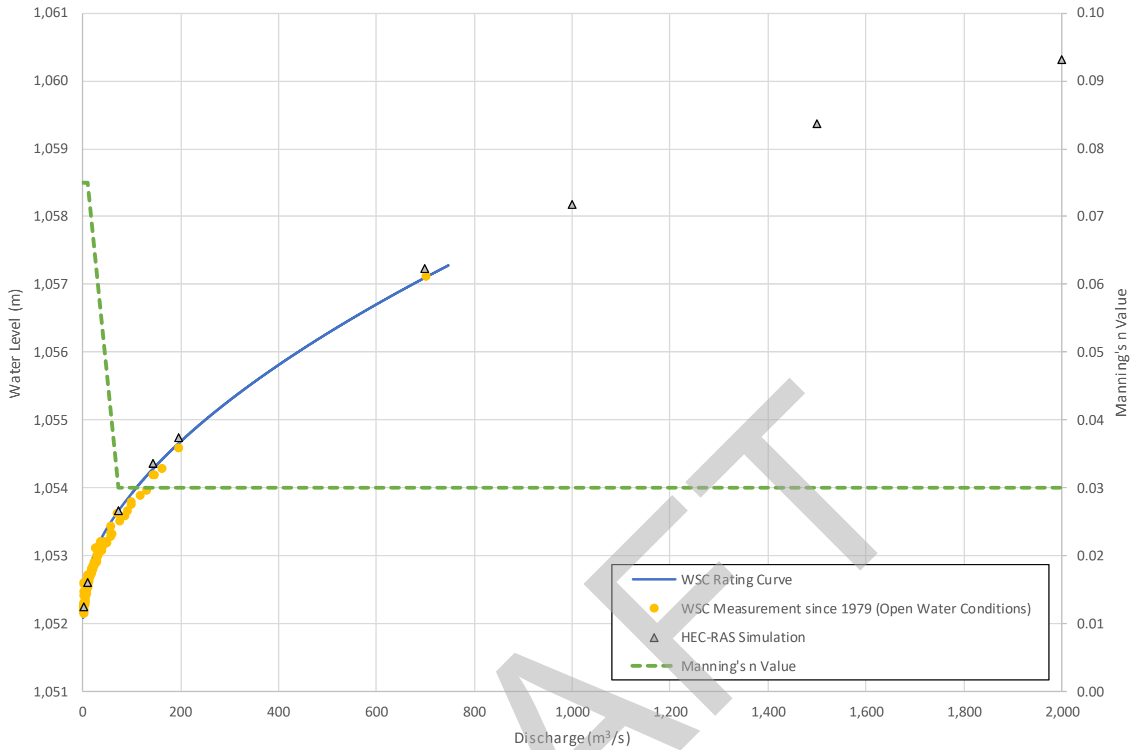

Figure 21: Rating Curve Comparison at WSC Station No. 05BJ001 – Elbow River below Glenmore Dam

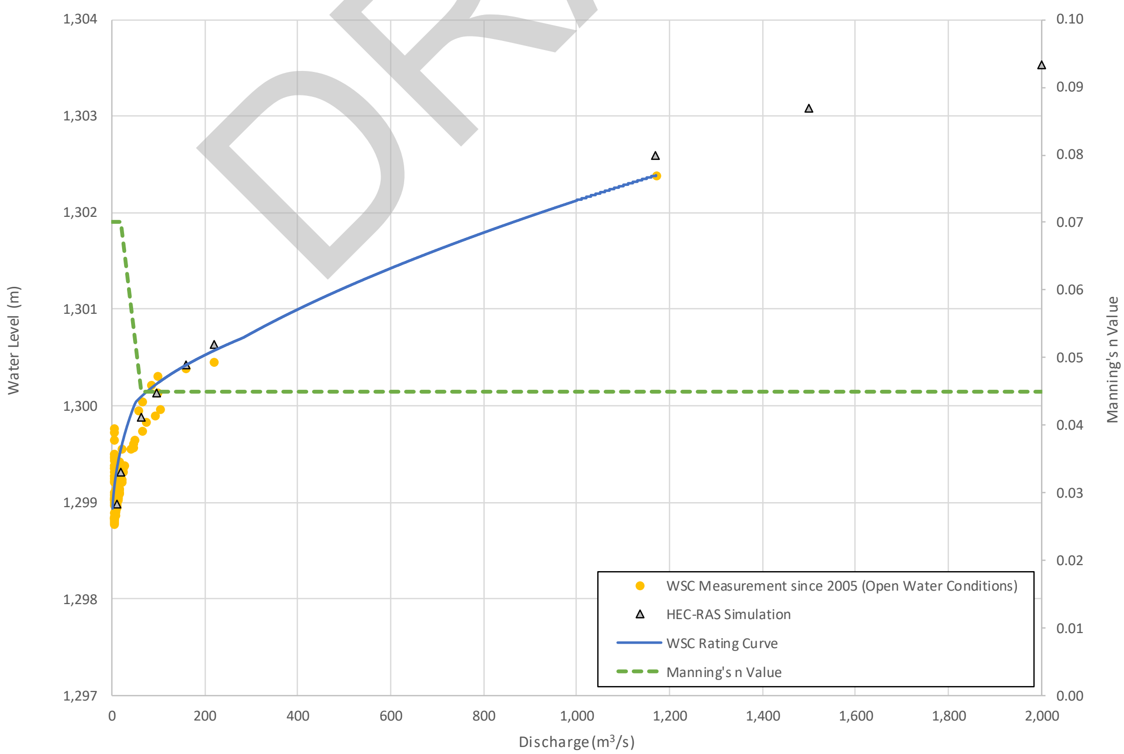

Figure 22: Rating Curve Comparison at WSC Station No. 05BJ004 – Elbow River at Bragg Creek

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Classification: Public

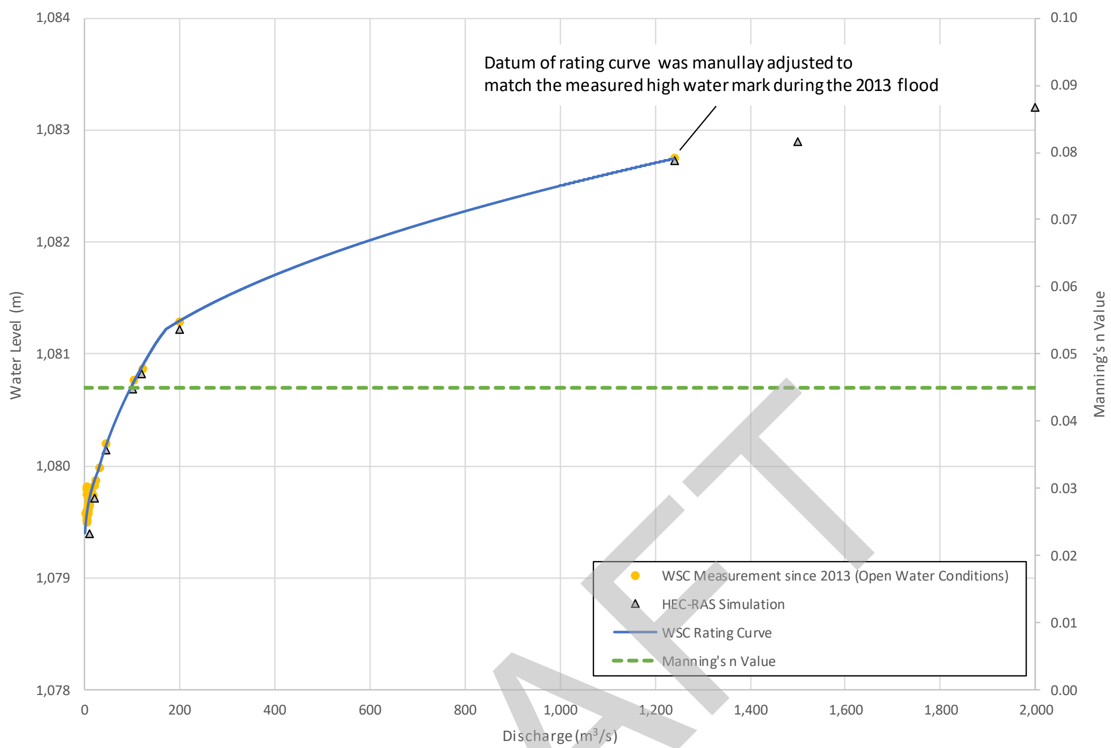

Figure 23: Rating Curve Comparison at WSC Station No. 05BJ010 – Elbow River at Sarcee Bridge

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5.3.7 Summary of Calibration Results

Because the primary purpose of the Bow and Elbow River Hazard Study is to identify flood hazards with flood mapping, the focus of model calibration was to determine appropriate Manning's *n* roughness values and contraction and expansion coefficients for a range of flood conditions.

5.3.7.1 Bow River

The Bow River high flow model calibration was based on highwater marks collected for the 2005 and 2013 floods. The differences between the simulated water levels and highwater marks are summarized in Table 38.

Table 38: Bow River High Flow Calibration Results

Parameter	2005 Flood	2013 Flood
Mean difference between simulated water levels and AEP highwater marks	+0.02 m	+0.06 m
Mean absolute difference between simulated water levels and AEP highwater marks	0.36 m	0.20 m
Mean difference between simulated water levels and City of Calgary highwater marks (within 50 m of main channel banks)	-0.07 m	+0.18 m
Mean absolute difference between simulated water levels and City of Calgary highwater marks (within 50 m of main channel banks)	0.38 m	0.26 m

Classification: Public

Table B1 in Appendix B and Table C1 in Appendix C present a detailed comparison of the simulated water levels and 2005 and 2013 flood highwater marks collected along the Bow River model reach.

5.3.7.2 Lower Elbow River

The Lower Elbow model high flow calibration was based on highwater marks collected for the 2005 and 2013 floods. The differences between the simulated and highwater marks are summarized Table 39.

Table 39: Lower Elbow River High Flow Calibration Results

Parameter	2005 Flood	2013 Flood
Mean difference between simulated water levels and AEP highwater marks	+0.01 m	+0.05 m
Mean absolute difference between simulated water levels and AEP highwater marks	0.08 m	0.10 m
Mean difference between simulated water levels and City of Calgary highwater marks (within 50 m of main channel banks)	+0.15 m	+0.13 m
Mean absolute difference between simulated water levels and City of Calgary highwater marks (within 50 m of main channel banks)	0.29 m	0.23 m

Table B2 in Appendix B and Table C2 in Appendix C present a detailed comparison of the simulated water levels and 2005 and 2013 flood highwater marks collected along the Lower Elbow model reach.

5.3.7.3 Upper Elbow River

The Upper Elbow model high flow calibration was based on highwater marks collected for the 2005 and 2013 floods. The differences between the simulated water levels and highwater marks are summarized in Table 40.

Table 40: Upper Elbow River High Flow Calibration Results

Parameter	2005 Flood	2013 Flood
Mean difference between simulated water levels and AEP highwater marks	+0.18 m	+0.12 m
Mean absolute difference between simulated water levels and AEP highwater marks	0.60 m	0.29 m

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Classification: Public

Table B3 in Appendix B and Table C3 in Appendix C present a detailed comparison of the simulated water levels and 2005 and 2013 flood highwater marks collected along the Upper Elbow model reach.

5.3.7.4 Bragg Creek

There were no surveyed highwater marks available for Bragg Creek. Therefore, the Bragg Creek study reach was not conventionally calibrated and model parameters were selected based on professional judgement.

Figure D-2 in Appendix D shows the simulated water surface profile for the 2013 flood.

5.3.7.5 Lott Creek

Flow measurements are not available for Lott Creek, including for the 2013 flood. The peak 2013 flood flow is estimated to be in the order of a 10-year flood, with a flow of 11.7 m^3/s. (Golder 2020). A model validation was performed using three highwater marks collected following the 2013 flood. The differences between the simulated water levels and highwater marks are summarized in Table 41.

Table 41: Lott Creek High Flow Calibration Results

Parameter	2013 Flood
Mean difference between simulated water levels and AEP highwater marks	+0.12 m
Mean absolute difference between simulated water levels and AEP highwater marks	0.14 m

Table D1 in Appendix D presents a detailed comparison of the simulated water levels and highwater marks collected along Lott Creek following the 2013 flood.

5.4 Model Parameters and Options

5.4.1 Manning Roughness Values

5.4.1.1 Channel Roughness

The calibrated main channel Manning's *n* values are summarized in Table 42.

Table 42: Calibrated Main Channel Roughness Values for High Flow Conditions

River Reach	Manning's *n* Value
Bow River	0.028 - 0.050
Lower Elbow River (below Glenmore Dam)	0.030 - 0.040
Upper Elbow River (within Glenmore Reservoir)	0.030
Upper Elbow River (above Glenmore Reservoir)	0.045
Bragg Creek	0.050
Lott Creek	0.060

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Classification: Public

5.4.1.2 Overbank Roughness

During the calibration process, the initially-estimated Manning's *n* values for the overbank areas were adjusted only in the areas where simulated water levels were largely different from highwater marks. Only the Manning's *n* values for the "Urban Mixture (Residential and Small Commercial)" and "Trees/Bushes" within Calgary were adjusted. The adjustments were made for entire neighborhoods to maintain consistent roughness assignments within that particular area. The calibrated overbank roughness values are summarized in Table 43.

Table 43: Estimated Overbank Roughness Values

No.	Description	Manning's *n* Value
1	Main River Channels	See Table 42
2	Urban Mixture (Residential and Small Commercial)	0.080 - 0.150
3	Urban Mixture (Industrial)	0.035
4	Urban Mixture (Downtown)	0.040
5	Grassland	0.038
6	Trees/Bushes	0.100 - 0.150

5.4.2 Expansion and Contraction Coefficients

Bow River and Lower Elbow River

During the calibration process, the values of the contraction/expansion coefficients were adjusted upstream and downstream of some bridges to match the highwater marks without using unrealistic channel bed roughness values. The calibrated contraction coefficient values range from 0.0 to 0.5, and the calibrated expansion coefficient values range from 0.0 to 0.8 (see Table 44). For all other cross sections, the default contraction and expansion coefficients values were used (0.1 and 0.3, respectively).

Table 44: Bow and Lower Elbow River Calibrated Expansion and Contraction Coefficients – 2013 High Flow Calibration

River	Model Reach	River Station (m)	Expansion Coefficient	Contraction Coefficient
Bow River	B1_Zoo_DSBC	41,122	0.5	0.8
Bow River	B1_Zoo_DSBC	41,038	0.5	0.8
Bow River	B1_Zoo_DSBC	40,878	0.5	0.8
Bow River	B1_Zoo_DSBC	40,788	0.5	0.8
Bow River	B1_Zoo_DSBC	40,663	0.5	0.8
Bow River	B1_Zoo_DSBC	40,518	0.5	0.8
Bow River	B1_Zoo_DSBC	37,520	0.5	0.8
Bow River	B1_Zoo_DSBC	37,480	0.5	0.8
Bow River	B1_Zoo_DSBC	37,447	0.5	0.8
Bow River	B1_Zoo_DSBC	34,780	0.5	0.8
Bow River	B1_Zoo_DSBC	34,758	0.5	0.8
Bow River	B1_Zoo_DSBC	26,732	0.0	0.0
Bow River	B1_Zoo_DSBC	26,716	0.0	0.0
Bow River	B1_Zoo_DSBC	23,977	0.5	0.8
Bow River	B1_Zoo_DSBC	23,924	0.5	0.8
Bow River	B1_Zoo_DSBC	23,884	0.5	0.8
Elbow River	E9_Dam_Roxboro	8,217	0.0	0.0

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Table 44: Bow and Lower Elbow River Calibrated Expansion and Contraction Coefficients – 2013 High Flow Calibration

River	Model Reach	River Station (m)	Expansion Coefficient	Contraction Coefficient
Elbow River	E9_Dam_Roxboro	8,181	0.0	0.0
Elbow River	E9_Dam_Roxboro	8,121	0.0	0.0
Elbow River	E9_Dam_Roxboro	7,221	0.5	0.8
Elbow River	E9_Dam_Roxboro	7,195	0.5	0.8
Elbow River	E7_Cliff_Roxboro	4,795	0.0	0.0
Elbow River	E7_Cliff_Roxboro	4,768	0.0	0.0
Elbow River	E4_Talisman	3,398	0.3	0.3
Elbow River	E4_Talisman	3,478	0.3	0.3
Elbow River	E4_Talisman	3,251	0.5	0.8
Elbow River	E4_Talisman	3,236	0.5	0.8
Elbow River	E4_Talisman	2,966	0.3	0.5
Elbow River	E4_Talisman	2,939	0.3	0.5
Elbow River	E3_22AV_25AV	2,742	0.0	0.0
Elbow River	E3_22AV_25AV	2,699	0.0	0.0
Elbow River	E3_22AV_25AV	2,656	0.0	0.0
Elbow River	E2_Stampede_Clif	2,469	0.0	0.0
Elbow River	E2_Stampede_Clif	2,443	0.0	0.0
Elbow River	E2_Stampede_Clif	1,249	0.0	0.0
Elbow River	E2_Stampede_Clif	1,238	0.0	0.0
Elbow River	E2_Stampede_Clif	999	0.0	0.0
Elbow River	E2_Stampede_Clif	979	0.0	0.0
Elbow River	E2_Stampede_Clif	588	0.0	0.0
Elbow River	E2_Stampede_Clif	568	0.0	0.0
Elbow River	E1_Cliff_Bow	343	0.0	0.0
Elbow River	E1_Cliff_Bow	324	0.0	0.0
Elbow River	E1_Cliff_Bow	295	0.4	0.7
Elbow River	E1_Cliff_Bow	275	0.4	0.7

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Upper Elbow River

During the calibration process, the values of the contraction/expansion coefficients were slightly adjusted upstream and downstream of the Balsam Avenue Bridge to match the highwater marks without using unrealistic channel bed roughness values (see Table 45). For all other cross sections, the default contraction and expansion coefficients values were used (0.1 and 0.3, respectively).

Table 45: Upper Elbow River Calibrated Expansion and Contraction Coefficients – 2013 High Flow Calibration

River	Model Reach	River Station (m)	Expansion Coefficient	Contraction Coefficient
Elbow River	E13_Bragg_Lott	60,568	0.2	0.4
Elbow River	E13_Bragg_Lott	60,516	0.2	0.4

Lott Creek

The calibrated contraction and expansion coefficients were the default values of 0.1 and 0.3, respectively.

Bragg Creek

The calibrated contraction and expansion coefficients were the default values of 0.1 and 0.3, respectively.

5.4.3 Minor Losses

In consideration of the flood frequency profile generation, minor losses were introduced at some cross sections to eliminate or reduce the impact of unrealistic water level drops and profile crossings (i.e., where lower flood flows would result in higher water levels or higher flood flows would result in lower water levels). Minor losses were introduced at 40 cross sections (representing about 2% of all cross sections), as summarized in Table 46.

Table 46: Minor Losses at Cross Sections

River / Branch	Model Reach	River Station (m)	Minor Loss
Bow River	B1_Zoo_DSBC	39,262	0.3
Bow River	B1_Zoo_DSBC	7,267	0.5
Bow River	B1_Zoo_DSBC	7,068	0.3
Bow River	B1_Zoo_DSBC	5,643	0.3
Bow River	B1_Zoo_DSBC	3,711	0.1
Elbow River	E13_Bragg_Lott	60,616	0.2
Elbow River	E13_Bragg_Lott	60,568	0.2
Elbow River	E13_Bragg_Lott	60,516	0.1
Elbow River	E13_Bragg_Lott	60,113	0.1
Elbow River	E13_Bragg_Lott	60,065	0.15
Elbow River	E13_Bragg_Lott	60,011	0.2
Elbow River	E13_Bragg_Lott	57,597	0.1
Elbow River	E13_Bragg_Lott	57,512	0.1
Elbow River	E13_Bragg_Lott	57,437	0.1
Elbow River	E13_Bragg_Lott	57,356	0.1
Elbow River	E13_Bragg_Lott	57,286	0.1
Elbow River	E13_Bragg_Lott	57,215	0.25
Elbow River	E13_Bragg_Lott	57,132	0.2
Elbow River	E13_Bragg_Lott	57,049	0.2
Elbow River	E13_Bragg_Lott	56,974	0.2
Elbow River	E13_Bragg_Lott	56,895	0.2
Elbow River	E13_Bragg_Lott	56,812	0.1
Elbow River	E13_Bragg_Lott	28,113	1.0
Elbow River	E9_Dam_Roxboro	10,382	0.3
Elbow River	E9_Dam_Roxboro	10,253	0.3
Elbow River	E9_Dam_Roxboro	8,121	0.3
Elbow River	E2_Stampede_Clif	2,424	0.3
Elbow River	E2_Stampede_Clif	2,387	0.5
Elbow River	E2_Stampede_Clif	2,331	0.1
Elbow River	E1_Cliff_Bow	171	0.1
Bragg Creek	Bragg Creek	110	0.1
Bragg Creek	Bragg Creek	94	0.1
Lott Creek	L3_USBC_EVL	6,025	0.5

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Table 46: Minor Losses at Cross Sections

River / Branch	Model Reach	River Station (m)	Minor Loss
Lott Creek	L3_USBC_EVL	5,231	0.2
Lott Creek	L2_EVL_LCDrive	4,408	0.7
Lott Creek	L2_EVL_LCDrive	4,046	0.2
Lott Creek	L1_LCDrive_Elbow	3,585	0.7
Lott Creek	L1_LCDrive_Elbow	2,703	0.5
Lott Creek Lakes	Lott Creek Lakes	1,006	0.5
Lott Creek Lakes	Lott Creek Lakes	405	0.75
Lott Creek Lakes	Lott Creek Lakes	366	0.5

5.4.4 Obstructions and Ineffective Flow Areas

Blocked obstructions were used in the model setup for large permanent obstructions within floodplains in the central parts of Calgary. This included the following features:

- large building blocks in Downtown;
- apartment blocks in Erlton;
- Holy Cross Centre in Mission between 1st Street SW and 2nd Street SW;
- parts of the Repsol Sports Centre;
- large buildings on Stampede Grounds including the Big Four, BMO Centre, Saddledome, Grandstand, and Horse Barn buildings; and the
- Calgary Transit Victoria Park Centre.

Small residential buildings were not specified as building blockage, because their effects on the hydraulic conditions in the overbank and floodplain are captured by the composite Manning's *n* value for residential areas.

A large number of ineffective flow areas were included in the model setup for all study reaches. A consistent approach for the use of ineffective flow areas was applied for the whole study area. The following five general types of ineffective flow areas were implemented in the model setup:

- Topographical low areas in which standing water may occur: Permanent ineffective flow areas were specified to block off low-lying areas that do not effectively convey flow. Areas where this type of ineffective flow area was used included ponds on golf courses and remnant channels in the Elbow River floodplain that are disconnected during normal or low flood conditions.
- Topographical low areas that can be activated: Non-permanent ineffective flow areas were specified to block off low-lying areas that can become active after the water level is above a certain elevation.
- Bridge decks and embankments: Permanent ineffective flow areas were specified to block off flow through bridge embankments at cross sections upstream and downstream of bridge and culvert crossings. Permanent ineffective flow areas were also used to model the contraction and expansion for large bridges with wide floodplains according to HEC-RAS manual guidelines.

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- Areas behind levees: Permanent ineffective flow areas were used to block off areas behind flood control structures along the Redwood Meadows berms and the Stampede Flood Wall. The elevation of these permanent ineffective flow areas was set to the height of the levees or lower as long as no numerical instabilities or unrealistic water level fluctuations occurred. High permanent ineffective flow areas on the left floodplain along the Stampede Flood Wall were added to obtain stable numerical water level results and realistic flood profiles along this reach.

- Areas behind road and railway embankments: Areas behind continuous road and railway embankments were generally modelled as permanently ineffective. For example, this includes along Highway 22 in the Elbow River valley between Bragg Creek and Redwood Meadows and along the CP Rail railway embankment in the Bow River valley between Edworthy Park and downtown Calgary.

5.4.5 Flow Splits, Islands, and Diversions

The flow splits for the Bow and Lower Elbow and Upper Elbow models are described in detail in Section 5.1.2.2. In addition to these flow splits around Prince's Island and Zoo Island (St. Patrick's and St. George's Islands) there is an additional large island on the Bow River near Bowness and Bowmont Park. Water level differences between main and the side channels are expected to be small and there are no structures or local inflows at the island so that a flow split with separate branches was considered not necessary for the purpose of this study.

There are fresh water intakes on the Bow River near Stoney Trail Bridge upstream of Bowness Park and in Glenmore Reservoir, and a flow diversion at the WH Weir. However, these flow reductions are small or not operational during flood events and were therefore not included in the peak flood flow estimates.

5.5 Open Water Flood Frequency Profiles

Surface water profiles were simulated for the 2-, 5-, 10-, 20-, 35-, 50-, 75-, 100-, 200-, 350-, 500-, 750- and 1,000-year flood events using the calibrated hydraulic models. The flood frequency flow estimates for the Bow River, the Elbow River, Bragg Creek, and Lott Creek were based on those provided in the Bow, Elbow, Highwood, and Sheep River Hydrology Assessment Report (Golder 2020).

The Bow River and Lower Elbow River includes numerous flow splits and side channels. The optimized flows for all flood events along the main and side channels within the City of Calgary are presented in Table 47.

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Table 47: Optimized Flows for the 2- to 1,000-Year Flood Events within the City of Calgary

River	Model Reach	River Station (m)	2-Year	5-Year	10-Year	20-Year	35-Year	50-Year	75-Year	100-Year	200-Year	350-Year	500-Year	750-Year	1000-Year
Bow River	B6_USBC_Prince	69677.02	401	627	845	1,120	1,400	1,610	1,880	2,090	2,710	3,330	3,790	4,400	4,880
Bow River	B5_Prince	50646.70	385	601	811	1,065	1,305	1,478	1,679	1,834	2,163	2,438	2,622	2,858	3,052
Bow River	B4_Prince_Zoo	49338.12	401	627	845	1,120	1,400	1,610	1,880	2,090	2,710	3,330	3,790	4,400	4,880
Bow River	B3_Zoo	48119.59	282	426	564	739	916	1,049	1,224	1,360	1,780	2,063	2,361	2,741	3,048
Bow River	B2_Zoo	47382.00	345	538	715	929	1,146	1,299	1,494	1,660	2,120	2,443	2,761	3,161	3,478
Bow River	B1_Zoo_DSBC	46078.01	464	739	996	1,310	1,630	1,860	2,150	2,390	3,050	3,710	4,190	4,820	5,310
Bow River	B1_Zoo_DSBC	45933.01	465	746	1,010	1,330	1,650	1,890	2,180	2,420	3,090	3,760	4,240	4,880	5,370
Bow River	B1_Zoo_DSBC	25468.90	469	762	1,040	1,380	1,730	1,980	2,310	2,580	3,340	4,120	4,700	5,480	6,100
Bow River	B1_Zoo_DSBC	16919.80	472	770	1,050	1,400	1,760	2,020	2,350	2,620	3,390	4,180	4,770	5,560	6,180
Bow River	B1_Zoo_DSBC	9215.69	478	780	1,070	1,420	1,780	2,040	2,380	2,660	3,440	4,240	4,830	5,630	6,260
Bow River	B1_Zoo_DSBC	-183.24	582	867	1,140	1,500	1,870	2,150	2,530	2,840	3,750	4,690	5,420	6,390	7,180
BS1_Zoo	BS1_Zoo	1928.07	119	201	281	381	484	561	656	730	930	1,267	1,429	1,659	1,832
BS2_Prince	BS2_Prince	979.24	15.9	25.7	33.7	55.1	95.3	132	201	256	547	892	1,168	1,542	1,828
Elbow River	E9_Dam_Roxboro	11417.44	70.4	157	253	379	509	610	738	841	1,140	1,440	1,660	1,930	2,150
Elbow River	E8_Roxboro_Cliff	5258.69	70.4	157	253	379	505	596	704	787	1,020	1,244	1,406	1,601	1,756
Elbow River	E7_Cliff_Roxboro	4829.84	70.3	157	253	379	496	572	655	715	888	1,047	1,167	1,303	1,411
Elbow River	E6_Roxboro_25AV	4281.39	70.3	157	253	379	500	586	689	770	1,007	1,243	1,420	1,632	1,805
Elbow River	E5_25AV_22AV	4052.46	70.3	157	253	372	460	519	589	642	799	944	1,048	1,169	1,274
Elbow River	E4_Talisman	3670.85	70.3	157	253	363	442	493	552	596	721	831	909	1,002	1,089
Elbow River	E3_22AV_25AV	2741.57	70.3	157	253	372	460	519	589	642	799	944	1,048	1,169	1,274
Elbow River	E2_Stampede_Clif	2607.66	70.3	157	253	379	500	586	689	770	1,007	1,243	1,420	1,632	1,805
Elbow River	E1_Cliff_Bow	342.75	70.4	157	253	379	509	610	738	841	1,140	1,440	1,660	1,930	2,150
ES1_CliffST	ES1_CliffST	3546.76	0.05	0.07	0.09	0.29	9.30	23.9	48.7	71.5	133	197	240	298	345
ES2_25AV	ES2_25AV	517.45	0.00	0.00	0.00	7.19	39.5	66.6	100	127	208	299	372	464	531
ES3_22AV	ES3_22AV	443.41	0.08	0.11	0.16	8.41	18.2	26.6	37.1	46.5	78.3	113	139	166	185
ES4_Roxboro	ES4_Roxboro	914.59	0.00	0.00	0.03	0.16	3.99	13.9	34.0	54.2	120	196	254	329	394

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Classification: Public

5.5.1 Bow River

The boundary condition at the downstream end of the Bow River study reach was simulated based on normal flow conditions with an estimated energy slope of 0.0018 m/m for all flood discharges.

The simulated open water flood profiles of the various return periods for the Bow River are shown in Figures 25 to 28. Water levels for individual cross sections are listed in Table E1 in Appendix E. Water levels for individual cross sections along the Bow River side channels are listed in Table E2 in Appendix E.

5.5.2 Elbow River

The water level boundary condition at Glenmore Dam was based on full supply water levels for Elbow River flows of 350 m^3/s or less, and the outflow rating curve for Glenmore Dam provided by the City of Calgary (Figure 24) for flows above 350 m^3/s. The flood peak discharges for the study reaches are summarized in Table 5 in Section 3.1.

Based on the high flow calibration results and surveyed highwater marks, it was assumed that supercritical flow conditions will occur at the Highway 22 Bridge for all flood events. Therefore, design flood water levels for the cross sections from river stations 48,133 m to 49,140 m were based on the supercritical flow simulation results. For all other cross sections, subcritical flow simulation results were used to determine the design flood water levels.

The Elbow River model geometry in the Bragg Creek area includes new and upgraded flood control structures present in early 2022. No changes were made to the model calibration parameters (roughness, losses, etc.).

The simulated open water flood profiles of the various return periods for the Elbow River are shown in Figures 29 to 32. Water levels for individual cross sections are listed in Table E3 in Appendix E. Water levels for individual cross sections along the Elbow River side channels are listed in Table E4 in Appendix E.

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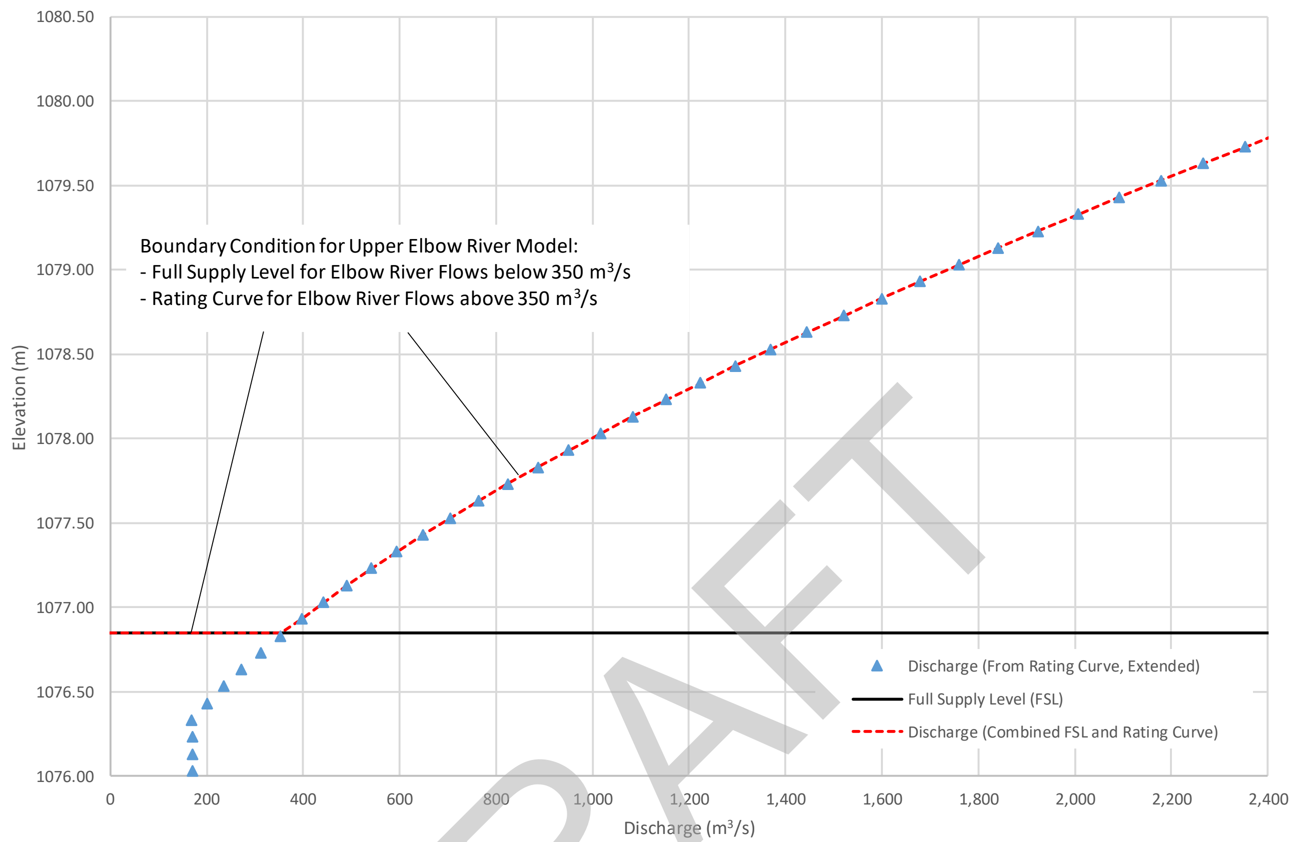

Figure 24: Boundary Condition at Glenmore Dam - Combined Rating Curve and Full Supply Level

5.5.3 Bragg Creek

The Bragg Creek model geometry includes new and updated flood control structures present in early 2022. No changes were made to the model calibration parameters (roughness, losses, etc.).

The simulated open water flood profiles of the various return periods for Bragg Creek are shown in Figure 33. Water levels for individual cross sections are listed in Table E5 in Appendix E.

5.5.4 Lott Creek

The simulated open water flood profiles of the various return periods for Lott Creek are shown in Figure 34. Water levels for individual cross sections are listed in Table E6 in Appendix E. Water levels for individual cross sections along the Lott Creek Lakes side channel are listed in Table E7 in Appendix E.

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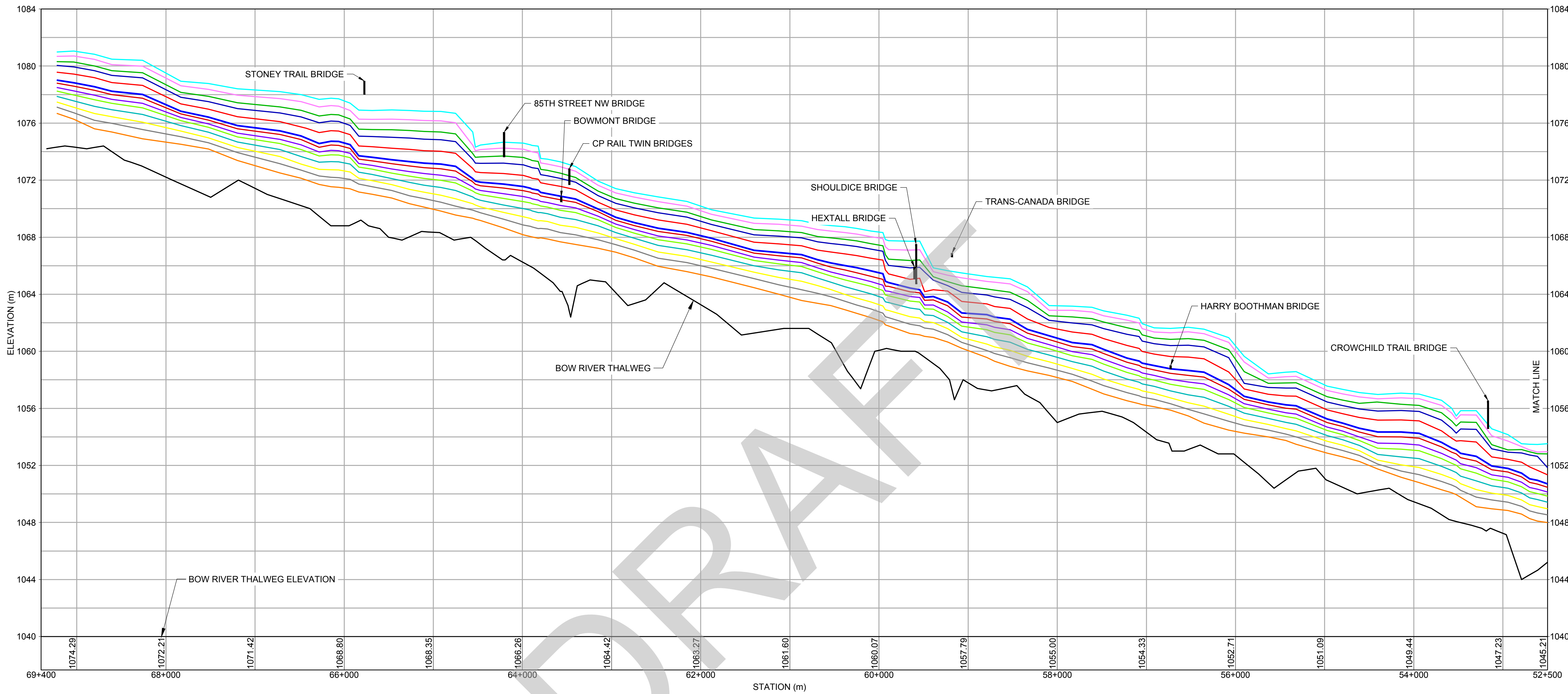


0 1,000 2,000

HORIZONTAL SCALE 1:50,000 METRES

VERTICAL EXAGERATION = 160X

LEGEND

FLOOD PROFILE - 2 YEAR	DESIGN FLOOD PROFILE - 100 YEAR
FLOOD PROFILE - 5 YEAR	FLOOD PROFILE - 200 YEAR
FLOOD PROFILE - 10 YEAR	FLOOD PROFILE - 350 YEAR
FLOOD PROFILE - 20 YEAR	FLOOD PROFILE - 500 YEAR
FLOOD PROFILE - 35 YEAR	FLOOD PROFILE - 750 YEAR
FLOOD PROFILE - 50 YEAR	FLOOD PROFILE - 1000 YEAR
FLOOD PROFILE - 75 YEAR	

REFERENCE

FLOOD PROFILES FROM HEC-RAS MODELLING. RIVER THALWEG SURVEY DATA COLLECTED BY GOLDER IN SEPTEMBER TO OCTOBER 2015 (UPPER ELBOW RIVER), IN SEPTEMBER TO NOVEMBER (LOWER ELBOW RIVER AND BOW RIVER) AND APRIL 2014 (BOW RIVER).

CLIENT
ALBERTA ENVIRONMENT AND PARKS

PROJECT
BOW AND ELBOW RIVER HAZARD STUDY

CONSULTANT

GOLDER

YYYY-MM-DD	2020-08-25
DESIGNED	WP
PREPARED	JDS
REVIEWED	WP
APPROVED	DL

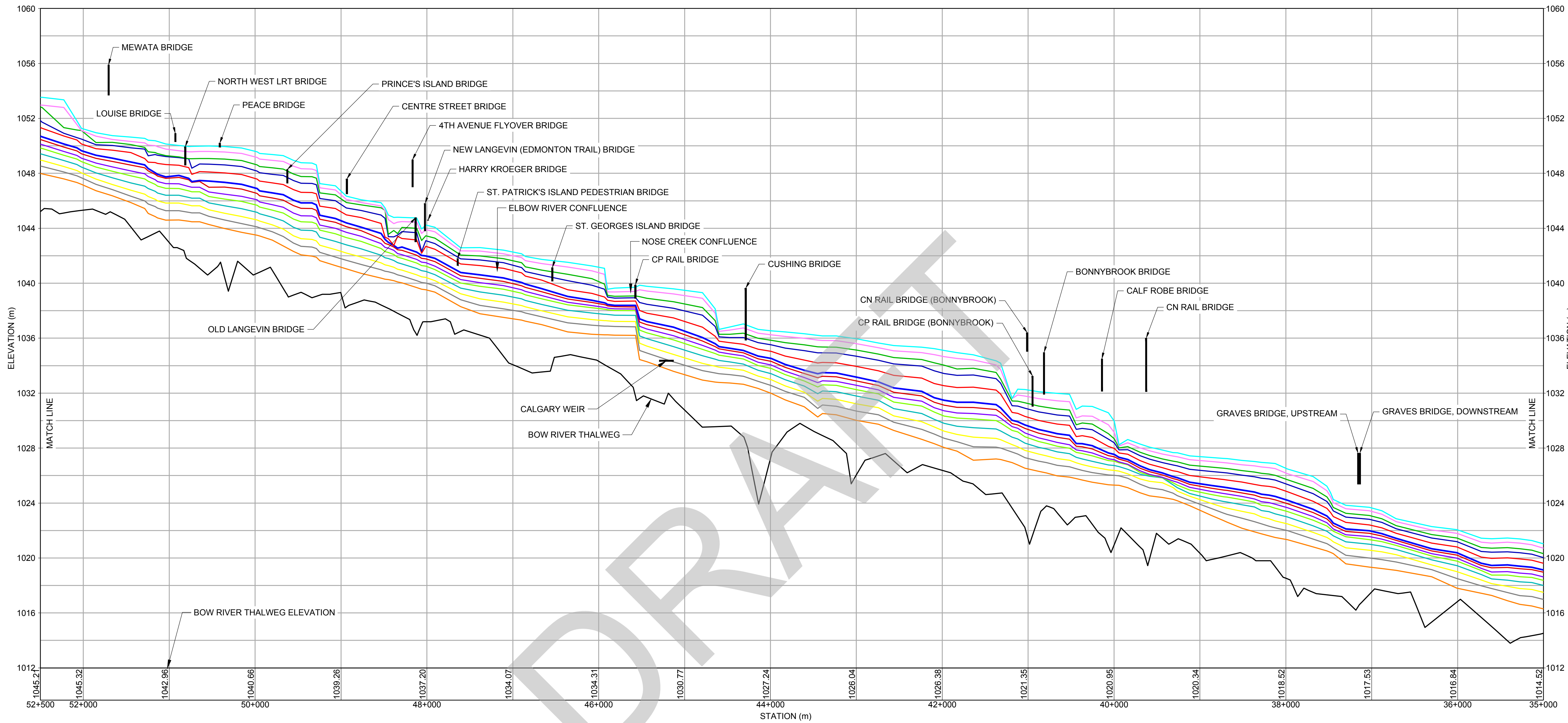
TITLE
OPEN WATER FLOOD PROFILES - BOW RIVER

PROJECT NO.	PHASE	REV.	FIGURE
1536673	2000	2	25

Path: \\golder.gds\gal\saskatoon\gis\2015\1536673\Figures\2000_FloodLevels\ | File Name: 1536673 Bow.dwg | Last Edited By: jsikorsky Date: 2020-08-25 Time 2:31:00 PM | Printed By: jsikorsky Date: 2020-08-25 Time 2:33:00 PM

25 mm IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

Classification: Public



LEGEND

- FLOOD PROFILE - 2 YEAR
- FLOOD PROFILE - 5 YEAR
- FLOOD PROFILE - 10 YEAR
- FLOOD PROFILE - 20 YEAR
- FLOOD PROFILE - 35 YEAR
- FLOOD PROFILE - 50 YEAR
- FLOOD PROFILE - 75 YEAR
- DESIGN FLOOD PROFILE - 100 YEAR
- FLOOD PROFILE - 200 YEAR
- FLOOD PROFILE - 350 YEAR
- FLOOD PROFILE - 500 YEAR
- FLOOD PROFILE - 750 YEAR
- FLOOD PROFILE - 1000 YEAR

REFERENCE

FLOOD PROFILES FROM HEC-RAS MODELLING. RIVER THALWEG SURVEY DATA COLLECTED BY GOLDER IN SEPTEMBER TO OCTOBER 2015 (UPPER ELBOW RIVER), IN SEPTEMBER TO NOVEMBER (LOWER ELBOW RIVER AND BOW RIVER) AND APRIL 2014 (BOW RIVER).

CLIENT
ALBERTA ENVIRONMENT AND PARKS

PROJECT
BOW AND ELBOW RIVER HAZARD STUDY

CONSULTANT
GOLDER

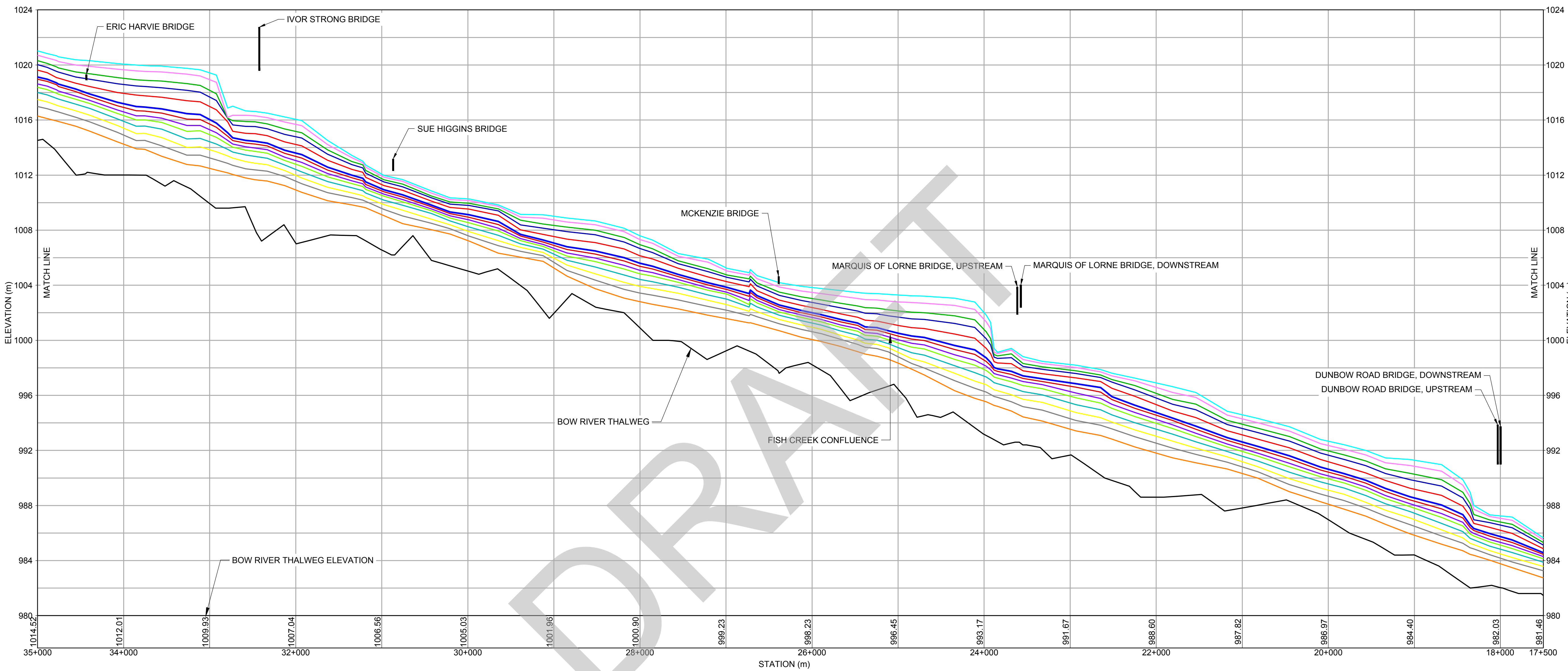
YYYY-MM-DD	2020-08-25
DESIGNED	WP
PREPARED	JDS
REVIEWED	WP
APPROVED	DL

TITLE
OPEN WATER FLOOD PROFILES - BOW RIVER

PROJECT NO.	PHASE	REV.	FIGURE
1536673	2000	2	26

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B
25 mm

Classification: Public



0 1,000 2,000

HORIZONTAL SCALE 1:50,000 METRES
VERTICAL EXAGERATION = 160X

LEGEND

FLOOD PROFILE - 2 YEAR	DESIGN FLOOD PROFILE - 100 YEAR
FLOOD PROFILE - 5 YEAR	FLOOD PROFILE - 200 YEAR
FLOOD PROFILE - 10 YEAR	FLOOD PROFILE - 350 YEAR
FLOOD PROFILE - 20 YEAR	FLOOD PROFILE - 500 YEAR
FLOOD PROFILE - 35 YEAR	FLOOD PROFILE - 750 YEAR
FLOOD PROFILE - 50 YEAR	FLOOD PROFILE - 1000 YEAR
FLOOD PROFILE - 75 YEAR	

REFERENCE

FLOOD PROFILES FROM HEC-RAS MODELLING. RIVER THALWEG SURVEY DATA COLLECTED BY GOLDER IN SEPTEMBER TO OCTOBER 2015 (UPPER ELBOW RIVER), IN SEPTEMBER TO NOVEMBER (LOWER ELBOW RIVER AND BOW RIVER) AND APRIL 2014 (BOW RIVER).

CLIENT
ALBERTA ENVIRONMENT AND PARKS

PROJECT
BOW AND ELBOW RIVER HAZARD STUDY

CONSULTANT
GOLDER

YYYY-MM-DD	2020-08-25
DESIGNED	WP
PREPARED	JDS
REVIEWED	WP
APPROVED	DL

TITLE
OPEN WATER FLOOD PROFILES - BOW RIVER

PROJECT NO.	PHASE	REV.	FIGURE
1536673	2000	2	27

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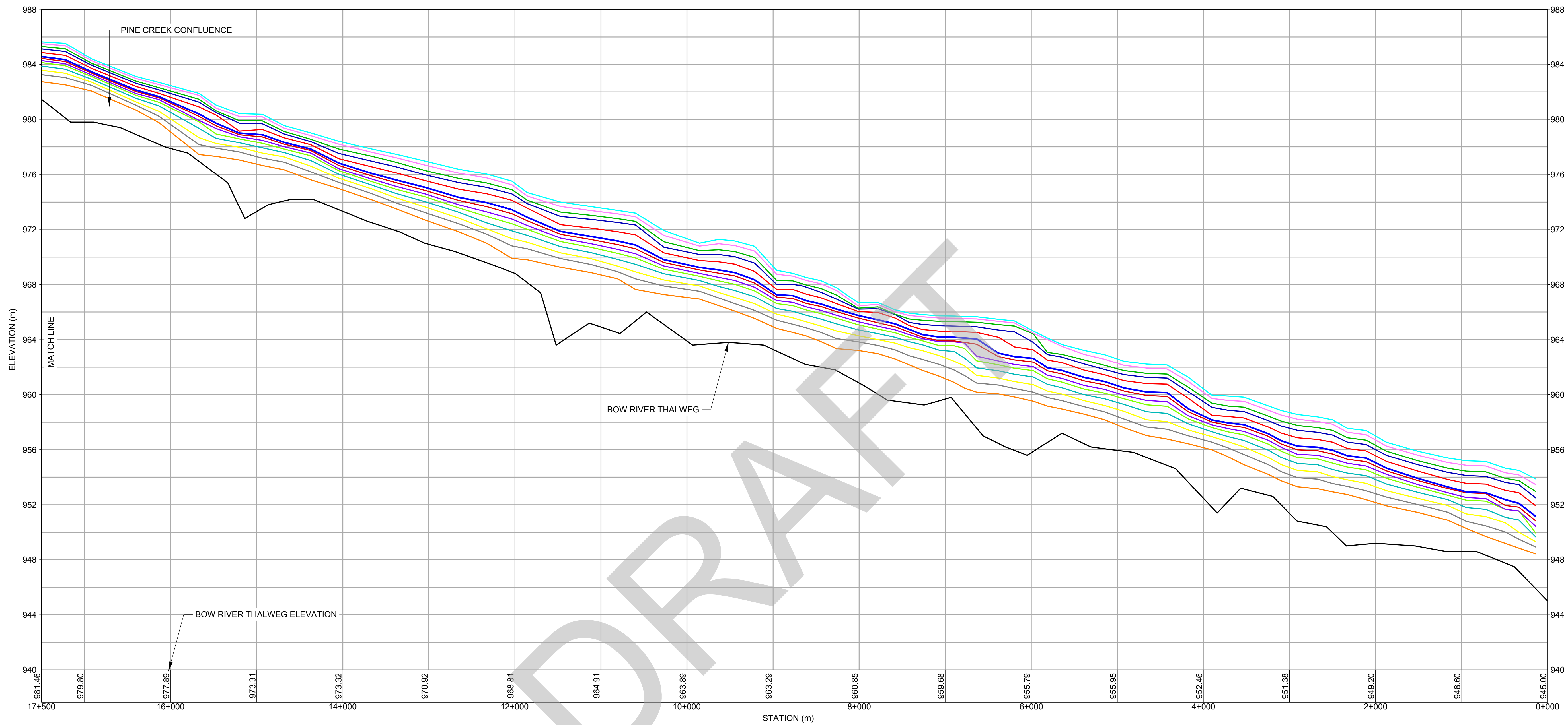
IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B
25 mm

Classification: Public



0 1,000 2,000

HORIZONTAL SCALE 1:50,000 METRES
VERTICAL EXAGERATION = 160X

LEGEND

FLOOD PROFILE - 2 YEAR	DESIGN FLOOD PROFILE - 100 YEAR
FLOOD PROFILE - 5 YEAR	FLOOD PROFILE - 200 YEAR
FLOOD PROFILE - 10 YEAR	FLOOD PROFILE - 350 YEAR
FLOOD PROFILE - 20 YEAR	FLOOD PROFILE - 500 YEAR
FLOOD PROFILE - 35 YEAR	FLOOD PROFILE - 750 YEAR
FLOOD PROFILE - 50 YEAR	FLOOD PROFILE - 1000 YEAR
FLOOD PROFILE - 75 YEAR	

REFERENCE

FLOOD PROFILES FROM HEC-RAS MODELLING. RIVER THALWEG SURVEY DATA COLLECTED BY GOLDER IN SEPTEMBER TO OCTOBER 2015 (UPPER ELBOW RIVER), IN SEPTEMBER TO NOVEMBER (LOWER ELBOW RIVER AND BOW RIVER) AND APRIL 2014 (BOW RIVER).

CLIENT
ALBERTA ENVIRONMENT AND PARKS

PROJECT
BOW AND ELBOW RIVER HAZARD STUDY

CONSULTANT

GOLDER

YYYY-MM-DD	2020-08-25
DESIGNED	WP
PREPARED	JDS
REVIEWED	WP
APPROVED	DL

TITLE
OPEN WATER FLOOD PROFILES - BOW RIVER

PROJECT NO.	PHASE	REV.	FIGURE
1536673	2000	2	28

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25 mm
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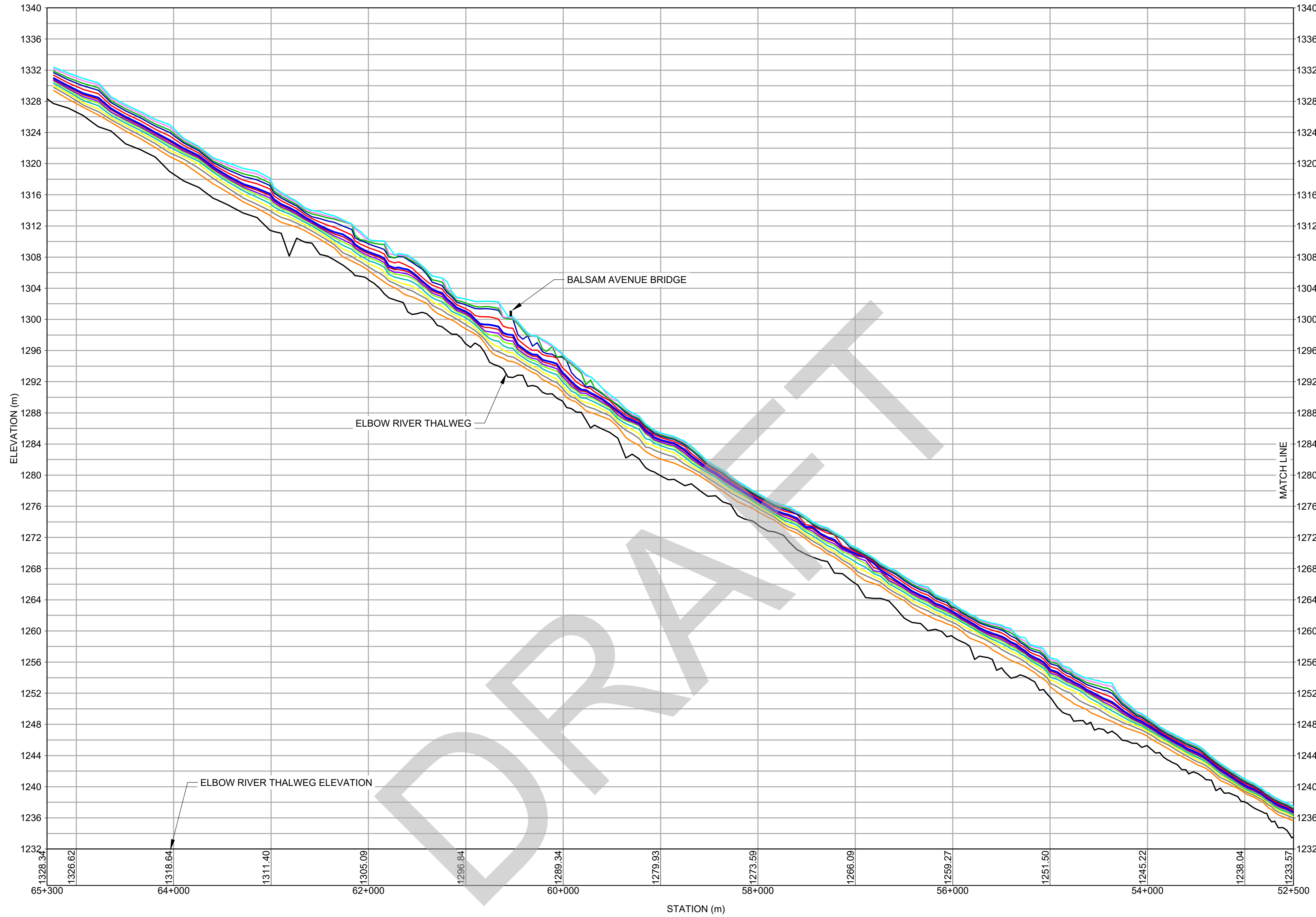
Classification: Public



LEGEND

FLOOD PROFILE - 2 YEAR	DESIGN FLOOD PROFILE - 100 YEAR
FLOOD PROFILE - 5 YEAR	FLOOD PROFILE - 200 YEAR
FLOOD PROFILE - 10 YEAR	FLOOD PROFILE - 350 YEAR
FLOOD PROFILE - 20 YEAR	FLOOD PROFILE - 500 YEAR
FLOOD PROFILE - 35 YEAR	FLOOD PROFILE - 750 YEAR
FLOOD PROFILE - 50 YEAR	FLOOD PROFILE - 1000 YEAR
FLOOD PROFILE - 75 YEAR	

REFERENCE

FLOOD PROFILES FROM HEC-RAS MODELLING. RIVER THALWEG SURVEY DATA COLLECTED BY GOLDER IN SEPTEMBER TO OCTOBER 2015 (UPPER ELBOW RIVER), IN SEPTEMBER TO NOVEMBER (LOWER ELBOW RIVER AND BOW RIVER) AND APRIL 2014 (BOW RIVER).

0 1,000 2,000

HORIZONTAL SCALE 1:50,000 METRES
VERTICAL EXAGERATION = 80X

CLIENT
ALBERTA ENVIRONMENT AND PARKS

PROJECT
BOW AND ELBOW RIVER HAZARD STUDY

CONSULTANT
GOLDER
MEMBER OF WSP

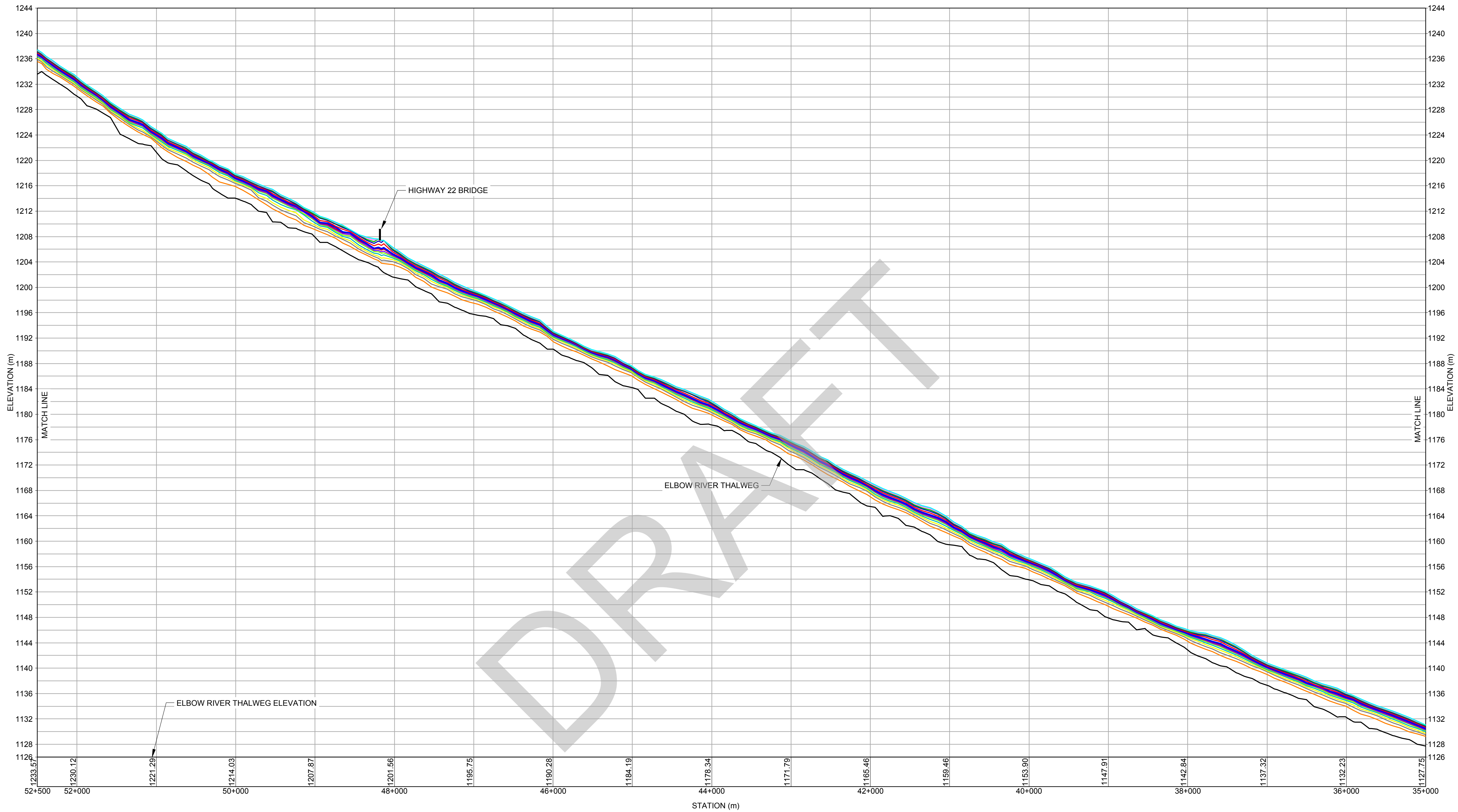
YYYY-MM-DD	2022-03-17
DESIGNED	WP
PREPARED	JDS
REVIEWED	WP
APPROVED	DL

TITLE
OPEN WATER FLOOD PROFILES - ELBOW RIVER

PROJECT NO.	PHASE	REV.	FIGURE
1536673	2000	1	29

25 mm
IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

Classification: Public



LEGEND

- FLOOD PROFILE - 2 YEAR
- FLOOD PROFILE - 5 YEAR
- FLOOD PROFILE - 10 YEAR
- FLOOD PROFILE - 20 YEAR
- FLOOD PROFILE - 35 YEAR
- FLOOD PROFILE - 50 YEAR
- FLOOD PROFILE - 75 YEAR
- DESIGN FLOOD PROFILE - 100 YEAR
- FLOOD PROFILE - 200 YEAR
- FLOOD PROFILE - 350 YEAR
- FLOOD PROFILE - 500 YEAR
- FLOOD PROFILE - 750 YEAR
- FLOOD PROFILE - 1000 YEAR

REFERENCE

FLOOD PROFILES FROM HEC-RAS MODELLING. RIVER THALWEG SURVEY DATA COLLECTED BY GOLDER IN SEPTEMBER TO OCTOBER 2015 (UPPER ELBOW RIVER), IN SEPTEMBER TO NOVEMBER (LOWER ELBOW RIVER AND BOW RIVER) AND APRIL 2014 (BOW RIVER).

0 1,000 2,000

HORIZONTAL SCALE 1:50,000 METRES
VERTICAL EXAGERATION = 80X

CLIENT
ALBERTA ENVIRONMENT AND PARKS

PROJECT
BOW AND ELBOW RIVER HAZARD STUDY

CONSULTANT
GOLDER

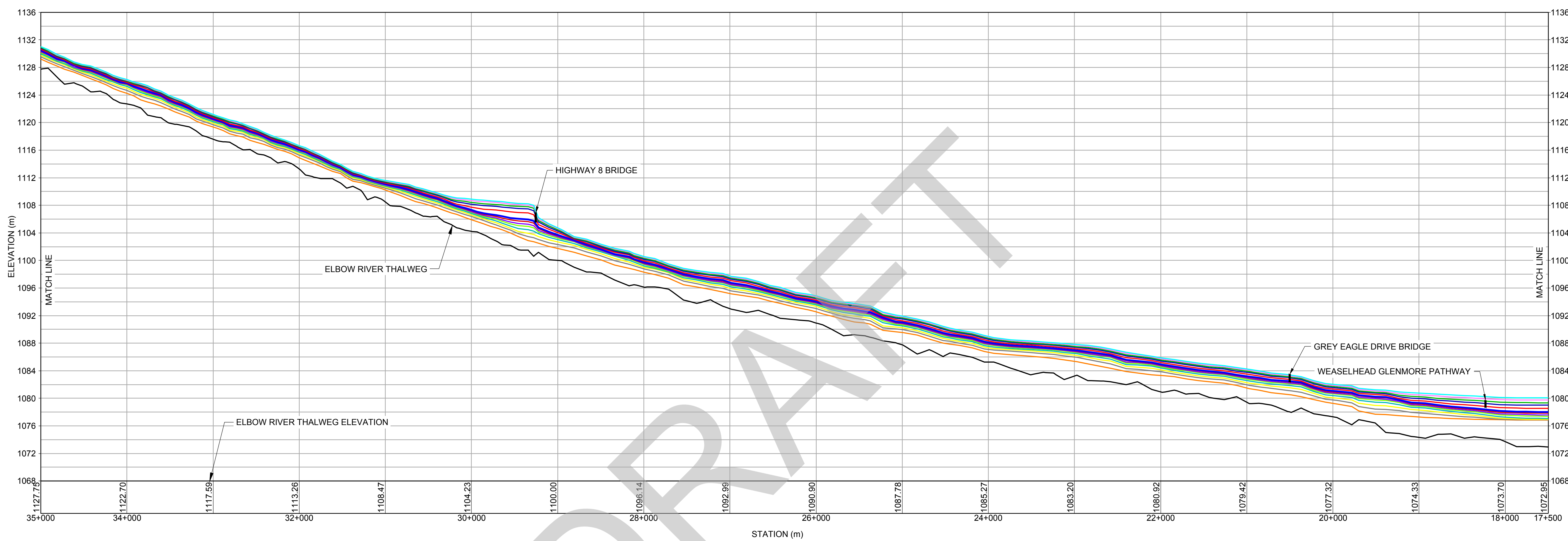
YYYY-MM-DD	2018-11-30
DESIGNED	WP
PREPARED	JDS
REVIEWED	WP
APPROVED	DL

TITLE
OPEN WATER FLOOD PROFILES - ELBOW RIVER

PROJECT NO.	PHASE	REV.	FIGURE
1536673	2000	0	30

25 mm IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

Classification: Public



0 1,000 2,000

HORIZONTAL SCALE 1:50,000 METRES
VERTICAL EXAGERATION = 80X

LEGEND

FLOOD PROFILE - 2 YEAR	DESIGN FLOOD PROFILE - 100 YEAR
FLOOD PROFILE - 5 YEAR	FLOOD PROFILE - 200 YEAR
FLOOD PROFILE - 10 YEAR	FLOOD PROFILE - 350 YEAR
FLOOD PROFILE - 20 YEAR	FLOOD PROFILE - 500 YEAR
FLOOD PROFILE - 35 YEAR	FLOOD PROFILE - 750 YEAR
FLOOD PROFILE - 50 YEAR	FLOOD PROFILE - 1000 YEAR
FLOOD PROFILE - 75 YEAR	

REFERENCE

FLOOD PROFILES FROM HEC-RAS MODELLING. RIVER THALWEG SURVEY DATA COLLECTED BY GOLDER IN SEPTEMBER TO OCTOBER 2015 (UPPER ELBOW RIVER), IN SEPTEMBER TO NOVEMBER (LOWER ELBOW RIVER AND BOW RIVER) AND APRIL 2014 (BOW RIVER).

CLIENT
ALBERTA ENVIRONMENT AND PARKS

PROJECT
BOW AND ELBOW RIVER HAZARD STUDY

CONSULTANT
GOLDER

YYYY-MM-DD	2018-11-30
DESIGNED	WP
PREPARED	JDS
REVIEWED	WP
APPROVED	DL

TITLE
OPEN WATER FLOOD PROFILES - ELBOW RIVER

PROJECT NO.	PHASE	REV.	FIGURE
1536673	2000	0	31

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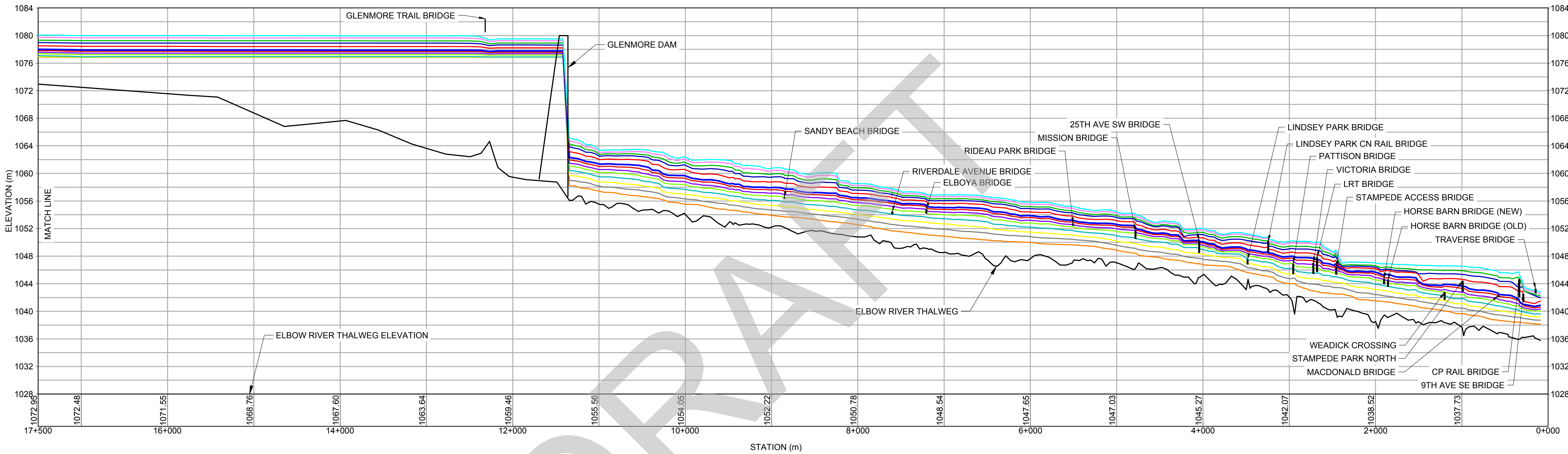
Classification: Public



LEGEND

FLOOD PROFILE - 2 YEAR	DESIGN FLOOD PROFILE - 100 YEAR
FLOOD PROFILE - 5 YEAR	FLOOD PROFILE - 200 YEAR
FLOOD PROFILE - 10 YEAR	FLOOD PROFILE - 350 YEAR
FLOOD PROFILE - 20 YEAR	FLOOD PROFILE - 500 YEAR
FLOOD PROFILE - 35 YEAR	FLOOD PROFILE - 750 YEAR
FLOOD PROFILE - 50 YEAR	FLOOD PROFILE - 1000 YEAR
FLOOD PROFILE - 75 YEAR	

REFERENCE

FLOOD PROFILES FROM HEC-RAS MODELLING. RIVER THALWEG SURVEY DATA COLLECTED BY GOLDER IN SEPTEMBER TO OCTOBER 2015 (UPPER ELBOW RIVER), IN SEPTEMBER TO NOVEMBER (LOWER ELBOW RIVER AND BOW RIVER) AND APRIL 2014 (BOW RIVER).

0 1,000 2,000

HORIZONTAL SCALE 1:50,000 METRES
VERTICAL EXAGERATION = 80X

CLIENT
ALBERTA ENVIRONMENT AND PARKS

PROJECT
BOW AND ELBOW RIVER HAZARD STUDY

CONSULTANT

GOLDER

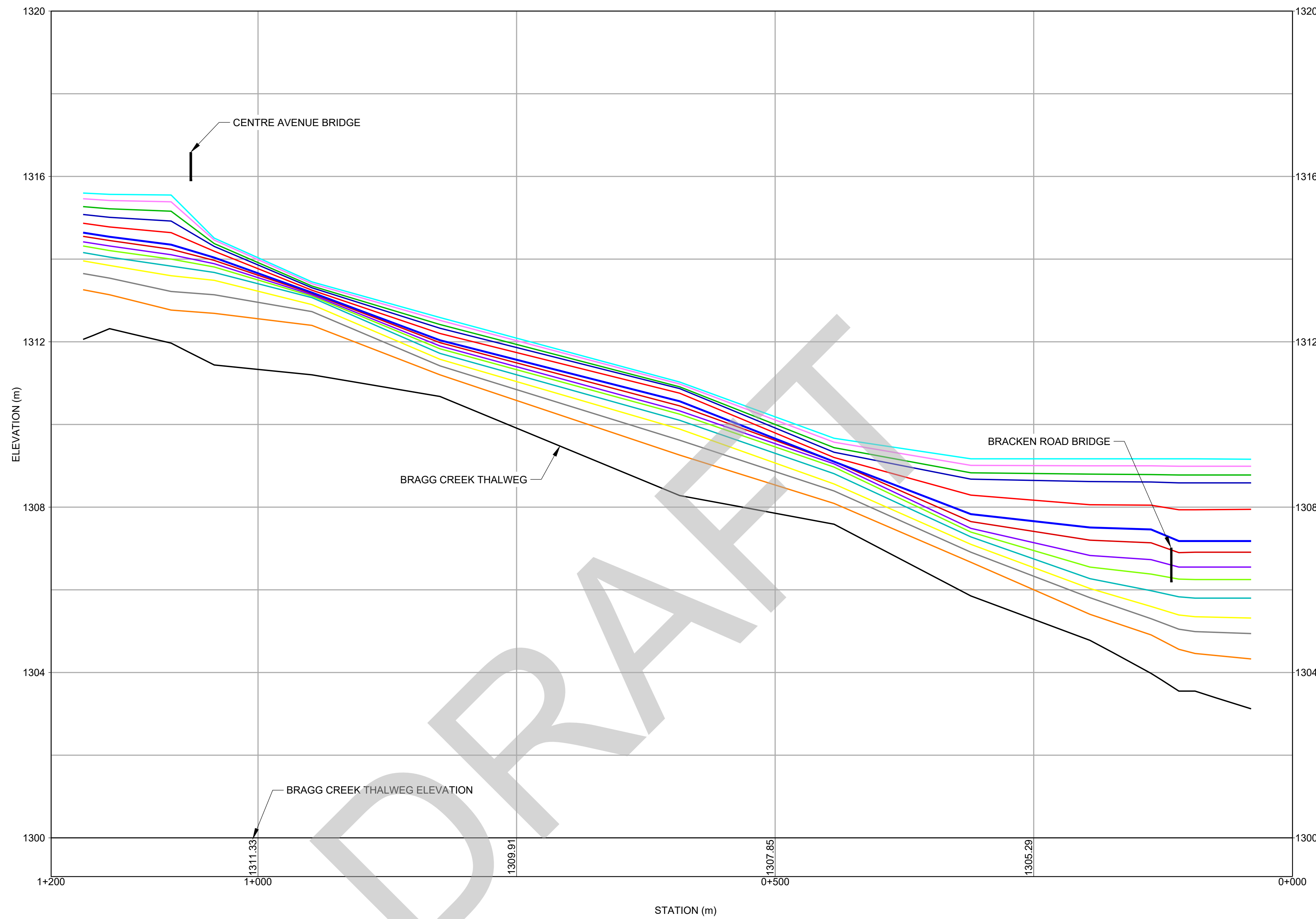
YYYY-MM-DD	2020-08-25
DESIGNED	WP
PREPARED	JDS
REVIEWED	WP
APPROVED	DL

TITLE
OPEN WATER FLOOD PROFILES - ELBOW RIVER

PROJECT NO.	PHASE	REV.	FIGURE
1536673	2000	2	32

25 mm IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

Classification: Public



LEGEND

- FLOOD PROFILE - 2 YEAR
- FLOOD PROFILE - 5 YEAR
- FLOOD PROFILE - 10 YEAR
- FLOOD PROFILE - 20 YEAR
- FLOOD PROFILE - 35 YEAR
- FLOOD PROFILE - 50 YEAR
- FLOOD PROFILE - 75 YEAR
- DESIGN FLOOD PROFILE - 100 YEAR
- FLOOD PROFILE - 200 YEAR
- FLOOD PROFILE - 350 YEAR
- FLOOD PROFILE - 500 YEAR
- FLOOD PROFILE - 750 YEAR
- FLOOD PROFILE - 1000 YEAR

REFERENCE

FLOOD PROFILES FROM HEC-RAS MODELLING. RIVER THALWEG SURVEY DATA COLLECTED BY GOLDER IN SEPTEMBER 2013, OCTOBER 2015, NOVEMBER 2015, MAY 2016, JUNE 2016, AND JULY 2016 FOR THE ELBOW RIVER. RIVER THALWEG SURVEY DATA COLLECTED BY GOLDER IN JUNE 2016 FOR LOTT CREEK. RIVER THALWEG SURVEY DATA COLLECTED BY GOLDER IN JULY 2016 FOR BRAGG CREEK.

0 100 200
HORIZONTAL SCALE 1:5,000 METRES
VERTICAL EXAGERATION = 40X

CLIENT
ALBERTA ENVIRONMENT AND PARKS

PROJECT
BOW AND ELBOW RIVER HAZARD STUDY

CONSULTANT
GOLDER
MEMBER OF WSP

YYYY-MM-DD	2022-03-17
DESIGNED	WP
PREPARED	JDS
REVIEWED	WP
APPROVED	DL

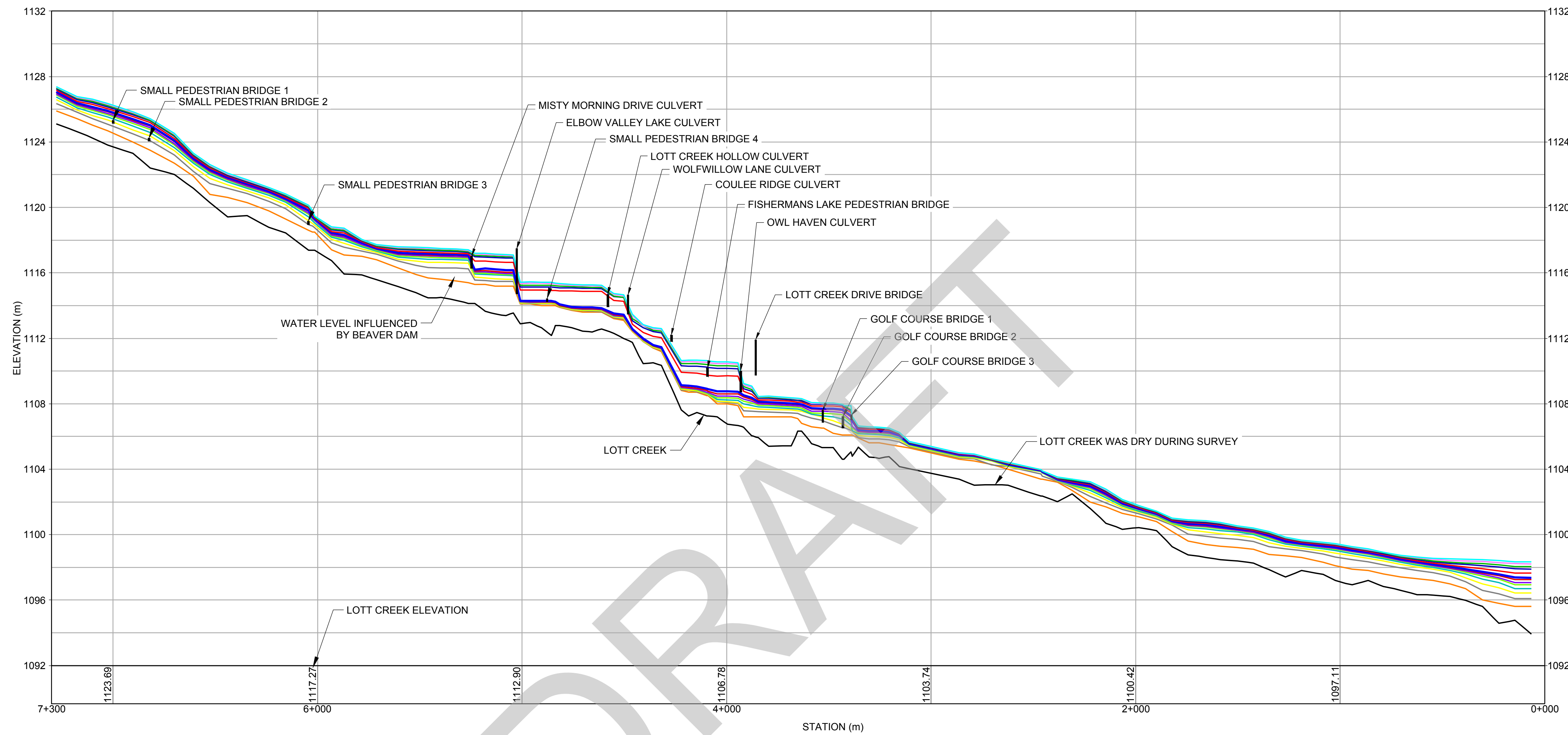
TITLE
OPEN WATER FLOOD PROFILES - BRAGG CREEK

PROJECT NO.	PHASE	REV.	FIGURE
1536673	2000	1	33

Path: \\golder.gds\gal\saskatoon\gis\2015\1536673\Figures\2000_FloodLevels\ | File Name: 1536673 Bragg Creek.dwg | Last Edited By: sdolinsky Date: 2022-03-17 Time:2:01:54 PM | Printed By: SDolinsky Date: 2022-03-17 Time:2:04:13 PM

25 mm
IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

Classification: Public



LEGEND

FLOOD PROFILE - 2 YEAR	DESIGN FLOOD PROFILE - 100 YEAR
FLOOD PROFILE - 5 YEAR	FLOOD PROFILE - 200 YEAR
FLOOD PROFILE - 10 YEAR	FLOOD PROFILE - 350 YEAR
FLOOD PROFILE - 20 YEAR	FLOOD PROFILE - 500 YEAR
FLOOD PROFILE - 35 YEAR	FLOOD PROFILE - 750 YEAR
FLOOD PROFILE - 50 YEAR	FLOOD PROFILE - 1000 YEAR
FLOOD PROFILE - 75 YEAR	

REFERENCE

FLOOD PROFILES FROM HEC-RAS MODELLING. RIVER THALWEG SURVEY DATA COLLECTED BY GOLDER IN SEPTEMBER 2013, OCTOBER 2015, NOVEMBER 2015, MAY 2016, JUNE 2016, AND JULY 2016 FOR THE ELBOW RIVER. RIVER THALWEG SURVEY DATA COLLECTED BY GOLDER IN JUNE 2016 FOR LOTT CREEK. RIVER THALWEG SURVEY DATA COLLECTED BY GOLDER IN JULY 2016 FOR BRAGG CREEK.

0 500 1,000
HORIZONTAL SCALE 1:25,000 METRES
VERTICAL EXAGERATION = 80X

CLIENT
ALBERTA ENVIRONMENT AND PARKS

PROJECT
BOW AND ELBOW RIVER HAZARD STUDY

CONSULTANT
GOLDER

YYYY-MM-DD	2018-11-30
DESIGNED	WP
PREPARED	JDS
REVIEWED	WP
APPROVED	DL

TITLE
OPEN WATER FLOOD PROFILES - LOTT CREEK

PROJECT NO.	PHASE	REV.	FIGURE
1536673	2000	0	34

Path: \\golder.gds\gal\saskatoon\gis\2015\1536673\Figures\2000_FloodLevels\ | File Name: 1536673 Lott Creek.dwg | Last Edited By: jcarthy Date: 2018-12-06 Time:11:05:57 AM | Printed By: jsikorsky Date: 2018-12-06 Time:11:29:18 AM

25 mm IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

Classification: Public

5.6 Model Sensitivity

Sensitivity analyses were conducted to evaluate the effects of changing model parameters on the simulated 100-year flood water levels. The model parameters included in the sensitivity analyses are the downstream boundary conditions and Manning's *n* values for main channels and overbank areas. The results of the sensitivity analyses can be used to quantify the level of uncertainty associated with the simulated 100-year flood levels.

5.6.1 Boundary Conditions

5.6.1.1 Bow and Lower Elbow Model

The normal flow condition was assumed as the downstream boundary condition in the Bow and Lower Elbow model. A sensitivity analysis was performed to assess the effects of varying the assumed downstream boundary energy slope on the upstream water levels. The downstream boundary energy slope was varied by ±20% from the base value of 0.0018 m/m.

The downstream model boundary was located approximately 2 km downstream of the Highwood River confluence. The water level at the downstream boundary increased by 0.20 m for decreasing the energy slope by 20% and reduced by 0.15 m by increasing the energy slope by 20%. Due to the slope of the Bow River, the energy slope change at the downstream model boundary has very small effect on the simulated water levels at the Highwood River confluence (which is the downstream study boundary) and no effects farther upstream.

The results of the sensitivity analysis of the downstream boundary condition for the Bow River are presented in Figure F.1 in Appendix F.

5.6.1.2 Upper Elbow Model

Sensitivity analyses were performed to assess the effects of the following variations of the downstream boundary condition for the Upper Elbow model:

- Water level at Glenmore Dam was varied by ±0.50 m.
- Water level at Glenmore Dam was varied based on the outflow rating curve for a peak outflow of 841 m^3/s that was varied by ±10%, which resulted in an increase of 0.15 m for 10% higher flows and a decrease of 0.13 m for 10% lower flows.

This variation of downstream boundary conditions influenced water levels through Glenmore Reservoir and along the Elbow River to a location between Weaselhead Glenmore Pathway Bridge and Grey Eagle Drive Bridge.

The results of the sensitivity analysis of the downstream boundary condition for the upper Elbow River are presented in Figure F.3 in Appendix F.

5.6.2 Manning Roughness

5.6.2.1 Bow River

Main channel and overbank Manning's *n* values were increased and decreased by 10% for the sensitivity analysis. The results of the sensitivity analysis are presented in Figure F.1 in Appendix F and summarized in Table 48.

DRAFT

Classification: Public

Table 48: Summary of Sensitivity Analysis Results – Bow River

River	Parameter	Water Level Difference due to Changes from the Base Values (m)					
		Main Channel Manning's *n*		Overbank Manning's *n*		Downstream Boundary Energy Slope[(1)]	
		+10%	-10%	+10%	-10%	+20%	-20%
Bow River	Maximum	0.35	0.04	0.22	0.01	0.00	0.20
	Minimum	0.00	-0.38	-0.01	-0.13	-0.15	0.00
	Average	**0.15**	**-0.15**	**0.03**	**-0.03**	**0.00**	**0.00**

Notes:
1) Downstream boundary variation is applied at the model boundary located approximately 2 km downstream of the study boundary. The boundary variation has very small effects at the study boundary at the Highwood River confluence.

5.6.2.2 Lower Elbow River

Main channel and overbank Manning's *n* values were increased and decreased by 10% in the sensitivity analysis. The results of the sensitivity analysis are presented in Figure F.2 in Appendix F and summarized in Table 49.

Table 49: Summary of Sensitivity Analysis Results – Lower Elbow River

River	Parameter	Water Level Difference due to Changes from the Base Values (m)					
		Main Channel Manning's *n*		Overbank Manning's *n*		Downstream Boundary Energy Slope[(1)]	
		+10%	-10%	+10%	-10%	+20%	-20%
Lower Elbow River	Maximum	0.52	0.13	0.16	0.02	0.00	0.00
	Minimum	0.00	-0.32	-0.03	-0.06	0.00	0.00
	Average	**0.13**	**-0.12**	**0.03**	**-0.03**	**0.00**	**0.00**

Notes:
1) The downstream end of the Elbow River reach is connected with the Bow River using an internal boundary. The Bow River downstream boundary is too far away to have any effect on Elbow River water levels.

5.6.2.3 Upper Elbow River

Main channel and overbank Manning's *n* values were increased and decreased by 10% in the sensitivity analysis. The results of the sensitivity analysis are presented in Figure F.3 in Appendix F and summarized in Table 50.

Table 50: Summary of Sensitivity Analysis Results – Upper Elbow River

River	Parameter	Water Level Difference due to Changes from the Base Values (m)							
		Main Channel Manning's *n*		Overbank Manning's *n*		Water Level at Glenmore Dam		Peak Flow at Glenmore Dam	
		+10%	-10%	+10%	-10%	+ 0.5 m	- 0.5 m	+10%	-10%
Upper Elbow River	Maximum	0.21	0.16	0.09	0.16	0.51	0.01	0.15	0.00
	Minimum	-0.12	-0.24	-0.01	-0.16	-0.01	-0.50	-0.01	-0.13
	Average	**0.05**	**-0.05**	**0.02**	**-0.03**	**0.02**	**-0.02**	**0.01**	**0.00**

DRAFT

5.6.2.4 Bragg Creek

Main channel and overbank Manning's *n* values were increased and decreased by 10% in the sensitivity analysis. The results of the sensitivity analysis are presented in Figure F.4 in Appendix F and summarized in Table 51.

Table 51: Summary of Sensitivity Analysis Results – Bragg Creek

Creek	Parameter	Water Level Difference due to Changes from the Base Values (m)					
		Main Channel Manning's *n*		Overbank Manning's *n*		Downstream Boundary Energy Slope(1)	
		+10%	-10%	+10%	-10%	+20%	-20%
Bragg Creek	Maximum	0.15	-0.01	0.04	0.00	0.00	0.00
	Minimum	0.01	-0.12	0.00	-0.03	0.00	0.00
	Average	**0.07**	**-0.07**	**0.02**	**-0.02**	**0.00**	**0.00**

Notes:
1) The downstream end of the Bragg Creek reach is connected with the Elbow River using an internal boundary. The Elbow River downstream boundary is too far away to have any effect on Bragg Creek water levels.

5.6.2.5 Lott Creek

Main channel and overbank Manning's *n* values were increased and decreased by 10% in the sensitivity analysis. The results of the sensitivity analysis are presented in Figure F.5 in Appendix F and summarized in Table 52.

Table 52: Summary of Sensitivity Analysis Results – Lott Creek

Creek	Parameter	Water Level Difference due to Changes from Base Values (m)					
		Main Channel Manning's *n*		Overbank Manning's *n*		Downstream Boundary Energy Slope(1)	
		+10%	-10%	+10%	-10%	+20%	-20%
Lott Creek	Maximum	0.06	0.01	0.04	0.00	0.00	0.00
	Minimum	-0.01	-0.08	0.00	-0.06	0.00	0.00
	Average	**0.02**	**-0.02**	**0.01**	**-0.02**	**0.00**	**0.00**

Notes:
1) The downstream end of the Lott Creek reach is connected with the Elbow River using an internal boundary. The Elbow River downstream boundary is too far away to have any effect on Lott Creek water levels.

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Golder Associates
Classification: Public

6.0 CONCLUSIONS

6.1 Model Setup

The study area was divided into two hydraulic models for operational and reporting simplicity:

1) Bow and Lower Elbow Model – including the Bow River between Bearspaw Dam and the Highwood River confluence, and the Elbow River below Glenmore Dam

2) Upper Elbow Model – including the Elbow River above Glenmore Dam, and Bragg and Lott Creeks

The Bow and Lower Elbow model reach includes 705 cross sections, 63 bridges, and 23 dedicated flood control structures. The average cross section spacing along the Bow River is about 191 m, with spacing is denser within Calgary, and the average cross section spacing along the lower Elbow River is about 47 m. In addition to the main river reaches, the Bow and Lower Elbow model includes two explicitly modelled side channel branches along the Bow River at Prince's Island and Zoo Island, and four explicitly modelled side channel branches along the Elbow River to reflect complicated flow patterns upstream of the Bow River confluence.

The Upper Bow model reach includes 713 cross sections, 13 bridges, nine culverts, and nine dedicated flood control structures. The average upper Elbow River cross section spacing is about 50 m through the communities of Bragg Creek and Redwood Meadows, and ranges from 80 m to 130 m elsewhere. The average cross section spacing along Bragg Creek is about 84 m and the average cross section spacing along Lott Creek is about 65 m. In addition to the main Elbow River, Bragg Creek, and Lott Creek reaches, the model includes a Lott Creek side channel branch where flow is directed through a series of man-made structures and lakes.

6.2 Model Calibration

The models were calibrated based on the available low flow, high flow, and rating curve data. Main channel Manning's *n* roughness was the primary model parameter used in calibrating the models. Additional calibration of contraction and expansion losses at several bridge locations along the Bow River and the lower Elbow River was undertaken based on available 2013 flood highwater marks. The models calibrated and validated for high flow conditions were deemed the most appropriate to simulate water levels for the thirteen open water flood scenarios needed for flood mapping: the 2-, 5-, 10-, 20-, 35-, 50-, 75-, 100-, 200-, 350-, 500-, 750-, and 1,000-year floods.

The calibrated main channel Manning's *n* values for high flow conditions are listed below:

- 0.028 to 0.050 along the Bow River;
- 0.030 to 0.040 along the Elbow River below Glenmore Dam;
- 0.045 along the Elbow River above Glenmore Dam;
- 0.050 along Bragg Creek; and
- 0.060 along Lott Creek.

The above Manning's *n* values are within the typical ranges of roughness values for similar rivers (Chow 1959).

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Classification: Public

6.3 Model Sensitivity

Model sensitivity to model roughness was evaluated using 100-year flood simulation results. The results of the sensitivity analysis show that variation of main channel roughness has a much higher influence on simulated flood levels than variation of the overbank roughness values. On average, variation of the Manning's *n* values by ±10% resulted in water levels within ±0.15 m of base 100-year flood water levels along the Bow and lower Elbow Rivers, and ±0.05 m along the upper Elbow River, Bragg Creek, and Lott Creek. Model sensitivity downstream boundary conditions was also assessed, but were determined to be generally negligible.

6.4 Flood Profiles

The calibrated high flow models were used to simulate open water flood profiles for full range of flood flows. All water levels were simulated based on subcritical flow conditions except along the Elbow River at the Highway 22 Bridge, where simulated water levels were based on supercritical flow conditions. Computed water levels for some flood scenarios at a very small subset of cross sections were manually adjusted to the nearest lower or higher flood level or interpolated to avoid crossing water level profiles.

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Classification: Public

Report Signature Page

GOLDER ASSOCIATES LTD.

Prepared by:

Original Signed by

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APPENDIX A

Low Flow Model Calibration Results

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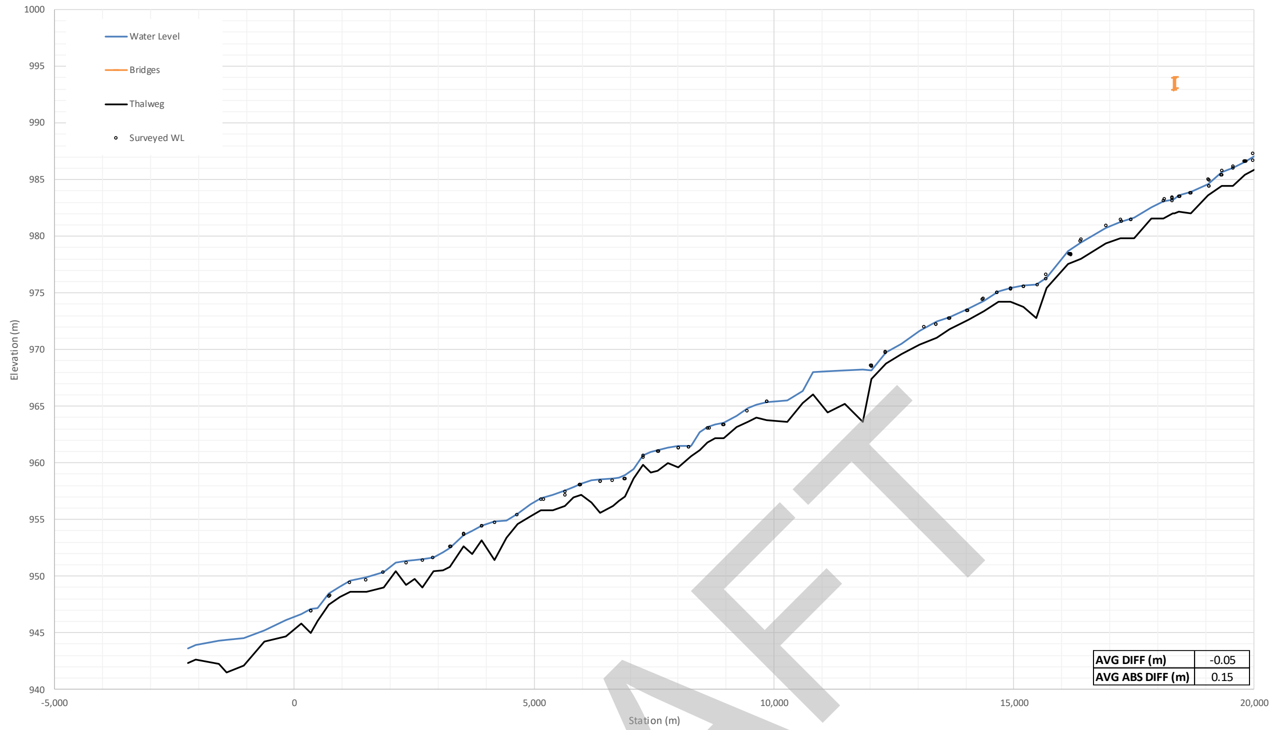

Figure A-1: Low Flow Calibration – Comparison of Simulated Water Surface Profile and Surveyed Water Levels – Bow River (Part 1 of 3)

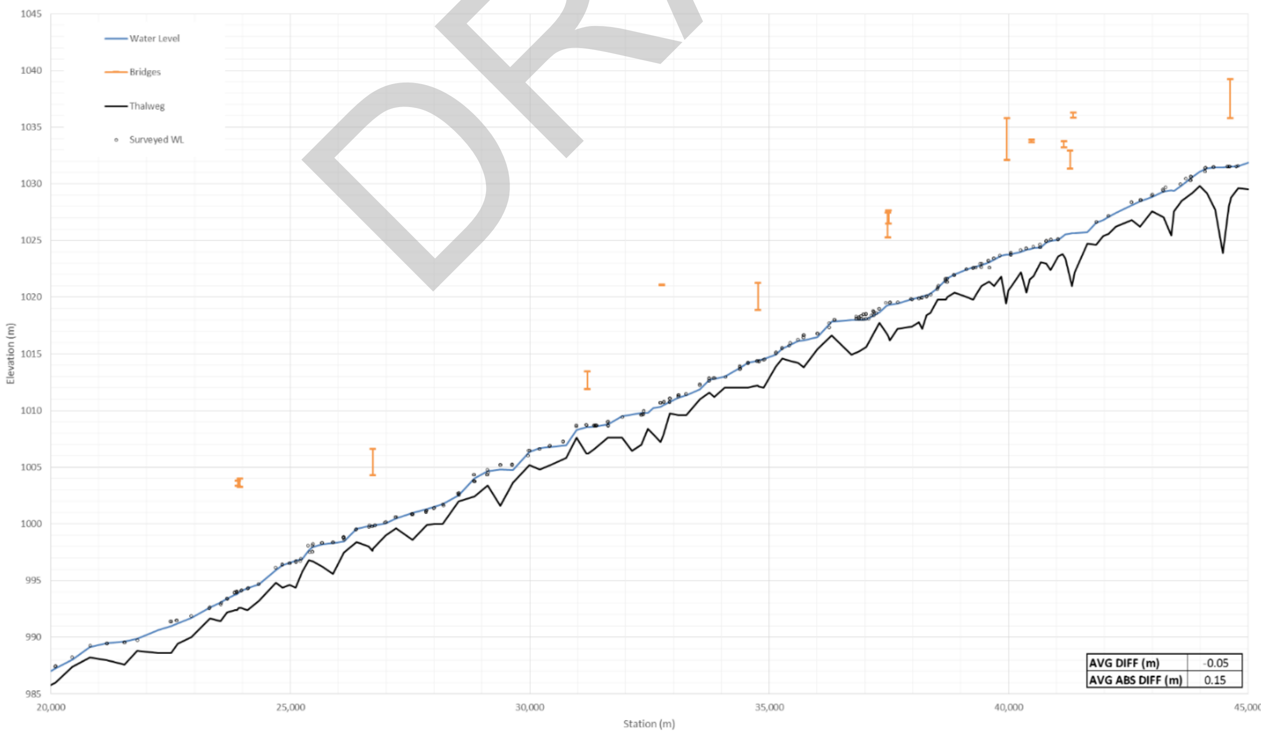

Figure A-2: Low Flow Calibration – Comparison of Simulated Water Surface Profile and Surveyed Water Levels – Bow River (Part 2 of 3)

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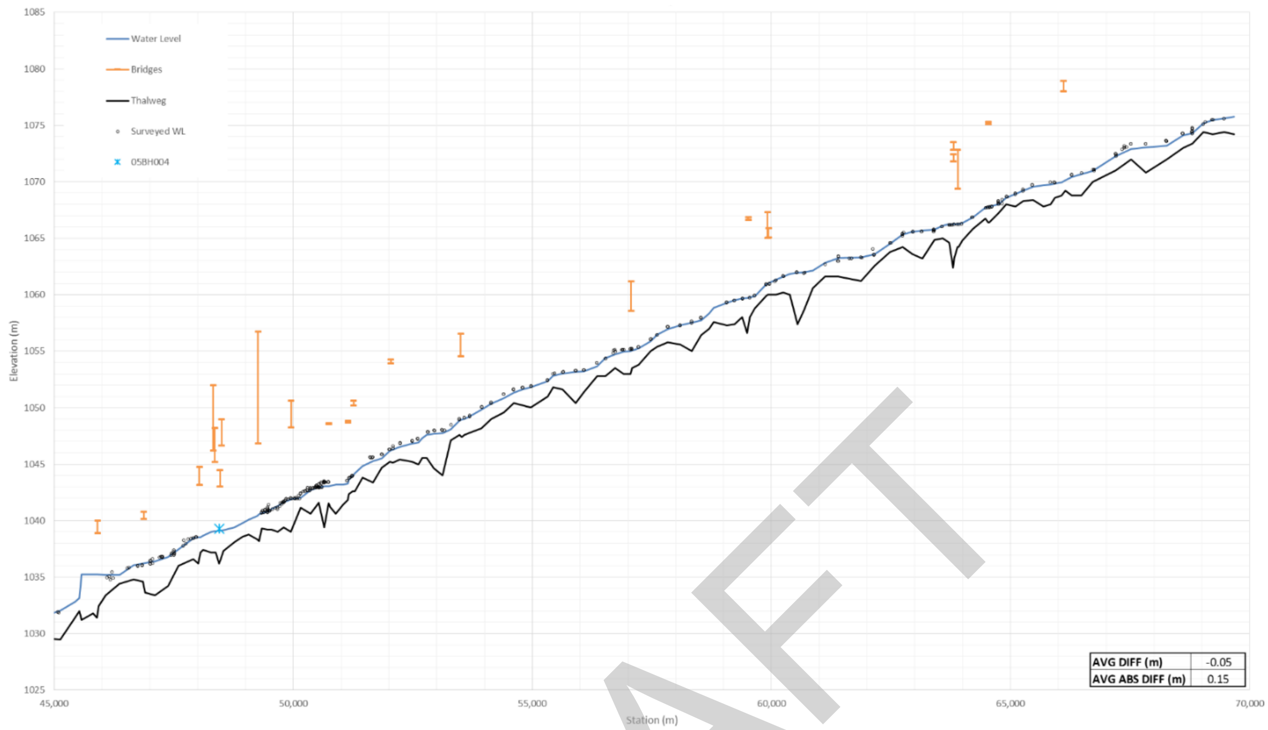

Figure A-3: Low Flow Calibration – Comparison of Simulated Water Surface Profile and Surveyed Water Levels – Bow River (Part 3 of 3)

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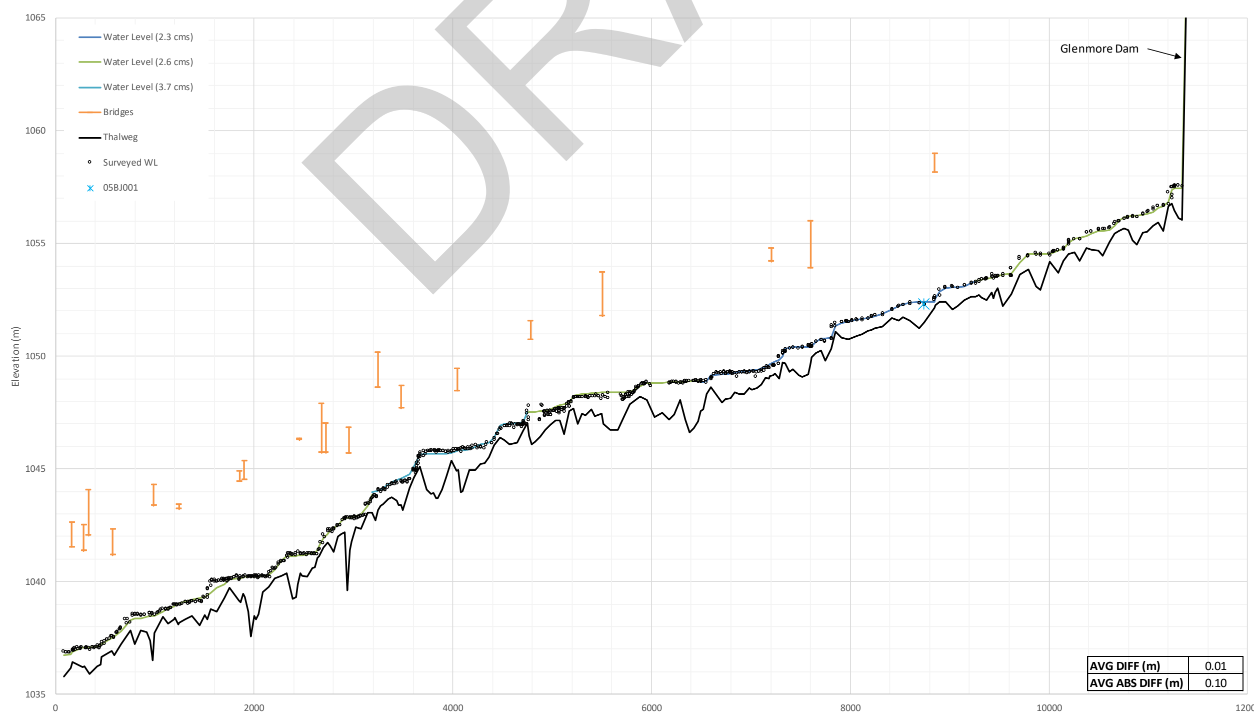

Figure A-4: Low Flow Calibration – Comparison of Simulated Water Surface Profile and Surveyed Water Levels – Elbow River (Part 1 of 5)

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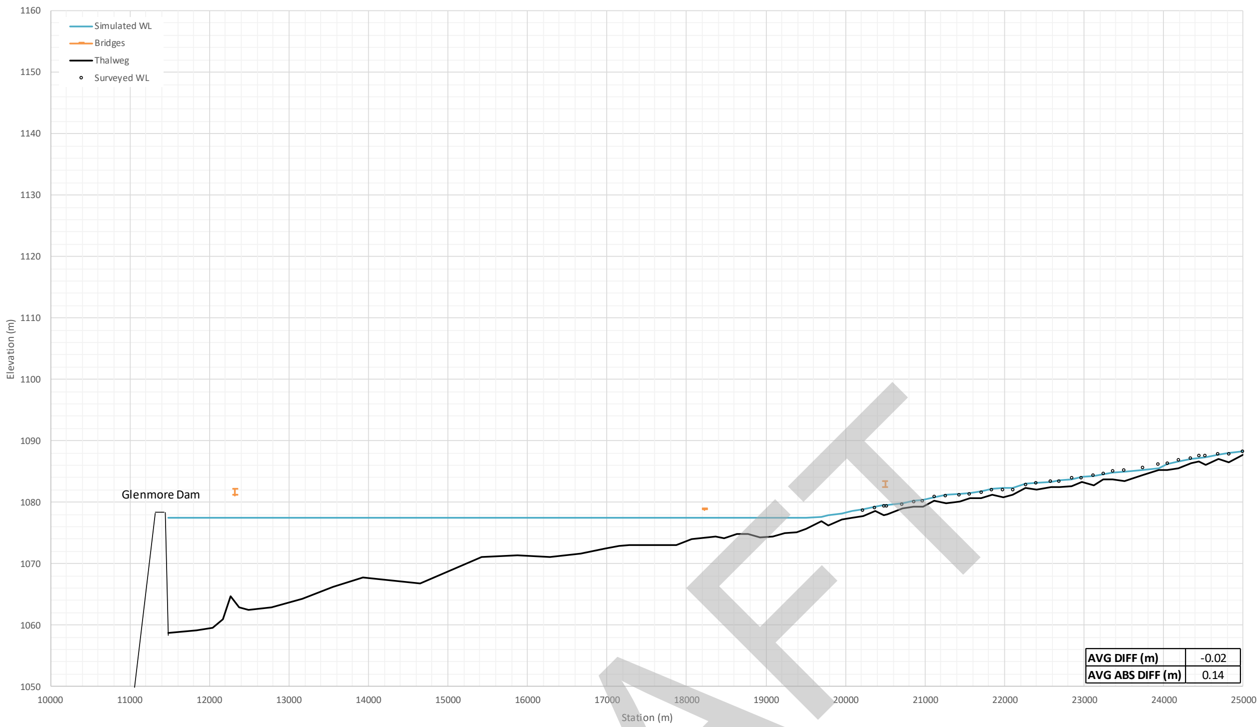

Figure A-5: Low Flow Calibration – Comparison of Simulated Water Surface Profile and Surveyed Water Levels – Elbow River (Part 2 of 5)

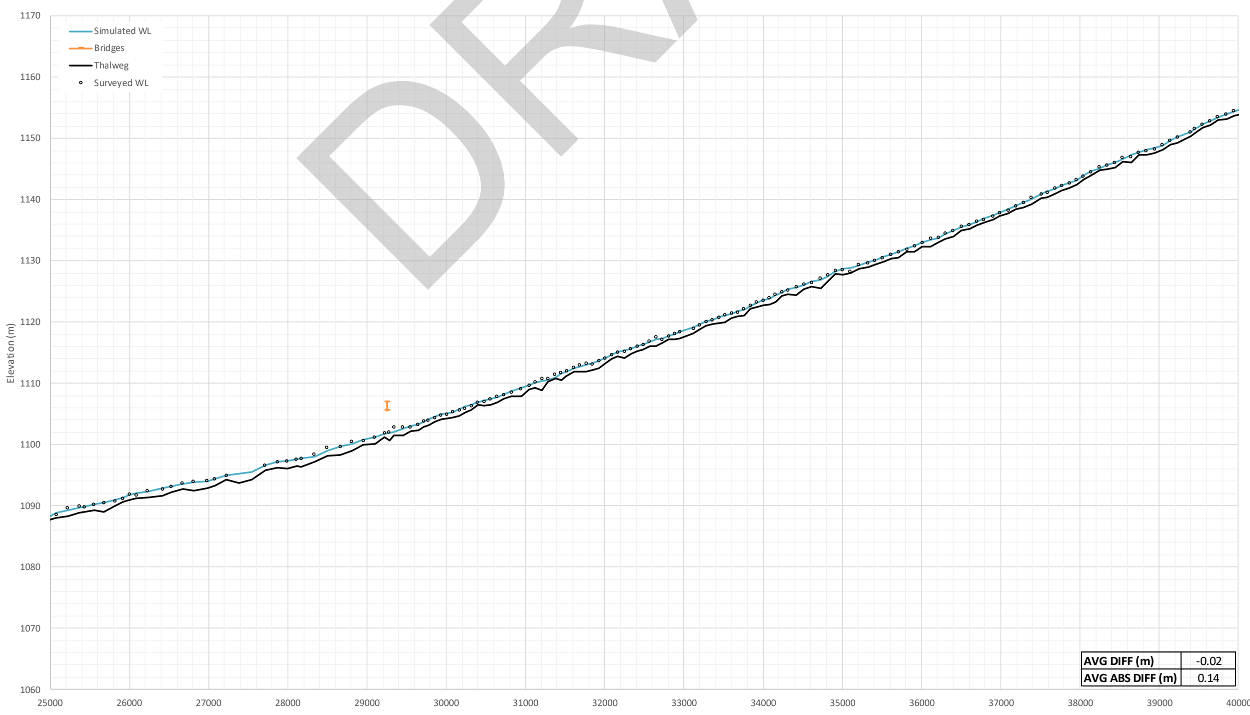

Figure A-6: Low Flow Calibration – Comparison of Simulated Water Surface Profile and Surveyed Water Levels – Lower Elbow River (Part 3 of 5)

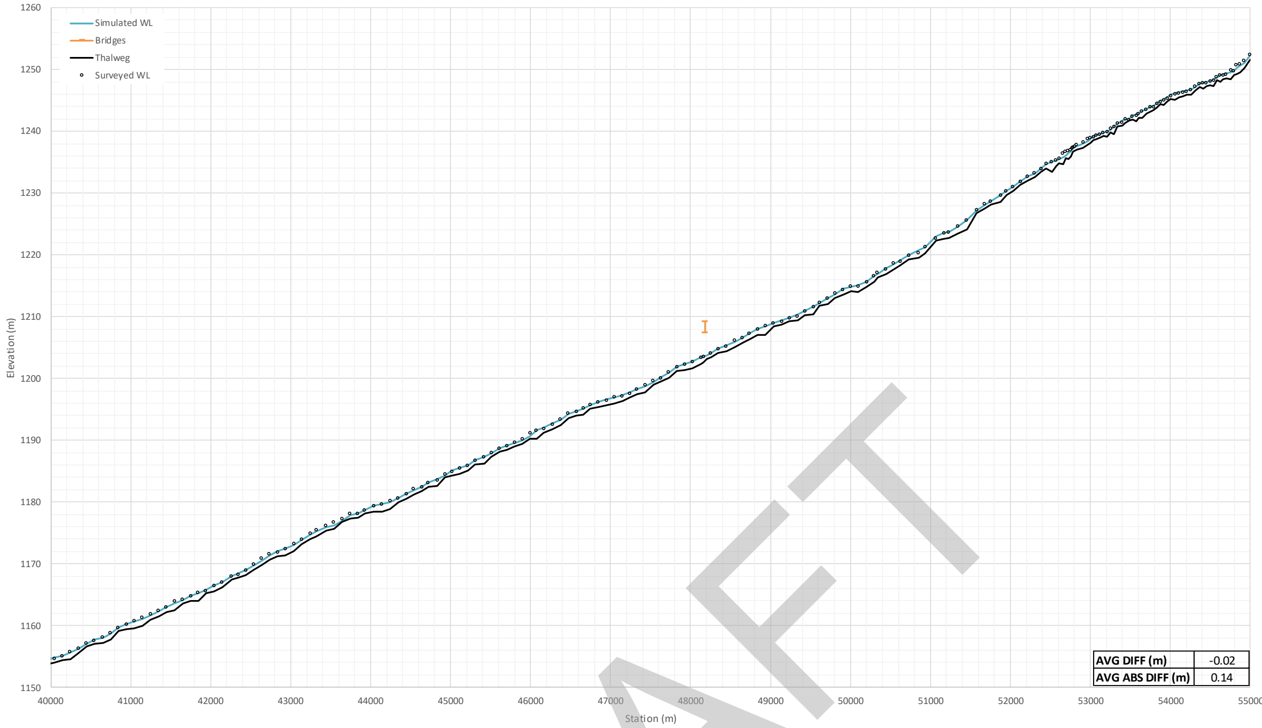

Figure A-7: Low Flow Calibration – Comparison of Simulated Water Surface Profile and Surveyed Water Levels – Elbow River (Part 4 of 5)

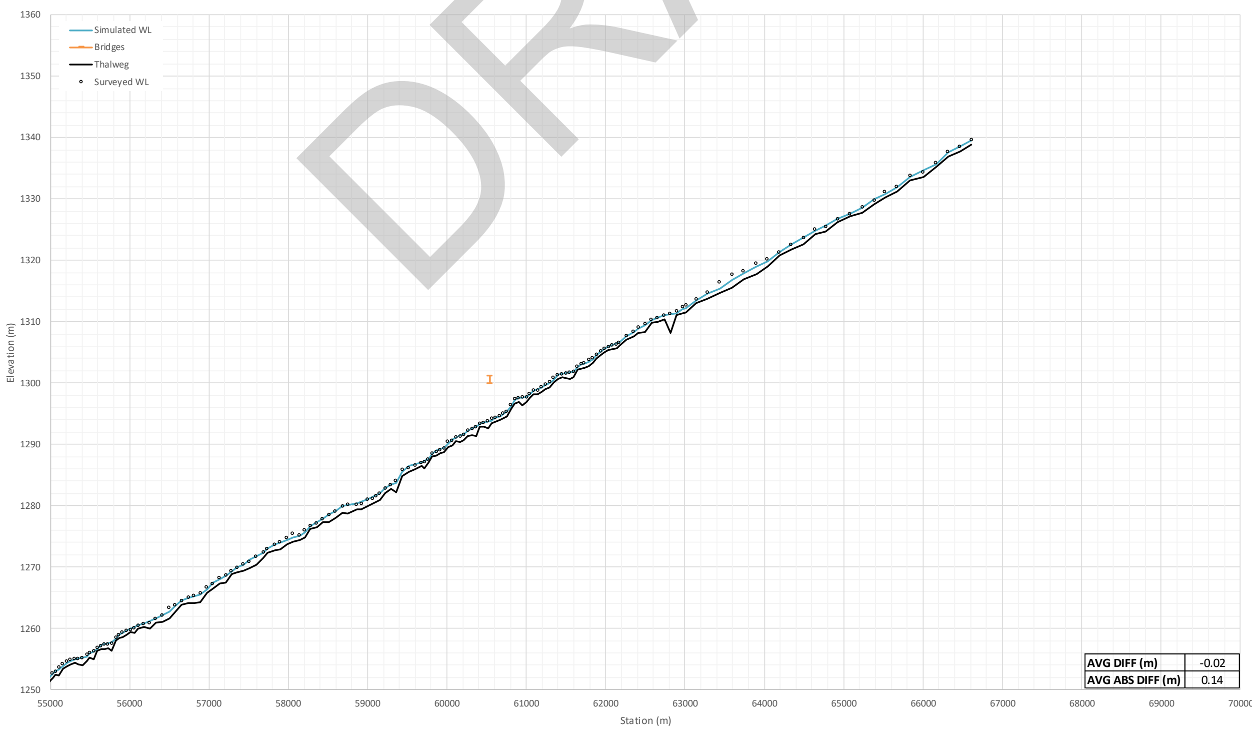

Figure A-8: Low Flow Calibration – Comparison of Simulated Water Surface Profile and Surveyed Water Levels – Elbow River (Part 4 of 5)

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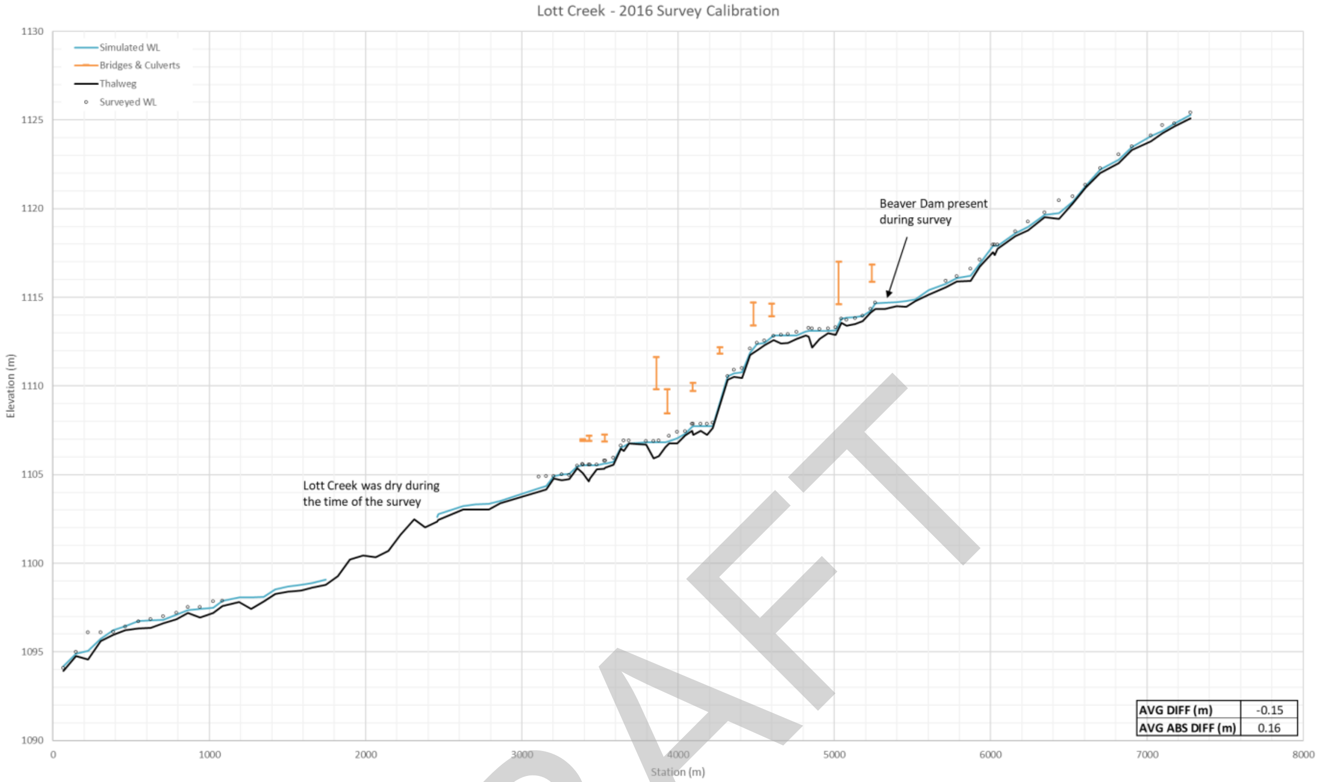

Figure A-9: Low Flow Calibration – Comparison of Simulated Water Surface Profile and Surveyed Water Levels – Lott Creek

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APPENDIX B

2005 Flood High Flow Model Calibration Results

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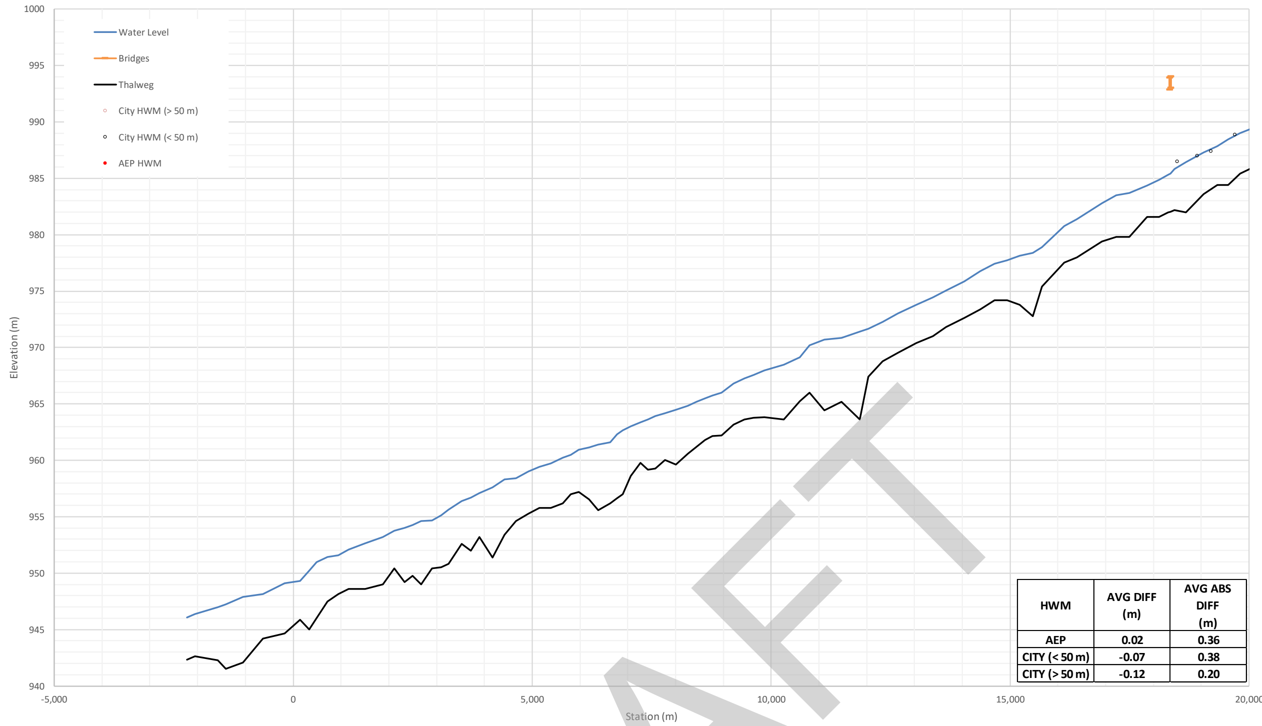

Figure B-1: High Flow Calibration (2005 Flood) – Comparison of Simulated Water Surface Profile and Surveyed Highwater Marks – Bow River (Part 1 of 3)

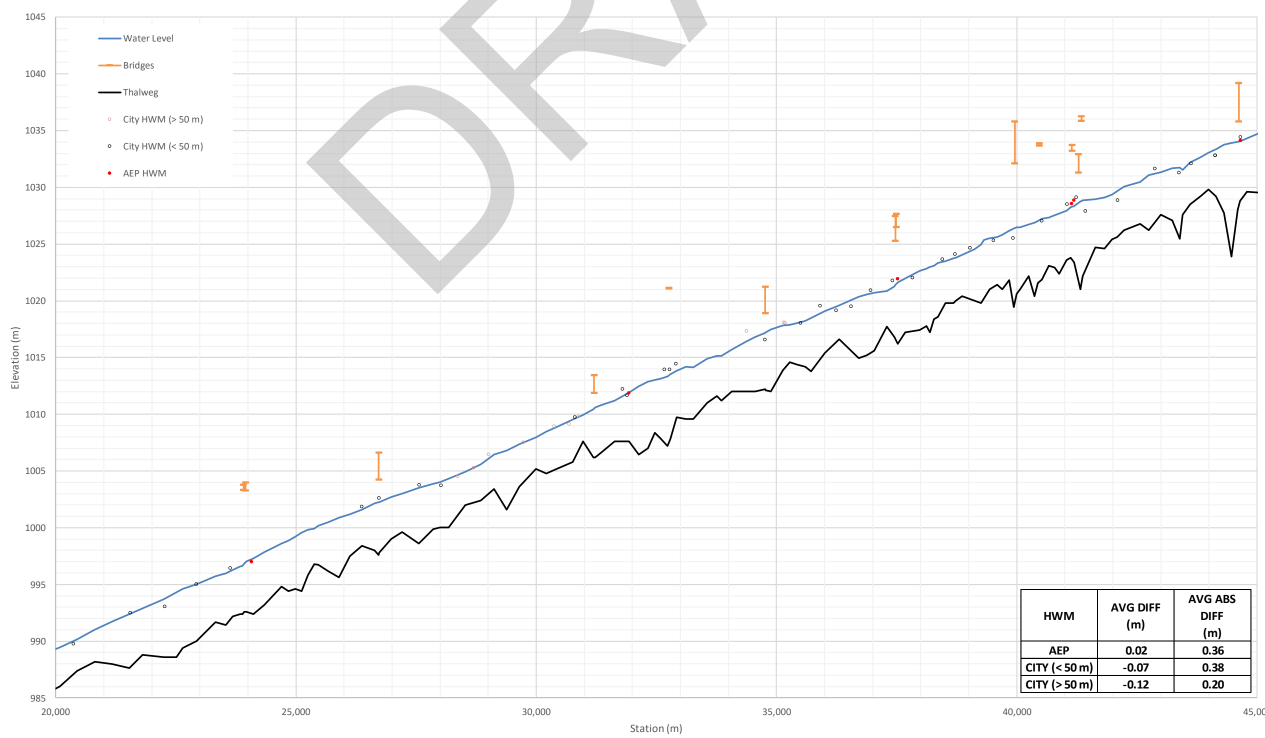

Figure B-2: High Flow Calibration (2005 Flood) – Comparison of Simulated Water Surface Profile and Surveyed Highwater Marks – Bow River (Part 2 of 3)

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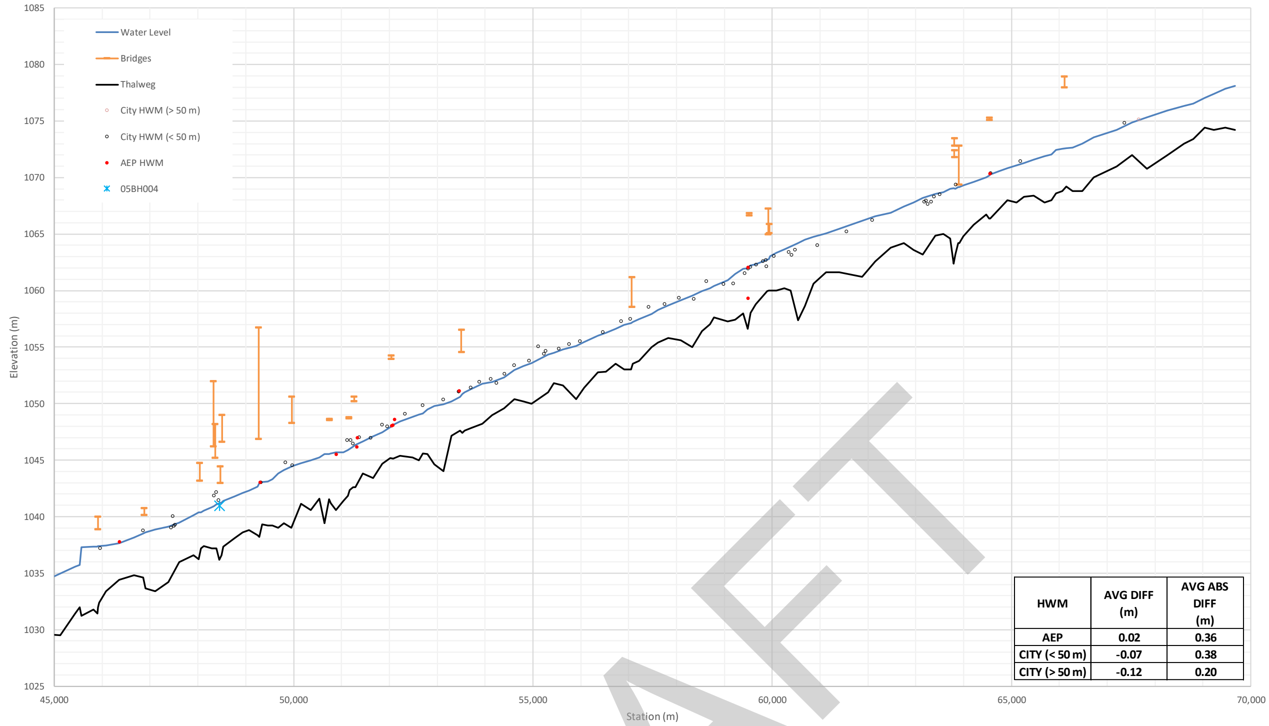

HWM	AVG DIFF (m)	AVG ABS DIFF (m)
AEP	0.02	0.36
CITY (< 50 m)	-0.07	0.38
CITY (> 50 m)	-0.12	0.20

Figure B-3: High Flow Calibration (2005 Flood) – Comparison of Simulated Water Surface Profile and Surveyed Highwater Marks – Bow River (Part 3 of 3)

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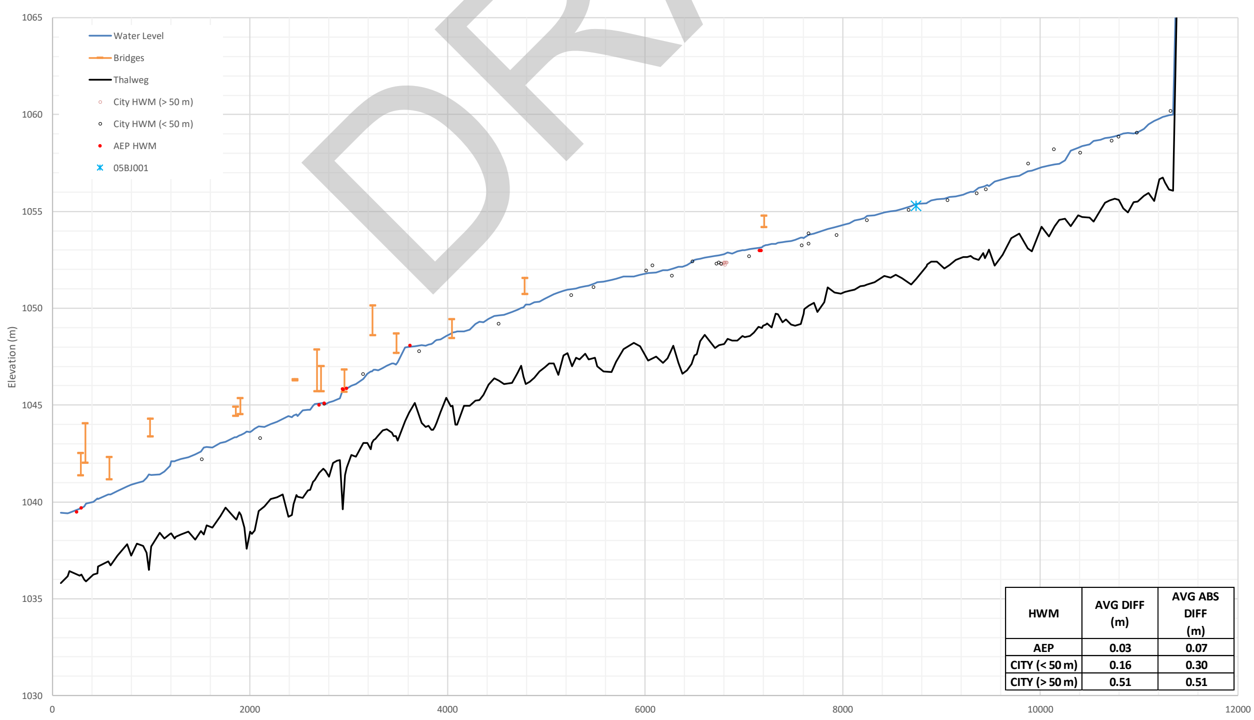

HWM	AVG DIFF (m)	AVG ABS DIFF (m)
AEP	0.03	0.07
CITY (< 50 m)	0.16	0.30
CITY (> 50 m)	0.51	0.51

Figure B-4: High Flow Calibration (2005 Flood) – Comparison of Simulated Water Surface Profile and Surveyed Highwater Marks – Lower Elbow River

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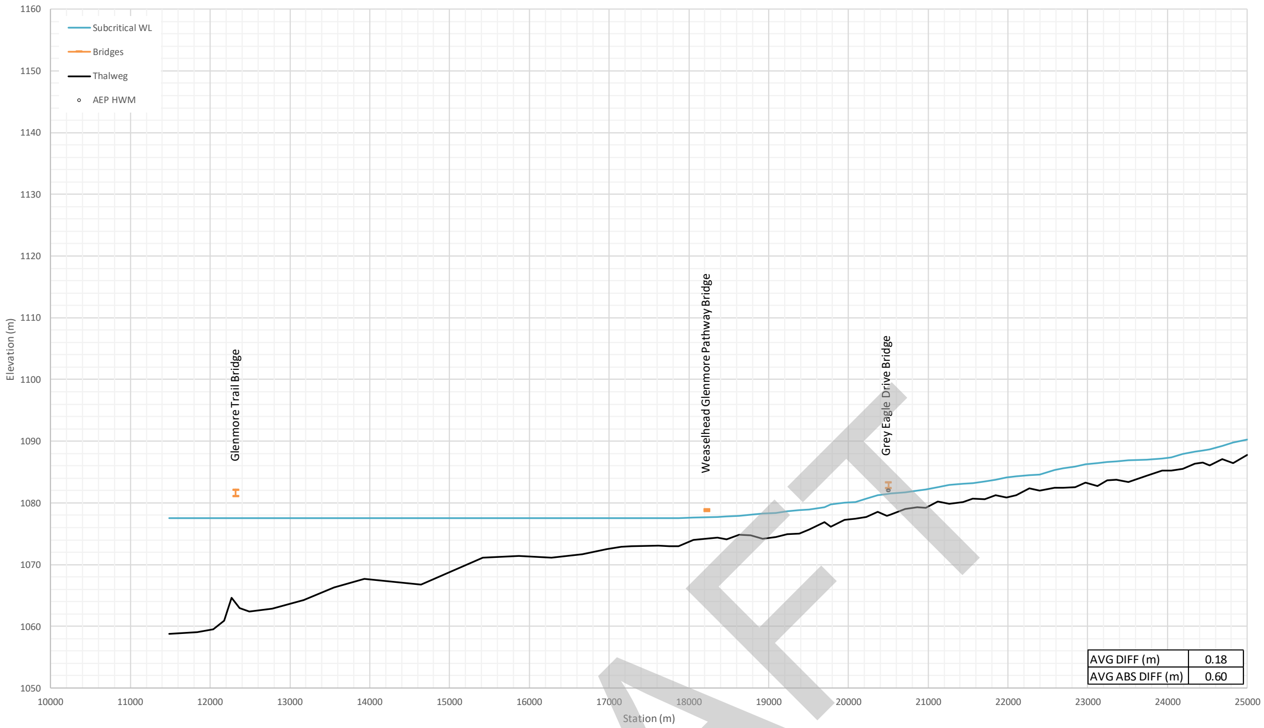

Figure B-5: High Flow Calibration (2005 Flood) – Comparison of Simulated Water Surface Profile and Surveyed Highwater Marks – Upper Elbow River (Part 1 of 4)

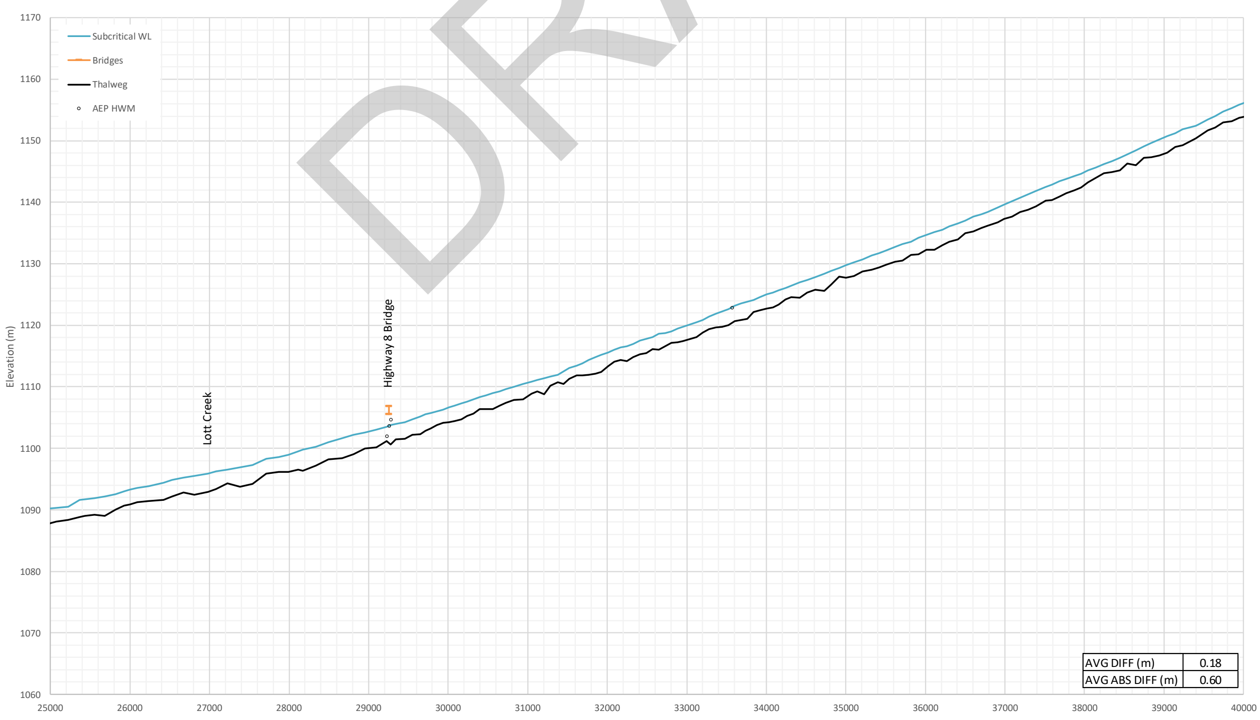

Figure B-6: High Flow Calibration (2005 Flood) – Comparison of Simulated Water Surface Profile and Surveyed Highwater Marks – Upper Elbow River (Part 2 of 4)

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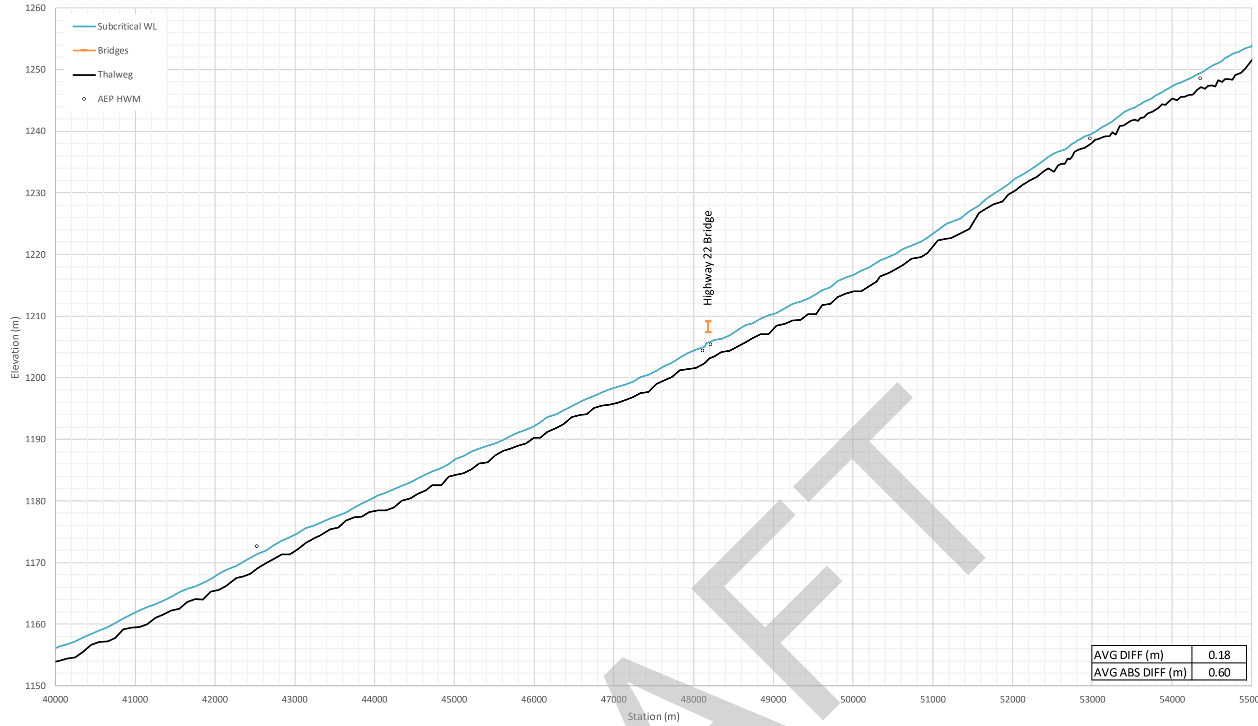

Figure B-7: High Flow Calibration (2005 Flood) – Comparison of Simulated Water Surface Profile and Surveyed Highwater Marks – Upper Elbow River (Part 3 of 4)

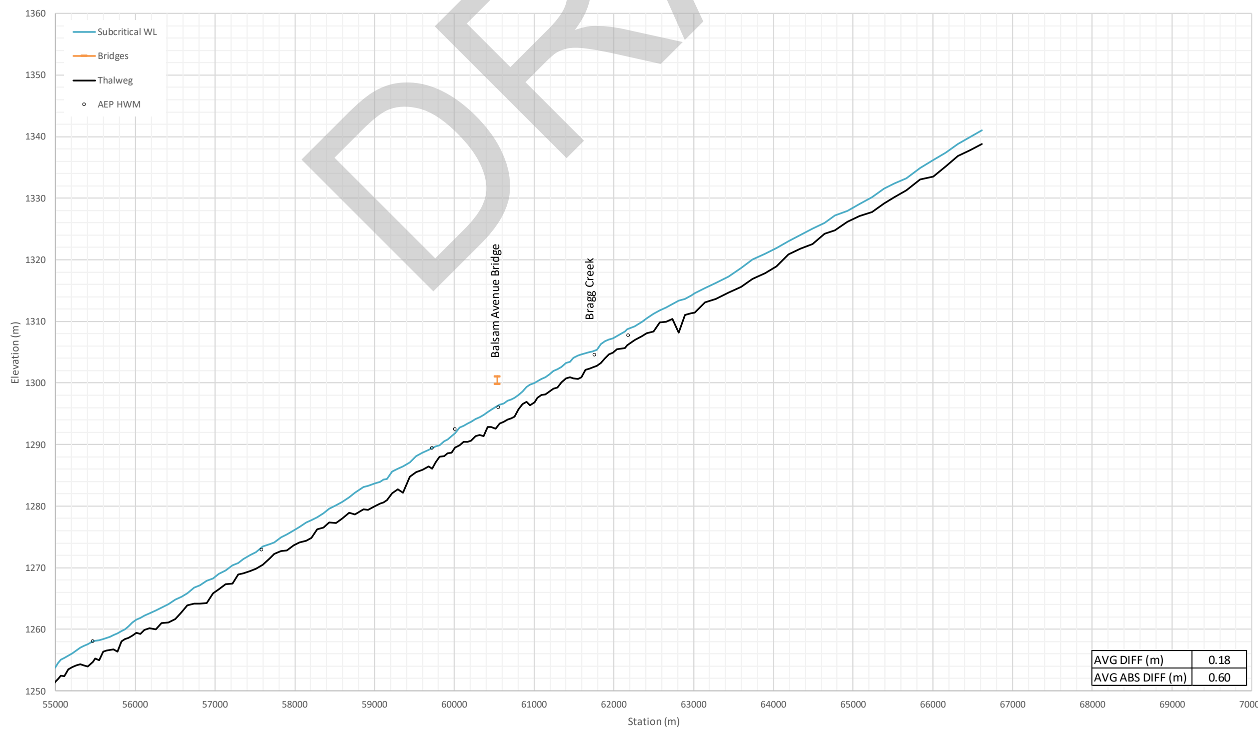

Figure B-8: High Flow Calibration (2005 Flood) – Comparison of Simulated Water Surface Profile and Surveyed Highwater Marks – Upper Elbow River (Part 4 of 4)

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Table B-1: High Flow Calibration (2005 Flood) – Comparison of Simulated Water Surface Profile and Surveyed Highwater Marks – Bow River

XS No.	River Station (m)	Surveyed Highwater Mark Elevation (m)	Simulated Water Level (m)	Difference (Surveyed - Simulated) (m)	Absolute Difference (Simulated - Surveyed) (m)	Within 50 m of Main Channel Banks (Y/N)	Source
1	67,666	1075.12	1075.10	-0.01	0.01	N	CITY
2	67,367	1074.84	1074.56	-0.28	0.28	Y	CITY
3	65,192	1071.44	1071.17	-0.28	0.28	Y	CITY
4	64,565	1070.35	1070.26	-0.09	0.09	Y	CITY
5	64,551	1070.35	1070.23	-0.12	0.12	Y	AEP
6	63,837	1069.35	1069.03	-0.32	0.32	Y	CITY
7	63,500	1068.52	1068.65	0.13	0.13	Y	CITY
8	63,383	1068.32	1068.53	0.22	0.22	Y	CITY
9	63,331	1067.85	1068.46	0.61	0.61	Y	CITY
10	63,255	1067.62	1068.34	0.72	0.72	Y	CITY
11	63,218	1067.92	1068.29	0.36	0.36	Y	CITY
12	63,177	1067.86	1068.22	0.37	0.37	Y	CITY
13	62,095	1066.24	1066.47	0.23	0.23	Y	CITY
14	61,551	1065.22	1065.67	0.45	0.45	Y	CITY
15	60,948	1063.99	1064.86	0.88	0.88	Y	CITY
16	60,476	1063.57	1064.08	0.51	0.51	Y	CITY
17	60,405	1063.15	1063.93	0.78	0.78	Y	CITY
18	60,348	1063.38	1063.81	0.44	0.44	Y	CITY
19	60,042	1063.03	1063.24	0.21	0.21	Y	CITY
20	59,878	1062.10	1062.71	0.61	0.61	Y	CITY
21	59,876	1062.66	1062.71	0.05	0.05	Y	CITY
22	59,816	1062.60	1062.60	0.01	0.01	Y	CITY
23	59,673	1062.28	1062.35	0.07	0.07	Y	CITY
24	59,545	1062.06	1062.21	0.15	0.15	Y	CITY
25	59,499	1062.07	1062.03	-0.04	0.04	Y	AEP
26	59,498	1059.33	1062.02	2.70	2.70	Y	EXCLUDE-AEP
27	59,496	1061.92	1062.01	0.10	0.10	Y	CITY
28	59,426	1061.54	1061.94	0.40	0.40	Y	CITY
29	59,186	1060.63	1061.32	0.69	0.69	Y	CITY
30	58,982	1060.57	1060.74	0.17	0.17	Y	CITY
31	58,633	1060.80	1060.10	-0.70	0.70	Y	CITY
32	58,368	1059.27	1059.61	0.34	0.34	Y	CITY
33	58,049	1059.35	1059.09	-0.26	0.26	Y	CITY
34	57,758	1058.78	1058.56	-0.21	0.21	Y	CITY
35	57,427	1058.54	1057.85	-0.69	0.69	Y	CITY
36	57,038	1057.45	1057.11	-0.35	0.35	Y	CITY
37	56,852	1057.29	1056.85	-0.44	0.44	Y	CITY
38	56,462	1056.32	1056.18	-0.14	0.14	Y	CITY
39	55,989	1055.50	1055.29	-0.21	0.21	Y	CITY
40	55,761	1055.26	1054.94	-0.32	0.32	Y	CITY
41	55,542	1054.83	1054.65	-0.19	0.19	Y	CITY
42	55,269	1054.65	1054.21	-0.44	0.44	Y	CITY

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Table B-1: High Flow Calibration (2005 Flood) – Comparison of Simulated Water Surface Profile and Surveyed Highwater Marks – Bow River

XS No.	River Station (m)	Surveyed Highwater Mark Elevation (m)	Simulated Water Level (m)	Difference (Surveyed - Simulated) (m)	Absolute Difference (Simulated - Surveyed) (m)	Within 50 m of Main Channel Banks (Y/N)	Source
43	55,230	1054.38	1054.13	-0.25	0.25	Y	CITY
44	55,114	1055.06	1053.90	-1.16	1.16	Y	CITY
45	54,921	1053.77	1053.52	-0.25	0.25	Y	CITY
46	54,614	1053.36	1052.96	-0.41	0.41	Y	CITY
47	54,413	1052.62	1052.33	-0.29	0.29	Y	CITY
48	54,243	1051.79	1052.08	0.29	0.29	Y	CITY
49	54,123	1052.14	1051.91	-0.23	0.23	Y	CITY
50	53,886	1051.93	1051.63	-0.30	0.30	Y	CITY
51	53,705	1051.38	1051.27	-0.11	0.11	Y	CITY
52	53,464	1051.15	1050.57	-0.58	0.58	Y	AEP
53	53,455	1051.04	1050.55	-0.49	0.49	Y	CITY
54	53,449	1051.03	1050.53	-0.49	0.49	Y	CITY
55	53,132	1050.35	1049.95	-0.40	0.40	Y	CITY
56	52,697	1049.82	1049.14	-0.68	0.68	Y	CITY
57	52,334	1049.06	1048.58	-0.47	0.47	Y	CITY
58	52,105	1048.61	1048.17	-0.44	0.44	Y	AEP
59	52,078	1048.08	1048.12	0.03	0.03	Y	AEP
60	52,047	1048.03	1048.02	-0.01	0.01	Y	AEP
61	51,956	1047.97	1047.75	-0.22	0.22	Y	CITY
62	51,857	1048.12	1047.48	-0.64	0.64	Y	CITY
63	51,612	1046.93	1046.99	0.06	0.06	Y	CITY
64	51,374	1047.02	1046.53	-0.49	0.49	Y	CITY
65	51,338	1047.00	1046.46	-0.54	0.54	Y	AEP
66	51,326	1046.14	1046.44	0.29	0.29	Y	AEP
67	51,247	1046.46	1046.19	-0.27	0.27	Y	CITY
68	51,195	1046.76	1046.06	-0.69	0.69	Y	CITY
69	51,119	1046.73	1045.84	-0.89	0.89	Y	CITY
70	50,886	1045.52	1045.70	0.18	0.18	Y	AEP
71	49,970	1044.53	1044.46	-0.07	0.07	Y	CITY
72	49,837	1044.76	1044.20	-0.56	0.56	Y	CITY
73	49,317	1043.02	1043.02	0.00	0.00	Y	CITY
74	49,296	1043.05	1042.97	-0.07	0.07	Y	AEP
75	48,438	1041.46	1041.17	-0.30	0.30	Y	CITY
76	48,389	1042.12	1041.08	-1.04	1.04	Y	CITY
77	48,341	1041.83	1040.93	-0.90	0.90	Y	CITY
78	47,531	1039.27	1039.34	0.07	0.07	Y	CITY
79	47,499	1039.19	1039.29	0.10	0.10	Y	CITY
80	47,474	1040.03	1039.25	-0.78	0.78	Y	CITY
81	47,445	1039.02	1039.20	0.19	0.19	Y	CITY
82	46,870	1037.21	1038.53	1.31	1.31	Y	EXCLUDE-AEP
83	46,868	1037.46	1038.52	1.07	1.07	Y	EXCLUDE-AEP
84	46,856	1038.77	1038.49	-0.27	0.27	Y	CITY

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Table B-1: High Flow Calibration (2005 Flood) – Comparison of Simulated Water Surface Profile and Surveyed Highwater Marks – Bow River

XS No.	River Station (m)	Surveyed Highwater Mark Elevation (m)	Simulated Water Level (m)	Difference (Surveyed - Simulated) (m)	Absolute Difference (Simulated - Surveyed) (m)	Within 50 m of Main Channel Banks (Y/N)	Source
85	46,364	1037.76	1037.64	-0.12	0.12	Y	AEP
86	45,965	1037.17	1037.39	0.22	0.22	Y	CITY
87	45,900	1036.00	1037.37	1.37	1.37	Y	EXCLUDE-AEP
88	44,658	1034.44	1034.10	-0.34	0.34	Y	CITY
89	44,654	1034.16	1034.09	-0.06	0.06	Y	AEP
90	44,647	1032.61	1034.08	1.47	1.47	Y	EXCLUDE-AEP
91	44,137	1032.78	1033.33	0.55	0.55	Y	CITY
92	44,137	1032.78	1033.33	0.55	0.55	Y	CITY
93	43,630	1032.12	1032.22	0.10	0.10	Y	CITY
94	43,383	1031.27	1031.74	0.47	0.47	Y	CITY
95	42,873	1031.63	1031.21	-0.41	0.41	Y	CITY
96	42,100	1028.88	1029.68	0.80	0.80	Y	CITY
97	41,428	1027.87	1028.88	1.01	1.01	Y	CITY
98	41,246	1029.09	1028.54	-0.55	0.55	Y	CITY
99	41,183	1028.86	1028.36	-0.50	0.50	Y	AEP
100	41,136	1028.57	1028.26	-0.30	0.30	Y	AEP
101	41,044	1028.50	1027.98	-0.52	0.52	Y	CITY
102	40,527	1027.05	1027.24	0.19	0.19	Y	CITY
103	39,927	1025.52	1026.36	0.84	0.84	Y	CITY
104	39,523	1025.31	1025.57	0.26	0.26	Y	CITY
105	39,036	1024.67	1024.40	-0.27	0.27	Y	CITY
106	38,717	1024.11	1023.78	-0.33	0.33	Y	CITY
107	38,460	1023.66	1023.45	-0.22	0.22	Y	CITY
108	37,838	1022.03	1022.31	0.28	0.28	Y	CITY
109	37,522	1021.96	1021.61	-0.35	0.35	Y	AEP
110	37,420	1021.78	1021.21	-0.56	0.56	Y	CITY
111	36,958	1020.90	1020.63	-0.27	0.27	Y	CITY
112	36,559	1019.48	1020.07	0.59	0.59	Y	CITY
113	36,249	1019.12	1019.51	0.39	0.39	Y	CITY
114	35,906	1019.54	1018.88	-0.65	0.65	Y	CITY
115	35,499	1018.01	1018.12	0.11	0.11	Y	CITY
116	35,178	1018.04	1017.85	-0.19	0.19	N	CITY
117	35,152	1018.07	1017.84	-0.23	0.23	N	CITY
118	34,759	1016.56	1017.16	0.60	0.60	Y	CITY
119	34,375	1017.31	1016.42	-0.89	0.89	N	CITY
120	32,909	1014.44	1013.80	-0.64	0.64	Y	CITY
121	32,784	1013.93	1013.49	-0.43	0.43	Y	CITY
122	32,671	1013.91	1013.25	-0.66	0.66	Y	CITY
123	31,927	1011.88	1011.89	0.01	0.01	Y	AEP
124	31,896	1011.67	1011.82	0.14	0.14	Y	CITY
125	31,802	1012.23	1011.60	-0.63	0.63	Y	CITY
126	30,883	1009.78	1009.77	-0.01	0.01	N	CITY

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Classification: Public

Table B-1: High Flow Calibration (2005 Flood) – Comparison of Simulated Water Surface Profile and Surveyed Highwater Marks – Bow River

XS No.	River Station (m)	Surveyed Highwater Mark Elevation (m)	Simulated Water Level (m)	Difference (Surveyed - Simulated) (m)	Absolute Difference (Simulated - Surveyed) (m)	Within 50 m of Main Channel Banks (Y/N)	Source
127	30,810	1009.72	1009.64	-0.08	0.08	Y	CITY
128	30,687	1009.15	1009.40	0.25	0.25	N	CITY
129	30,376	1008.90	1008.79	-0.12	0.12	N	CITY
130	29,728	1007.52	1007.49	-0.03	0.03	N	CITY
131	29,015	1006.43	1006.10	-0.33	0.33	N	CITY
132	28,710	1005.28	1005.31	0.03	0.03	N	CITY
133	28,365	1004.52	1004.66	0.14	0.14	N	CITY
134	28,021	1003.73	1004.07	0.34	0.34	Y	CITY
135	27,567	1003.77	1003.55	-0.22	0.22	Y	CITY
136	26,735	1002.62	1002.25	-0.37	0.37	Y	CITY
137	26,373	1001.83	1001.58	-0.25	0.25	Y	CITY
138	24,071	997.01	997.22	0.21	0.21	Y	AEP
139	23,638	996.43	996.19	-0.25	0.25	Y	CITY
140	22,931	995.02	994.99	-0.02	0.02	Y	CITY
141	22,277	993.04	993.78	0.74	0.74	Y	CITY
142	21,560	992.48	992.41	-0.07	0.07	Y	CITY
143	20,375	989.77	990.00	0.23	0.23	Y	CITY
144	19,702	988.85	988.75	-0.09	0.09	Y	CITY
145	19,207	987.40	987.60	0.21	0.21	Y	CITY
146	18,913	986.97	986.97	0.00	0.00	Y	CITY
147	18,505	986.50	986.01	-0.49	0.49	Y	CITY

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Classification: Public

Table B-2: High Flow Calibration (2005 Flood) – Comparison of Simulated Water Surface Profile and Surveyed Highwater Marks – Lower Elbow River

XS No.	River Station (m)	Surveyed Highwater Mark Elevation (m)	Simulated Water Level (m)	Difference (Surveyed - Simulated) (m)	Absolute Difference (Simulated - Surveyed) (m)	Within 50 m of Main Channel Banks (Y/N)	Source
1	11,327	1059.22	1059.98	0.76	0.76	Y	EXCLUDE-CITY
2	11,320	1060.19	1059.98	-0.21	0.21	Y	CITY
3	11,317	1059.49	1059.97	0.48	0.48	Y	EXCLUDE-CITY
4	11,165	1058.88	1059.70	0.82	0.82	Y	EXCLUDE-CITY
5	10,980	1058.18	1059.06	0.88	0.88	Y	EXCLUDE-CITY
6	10,979	1059.06	1059.06	0.00	0.00	Y	CITY
7	10,797	1058.84	1058.93	0.09	0.09	Y	CITY
8	10,797	1058.04	1058.93	0.89	0.89	Y	EXCLUDE-CITY
9	10,727	1058.65	1058.84	0.19	0.19	Y	CITY
10	10,407	1058.03	1058.33	0.30	0.30	Y	CITY
11	10,140	1058.21	1057.42	-0.79	0.79	Y	CITY
12	9,881	1057.45	1057.07	-0.39	0.39	Y	CITY
13	9,452	1056.13	1056.34	0.21	0.21	Y	CITY
14	9,450	1055.37	1056.34	0.97	0.97	Y	EXCLUDE-CITY
15	9,362	1055.92	1056.18	0.25	0.25	Y	CITY
16	9,362	1055.24	1056.17	0.94	0.94	Y	EXCLUDE-CITY
17	9,069	1054.83	1055.72	0.88	0.88	Y	EXCLUDE-CITY
18	9,067	1055.57	1055.71	0.14	0.14	Y	CITY
19	8,671	1054.34	1055.23	0.90	0.90	Y	EXCLUDE-CITY
20	8,671	1055.07	1055.23	0.17	0.17	Y	CITY
21	8,248	1054.54	1054.75	0.21	0.21	Y	CITY
22	7,944	1053.77	1054.22	0.45	0.45	Y	CITY
23	7,943	1053.13	1054.22	1.09	1.09	Y	EXCLUDE-CITY
24	7,656	1053.84	1053.77	-0.07	0.07	Y	CITY
25	7,656	1053.33	1053.77	0.44	0.44	Y	CITY
26	7,588	1053.22	1053.65	0.43	0.43	Y	CITY
27	7,176	1052.99	1053.15	0.17	0.17	Y	AEP
28	7,159	1052.99	1053.14	0.15	0.15	Y	AEP
29	7,055	1052.69	1053.04	0.36	0.36	Y	CITY
30	6,830	1052.35	1052.87	0.51	0.51	N	CITY
31	6,824	1052.33	1052.85	0.52	0.52	N	CITY
32	6,811	1052.24	1052.83	0.58	0.58	N	CITY
33	6,811	1052.35	1052.82	0.47	0.47	N	CITY
34	6,807	1052.31	1052.82	0.50	0.50	N	CITY
35	6,799	1052.36	1052.80	0.44	0.44	N	CITY
36	6,777	1052.26	1052.77	0.51	0.51	N	CITY
37	6,774	1052.28	1052.76	0.48	0.48	Y	CITY
38	6,759	1051.37	1052.74	1.37	1.37	Y	EXCLUDE-CITY
39	6,748	1052.35	1052.72	0.37	0.37	Y	CITY
40	6,726	1052.29	1052.71	0.42	0.42	Y	CITY
41	6,485	1052.39	1052.43	0.04	0.04	Y	CITY
42	6,277	1050.97	1052.05	1.08	1.08	Y	EXCLUDE-CITY

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Classification: Public

Table B-2: High Flow Calibration (2005 Flood) – Comparison of Simulated Water Surface Profile and Surveyed Highwater Marks – Lower Elbow River

XS No.	River Station (m)	Surveyed Highwater Mark Elevation (m)	Simulated Water Level (m)	Difference (Surveyed - Simulated) (m)	Absolute Difference (Simulated - Surveyed) (m)	Within 50 m of Main Channel Banks (Y/N)	Source
43	6,272	1051.68	1052.04	0.36	0.36	Y	CITY
44	6,075	1052.20	1051.84	-0.36	0.36	Y	CITY
45	6,013	1051.94	1051.81	-0.13	0.13	Y	CITY
46	5,480	1051.08	1051.27	0.19	0.19	Y	CITY
47	5,255	1050.65	1051.00	0.35	0.35	Y	CITY
48	4,521	1049.17	1049.63	0.46	0.46	Y	CITY
49	3,717	1047.78	1048.07	0.29	0.29	Y	CITY
50	3,622	1048.07	1048.01	-0.06	0.06	Y	AEP
51	3,151	1046.59	1046.37	-0.23	0.23	Y	CITY
52	2,976	1045.85	1045.86	-0.02	0.02	Y	AEP
53	2,944	1045.80	1045.81	-0.01	0.01	Y	AEP
54	2,935	1045.83	1045.73	-0.13	0.13	Y	AEP
55	2,754	1045.04	1045.10	-0.04	0.04	Y	CITY
56	2,750	1045.09	1045.10	-0.08	0.08	Y	AEP
57	2,701	1045.02	1045.08	-0.04	0.04	Y	AEP
58	2,103	1043.27	1043.90	0.50	0.50	Y	CITY
59	1,516	1042.19	1042.69	0.42	0.42	Y	CITY
60	1,503	1041.41	1042.59	1.11	1.11	Y	EXCLUDE-CITY
61	584	1042.65	1040.39	-2.26	2.26	Y	EXCLUDE-CITY
62	581	1042.55	1040.39	-2.16	2.16	Y	EXCLUDE-CITY
63	571	1042.57	1040.40	-2.17	2.17	Y	EXCLUDE-CITY
64	292	1039.68	1039.68	-0.01	0.01	Y	AEP
65	242	1039.49	1039.59	0.10	0.10	Y	AEP

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Classification: Public

Table B-3: High Flow Calibration (2005 Flood) – Comparison of Simulated Water Surface Profile and Surveyed Highwater Marks – Upper Elbow River

XS No.	River Station (m)	Simulated Water Level (m)	Surveyed Highwater Marks (m)	Difference (Simulated - Surveyed) (m)	Absolute Difference (Simulated - Surveyed) (m)	Source
1	62,186	1308.78	1307.66	1.12	1.12	AEP
2	61,761	1305.27	1304.58	0.69	0.69	AEP
3	60,552	1296.34	1295.99	0.35	0.35	AEP
4	60,009	1291.81	1292.45	-0.64	0.64	AEP
5	59,719	1289.38	1289.37	0.01	0.01	AEP
6	57,587	1273.30	1272.86	0.44	0.44	AEP
7	55,468	1258.03	1258.05	-0.02	0.02	AEP
8	54,356	1249.46	1248.56	0.90	0.90	AEP
9	52,968	1239.44	1238.83	0.61	0.61	AEP
10	48,214	1205.85	1205.36	0.49	0.49	AEP
11	48,117	1204.90	1204.34	0.56	0.56	AEP
12	42,525	1171.29	1172.62	-1.33	1.33	AEP
13	33,576	1123.01	1122.82	0.19	0.19	AEP
14	29,280	1103.79	1104.57	-0.78	0.78	AEP
15	29,260	1103.69	1103.57	0.12	0.12	AEP
16	29,234	1103.55	1101.95	1.60	1.60	AEP
17	20,512	1081.49	1082.03	-0.54	0.54	AEP
18	20,494	1081.47	1081.94	-0.47	0.47	AEP

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Classification: Public

APPENDIX C

2013 Flood High Flow Model Calibration Results

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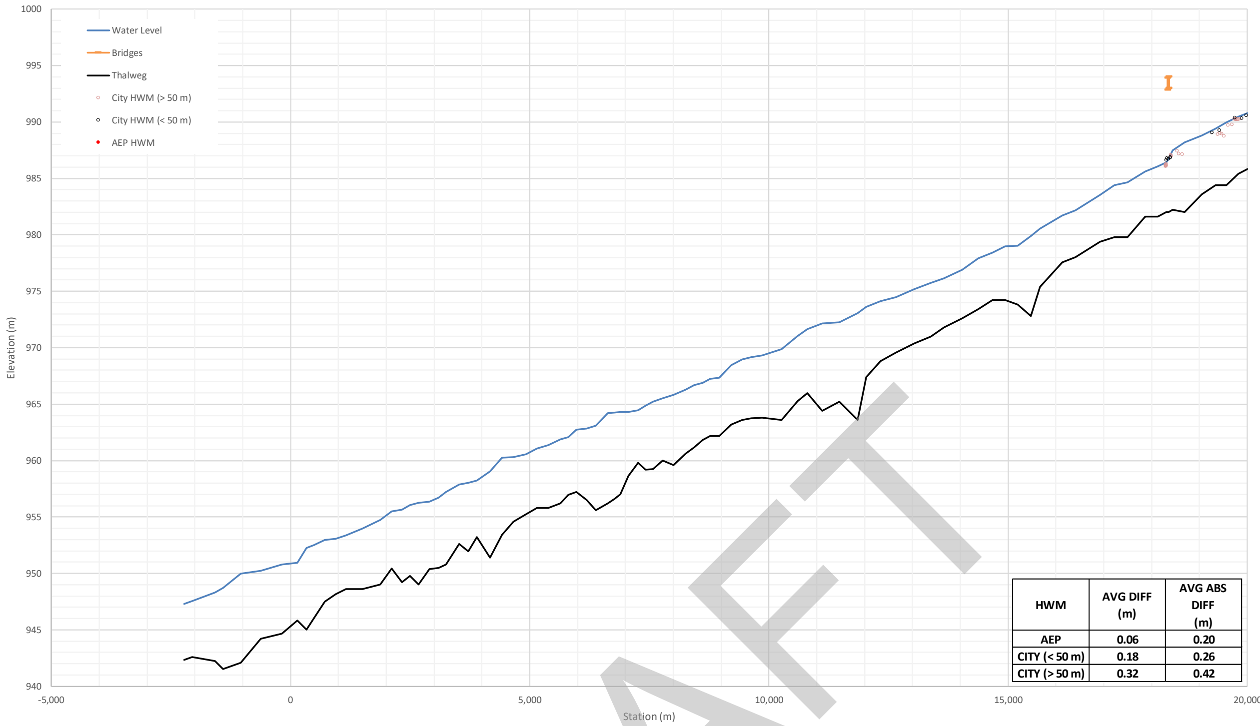

Figure C-1: High Flow Calibration (2013 Flood) – Comparison of Simulated Water Surface Profile and Surveyed Highwater Marks – Bow River (Part 1 of 3)

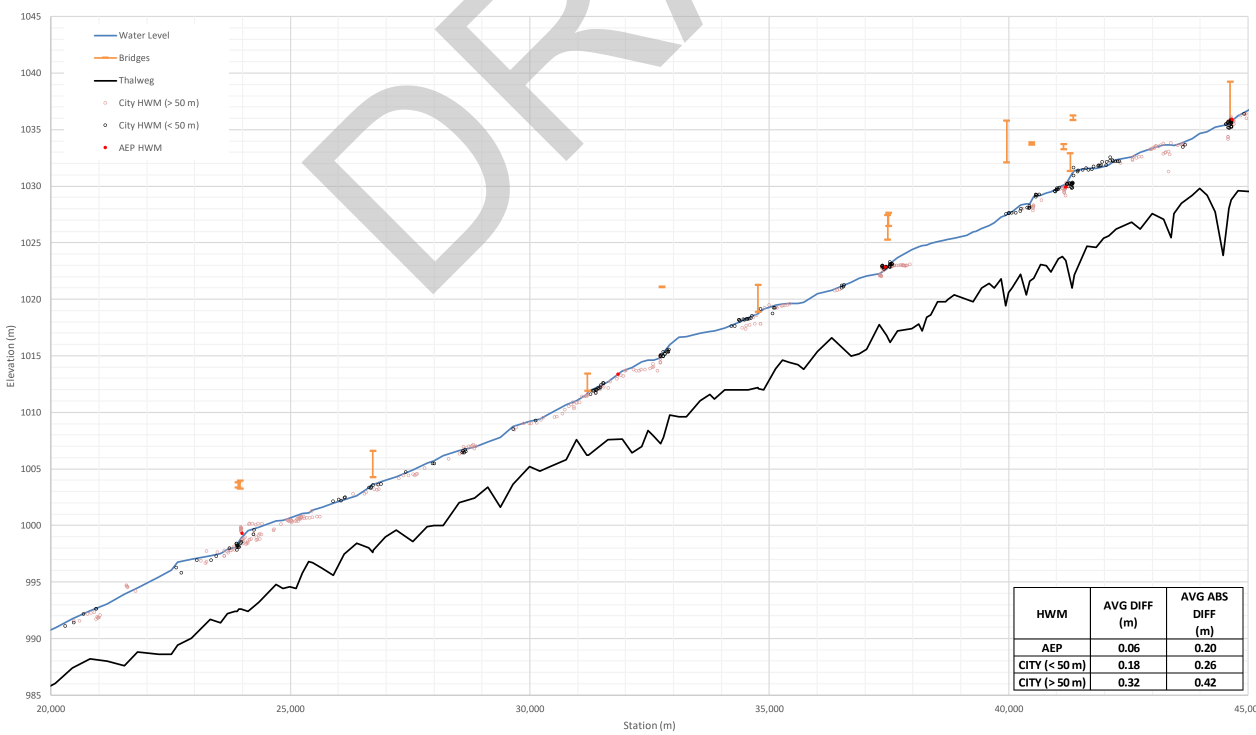

Figure C-2: High Flow Calibration (2013 Flood) – Comparison of Simulated Water Surface Profile and Surveyed Highwater Marks – Bow River (Part 2 of 3)

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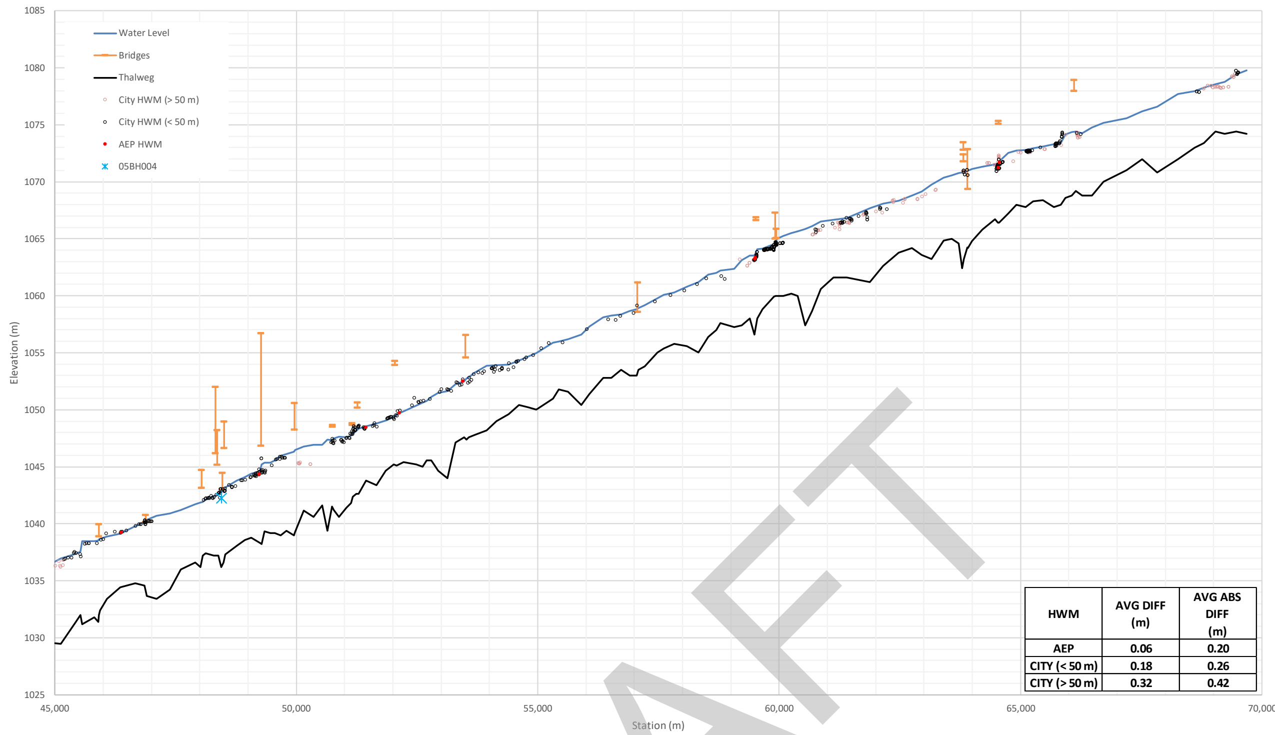

Figure C-3: High Flow Calibration (2013 Flood) – Comparison of Simulated Water Surface Profile and Surveyed Highwater Marks – Bow River (Part 3 of 3)

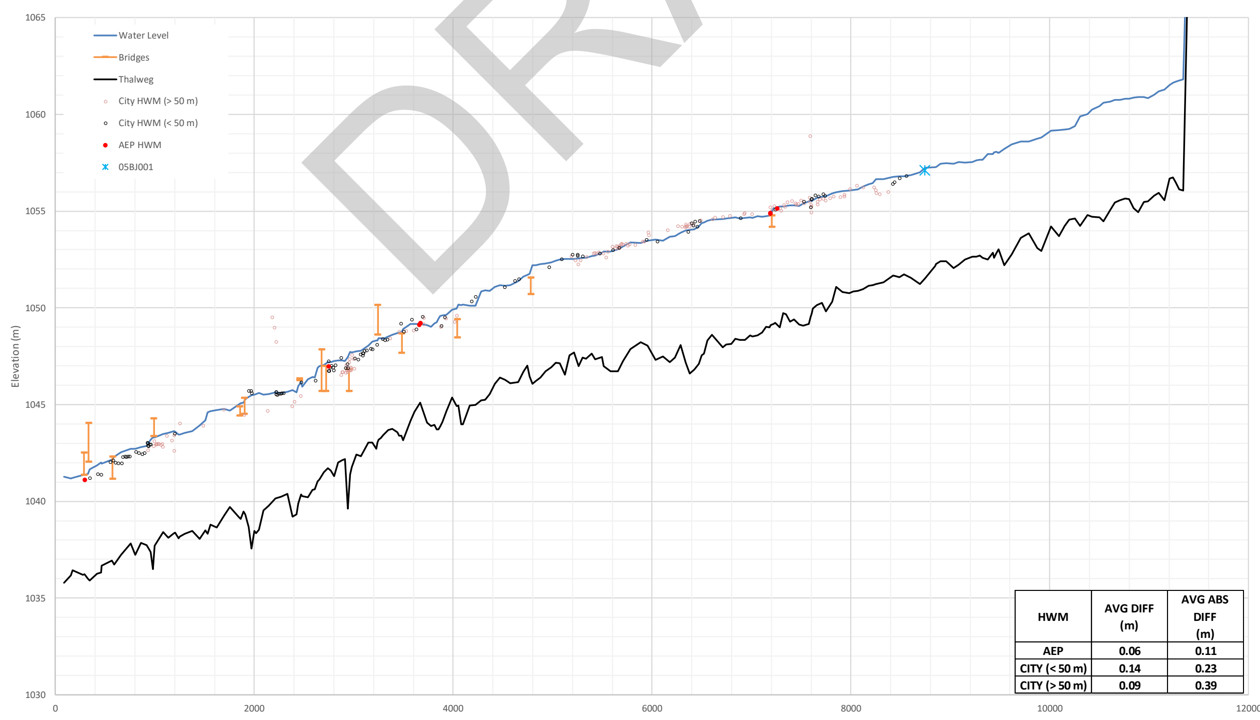

Figure C-4: High Flow Calibration (2013 Flood) – Comparison of Simulated Water Surface Profile and Surveyed Highwater Marks – Lower Elbow River

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Classification: Public

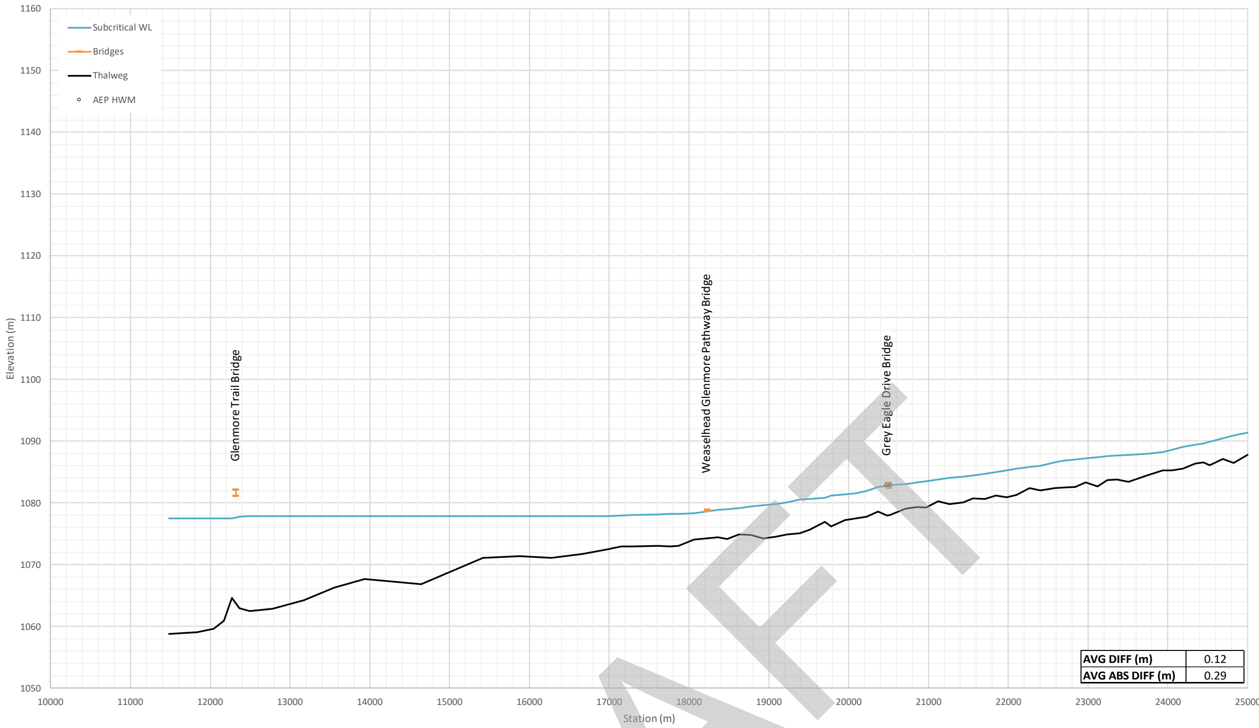

Figure C-5: High Flow Calibration (2013 Flood) – Comparison of Simulated Water Surface Profile and Surveyed Highwater Marks – Upper Elbow River (Part 1 of 4)

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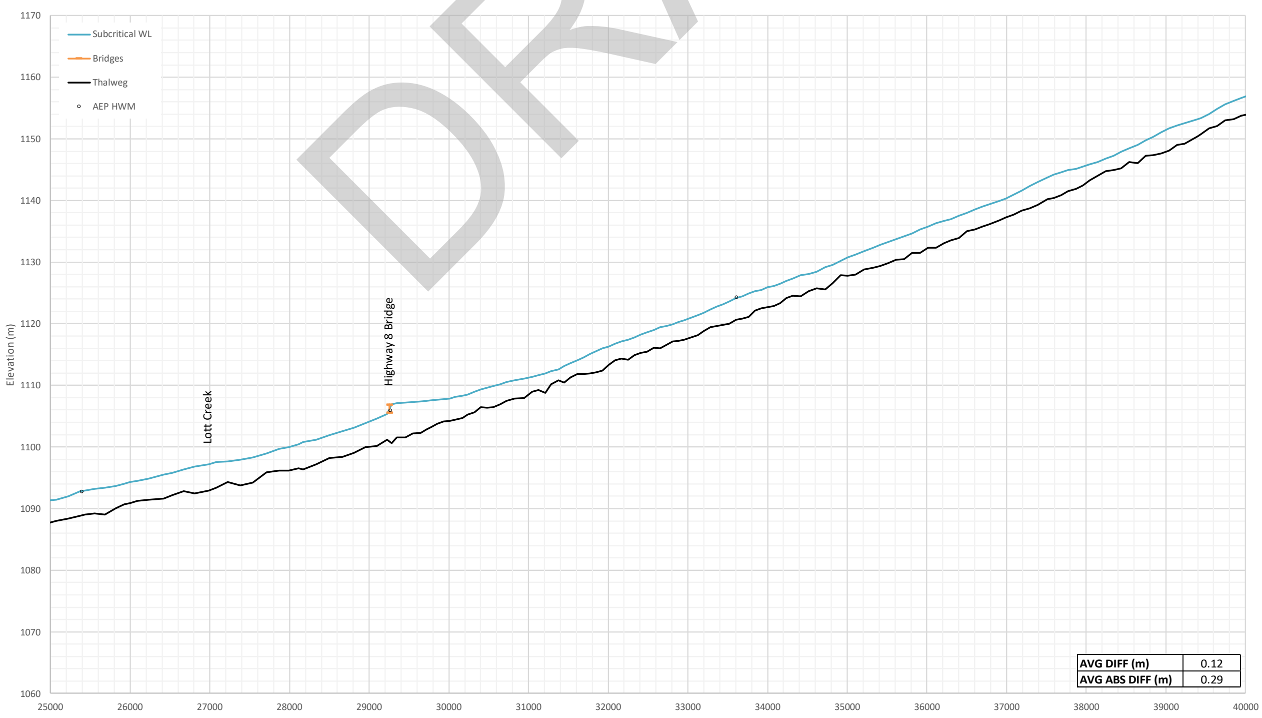

Figure C-6: High Flow Calibration (2013 Flood) – Comparison of Simulated Water Surface Profile and Surveyed Highwater Marks – Upper Elbow River (Part 2 of 4)

Classification: Public

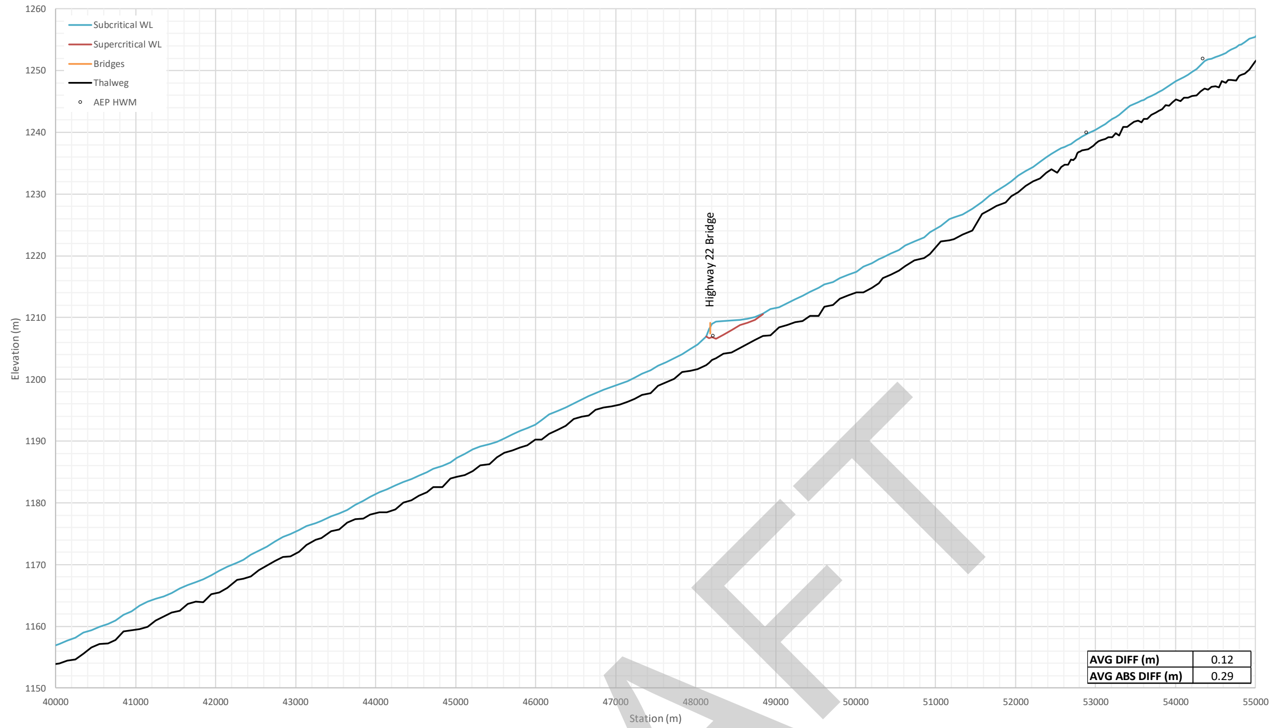

Figure C-7: High Flow Calibration (2013 Flood) – Comparison of Simulated Water Surface Profile and Surveyed Highwater Marks – Upper Elbow River (Part 3 of 4)

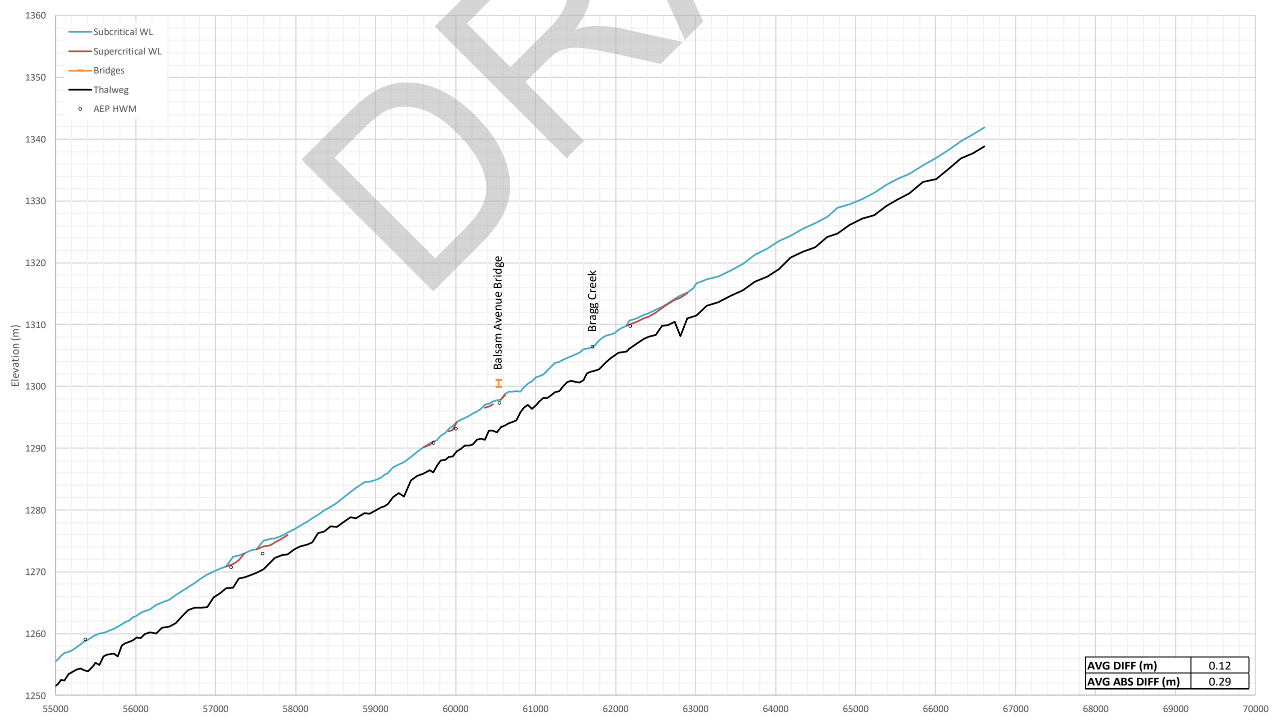

Figure C-8: High Flow Calibration (2013 Flood) – Comparison of Simulated Water Surface Profile and Surveyed Highwater Marks – Upper Elbow River (Part 4 of 4)

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Classification: Public

Table C-1: High Flow Calibration (2013 Flood) – Comparison of Simulated Water Surface Profile and Surveyed Highwater Marks – Bow River

XS No.	River Station (m)	Surveyed Highwater Mark Elevation (m)	Simulated Water Level (m)	Difference (Surveyed - Simulated) (m)	Absolute Difference (Simulated - Surveyed) (m)	Within 50 m of Main Channel Banks (Y/N)	Source
1	69,511	1079.56	1079.49	-0.07	0.07	Y	CITY
2	69,511	1079.56	1079.49	-0.07	0.07	Y	CITY
3	69,505	1079.54	1079.48	-0.06	0.06	Y	CITY
4	69,505	1079.54	1079.48	-0.06	0.06	Y	CITY
5	69,490	1079.41	1079.45	0.05	0.05	Y	CITY
6	69,490	1079.41	1079.45	0.05	0.05	Y	CITY
7	69,465	1079.70	1079.41	-0.30	0.30	Y	CITY
8	69,465	1079.70	1079.41	-0.30	0.30	Y	CITY
9	68,703	1077.84	1078.10	0.26	0.26	Y	CITY
10	68,703	1077.84	1078.10	0.26	0.26	Y	CITY
11	68,656	1077.88	1078.02	0.14	0.14	Y	CITY
12	68,656	1077.88	1078.02	0.14	0.14	Y	CITY
13	66,250	1074.17	1074.27	0.10	0.10	Y	CITY
14	66,169	1074.24	1074.37	0.13	0.13	Y	CITY
15	65,874	1074.32	1073.69	-0.63	0.63	Y	CITY
16	65,873	1074.27	1073.69	-0.57	0.57	Y	CITY
17	65,872	1074.13	1073.68	-0.45	0.45	Y	CITY
18	65,872	1074.13	1073.68	-0.45	0.45	Y	CITY
19	65,862	1073.88	1073.60	-0.28	0.28	Y	CITY
20	65,862	1073.88	1073.60	-0.28	0.28	Y	CITY
21	65,862	1073.97	1073.60	-0.37	0.37	Y	CITY
22	65,822	1073.54	1073.40	-0.14	0.14	Y	CITY
23	65,813	1073.44	1073.39	-0.05	0.05	Y	CITY
24	65,809	1073.35	1073.39	0.03	0.03	Y	CITY
25	65,802	1073.33	1073.38	0.05	0.05	Y	CITY
26	65,758	1073.34	1073.35	0.01	0.01	Y	CITY
27	65,758	1073.34	1073.35	0.01	0.01	Y	CITY
28	65,754	1073.16	1073.34	0.18	0.18	Y	CITY
29	65,735	1073.26	1073.33	0.07	0.07	Y	CITY
30	65,735	1073.26	1073.33	0.07	0.07	Y	CITY
31	65,735	1073.32	1073.33	0.01	0.01	Y	CITY
32	65,734	1073.33	1073.33	0.00	0.00	Y	CITY
33	65,728	1073.27	1073.32	0.05	0.05	Y	CITY
34	65,725	1073.09	1073.32	0.23	0.23	Y	CITY
35	65,725	1073.09	1073.32	0.23	0.23	Y	CITY
36	65,723	1073.12	1073.32	0.20	0.20	Y	CITY
37	65,413	1072.97	1073.04	0.07	0.07	Y	CITY
38	65,249	1072.73	1072.91	0.19	0.19	Y	CITY
39	65,197	1072.68	1072.87	0.19	0.19	Y	CITY
40	65,197	1072.68	1072.87	0.19	0.19	Y	CITY
41	65,195	1072.64	1072.87	0.24	0.24	Y	CITY
42	65,195	1072.64	1072.87	0.24	0.24	Y	CITY

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Classification: Public

Table C-1: High Flow Calibration (2013 Flood) – Comparison of Simulated Water Surface Profile and Surveyed Highwater Marks – Bow River

XS No.	River Station (m)	Surveyed Highwater Mark Elevation (m)	Simulated Water Level (m)	Difference (Surveyed - Simulated) (m)	Absolute Difference (Simulated - Surveyed) (m)	Within 50 m of Main Channel Banks (Y/N)	Source
43	65,188	1072.69	1072.87	0.18	0.18	Y	CITY
44	65,188	1072.69	1072.87	0.18	0.18	Y	CITY
45	65,177	1072.63	1072.86	0.23	0.23	Y	CITY
46	65,177	1072.63	1072.86	0.23	0.23	Y	CITY
47	65,165	1072.66	1072.85	0.19	0.19	Y	CITY
48	65,165	1072.66	1072.85	0.19	0.19	Y	CITY
49	65,162	1072.73	1072.85	0.12	0.12	Y	CITY
50	65,158	1072.63	1072.84	0.21	0.21	Y	CITY
51	65,158	1072.63	1072.84	0.21	0.21	Y	CITY
52	65,150	1072.61	1072.84	0.23	0.23	Y	CITY
53	65,150	1072.61	1072.84	0.23	0.23	Y	CITY
54	65,139	1072.71	1072.83	0.12	0.12	Y	CITY
55	65,139	1072.71	1072.83	0.12	0.12	Y	CITY
56	65,133	1072.70	1072.82	0.13	0.13	Y	CITY
57	65,133	1072.70	1072.82	0.13	0.13	Y	CITY
58	65,130	1072.63	1072.82	0.19	0.19	Y	CITY
59	65,130	1072.63	1072.82	0.19	0.19	Y	CITY
60	64,638	1071.74	1072.11	0.37	0.37	Y	CITY
61	64,638	1071.74	1072.11	0.37	0.37	Y	CITY
62	64,624	1071.65	1072.06	0.41	0.41	Y	CITY
63	64,624	1071.65	1072.06	0.41	0.41	Y	CITY
64	64,589	1071.64	1071.92	0.28	0.28	Y	CITY
65	64,589	1071.64	1071.92	0.28	0.28	Y	CITY
66	64,584	1071.52	1071.90	0.38	0.38	Y	CITY
67	64,584	1071.52	1071.90	0.38	0.38	Y	CITY
68	64,582	1071.59	1071.89	0.30	0.30	Y	CITY
69	64,582	1071.59	1071.89	0.30	0.30	Y	CITY
70	64,566	1071.19	1071.83	0.64	0.64	Y	CITY
71	64,566	1071.19	1071.83	0.64	0.64	Y	CITY
72	64,562	1071.70	1071.81	0.12	0.12	Y	AEP
73	64,560	1071.93	1071.80	-0.13	0.13	Y	CITY
74	64,560	1071.93	1071.80	-0.13	0.13	Y	CITY
75	64,557	1071.10	1071.80	0.70	0.70	Y	CITY
76	64,557	1071.10	1071.80	0.70	0.70	Y	CITY
77	64,543	1071.27	1071.71	0.44	0.44	Y	AEP
78	64,534	1071.43	1071.65	0.22	0.22	Y	CITY
79	64,530	1071.41	1071.63	0.22	0.22	Y	CITY
80	64,530	1071.41	1071.63	0.22	0.22	Y	CITY
81	64,528	1071.48	1071.62	0.14	0.14	Y	CITY
82	64,528	1071.48	1071.62	0.14	0.14	Y	CITY
83	64,526	1071.14	1071.61	0.47	0.47	Y	CITY
84	64,526	1071.14	1071.61	0.47	0.47	Y	CITY

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Classification: Public

Table C-1: High Flow Calibration (2013 Flood) – Comparison of Simulated Water Surface Profile and Surveyed Highwater Marks – Bow River

XS No.	River Station (m)	Surveyed Highwater Mark Elevation (m)	Simulated Water Level (m)	Difference (Surveyed - Simulated) (m)	Absolute Difference (Simulated - Surveyed) (m)	Within 50 m of Main Channel Banks (Y/N)	Source
85	64,526	1071.35	1071.61	0.26	0.26	Y	CITY
86	64,526	1071.35	1071.61	0.26	0.26	Y	CITY
87	64,524	1071.26	1071.61	0.35	0.35	Y	CITY
88	64,524	1071.26	1071.61	0.35	0.35	Y	CITY
89	64,523	1071.30	1071.61	0.31	0.31	Y	CITY
90	64,523	1071.30	1071.61	0.31	0.31	Y	CITY
91	64,511	1071.12	1071.59	0.47	0.47	Y	CITY
92	64,511	1071.12	1071.59	0.47	0.47	Y	CITY
93	64,506	1070.91	1071.57	0.67	0.67	Y	CITY
94	64,506	1070.91	1071.57	0.67	0.67	Y	CITY
95	63,905	1070.55	1070.97	0.43	0.43	Y	CITY
96	63,905	1070.55	1070.97	0.43	0.43	Y	CITY
97	63,897	1071.01	1070.95	-0.06	0.06	Y	CITY
98	63,897	1071.01	1070.95	-0.06	0.06	Y	CITY
99	63,848	1070.62	1070.87	0.26	0.26	Y	CITY
100	63,848	1070.62	1070.87	0.26	0.26	Y	CITY
101	63,830	1070.98	1070.85	-0.13	0.13	Y	CITY
102	63,830	1070.98	1070.85	-0.13	0.13	Y	CITY
103	63,825	1070.81	1070.84	0.03	0.03	Y	CITY
104	63,825	1070.81	1070.84	0.03	0.03	Y	CITY
105	62,234	1067.59	1068.15	0.56	0.56	Y	CITY
106	62,106	1067.69	1068.01	0.32	0.32	Y	CITY
107	62,098	1067.57	1068.00	0.43	0.43	Y	CITY
108	62,088	1067.75	1067.98	0.24	0.24	Y	CITY
109	61,827	1066.68	1067.59	0.91	0.91	Y	CITY
110	61,827	1066.68	1067.59	0.91	0.91	Y	CITY
111	61,826	1066.87	1067.59	0.72	0.72	Y	CITY
112	61,817	1067.24	1067.57	0.33	0.33	Y	CITY
113	61,812	1067.29	1067.56	0.27	0.27	Y	CITY
114	61,812	1067.30	1067.56	0.26	0.26	Y	CITY
115	61,803	1067.16	1067.55	0.39	0.39	Y	CITY
116	61,655	1066.95	1067.28	0.34	0.34	Y	CITY
117	61,509	1066.69	1067.02	0.34	0.34	Y	CITY
118	61,507	1066.57	1067.02	0.45	0.45	Y	CITY
119	61,497	1066.69	1067.00	0.31	0.31	Y	CITY
120	61,477	1066.70	1066.97	0.26	0.26	Y	CITY
121	61,469	1066.75	1066.95	0.21	0.21	Y	CITY
122	61,400	1066.84	1066.83	-0.01	0.01	Y	CITY
123	61,350	1066.46	1066.80	0.34	0.34	Y	CITY
124	61,322	1066.51	1066.78	0.27	0.27	Y	CITY
125	61,318	1066.42	1066.78	0.36	0.36	Y	CITY
126	61,314	1066.34	1066.78	0.44	0.44	Y	CITY

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Classification: Public

Table C-1: High Flow Calibration (2013 Flood) – Comparison of Simulated Water Surface Profile and Surveyed Highwater Marks – Bow River

XS No.	River Station (m)	Surveyed Highwater Mark Elevation (m)	Simulated Water Level (m)	Difference (Surveyed - Simulated) (m)	Absolute Difference (Simulated - Surveyed) (m)	Within 50 m of Main Channel Banks (Y/N)	Source
127	61,311	1068.01	1066.77	-1.24	1.24	Y	EXCLUDE-CITY
128	61,285	1066.34	1066.76	0.42	0.42	Y	CITY
129	61,279	1066.42	1066.75	0.34	0.34	Y	CITY
130	61,110	1066.33	1066.64	0.32	0.32	Y	CITY
131	60,915	1066.09	1066.52	0.44	0.44	Y	CITY
132	60,777	1065.77	1066.30	0.53	0.53	Y	CITY
133	60,771	1065.57	1066.29	0.72	0.72	Y	CITY
134	60,759	1065.83	1066.27	0.44	0.44	Y	CITY
135	60,090	1064.65	1065.23	0.58	0.58	Y	CITY
136	60,090	1064.65	1065.23	0.58	0.58	Y	CITY
137	60,077	1064.59	1065.21	0.62	0.62	Y	CITY
138	60,077	1064.59	1065.21	0.62	0.62	Y	CITY
139	60,069	1064.61	1065.19	0.58	0.58	Y	CITY
140	60,069	1064.61	1065.19	0.58	0.58	Y	CITY
141	60,032	1064.59	1065.13	0.54	0.54	Y	CITY
142	60,032	1064.59	1065.13	0.54	0.54	Y	CITY
143	60,023	1064.58	1065.11	0.53	0.53	Y	CITY
144	60,023	1064.58	1065.11	0.53	0.53	Y	CITY
145	59,949	1064.42	1064.86	0.45	0.45	Y	CITY
146	59,949	1064.42	1064.86	0.45	0.45	Y	CITY
147	59,947	1064.49	1064.84	0.35	0.35	Y	CITY
148	59,947	1064.49	1064.84	0.35	0.35	Y	CITY
149	59,947	1064.62	1064.84	0.22	0.22	Y	CITY
150	59,947	1064.62	1064.84	0.22	0.22	Y	CITY
151	59,947	1064.53	1064.84	0.31	0.31	Y	CITY
152	59,947	1064.53	1064.84	0.31	0.31	Y	CITY
153	59,947	1064.46	1064.83	0.37	0.37	Y	CITY
154	59,947	1064.46	1064.83	0.37	0.37	Y	CITY
155	59,946	1064.56	1064.83	0.26	0.26	Y	CITY
156	59,946	1064.61	1064.82	0.21	0.21	Y	CITY
157	59,946	1064.61	1064.82	0.21	0.21	Y	CITY
158	59,945	1064.65	1064.81	0.16	0.16	Y	CITY
159	59,945	1064.65	1064.81	0.16	0.16	Y	CITY
160	59,944	1064.62	1064.79	0.16	0.16	Y	CITY
161	59,944	1064.62	1064.79	0.16	0.16	Y	CITY
162	59,943	1064.44	1064.76	0.32	0.32	Y	CITY
163	59,943	1064.44	1064.76	0.32	0.32	Y	CITY
164	59,934	1064.69	1064.62	-0.06	0.06	Y	CITY
165	59,934	1064.69	1064.62	-0.06	0.06	Y	CITY
166	59,933	1064.61	1064.61	0.00	0.00	Y	CITY
167	59,908	1064.26	1064.53	0.28	0.28	Y	CITY
168	59,908	1064.26	1064.53	0.28	0.28	Y	CITY

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Table C-1: High Flow Calibration (2013 Flood) – Comparison of Simulated Water Surface Profile and Surveyed Highwater Marks – Bow River

XS No.	River Station (m)	Surveyed Highwater Mark Elevation (m)	Simulated Water Level (m)	Difference (Surveyed - Simulated) (m)	Absolute Difference (Simulated - Surveyed) (m)	Within 50 m of Main Channel Banks (Y/N)	Source
169	59,907	1064.31	1064.53	0.22	0.22	Y	CITY
170	59,907	1064.31	1064.53	0.22	0.22	Y	CITY
171	59,900	1063.98	1064.53	0.55	0.55	Y	CITY
172	59,900	1063.98	1064.53	0.55	0.55	Y	CITY
173	59,900	1064.42	1064.53	0.11	0.11	Y	CITY
174	59,900	1064.42	1064.53	0.11	0.11	Y	CITY
175	59,897	1064.05	1064.53	0.48	0.48	Y	CITY
176	59,897	1064.05	1064.53	0.48	0.48	Y	CITY
177	59,893	1064.27	1064.53	0.25	0.25	Y	CITY
178	59,893	1064.27	1064.53	0.25	0.25	Y	CITY
179	59,893	1064.07	1064.53	0.46	0.46	Y	CITY
180	59,893	1064.07	1064.53	0.46	0.46	Y	CITY
181	59,883	1064.06	1064.51	0.45	0.45	Y	CITY
182	59,880	1064.08	1064.51	0.43	0.43	Y	CITY
183	59,880	1064.08	1064.51	0.43	0.43	Y	CITY
184	59,859	1064.28	1064.48	0.20	0.20	Y	CITY
185	59,855	1064.21	1064.47	0.26	0.26	Y	CITY
186	59,855	1064.21	1064.47	0.26	0.26	Y	CITY
187	59,844	1064.20	1064.45	0.26	0.26	Y	CITY
188	59,844	1064.20	1064.45	0.26	0.26	Y	CITY
189	59,834	1064.08	1064.44	0.36	0.36	Y	CITY
190	59,834	1064.08	1064.44	0.36	0.36	Y	CITY
191	59,823	1064.14	1064.42	0.28	0.28	Y	CITY
192	59,823	1064.14	1064.42	0.28	0.28	Y	CITY
193	59,813	1064.07	1064.40	0.34	0.34	Y	CITY
194	59,813	1064.07	1064.40	0.34	0.34	Y	CITY
195	59,785	1064.08	1064.36	0.28	0.28	Y	CITY
196	59,785	1064.08	1064.36	0.28	0.28	Y	CITY
197	59,769	1064.09	1064.34	0.25	0.25	Y	CITY
198	59,769	1064.09	1064.34	0.25	0.25	Y	CITY
199	59,763	1064.10	1064.33	0.23	0.23	Y	CITY
200	59,763	1064.10	1064.33	0.23	0.23	Y	CITY
201	59,762	1064.08	1064.33	0.25	0.25	Y	CITY
202	59,762	1064.08	1064.33	0.25	0.25	Y	CITY
203	59,759	1064.05	1064.32	0.28	0.28	Y	CITY
204	59,759	1064.05	1064.32	0.28	0.28	Y	CITY
205	59,745	1064.11	1064.30	0.20	0.20	Y	CITY
206	59,745	1064.11	1064.30	0.20	0.20	Y	CITY
207	59,728	1064.06	1064.27	0.21	0.21	Y	CITY
208	59,728	1064.06	1064.27	0.21	0.21	Y	CITY
209	59,717	1064.04	1064.26	0.22	0.22	Y	CITY
210	59,717	1064.04	1064.26	0.22	0.22	Y	CITY

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Table C-1: High Flow Calibration (2013 Flood) – Comparison of Simulated Water Surface Profile and Surveyed Highwater Marks – Bow River

XS No.	River Station (m)	Surveyed Highwater Mark Elevation (m)	Simulated Water Level (m)	Difference (Surveyed - Simulated) (m)	Absolute Difference (Simulated - Surveyed) (m)	Within 50 m of Main Channel Banks (Y/N)	Source
211	59,705	1063.99	1064.24	0.26	0.26	Y	CITY
212	59,705	1063.99	1064.24	0.26	0.26	Y	CITY
213	59,686	1064.02	1064.21	0.19	0.19	Y	CITY
214	59,686	1064.02	1064.21	0.19	0.19	Y	CITY
215	59,686	1064.00	1064.21	0.22	0.22	Y	CITY
216	59,686	1064.00	1064.21	0.22	0.22	Y	CITY
217	59,545	1063.83	1064.10	0.27	0.27	Y	CITY
218	59,545	1063.83	1064.10	0.27	0.27	Y	CITY
219	59,542	1063.58	1064.08	0.50	0.50	Y	CITY
220	59,542	1063.58	1064.08	0.50	0.50	Y	CITY
221	59,541	1063.53	1064.07	0.54	0.54	Y	CITY
222	59,541	1063.53	1064.07	0.54	0.54	Y	CITY
223	59,540	1063.46	1064.06	0.59	0.59	Y	CITY
224	59,540	1063.46	1064.06	0.59	0.59	Y	CITY
225	59,535	1063.37	1064.00	0.64	0.64	Y	CITY
226	59,535	1063.37	1064.00	0.64	0.64	Y	CITY
227	59,509	1063.15	1063.74	0.59	0.59	Y	CITY
228	59,509	1063.15	1063.74	0.59	0.59	Y	CITY
229	59,503	1063.13	1063.68	0.55	0.55	Y	CITY
230	59,503	1063.13	1063.68	0.55	0.55	Y	CITY
231	59,500	1063.35	1063.65	0.31	0.31	Y	AEP
232	59,499	1063.25	1063.64	0.39	0.39	Y	AEP
233	59,499	1063.19	1063.63	0.44	0.44	Y	CITY
234	59,499	1063.19	1063.63	0.44	0.44	Y	CITY
235	59,494	1063.12	1063.59	0.47	0.47	Y	CITY
236	59,494	1063.12	1063.59	0.47	0.47	Y	CITY
237	59,493	1063.11	1063.58	0.47	0.47	Y	CITY
238	59,493	1063.11	1063.58	0.47	0.47	Y	CITY
239	58,883	1061.47	1062.26	0.79	0.79	Y	CITY
240	58,806	1061.70	1062.22	0.52	0.52	Y	CITY
241	58,499	1061.52	1061.77	0.25	0.25	Y	CITY
242	58,306	1061.00	1061.16	0.16	0.16	Y	CITY
243	58,045	1060.45	1060.69	0.24	0.24	Y	CITY
244	57,751	1060.02	1060.22	0.20	0.20	Y	CITY
245	57,429	1059.46	1059.66	0.20	0.20	Y	CITY
246	57,057	1059.12	1058.85	-0.27	0.27	Y	CITY
247	56,989	1058.46	1058.74	0.29	0.29	Y	CITY
248	56,720	1058.23	1058.38	0.15	0.15	Y	CITY
249	56,618	1057.87	1058.31	0.44	0.44	Y	CITY
250	56,469	1057.93	1058.20	0.27	0.27	Y	CITY
251	56,027	1057.04	1057.09	0.05	0.05	Y	CITY
252	55,808	1057.62	1056.45	-1.17	1.17	Y	EXCLUDE-CITY

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Classification: Public

Table C-1: High Flow Calibration (2013 Flood) – Comparison of Simulated Water Surface Profile and Surveyed Highwater Marks – Bow River

XS No.	River Station (m)	Surveyed Highwater Mark Elevation (m)	Simulated Water Level (m)	Difference (Surveyed - Simulated) (m)	Absolute Difference (Simulated - Surveyed) (m)	Within 50 m of Main Channel Banks (Y/N)	Source
253	55,523	1055.89	1056.07	0.17	0.17	Y	CITY
254	55,232	1055.84	1055.65	-0.18	0.18	Y	CITY
255	55,081	1055.37	1055.25	-0.12	0.12	Y	CITY
256	54,906	1054.78	1054.85	0.08	0.08	Y	CITY
257	54,765	1054.58	1054.60	0.02	0.02	Y	CITY
258	54,736	1054.44	1054.54	0.10	0.10	Y	CITY
259	54,595	1054.28	1054.26	-0.02	0.02	Y	CITY
260	54,568	1054.19	1054.22	0.03	0.03	Y	CITY
261	54,568	1054.18	1054.22	0.03	0.03	Y	CITY
262	54,506	1053.72	1054.11	0.39	0.39	Y	CITY
263	54,404	1054.04	1053.94	-0.10	0.10	Y	CITY
264	54,400	1053.49	1053.94	0.45	0.45	Y	CITY
265	54,268	1053.55	1053.94	0.39	0.39	Y	CITY
266	54,268	1053.66	1053.94	0.28	0.28	Y	CITY
267	54,266	1053.62	1053.94	0.32	0.32	Y	CITY
268	54,220	1053.44	1053.93	0.50	0.50	Y	CITY
269	54,133	1053.79	1053.93	0.14	0.14	Y	CITY
270	54,118	1053.52	1053.92	0.41	0.41	Y	CITY
271	54,097	1053.30	1053.91	0.61	0.61	Y	CITY
272	54,086	1053.69	1053.91	0.22	0.22	Y	CITY
273	54,059	1053.67	1053.89	0.22	0.22	Y	CITY
274	54,058	1053.62	1053.89	0.27	0.27	Y	CITY
275	54,057	1053.58	1053.89	0.31	0.31	Y	CITY
276	53,896	1053.38	1053.73	0.36	0.36	Y	CITY
277	53,855	1053.22	1053.63	0.41	0.41	Y	CITY
278	53,775	1053.23	1053.44	0.21	0.21	Y	CITY
279	53,675	1053.11	1053.18	0.08	0.08	Y	CITY
280	53,637	1052.58	1053.06	0.49	0.49	Y	CITY
281	53,602	1052.42	1052.96	0.54	0.54	Y	CITY
282	53,584	1052.82	1052.90	0.08	0.08	Y	CITY
283	53,565	1052.34	1052.85	0.51	0.51	Y	CITY
284	53,461	1051.61	1052.46	0.85	0.85	Y	EXCLUDE-CITY
285	53,458	1052.63	1052.46	-0.18	0.18	Y	CITY
286	53,453	1052.50	1052.45	-0.05	0.05	Y	AEP
287	53,428	1052.21	1052.41	0.21	0.21	Y	CITY
288	53,397	1052.16	1052.37	0.21	0.21	Y	CITY
289	53,343	1052.34	1052.29	-0.04	0.04	Y	CITY
290	53,327	1052.42	1052.27	-0.14	0.14	Y	CITY
291	53,217	1051.64	1051.95	0.31	0.31	Y	CITY
292	53,151	1051.75	1051.73	-0.02	0.02	Y	CITY
293	53,151	1051.74	1051.73	-0.01	0.01	Y	CITY
294	53,132	1051.81	1051.67	-0.14	0.14	Y	CITY

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Classification: Public

Table C-1: High Flow Calibration (2013 Flood) – Comparison of Simulated Water Surface Profile and Surveyed Highwater Marks – Bow River

XS No.	River Station (m)	Surveyed Highwater Mark Elevation (m)	Simulated Water Level (m)	Difference (Surveyed - Simulated) (m)	Absolute Difference (Simulated - Surveyed) (m)	Within 50 m of Main Channel Banks (Y/N)	Source
295	53,017	1051.80	1051.54	-0.25	0.25	Y	CITY
296	52,970	1051.56	1051.50	-0.06	0.06	Y	CITY
297	52,770	1050.91	1051.05	0.13	0.13	Y	CITY
298	52,639	1050.75	1050.67	-0.08	0.08	Y	CITY
299	52,575	1050.71	1050.56	-0.15	0.15	Y	CITY
300	52,547	1050.60	1050.50	-0.09	0.09	Y	CITY
301	52,537	1050.69	1050.49	-0.20	0.20	Y	CITY
302	52,455	1051.05	1050.33	-0.73	0.73	Y	CITY
303	52,406	1050.38	1050.23	-0.15	0.15	Y	CITY
304	52,146	1049.93	1049.72	-0.22	0.22	Y	CITY
305	52,136	1049.76	1049.70	-0.06	0.06	Y	AEP
306	52,102	1049.88	1049.63	-0.25	0.25	Y	CITY
307	52,090	1049.44	1049.61	0.17	0.17	Y	CITY
308	52,066	1049.51	1049.55	0.04	0.04	Y	CITY
309	52,030	1049.17	1049.41	0.24	0.24	Y	CITY
310	52,022	1049.23	1049.38	0.15	0.15	Y	CITY
311	52,014	1049.34	1049.36	0.02	0.02	Y	CITY
312	51,975	1049.37	1049.28	-0.09	0.09	Y	CITY
313	51,961	1049.38	1049.26	-0.12	0.12	Y	CITY
314	51,939	1049.33	1049.21	-0.12	0.12	Y	CITY
315	51,931	1049.29	1049.19	-0.09	0.09	Y	CITY
316	51,916	1049.26	1049.16	-0.10	0.10	Y	CITY
317	51,898	1049.28	1049.13	-0.15	0.15	Y	CITY
318	51,891	1049.22	1049.11	-0.11	0.11	Y	CITY
319	51,678	1048.52	1048.83	0.31	0.31	Y	CITY
320	51,622	1048.81	1048.76	-0.05	0.05	Y	CITY
321	51,608	1048.63	1048.74	0.12	0.12	Y	CITY
322	51,588	1048.53	1048.72	0.19	0.19	Y	CITY
323	51,435	1048.47	1048.53	0.06	0.06	Y	AEP
324	51,432	1048.43	1048.52	0.09	0.09	Y	CITY
325	51,425	1048.31	1048.51	0.21	0.21	Y	CITY
326	51,419	1048.36	1048.51	0.14	0.14	Y	CITY
327	51,405	1048.34	1048.49	0.14	0.14	Y	CITY
328	51,404	1048.44	1048.49	0.05	0.05	Y	CITY
329	51,298	1048.60	1048.36	-0.24	0.24	Y	CITY
330	51,295	1048.53	1048.35	-0.17	0.17	Y	CITY
331	51,290	1048.45	1048.35	-0.11	0.11	Y	CITY
332	51,285	1048.48	1048.34	-0.14	0.14	Y	CITY
333	51,232	1048.19	1048.09	-0.10	0.10	Y	CITY
334	51,230	1048.24	1048.08	-0.16	0.16	Y	CITY
335	51,222	1048.18	1048.06	-0.12	0.12	Y	CITY
336	51,217	1048.19	1048.04	-0.15	0.15	Y	CITY

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Classification: Public

Table C-1: High Flow Calibration (2013 Flood) – Comparison of Simulated Water Surface Profile and Surveyed Highwater Marks – Bow River

XS No.	River Station (m)	Surveyed Highwater Mark Elevation (m)	Simulated Water Level (m)	Difference (Surveyed - Simulated) (m)	Absolute Difference (Simulated - Surveyed) (m)	Within 50 m of Main Channel Banks (Y/N)	Source
337	51,214	1048.46	1048.03	-0.43	0.43	Y	CITY
338	51,200	1048.37	1047.99	-0.38	0.38	Y	CITY
339	51,196	1048.08	1047.98	-0.11	0.11	Y	CITY
340	51,192	1048.53	1047.96	-0.57	0.57	Y	CITY
341	51,186	1048.28	1047.94	-0.33	0.33	Y	CITY
342	51,174	1047.86	1047.90	0.04	0.04	Y	CITY
343	51,168	1047.93	1047.88	-0.04	0.04	Y	CITY
344	51,162	1048.09	1047.86	-0.22	0.22	Y	CITY
345	51,141	1047.86	1047.77	-0.09	0.09	Y	CITY
346	51,120	1047.91	1047.72	-0.19	0.19	Y	CITY
347	51,108	1047.49	1047.70	0.21	0.21	Y	CITY
348	51,097	1047.56	1047.68	0.12	0.12	Y	CITY
349	51,056	1047.53	1047.61	0.08	0.08	Y	CITY
350	51,038	1047.46	1047.59	0.13	0.13	Y	CITY
351	50,993	1047.15	1047.61	0.46	0.46	Y	CITY
352	50,971	1047.21	1047.62	0.41	0.41	Y	CITY
353	50,953	1047.20	1047.63	0.42	0.42	Y	CITY
354	50,943	1047.32	1047.63	0.31	0.31	Y	CITY
355	50,928	1047.33	1047.64	0.31	0.31	Y	CITY
356	50,798	1047.26	1047.52	0.26	0.26	Y	CITY
357	50,771	1047.02	1047.47	0.45	0.45	Y	CITY
358	50,762	1047.09	1047.42	0.34	0.34	Y	CITY
359	50,759	1047.27	1047.41	0.14	0.14	Y	CITY
360	50,752	1047.18	1047.38	0.20	0.20	Y	CITY
361	50,751	1047.42	1047.37	-0.04	0.04	Y	CITY
362	50,728	1047.13	1047.32	0.19	0.19	Y	CITY
363	50,548	1046.13	1046.98	0.85	0.85	Y	EXCLUDE-CITY
364	50,373	1045.70	1046.95	1.25	1.25	Y	EXCLUDE-CITY
365	49,985	1045.27	1046.49	1.23	1.23	Y	EXCLUDE-CITY
366	49,978	1045.27	1046.48	1.21	1.21	Y	EXCLUDE-CITY
367	49,970	1045.35	1046.44	1.10	1.10	Y	EXCLUDE-CITY
368	49,771	1045.77	1046.10	0.33	0.33	Y	CITY
369	49,764	1045.79	1046.09	0.31	0.31	Y	CITY
370	49,758	1045.78	1046.08	0.31	0.31	Y	CITY
371	49,723	1045.75	1046.04	0.30	0.30	Y	CITY
372	49,705	1045.88	1046.02	0.14	0.14	Y	CITY
373	49,665	1045.66	1045.95	0.29	0.29	Y	CITY
374	49,662	1045.85	1045.94	0.09	0.09	Y	CITY
375	49,607	1045.67	1045.76	0.08	0.08	Y	CITY
376	49,584	1045.63	1045.68	0.05	0.05	Y	CITY
377	49,499	1045.12	1045.45	0.33	0.33	Y	CITY
378	49,365	1044.67	1045.37	0.70	0.70	Y	CITY

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Table C-1: High Flow Calibration (2013 Flood) – Comparison of Simulated Water Surface Profile and Surveyed Highwater Marks – Bow River

XS No.	River Station (m)	Surveyed Highwater Mark Elevation (m)	Simulated Water Level (m)	Difference (Surveyed - Simulated) (m)	Absolute Difference (Simulated - Surveyed) (m)	Within 50 m of Main Channel Banks (Y/N)	Source
379	49,357	1044.56	1045.36	0.81	0.81	Y	CITY
380	49,357	1044.54	1045.36	0.83	0.83	Y	CITY
381	49,350	1044.43	1045.36	0.93	0.93	Y	CITY
382	49,301	1044.72	1045.27	0.54	0.54	Y	CITY
383	49,300	1044.57	1045.26	0.69	0.69	Y	CITY
384	49,294	1044.45	1045.24	0.80	0.80	Y	CITY
385	49,287	1044.48	1045.22	0.74	0.74	Y	CITY
386	49,282	1045.73	1045.15	-0.59	0.59	Y	CITY
387	49,282	1045.74	1045.15	-0.59	0.59	Y	CITY
388	49,280	1044.64	1045.11	0.48	0.48	Y	CITY
389	49,245	1044.57	1044.61	0.04	0.04	Y	CITY
390	49,240	1044.27	1044.60	0.33	0.33	Y	CITY
391	49,238	1044.73	1044.60	-0.12	0.12	Y	CITY
392	49,225	1044.37	1044.58	0.22	0.22	Y	AEP
393	49,207	1044.40	1044.56	0.16	0.16	Y	CITY
394	49,196	1044.47	1044.55	0.07	0.07	Y	CITY
395	49,179	1044.15	1044.52	0.37	0.37	Y	CITY
396	49,166	1044.42	1044.51	0.09	0.09	Y	CITY
397	49,158	1044.25	1044.50	0.25	0.25	Y	CITY
398	49,151	1044.21	1044.49	0.28	0.28	Y	CITY
399	49,141	1044.20	1044.47	0.27	0.27	Y	CITY
400	49,126	1044.28	1044.46	0.18	0.18	Y	CITY
401	49,065	1044.08	1044.38	0.30	0.30	Y	CITY
402	49,056	1044.06	1044.35	0.29	0.29	Y	CITY
403	48,947	1043.84	1044.09	0.25	0.25	Y	CITY
404	48,887	1043.78	1043.99	0.20	0.20	Y	CITY
405	48,866	1043.77	1043.95	0.17	0.17	Y	CITY
406	48,741	1043.29	1043.72	0.43	0.43	Y	CITY
407	48,678	1043.16	1043.56	0.40	0.40	Y	CITY
408	48,678	1043.17	1043.56	0.39	0.39	Y	CITY
409	48,667	1043.24	1043.54	0.30	0.30	Y	CITY
410	48,612	1043.37	1043.40	0.03	0.03	Y	CITY
411	48,535	1043.08	1043.20	0.13	0.13	Y	CITY
412	48,525	1042.86	1043.14	0.28	0.28	Y	CITY
413	48,518	1042.85	1043.09	0.24	0.24	Y	CITY
414	48,517	1042.89	1043.09	0.20	0.20	Y	CITY
415	48,477	1043.03	1042.87	-0.17	0.17	Y	CITY
416	48,451	1043.02	1042.82	-0.19	0.19	Y	CITY
417	48,432	1042.66	1042.77	0.11	0.11	Y	CITY
418	48,429	1043.02	1042.77	-0.25	0.25	Y	CITY
419	48,427	1042.28	1042.76	0.48	0.48	Y	CITY
420	48,411	1042.71	1042.72	0.01	0.01	Y	CITY

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Classification: Public

Table C-1: High Flow Calibration (2013 Flood) – Comparison of Simulated Water Surface Profile and Surveyed Highwater Marks – Bow River

XS No.	River Station (m)	Surveyed Highwater Mark Elevation (m)	Simulated Water Level (m)	Difference (Surveyed - Simulated) (m)	Absolute Difference (Simulated - Surveyed) (m)	Within 50 m of Main Channel Banks (Y/N)	Source
421	48,395	1042.66	1042.67	0.02	0.02	Y	CITY
422	48,394	1042.65	1042.67	0.02	0.02	Y	CITY
423	48,393	1042.66	1042.67	0.01	0.01	Y	CITY
424	48,347	1042.51	1042.48	-0.03	0.03	Y	CITY
425	48,308	1042.33	1042.43	0.10	0.10	Y	CITY
426	48,278	1042.24	1042.39	0.16	0.16	Y	CITY
427	48,261	1042.29	1042.36	0.07	0.07	Y	CITY
428	48,241	1042.43	1042.33	-0.10	0.10	Y	CITY
429	48,213	1042.22	1042.27	0.05	0.05	Y	CITY
430	48,191	1042.27	1042.23	-0.04	0.04	Y	CITY
431	48,172	1042.23	1042.20	-0.03	0.03	Y	CITY
432	48,139	1042.24	1042.14	-0.10	0.10	Y	CITY
433	48,119	1042.15	1042.10	-0.05	0.05	Y	CITY
434	48,088	1042.04	1042.00	-0.04	0.04	Y	CITY
435	47,013	1040.20	1040.56	0.36	0.36	Y	CITY
436	46,995	1040.22	1040.53	0.31	0.31	Y	CITY
437	46,978	1040.20	1040.50	0.29	0.29	Y	CITY
438	46,953	1040.23	1040.46	0.23	0.23	Y	CITY
439	46,939	1040.19	1040.43	0.24	0.24	Y	CITY
440	46,889	1040.08	1040.33	0.25	0.25	Y	CITY
441	46,886	1040.14	1040.32	0.18	0.18	Y	CITY
442	46,885	1039.96	1040.31	0.36	0.36	Y	CITY
443	46,883	1039.96	1040.31	0.35	0.35	Y	CITY
444	46,882	1039.92	1040.30	0.38	0.38	Y	CITY
445	46,882	1039.70	1040.30	0.60	0.60	Y	EXCLUDE-CITY
446	46,873	1040.07	1040.26	0.19	0.19	Y	CITY
447	46,872	1040.29	1040.26	-0.03	0.03	Y	CITY
448	46,871	1040.26	1040.26	-0.01	0.01	Y	CITY
449	46,871	1040.11	1040.25	0.14	0.14	Y	CITY
450	46,869	1039.69	1040.25	0.55	0.55	Y	EXCLUDE-CITY
451	46,868	1039.49	1040.24	0.75	0.75	Y	EXCLUDE-CITY
452	46,864	1040.09	1040.23	0.14	0.14	Y	CITY
453	46,854	1040.09	1040.19	0.09	0.09	Y	CITY
454	46,815	1039.34	1040.11	0.77	0.77	Y	EXCLUDE-CITY
455	46,803	1039.26	1040.08	0.83	0.83	Y	EXCLUDE-CITY
456	46,782	1039.96	1040.04	0.08	0.08	Y	CITY
457	46,782	1039.97	1040.04	0.08	0.08	Y	CITY
458	46,754	1039.95	1039.99	0.04	0.04	Y	CITY
459	46,683	1039.81	1039.85	0.05	0.05	Y	CITY
460	46,483	1039.37	1039.40	0.03	0.03	Y	CITY
461	46,399	1039.27	1039.21	-0.06	0.06	Y	CITY
462	46,376	1039.27	1039.15	-0.12	0.12	Y	CITY

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Classification: Public

Table C-1: High Flow Calibration (2013 Flood) – Comparison of Simulated Water Surface Profile and Surveyed Highwater Marks – Bow River

XS No.	River Station (m)	Surveyed Highwater Mark Elevation (m)	Simulated Water Level (m)	Difference (Surveyed - Simulated) (m)	Absolute Difference (Simulated - Surveyed) (m)	Within 50 m of Main Channel Banks (Y/N)	Source
463	46,372	1039.28	1039.14	-0.14	0.14	Y	AEP
464	46,366	1039.18	1039.13	-0.04	0.04	Y	CITY
465	46,241	1039.28	1039.01	-0.27	0.27	Y	CITY
466	46,069	1038.30	1038.86	0.56	0.56	Y	EXCLUDE-CITY
467	46,063	1039.12	1038.85	-0.27	0.27	Y	CITY
468	46,006	1038.61	1038.77	0.16	0.16	Y	CITY
469	45,956	1038.56	1038.70	0.14	0.14	Y	CITY
470	45,875	1038.27	1038.51	0.25	0.25	Y	CITY
471	45,708	1038.28	1038.46	0.18	0.18	Y	CITY
472	45,708	1038.28	1038.46	0.18	0.18	Y	CITY
473	45,660	1038.30	1038.46	0.17	0.17	Y	CITY
474	45,623	1038.20	1038.46	0.26	0.26	Y	CITY
475	45,537	1037.13	1037.79	0.67	0.67	Y	CITY
476	45,528	1037.33	1037.63	0.30	0.30	Y	CITY
477	45,450	1037.39	1037.38	-0.01	0.01	Y	CITY
478	45,414	1037.52	1037.33	-0.19	0.19	Y	CITY
479	45,397	1037.39	1037.30	-0.09	0.09	Y	CITY
480	45,347	1037.01	1037.24	0.23	0.23	Y	CITY
481	45,278	1037.00	1037.15	0.16	0.16	Y	CITY
482	45,223	1036.88	1037.09	0.21	0.21	Y	CITY
483	45,194	1036.87	1037.05	0.18	0.18	Y	CITY
484	44,925	1036.37	1036.51	0.14	0.14	Y	CITY
485	44,897	1035.05	1036.45	1.40	1.40	Y	EXCLUDE-CITY
486	44,659	1035.89	1035.76	-0.12	0.12	Y	AEP
487	44,655	1035.23	1035.74	0.52	0.52	Y	CITY
488	44,654	1035.26	1035.74	0.48	0.48	Y	CITY
489	44,654	1035.20	1035.74	0.54	0.54	Y	CITY
490	44,654	1035.74	1035.74	0.00	0.00	Y	CITY
491	44,653	1035.55	1035.74	0.19	0.19	Y	CITY
492	44,652	1035.75	1035.74	-0.01	0.01	Y	CITY
493	44,649	1035.29	1035.72	0.43	0.43	Y	CITY
494	44,645	1035.55	1035.71	0.16	0.16	Y	CITY
495	44,645	1035.71	1035.71	0.00	0.00	Y	CITY
496	44,644	1035.76	1035.71	-0.05	0.05	Y	CITY
497	44,643	1035.69	1035.70	0.02	0.02	Y	CITY
498	44,642	1035.60	1035.70	0.10	0.10	Y	CITY
499	44,641	1035.86	1035.69	-0.17	0.17	Y	CITY
500	44,636	1035.73	1035.67	-0.06	0.06	Y	CITY
501	44,612	1035.13	1035.54	0.42	0.42	Y	CITY
502	44,606	1035.73	1035.52	-0.22	0.22	Y	CITY
503	44,605	1035.18	1035.51	0.33	0.33	Y	CITY
504	44,598	1035.53	1035.48	-0.05	0.05	Y	CITY

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Classification: Public

Table C-1: High Flow Calibration (2013 Flood) – Comparison of Simulated Water Surface Profile and Surveyed Highwater Marks – Bow River

XS No.	River Station (m)	Surveyed Highwater Mark Elevation (m)	Simulated Water Level (m)	Difference (Surveyed - Simulated) (m)	Absolute Difference (Simulated - Surveyed) (m)	Within 50 m of Main Channel Banks (Y/N)	Source
505	44,590	1035.18	1035.48	0.29	0.29	Y	CITY
506	44,588	1035.66	1035.47	-0.19	0.19	Y	CITY
507	44,578	1035.58	1035.46	-0.12	0.12	Y	CITY
508	44,554	1035.45	1035.44	-0.01	0.01	Y	CITY
509	44,544	1035.47	1035.43	-0.04	0.04	Y	CITY
510	43,685	1033.64	1033.96	0.32	0.32	Y	CITY
511	43,645	1033.44	1033.89	0.45	0.45	Y	CITY
512	42,314	1032.18	1032.39	0.21	0.21	Y	CITY
513	42,283	1032.19	1032.37	0.17	0.17	Y	CITY
514	42,230	1032.17	1032.31	0.14	0.14	Y	CITY
515	42,189	1032.19	1032.18	-0.01	0.01	Y	CITY
516	42,169	1032.28	1032.12	-0.16	0.16	Y	CITY
517	42,129	1032.54	1032.00	-0.54	0.54	Y	CITY
518	42,123	1032.25	1031.99	-0.26	0.26	Y	CITY
519	42,056	1032.11	1031.84	-0.27	0.27	Y	CITY
520	42,037	1031.81	1031.81	-0.01	0.01	Y	CITY
521	41,955	1032.13	1031.69	-0.44	0.44	Y	CITY
522	41,932	1031.84	1031.67	-0.17	0.17	Y	CITY
523	41,908	1031.79	1031.65	-0.14	0.14	Y	CITY
524	41,886	1031.80	1031.62	-0.18	0.18	Y	CITY
525	41,870	1031.78	1031.61	-0.17	0.17	Y	CITY
526	41,779	1031.71	1031.57	-0.14	0.14	Y	CITY
527	41,740	1031.45	1031.57	0.12	0.12	Y	CITY
528	41,666	1031.43	1031.57	0.14	0.14	Y	CITY
529	41,622	1031.59	1031.56	-0.03	0.03	Y	CITY
530	41,545	1031.41	1031.51	0.10	0.10	Y	CITY
531	41,455	1031.38	1031.45	0.06	0.06	Y	CITY
532	41,449	1031.28	1031.44	0.17	0.17	Y	CITY
533	41,364	1030.92	1031.35	0.43	0.43	Y	CITY
534	41,364	1031.64	1031.35	-0.28	0.28	Y	CITY
535	41,352	1030.27	1031.29	1.03	1.03	Y	CITY
536	41,336	1030.31	1031.21	0.90	0.90	Y	CITY
537	41,334	1030.16	1031.20	1.05	1.05	Y	CITY
538	41,332	1030.22	1031.20	0.98	0.98	Y	CITY
539	41,331	1029.84	1031.19	1.35	1.35	Y	CITY
540	41,326	1030.21	1031.16	0.96	0.96	Y	CITY
541	41,318	1029.82	1031.12	1.31	1.31	Y	CITY
542	41,313	1030.21	1031.09	0.88	0.88	Y	CITY
543	41,312	1030.17	1031.08	0.91	0.91	Y	CITY
544	41,310	1029.88	1031.06	1.18	1.18	Y	CITY
545	41,281	1030.22	1030.85	0.63	0.63	Y	CITY
546	41,276	1030.24	1030.81	0.57	0.57	Y	CITY

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Classification: Public

Table C-1: High Flow Calibration (2013 Flood) – Comparison of Simulated Water Surface Profile and Surveyed Highwater Marks – Bow River

XS No.	River Station (m)	Surveyed Highwater Mark Elevation (m)	Simulated Water Level (m)	Difference (Surveyed - Simulated) (m)	Absolute Difference (Simulated - Surveyed) (m)	Within 50 m of Main Channel Banks (Y/N)	Source
547	41,255	1029.98	1030.65	0.68	0.68	Y	CITY
548	41,233	1030.18	1030.49	0.31	0.31	Y	CITY
549	41,228	1030.17	1030.45	0.28	0.28	Y	CITY
550	41,218	1030.16	1030.37	0.22	0.22	Y	CITY
551	41,058	1029.86	1029.89	0.02	0.02	Y	CITY
552	41,032	1029.72	1029.82	0.10	0.10	Y	CITY
553	41,018	1029.71	1029.79	0.08	0.08	Y	CITY
554	41,014	1029.80	1029.78	-0.01	0.01	Y	CITY
555	41,003	1029.67	1029.76	0.09	0.09	Y	CITY
556	40,997	1029.63	1029.75	0.12	0.12	Y	CITY
557	40,980	1029.49	1029.71	0.22	0.22	Y	CITY
558	40,967	1029.53	1029.69	0.15	0.15	Y	CITY
559	40,642	1029.24	1029.20	-0.04	0.04	Y	CITY
560	40,599	1029.20	1029.17	-0.03	0.03	Y	CITY
561	40,572	1029.24	1029.15	-0.09	0.09	Y	CITY
562	40,570	1029.03	1029.14	0.11	0.11	Y	CITY
563	40,566	1029.18	1029.14	-0.04	0.04	Y	CITY
564	40,443	1028.10	1028.47	0.38	0.38	Y	CITY
565	40,439	1027.22	1028.45	1.23	1.23	Y	EXCLUDE-CITY
566	40,436	1028.23	1028.45	0.22	0.22	Y	CITY
567	40,422	1028.04	1028.45	0.41	0.41	Y	CITY
568	40,388	1028.11	1028.45	0.35	0.35	Y	CITY
569	40,264	1027.98	1028.33	0.35	0.35	Y	CITY
570	40,247	1027.80	1028.30	0.50	0.50	Y	CITY
571	40,154	1027.62	1028.02	0.40	0.40	Y	CITY
572	40,071	1027.60	1027.77	0.17	0.17	Y	CITY
573	40,007	1027.60	1027.66	0.07	0.07	Y	CITY
574	40,007	1027.60	1027.66	0.06	0.06	Y	CITY
575	39,951	1027.55	1027.45	-0.10	0.10	Y	CITY
576	37,576	1023.14	1023.35	0.22	0.22	Y	CITY
577	37,566	1023.10	1023.32	0.23	0.23	Y	CITY
578	37,556	1023.10	1023.29	0.19	0.19	Y	CITY
579	37,556	1023.10	1023.29	0.19	0.19	Y	CITY
580	37,539	1023.10	1023.24	0.14	0.14	Y	CITY
581	37,535	1023.02	1023.23	0.21	0.21	Y	CITY
582	37,530	1023.07	1023.22	0.15	0.15	Y	CITY
583	37,527	1023.26	1023.21	-0.05	0.05	Y	CITY
584	37,522	1023.06	1023.19	0.13	0.13	Y	CITY
585	37,519	1022.84	1023.18	0.34	0.34	Y	CITY
586	37,517	1022.89	1023.17	0.28	0.28	Y	CITY
587	37,506	1022.87	1023.09	0.22	0.22	Y	CITY
588	37,452	1022.84	1022.70	-0.14	0.14	Y	CITY

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Table C-1: High Flow Calibration (2013 Flood) – Comparison of Simulated Water Surface Profile and Surveyed Highwater Marks – Bow River

XS No.	River Station (m)	Surveyed Highwater Mark Elevation (m)	Simulated Water Level (m)	Difference (Surveyed - Simulated) (m)	Absolute Difference (Simulated - Surveyed) (m)	Within 50 m of Main Channel Banks (Y/N)	Source
589	37,444	1022.87	1022.65	-0.21	0.21	Y	CITY
590	37,436	1022.81	1022.63	-0.18	0.18	Y	CITY
591	37,432	1022.77	1022.62	-0.15	0.15	Y	CITY
592	37,432	1022.78	1022.62	-0.16	0.16	Y	CITY
593	37,428	1022.85	1022.60	-0.25	0.25	Y	AEP
594	37,402	1022.66	1022.53	-0.13	0.13	Y	CITY
595	37,394	1022.83	1022.51	-0.32	0.32	Y	CITY
596	37,384	1022.80	1022.48	-0.33	0.33	Y	CITY
597	37,374	1022.96	1022.45	-0.51	0.51	Y	CITY
598	37,371	1022.91	1022.44	-0.47	0.47	Y	CITY
599	37,371	1022.91	1022.44	-0.47	0.47	Y	CITY
600	37,361	1022.90	1022.41	-0.48	0.48	Y	CITY
601	36,569	1021.27	1021.26	-0.02	0.02	Y	CITY
602	36,552	1021.07	1021.23	0.15	0.15	Y	CITY
603	36,520	1021.18	1021.17	-0.01	0.01	Y	CITY
604	36,516	1021.02	1021.16	0.14	0.14	Y	CITY
605	35,116	1019.24	1019.46	0.21	0.21	Y	CITY
606	35,096	1019.20	1019.43	0.22	0.22	Y	CITY
607	35,068	1018.74	1019.39	0.65	0.65	Y	CITY
608	34,820	1019.14	1018.88	-0.26	0.26	Y	CITY
609	34,647	1018.53	1018.51	-0.02	0.02	Y	CITY
610	34,616	1018.30	1018.45	0.15	0.15	Y	CITY
611	34,586	1018.27	1018.40	0.13	0.13	Y	CITY
612	34,552	1018.23	1018.34	0.11	0.11	Y	CITY
613	34,539	1018.28	1018.31	0.03	0.03	Y	CITY
614	34,489	1018.16	1018.21	0.04	0.04	Y	CITY
615	34,462	1018.20	1018.15	-0.05	0.05	Y	CITY
616	34,393	1018.04	1018.02	-0.02	0.02	Y	CITY
617	34,375	1018.14	1017.98	-0.16	0.16	Y	CITY
618	34,373	1018.17	1017.98	-0.19	0.19	Y	CITY
619	34,287	1017.62	1017.83	0.21	0.21	Y	CITY
620	34,214	1017.60	1017.70	0.10	0.10	Y	CITY
621	32,939	1015.49	1016.05	0.56	0.56	Y	EXCLUDE-CITY
622	32,908	1015.51	1015.91	0.40	0.40	Y	CITY
623	32,898	1015.37	1015.85	0.48	0.48	Y	CITY
624	32,893	1015.34	1015.83	0.49	0.49	Y	CITY
625	32,886	1014.75	1015.79	1.04	1.04	Y	EXCLUDE-CITY
626	32,880	1015.34	1015.75	0.41	0.41	Y	CITY
627	32,876	1015.48	1015.73	0.25	0.25	Y	CITY
628	32,862	1014.89	1015.65	0.76	0.76	Y	EXCLUDE-CITY
629	32,826	1014.79	1015.45	0.66	0.66	Y	EXCLUDE-CITY
630	32,823	1015.16	1015.43	0.28	0.28	Y	CITY

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Table C-1: High Flow Calibration (2013 Flood) – Comparison of Simulated Water Surface Profile and Surveyed Highwater Marks – Bow River

XS No.	River Station (m)	Surveyed Highwater Mark Elevation (m)	Simulated Water Level (m)	Difference (Surveyed - Simulated) (m)	Absolute Difference (Simulated - Surveyed) (m)	Within 50 m of Main Channel Banks (Y/N)	Source
631	32,821	1015.11	1015.42	0.31	0.31	Y	CITY
632	32,797	1015.33	1015.29	-0.04	0.04	Y	CITY
633	32,796	1014.93	1015.28	0.35	0.35	Y	CITY
634	32,786	1014.97	1015.22	0.25	0.25	Y	CITY
635	32,747	1015.08	1014.93	-0.15	0.15	Y	CITY
636	32,736	1014.96	1014.84	-0.12	0.12	Y	CITY
637	32,735	1014.91	1014.83	-0.08	0.08	Y	CITY
638	32,731	1014.95	1014.81	-0.14	0.14	Y	CITY
639	32,731	1014.95	1014.81	-0.14	0.14	Y	CITY
640	32,704	1014.10	1014.78	0.68	0.68	Y	EXCLUDE-CITY
641	31,552	1012.53	1012.53	0.01	0.01	Y	CITY
642	31,536	1012.61	1012.49	-0.11	0.11	Y	CITY
643	31,493	1012.37	1012.40	0.03	0.03	Y	CITY
644	31,475	1012.20	1012.36	0.15	0.15	Y	CITY
645	31,450	1012.08	1012.30	0.22	0.22	Y	CITY
646	31,430	1012.14	1012.26	0.12	0.12	Y	CITY
647	31,410	1011.98	1012.21	0.23	0.23	Y	CITY
648	31,395	1011.93	1012.18	0.25	0.25	Y	CITY
649	31,382	1011.69	1012.15	0.46	0.46	Y	CITY
650	31,369	1011.98	1012.12	0.14	0.14	Y	CITY
651	31,346	1011.88	1012.07	0.19	0.19	Y	CITY
652	31,325	1011.90	1012.04	0.14	0.14	Y	CITY
653	31,278	1011.56	1011.96	0.41	0.41	Y	CITY
654	30,125	1009.25	1009.33	0.08	0.08	Y	CITY
655	29,661	1008.48	1008.76	0.28	0.28	Y	CITY
656	28,664	1006.52	1006.76	0.24	0.24	Y	CITY
657	28,653	1006.66	1006.75	0.09	0.09	Y	CITY
658	28,636	1006.43	1006.74	0.30	0.30	Y	CITY
659	28,630	1006.40	1006.73	0.33	0.33	Y	CITY
660	28,607	1006.57	1006.71	0.15	0.15	Y	CITY
661	28,593	1006.45	1006.70	0.25	0.25	Y	CITY
662	28,006	1005.43	1005.74	0.30	0.30	Y	CITY
663	27,977	1005.46	1005.69	0.23	0.23	Y	CITY
664	27,943	1004.93	1005.64	0.72	0.72	Y	EXCLUDE-CITY
665	27,418	1004.69	1004.67	-0.02	0.02	Y	CITY
666	26,897	1003.62	1003.85	0.23	0.23	Y	CITY
667	26,845	1003.60	1003.78	0.18	0.18	Y	CITY
668	26,736	1003.56	1003.62	0.06	0.06	Y	CITY
669	26,699	1003.39	1003.60	0.21	0.21	Y	CITY
670	26,680	1003.26	1003.51	0.25	0.25	Y	CITY
671	26,650	1003.31	1003.38	0.07	0.07	Y	CITY
672	26,152	1002.49	1002.30	-0.19	0.19	Y	CITY

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Table C-1: High Flow Calibration (2013 Flood) – Comparison of Simulated Water Surface Profile and Surveyed Highwater Marks – Bow River

XS No.	River Station (m)	Surveyed Highwater Mark Elevation (m)	Simulated Water Level (m)	Difference (Surveyed - Simulated) (m)	Absolute Difference (Simulated - Surveyed) (m)	Within 50 m of Main Channel Banks (Y/N)	Source
673	26,134	1002.42	1002.27	-0.15	0.15	Y	CITY
674	26,057	1002.19	1002.17	-0.02	0.02	Y	CITY
675	26,017	1002.27	1002.11	-0.15	0.15	Y	CITY
676	25,900	1002.11	1001.96	-0.15	0.15	Y	CITY
677	24,245	999.58	999.71	0.13	0.13	Y	CITY
678	24,234	999.21	999.70	0.49	0.49	Y	CITY
679	23,995	998.40	998.98	0.59	0.59	Y	EXCLUDE-CITY
680	23,984	998.54	998.93	0.39	0.39	Y	CITY
681	23,979	998.09	998.91	0.81	0.81	Y	EXCLUDE-CITY
682	23,979	998.09	998.90	0.81	0.81	Y	EXCLUDE-CITY
683	23,974	998.01	998.88	0.88	0.88	Y	EXCLUDE-CITY
684	23,968	998.43	998.84	0.41	0.41	Y	CITY
685	23,935	998.04	998.63	0.59	0.59	Y	CITY
686	23,924	998.23	998.56	0.33	0.33	Y	CITY
687	23,919	998.05	998.50	0.46	0.46	Y	CITY
688	23,899	998.05	998.30	0.25	0.25	Y	CITY
689	23,895	998.22	998.25	0.03	0.03	Y	CITY
690	23,888	997.66	998.18	0.52	0.52	Y	EXCLUDE-CITY
691	23,885	998.22	998.15	-0.07	0.07	Y	CITY
692	23,884	998.39	998.14	-0.25	0.25	Y	CITY
693	23,883	997.81	998.14	0.33	0.33	Y	CITY
694	23,871	998.39	998.11	-0.28	0.28	Y	CITY
695	23,737	997.94	997.95	0.00	0.00	Y	CITY
696	23,462	997.27	997.45	0.18	0.18	Y	CITY
697	23,350	996.92	997.35	0.42	0.42	Y	CITY
698	23,046	996.91	997.09	0.18	0.18	Y	CITY
699	22,725	995.79	996.81	1.02	1.02	Y	CITY
700	22,706	994.91	996.80	1.89	1.89	Y	EXCLUDE-CITY
701	22,618	996.24	996.60	0.36	0.36	Y	CITY
702	20,953	992.63	992.67	0.04	0.04	Y	CITY
703	20,953	992.63	992.67	0.04	0.04	Y	CITY
704	20,690	992.15	992.20	0.05	0.05	Y	CITY
705	20,477	991.39	991.81	0.42	0.42	Y	CITY
706	20,308	991.07	991.43	0.37	0.37	Y	CITY
707	19,984	990.55	990.75	0.19	0.19	Y	CITY
708	19,882	990.31	990.57	0.26	0.26	Y	CITY
709	19,745	990.35	990.32	-0.03	0.03	Y	CITY
710	19,596	988.93	990.03	1.10	1.10	Y	EXCLUDE-CITY
711	19,418	989.28	989.60	0.32	0.32	Y	CITY
712	19,264	989.06	989.24	0.18	0.18	Y	CITY
713	18,394	986.83	987.12	0.30	0.30	Y	CITY
714	18,386	986.88	987.05	0.17	0.17	Y	CITY

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Table C-1: High Flow Calibration (2013 Flood) – Comparison of Simulated Water Surface Profile and Surveyed Highwater Marks – Bow River

XS No.	River Station (m)	Surveyed Highwater Mark Elevation (m)	Simulated Water Level (m)	Difference (Surveyed - Simulated) (m)	Absolute Difference (Simulated - Surveyed) (m)	Within 50 m of Main Channel Banks (Y/N)	Source
715	18,353	986.73	986.76	0.03	0.03	Y	CITY
716	18,318	986.78	986.50	-0.27	0.27	Y	CITY
717	18,305	986.64	986.43	-0.21	0.21	Y	CITY

Note: Only highwater marks within 50 m of the main channel banks are reported and used to calculate the statistical difference between simulated water levels and measured highwater marks.

Table C-2: High Flow Calibration (2013 Flood) – Comparison of Simulated Water Surface Profile and Surveyed Highwater Marks – Lower Elbow River

XS No.	River Station (m)	Surveyed Highwater Mark Elevation (m)	Simulated Water Level (m)	Difference (Surveyed - Simulated) (m)	Absolute Difference (Simulated - Surveyed) (m)	Within 50 m of Main Channel Banks (Y/N)	Source
1	8,563	1056.80	1056.82	0.03	0.03	Y	CITY
2	8,493	1056.70	1056.80	0.11	0.11	Y	CITY
3	8,441	1056.48	1056.78	0.30	0.30	Y	CITY
4	8,425	1056.39	1056.77	0.38	0.38	Y	CITY
5	7,743	1055.78	1055.75	-0.02	0.02	Y	CITY
6	7,724	1055.86	1055.74	-0.12	0.12	Y	CITY
7	7,678	1055.75	1055.70	-0.05	0.05	Y	CITY
8	7,644	1055.81	1055.65	-0.16	0.16	Y	CITY
9	7,611	1055.62	1055.55	-0.06	0.06	Y	CITY
10	7,604	1055.60	1055.51	-0.08	0.08	Y	CITY
11	7,600	1055.17	1055.53	0.36	0.36	Y	CITY
12	7,532	1055.47	1055.41	-0.06	0.06	Y	CITY
13	7,260	1055.13	1055.20	0.07	0.07	Y	AEP
14	7,246	1055.05	1055.18	0.13	0.13	Y	CITY
15	7,192	1054.90	1054.83	-0.09	0.09	Y	AEP
16	7,189	1054.87	1054.82	-0.07	0.07	Y	AEP
17	6,894	1054.62	1054.62	-0.01	0.01	Y	CITY
18	6,481	1054.47	1054.28	-0.18	0.18	Y	CITY
19	6,461	1054.17	1054.19	0.02	0.02	Y	CITY
20	6,438	1054.45	1054.11	-0.34	0.34	Y	CITY
21	6,419	1054.24	1054.06	-0.18	0.18	Y	CITY
22	6,401	1054.37	1054.06	-0.31	0.31	Y	CITY
23	6,367	1053.90	1054.03	0.14	0.14	Y	CITY
24	6,059	1053.42	1053.51	0.10	0.10	Y	CITY
25	5,951	1053.51	1053.47	-0.05	0.05	Y	CITY
26	5,676	1053.10	1053.07	-0.03	0.03	Y	CITY
27	5,626	1050.04	1052.97	2.94	2.94	Y	EXCLUDE-CITY
28	5,614	1052.96	1052.96	0.00	0.00	Y	CITY
29	5,477	1052.79	1052.82	0.04	0.04	Y	CITY
30	5,308	1052.64	1052.58	-0.06	0.06	Y	CITY

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Table C-2: High Flow Calibration (2013 Flood) – Comparison of Simulated Water Surface Profile and Surveyed Highwater Marks – Lower Elbow River

XS No.	River Station (m)	Surveyed Highwater Mark Elevation (m)	Simulated Water Level (m)	Difference (Surveyed - Simulated) (m)	Absolute Difference (Simulated - Surveyed) (m)	Within 50 m of Main Channel Banks (Y/N)	Source
31	5,258	1052.66	1052.55	-0.10	0.10	Y	CITY
32	5,258	1052.72	1052.55	-0.16	0.16	Y	CITY
33	5,206	1052.74	1052.54	-0.20	0.20	Y	CITY
34	5,093	1052.50	1052.51	0.02	0.02	Y	CITY
35	4,968	1052.09	1052.33	0.25	0.25	Y	CITY
36	4,663	1051.47	1051.43	-0.03	0.03	Y	CITY
37	4,622	1051.38	1051.31	-0.06	0.06	Y	CITY
38	4,522	1051.06	1051.14	0.09	0.09	Y	CITY
39	4,232	1050.55	1050.22	-0.32	0.32	Y	CITY
40	4,187	1050.32	1050.11	-0.21	0.21	Y	CITY
41	3,922	1049.50	1049.63	0.13	0.13	Y	CITY
42	3,885	1049.05	1049.61	0.55	0.55	Y	CITY
43	3,696	1049.51	1049.15	-0.37	0.37	Y	CITY
44	3,677	1049.97	1049.16	-0.80	0.80	Y	EXCLUDE-CITY
45	3,668	1049.21	1049.17	-0.04	0.04	Y	AEP
46	3,662	1049.14	1049.17	0.04	0.04	Y	AEP
47	3,632	1048.86	1049.17	0.31	0.31	Y	CITY
48	3,588	1049.36	1049.16	-0.20	0.20	Y	CITY
49	3,507	1048.75	1048.93	0.17	0.17	Y	CITY
50	3,477	1049.18	1048.72	-0.46	0.46	Y	CITY
51	3,343	1048.35	1048.51	0.15	0.15	Y	CITY
52	3,321	1048.33	1048.45	0.11	0.11	Y	CITY
53	3,297	1048.36	1048.39	0.02	0.02	Y	CITY
54	3,237	1048.07	1048.32	0.25	0.25	Y	CITY
55	3,192	1047.85	1048.26	0.40	0.40	Y	CITY
56	3,173	1047.86	1048.18	0.31	0.31	Y	CITY
57	3,137	1047.77	1048.01	0.22	0.22	Y	CITY
58	3,113	1047.76	1047.92	0.15	0.15	Y	CITY
59	3,101	1047.62	1047.88	0.24	0.24	Y	CITY
60	3,097	1047.62	1047.87	0.23	0.23	Y	CITY
61	3,093	1047.51	1047.85	0.33	0.33	Y	CITY
62	3,071	1047.57	1047.78	0.19	0.19	Y	CITY
63	3,050	1047.32	1047.77	0.43	0.43	Y	CITY
64	3,018	1047.37	1047.75	0.36	0.36	Y	CITY
65	2,944	1046.87	1047.51	0.61	0.61	Y	CITY
66	2,943	1047.07	1047.51	0.40	0.40	Y	CITY
67	2,925	1046.87	1047.36	0.45	0.45	Y	CITY
68	2,879	1047.39	1047.27	-0.16	0.16	Y	CITY
69	2,818	1047.00	1047.27	0.22	0.22	Y	CITY
70	2,804	1046.75	1047.26	0.46	0.46	Y	CITY
71	2,794	1046.90	1047.25	0.30	0.30	Y	CITY
72	2,782	1046.98	1047.22	0.20	0.20	Y	CITY

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Classification: Public

Table C-2: High Flow Calibration (2013 Flood) – Comparison of Simulated Water Surface Profile and Surveyed Highwater Marks – Lower Elbow River

XS No.	River Station (m)	Surveyed Highwater Mark Elevation (m)	Simulated Water Level (m)	Difference (Surveyed - Simulated) (m)	Absolute Difference (Simulated - Surveyed) (m)	Within 50 m of Main Channel Banks (Y/N)	Source
73	2,766	1046.91	1047.20	0.24	0.24	Y	CITY
74	2,761	1046.50	1047.20	0.65	0.65	Y	EXCLUDE-AEP
75	2,759	1046.71	1047.20	0.44	0.44	Y	CITY
76	2,754	1046.74	1047.20	0.42	0.42	Y	CITY
77	2,751	1047.22	1047.20	-0.06	0.06	Y	CITY
78	2,749	1046.97	1047.20	0.19	0.19	Y	AEP
79	2,693	1046.28	1047.04	0.72	0.72	Y	EXCLUDE-AEP
80	2,619	1046.24	1046.60	0.30	0.30	Y	CITY
81	2,476	1046.13	1046.04	-0.13	0.13	Y	CITY
82	2,297	1045.56	1045.63	0.12	0.12	Y	CITY
83	2,283	1045.58	1045.61	0.09	0.09	Y	CITY
84	2,269	1045.55	1045.60	0.12	0.12	Y	CITY
85	2,259	1046.24	1045.61	-0.57	0.57	Y	EXCLUDE-CITY
86	2,250	1045.56	1045.62	0.13	0.13	Y	CITY
87	2,243	1046.24	1045.62	-0.55	0.55	Y	EXCLUDE-CITY
88	2,234	1045.49	1045.63	0.21	0.21	Y	CITY
89	2,226	1045.64	1045.63	0.07	0.07	Y	CITY
90	2,226	1045.64	1045.63	0.07	0.07	Y	CITY
91	2,222	1045.53	1045.64	0.18	0.18	Y	CITY
92	1,979	1045.57	1045.49	-0.27	0.27	Y	CITY
93	1,973	1045.68	1045.48	-0.38	0.38	Y	CITY
94	1,956	1046.19	1045.44	-0.97	0.97	Y	EXCLUDE-CITY
95	1,947	1045.68	1045.41	-0.52	0.52	Y	CITY
96	1,204	1043.47	1043.60	0.13	0.13	Y	CITY
97	965	1042.91	1043.24	0.33	0.33	Y	CITY
98	954	1042.93	1043.19	0.27	0.27	Y	CITY
99	941	1042.84	1043.07	0.23	0.23	Y	CITY
100	934	1042.87	1043.01	0.14	0.14	Y	CITY
101	934	1042.99	1043.01	0.02	0.02	Y	CITY
102	928	1043.01	1042.95	-0.06	0.06	Y	CITY
103	897	1042.49	1042.84	0.36	0.36	Y	CITY
104	876	1042.42	1042.82	0.40	0.40	Y	CITY
105	844	1042.48	1042.77	0.30	0.30	Y	CITY
106	813	1042.54	1042.73	0.19	0.19	Y	CITY
107	753	1042.31	1042.71	0.40	0.40	Y	CITY
108	734	1042.29	1042.67	0.38	0.38	Y	CITY
109	718	1042.28	1042.64	0.36	0.36	Y	CITY
110	705	1042.29	1042.62	0.33	0.33	Y	CITY
111	684	1042.28	1042.58	0.29	0.29	Y	CITY
112	669	1041.96	1042.55	0.59	0.59	Y	CITY
113	648	1041.55	1042.49	0.94	0.94	Y	EXCLUDE-CITY
114	634	1041.94	1042.45	0.51	0.51	Y	CITY

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Table C-2: High Flow Calibration (2013 Flood) – Comparison of Simulated Water Surface Profile and Surveyed Highwater Marks – Lower Elbow River

XS No.	River Station (m)	Surveyed Highwater Mark Elevation (m)	Simulated Water Level (m)	Difference (Surveyed - Simulated) (m)	Absolute Difference (Simulated - Surveyed) (m)	Within 50 m of Main Channel Banks (Y/N)	Source
115	610	1041.99	1042.38	0.39	0.39	Y	CITY
116	586	1042.09	1042.29	0.20	0.20	Y	CITY
117	557	1042.00	1042.13	0.13	0.13	Y	CITY
118	465	1041.37	1041.95	0.58	0.58	Y	CITY
119	431	1041.38	1041.91	0.53	0.53	Y	CITY
120	386	1041.00	1041.77	0.78	0.78	Y	EXCLUDE-CITY
121	353	1040.20	1041.69	1.49	1.49	Y	EXCLUDE-CITY
122	349	1041.18	1041.68	0.51	0.51	Y	CITY
123	314	1040.63	1041.40	0.77	0.77	Y	EXCLUDE-CITY
124	294	1041.12	1041.36	0.24	0.24	Y	AEP
125	270	1041.07	1041.34	0.28	0.28	Y	EXCLUDE-CITY
126	240	1040.98	1041.31	0.32	0.32	Y	EXCLUDE-CITY
127	213	1040.96	1041.27	0.31	0.31	Y	EXCLUDE-CITY
128	176	1040.88	1041.23	0.35	0.35	Y	EXCLUDE-CITY
129	125	1040.65	1041.21	0.56	0.56	Y	EXCLUDE-CITY
130	88	1040.65	1041.26	0.61	0.61	Y	EXCLUDE-CITY

Note: Only highwater marks within 50 m of the main channel banks are reported and used to calculate the statistical difference between simulated water levels and measured highwater marks.

Table C-3: High Flow Calibration (2013 Flood) – Comparison of Simulated Water Surface Profile and Surveyed Highwater Marks – Upper Elbow River

XS No.	River Station (m)	Surveyed Highwater Mark Elevation (m)	Simulated Water Level (Subcritical) (m)	Simulated Water Level (Supercritical) (m)	Selected Profile	Difference (Simulated - Surveyed) (m)	Absolute Difference (Simulated - Surveyed) (m)	Source
1	62,187	1309.76	1310.75	1310.09	supercritical	0.33	0.33	AEP
2	61,710	1306.37	1306.38	1305.91	subcritical	0.01	0.01	AEP
3	60,552	1297.26	1297.81	1297.68	supercritical	0.43	0.43	AEP
4	60,009	1293.11	1294.18	1294.14	supercritical	1.04	1.04	AEP
5	59,724	1290.76	1291.12	1291.02	supercritical	0.26	0.26	AEP
6	57,587	1272.90	1274.86	1274.04	supercritical	1.14	1.14	EXCLUDED-AEP
7	57,196	1270.64	1272.05	1271.13	supercritical	0.50	0.50	AEP
8	55,372	1259.04	1258.84	1258.32	subcritical	-0.20	0.20	AEP
9	54,344	1251.89	1251.27	1250.39	subcritical	-0.62	0.62	AEP
10	52,884	1239.99	1239.72	1239.34	subcritical	-0.26	0.26	AEP
11	48,216	1207.03	1209.07	1206.80	supercritical	-0.23	0.23	AEP
12	33,612	1124.22	1124.22	1123.96	subcritical	0.00	0.00	AEP
13	29,264	1105.88	1106.45	1104.54	subcritical	0.56	0.56	AEP
14	25,397	1092.75	1092.89	1092.24	subcritical	0.14	0.14	AEP
15	20,522	1082.87	1082.87	1082.05	subcritical	0.00	0.00	AEP
16	20,472	1082.85	1082.76	1082.04	subcritical	-0.09	0.09	AEP

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APPENDIX D

High Flow Model Validation Results

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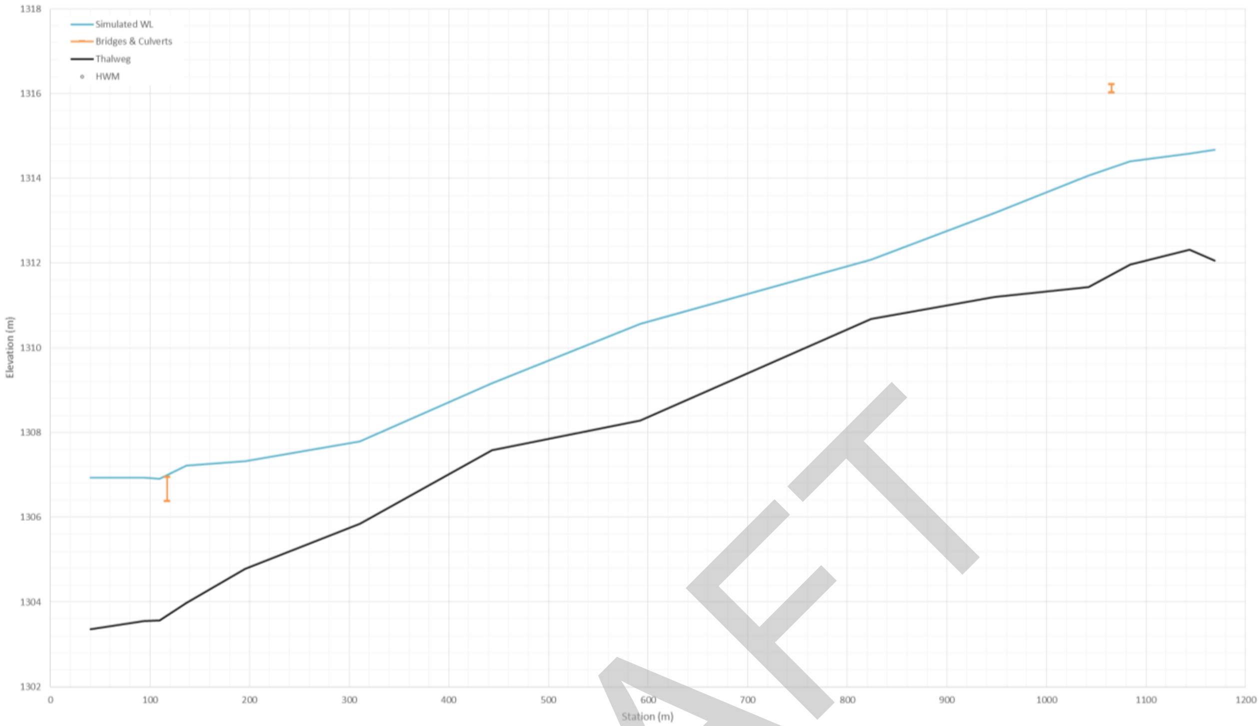

Figure D-1: High Flow Validation (2013 Flood) – Comparison of Simulated Water Surface Profile and Surveyed Highwater Marks – Bragg Creek

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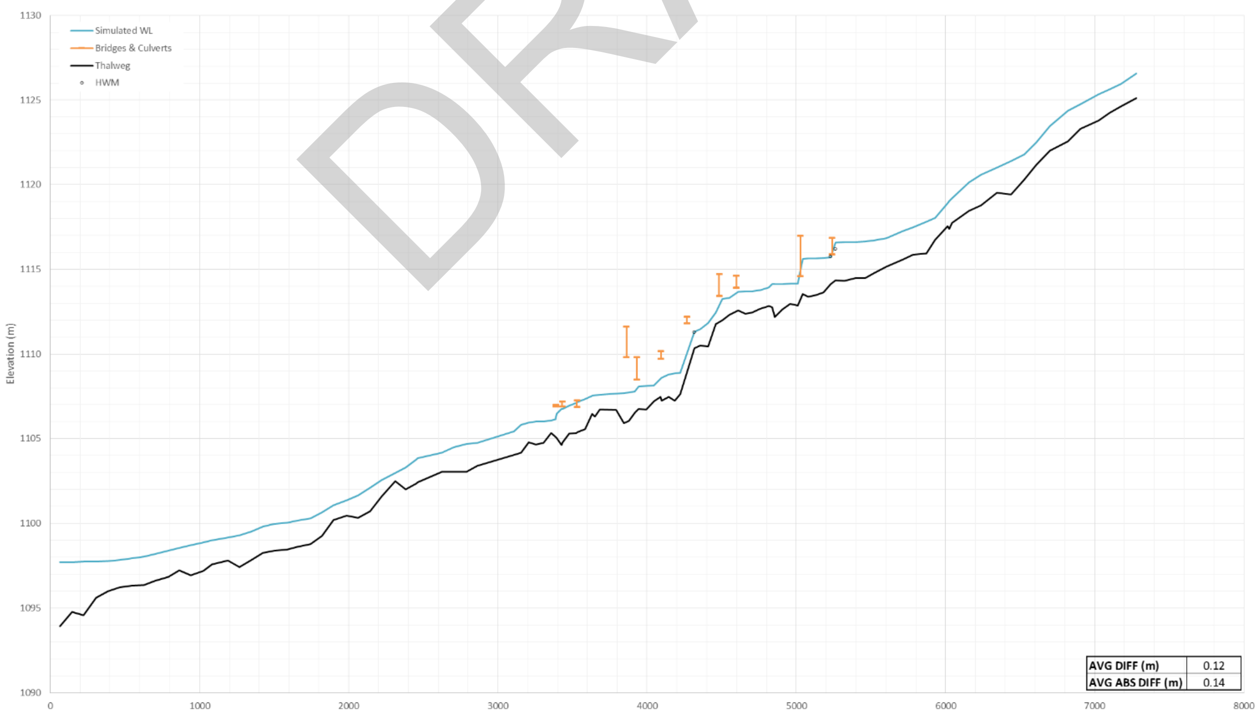

Figure D-2: High Flow Validation (2013 Flood) – Comparison of Simulated Water Surface Profile and Surveyed Highwater Marks – Lott Creek

Classification: Public

Table D-1: High Flow Validation (2013 Flood) – Comparison of Simulated Water Surface Profile and Surveyed Highwater Marks – Lott Creek

XS No.	River Station (m)	Surveyed Highwater Mark Elevation (m)	Simulated Water Level (m)	Difference (Surveyed - Simulated) (m)	Absolute Difference (Simulated - Surveyed) (m)	Source
1	5,262	1116.20	1116.58	0.38	0.38	AEP
2	5,231	1115.75	1115.72	-0.03	0.03	AEP
3	4,318	1111.29	1111.30	0.01	0.01	AEP

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APPENDIX E

Open Water Flood Frequency Profile Tables

Classification: Public

Table E1: Flood Frequency Profiles – Bow River

River	Model Reach	River Station (m)	Minimum Channel Elevation (m)	Simulated Water Levels for Various Flood Events (m)													Notes
				2-year	5-year	10-year	20-year	35-year	50-year	75-year	100-year	200-year	350-year	500-year	750-year	1,000-year	
Bow River	B6_USBC_Prince	69,677	1074.20	1077.21	1077.77	1078.23	1078.73	1079.18	1079.47	1079.83	1080.08	1080.76	1081.37	1081.80	1082.30	1082.68	XS 1
Bow River	B6_USBC_Prince	69,470	1074.40	1076.98	1077.51	1077.95	1078.43	1078.85	1079.13	1079.47	1079.71	1080.35	1080.92	1081.33	1081.80	1082.16	XS 2
Bow River	B6_USBC_Prince	69,224	1074.20	1076.68	1077.12	1077.48	1077.87	1078.24	1078.50	1078.80	1079.01	1079.57	1080.04	1080.31	1080.68	1080.98	XS 3
Bow River	B6_USBC_Prince	69,034	1074.40	1076.28	1076.72	1077.11	1077.56	1077.97	1078.26	1078.59	1078.83	1079.44	1079.94	1080.29	1080.71	1081.05	XS 4
Bow River	B6_USBC_Prince	68,801	1073.40	1075.60	1076.19	1076.67	1077.18	1077.64	1077.95	1078.30	1078.55	1079.18	1079.68	1080.01	1080.47	1080.82	XS 5
Bow River	B6_USBC_Prince	68,607	1073.00	1075.38	1075.98	1076.45	1076.94	1077.38	1077.66	1077.99	1078.23	1078.84	1079.34	1079.68	1080.10	1080.48	XS 6
Bow River	B6_USBC_Prince	68,262	1072.00	1074.90	1075.55	1076.06	1076.60	1077.07	1077.38	1077.74	1078.01	1078.64	1079.17	1079.53	1079.99	1080.40	XS 7
Bow River	B6_USBC_Prince	67,833	1070.80	1074.52	1075.04	1075.44	1075.83	1076.17	1076.39	1076.65	1076.83	1077.34	1077.81	1078.15	1078.62	1078.93	XS 8
Bow River	B6_USBC_Prince	67,522	1072.00	1074.18	1074.62	1074.97	1075.36	1075.70	1075.94	1076.21	1076.42	1076.98	1077.50	1077.87	1078.36	1078.78	XS 9
Bow River	B6_USBC_Prince	67,197	1071.00	1073.38	1073.93	1074.29	1074.68	1075.03	1075.29	1075.60	1075.83	1076.45	1077.01	1077.42	1077.95	1078.40	XS 10
Bow River	B6_USBC_Prince	66,720	1070.00	1072.51	1073.15	1073.66	1074.14	1074.57	1074.86	1075.21	1075.46	1076.10	1076.71	1077.14	1077.72	1078.21	XS 11
Bow River	B6_USBC_Prince	66,484	1068.80	1072.13	1072.70	1073.13	1073.66	1074.15	1074.48	1074.85	1075.10	1075.79	1076.44	1076.90	1077.50	1078.00	XS 12
Bow River	B6_USBC_Prince	66,280	1068.80	1071.70	1072.29	1072.75	1073.26	1073.69	1073.97	1074.31	1074.57	1075.33	1076.02	1076.50	1077.13	1077.66	XS 13
Bow River	B6_USBC_Prince	66,148	1069.20	1071.54	1072.20	1072.73	1073.30	1073.78	1074.09	1074.46	1074.73	1075.47	1076.14	1076.61	1077.23	1077.75	XS 14; U/S of Stoney Trail Bridge
Bow River	B6_USBC_Prince	66,062	1068.80	1071.50	1072.17	1072.71	1073.28	1073.76	1074.07	1074.44	1074.71	1075.44	1076.11	1076.58	1077.19	1077.71	XS 15; D/S of Stoney Trail Bridge
Bow River	B6_USBC_Prince	65,934	1068.60	1071.40	1072.06	1072.57	1073.12	1073.58	1073.88	1074.23	1074.49	1075.19	1075.84	1076.29	1076.89	1077.40	XS 16
Bow River	B6_USBC_Prince	65,837	1068.00	1071.17	1071.72	1072.13	1072.56	1072.92	1073.16	1073.47	1073.71	1074.39	1075.09	1075.57	1076.28	1076.91	XS 17
Bow River	B6_USBC_Prince	65,687	1067.80	1071.01	1071.54	1071.96	1072.40	1072.77	1073.03	1073.35	1073.60	1074.34	1075.06	1075.55	1076.26	1076.88	XS 18
Bow River	B6_USBC_Prince	65,467	1068.40	1070.75	1071.28	1071.68	1072.11	1072.49	1072.78	1073.15	1073.43	1074.24	1075.01	1075.54	1076.28	1076.92	XS 19
Bow River	B6_USBC_Prince	65,266	1068.30	1070.35	1070.91	1071.36	1071.84	1072.28	1072.60	1073.00	1073.30	1074.16	1074.95	1075.48	1076.23	1076.88	XS 20
Bow River	B6_USBC_Prince	65,103	1067.80	1070.11	1070.70	1071.16	1071.65	1072.12	1072.46	1072.88	1073.19	1074.07	1074.87	1075.42	1076.18	1076.83	XS 21
Bow River	B6_USBC_Prince	64,915	1068.00	1069.83	1070.45	1070.95	1071.48	1071.99	1072.35	1072.79	1073.12	1074.02	1074.83	1075.38	1076.15	1076.82	XS 22
Bow River	B6_USBC_Prince	64,750	1067.21	1069.56	1070.18	1070.69	1071.28	1071.81	1072.19	1072.64	1072.97	1073.88	1074.70	1075.24	1076.02	1076.68	XS 23
Bow River	B6_USBC_Prince	64,557	1066.40	1069.33	1069.90	1070.35	1070.83	1071.24	1071.53	1071.88	1072.11	1072.82	1073.46	1073.87	1074.45	1075.38	XS 24; U/S of 85th Street Bridge
Bow River	B6_USBC_Prince	64,528	1066.40	1069.27	1069.83	1070.26	1070.71	1071.11	1071.38	1071.71	1071.94	1072.58	1073.19	1073.60	1074.07	1074.32	XS 25; D/S of 85th Street Bridge
Bow River	B6_USBC_Prince	64,470	1066.73	1069.17	1069.71	1070.13	1070.58	1070.98	1071.27	1071.61	1071.86	1072.53	1073.18	1073.63	1074.14	1074.46	XS 26
Bow River	B6_USBC_Prince	64,212	1065.82	1068.66	1069.27	1069.74	1070.26	1070.72	1071.05	1071.44	1071.72	1072.47	1073.19	1073.69	1074.25	1074.66	XS 27
Bow River	B6_USBC_Prince	63,991	1064.80	1068.16	1068.86	1069.43	1070.00	1070.50	1070.85	1071.26	1071.55	1072.33	1073.07	1073.59	1074.17	1074.59	XS 28
Bow River	B6_USBC_Prince	63,911	1064.20	1068.04	1068.76	1069.32	1069.90	1070.40	1070.74	1071.15	1071.43	1072.19	1072.92	1073.43	1074.03	1074.48	XS 29; U/S of Bowmont Bridge
Bow River	B6_USBC_Prince	63,892	1064.22	1068.02	1068.72	1069.27	1069.84	1070.35	1070.69	1071.10	1071.38	1072.14	1072.88	1073.38	1073.98	1074.44	XS 30; D/S of Bowmont Bridge
Bow River	B6_USBC_Prince	63,823	1063.20	1067.93	1068.60	1069.15	1069.73	1070.25	1070.60	1071.02	1071.30	1072.07	1072.81	1073.31	1073.91	1074.38	XS 31; U/S of CP Rail Twin Bridges
Bow River	B6_USBC_Prince	63,795	1062.40	1067.95	1068.62	1069.16	1069.72	1070.19	1070.51	1070.89	1071.14	1071.82	1072.38	1072.76	1073.20	1073.52	XS 32; D/S of CP Rail Twin Bridges
Bow River	B6_USBC_Prince	63,720	1064.60	1067.88	1068.57	1069.10	1069.65	1070.11	1070.43	1070.80	1071.05	1071.73	1072.30	1072.69	1073.13	1073.47	XS 33
Bow River	B6_USBC_Prince	63,575	1065.00	1067.68	1068.32	1068.84	1069.40	1069.89	1070.23	1070.62	1070.88	1071.56	1072.12	1072.49	1072.94	1073.28	XS 34
Bow River	B6_USBC_Prince	63,403	1064.84	1067.49	1068.16	1068.69	1069.24	1069.73	1070.06	1070.44	1070.68	1071.33	1071.85	1072.19	1072.63	1072.95	XS 35
Bow River	B6_USBC_Prince	63,152	1063.20	1067.22	1067.82	1068.30	1068.80	1069.22	1069.48	1069.79	1069.98	1070.45	1070.92	1071.24	1071.64	1071.93	XS 36
Bow River	B6_USBC_Prince	62,954	1063.60	1066.95	1067.48	1067.90	1068.32	1068.68	1068.92	1069.19	1069.39	1069.91	1070.38	1070.71	1071.10	1071.41	XS 37
Bow River	B6_USBC_Prince	62,746	1064.20	1066.55	1067.09	1067.51	1067.93	1068.29	1068.53	1068.82	1069.02	1069.57	1070.06	1070.39	1070.81	1071.12	XS 38

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Table E1: Flood Frequency Profiles – Bow River

River	Model Reach	River Station (m)	Minimum Channel Elevation (m)	Simulated Water Levels for Various Flood Events (m)													Notes
				2-year	5-year	10-year	20-year	35-year	50-year	75-year	100-year	200-year	350-year	500-year	750-year	1,000-year	
Bow River	B6_USBC_Prince	62,477	1063.80	1065.95	1066.53	1066.96	1067.42	1067.82	1068.09	1068.41	1068.63	1069.21	1069.71	1070.06	1070.49	1070.82	XS 39
Bow River	B6_USBC_Prince	62,155	1062.60	1065.59	1066.22	1066.66	1067.12	1067.53	1067.81	1068.12	1068.34	1068.91	1069.41	1069.75	1070.18	1070.51	XS 40
Bow River	B6_USBC_Prince	61,879	1061.20	1065.22	1065.82	1066.26	1066.74	1067.15	1067.42	1067.72	1067.93	1068.45	1068.89	1069.21	1069.61	1069.93	XS 41
Bow River	B6_USBC_Prince	61,402	1061.60	1064.46	1065.09	1065.55	1066.00	1066.37	1066.60	1066.88	1067.08	1067.65	1068.17	1068.53	1068.97	1069.34	XS 42
Bow River	B6_USBC_Prince	61,123	1061.60	1064.00	1064.66	1065.17	1065.71	1066.13	1066.39	1066.70	1066.92	1067.53	1068.07	1068.44	1068.90	1069.27	XS 43
Bow River	B6_USBC_Prince	60,868	1060.60	1063.56	1064.31	1064.91	1065.50	1065.94	1066.22	1066.55	1066.77	1067.40	1067.95	1068.32	1068.78	1069.16	XS 44
Bow River	B6_USBC_Prince	60,688	1058.64	1063.37	1064.07	1064.61	1065.14	1065.57	1065.85	1066.18	1066.42	1067.10	1067.67	1068.05	1068.53	1068.91	XS 45
Bow River	B6_USBC_Prince	60,540	1057.39	1063.20	1063.83	1064.33	1064.84	1065.28	1065.56	1065.91	1066.19	1066.96	1067.56	1067.95	1068.43	1068.82	XS 46
Bow River	B6_USBC_Prince	60,382	1060.00	1062.92	1063.51	1063.99	1064.53	1065.00	1065.32	1065.70	1066.01	1066.83	1067.45	1067.85	1068.33	1068.73	XS 47
Bow River	B6_USBC_Prince	60,250	1060.20	1062.66	1063.25	1063.74	1064.30	1064.80	1065.14	1065.51	1065.86	1066.71	1067.34	1067.74	1068.22	1068.62	XS 48
Bow River	B6_USBC_Prince	60,089	1060.00	1062.36	1062.96	1063.45	1064.03	1064.56	1064.89	1065.26	1065.64	1066.52	1067.14	1067.54	1068.03	1068.43	XS 49
Bow River	B6_USBC_Prince	59,957	1060.00	1062.07	1062.67	1063.18	1063.75	1064.26	1064.63	1065.04	1065.44	1066.39	1067.01	1067.40	1067.90	1068.32	XS 50; U/S of Hextall Bridge
Bow River	B6_USBC_Prince	59,929	1060.00	1061.86	1062.43	1062.92	1063.47	1063.94	1064.23	1064.57	1064.91	1065.70	1066.38	1066.78	1067.33	1067.84	XS 51; Between Hextall Bridge and Shouldice Bridge
Bow River	B6_USBC_Prince	59,893	1059.93	1061.77	1062.36	1062.86	1063.41	1063.89	1064.21	1064.55	1064.82	1065.43	1066.02	1066.46	1067.14	1067.75	XS 52; D/S of Shouldice Bridge
Bow River	B6_USBC_Prince	59,651	1058.80	1061.25	1061.90	1062.43	1063.03	1063.52	1063.84	1064.17	1064.43	1065.05	1065.85	1066.37	1067.10	1067.72	XS 53
Bow River	B6_USBC_Prince	59,544	1058.01	1061.15	1061.79	1062.33	1062.94	1063.45	1063.78	1064.11	1064.31	1065.12	1065.89	1066.40	1067.12	1067.73	XS 54; U/S of Trans-Canada Hwy Bridge
Bow River	B6_USBC_Prince	59,488	1056.60	1061.05	1061.63	1062.09	1062.56	1062.98	1063.25	1063.58	1063.79	1064.19	1065.56(1)	1065.97(1)	1066.55(1)	1067.04(1)	XS 55; D/S of Trans-Canada Hwy Bridge
Bow River	B6_USBC_Prince	59,392	1058.00	1060.97	1061.55	1062.02	1062.51	1062.95	1063.24	1063.60	1063.84	1064.31	1064.99	1065.23	1065.58	1065.85	XS 56
Bow River	B6_USBC_Prince	59,231	1057.40	1060.65	1061.17	1061.59	1062.03	1062.44	1062.76	1063.19	1063.46	1064.22	1064.61	1064.89	1065.34	1065.65	XS 57
Bow River	B6_USBC_Prince	59,071	1057.27	1060.22	1060.63	1060.97	1061.36	1061.76	1062.05	1062.40	1062.69	1063.50	1064.13	1064.59	1065.15	1065.49	XS 58
Bow River	B6_USBC_Prince	58,789	1057.60	1059.57	1060.06	1060.51	1061.02	1061.51	1061.86	1062.27	1062.57	1063.32	1063.94	1064.37	1064.90	1065.24	XS 59
Bow River	B6_USBC_Prince	58,702	1057.00	1059.30	1059.84	1060.31	1060.84	1061.33	1061.68	1062.09	1062.40	1063.14	1063.81	1064.29	1064.84	1065.19	XS 60
Bow River	B6_USBC_Prince	58,530	1056.40	1058.94	1059.55	1060.07	1060.64	1061.15	1061.51	1061.94	1062.25	1063.01	1063.64	1064.14	1064.73	1065.08	XS 61
Bow River	B6_USBC_Prince	58,335	1055.00	1058.63	1059.19	1059.64	1060.14	1060.59	1060.90	1061.27	1061.54	1062.26	1063.06	1063.58	1064.19	1064.52	XS 62
Bow River	B6_USBC_Prince	58,091	1055.60	1058.31	1058.83	1059.26	1059.74	1060.17	1060.47	1060.83	1061.09	1061.67	1062.17	1062.49	1062.88	1063.21	XS 63
Bow River	B6_USBC_Prince	57,831	1055.80	1057.88	1058.39	1058.80	1059.27	1059.69	1059.98	1060.34	1060.61	1061.35	1061.99	1062.41	1062.87	1063.17	XS 64; Montgomery Berm on LOB
Bow River	B6_USBC_Prince	57,610	1055.39	1057.35	1057.91	1058.39	1058.96	1059.43	1059.76	1060.16	1060.46	1061.20	1061.86	1062.29	1062.75	1063.08	XS 65; Montgomery Berm on LOB
Bow River	B6_USBC_Prince	57,480	1055.00	1057.02	1057.59	1058.06	1058.62	1059.10	1059.44	1059.84	1060.13	1060.89	1061.59	1062.05	1062.49	1062.83	XS 66
Bow River	B6_USBC_Prince	57,219	1053.80	1056.54	1057.10	1057.56	1058.06	1058.52	1058.85	1059.24	1059.53	1060.41	1061.19	1061.66	1062.18	1062.53	XS 67
Bow River	B6_USBC_Prince	57,081	1053.51	1056.33	1056.88	1057.33	1057.83	1058.28	1058.60	1059.01	1059.31	1060.20	1061.04	1061.47	1061.99	1062.32	XS 68; U/S of Harry Boothman Bridge
Bow River	B6_USBC_Prince	57,049	1053.00	1056.26	1056.79	1057.22	1057.71	1058.16	1058.48	1058.88	1059.17	1059.99	1060.72	1061.16	1061.59	1061.93	XS 69; D/S of Harry Boothman Bridge
Bow River	B6_USBC_Prince	56,912	1053.00	1056.12	1056.63	1057.05	1057.54	1057.98	1058.31	1058.70	1059.00	1059.81	1060.53	1060.93	1061.35	1061.64	XS 70
Bow River	B6_USBC_Prince	56,731	1053.51	1055.87	1056.32	1056.73	1057.22	1057.69	1058.03	1058.45	1058.77	1059.63	1060.40	1060.84	1061.30	1061.61	XS 71
Bow River	B6_USBC_Prince	56,529	1052.80	1055.46	1055.93	1056.39	1056.95	1057.48	1057.85	1058.31	1058.65	1059.59	1060.43	1060.89	1061.37	1061.68	XS 72
Bow River	B6_USBC_Prince	56,353	1052.78	1054.96	1055.61	1056.15	1056.77	1057.33	1057.71	1058.19	1058.53	1059.47	1060.31	1060.77	1061.24	1061.55	XS 73
Bow River	B6_USBC_Prince	56,076	1051.40	1054.47	1055.09	1055.59	1056.14	1056.62	1056.95	1057.35	1057.66	1058.55	1059.56	1060.11	1060.62	1060.95	XS 74
Bow River	B6_USBC_Prince	55,902	1050.40	1054.26	1054.79	1055.21	1055.67	1056.06	1056.32	1056.63	1056.84	1057.36	1057.75	1058.57	1059.25	1059.64	XS 75

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Table E1: Flood Frequency Profiles – Bow River

River	Model Reach	River Station (m)	Minimum Channel Elevation (m)	Simulated Water Levels for Various Flood Events (m)													Notes
				2-year	5-year	10-year	20-year	35-year	50-year	75-year	100-year	200-year	350-year	500-year	750-year	1,000-year	
Bow River	B6_USBC_Prince	55,631	1051.60	1054.00	1054.48	1054.87	1055.30	1055.68	1055.94	1056.24	1056.45	1056.99	1057.46	1057.75	1058.12	1058.41	XS 76
Bow River	B6_USBC_Prince	55,434	1051.80	1053.74	1054.19	1054.58	1055.02	1055.42	1055.69	1056.01	1056.24	1056.87	1057.42	1057.78	1058.22	1058.53	XS 77
Bow River	B6_USBC_Prince	55,322	1051.00	1053.48	1054.00	1054.42	1054.88	1055.31	1055.60	1055.94	1056.18	1056.85	1057.42	1057.79	1058.24	1058.57	XS 78
Bow River	B6_USBC_Prince	54,971	1050.00	1052.86	1053.32	1053.69	1054.09	1054.45	1054.69	1055.00	1055.25	1055.89	1056.45	1056.82	1057.25	1057.55	XS 79
Bow River	B6_USBC_Prince	54,799	1050.20	1052.60	1053.05	1053.41	1053.80	1054.16	1054.41	1054.72	1054.96	1055.62	1056.19	1056.58	1057.02	1057.33	XS 80
Bow River	B6_USBC_Prince	54,612	1050.40	1052.28	1052.70	1053.03	1053.40	1053.74	1054.00	1054.34	1054.61	1055.36	1055.96	1056.35	1056.80	1057.11	XS 81
Bow River	B6_USBC_Prince	54,403	1049.60	1051.75	1052.09	1052.37	1052.77	1053.21	1053.56	1054.01	1054.34	1055.17	1055.81	1056.22	1056.67	1056.98	XS 82
Bow River	B6_USBC_Prince	54,141	1049.00	1051.17	1051.60	1052.04	1052.60	1053.14	1053.53	1054.00	1054.34	1055.19	1055.85	1056.28	1056.74	1057.07	XS 83
Bow River	B6_USBC_Prince	53,940	1048.20	1050.79	1051.35	1051.86	1052.47	1053.03	1053.43	1053.91	1054.25	1055.12	1055.78	1056.21	1056.68	1057.00	XS 84
Bow River	B6_USBC_Prince	53,690	1047.80	1050.29	1050.87	1051.36	1051.94	1052.47	1052.85	1053.29	1053.61	1054.42	1055.17	1055.69	1056.21	1056.56	XS 85
Bow River	B6_USBC_Prince	53,575	1047.60	1050.08	1050.62	1051.10	1051.64	1052.15	1052.51	1052.93	1053.22	1053.91	1054.59	1055.11	1055.67	1056.01	XS 86
Bow River	B6_USBC_Prince	53,523	1047.40	1049.95	1050.48	1050.95	1051.50	1052.01	1052.37	1052.80	1053.08	1053.70	1054.26	1054.77	1055.24	1055.46	XS 87; U/S of Crowchild Trail Bridge
Bow River	B6_USBC_Prince	53,475	1047.60	1049.77	1050.25	1050.71	1051.25	1051.76	1052.12	1052.54	1052.85	1053.73	1054.55	1055.04	1055.54	1055.83	XS 88; D/S of Crowchild Trail Bridge
Bow River	B6_USBC_Prince	53,299	1047.13	1049.10	1049.78	1050.31	1050.91	1051.46	1051.84	1052.30	1052.63	1053.64	1054.52	1055.02	1055.53	1055.84	XS 89
Bow River	B6_USBC_Prince	53,127	1044.00	1048.96	1049.58	1050.06	1050.57	1051.03	1051.34	1051.70	1051.96	1052.59	1053.17	1053.45	1054.08	1054.57	XS 90
Bow River	B6_USBC_Prince	52,944	1044.63	1048.84	1049.42	1049.89	1050.40	1050.85	1051.17	1051.53	1051.79	1052.42	1052.93	1053.09	1053.70	1054.15	XS 91; West Hillhurst Berm on LOB
Bow River	B6_USBC_Prince	52,791	1045.53	1048.59	1049.13	1049.58	1050.07	1050.51	1050.82	1051.19	1051.46	1052.23	1052.87	1053.11	1053.32	1053.52	XS 92; West Hillhurst Berm on LOB
Bow River	B6_USBC_Prince	52,701	1045.56	1048.27	1048.81	1049.25	1049.72	1050.16	1050.45	1050.81	1051.06	1051.90	1052.73	1052.95	1053.08	1053.48	XS 93; West Hillhurst Berm on LOB
Bow River	B6_USBC_Prince	52,614	1045.00	1048.10	1048.66	1049.11	1049.60	1050.03	1050.33	1050.69	1050.95	1051.65	1052.64	1052.82	1052.94	1053.47	XS 94; West Hillhurst Berm on LOB
Bow River	B6_USBC_Prince	52,484	1045.21	1047.97	1048.51	1048.94	1049.40	1049.82	1050.10	1050.43	1050.67	1051.29	1051.73	1052.81	1052.97	1053.53	XS 95; West Hillhurst Berm on LOB
Bow River	B6_USBC_Prince	52,228	1045.40	1047.60	1048.10	1048.49	1048.93	1049.32	1049.59	1049.91	1050.14	1050.72	1050.91	1051.32	1052.79	1053.35	XS 96; West Hillhurst Berm on LOB
Bow River	B6_USBC_Prince	52,076	1045.12	1047.33	1047.82	1048.20	1048.64	1049.04	1049.30	1049.63	1049.86	1050.43	1050.60(1)	1051.16(1)	1051.55(1)	1051.81(1)	XS 97; U/S of Mewata Bridge; West Hillhurst Berm on LOB
Bow River	B6_USBC_Prince	52,022	1045.20	1047.20	1047.67	1048.03	1048.45	1048.85	1049.10	1049.42	1049.64	1050.14	1050.49	1051.11	1051.11(2)	1051.27	XS 98; D/S of Mewata Bridge; Kensington Berm on LOB
Bow River	B6_USBC_Prince	51,854	1044.67	1046.74	1047.20	1047.58	1048.03	1048.46	1048.74	1049.09	1049.31	1049.79	1050.08	1050.24	1050.70	1050.95	XS 99; Kensington Berm on LOB
Bow River	B6_USBC_Prince	51,663	1043.40	1046.37	1046.81	1047.19	1047.68	1048.15	1048.47	1048.87	1049.10	1049.68	1050.03	1050.25	1050.46	1050.74	XS 100; Kensington Berm on LOB
Bow River	B6_USBC_Prince	51,449	1043.80	1045.87	1046.34	1046.77	1047.31	1047.82	1048.18	1048.60	1048.83	1049.51	1049.86	1050.10	1050.32	1050.64	XS 101; Kensington Berm on LOB
Bow River	B6_USBC_Prince	51,286	1042.60	1045.44	1045.99	1046.48	1047.06	1047.59	1047.96	1048.40	1048.61	1049.08	1049.76	1049.68(1)	1050.21	1050.54	XS 102; U/S of Louise Bridge
Bow River	B6_USBC_Prince	51,244	1042.61	1045.08	1045.77	1046.31	1046.90	1047.42	1047.77	1048.18	1048.35	1048.81	1049.27	1049.57	1050.05	1050.41	XS 103; D/S of Louise Bridge
Bow River	B6_USBC_Prince	51,166	1042.37	1044.85	1045.59	1046.11	1046.69	1047.20	1047.54	1047.92	1048.04	1048.79	1049.37	1049.51	1050.01	1050.37	XS 104; U/S of NW LRT Bridge; Sunnyside Berm on LOB
Bow River	B6_USBC_Prince	51,135	1041.80	1044.75	1045.47	1046.00	1046.56	1047.06	1047.40	1047.79	1047.92	1048.72	1049.31	1049.43	1049.94	1050.32	XS 105; D/S of NW LRT Bridge; Sunnyside Berm on LOB
Bow River	B6_USBC_Prince	51,040	1041.40	1044.59	1045.28	1045.83	1046.41	1046.91	1047.25	1047.63	1047.74	1048.64	1049.22	1049.29	1049.77	1050.14	XS 106; Sunnyside Berm on LOB
Bow River	B6_USBC_Prince	50,888	1040.60	1044.61	1045.28	1045.83	1046.40	1046.90	1047.24	1047.70	1047.84	1048.59	1049.14	1049.19	1049.65	1050.03	XS 107; Sunnyside Berm on LOB
Bow River	B6_USBC_Prince	50,773	1041.20	1044.51	1045.16	1045.69	1046.24	1046.72	1047.04	1047.53	1047.64	1048.41	1049.05	1049.06	1049.57	1049.95	XS 108; U/S of Peace Bridge; Sunnyside Berm on LOB
Bow River	B6_USBC_Prince	50,737	1041.53	1044.47	1045.12	1045.64	1046.19	1046.66	1046.98	1047.35	1047.39	1047.92	1048.37	1049.06	1049.56	1049.96	XS 109; D/S of Peace Bridge; Sunnyside Berm on LOB

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Table E1: Flood Frequency Profiles – Bow River

River	Model Reach	River Station (m)	Minimum Channel Elevation (m)	Simulated Water Levels for Various Flood Events (m)													Notes
				2-year	5-year	10-year	20-year	35-year	50-year	75-year	100-year	200-year	350-year	500-year	750-year	1,000-year	
Bow River	B5_Prince	50,647	1039.41	1044.47	1045.12	1045.64	1046.19	1046.66	1046.99	1047.41	1047.48	1048.12	1048.68	1049.08	1049.59	1049.98	XS 110; Sunnyside Berm on LOB
Bow River	B5_Prince	50,538	1041.60	1044.28	1044.87	1045.34	1045.85	1046.31	1046.64	1046.99	1047.43	1048.10	1048.67	1049.08	1049.59	1049.99	XS 111; Sunnyside Berm on LOB
Bow River	B5_Prince	50,356	1040.60	1043.98	1044.60	1045.10	1045.64	1046.13	1046.49	1047.00	1047.35	1048.03	1048.62	1049.04	1049.55	1049.95	XS 112; Sunnyside Berm on LOB
Bow River	B5_Prince	50,157	1041.16	1043.70	1044.34	1044.86	1045.43	1045.96	1046.33	1046.85	1047.20	1047.91	1048.50	1048.93	1049.45	1049.85	XS 113; Sunnyside Berm on LOB
Bow River	B5_Prince	49,977	1039.28	1043.49	1044.10	1044.60	1045.16	1045.67	1046.07	1046.53	1046.89	1047.58	1048.17	1048.61	1049.15	1049.56	XS 114; U/S of Prince's Island Bridge; Sunnyside Berm on LOB
Bow River	B5_Prince	49,948	1039.00	1043.44	1044.04	1044.53	1045.06	1045.55	1045.92	1046.37	1046.72	1047.43	1048.05	1048.50	1049.04	1049.45	XS 115; D/S of Prince's Island Bridge; Sunnyside Berm on LOB
Bow River	B5_Prince	49,799	1039.40	1043.13	1043.75	1044.25	1044.80	1045.32	1045.71	1046.20	1046.57	1047.30	1047.93	1048.40	1048.95	1049.37	XS 116; Sunnyside Berm on LOB
Bow River	B5_Prince	49,673	1039.00	1042.71	1043.40	1043.94	1044.54	1045.11	1045.53	1046.05	1046.44	1047.19	1047.85	1048.31	1048.87	1049.29	XS 117; Sunnyside Berm on LOB
Bow River	B5_Prince	49,553	1039.20	1042.31	1042.93	1043.46	1044.08	1044.67	1045.11	1045.65	1046.05	1046.81	1047.47	1047.95	1048.52	1048.95	XS 118; Sunnyside Berm on LOB
Bow River	B5_Prince	49,465	1039.20	1042.06	1042.69	1043.24	1043.87	1044.47	1044.91	1045.45	1045.85	1046.61	1047.28	1047.77	1048.34	1048.77	XS 119; Sunnyside Berm on LOB
Bow River	B4_Prince_Zoo	49,338	1039.33	1041.97	1042.63	1043.19	1043.84	1044.45	1044.89	1045.44	1045.85	1046.60	1047.26	1047.75	1048.31	1048.75	XS 120; Sunnyside Berm on LOB
Bow River	B4_Prince_Zoo	49,287	1038.20	1041.89	1042.53	1043.09	1043.73	1044.33	1044.76	1045.30	1045.70	1046.51	1047.17	1047.65	1048.20	1048.62	XS 121; U/S of Centre St Bridge; Sunnyside Berm on LOB
Bow River	B4_Prince_Zoo	49,247	1038.33	1041.64	1042.25	1042.76	1043.35	1043.87	1044.24	1044.66	1044.95	1045.61	1046.17	1046.58	1046.94	1047.25	XS 122; D/S of Centre St Bridge; Memorial Drive Berm on LOB; Riverwalk Berm on ROB
Bow River	B4_Prince_Zoo	49,065	1038.80	1041.28	1041.91	1042.45	1043.05	1043.60	1043.99	1044.43	1044.71	1045.44	1046.01	1046.43	1046.79	1047.09	XS 123; Memorial Drive Berm on LOB; Riverwalk Berm on ROB
Bow River	B4_Prince_Zoo	48,937	1038.60	1041.04	1041.67	1042.20	1042.79	1043.32	1043.70	1044.11	1044.39	1044.98	1045.48	1045.88	1046.10	1046.34	XS 124; Memorial Drive Berm on LOB; Riverwalk Berm on ROB
Bow River	B4_Prince_Zoo	48,766	1038.08	1040.72	1041.37	1041.90	1042.50	1043.04	1043.41	1043.82	1044.08	1044.78	1045.29	1045.70	1045.87	1046.07	XS 125; Riverwalk Berm on ROB
Bow River	B4_Prince_Zoo	48,535	1037.32	1040.37	1040.98	1041.48	1042.04	1042.53	1042.88	1043.22	1043.63	1044.35	1044.96	1045.49	1045.62	1045.86	XS 126; U/S of 4th Ave Flyover Bridge; Langevin Bridge Berm on LOB; Riverwalk Berm on ROB
Bow River	B4_Prince_Zoo	48,488	1036.60	1040.29	1040.87	1041.34	1041.85	1042.30	1042.61	1042.90	1043.19	1043.35	1044.73	1045.30	1045.30(2)	1045.48	XS 127; Between 4th Ave Flyover Bridge and Old Langevin Bridge; Langevin Bridge Berm on LOB; Riverwalk Berm on ROB
Bow River	B4_Prince_Zoo	48,450	1036.20	1040.26	1040.83	1041.29	1041.80	1042.24	1042.55	1042.82	1042.98	1043.24	1043.39	1043.56	1044.63	1044.96	XS 128; D/S of Old Langevin Bridge; Langevin Bridge Berm on LOB; Riverwalk Berm on ROB
Bow River	B4_Prince_Zoo	48,385	1037.20	1040.19	1040.73	1041.17	1041.66	1042.09	1042.39	1042.63	1042.75	1042.75(2)	1043.38	1043.84	1044.34	1044.79	XS 129; U/S of Edmonton Trail Bridge; Langevin Bridge Berm on LOB; Riverwalk Berm on ROB
Bow River	B4_Prince_Zoo	48,341	1037.20	1040.10	1040.61	1041.02	1041.49	1041.89	1042.16	1042.43	1042.56	1043.41	1043.51	1043.61	1044.45	1044.80	XS 130; Between Edmonton Trail Bridge and Harry Kroeger Bridge; Riverwalk Berm on ROB
Bow River	B4_Prince_Zoo	48,290	1037.20	1040.03	1040.53	1040.95	1041.40	1041.81	1042.08	1042.40	1042.63	1043.26	1043.76	1044.06	1044.49	1044.79	XS 131; D/S of Harry Kroeger Bridge; Riverwalk Berm on ROB; Bridgeland Berm on LOB
Bow River	B3_Zoo	48,120	1037.40	1039.68	1040.19	1040.61	1041.07	1041.47	1041.74	1042.04	1042.27	1043.15	1043.68	1043.99	1044.44	1044.75	XS 132; Riverwalk Berm on ROB
Bow River	B3_Zoo	48,062	1037.20	1039.56	1040.05	1040.46	1040.91	1041.29	1041.54	1041.82	1042.02	1042.18	1042.31	1043.11	1043.62	1043.95	XS 133; U/S of St Patrick's Island Bridge; Riverwalk Berm on ROB
Bow River	B3_Zoo	48,012	1036.22	1039.52	1040.02	1040.42	1040.86	1041.25	1041.50	1041.77	1041.98	1042.69	1043.10	1043.46	1043.91	1044.23	XS 134; D/S of St Patrick's Island Bridge; Riverwalk Berm on ROB
Bow River	B3_Zoo	47,907	1036.60	1039.35	1039.81	1040.19	1040.62	1041.00	1041.25	1041.57	1041.81	1042.48	1042.89	1043.28	1043.74	1044.08	XS 135; Riverwalk Berm on ROB

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Table E1: Flood Frequency Profiles – Bow River

River	Model Reach	River Station (m)	Minimum Channel Elevation (m)	Simulated Water Levels for Various Flood Events (m)													Notes
				2-year	5-year	10-year	20-year	35-year	50-year	75-year	100-year	200-year	350-year	500-year	750-year	1,000-year	
Bow River	B3_Zoo	47,607	1036.00	1038.30	1038.80	1039.23	1039.64	1040.02	1040.26	1040.55	1040.78	1041.41	1041.78	1042.05	1042.36	1042.58	XS 136
Bow River	B2_Zoo	47,382	1034.20	1037.78	1038.39	1038.87	1039.36	1039.78	1040.04	1040.36	1040.61	1041.29	1041.69	1041.99	1042.34	1042.60	XS 137; West Inglewood Berm on ROB
Bow River	B2_Zoo	47,110	1033.40	1037.51	1038.14	1038.62	1039.13	1039.57	1039.83	1040.14	1040.39	1041.09	1041.49	1041.79	1042.14	1042.41	XS 138; West Inglewood Berm on ROB
Bow River	B2_Zoo	46,899	1033.64	1037.31	1037.92	1038.38	1038.87	1039.28	1039.52	1039.82	1040.06	1040.76	1041.14	1041.50	1041.87	1042.15	XS 139; U/S of St George's Island Bridge; West Inglewood Berm on ROB
Bow River	B2_Zoo	46,852	1034.60	1037.23	1037.83	1038.28	1038.75	1039.16	1039.40	1039.70	1039.93	1040.52	1040.85	1041.19	1041.64	1041.95	XS 140; D/S of St George's Island Bridge; West Inglewood Berm on ROB
Bow River	B2_Zoo	46,664	1034.80	1036.98	1037.56	1037.99	1038.46	1038.87	1039.10	1039.38	1039.60	1040.22	1040.58	1040.95	1041.43	1041.74	XS 141; West Inglewood Berm on ROB
Bow River	B2_Zoo	46,359	1034.40	1036.45	1037.12	1037.55	1038.03	1038.43	1038.61	1038.85	1039.03	1039.53	1040.19	1040.65	1041.18	1041.52	XS 142; Inglewood Flood Barrier on ROB
Bow River	B1_Zoo_DSBC	46,078	1033.40	1036.28	1036.94	1037.35	1037.83	1038.22	1038.38	1038.60	1038.76	1039.26	1039.85	1040.33	1040.90	1041.26	XS 143
Bow River	B1_Zoo_DSBC	45,933	1032.41	1036.24	1036.88	1037.27	1037.74	1038.11	1038.24	1038.44	1038.57	1038.99	1039.56	1039.94	1040.65	1041.08	XS 144
Bow River	B1_Zoo_DSBC	45,915	1032.00	1036.24	1036.88	1037.27	1037.74	1038.10	1038.23	1038.41	1038.53	1038.89	1039.29	1039.57	1039.98	1040.22	XS 145; U/S of CP Bridge
Bow River	B1_Zoo_DSBC	45,896	1031.41	1036.24	1036.88	1037.26	1037.72	1038.07	1038.19	1038.35	1038.46	1038.76	1038.99	1039.11	1039.36	1039.57	XS 146; D/S of CP Bridge
Bow River	B1_Zoo_DSBC	45,814	1031.80	1036.22	1036.85	1037.22	1037.67	1038.02	1038.14	1038.29	1038.39	1038.68	1038.91	1039.05	1039.36	1039.65	XS 147; Pearce Estate Park Berm on ROB
Bow River	B1_Zoo_DSBC	45,570	1031.20	1036.20	1036.83	1037.21	1037.66	1038.01	1038.12	1038.27	1038.39	1038.70	1038.94	1039.08	1039.40	1039.71	XS 148; U/S of Western Headworks Weir; Pearce Estate Park Berm on ROB
Bow River	B1_Zoo_DSBC	45,525	1032.00	1034.45	1035.10	1035.63	1036.16	1036.59	1036.87	1037.17	1037.41	1038.02	1038.60	1039.02	1039.53	1039.86	XS 149; D/S of Western Headworks Weir; Pearce Estate Park Berm on ROB
Bow River	B1_Zoo_DSBC	45,439	1031.40	1034.28	1034.92	1035.43	1035.97	1036.39	1036.67	1036.98	1037.21	1037.82	1038.47	1038.90	1039.43	1039.77	XS 150; Pearce Estate Park Berm on ROB
Bow River	B1_Zoo_DSBC	45,128	1029.49	1033.59	1034.27	1034.81	1035.38	1035.87	1036.18	1036.53	1036.80	1037.48	1038.18	1038.65	1039.22	1039.59	XS 151
Bow River	B1_Zoo_DSBC	44,792	1029.60	1032.95	1033.64	1034.17	1034.72	1035.18	1035.48	1035.80	1036.05	1036.80	1037.67	1038.23	1038.90	1039.31	XS 152
Bow River	B1_Zoo_DSBC	44,644	1028.80	1032.81	1033.46	1033.96	1034.47	1034.88	1035.13	1035.39	1035.59	1036.14	1036.85	1037.28	1037.82	1038.14	XS 153; U/S of Cushing Bridge
Bow River	B1_Zoo_DSBC	44,600	1028.01	1032.78	1033.41	1033.89	1034.38	1034.76	1034.99	1035.22	1035.39	1035.78	1036.10	1036.29	1036.50	1036.64	XS 154; D/S of Cushing Bridge
Bow River	B1_Zoo_DSBC	44,473	1023.88	1032.74	1033.35	1033.80	1034.27	1034.64	1034.86	1035.09	1035.26	1035.68	1036.04	1036.29	1036.59	1036.81	XS 155; South Inglewood Berm on ROB
Bow River	B1_Zoo_DSBC	44,315	1027.73	1032.65	1033.23	1033.67	1034.12	1034.48	1034.71	1034.94	1035.11	1035.56	1036.05	1036.36	1036.75	1037.04	XS 156; South Inglewood Berm on ROB
Bow River	B1_Zoo_DSBC	44,143	1029.20	1032.34	1032.86	1033.24	1033.66	1034.01	1034.24	1034.50	1034.69	1035.20	1035.67	1035.99	1036.36	1036.64	XS 157; South Inglewood Berm on ROB
Bow River	B1_Zoo_DSBC	43,992	1029.80	1031.99	1032.55	1032.97	1033.41	1033.80	1034.05	1034.31	1034.52	1035.04	1035.52	1035.85	1036.24	1036.54	XS 158
Bow River	B1_Zoo_DSBC	43,828	1029.20	1031.51	1032.13	1032.53	1032.97	1033.35	1033.60	1033.87	1034.09	1034.69	1035.28	1035.67	1036.12	1036.45	XS 159
Bow River	B1_Zoo_DSBC	43,607	1028.50	1031.01	1031.69	1032.07	1032.51	1032.88	1033.13	1033.42	1033.66	1034.40	1035.09	1035.51	1035.99	1036.33	XS 160
Bow River	B1_Zoo_DSBC	43,450	1027.60	1030.27	1030.88	1031.41	1031.96	1032.45	1032.77	1033.12	1033.41	1034.20	1034.93	1035.37	1035.86	1036.21	XS 161
Bow River	B1_Zoo_DSBC	43,395	1025.46	1030.51	1031.14	1031.62	1032.15	1032.60	1032.90	1033.23	1033.49	1034.23	1034.93	1035.36	1035.83	1036.17	XS 162
Bow River	B1_Zoo_DSBC	43,234	1027.07	1030.42	1031.05	1031.55	1032.10	1032.56	1032.86	1033.19	1033.46	1034.21	1034.92	1035.35	1035.82	1036.16	XS 163
Bow River	B1_Zoo_DSBC	42,997	1027.60	1030.01	1030.69	1031.22	1031.78	1032.25	1032.56	1032.89	1033.16	1033.94	1034.68	1035.13	1035.60	1035.95	XS 164
Bow River	B1_Zoo_DSBC	42,744	1026.20	1029.73	1030.42	1030.94	1031.48	1031.94	1032.23	1032.55	1032.82	1033.63	1034.39	1034.84	1035.31	1035.65	XS 165
Bow River	B1_Zoo_DSBC	42,565	1026.80	1029.29	1029.88	1030.35	1030.87	1031.35	1031.69	1032.07	1032.38	1033.29	1034.13	1034.59	1035.08	1035.46	XS 166
Bow River	B1_Zoo_DSBC	42,238	1026.20	1028.64	1029.36	1029.92	1030.52	1031.06	1031.41	1031.80	1032.13	1033.09	1033.97	1034.45	1034.95	1035.34	XS 167
Bow River	B1_Zoo_DSBC	42,093	1025.60	1028.32	1029.02	1029.54	1030.09	1030.62	1030.94	1031.33	1031.67	1032.70	1033.62	1034.21	1034.80	1035.24	XS 168
Bow River	B1_Zoo_DSBC	41,978	1025.40	1028.04	1028.72	1029.23	1029.80	1030.33	1030.71	1031.12	1031.48	1032.54	1033.42	1034.04	1034.66	1035.11	XS 169
Bow River	B1_Zoo_DSBC	41,828	1024.60	1027.78	1028.47	1028.99	1029.59	1030.18	1030.56	1030.97	1031.34	1032.41	1033.29	1033.76	1034.53	1034.95	XS 170

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Table E1: Flood Frequency Profiles – Bow River

River	Model Reach	River Station (m)	Minimum Channel Elevation (m)	Simulated Water Levels for Various Flood Events (m)													Notes
				2-year	5-year	10-year	20-year	35-year	50-year	75-year	100-year	200-year	350-year	500-year	750-year	1,000-year	
Bow River	B1_Zoo_DSBC	41,638	1024.70	1027.12	1028.10	1028.79	1029.49	1030.12	1030.52	1030.95	1031.33	1032.43	1033.32	1033.81	1034.42	1034.79	XS 171
Bow River	B1_Zoo_DSBC	41,373	1022.18	1027.21	1028.07	1028.71	1029.39	1030.00	1030.39	1030.81	1031.17	1032.22	1033.06	1033.50	1034.05	1034.35	XS 172; U/S of CN Bridge
Bow River	B1_Zoo_DSBC	41,320	1021.00	1027.17	1028.00	1028.61	1029.25	1029.83	1030.19	1030.58	1030.92	1031.93	1032.73	1033.01	1033.72	1034.18	XS 173; Between CN Bridge and CP Bridge
Bow River	B1_Zoo_DSBC	41,187	1023.40	1026.95	1027.71	1028.25	1028.79	1029.29	1029.56	1029.79	1030.02	1030.59	1031.09	1031.43	1031.61	1031.61[2]	XS 174; Between CP Bridge and Bonnybrook Bridge
Bow River	B1_Zoo_DSBC	41,122	1023.80	1026.77	1027.56	1028.10	1028.66	1029.18	1029.45	1029.68	1029.92	1030.53	1031.06	1031.42	1031.87	1032.29	XS 175; D/S of Bonnybrook Bridge
Bow River	B1_Zoo_DSBC	41,038	1023.60	1026.54	1027.30	1027.83	1028.36	1028.82	1029.10	1029.43	1029.68	1030.31	1030.90	1031.29	1031.79	1032.26	XS 176
Bow River	B1_Zoo_DSBC	40,878	1022.40	1026.31	1027.05	1027.56	1028.05	1028.48	1028.74	1029.09	1029.35	1030.01	1030.63	1031.06	1031.60	1032.11	XS 177
Bow River	B1_Zoo_DSBC	40,788	1022.96	1026.19	1026.94	1027.44	1027.93	1028.34	1028.61	1028.96	1029.23	1029.90	1030.54	1030.97	1031.53	1032.05	XS 178
Bow River	B1_Zoo_DSBC	40,663	1023.08	1025.98	1026.74	1027.24	1027.72	1028.14	1028.41	1028.78	1029.05	1029.75	1030.41	1030.85	1031.44	1031.98	XS 179
Bow River	B1_Zoo_DSBC	40,518	1021.87	1025.88	1026.64	1027.12	1027.59	1027.99	1028.24	1028.65	1028.93	1029.65	1030.33	1030.77	1031.37	1031.92	XS 180; U/S of Calf Robe Bridge
Bow River	B1_Zoo_DSBC	40,440	1021.60	1025.78	1026.50	1026.93	1027.33	1027.68	1027.87	1028.13	1028.33	1028.84	1029.36	1029.70	1030.20	1030.82	XS 181; D/S of Calf Robe Bridge
Bow River	B1_Zoo_DSBC	40,371	1020.40	1025.68	1026.38	1026.80	1027.21	1027.60	1027.81	1028.09	1028.32	1028.90	1029.43	1029.83	1030.35	1031.06	XS 182
Bow River	B1_Zoo_DSBC	40,254	1022.20	1025.51	1026.22	1026.63	1027.04	1027.43	1027.64	1027.94	1028.18	1028.77	1029.34	1029.75	1030.32	1031.03	XS 183
Bow River	B1_Zoo_DSBC	40,065	1021.00	1025.33	1026.04	1026.41	1026.77	1027.09	1027.22	1027.45	1027.64	1028.12	1028.65	1029.05	1029.70	1030.57	XS 184
Bow River	B1_Zoo_DSBC	39,997	1020.60	1025.31	1026.02	1026.38	1026.73	1027.05	1027.16	1027.37	1027.54	1027.98	1028.38	1028.68	1029.14	1029.96	XS 185; U/S of CN Bridge
Bow River	B1_Zoo_DSBC	39,942	1019.45	1025.29	1025.98	1026.32	1026.65	1026.93	1027.00	1027.19	1027.33	1027.64	1027.87	1028.01	1028.15	1028.24	XS 186; D/S of CN Bridge
Bow River	B1_Zoo_DSBC	39,841	1021.80	1025.12	1025.80	1026.13	1026.46	1026.78	1026.82	1027.02	1027.17	1027.55	1027.88	1028.11	1028.39	1028.62	XS 187
Bow River	B1_Zoo_DSBC	39,697	1021.00	1024.75	1025.37	1025.75	1026.10	1026.23[1]	1026.35	1026.54	1026.70	1027.09	1027.45	1027.70	1028.02	1028.29	XS 188
Bow River	B1_Zoo_DSBC	39,587	1021.40	1024.52	1025.10	1025.58	1025.95	1026.02[1]	1026.09	1026.28	1026.43	1026.82	1027.19	1027.46	1027.80	1028.07	XS 189
Bow River	B1_Zoo_DSBC	39,436	1021.00	1024.41	1024.97	1025.47	1025.83	1025.85[1]	1025.87	1026.05	1026.19	1026.57	1026.95	1027.21	1027.57	1027.86	XS 190
Bow River	B1_Zoo_DSBC	39,313	1020.20	1024.27	1024.72	1025.13	1025.33[1]	1025.47[1]	1025.61	1025.78	1025.93	1026.35	1026.77	1027.05	1027.42	1027.67	XS 191
Bow River	B1_Zoo_DSBC	39,262	1019.80	1024.17	1024.54	1024.87	1025.12	1025.31	1025.51	1025.70	1025.85	1026.29	1026.71	1027.00	1027.37	1027.66	XS 192
Bow River	B1_Zoo_DSBC	39,120	1020.00	1023.81	1024.19	1024.50	1024.69	1024.95	1025.14	1025.35	1025.52	1026.01	1026.46	1026.76	1027.15	1027.43	XS 193
Bow River	B1_Zoo_DSBC	38,865	1020.40	1023.10	1023.60	1023.97	1024.30	1024.62	1024.84	1025.08	1025.28	1025.81	1026.30	1026.61	1027.02	1027.32	XS 194
Bow River	B1_Zoo_DSBC	38,725	1020.00	1022.72	1023.27	1023.69	1024.11	1024.46	1024.69	1024.95	1025.16	1025.71	1026.22	1026.53	1026.95	1027.25	XS 195
Bow River	B1_Zoo_DSBC	38,682	1019.80	1022.61	1023.17	1023.62	1024.07	1024.43	1024.66	1024.92	1025.12	1025.68	1026.19	1026.51	1026.92	1027.23	XS 196; Glenmore Trail Berm on ROB
Bow River	B1_Zoo_DSBC	38,513	1019.80	1022.17	1022.90	1023.40	1023.88	1024.24	1024.48	1024.74	1024.95	1025.53	1026.03	1026.36	1026.79	1027.10	XS 197; Glenmore Trail Berm on ROB
Bow River	B1_Zoo_DSBC	38,366	1018.60	1021.90	1022.64	1023.21	1023.71	1024.07	1024.30	1024.58	1024.80	1025.36	1025.91	1026.25	1026.70	1027.02	XS 198; Glenmore Trail Berm on ROB
Bow River	B1_Zoo_DSBC	38,283	1018.40	1021.76	1022.49	1022.99	1023.45	1023.84	1024.10	1024.40	1024.64	1025.26	1025.81	1026.17	1026.63	1026.96	XS 199
Bow River	B1_Zoo_DSBC	38,197	1017.20	1021.61	1022.31	1022.86	1023.37	1023.77	1024.04	1024.34	1024.58	1025.21	1025.75	1026.11	1026.58	1026.92	XS 200
Bow River	B1_Zoo_DSBC	38,125	1017.80	1021.50	1022.19	1022.70	1023.21	1023.63	1023.92	1024.23	1024.49	1025.13	1025.67	1026.02	1026.51	1026.88	XS 201
Bow River	B1_Zoo_DSBC	37,982	1017.40	1021.33	1022.00	1022.49	1022.99	1023.39	1023.66	1023.96	1024.20	1024.83	1025.36	1025.70	1026.14	1026.48	XS 202
Bow River	B1_Zoo_DSBC	37,683	1017.20	1020.81	1021.38	1021.86	1022.34	1022.75	1023.01	1023.31	1023.54	1024.12	1024.68	1025.07	1025.57	1025.93	XS 203
Bow River	B1_Zoo_DSBC	37,520	1016.20	1020.51	1021.04	1021.50	1021.95	1022.33	1022.56	1022.84	1023.06	1023.61	1024.11	1024.45	1024.90	1025.22	XS 204; U/S of Graves Bridge Upstream
Bow River	B1_Zoo_DSBC	37,480	1016.60	1020.41	1020.88	1021.33	1021.76	1022.12	1022.32	1022.59	1022.79	1023.30	1023.76	1024.06	1024.46	1024.75	XS 205; Between Graves Bridge Upstream and Graves Bridge Downstream
Bow River	B1_Zoo_DSBC	37,447	1016.80	1020.31	1020.75	1021.18	1021.61	1021.94	1022.11	1022.35	1022.54	1023.01	1023.42	1023.68	1024.02	1024.26	XS 206; D/S of Graves Bridge Downstream
Bow River	B1_Zoo_DSBC	37,301	1017.74	1019.57	1020.20	1020.74	1021.18	1021.55	1021.69	1021.93	1022.11	1022.59	1022.98	1023.25	1023.59	1023.84	XS 207

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Table E1: Flood Frequency Profiles – Bow River

River	Model Reach	River Station (m)	Minimum Channel Elevation (m)	Simulated Water Levels for Various Flood Events (m)													Notes
				2-year	5-year	10-year	20-year	35-year	50-year	75-year	100-year	200-year	350-year	500-year	750-year	1,000-year	
Bow River	B1_Zoo_DSBC	37,029	1015.60	1019.34	1020.00	1020.57	1021.01	1021.33	1021.56	1021.80	1021.98	1022.41	1022.82	1023.09	1023.44	1023.69	XS 208
Bow River	B1_Zoo_DSBC	36,882	1015.20	1019.23	1019.88	1020.45	1020.86	1021.19	1021.38	1021.60	1021.77	1022.20	1022.59	1022.85	1023.19	1023.44	XS 209
Bow River	B1_Zoo_DSBC	36,714	1014.95	1019.10	1019.71	1020.24	1020.62	1020.91	1021.09	1021.28	1021.43	1021.80	1022.13	1022.36	1022.65	1022.86	XS 210
Bow River	B1_Zoo_DSBC	36,303	1016.60	1018.64	1019.15	1019.50	1019.86	1020.14	1020.32	1020.52	1020.68	1021.08	1021.45	1021.71	1022.04	1022.29	XS 211
Bow River	B1_Zoo_DSBC	36,008	1015.40	1017.80	1018.50	1019.00	1019.44	1019.77	1019.98	1020.21	1020.38	1020.80	1021.19	1021.45	1021.80	1022.06	XS 212
Bow River	B1_Zoo_DSBC	35,723	1013.80	1017.43	1017.98	1018.40	1018.79	1019.09	1019.24	1019.45	1019.61	1020.06	1020.47	1020.76	1021.15	1021.44	XS 213
Bow River	B1_Zoo_DSBC	35,602	1014.20	1017.27	1017.77	1018.13	1018.48	1018.76	1018.98	1019.28	1019.46	1019.97	1020.42	1020.71	1021.08	1021.40	XS 214
Bow River	B1_Zoo_DSBC	35,419	1014.40	1016.89	1017.48	1017.93	1018.39	1018.75	1019.00	1019.31	1019.50	1020.01	1020.45	1020.75	1021.15	1021.45	XS 215
Bow River	B1_Zoo_DSBC	35,275	1014.60	1016.62	1017.26	1017.77	1018.26	1018.64	1018.90	1019.22	1019.41	1019.93	1020.38	1020.68	1021.08	1021.39	XS 216
Bow River	B1_Zoo_DSBC	35,136	1013.86	1016.51	1017.19	1017.71	1018.21	1018.58	1018.83	1019.15	1019.33	1019.84	1020.27	1020.57	1020.96	1021.27	XS 217
Bow River	B1_Zoo_DSBC	34,888	1012.00	1016.11	1016.82	1017.33	1017.83	1018.21	1018.46	1018.81	1018.96	1019.44	1019.83	1020.11	1020.51	1020.83	XS 218
Bow River	B1_Zoo_DSBC	34,780	1012.10	1015.94	1016.63	1017.09	1017.57	1017.95	1018.20	1018.57	1018.70	1019.09	1019.54	1019.87	1020.33	1020.67	XS 219; U/S of Eric Harvie Bridge
Bow River	B1_Zoo_DSBC	34,758	1012.20	1015.90	1016.58	1017.04	1017.52	1017.88	1018.11	1018.43	1018.61	1019.05	1019.48	1019.79	1020.25	1020.59	XS 220; D/S of Eric Harvie Bridge
Bow River	B1_Zoo_DSBC	34,557	1012.00	1015.55	1016.20	1016.68	1017.15	1017.51	1017.74	1018.07	1018.25	1018.68	1019.13	1019.49	1020.00	1020.38	XS 221
Bow River	B1_Zoo_DSBC	34,396	1012.00	1015.19	1015.87	1016.36	1016.85	1017.21	1017.43	1017.69	1017.89	1018.43	1018.96	1019.36	1019.91	1020.31	XS 222
Bow River	B1_Zoo_DSBC	34,071	1012.00	1014.41	1015.10	1015.60	1016.08	1016.48	1016.73	1017.03	1017.28	1018.00	1018.63	1019.08	1019.69	1020.10	XS 223; Quarry Park Berm on LOB
Bow River	B1_Zoo_DSBC	33,853	1011.20	1013.91	1014.51	1015.02	1015.55	1016.01	1016.31	1016.68	1016.98	1017.81	1018.47	1018.93	1019.58	1020.00	XS 224; Quarry Park Berm on LOB
Bow River	B1_Zoo_DSBC	33,754	1011.60	1013.87	1014.52	1015.03	1015.57	1016.01	1016.30	1016.65	1016.94	1017.76	1018.43	1018.89	1019.54	1019.96	XS 225; Quarry Park Berm on LOB
Bow River	B1_Zoo_DSBC	33,557	1011.00	1013.37	1014.12	1014.73	1015.34	1015.83	1016.14	1016.51	1016.81	1017.66	1018.35	1018.83	1019.49	1019.92	XS 226; Quarry Park Berm on LOB
Bow River	B1_Zoo_DSBC	33,266	1009.60	1012.77	1013.45	1014.02	1014.62	1015.18	1015.60	1016.07	1016.46	1017.41	1018.16	1018.65	1019.33	1019.76	XS 227; Quarry Park Berm on LOB
Bow River	B1_Zoo_DSBC	33,111	1009.60	1012.67	1013.45	1014.06	1014.67	1015.22	1015.60	1016.04	1016.40	1017.32	1018.03	1018.52	1019.21	1019.65	XS 228; Quarry Park Berm on LOB
Bow River	B1_Zoo_DSBC	32,923	1009.75	1012.37	1013.11	1013.70	1014.25	1014.74	1015.07	1015.47	1015.78	1016.74	1017.42	1017.91	1018.74	1019.27	XS 229
Bow River	B1_Zoo_DSBC	32,791	1007.81	1012.17	1012.85	1013.39	1013.87	1014.26	1014.52	1014.83	1015.08	1015.87	1016.13	1016.13[2]	1016.20	1016.87	XS 230; U/S of Ivor Strong Bridge
Bow River	B1_Zoo_DSBC	32,732	1007.21	1012.04	1012.71	1013.24	1013.68	1014.03	1014.25	1014.51	1014.70	1015.18	1015.64	1015.95	1016.34	1017.01	XS 231; D/S of Ivor Strong Bridge
Bow River	B1_Zoo_DSBC	32,582	1007.90	1011.80	1012.46	1012.98	1013.46	1013.82	1014.06	1014.32	1014.52	1015.03	1015.54	1015.89	1016.34	1016.66	XS 232
Bow River	B1_Zoo_DSBC	32,471	1008.39	1011.66	1012.38	1012.87	1013.36	1013.73	1013.97	1014.25	1014.46	1015.01	1015.52	1015.87	1016.30	1016.62	XS 233
Bow River	B1_Zoo_DSBC	32,331	1007.00	1011.57	1012.28	1012.76	1013.23	1013.60	1013.84	1014.12	1014.32	1014.86	1015.37	1015.72	1016.17	1016.50	XS 234
Bow River	B1_Zoo_DSBC	32,129	1006.44	1011.24	1011.90	1012.34	1012.74	1013.06	1013.30	1013.58	1013.81	1014.41	1014.96	1015.35	1015.86	1016.23	XS 235
Bow River	B1_Zoo_DSBC	31,930	1007.63	1010.75	1011.37	1011.79	1012.23	1012.64	1012.92	1013.24	1013.49	1014.12	1014.69	1015.08	1015.59	1015.96	XS 236
Bow River	B1_Zoo_DSBC	31,629	1007.60	1010.14	1010.72	1011.12	1011.53	1011.88	1012.11	1012.37	1012.57	1013.08	1013.52	1013.83	1014.22	1014.52	XS 237
Bow River	B1_Zoo_DSBC	31,348	1006.60	1009.84	1010.37	1010.71	1011.08	1011.39	1011.59	1011.81	1011.99	1012.42	1012.76	1012.99	1013.27	1013.43	XS 238
Bow River	B1_Zoo_DSBC	31,220	1006.20	1009.68	1010.18	1010.51	1010.87	1011.18	1011.37	1011.59	1011.77	1012.20	1012.52	1012.75	1012.89	1013.01	XS 239; U/S of Sue Higgins Bridge
Bow River	B1_Zoo_DSBC	31,186	1006.20	1009.62	1010.09	1010.38	1010.70	1010.96	1011.13	1011.32	1011.50	1011.84	1012.14	1012.34	1012.57	1012.74	XS 240; D/S of Sue Higgins Bridge
Bow River	B1_Zoo_DSBC	30,974	1007.60	1009.06	1009.50	1009.87	1010.18	1010.47	1010.62	1010.79	1010.93	1011.24	1011.50	1011.66	1011.85	1011.98	XS 241
Bow River	B1_Zoo_DSBC	30,757	1005.80	1008.47	1009.03	1009.46	1009.81	1010.06	1010.22	1010.40	1010.57	1010.89	1011.15	1011.34	1011.54	1011.68	XS 242
Bow River	B1_Zoo_DSBC	30,425	1005.20	1008.04	1008.50	1008.81	1009.21	1009.41	1009.54	1009.70	1009.83	1010.11	1010.35	1010.49	1010.70	1010.85	XS 243
Bow River	B1_Zoo_DSBC	30,208	1004.80	1007.72	1008.11	1008.39	1008.67	1008.89	1009.05	1009.20	1009.32	1009.65	1009.89	1010.05	1010.22	1010.35	XS 244
Bow River	B1_Zoo_DSBC	29,989	1005.20	1007.22	1007.58	1007.90	1008.24	1008.54	1008.75	1008.94	1009.12	1009.53	1009.80	1009.95	1010.15	1010.27	XS 245

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Table E1: Flood Frequency Profiles – Bow River

River	Model Reach	River Station (m)	Minimum Channel Elevation (m)	Simulated Water Levels for Various Flood Events (m)													Notes
				2-year	5-year	10-year	20-year	35-year	50-year	75-year	100-year	200-year	350-year	500-year	750-year	1,000-year	
Bow River	B1_Zoo_DSBC	29,647	1003.63	1006.33	1006.87	1007.25	1007.63	1007.94	1008.15	1008.41	1008.63	1009.08	1009.40	1009.54	1009.73	1009.84	XS 246
Bow River	B1_Zoo_DSBC	29,388	1001.61	1006.04	1006.47	1006.75	1007.01	1007.24	1007.39	1007.57	1007.69	1008.02	1008.38	1008.72	1008.95	1009.15	XS 247
Bow River	B1_Zoo_DSBC	29,125	1003.40	1005.73	1006.14	1006.38	1006.62	1006.82	1006.97	1007.14	1007.28	1007.70	1008.14	1008.45	1008.87	1009.12	XS 248
Bow River	B1_Zoo_DSBC	28,848	1002.40	1004.67	1005.07	1005.47	1005.82	1006.12	1006.35	1006.59	1006.80	1007.35	1007.89	1008.22	1008.60	1008.88	XS 249
Bow River	B1_Zoo_DSBC	28,519	1002.00	1003.75	1004.37	1004.84	1005.32	1005.72	1005.97	1006.26	1006.49	1007.10	1007.67	1008.00	1008.40	1008.67	XS 250
Bow River	B1_Zoo_DSBC	28,184	1000.00	1003.07	1003.70	1004.21	1004.75	1005.18	1005.45	1005.76	1006.00	1006.63	1007.14	1007.47	1007.89	1008.15	XS 251
Bow River	B1_Zoo_DSBC	28,004	1000.00	1002.81	1003.43	1003.92	1004.42	1004.84	1005.09	1005.38	1005.60	1006.15	1006.67	1006.95	1007.33	1007.60	XS 252
Bow River	B1_Zoo_DSBC	27,853	999.89	1002.62	1003.27	1003.77	1004.26	1004.66	1004.91	1005.18	1005.38	1005.91	1006.37	1006.65	1007.04	1007.28	XS 253
Bow River	B1_Zoo_DSBC	27,554	998.60	1002.28	1002.93	1003.42	1003.86	1004.21	1004.41	1004.62	1004.79	1005.24	1005.57	1005.78	1006.11	1006.31	XS 254
Bow River	B1_Zoo_DSBC	27,205	999.60	1001.82	1002.46	1002.90	1003.29	1003.63	1003.80	1004.01	1004.18	1004.60	1004.98	1005.20	1005.67	1005.89	XS 255
Bow River	B1_Zoo_DSBC	26,987	999.00	1001.57	1002.18	1002.59	1002.98	1003.35	1003.49	1003.68	1003.85	1004.26	1004.57	1004.75	1005.04	1005.23	XS 256
Bow River	B1_Zoo_DSBC	26,732	997.80	1001.26	1001.78	1002.11	1002.42	1002.60	1002.89	1003.19	1003.40	1003.90	1004.24	1004.46	1004.73	1004.92	XS 257; U/S of McKenzie Bridge
Bow River	B1_Zoo_DSBC	26,716	997.60	1001.28	1001.89	1002.30	1002.69	1003.01	1003.23	1003.47	1003.65	1004.11	1004.44	1004.66	1004.94	1005.14	XS 258; D/S of McKenzie Bridge
Bow River	B1_Zoo_DSBC	26,640	998.00	1001.15	1001.71	1002.08	1002.43	1002.72	1002.90	1003.10	1003.25	1003.61	1003.95	1004.18	1004.48	1004.71	XS 259
Bow River	B1_Zoo_DSBC	26,380	998.40	1000.70	1001.20	1001.52	1001.82	1002.06	1002.23	1002.42	1002.56	1002.92	1003.26	1003.50	1003.87	1004.19	XS 260
Bow River	B1_Zoo_DSBC	26,122	997.46	1000.22	1000.79	1001.12	1001.42	1001.66	1001.83	1002.01	1002.16	1002.53	1002.89	1003.16	1003.58	1003.93	XS 261
Bow River	B1_Zoo_DSBC	25,893	995.60	999.92	1000.49	1000.80	1001.10	1001.35	1001.52	1001.70	1001.86	1002.24	1002.63	1002.93	1003.39	1003.77	XS 262
Bow River	B1_Zoo_DSBC	25,672	996.20	999.56	1000.07	1000.38	1000.68	1000.95	1001.12	1001.34	1001.51	1001.93	1002.36	1002.70	1003.21	1003.62	XS 263
Bow River	B1_Zoo_DSBC	25,469	996.71	999.17	999.70	1000.03	1000.36	1000.66	1000.85	1001.08	1001.25	1001.68	1002.13	1002.49	1003.04	1003.48	XS 264
Bow River	B1_Zoo_DSBC	25,383	996.80	999.00	999.49	999.79	1000.09	1000.36	1000.56	1000.79	1000.98	1001.46	1001.97	1002.37	1002.96	1003.42	XS 265
Bow River	B1_Zoo_DSBC	25,245	995.80	998.85	999.40	999.71	1000.01	1000.30	1000.50	1000.74	1000.92	1001.40	1001.92	1002.33	1002.93	1003.40	XS 266
Bow River	B1_Zoo_DSBC	25,114	994.40	998.63	999.16	999.46	999.76	1000.05	1000.26	1000.51	1000.69	1001.22	1001.78	1002.22	1002.85	1003.34	XS 267
Bow River	B1_Zoo_DSBC	24,988	994.60	998.31	998.77	999.09	999.44	999.78	1000.02	1000.29	1000.50	1001.07	1001.67	1002.13	1002.79	1003.29	XS 268
Bow River	B1_Zoo_DSBC	24,842	994.40	997.90	998.32	998.67	999.10	999.51	999.78	1000.09	1000.31	1000.92	1001.56	1002.05	1002.74	1003.24	XS 269
Bow River	B1_Zoo_DSBC	24,696	994.80	997.48	997.99	998.43	998.92	999.37	999.66	999.98	1000.21	1000.85	1001.51	1002.00	1002.70	1003.21	XS 270
Bow River	B1_Zoo_DSBC	24,343	993.20	996.34	997.07	997.61	998.15	998.62	998.95	999.33	999.63	1000.46	1001.23	1001.78	1002.53	1003.06	XS 271
Bow River	B1_Zoo_DSBC	24,109	992.40	995.79	996.51	997.05	997.65	998.20	998.55	998.98	999.31	1000.15	1000.94	1001.49	1002.24	1002.78	XS 272
Bow River	B1_Zoo_DSBC	23,977	992.60	995.53	996.24	996.78	997.34	997.81	998.11	998.46	998.72	999.41	1000.11	1000.61	1001.34	1001.83	XS 273; U/S of Marquis of Lorne Bridge Upstream
Bow River	B1_Zoo_DSBC	23,924	992.60	995.39	996.07	996.58	997.12	997.57	997.86	998.16	998.40	999.03	999.66	1000.13	1000.84	1001.31	XS 274; Between Marquis of Lorne Bridge Upstream and Marquis of Lorne Bridge Downstream
Bow River	B1_Zoo_DSBC	23,884	992.40	995.27	995.92	996.41	996.92	997.33	997.59	997.84	998.02	998.45	998.78	998.96	999.14	999.41	XS 275; D/S of Marquis of Lorne Bridge Downstream
Bow River	B1_Zoo_DSBC	23,844	992.40	995.21	995.86	996.34	996.84	997.25	997.51	997.75	997.93	998.36	998.69	998.87	999.04	999.13	XS 276
Bow River	B1_Zoo_DSBC	23,684	992.20	994.86	995.54	996.05	996.57	996.99	997.26	997.52	997.74	998.30	998.74	999.01	999.30	999.41	XS 277
Bow River	B1_Zoo_DSBC	23,547	991.40	994.44	995.18	995.72	996.28	996.72	997.00	997.23	997.41	997.78	998.10	998.32	998.60	998.82	XS 278
Bow River	B1_Zoo_DSBC	23,324	991.68	994.14	994.93	995.50	996.04	996.49	996.78	997.01	997.20	997.58	997.89	998.08	998.31	998.48	XS 279
Bow River	B1_Zoo_DSBC	22,932	990.00	993.42	994.18	994.76	995.32	995.83	996.17	996.59	996.85	997.27	997.59	997.78	998.02	998.20	XS 280

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Table E1: Flood Frequency Profiles – Bow River

River	Model Reach	River Station (m)	Minimum Channel Elevation (m)	Simulated Water Levels for Various Flood Events (m)													Notes
				2-year	5-year	10-year	20-year	35-year	50-year	75-year	100-year	200-year	350-year	500-year	750-year	1,000-year	
Bow River	B1_Zoo_DSBC	22,646	989.41	993.09	993.83	994.38	994.95	995.45	995.77	996.24	996.57	997.00	997.30	997.48	997.71	997.88	XS 281
Bow River	B1_Zoo_DSBC	22,515	988.60	992.82	993.56	994.07	994.59	995.06	995.35	995.70	995.91	996.51	996.96	997.15	997.42	997.62	XS 282
Bow River	B1_Zoo_DSBC	22,249	988.60	992.25	992.99	993.50	994.02	994.47	994.75	995.06	995.29	995.93	996.40	996.71	997.06	997.25	XS 283
Bow River	B1_Zoo_DSBC	21,808	988.80	991.46	992.16	992.68	993.18	993.59	993.86	994.17	994.34	994.86	995.35	995.71	996.21	996.63	XS 284
Bow River	B1_Zoo_DSBC	21,539	987.61	991.10	991.71	992.17	992.63	993.01	993.25	993.54	993.77	994.38	994.96	995.36	995.85	996.21	XS 285
Bow River	B1_Zoo_DSBC	21,174	988.00	990.65	991.15	991.54	991.92	992.26	992.47	992.73	992.93	993.43	993.88	994.19	994.57	994.85	XS 286
Bow River	B1_Zoo_DSBC	20,821	988.20	989.99	990.45	990.83	991.24	991.59	991.81	992.09	992.29	992.82	993.30	993.62	994.02	994.33	XS 287
Bow River	B1_Zoo_DSBC	20,451	987.40	989.00	989.52	989.95	990.42	990.81	991.07	991.38	991.61	992.19	992.68	993.01	993.41	993.72	XS 288
Bow River	B1_Zoo_DSBC	20,090	986.00	988.28	988.83	989.26	989.71	990.08	990.30	990.58	990.79	991.34	991.80	992.11	992.50	992.80	XS 289
Bow River	B1_Zoo_DSBC	19,815	985.40	987.73	988.35	988.81	989.27	989.63	989.85	990.11	990.31	990.84	991.34	991.67	992.09	992.41	XS 290
Bow River	B1_Zoo_DSBC	19,564	984.41	987.23	987.81	988.24	988.72	989.11	989.34	989.62	989.83	990.37	990.89	991.24	991.68	992.01	XS 291
Bow River	B1_Zoo_DSBC	19,337	984.42	986.64	987.23	987.67	988.13	988.50	988.73	989.02	989.24	989.82	990.32	990.67	991.11	991.46	XS 292
Bow River	B1_Zoo_DSBC	19,051	983.60	985.95	986.61	987.09	987.56	987.91	988.13	988.41	988.63	989.25	989.87	990.34	990.91	991.34	XS 293
Bow River	B1_Zoo_DSBC	18,685	982.00	985.19	985.79	986.23	986.70	987.13	987.41	987.76	988.03	988.74	989.41	989.87	990.49	990.97	XS 294
Bow River	B1_Zoo_DSBC	18,436	982.20	984.72	985.26	985.66	986.11	986.52	986.78	987.10	987.34	987.96	988.55	988.96	989.48	989.87	XS 295; U/S of Dunbow Bridge Upstream
Bow River	B1_Zoo_DSBC	18,352	982.01	984.45	984.93	985.26	985.61	985.93	986.13	986.39	986.60	987.21	987.76	988.13	988.60	988.96	XS 296; Between Dunbow Bridge Upstream and Dunbow Bridge Downstream
Bow River	B1_Zoo_DSBC	18,309	982.00	984.38	984.85	985.17	985.51	985.79	985.97	986.18	986.33	986.70	986.97	987.35	987.73	988.01	XS 297; D/S of Dunbow Bridge Downstream
Bow River	B1_Zoo_DSBC	18,123	981.60	984.03	984.43	984.73	985.05	985.35	985.54	985.78	985.96	986.41	986.75	986.95	987.20	987.32	XS 298
Bow River	B1_Zoo_DSBC	17,863	981.60	983.48	983.89	984.22	984.58	984.88	985.08	985.31	985.49	985.97	986.38	986.63	986.93	987.16	XS 299
Bow River	B1_Zoo_DSBC	17,498	979.80	982.74	983.25	983.57	983.88	984.13	984.28	984.44	984.57	984.86	985.12	985.30	985.50	985.64	XS 300
Bow River	B1_Zoo_DSBC	17,226	979.80	982.52	983.05	983.36	983.65	983.90	984.05	984.21	984.34	984.66	984.94	985.13	985.36	985.53	XS 301
Bow River	B1_Zoo_DSBC	16,920	979.40	982.07	982.47	982.72	982.93	983.12	983.24	983.37	983.47	983.72	983.94	984.09	984.28	984.41	XS 302
Bow River	B1_Zoo_DSBC	16,402	978.00	980.68	981.03	981.27	981.53	981.75	981.88	982.03	982.13	982.39	982.62	982.78	982.98	983.13	XS 303
Bow River	B1_Zoo_DSBC	16,136	977.55	979.76	980.23	980.58	980.98	981.25	981.44	981.57	981.66	981.90	982.15	982.31	982.53	982.69	XS 304
Bow River	B1_Zoo_DSBC	15,672	975.40	977.45	978.17	978.68	979.35	979.83	979.93	980.23	980.40	980.91	981.26	981.47	981.75	981.90	XS 305
Bow River	B1_Zoo_DSBC	15,472	972.80	977.31	977.91	978.26	978.62	978.94	979.34	979.54	979.72	980.32	980.51	980.63	980.82	981.05	XS 306
Bow River	B1_Zoo_DSBC	15,202	973.80	977.05	977.64	977.98	978.31	978.58	978.74	978.89	979.01	979.15	979.72	979.91	980.21	980.43	XS 307
Bow River	B1_Zoo_DSBC	14,936	974.20	976.65	977.18	977.56	977.94	978.27	978.48	978.73	978.89	979.28	979.68	979.90	980.19	980.37	XS 308
Bow River	B1_Zoo_DSBC	14,680	974.20	976.34	976.89	977.27	977.60	977.85	978.02	978.20	978.33	978.66	978.95	979.13	979.37	979.55	XS 309
Bow River	B1_Zoo_DSBC	14,373	973.40	975.61	976.19	976.60	977.01	977.36	977.55	977.74	977.85	978.16	978.39	978.56	978.82	979.02	XS 310
Bow River	B1_Zoo_DSBC	14,047	972.60	974.97	975.43	975.73	976.02	976.27	976.42	976.65	976.83	977.14	977.53	977.85	978.20	978.41	XS 311
Bow River	B1_Zoo_DSBC	13,661	971.80	974.16	974.61	974.95	975.23	975.48	975.66	975.89	976.07	976.55	976.96	977.32	977.61	977.85	XS 312
Bow River	B1_Zoo_DSBC	13,385	971.00	973.52	973.94	974.31	974.63	974.94	975.15	975.41	975.61	976.13	976.56	976.89	977.22	977.48	XS 313
Bow River	B1_Zoo_DSBC	13,036	970.40	972.67	973.22	973.62	974.01	974.36	974.58	974.83	975.05	975.55	975.97	976.27	976.67	976.96	XS 314
Bow River	B1_Zoo_DSBC	12,653	969.56	971.84	972.42	972.83	973.25	973.57	973.80	974.11	974.34	974.94	975.41	975.72	976.10	976.38	XS 315
Bow River	B1_Zoo_DSBC	12,330	968.80	971.01	971.67	972.05	972.49	972.95	973.28	973.67	973.96	974.61	975.07	975.38	975.76	976.03	XS 316
Bow River	B1_Zoo_DSBC	12,035	967.40	969.91	970.81	971.34	971.91	972.42	972.76	973.15	973.44	974.13	974.59	974.89	975.25	975.52	XS 317

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Table E1: Flood Frequency Profiles – Bow River

River	Model Reach	River Station (m)	Minimum Channel Elevation (m)	Simulated Water Levels for Various Flood Events (m)													Notes
				2-year	5-year	10-year	20-year	35-year	50-year	75-year	100-year	200-year	350-year	500-year	750-year	1,000-year	
Bow River	B1_Zoo_DSBC	11,856	963.60	969.80	970.59	971.07	971.57	972.01	972.29	972.63	972.88	973.54	973.88	974.13	974.43	974.68	XS 318
Bow River	B1_Zoo_DSBC	11,470	965.20	969.26	969.90	970.31	970.75	971.13	971.38	971.66	971.86	972.35	972.95	973.27	973.68	974.00	XS 319
Bow River	B1_Zoo_DSBC	11,115	964.43	968.86	969.46	969.88	970.32	970.70	970.97	971.27	971.50	972.11	972.74	973.03	973.38	973.67	XS 320
Bow River	B1_Zoo_DSBC	10,806	966.00	968.41	968.93	969.34	969.83	970.26	970.55	970.90	971.16	971.84	972.52	972.79	973.14	973.39	XS 321
Bow River	B1_Zoo_DSBC	10,597	965.25	967.65	968.41	968.92	969.47	969.94	970.24	970.60	970.87	971.61	972.33	972.60	972.93	973.19	XS 322
Bow River	B1_Zoo_DSBC	10,271	963.61	967.27	967.90	968.34	968.78	969.12	969.35	969.61	969.81	970.31	970.71	971.11	971.58	971.93	XS 323
Bow River	B1_Zoo_DSBC	9,854	963.80	966.94	967.52	967.90	968.30	968.60	968.81	969.06	969.25	969.75	970.18	970.46	970.80	971.01	XS 324
Bow River	B1_Zoo_DSBC	9,630	963.98	966.47	967.03	967.42	967.86	968.27	968.52	968.82	969.06	969.66	970.18	970.53	970.96	971.28	XS 325
Bow River	B1_Zoo_DSBC	9,444	963.60	966.07	966.62	967.07	967.57	968.02	968.29	968.62	968.86	969.48	970.03	970.40	970.84	971.17	XS 326
Bow River	B1_Zoo_DSBC	9,216	963.19	965.54	966.12	966.61	967.12	967.54	967.81	968.11	968.35	968.96	969.57	969.98	970.44	970.78	XS 327
Bow River	B1_Zoo_DSBC	8,958	962.20	964.82	965.41	965.84	966.26	966.61	966.84	967.09	967.26	967.64	968.00	968.29	968.74	969.04	XS 328
Bow River	B1_Zoo_DSBC	8,772	962.17	964.53	965.12	965.58	966.06	966.47	966.71	966.99	967.19	967.64	968.01	968.27	968.61	968.81	XS 329
Bow River	B1_Zoo_DSBC	8,613	961.80	964.26	964.85	965.29	965.77	966.15	966.37	966.63	966.83	967.30	967.69	967.96	968.29	968.50	XS 330
Bow River	B1_Zoo_DSBC	8,443	961.17	963.85	964.53	964.99	965.49	965.89	966.13	966.40	966.59	967.04	967.44	967.71	968.06	968.28	XS 331
Bow River	B1_Zoo_DSBC	8,262	960.60	963.35	964.08	964.63	965.15	965.55	965.77	966.03	966.22	966.61	966.95	967.24	967.56	967.76	XS 332
Bow River	B1_Zoo_DSBC	8,011	959.60	963.22	963.84	964.29	964.71	965.08	965.31	965.57	965.75	966.05	966.22	966.28	966.45	966.68	XS 333
Bow River	B1_Zoo_DSBC	7,780	960.01	962.98	963.57	964.00	964.43	964.76	964.98	965.22	965.44	965.97	966.24	966.38	966.56	966.69	XS 334
Bow River	B1_Zoo_DSBC	7,581	959.26	962.59	963.25	963.74	964.17	964.50	964.71	964.94	965.15	965.57	965.82	965.85	966.02	966.16	XS 335
Bow River	B1_Zoo_DSBC	7,422	959.18	962.17	962.83	963.41	963.85	964.16	964.36	964.55	964.75	965.02	965.25	965.50	965.75	965.92	XS 336
Bow River	B1_Zoo_DSBC	7,267	959.80	961.77	962.57	963.20	963.63	963.91	964.08	964.18	964.36	964.73	965.11	965.41	965.66	965.82	XS 337
Bow River	B1_Zoo_DSBC	7,068	958.63	961.34	962.19	962.83	963.23	963.56	963.84	963.91	964.18	964.62	965.01	965.33	965.57	965.73	XS 338
Bow River	B1_Zoo_DSBC	6,894	957.00	960.88	961.78	962.42	963.14	963.54	963.83	963.90	964.17	964.60	964.99	965.31	965.55	965.71	XS 339
Bow River	B1_Zoo_DSBC	6,775	956.63	960.48	961.39	962.09	962.66	963.36	963.75	963.80	964.11	964.56	964.96	965.29	965.52	965.68	XS 340
Bow River	B1_Zoo_DSBC	6,635	956.20	960.18	960.85	961.40	961.95	962.46	962.79	963.67	964.05	964.53	964.93	965.26	965.50	965.66	XS 341
Bow River	B1_Zoo_DSBC	6,381	955.60	960.05	960.70	961.20	961.73	962.17	962.45	962.77	963.02	964.16	964.70	965.09	965.33	965.48	XS 342
Bow River	B1_Zoo_DSBC	6,195	956.52	959.83	960.45	960.95	961.48	961.92	962.19	962.52	962.76	963.47	964.56	964.99	965.21	965.36	XS 343
Bow River	B1_Zoo_DSBC	5,978	957.20	959.52	960.19	960.73	961.28	961.74	962.03	962.37	962.63	963.26	963.80	964.42	964.47	964.63	XS 344
Bow River	B1_Zoo_DSBC	5,811	956.98	959.17	959.79	960.27	960.75	961.15	961.41	961.73	961.96	962.51	962.91	963.07	963.99	964.12	XS 345
Bow River	B1_Zoo_DSBC	5,643	956.20	958.96	959.56	960.04	960.50	960.91	961.18	961.51	961.76	962.33	962.73	962.92	963.50	963.64	XS 346
Bow River	B1_Zoo_DSBC	5,387	955.78	958.58	959.13	959.56	960.00	960.41	960.68	961.01	961.26	961.79	962.23	962.53	962.92	963.21	XS 347
Bow River	B1_Zoo_DSBC	5,146	955.80	958.17	958.74	959.21	959.69	960.10	960.38	960.71	960.95	961.44	961.83	962.13	962.57	962.89	XS 348
Bow River	B1_Zoo_DSBC	4,921	955.25	957.59	958.23	958.78	959.29	959.69	959.95	960.27	960.49	961.02	961.46	961.75	962.13	962.42	XS 349
Bow River	B1_Zoo_DSBC	4,658	954.60	957.02	957.65	958.17	958.76	959.26	959.57	959.93	960.20	960.80	961.25	961.55	961.93	962.22	XS 350
Bow River	B1_Zoo_DSBC	4,422	953.42	956.77	957.49	958.04	958.64	959.15	959.48	959.87	960.15	960.76	961.20	961.49	961.87	962.15	XS 351
Bow River	B1_Zoo_DSBC	4,175	951.40	956.43	957.01	957.43	957.88	958.24	958.47	958.75	958.97	959.73	960.21	960.54	960.96	961.27	XS 352
Bow River	B1_Zoo_DSBC	3,900	953.20	955.99	956.55	956.94	957.30	957.61	957.80	958.01	958.16	958.50	959.07	959.38	959.72	959.96	XS 353
Bow River	B1_Zoo_DSBC	3,711	951.98	955.47	956.12	956.57	956.94	957.29	957.52	957.77	957.95	958.41	958.86	959.17	959.58	959.89	XS 354
Bow River	B1_Zoo_DSBC	3,529	952.60	954.90	955.65	956.20	956.67	957.08	957.33	957.62	957.81	958.31	958.77	959.09	959.51	959.82	XS 355

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Table E1: Flood Frequency Profiles – Bow River

River	Model Reach	River Station (m)	Minimum Channel Elevation (m)	Simulated Water Levels for Various Flood Events (m)													Notes
				2-year	5-year	10-year	20-year	35-year	50-year	75-year	100-year	200-year	350-year	500-year	750-year	1,000-year	
Bow River	B1_Zoo_DSBC	3,245	950.80	954.21	954.91	955.44	955.96	956.40	956.68	956.97	957.15	957.64	958.11	958.44	958.86	959.18	XS 356
Bow River	B1_Zoo_DSBC	3,097	950.51	953.74	954.41	954.92	955.43	955.88	956.18	956.42	956.65	957.21	957.73	958.08	958.52	958.85	XS 357
Bow River	B1_Zoo_DSBC	2,905	950.40	953.30	953.97	954.49	955.00	955.42	955.66	955.99	956.26	956.87	957.40	957.76	958.22	958.56	XS 358
Bow River	B1_Zoo_DSBC	2,673	949.00	953.16	953.86	954.39	954.91	955.33	955.59	955.92	956.17	956.74	957.26	957.61	958.06	958.39	XS 359
Bow River	B1_Zoo_DSBC	2,501	949.76	952.93	953.55	954.05	954.56	955.02	955.33	955.69	955.96	956.54	957.06	957.41	957.85	958.18	XS 360
Bow River	B1_Zoo_DSBC	2,326	949.20	952.74	953.33	953.81	954.30	954.74	955.01	955.30	955.55	956.08	956.55	956.86	957.26	957.55	XS 361
Bow River	B1_Zoo_DSBC	2,111	950.43	952.37	953.02	953.56	954.11	954.53	954.81	955.13	955.39	955.91	956.38	956.69	957.09	957.39	XS 362
Bow River	B1_Zoo_DSBC	1,871	949.00	951.92	952.55	953.02	953.50	953.91	954.20	954.46	954.66	955.15	955.58	955.88	956.25	956.53	XS 363
Bow River	B1_Zoo_DSBC	1,506	948.60	951.44	952.01	952.46	952.90	953.26	953.47	953.75	953.92	954.44	954.90	955.20	955.59	955.89	XS 364
Bow River	B1_Zoo_DSBC	1,160	948.60	950.87	951.45	951.94	952.37	952.68	952.87	953.17	953.29	953.83	954.35	954.66	955.07	955.39	XS 365
Bow River	B1_Zoo_DSBC	946	948.14	950.28	950.79	951.34	951.80	952.33	952.52	952.87	952.94	953.56	954.12	954.44	954.87	955.20	XS 366
Bow River	B1_Zoo_DSBC	721	947.48	949.70	950.46	951.14	951.66	952.26	952.44	952.81	952.87	953.50	954.06	954.39	954.82	955.15	XS 367
Bow River	B1_Zoo_DSBC	491	946.01	949.19	950.01	950.69	951.08	951.67	951.67	951.94	952.37	953.04	953.62	953.92	954.32	954.65	XS 368
Bow River	B1_Zoo_DSBC	335	945.00	948.85	949.49	950.00	950.88	951.54	951.54(2)	951.82	952.10	952.87	953.47	953.76	954.17	954.49	XS 369
Bow River	B1_Zoo_DSBC	138	945.85	948.42	948.93	949.31	949.65	949.93	950.42	950.82	951.15	951.92	952.49	952.95	953.47	953.87	XS 370

Notes:

1) Simulated water level replaced with Interpolated water level between upstream and downstream cross-sections.

2) Simulated water level replaced with higher water level from lower flow profile to avoid profile crossing.

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Table E2: Flood Frequency Profiles – Bow River Side Channels

Branch	Model Reach	River Station (m)	Minimum Channel Elevation (m)	Simulated Water Levels for Various Flood Events (m)													Notes
				2-year	5-year	10-year	20-year	35-year	50-year	75-year	100-year	200-year	350-year	500-year	750-year	1,000-year	
BS1_Zoo	BS1_Zoo	1,928	1037.98	1039.54	1040.11	1040.55	1041.02	1041.43	1041.70	1042.02	1042.26	1042.72	1043.43	1043.73	1044.17	1044.47	XS 392; Bridgeland Berm on LOB
BS1_Zoo	BS1_Zoo	1,889	1036.76	1039.54	1040.08	1040.51	1040.96	1041.36	1041.63	1041.94	1042.16	1042.56	1043.37	1043.68	1044.13	1044.44	XS 393; U/S of St Patrick's Island Bridge; Bridgeland Berm on LOB
BS1_Zoo	BS1_Zoo	1,844	1036.73	1039.46	1039.95	1040.33	1040.73	1041.09	1041.33	1041.62	1041.83	1042.38	1043.20	1043.52	1043.99	1044.32	XS 394; D/S of St Patrick's Island Bridge; Bridgeland Berm on LOB
BS1_Zoo	BS1_Zoo	1,740	1036.80	1039.36	1039.80	1040.14	1040.52	1040.87	1041.11	1041.39	1041.61	1042.19	1043.13	1043.46	1043.94	1044.27	XS 395; Bridgeland Berm on LOB
BS1_Zoo	BS1_Zoo	1,478	1036.68	1039.05	1039.50	1039.88	1040.33	1040.74	1041.03	1041.37	1041.63	1042.35	1043.05	1043.38	1043.86	1044.20	XS 396; Bridgeland Berm on LOB
BS1_Zoo	BS1_Zoo	1,182	1036.46	1038.35	1038.80	1039.18	1039.62	1040.03	1040.31	1040.63	1040.87	1041.58	1042.61	1043.03	1043.58	1043.99	XS 397; Bridgeland Berm on LOB
BS1_Zoo	BS1_Zoo	1,132	1036.01	1038.26	1038.73	1039.13	1039.60	1040.02	1040.31	1040.64	1040.89	1041.62	1042.63	1043.03	1043.60	1044.00	XS 398; U/S of Baines Bridge; Bridgeland Berm on LOB
BS1_Zoo	BS1_Zoo	1,103	1036.00	1038.14	1038.62	1039.03	1039.51	1039.94	1040.23	1040.56	1040.81	1041.44	1042.47	1042.91	1043.52	1043.95	XS 399; D/S of Baines Bridge; Bridgeland Berm on LOB
BS1_Zoo	BS1_Zoo	884	1036.20	1037.67	1038.22	1038.66	1039.15	1039.58	1039.86	1040.18	1040.42	1041.03	1041.88	1042.26	1042.79	1043.16	XS 400
BS1_Zoo	BS1_Zoo	708	1035.70	1037.16	1037.82	1038.28	1038.78	1039.20	1039.46	1039.77	1040.00	1040.58	1041.38	1041.77	1042.33	1042.72	XS 401
BS1_Zoo	BS1_Zoo	462	1034.01	1036.82	1037.48	1037.93	1038.42	1038.83	1039.06	1039.34	1039.56	1040.12	1040.74	1041.18	1041.87	1042.32	XS 402
BS1_Zoo	BS1_Zoo	443	1034.20	1036.76	1037.41	1037.84	1038.32	1038.72	1038.94	1039.22	1039.42	1039.98	1040.55	1040.90	1041.50	1041.95	XS 403; U/S of Zoo Service Bridge
BS1_Zoo	BS1_Zoo	420	1034.00	1036.72	1037.36	1037.78	1038.24	1038.62	1038.82	1039.07	1039.26	1039.75	1040.14	1040.47	1040.88	1041.14	XS 404; D/S of Zoo Service Bridge
BS1_Zoo	BS1_Zoo	214	1034.60	1036.41	1037.09	1037.53	1038.02	1038.43	1038.62	1038.88	1039.08	1039.65	1040.07	1040.49	1040.97	1041.28	XS 405
BS2_Prince	BS2_Prince	979	1042.20	1044.53	1045.22	1045.78	1046.38	1046.89	1047.24	1047.61	1047.69	1048.14	1048.47	1048.68	1048.99	1049.51	XS 378; U/S of Prince's Island Park Causeway
BS2_Prince	BS2_Prince	930	1042.20	1044.23	1044.43	1044.57	1044.86	1045.29	1045.68	1046.23	1046.63	1047.53	1048.26	1048.77	1049.35	1049.79	XS 379; D/S of Prince's Island Park Causeway
BS2_Prince	BS2_Prince	884	1042.40	1044.22	1044.43	1044.56	1044.85	1045.28	1045.68	1046.23	1046.63	1047.57	1048.25	1048.74	1049.30	1049.73	XS 380
BS2_Prince	BS2_Prince	724	1042.60	1044.21	1044.41	1044.54	1044.82	1045.23	1045.62	1046.17	1046.57	1047.41	1048.21	1048.71	1049.27	1049.70	XS 381
BS2_Prince	BS2_Prince	635	1042.60	1044.21	1044.41	1044.54	1044.81	1045.21	1045.61	1046.15	1046.56	1047.45	1048.19	1048.68	1049.25	1049.68	XS 382
BS2_Prince	BS2_Prince	573	1042.40	1044.21	1044.40	1044.53	1044.81	1045.20	1045.60	1046.14	1046.54	1047.39	1048.09	1048.55	1049.08	1049.50	XS 383
BS2_Prince	BS2_Prince	482	1042.40	1044.21	1044.40	1044.52	1044.79	1045.18	1045.57	1046.10	1046.50	1047.35	1048.05	1048.51	1049.05	1049.49	XS 384; U/S of Jaipur Bridge
BS2_Prince	BS2_Prince	470	1042.40	1044.21	1044.40	1044.52	1044.79	1045.18	1045.56	1046.09	1046.49	1047.29	1047.99	1048.47	1049.03	1049.46	XS 385; D/S of Jaipur Bridge
BS2_Prince	BS2_Prince	417	1042.40	1044.21	1044.40	1044.52	1044.79	1045.17	1045.56	1046.09	1046.50	1047.31	1048.01	1048.48	1049.04	1049.47	XS 386
BS2_Prince	BS2_Prince	371	1042.20	1044.20	1044.39	1044.51	1044.77	1045.14	1045.53	1046.06	1046.47	1047.27	1047.95	1048.43	1049.00	1049.43	XS 387; U/S of Prince's Island Park Weir
BS2_Prince	BS2_Prince	354	1040.80	1042.94	1043.20	1043.70	1044.38	1045.03	1045.50	1046.06	1046.46	1047.24	1047.91	1048.38	1048.94	1049.37	XS 388; D/S of Prince's Island Park Weir
BS2_Prince	BS2_Prince	312	1041.40	1042.86	1043.11	1043.67	1044.35	1044.99	1045.47	1046.03	1046.44	1047.23	1047.91	1048.39	1048.95	1049.38	XS 389; U/S of Prince's Island Bridge
BS2_Prince	BS2_Prince	304	1041.00	1042.87	1043.12	1043.67	1044.35	1044.99	1045.45	1046.02	1046.43	1047.22	1047.90	1048.37	1048.94	1049.37	XS 390; D/S of Prince's Island Bridge
BS2_Prince	BS2_Prince	201	1041.58	1042.45	1043.02	1043.65	1044.34	1044.98	1045.44	1046.00	1046.41	1047.17	1047.84	1048.32	1048.88	1049.31	XS 391

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Table E3: Flood Frequency Profiles – Elbow River

River	Model Reach	River Station (m)	Minimum Channel Elevation (m)	Simulated Water Levels for Various Flood Events (m)													Notes
				2-year	5-year	10-year	20-year	35-year	50-year	75-year	100-year	200-year	350-year	500-year	750-year	1,000-year	
Elbow River	E14_USBC_Bragg	66,613	1338.79	1340.27	1340.63	1340.91	1341.14	1341.31	1341.44	1341.57	1341.66	1341.88	1342.09	1342.24	1342.40	1342.53	XS 406
Elbow River	E14_USBC_Bragg	66,464	1337.74	1339.24	1339.60	1339.85	1340.05	1340.22	1340.34	1340.47	1340.56	1340.82	1341.05	1341.20	1341.38	1341.52	XS 407
Elbow River	E14_USBC_Bragg	66,317	1336.86	1338.17	1338.50	1338.71	1338.93	1339.10	1339.22	1339.35	1339.45	1339.71	1339.94	1340.09	1340.26	1340.40	XS 408
Elbow River	E14_USBC_Bragg	66,163	1335.21	1336.48	1337.10	1337.33	1337.54	1337.71	1337.82	1337.94	1338.03	1338.27	1338.47	1338.60	1338.75	1338.87	XS 409
Elbow River	E14_USBC_Bragg	66,005	1333.54	1335.45	1335.92	1336.15	1336.33	1336.48	1336.57	1336.68	1336.77	1336.99	1337.19	1337.33	1337.49	1337.62	XS 410
Elbow River	E14_USBC_Bragg	65,839	1333.04	1334.24	1334.61	1334.82	1335.02	1335.20	1335.32	1335.46	1335.55	1335.82	1336.05	1336.21	1336.41	1336.56	XS 411
Elbow River	E14_USBC_Bragg	65,669	1331.26	1332.52	1332.91	1333.14	1333.39	1333.60	1333.74	1333.90	1334.03	1334.37	1334.66	1334.85	1335.08	1335.25	XS 412
Elbow River	E14_USBC_Bragg	65,521	1330.20	1331.62	1332.02	1332.28	1332.57	1332.81	1332.96	1333.15	1333.28	1333.61	1333.92	1334.10	1334.31	1334.49	XS 413
Elbow River	E14_USBC_Bragg	65,387	1329.16	1330.90	1331.240	1331.50	1331.77	1331.96	1332.09	1332.24	1332.35	1332.64	1332.91	1333.09	1333.32	1333.50	XS 414
Elbow River	E14_USBC_Bragg	65,236	1327.73	1329.43	1329.82	1330.07	1330.34	1330.58	1330.72	1330.89	1331.02	1331.37	1331.69	1331.92	1332.20	1332.42	XS 415
Elbow River	E14_USBC_Bragg	65,080	1327.12	1328.25	1328.71	1329.00	1329.24	1329.48	1329.62	1329.81	1329.95	1330.36	1330.75	1331.02	1331.35	1331.61	XS 416
Elbow River	E14_USBC_Bragg	64,928	1326.16	1327.23	1327.54	1327.81	1328.11	1328.40	1328.60	1328.84	1329.03	1329.53	1329.98	1330.29	1330.65	1330.92	XS 417
Elbow River	E14_USBC_Bragg	64,773	1324.74	1326.25	1326.67	1327.03	1327.44	1327.77	1328.01	1328.26	1328.46	1328.98	1329.43	1329.75	1330.10	1330.37	XS 418
Elbow River	E14_USBC_Bragg	64,642	1324.19	1325.30	1325.64	1325.90	1326.20	1326.50	1326.63	1326.92	1327.06	1327.47	1327.84	1328.08	1328.37	1328.58	XS 419
Elbow River	E14_USBC_Bragg	64,495	1322.54	1324.18	1324.60	1324.93	1325.22	1325.47	1325.63	1325.84	1326.00	1326.41	1326.78	1327.03	1327.33	1327.56	XS 420
Elbow River	E14_USBC_Bragg	64,338	1321.77	1323.19	1323.60	1323.92	1324.24	1324.50	1324.68	1324.89	1325.05	1325.47	1325.85	1326.11	1326.42	1326.65	XS 421
Elbow River	E14_USBC_Bragg	64,189	1320.84	1322.07	1322.57	1322.91	1323.24	1323.48	1323.64	1323.84	1324.00	1324.42	1324.81	1325.09	1325.42	1325.69	XS 422
Elbow River	E14_USBC_Bragg	64,040	1318.98	1320.91	1321.38	1321.70	1322.12	1322.40	1322.60	1322.84	1323.03	1323.54	1324.00	1324.32	1324.70	1324.99	XS 423
Elbow River	E14_USBC_Bragg	63,898	1317.78	1320.06	1320.58	1320.94	1321.20	1321.44	1321.61	1321.81	1321.95	1322.32	1322.64	1322.84	1323.08	1323.25	XS 424
Elbow River	E14_USBC_Bragg	63,741	1316.93	1318.69	1319.40	1319.95	1320.30	1320.54	1320.71	1320.89	1321.02	1321.35	1321.64	1321.83	1322.04	1322.20	XS 425
Elbow River	E14_USBC_Bragg	63,594	1315.57	1317.40	1318.09	1318.48	1318.89	1319.11	1319.28	1319.44	1319.56	1319.86	1320.13	1320.32	1320.56	1320.75	XS 426
Elbow River	E14_USBC_Bragg	63,435	1314.65	1316.24	1316.81	1317.16	1317.59	1317.87	1318.03	1318.22	1318.36	1318.76	1319.15	1319.43	1319.77	1320.05	XS 427
Elbow River	E14_USBC_Bragg	63,281	1313.64	1315.04	1315.57	1316.07	1316.49	1316.77	1316.95	1317.18	1317.36	1317.86	1318.33	1318.67	1319.05	1319.36	XS 428
Elbow River	E14_USBC_Bragg	63,143	1313.06	1314.26	1314.76	1315.25	1315.69	1316.04	1316.28	1316.58	1316.81	1317.40	1317.92	1318.28	1318.68	1319.02	XS 429
Elbow River	E14_USBC_Bragg	63,013	1311.46	1313.36	1313.96	1314.42	1314.91	1315.32	1315.61	1315.93	1316.15	1316.74	1317.21	1317.51	1317.86	1318.15	XS 430
Elbow River	E14_USBC_Bragg	62,971	1311.28	1312.99	1313.59	1314.03	1314.46	1314.80	1315.02	1315.25	1315.42	1315.84	1316.26	1316.49	1316.81	1316.96	XS 431
Elbow River	E14_USBC_Bragg	62,896	1311.05	1312.45	1313.09	1313.54	1313.94	1314.23	1314.42	1314.64	1314.80	1315.23	1315.59	1315.83	1316.11	1316.30	XS 432
Elbow River	E14_USBC_Bragg	62,813	1308.13	1312.15	1312.78	1313.19	1313.56	1313.83	1313.99	1314.19	1314.33	1314.70	1315.03	1315.25	1315.49	1315.68	XS 433
Elbow River	E14_USBC_Bragg	62,738	1310.43	1311.85	1312.35	1312.71	1313.05	1313.32	1313.50	1313.70	1313.85	1314.23	1314.56	1314.77	1315.02	1315.20	XS 434
Elbow River	E14_USBC_Bragg	62,655	1309.91	1311.41	1311.86	1312.18	1312.48	1312.72	1312.86	1313.03	1313.15	1313.46	1313.74	1313.94	1314.16	1314.35	XS 435
Elbow River	E14_USBC_Bragg	62,580	1309.80	1310.87	1311.34	1311.69	1311.98	1312.22	1312.36	1312.51	1312.62	1312.93	1313.25	1313.54	1313.77	1314.01	XS 436
Elbow River	E14_USBC_Bragg	62,498	1308.33	1310.29	1310.74	1311.10	1311.37	1311.58	1311.74	1311.92	1312.06	1312.48	1312.94	1313.31	1313.56	1313.83	XS 437
Elbow River	E14_USBC_Bragg	62,413	1308.09	1309.62	1310.11	1310.41	1310.73	1310.97	1311.14	1311.35	1311.53	1312.07	1312.61	1313.02	1313.23	1313.47	XS 438
Elbow River	E14_USBC_Bragg	62,352	1307.64	1309.17	1309.60	1309.88	1310.18	1310.50	1310.72	1310.99	1311.22	1311.86	1312.45	1312.89	1313.08	1313.31	XS 439
Elbow River	E14_USBC_Bragg	62,262	1306.97	1308.03	1308.55	1309.02	1309.50	1309.94	1310.24	1310.62	1310.89	1311.34[(1)]	1311.99[(1)]	1312.55[(1)]	1312.64[(1)]	1312.78[(1)]	XS 440
Elbow River	E14_USBC_Bragg	62,169	1306.09	1307.50	1308.08	1308.55	1309.01	1309.40	1309.65	1309.96	1310.19	1310.82	1311.53	1312.20	1312.20[(2)]	1312.24	XS 441; Bracken Road Berm on LOB
Elbow River	E14_USBC_Bragg	62,137	1305.62	1307.27	1307.78	1308.19	1308.62	1308.97	1309.19	1309.44	1309.62	1310.08	1310.48	1310.83	1311.61	1311.80	XS 442; Bracken Road Berm on LOB
Elbow River	E14_USBC_Bragg	62,086	1305.53	1306.95	1307.43	1307.82	1308.19	1308.51	1308.72	1308.98	1309.17	1309.68	1310.14	1310.25	1311.06	1311.32	XS 443; Bracken Road Berm on LOB

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Table E3: Flood Frequency Profiles – Elbow River

River	Model Reach	River Station (m)	Minimum Channel Elevation (m)	Simulated Water Levels for Various Flood Events (m)													Notes
				2-year	5-year	10-year	20-year	35-year	50-year	75-year	100-year	200-year	350-year	500-year	750-year	1,000-year	
Elbow River	E14_USBC_Bragg	62,036	1305.43	1306.61	1307.05	1307.44	1307.82	1308.15	1308.38	1308.66	1308.87	1309.42	1309.91	1310.16	1310.43	1310.75	XS 444
Elbow River	E14_USBC_Bragg	61,985	1304.95	1306.15	1306.64	1307.09	1307.50	1307.85	1308.09	1308.38	1308.59	1309.14	1309.62	1309.90	1310.19	1310.19[(2)]	XS 445
Elbow River	E14_USBC_Bragg	61,940	1304.60	1305.70	1306.28	1306.86	1307.30	1307.66	1307.90	1308.19	1308.40	1308.95	1309.43	1309.76	1310.12	1310.12[(2)]	XS 446
Elbow River	E14_USBC_Bragg	61,887	1304.01	1305.23	1305.94	1306.55	1307.05	1307.41	1307.66	1307.95	1308.16	1308.70	1309.20	1309.67	1310.09	1310.09[(2)]	XS 447
Elbow River	E14_USBC_Bragg	61,837	1303.29	1304.81	1305.53	1306.11	1306.68	1307.04	1307.31	1307.62	1307.84	1308.40	1308.97	1309.60	1310.05	1310.05[(2)]	XS 448
Elbow River	E14_USBC_Bragg	61,790	1302.78	1304.42	1304.95	1305.30	1305.79	1306.16	1306.39	1306.67	1306.89	1307.49	1308.01	1308.13	1308.47	1309.32	XS 449
Elbow River	E14_USBC_Bragg	61,730	1302.51	1304.06	1304.60	1304.97	1305.42	1305.82	1306.07	1306.37	1306.60	1307.26	1307.89	1307.89[(2)]	1308.26	1308.26[(2)]	XS 450
Elbow River	E13_Bragg_Lott	61,692	1302.35	1303.78	1304.36	1304.78	1305.32	1305.77	1306.06	1306.41	1306.67	1307.39	1308.06	1308.17	1308.26	1308.43	XS 451
Elbow River	E13_Bragg_Lott	61,642	1302.16	1303.31	1304.09	1304.59	1305.16	1305.64	1305.93	1306.27	1306.52	1307.15	1308.04	1308.14	1308.21	1308.37	XS 452
Elbow River	E13_Bragg_Lott	61,597	1300.97	1303.05	1303.85	1304.44	1305.05	1305.53	1305.82	1306.15	1306.40	1306.87[(1)]	1307.67[(1)]	1307.82[(1)]	1308.10	1308.26	XS 453
Elbow River	E13_Bragg_Lott	61,550	1300.63	1302.88	1303.64	1304.25	1304.82	1305.27	1305.52	1305.82	1306.03	1306.58	1307.29[(1)]	1307.49[(1)]	1307.70[(1)]	1307.84[(1)]	XS 454
Elbow River	E13_Bragg_Lott	61,497	1300.75	1302.59	1303.29	1303.86	1304.43	1304.86	1305.08	1305.33	1305.51	1305.93	1306.86[(1)]	1307.11	1307.29	1307.42	XS 455
Elbow River	E13_Bragg_Lott	61,450	1300.92	1302.34	1302.97	1303.44	1303.92	1304.23	1304.49	1304.76	1304.94	1305.43	1306.48	1306.64	1306.79	1306.92	XS 456
Elbow River	E13_Bragg_Lott	61,400	1300.72	1302.07	1302.61	1302.95	1303.32	1303.82	1304.03	1304.26	1304.43	1304.86	1305.77	1305.95	1306.16	1306.29	XS 457
Elbow River	E13_Bragg_Lott	61,344	1300.10	1301.30	1301.79	1302.30	1302.79	1303.16	1303.38	1303.66	1303.87	1304.40	1304.74	1305.07	1305.56	1305.59	XS 458
Elbow River	E13_Bragg_Lott	61,294	1299.23	1300.79	1301.47	1301.97	1302.48	1302.88	1303.12	1303.40	1303.61	1304.15	1304.57	1304.95	1305.44	1305.44[(2)]	XS 459
Elbow River	E13_Bragg_Lott	61,242	1299.05	1300.49	1301.18	1301.71	1302.25	1302.71	1302.94	1303.20	1303.40	1303.90	1304.34	1304.78	1305.32	1305.32[(2)]	XS 460
Elbow River	E13_Bragg_Lott	61,193	1298.56	1300.17	1300.75	1301.18	1301.70	1301.95	1302.26	1302.49	1302.66	1303.09	1303.46	1303.71	1303.90	1304.88	XS 461
Elbow River	E13_Bragg_Lott	61,143	1298.10	1299.91	1300.40	1300.74	1301.02	1301.48	1301.72	1301.95	1302.12	1302.54	1302.91	1303.16	1303.43	1303.54	XS 462
Elbow River	E13_Bragg_Lott	61,094	1298.09	1299.57	1300.06	1300.44	1300.76	1301.01	1301.17	1301.37	1301.51	1301.87	1302.22	1302.44	1302.74	1302.85	XS 463
Elbow River	E13_Bragg_Lott	61,045	1297.60	1299.11	1299.65	1300.09	1300.48	1300.75	1300.92	1301.11	1301.25	1301.62	1302.04	1302.29	1302.69	1302.72	XS 464
Elbow River	E13_Bragg_Lott	61,005	1296.88	1298.82	1299.33	1299.79	1300.25	1300.56	1300.72	1300.90	1301.04	1301.40	1301.87	1302.11	1302.59	1302.59[(2)]	XS 465
Elbow River	E13_Bragg_Lott	60,952	1296.41	1298.44	1298.95	1299.36	1299.76	1300.11	1300.29	1300.48	1300.63	1301.00	1301.61	1301.86	1302.45	1302.45[(2)]	XS 466
Elbow River	E13_Bragg_Lott	60,906	1296.97	1298.15	1298.57	1298.92	1299.31	1299.55	1299.71	1299.90	1300.02	1300.50	1301.41	1301.66	1302.31	1302.31[(2)]	XS 467
Elbow River	E13_Bragg_Lott	60,853	1296.56	1297.69	1298.05	1298.33	1298.68	1298.95	1299.14	1299.29	1299.43	1300.35	1301.36	1301.60	1302.30	1302.30[(2)]	XS 468
Elbow River	E13_Bragg_Lott	60,806	1295.77	1296.96	1297.47	1297.76	1298.08	1298.35	1298.52	1298.96	1299.35	1300.35	1301.37	1301.63	1302.33	1302.33[(2)]	XS 469
Elbow River	E13_Bragg_Lott	60,755	1294.50	1296.03	1296.67	1297.16	1297.54	1298.03	1298.42	1298.93	1299.32	1300.32	1301.36	1301.63	1302.34	1302.34[(2)]	XS 470
Elbow River	E13_Bragg_Lott	60,711	1294.21	1295.51	1296.07	1296.69	1297.30	1297.90	1298.32	1298.84	1299.22	1300.20	1301.26	1301.52	1302.27	1302.27[(2)]	XS 471
Elbow River	E13_Bragg_Lott	60,665	1294.02	1295.23	1295.84	1296.51	1297.19	1297.80	1298.22	1298.71	1299.08	1300.03	1301.16	1301.44	1302.26	1302.26[(2)]	XS 472
Elbow River	E13_Bragg_Lott	60,616	1293.65	1295.02	1295.58	1296.07	1296.64	1297.16	1297.52	1297.94	1298.25	1299.12	1300.23	1300.23[(2)]	1300.32	1301.33	XS 473
Elbow River	E13_Bragg_Lott	60,568	1293.39	1294.65	1295.26	1295.77	1296.36	1296.90	1297.28	1297.72	1298.04	1298.92	1300.08	1300.08[(2)]	1300.24	1300.40	XS 474; U/S of Balsam Avenue Bridge
Elbow River	E13_Bragg_Lott	60,516	1292.55	1294.59	1295.19	1295.71	1296.30	1296.84	1297.22	1297.66	1297.98	1298.86	1300.02	1300.02[(2)]	1300.17	1300.34	XS 475; D/S of Balsam Avenue Bridge
Elbow River	E13_Bragg_Lott	60,463	1292.85	1294.30	1294.79	1295.16	1295.55	1295.91	1296.14	1296.47	1296.74	1297.42	1298.03	1299.36	1299.55	1299.68	XS 476
Elbow River	E13_Bragg_Lott	60,414	1292.82	1293.94	1294.39	1294.75	1295.15	1295.50	1295.72	1296.05	1296.29	1296.91	1297.45	1298.60	1298.81	1298.93	XS 477
Elbow River	E13_Bragg_Lott	60,364	1291.40	1293.55	1294.00	1294.34	1294.72	1295.03	1295.27	1295.58	1295.82	1296.41	1297.89[(3)]	1297.89	1298.13	1298.26	XS 478
Elbow River	E13_Bragg_Lott	60,316	1291.52	1293.21	1293.65	1294.00	1294.41	1294.77	1295.01	1295.30	1295.50	1296.03	1296.56	1297.80	1297.80[(2)]	1297.91	XS 479
Elbow River	E13_Bragg_Lott	60,267	1291.34	1292.93	1293.36	1293.75	1294.21	1294.61	1294.89	1295.21	1295.45	1296.06	1297.01	1297.84	1297.84[(2)]	1297.84[(2)]	XS 480
Elbow River	E13_Bragg_Lott	60,213	1290.63	1292.27	1292.81	1293.23	1293.64	1294.00	1294.26	1294.58	1294.82	1295.48	1295.86	1296.19	1297.24	1297.40	XS 481

Table E3: Flood Frequency Profiles – Elbow River

River	Model Reach	River Station (m)	Minimum Channel Elevation (m)	Simulated Water Levels for Various Flood Events (m)													Notes
				2-year	5-year	10-year	20-year	35-year	50-year	75-year	100-year	200-year	350-year	500-year	750-year	1,000-year	
Elbow River	E13_Bragg_Lott	60,169	1290.43	1292.04	1292.55	1292.97	1293.39	1293.80	1294.07	1294.40	1294.65	1295.33	1295.62	1295.91	1296.95	1297.17	XS 482
Elbow River	E13_Bragg_Lott	60,113	1290.45	1291.6	1292.12	1292.59	1293.10	1293.55	1293.86	1294.23	1294.50	1295.25	1295.54	1296.51	1296.51	1296.66	XS 483
Elbow River	E13_Bragg_Lott	60,065	1289.88	1291.33	1291.89	1292.36	1292.88	1293.33	1293.64	1294.01	1294.29	1295.03	1295.16	1295.17	1296.03	1296.19	XS 484
Elbow River	E13_Bragg_Lott	60,011	1289.54	1290.74	1291.21	1291.63	1292.06	1292.43	1292.69	1292.99	1293.23	1293.84	1295.16	1295.33	1295.52	1295.67	XS 485
Elbow River	E13_Bragg_Lott	59,964	1288.69	1289.96	1290.49	1290.95	1291.45	1291.86	1292.13	1292.46	1292.68	1293.32	1294.69	1294.69[2]	1294.84	1295.01	XS 486
Elbow River	E13_Bragg_Lott	59,915	1288.55	1289.63	1290.05	1290.36	1290.79	1291.18	1291.43	1291.75	1292.03	1292.66	1293.18	1294.26	1294.45	1294.60	XS 487
Elbow River	E13_Bragg_Lott	59,869	1288.11	1289.41	1289.82	1290.17	1290.54	1290.86	1291.05	1291.25	1291.43	1292.01	1292.53	1293.72	1293.94	1294.09	XS 488
Elbow River	E13_Bragg_Lott	59,815	1288.06	1288.84	1289.22	1289.53	1289.91	1290.27	1290.52	1290.79	1290.99	1291.56	1292.04	1293.13	1293.33	1293.47	XS 489
Elbow River	E13_Bragg_Lott	59,764	1287.05	1288.26	1288.85	1289.35	1289.86	1290.25	1290.49	1290.74	1290.92	1291.26	1291.32	1291.62	1292.75	1292.90	XS 490
Elbow River	E13_Bragg_Lott	59,718	1286.07	1288.03	1288.65	1289.16	1289.61	1289.96	1290.17	1290.41	1290.56	1291.13	1291.41	1292.23	1292.61	1292.61[2]	XS 491
Elbow River	E13_Bragg_Lott	59,679	1286.43	1287.87	1288.48	1288.97	1289.40	1289.75	1289.95	1290.17	1290.31	1290.71	1291.10	1291.23	1292.23[4]	1292.23	XS 492
Elbow River	E13_Bragg_Lott	59,600	1285.92	1287.51	1288.05	1288.5	1288.90	1289.21	1289.40	1289.65	1289.78	1290.07	1290.46	1290.55	1291.19	1291.19[2]	XS 493
Elbow River	E13_Bragg_Lott	59,521	1285.47	1287.12	1287.61	1287.99	1288.33	1288.61	1288.79	1288.90	1289.07	1289.55	1289.70	1289.72	1289.87	1290.35	XS 494
Elbow River	E13_Bragg_Lott	59,439	1284.76	1286.21	1286.61	1286.93	1287.25	1287.54	1287.75	1288.06	1288.24	1288.50	1288.92	1289.04	1289.49	1289.60	XS 495
Elbow River	E13_Bragg_Lott	59,356	1282.21	1284.84	1285.76	1286.21	1286.61	1286.96	1287.12	1287.29	1287.43	1287.75	1288.02	1288.21	1288.53	1288.53	XS 496
Elbow River	E13_Bragg_Lott	59,292	1282.70	1284.29	1285.31	1285.85	1286.30	1286.68	1286.82	1286.96	1287.07	1287.31	1287.52	1287.65	1287.77	1288.01	XS 497
Elbow River	E13_Bragg_Lott	59,220	1282.09	1283.81	1284.72	1285.32	1285.88	1286.28	1286.42	1286.55	1286.66	1286.92	1287.12	1287.25	1287.40	1287.56	XS 498
Elbow River	E13_Bragg_Lott	59,153	1280.96	1283.03	1283.6	1284.12	1284.68	1285.27	1285.43	1285.62	1285.73	1286.00	1286.24	1286.37	1286.51	1286.57	XS 499
Elbow River	E13_Bragg_Lott	59,110	1280.60	1282.72	1283.51	1284.03	1284.57	1284.92	1285.06	1285.26	1285.36	1285.65	1285.84	1285.96	1286.10	1286.20	XS 500
Elbow River	E13_Bragg_Lott	59,067	1280.42	1282.43	1283.23	1283.73	1284.13	1284.41	1284.56	1284.75	1284.88	1285.17	1285.38	1285.57	1285.70	1285.80	XS 501
Elbow River	E13_Bragg_Lott	59,000	1279.93	1282.06	1282.89	1283.40	1283.81	1284.09	1284.23	1284.41	1284.53	1284.83	1285.03	1285.16	1285.31	1285.42	XS 502
Elbow River	E13_Bragg_Lott	58,920	1279.41	1281.76	1282.56	1283.07	1283.45	1283.78	1283.95	1284.16	1284.27	1284.51	1284.74	1284.88	1285.04	1285.15	XS 503
Elbow River	E13_Bragg_Lott	58,862	1279.47	1281.56	1282.36	1282.92	1283.29	1283.62	1283.79	1283.99	1284.10	1284.36	1284.60	1284.72	1284.87	1284.97	XS 504
Elbow River	E13_Bragg_Lott	58,751	1278.65	1280.93	1281.41	1281.86	1282.32	1282.59	1282.82	1283.06	1283.28	1283.67	1283.89	1284.04	1284.18	1284.33	XS 505
Elbow River	E13_Bragg_Lott	58,684	1278.88	1280.53	1280.93	1281.24	1281.59	1281.89	1282.09	1282.33	1282.46	1282.78	1283.21	1283.34	1283.62	1283.72	XS 506
Elbow River	E13_Bragg_Lott	58,593	1277.99	1279.85	1280.29	1280.57	1280.86	1281.11	1281.29	1281.47	1281.60	1281.93	1282.21	1282.38	1282.61	1282.71	XS 507
Elbow River	E13_Bragg_Lott	58,516	1277.29	1279.22	1279.63	1279.96	1280.31	1280.50	1280.62	1280.77	1280.88	1281.15	1281.37	1281.49	1281.62	1281.81	XS 508
Elbow River	E13_Bragg_Lott	58,433	1277.35	1278.51	1278.98	1279.34	1279.74	1279.92	1280.03	1280.15	1280.25	1280.49	1280.71	1280.86	1281.02	1281.14	XS 509
Elbow River	E13_Bragg_Lott	58,359	1276.55	1277.97	1278.39	1278.69	1279.03	1279.23	1279.35	1279.50	1279.62	1279.91	1280.18	1280.34	1280.52	1280.66	XS 510
Elbow River	E13_Bragg_Lott	58,279	1276.24	1277.21	1277.72	1278.05	1278.34	1278.58	1278.70	1278.83	1278.93	1279.18	1279.39	1279.54	1279.70	1279.83	XS 511; Redwood Meadows Golf & Country Club Berm on ROB
Elbow River	E13_Bragg_Lott	58,209	1274.80	1276.58	1277.24	1277.6	1277.85	1278.07	1278.18	1278.30	1278.39	1278.63	1278.83	1278.97	1279.13	1279.26	XS 512; Redwood Meadows Golf & Country Club Berm on ROB
Elbow River	E13_Bragg_Lott	58,142	1274.38	1276.23	1276.83	1277.19	1277.40	1277.55	1277.66	1277.77	1277.86	1278.09	1278.30	1278.44	1278.60	1278.73	XS 513; Redwood Meadows Golf & Country Club Berm on ROB
Elbow River	E13_Bragg_Lott	58,057	1274.13	1275.75	1276.24	1276.52	1276.72	1276.88	1276.99	1277.12	1277.22	1277.45	1277.65	1277.79	1277.95	1278.08	XS 514; Redwood Meadows Golf & Country Club Berm on ROB
Elbow River	E13_Bragg_Lott	57,984	1273.67	1275.18	1275.63	1275.89	1276.12	1276.33	1276.44	1276.57	1276.67	1276.90	1277.12	1277.27	1277.44	1277.57	XS 515; Redwood Meadows Golf & Country Club Berm on ROB

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Table E3: Flood Frequency Profiles – Elbow River

River	Model Reach	River Station (m)	Minimum Channel Elevation (m)	Simulated Water Levels for Various Flood Events (m)													Notes
				2-year	5-year	10-year	20-year	35-year	50-year	75-year	100-year	200-year	350-year	500-year	750-year	1,000-year	
Elbow River	E13_Bragg_Lott	57,899	1272.83	1274.60	1275.02	1275.27	1275.49	1275.69	1275.81	1275.93	1276.02	1276.28	1276.50	1276.66	1276.82	1276.94	XS 516; Redwood Meadows Golf & Country Club Berm on ROB
Elbow River	E13_Bragg_Lott	57,831	1272.72	1274.24	1274.59	1274.84	1275.01	1275.15	1275.26	1275.41	1275.53	1275.84	1276.06	1276.22	1276.40	1276.52	XS 517; Redwood Meadows Golf & Country Club Berm on ROB
Elbow River	E13_Bragg_Lott	57,738	1272.28	1273.39	1273.7	1273.94	1274.22	1274.48	1274.67	1274.91	1275.08	1275.41	1275.63	1275.83	1276.00	1276.13	XS 518; Redwood Meadows Golf & Country Club Berm on ROB
Elbow River	E13_Bragg_Lott	57,685	1271.47	1272.99	1273.37	1273.66	1273.98	1274.27	1274.48	1274.74	1274.91	1275.25	1275.44	1275.65	1275.82	1275.94	XS 519; Redwood Meadows Golf & Country Club Berm on ROB
Elbow River	E13_Bragg_Lott	57,597	1270.43	1272.56	1272.95	1273.25	1273.56	1273.83	1274.02	1274.26	1274.46	1274.97	1274.97	1275.19	1275.21	1275.33	XS 520; Redwood Meadows Golf & Country Club Berm on ROB
Elbow River	E13_Bragg_Lott	57,512	1269.86	1271.85	1272.16	1272.42	1272.71	1272.99	1273.20	1273.31	1273.37	1273.66	1274.36	1274.36(2)	1274.65	1274.74	XS 521; Redwood Meadows Golf & Country Club Berm on ROB
Elbow River	E13_Bragg_Lott	57,437	1269.47	1271.08	1271.54	1271.86	1272.23	1272.56	1272.79	1273.10	1273.31	1273.46	1273.66	1273.78	1273.91	1274.00	XS 522; Redwood Meadows Golf & Country Club Berm on ROB
Elbow River	E13_Bragg_Lott	57,356	1269.10	1270.58	1270.97	1271.24	1271.55	1271.84	1272.04	1272.29	1272.49	1272.96	1273.12	1273.22	1273.35	1273.48	XS 523; Redwood Meadows Golf & Country Club Berm on ROB
Elbow River	E13_Bragg_Lott	57,286	1268.91	1269.89	1270.29	1270.60	1270.96	1271.30	1271.53	1271.81	1272.03	1272.56	1272.84	1272.96	1273.12	1273.24	XS 524; Redwood Meadows Golf & Country Club Berm on ROB
Elbow River	E13_Bragg_Lott	57,215	1267.43	1269.47	1269.88	1270.21	1270.59	1270.94	1271.18	1271.47	1271.69	1272.34	1272.34(2)	1272.40	1272.54	1272.63	XS 525; Redwood Meadows Golf & Country Club Berm on ROB
Elbow River	E13_Bragg_Lott	57,132	1267.34	1268.73	1269.09	1269.42	1269.82	1270.19	1270.43	1270.60	1270.72	1270.89	1271.76	1271.86	1271.98	1272.06	XS 526; Redwood Meadows Golf & Country Club Berm on ROB
Elbow River	E13_Bragg_Lott	57,049	1266.52	1268.04	1268.51	1268.85	1269.29	1269.73	1269.99	1270.15	1270.21	1270.48	1270.65	1270.82	1270.92	1271.03	XS 527; Redwood Meadows Golf & Country Club Berm on ROB
Elbow River	E13_Bragg_Lott	56,974	1265.86	1267.11	1267.56	1268.09	1268.65	1269.15	1269.37	1269.59	1269.81	1270.02	1270.20	1270.32	1270.50	1270.61	XS 528; Redwood Meadows Golf & Country Club Berm on ROB
Elbow River	E13_Bragg_Lott	56,895	1264.28	1266.43	1267.12	1267.65	1268.18	1268.65	1269.02	1269.41	1269.41(2)	1269.51	1269.70	1269.80	1269.91	1270.01	XS 529; Redwood Meadows Golf & Country Club Berm on ROB
Elbow River	E13_Bragg_Lott	56,812	1264.17	1266.10	1266.65	1267.04	1267.37	1267.58	1267.72	1268.16	1268.69	1268.93	1269.10	1269.21	1269.32	1269.39	XS 530; Redwood Meadows Golf & Country Club Berm on ROB
Elbow River	E13_Bragg_Lott	56,740	1264.18	1265.77	1266.24	1266.60	1267.00	1267.34	1267.58	1267.79	1267.84	1268.08	1268.29	1268.44	1268.60	1268.71	XS 531
Elbow River	E13_Bragg_Lott	56,654	1263.84	1264.96	1265.37	1265.70	1266.03	1266.31	1266.46	1266.73	1267.13	1267.47	1267.72	1267.86	1267.98	1268.09	XS 532
Elbow River	E13_Bragg_Lott	56,576	1262.77	1264.36	1264.79	1265.12	1265.49	1265.79	1266.00	1266.24	1266.42	1266.84	1267.20	1267.38	1267.57	1267.70	XS 533
Elbow River	E13_Bragg_Lott	56,500	1261.65	1263.90	1264.30	1264.63	1264.96	1265.26	1265.46	1265.68	1265.82	1266.19	1266.49	1266.70	1266.89	1267.01	XS 534
Elbow River	E13_Bragg_Lott	56,417	1261.09	1263.03	1263.49	1263.87	1264.27	1264.58	1264.76	1264.96	1265.11	1265.49	1265.81	1266.01	1266.25	1266.38	XS 535
Elbow River	E13_Bragg_Lott	56,330	1260.96	1262.40	1262.97	1263.39	1263.73	1264.01	1264.19	1264.41	1264.56	1264.95	1265.27	1265.47	1265.69	1265.85	XS 536
Elbow River	E13_Bragg_Lott	56,254	1260.02	1261.96	1262.55	1262.95	1263.30	1263.61	1263.82	1264.05	1264.21	1264.61	1264.95	1265.18	1265.44	1265.64	XS 537
Elbow River	E13_Bragg_Lott	56,177	1260.20	1261.49	1262.07	1262.41	1262.73	1262.99	1263.16	1263.36	1263.51	1263.88	1264.19	1264.36	1264.54	1264.64	XS 538
Elbow River	E13_Bragg_Lott	56,111	1259.91	1261.20	1261.74	1262.07	1262.41	1262.67	1262.85	1263.06	1263.22	1263.57	1263.85	1264.04	1264.17	1264.28	XS 539
Elbow River	E13_Bragg_Lott	56,061	1259.25	1260.91	1261.43	1261.76	1262.09	1262.36	1262.55	1262.77	1262.91	1263.29	1263.64	1263.88	1264.01	1264.13	XS 540
Elbow River	E13_Bragg_Lott	56,013	1259.38	1260.70	1261.17	1261.51	1261.82	1262.08	1262.25	1262.43	1262.55	1262.84	1263.03	1263.20	1263.54	1263.65	XS 541
Elbow River	E13_Bragg_Lott	55,962	1258.93	1260.42	1260.88	1261.21	1261.52	1261.74	1261.89	1262.06	1262.19	1262.57	1262.87	1262.92	1263.05	1263.16	XS 542
Elbow River	E13_Bragg_Lott	55,909	1258.61	1259.96	1260.41	1260.76	1261.13	1261.33	1261.46	1261.61	1261.73	1262.02	1262.30	1262.52	1262.66	1262.76	XS 543
Elbow River	E13_Bragg_Lott	55,868	1258.40	1259.52	1260.05	1260.47	1260.86	1261.06	1261.20	1261.36	1261.48	1261.80	1262.07	1262.23	1262.42	1262.54	XS 544

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Classification: Public

Table E3: Flood Frequency Profiles – Elbow River

River	Model Reach	River Station (m)	Minimum Channel Elevation (m)	Simulated Water Levels for Various Flood Events (m)													Notes
				2-year	5-year	10-year	20-year	35-year	50-year	75-year	100-year	200-year	350-year	500-year	750-year	1,000-year	
Elbow River	E13_Bragg_Lott	55,827	1258.06	1259.09	1259.79	1260.22	1260.56	1260.77	1260.90	1261.06	1261.18	1261.48	1261.73	1261.89	1262.05	1262.17	XS 545
Elbow River	E13_Bragg_Lott	55,775	1256.34	1258.84	1259.52	1259.95	1260.21	1260.40	1260.54	1260.69	1260.81	1261.13	1261.41	1261.60	1261.80	1261.94	XS 546
Elbow River	E13_Bragg_Lott	55,727	1256.77	1258.60	1259.22	1259.55	1259.80	1259.99	1260.12	1260.28	1260.40	1260.74	1261.02	1261.18	1261.36	1261.49	XS 547
Elbow River	E13_Bragg_Lott	55,683	1256.67	1258.38	1259.00	1259.26	1259.50	1259.70	1259.84	1260.01	1260.14	1260.51	1260.81	1260.98	1261.17	1261.31	XS 548
Elbow River	E13_Bragg_Lott	55,640	1256.58	1258.05	1258.72	1258.95	1259.20	1259.42	1259.57	1259.76	1259.90	1260.30	1260.62	1260.81	1261.01	1261.16	XS 549
Elbow River	E13_Bragg_Lott	55,594	1256.35	1257.60	1258.38	1258.64	1258.91	1259.16	1259.32	1259.53	1259.68	1260.10	1260.44	1260.63	1260.83	1260.99	XS 550
Elbow River	E13_Bragg_Lott	55,549	1254.95	1257.28	1258.07	1258.38	1258.69	1258.96	1259.14	1259.35	1259.51	1259.95	1260.31	1260.52	1260.73	1260.89	XS 551
Elbow River	E13_Bragg_Lott	55,499	1255.27	1256.89	1257.61	1257.99	1258.39	1258.69	1258.88	1259.10	1259.28	1259.74	1260.13	1260.34	1260.57	1260.74	XS 552
Elbow River	E13_Bragg_Lott	55,464	1254.70	1256.63	1257.38	1257.79	1258.20	1258.47	1258.66	1258.89	1259.06	1259.52	1259.89	1260.07	1260.30	1260.48	XS 553
Elbow River	E13_Bragg_Lott	55,404	1253.93	1256.20	1256.97	1257.41	1257.73	1258.01	1258.19	1258.40	1258.56	1258.97	1259.36	1259.76	1260.10	1260.31	XS 554
Elbow River	E13_Bragg_Lott	55,351	1254.09	1255.95	1256.69	1257.12	1257.49	1257.73	1257.91	1258.11	1258.27	1258.68	1259.04	1259.28	1259.43	1259.48	XS 555; Redwood Meadows Berm on ROB
Elbow River	E13_Bragg_Lott	55,309	1254.35	1255.74	1256.43	1256.79	1257.11	1257.35	1257.50	1257.69	1257.83	1258.20	1258.53	1258.75	1259.01	1259.22	XS 556; Redwood Meadows Berm on ROB
Elbow River	E13_Bragg_Lott	55,257	1254.14	1255.42	1256.03	1256.41	1256.75	1256.98	1257.13	1257.31	1257.44	1257.80	1258.12	1258.35	1258.71	1259.11	XS 557; Redwood Meadows Berm on ROB
Elbow River	E13_Bragg_Lott	55,210	1253.82	1255.04	1255.56	1255.97	1256.27	1256.50	1256.64	1256.80	1256.93	1257.29	1257.61	1257.84	1258.11	1258.27	XS 558; Redwood Meadows Berm on ROB
Elbow River	E13_Bragg_Lott	55,158	1253.46	1254.64	1255.14	1255.58	1255.88	1256.09	1256.24	1256.43	1256.58	1256.98	1257.35	1257.61	1257.91	1258.07	XS 559; Redwood Meadows Berm on ROB
Elbow River	E13_Bragg_Lott	55,108	1252.37	1254.11	1254.70	1255.20	1255.52	1255.77	1255.95	1256.17	1256.33	1256.78	1257.18	1257.46	1257.78	1257.96	XS 560; Redwood Meadows Berm on ROB
Elbow River	E13_Bragg_Lott	55,067	1252.47	1253.81	1254.39	1254.87	1255.20	1255.45	1255.61	1255.82	1255.97	1256.39	1256.76	1257.00	1257.29	1257.69	XS 561; Redwood Meadows Berm on ROB
Elbow River	E13_Bragg_Lott	55,029	1251.87	1253.44	1253.94	1254.26	1254.67	1254.97	1255.16	1255.34	1255.47	1255.84	1256.18	1256.42	1256.69	1256.90	XS 562; Redwood Meadows Berm on ROB
Elbow River	E13_Bragg_Lott	54,996	1251.45	1252.81	1253.28	1253.70	1254.03	1254.35	1254.58	1254.82	1255.00	1255.42	1255.79	1256.04	1256.33	1256.54	XS 563; Redwood Meadows Berm on ROB
Elbow River	E13_Bragg_Lott	54,924	1250.18	1252.11	1252.83	1253.34	1253.77	1254.10	1254.30	1254.53	1254.70	1255.14	1255.52	1255.79	1256.09	1256.31	XS 564; Redwood Meadows Berm on ROB
Elbow River	E13_Bragg_Lott	54,869	1249.52	1251.61	1252.41	1252.91	1253.38	1253.68	1253.85	1254.05	1254.19	1254.57	1254.89	1255.10	1255.36	1255.56	XS 565; Redwood Meadows Berm on ROB
Elbow River	E13_Bragg_Lott	54,826	1249.29	1251.24	1252.19	1252.62	1253.06	1253.32	1253.50	1253.70	1253.85	1254.23	1254.58	1254.81	1255.08	1255.30	XS 566; Redwood Meadows Berm on ROB
Elbow River	E13_Bragg_Lott	54,796	1249.09	1251.05	1252.06	1252.49	1252.92	1253.19	1253.37	1253.58	1253.73	1254.12	1254.47	1254.70	1254.98	1255.24	XS 567; Redwood Meadows Berm on ROB
Elbow River	E13_Bragg_Lott	54,758	1248.40	1250.66	1251.62	1252.29	1252.70	1252.96	1253.12	1253.30	1253.43	1253.77	1254.06	1254.26	1254.49	1254.68	XS 568; Redwood Meadows Berm on ROB
Elbow River	E13_Bragg_Lott	54,697	1248.49	1250.31	1251.03	1251.88	1252.31	1252.59	1252.76	1252.95	1253.06	1253.37	1253.66	1253.86	1254.10	1254.31	XS 569; Redwood Meadows Berm on ROB
Elbow River	E13_Bragg_Lott	54,661	1248.47	1250.10	1250.79	1251.59	1252.05	1252.33	1252.50	1252.67	1252.78	1253.09	1253.39	1253.61	1253.87	1254.10	XS 570; Redwood Meadows Berm on ROB
Elbow River	E13_Bragg_Lott	54,626	1248.01	1249.92	1250.59	1251.18	1251.69	1252.01	1252.17	1252.34	1252.46	1252.80	1253.12	1253.38	1253.67	1253.93	XS 571; Redwood Meadows Berm on ROB
Elbow River	E13_Bragg_Lott	54,582	1248.27	1249.48	1250.35	1250.82	1251.30	1251.68	1251.86	1252.04	1252.18	1252.55	1252.93	1253.22	1253.54	1253.83	XS 572; Redwood Meadows Berm on ROB
Elbow River	E13_Bragg_Lott	54,545	1247.26	1249.30	1250.20	1250.66	1251.06	1251.42	1251.60	1251.80	1251.94	1252.35	1252.77	1253.08	1253.41	1253.71	XS 573; Redwood Meadows Berm on ROB
Elbow River	E13_Bragg_Lott	54,499	1247.47	1249.06	1249.90	1250.41	1250.77	1251.10	1251.29	1251.50	1251.66	1252.12	1252.58	1252.92	1253.27	1253.59	XS 574; Redwood Meadows Berm on ROB
Elbow River	E13_Bragg_Lott	54,451	1247.34	1248.81	1249.53	1249.99	1250.34	1250.67	1250.87	1251.12	1251.31	1251.86	1252.38	1252.73	1253.10	1253.42	XS 575; Redwood Meadows Berm on ROB
Elbow River	E13_Bragg_Lott	54,410	1246.86	1248.59	1249.21	1249.66	1250.04	1250.39	1250.63	1250.92	1251.14	1251.72	1252.26	1252.63	1252.99	1253.32	XS 576; Redwood Meadows Berm on ROB
Elbow River	E13_Bragg_Lott	54,364	1247.13	1248.37	1248.89	1249.29	1249.72	1250.10	1250.35	1250.65	1250.87	1251.45	1251.97	1252.33	1252.87	1253.30	XS 577; Redwood Meadows Berm on ROB
Elbow River	E13_Bragg_Lott	54,311	1246.65	1248.05	1248.59	1248.97	1249.38	1249.72	1249.94	1250.20	1250.38	1250.85	1251.26	1251.54	1251.86	1252.09	XS 578; Redwood Meadows Berm on ROB
Elbow River	E13_Bragg_Lott	54,260	1245.98	1247.75	1248.28	1248.62	1248.98	1249.27	1249.46	1249.67	1249.83	1250.22	1250.55	1250.76	1251.01	1251.23	XS 579; Redwood Meadows Berm on ROB
Elbow River	E13_Bragg_Lott	54,206	1245.86	1247.49	1248.01	1248.33	1248.65	1248.91	1249.08	1249.27	1249.41	1249.77	1250.07	1250.26	1250.49	1250.70	XS 580; Redwood Meadows Berm on ROB
Elbow River	E13_Bragg_Lott	54,156	1245.58	1247.26	1247.76	1248.05	1248.33	1248.55	1248.69	1248.86	1248.98	1249.27	1249.54	1249.76	1250.00	1250.15	XS 581; Redwood Meadows Berm on ROB
Elbow River	E13_Bragg_Lott	54,109	1245.57	1247.05	1247.51	1247.81	1248.07	1248.27	1248.40	1248.54	1248.65	1248.91	1249.13	1249.27	1249.43	1249.62	XS 582; Redwood Meadows Berm on ROB

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Table E3: Flood Frequency Profiles – Elbow River

River	Model Reach	River Station (m)	Minimum Channel Elevation (m)	Simulated Water Levels for Various Flood Events (m)													Notes
				2-year	5-year	10-year	20-year	35-year	50-year	75-year	100-year	200-year	350-year	500-year	750-year	1,000-year	
Elbow River	E13_Bragg_Lott	54,059	1245.05	1246.85	1247.26	1247.56	1247.80	1247.99	1248.12	1248.27	1248.38	1248.65	1248.89	1249.06	1249.24	1249.39	XS 583; Redwood Meadows Berm on ROB
Elbow River	E13_Bragg_Lott	54,006	1245.29	1246.52	1246.92	1247.19	1247.41	1247.59	1247.72	1247.87	1247.97	1248.24	1248.47	1248.62	1248.80	1248.93	XS 584; Redwood Meadows Berm on ROB
Elbow River	E13_Bragg_Lott	53,961	1244.82	1246.13	1246.62	1246.86	1247.08	1247.27	1247.39	1247.54	1247.64	1247.89	1248.11	1248.25	1248.41	1248.54	XS 585; Redwood Meadows Berm on ROB
Elbow River	E13_Bragg_Lott	53,918	1244.32	1245.79	1246.27	1246.53	1246.76	1246.94	1247.07	1247.21	1247.30	1247.55	1247.75	1247.89	1248.04	1248.16	XS 586; Redwood Meadows Berm on ROB
Elbow River	E13_Bragg_Lott	53,874	1244.38	1245.49	1245.85	1246.13	1246.43	1246.59	1246.70	1246.82	1246.91	1247.14	1247.33	1247.47	1247.62	1247.73	XS 587; Redwood Meadows Berm on ROB
Elbow River	E13_Bragg_Lott	53,834	1243.78	1245.21	1245.62	1245.88	1246.16	1246.31	1246.41	1246.53	1246.62	1246.83	1247.03	1247.16	1247.31	1247.42	XS 588; Redwood Meadows Berm on ROB
Elbow River	E13_Bragg_Lott	53,792	1243.44	1244.91	1245.40	1245.63	1245.85	1246.00	1246.10	1246.21	1246.29	1246.51	1246.71	1246.84	1246.99	1247.11	XS 589; Redwood Meadows Berm on ROB
Elbow River	E13_Bragg_Lott	53,751	1243.15	1244.60	1245.08	1245.32	1245.51	1245.67	1245.77	1245.90	1245.99	1246.22	1246.43	1246.57	1246.73	1246.86	XS 590; Redwood Meadows Berm on ROB
Elbow River	E13_Bragg_Lott	53,698	1242.85	1244.19	1244.64	1244.92	1245.13	1245.30	1245.41	1245.54	1245.63	1245.87	1246.08	1246.22	1246.38	1246.51	XS 591; Redwood Meadows Berm on ROB
Elbow River	E13_Bragg_Lott	53,647	1242.20	1243.90	1244.31	1244.60	1244.83	1245.00	1245.12	1245.24	1245.34	1245.58	1245.80	1245.94	1246.10	1246.23	XS 592; Redwood Meadows Berm on ROB
Elbow River	E13_Bragg_Lott	53,604	1242.15	1243.58	1243.98	1244.24	1244.46	1244.63	1244.75	1244.88	1244.98	1245.24	1245.46	1245.61	1245.79	1245.92	XS 593; Redwood Meadows Berm on ROB
Elbow River	E13_Bragg_Lott	53,577	1241.64	1243.43	1243.80	1244.06	1244.28	1244.46	1244.58	1244.72	1244.82	1245.09	1245.32	1245.47	1245.65	1245.79	XS 594; Redwood Meadows Berm on ROB
Elbow River	E13_Bragg_Lott	53,529	1241.89	1243.11	1243.45	1243.74	1243.98	1244.18	1244.31	1244.46	1244.57	1244.84	1245.08	1245.23	1245.41	1245.55	XS 595; Redwood Meadows Berm on ROB
Elbow River	E13_Bragg_Lott	53,483	1241.69	1242.77	1243.16	1243.47	1243.72	1243.92	1244.05	1244.20	1244.31	1244.58	1244.81	1244.97	1245.14	1245.28	XS 596; Redwood Meadows Berm on ROB
Elbow River	E13_Bragg_Lott	53,435	1241.28	1242.55	1242.92	1243.20	1243.43	1243.62	1243.74	1243.89	1243.99	1244.24	1244.46	1244.60	1244.77	1244.90	XS 597; Redwood Meadows Berm on ROB
Elbow River	E13_Bragg_Lott	53,397	1240.90	1242.34	1242.69	1242.94	1243.16	1243.34	1243.45	1243.56	1243.65	1243.88	1244.07	1244.21	1244.36	1244.48	XS 598; Redwood Meadows Berm on ROB
Elbow River	E13_Bragg_Lott	53,343	1240.85	1241.82	1242.17	1242.46	1242.66	1242.81	1242.91	1243.03	1243.11	1243.32	1243.50	1243.63	1243.78	1243.89	XS 599; Redwood Meadows Berm on ROB
Elbow River	E13_Bragg_Lott	53,297	1239.48	1241.30	1241.64	1241.92	1242.15	1242.32	1242.43	1242.54	1242.62	1242.84	1243.03	1243.16	1243.31	1243.42	XS 600; Redwood Meadows Berm on ROB
Elbow River	E13_Bragg_Lott	53,252	1239.81	1240.78	1241.15	1241.46	1241.71	1241.89	1241.99	1242.12	1242.21	1242.43	1242.63	1242.76	1242.91	1243.02	XS 601; Redwood Meadows Berm on ROB
Elbow River	E13_Bragg_Lott	53,212	1239.16	1240.57	1240.94	1241.21	1241.43	1241.59	1241.69	1241.81	1241.89	1242.11	1242.30	1242.42	1242.57	1242.68	XS 602; Redwood Meadows Berm on ROB
Elbow River	E13_Bragg_Lott	53,162	1239.20	1240.32	1240.65	1240.86	1241.06	1241.20	1241.30	1241.41	1241.49	1241.70	1241.89	1242.01	1242.16	1242.27	XS 603; Redwood Meadows Berm on ROB
Elbow River	E13_Bragg_Lott	53,120	1238.95	1240.04	1240.34	1240.53	1240.71	1240.85	1240.94	1241.04	1241.13	1241.34	1241.53	1241.66	1241.81	1241.92	XS 604; Redwood Meadows Berm on ROB
Elbow River	E13_Bragg_Lott	53,073	1238.72	1239.77	1240.00	1240.16	1240.32	1240.45	1240.55	1240.66	1240.74	1240.95	1241.15	1241.28	1241.43	1241.55	XS 605; Redwood Meadows Berm on ROB
Elbow River	E13_Bragg_Lott	53,037	1238.60	1239.52	1239.72	1239.87	1240.03	1240.16	1240.26	1240.37	1240.46	1240.68	1240.87	1241.01	1241.16	1241.28	XS 606; Redwood Meadows Berm on ROB
Elbow River	E13_Bragg_Lott	53,003	1238.16	1239.19	1239.43	1239.59	1239.76	1239.90	1240.00	1240.12	1240.21	1240.43	1240.63	1240.76	1240.91	1241.03	XS 607; Redwood Meadows Berm on ROB
Elbow River	E13_Bragg_Lott	52,971	1237.84	1238.97	1239.22	1239.38	1239.55	1239.69	1239.79	1239.91	1240.00	1240.22	1240.41	1240.54	1240.69	1240.80	XS 608; Redwood Meadows Berm on ROB
Elbow River	E13_Bragg_Lott	52,909	1237.29	1238.66	1238.91	1239.07	1239.23	1239.37	1239.46	1239.58	1239.67	1239.88	1240.07	1240.20	1240.34	1240.45	XS 609; Redwood Meadows Berm on ROB
Elbow River	E13_Bragg_Lott	52,832	1237.03	1238.08	1238.38	1238.57	1238.75	1238.89	1238.97	1239.06	1239.14	1239.33	1239.49	1239.62	1239.74	1239.84	XS 610; Redwood Meadows Berm on ROB
Elbow River	E13_Bragg_Lott	52,807	1236.89	1237.89	1238.18	1238.36	1238.51	1238.65	1238.73	1238.84	1238.90	1239.08	1239.24	1239.35	1239.48	1239.57	XS 611; Redwood Meadows Berm on ROB
Elbow River	E13_Bragg_Lott	52,790	1236.79	1237.72	1238.01	1238.20	1238.35	1238.48	1238.57	1238.67	1238.74	1238.91	1239.06	1239.16	1239.29	1239.39	XS 612; Redwood Meadows Berm on ROB
Elbow River	E13_Bragg_Lott	52,775	1236.64	1237.51	1237.82	1238.04	1238.21	1238.34	1238.42	1238.52	1238.59	1238.77	1238.92	1239.03	1239.14	1239.26	XS 613; Redwood Meadows Berm on ROB
Elbow River	E13_Bragg_Lott	52,752	1235.89	1237.25	1237.62	1237.84	1238.03	1238.17	1238.26	1238.36	1238.44	1238.63	1238.79	1238.89	1239.02	1239.17	XS 614
Elbow River	E13_Bragg_Lott	52,724	1235.48	1237.05	1237.39	1237.58	1237.75	1237.90	1238.00	1238.11	1238.18	1238.36	1238.51	1238.62	1238.74	1238.87	XS 615
Elbow River	E13_Bragg_Lott	52,692	1235.58	1236.71	1237.04	1237.26	1237.45	1237.60	1237.70	1237.83	1237.91	1238.10	1238.27	1238.38	1238.51	1238.65	XS 616
Elbow River	E13_Bragg_Lott	52,659	1234.72	1236.40	1236.74	1236.97	1237.18	1237.34	1237.45	1237.57	1237.66	1237.87	1238.04	1238.16	1238.29	1238.43	XS 617
Elbow River	E13_Bragg_Lott	52,610	1234.75	1236.16	1236.53	1236.76	1236.96	1237.11	1237.21	1237.33	1237.41	1237.62	1237.79	1237.91	1238.03	1238.12	XS 618
Elbow River	E13_Bragg_Lott	52,570	1234.41	1235.97	1236.32	1236.55	1236.76	1236.92	1237.02	1237.13	1237.21	1237.42	1237.59	1237.70	1237.82	1237.92	XS 619
Elbow River	E13_Bragg_Lott	52,518	1233.43	1235.71	1236.04	1236.26	1236.46	1236.60	1236.69	1236.80	1236.88	1237.07	1237.24	1237.35	1237.48	1237.59	XS 620

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Table E3: Flood Frequency Profiles – Elbow River

River	Model Reach	River Station (m)	Minimum Channel Elevation (m)	Simulated Water Levels for Various Flood Events (m)													Notes
				2-year	5-year	10-year	20-year	35-year	50-year	75-year	100-year	200-year	350-year	500-year	750-year	1,000-year	
Elbow River	E13_Bragg_Lott	52,446	1233.98	1235.27	1235.52	1235.72	1235.95	1236.08	1236.17	1236.27	1236.34	1236.53	1236.71	1236.81	1236.93	1237.02	XS 621
Elbow River	E13_Bragg_Lott	52,386	1233.44	1234.37	1234.75	1235.03	1235.29	1235.47	1235.57	1235.67	1235.74	1235.92	1236.08	1236.18	1236.30	1236.39	XS 622
Elbow River	E13_Bragg_Lott	52,303	1232.54	1233.68	1234.04	1234.30	1234.53	1234.71	1234.80	1234.89	1234.97	1235.17	1235.33	1235.44	1235.56	1235.67	XS 623
Elbow River	E13_Bragg_Lott	52,220	1232.06	1233.16	1233.43	1233.62	1233.81	1233.95	1234.03	1234.13	1234.21	1234.40	1234.56	1234.67	1234.80	1234.89	XS 624
Elbow River	E13_Bragg_Lott	52,124	1231.30	1232.40	1232.66	1232.86	1233.04	1233.20	1233.30	1233.41	1233.49	1233.68	1233.85	1233.96	1234.09	1234.18	XS 625
Elbow River	E13_Bragg_Lott	52,035	1230.35	1231.67	1231.97	1232.17	1232.36	1232.51	1232.61	1232.73	1232.81	1233.00	1233.17	1233.28	1233.41	1233.51	XS 626
Elbow River	E13_Bragg_Lott	51,947	1229.69	1230.82	1231.08	1231.25	1231.42	1231.58	1231.68	1231.80	1231.89	1232.09	1232.26	1232.36	1232.48	1232.57	XS 627
Elbow River	E13_Bragg_Lott	51,877	1228.61	1230.21	1230.50	1230.67	1230.84	1230.98	1231.07	1231.17	1231.25	1231.43	1231.59	1231.69	1231.81	1231.90	XS 628
Elbow River	E13_Bragg_Lott	51,758	1228.09	1229.17	1229.52	1229.71	1229.89	1230.03	1230.12	1230.22	1230.29	1230.47	1230.63	1230.73	1230.84	1230.92	XS 629
Elbow River	E13_Bragg_Lott	51,673	1227.44	1228.56	1228.84	1228.98	1229.14	1229.26	1229.34	1229.43	1229.50	1229.69	1229.85	1229.96	1230.08	1230.17	XS 630
Elbow River	E13_Bragg_Lott	51,579	1226.74	1227.45	1227.68	1227.86	1228.03	1228.19	1228.28	1228.40	1228.48	1228.69	1228.87	1228.99	1229.11	1229.20	XS 631
Elbow River	E13_Bragg_Lott	51,458	1224.12	1226.27	1226.64	1226.87	1227.07	1227.20	1227.28	1227.38	1227.45	1227.64	1227.82	1227.94	1228.07	1228.17	XS 632
Elbow River	E13_Bragg_Lott	51,341	1223.42	1225.35	1225.63	1225.79	1225.92	1226.08	1226.20	1226.33	1226.43	1226.68	1226.89	1227.02	1227.16	1227.27	XS 633
Elbow River	E13_Bragg_Lott	51,232	1222.68	1224.46	1224.80	1225.06	1225.39	1225.60	1225.72	1225.86	1225.96	1226.20	1226.39	1226.51	1226.64	1226.74	XS 634
Elbow River	E13_Bragg_Lott	51,173	1222.55	1224.09	1224.48	1224.74	1225.10	1225.31	1225.43	1225.57	1225.66	1225.89	1226.06	1226.17	1226.30	1226.40	XS 635
Elbow River	E13_Bragg_Lott	51,067	1222.29	1223.45	1223.71	1223.87	1224.04	1224.19	1224.30	1224.44	1224.53	1224.77	1224.97	1225.09	1225.22	1225.31	XS 636
Elbow River	E13_Bragg_Lott	50,932	1220.27	1221.97	1222.38	1222.64	1222.89	1223.11	1223.24	1223.40	1223.51	1223.78	1223.96	1224.08	1224.20	1224.29	XS 637
Elbow River	E13_Bragg_Lott	50,854	1219.60	1221.36	1221.67	1221.91	1222.18	1222.39	1222.50	1222.64	1222.73	1222.95	1223.14	1223.25	1223.39	1223.49	XS 638
Elbow River	E13_Bragg_Lott	50,733	1219.31	1220.46	1220.97	1221.33	1221.58	1221.76	1221.86	1221.97	1222.06	1222.27	1222.45	1222.57	1222.70	1222.80	XS 639
Elbow River	E13_Bragg_Lott	50,623	1218.32	1219.82	1220.38	1220.76	1220.97	1221.12	1221.23	1221.34	1221.43	1221.64	1221.83	1221.96	1222.09	1222.20	XS 640
Elbow River	E13_Bragg_Lott	50,539	1217.62	1219.24	1219.71	1220.04	1220.28	1220.42	1220.52	1220.63	1220.71	1220.92	1221.09	1221.21	1221.33	1221.43	XS 641
Elbow River	E13_Bragg_Lott	50,443	1216.95	1218.70	1219.14	1219.45	1219.72	1219.89	1219.98	1220.09	1220.16	1220.36	1220.53	1220.64	1220.77	1220.86	XS 642
Elbow River	E13_Bragg_Lott	50,338	1216.40	1217.79	1218.54	1218.89	1219.12	1219.29	1219.38	1219.48	1219.55	1219.72	1219.85	1219.93	1220.02	1220.09	XS 643
Elbow River	E13_Bragg_Lott	50,294	1215.59	1217.36	1218.13	1218.46	1218.76	1218.94	1219.05	1219.17	1219.26	1219.45	1219.59	1219.67	1219.76	1219.82	XS 644
Elbow River	E13_Bragg_Lott	50,203	1214.84	1216.61	1217.46	1217.78	1218.08	1218.27	1218.39	1218.52	1218.61	1218.80	1218.93	1219.02	1219.11	1219.18	XS 645
Elbow River	E13_Bragg_Lott	50,099	1214.05	1216.22	1216.89	1217.23	1217.53	1217.71	1217.82	1217.94	1218.03	1218.25	1218.41	1218.51	1218.60	1218.67	XS 646
Elbow River	E13_Bragg_Lott	50,008	1214.06	1215.90	1216.38	1216.60	1216.80	1216.97	1217.07	1217.18	1217.25	1217.44	1217.60	1217.70	1217.80	1217.88	XS 647
Elbow River	E13_Bragg_Lott	49,908	1213.61	1215.27	1215.92	1216.12	1216.32	1216.47	1216.57	1216.68	1216.76	1216.96	1217.13	1217.24	1217.36	1217.44	XS 648
Elbow River	E13_Bragg_Lott	49,806	1213.06	1214.51	1215.33	1215.60	1215.74	1215.88	1215.97	1216.08	1216.15	1216.34	1216.51	1216.61	1216.73	1216.82	XS 649
Elbow River	E13_Bragg_Lott	49,713	1211.99	1213.80	1214.09	1214.49	1214.93	1215.16	1215.30	1215.44	1215.54	1215.76	1215.94	1216.05	1216.19	1216.29	XS 650
Elbow River	E13_Bragg_Lott	49,613	1211.78	1212.98	1213.57	1214.02	1214.46	1214.74	1214.91	1215.07	1215.17	1215.37	1215.50	1215.57	1215.67	1215.76	XS 651
Elbow River	E13_Bragg_Lott	49,536	1210.31	1212.35	1212.94	1213.34	1213.75	1214.08	1214.24	1214.38	1214.49	1214.77	1215.02	1215.18	1215.34	1215.45	XS 652
Elbow River	E13_Bragg_Lott	49,433	1210.27	1211.71	1212.23	1212.65	1213.08	1213.41	1213.58	1213.76	1213.86	1214.11	1214.25	1214.36	1214.49	1214.59	XS 653
Elbow River	E13_Bragg_Lott	49,340	1209.40	1211.12	1211.72	1212.18	1212.57	1212.83	1213.01	1213.14	1213.26	1213.48	1213.72	1213.84	1213.97	1214.08	XS 654
Elbow River	E13_Bragg_Lott	49,240	1209.29	1210.61	1211.24	1211.72	1212.20	1212.30	1212.41	1212.63	1212.73	1212.93	1213.05	1213.19	1213.32	1213.42	XS 655
Elbow River	E13_Bragg_Lott	49,140	1208.76	1209.75[5]	1210.22[5]	1210.63[5]	1211.44[5]	1211.60[5]	1211.82[5]	1211.92[5]	1212.01[5]	1212.17[5]	1212.34[5]	1212.44[5]	1212.50[5]	1212.58[5]	XS 656
Elbow River	E13_Bragg_Lott	49,041	1208.40	1209.29[5]	1209.70[5]	1210.05[5]	1210.44[5]	1210.85[5]	1210.97[5]	1211.14[5]	1211.25[5]	1211.52[5]	1211.67[5]	1211.73[5]	1211.92[5]	1211.99[5]	XS 657
Elbow River	E13_Bragg_Lott	48,939	1207.09	1208.78[5]	1209.13[5]	1209.38[5]	1209.65[5]	1209.89[5]	1210.01[5]	1210.09[5]	1210.18[5]	1210.50[5]	1210.88[5]	1211.00[5]	1211.15[5]	1211.19[5]	XS 658

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Table E3: Flood Frequency Profiles – Elbow River

River	Model Reach	River Station (m)	Minimum Channel Elevation (m)	Simulated Water Levels for Various Flood Events (m)													Notes
				2-year	5-year	10-year	20-year	35-year	50-year	75-year	100-year	200-year	350-year	500-year	750-year	1,000-year	
Elbow River	E13_Bragg_Lott	48,843	1207.06	1208.30[5]	1208.78[5]	1209.15[5]	1209.44[5]	1209.63[5]	1209.80[5]	1209.96[5]	1210.07[5]	1210.35[5]	1210.56[5]	1210.68[5]	1210.78[5]	1210.84[5]	XS 659
Elbow River	E13_Bragg_Lott	48,740	1206.37	1207.69[5]	1208.03[5]	1208.30[5]	1208.63[5]	1208.84[5]	1209.03[5]	1209.17[5]	1209.44[5]	1209.63[5]	1209.93[5]	1210.04[5]	1210.16[5]	1210.27[5]	XS 660
Elbow River	E13_Bragg_Lott	48,651	1205.75	1206.97[5]	1207.55[5]	1207.77[5]	1208.02[5]	1208.25[5]	1208.46[5]	1208.62[5]	1208.73[5]	1209.15[5]	1209.39[5]	1209.59[5]	1209.72[5]	1209.80[5]	XS 661
Elbow River	E13_Bragg_Lott	48,556	1205.07	1206.43[5]	1206.97[5]	1207.32[5]	1207.70[5]	1208.06[5]	1208.31[5]	1208.48[5]	1208.54[5]	1208.78[5]	1208.98[5]	1209.09[5]	1209.09[2,5]	1209.09[2,5]	XS 662
Elbow River	E13_Bragg_Lott	48,449	1204.35	1205.63[5]	1206.03[5]	1206.33[5]	1206.65[5]	1207.02[5]	1207.24[5]	1207.40[5]	1207.61[5]	1207.89[5]	1208.13[5]	1208.27[5]	1208.27[2,5]	1208.28[5]	XS 663
Elbow River	E13_Bragg_Lott	48,348	1204.13	1205.08[5]	1205.40[5]	1205.68[5]	1205.99[5]	1206.33[5]	1206.55[5]	1206.74[5]	1206.85[5]	1207.14[5]	1207.40[5]	1207.56[5]	1207.77[5]	1207.94[5]	XS 664
Elbow River	E13_Bragg_Lott	48,255	1203.43	1204.51[5]	1204.84[5]	1205.11[5]	1205.40[5]	1205.65[5]	1205.80[5]	1206.00[5]	1206.15[5]	1206.54[5]	1206.91[5]	1207.16[5]	1207.45[5]	1207.68[5]	XS 665
Elbow River	E13_Bragg_Lott	48,203	1203.14	1204.22[5]	1204.61[5]	1204.93[5]	1205.29[5]	1205.60[5]	1205.82[5]	1206.08[5]	1206.28[5]	1206.82[5]	1207.27[5]	1207.60[5]	1207.60[2,5]	1207.60[2,5]	XS 666; U/S of Highway 22 Bridge
Elbow River	E13_Bragg_Lott	48,165	1202.66	1203.78[5]	1204.23[5]	1204.59[5]	1205.03[5]	1205.36[5]	1205.58[5]	1205.84[5]	1206.05[5]	1206.58[5]	1207.07[5]	1207.42[5]	1207.42[2,5]	1207.42[2,5]	XS 667; D/S of Highway 22 Bridge
Elbow River	E13_Bragg_Lott	48,133	1202.31	1203.77[5]	1204.28[5]	1204.67[5]	1205.10[5]	1205.46[5]	1205.71[5]	1206.00[5]	1206.23[5]	1206.86[5]	1207.42[5]	1207.42[2,5]	1207.42[2,5]	1207.42[2,5]	XS 668
Elbow River	E13_Bragg_Lott	48,025	1201.62	1203.57	1204.06	1204.38	1204.65	1204.87	1205.01	1205.18	1205.30	1205.61	1205.86	1206.03	1206.22	1206.35	XS 669
Elbow River	E13_Bragg_Lott	47,928	1201.38	1203.18	1203.65	1203.89	1204.12	1204.30	1204.42	1204.56	1204.66	1204.92	1205.13	1205.28	1205.44	1205.57	XS 670
Elbow River	E13_Bragg_Lott	47,829	1201.17	1202.57	1202.97	1203.18	1203.38	1203.53	1203.63	1203.74	1203.83	1204.06	1204.26	1204.39	1204.55	1204.66	XS 671
Elbow River	E13_Bragg_Lott	47,731	1200.12	1201.60	1202.02	1202.32	1202.57	1202.76	1202.88	1203.03	1203.12	1203.36	1203.57	1203.71	1203.87	1203.99	XS 672
Elbow River	E13_Bragg_Lott	47,630	1199.49	1200.94	1201.41	1201.74	1201.98	1202.15	1202.26	1202.39	1202.51	1202.75	1202.96	1203.10	1203.26	1203.38	XS 673
Elbow River	E13_Bragg_Lott	47,533	1198.99	1200.02	1200.54	1200.92	1201.25	1201.53	1201.68	1201.83	1201.95	1202.18	1202.38	1202.53	1202.67	1202.78	XS 674
Elbow River	E13_Bragg_Lott	47,435	1197.71	1199.56	1200.10	1200.38	1200.61	1200.79	1200.91	1201.06	1201.15	1201.45	1201.66	1201.80	1201.96	1202.08	XS 675
Elbow River	E13_Bragg_Lott	47,332	1197.48	1199.14	1199.71	1199.97	1200.17	1200.33	1200.44	1200.56	1200.65	1200.89	1201.08	1201.21	1201.35	1201.47	XS 676
Elbow River	E13_Bragg_Lott	47,239	1196.86	1198.59	1198.99	1199.26	1199.52	1199.69	1199.80	1199.92	1200.01	1200.23	1200.42	1200.54	1200.68	1200.79	XS 677
Elbow River	E13_Bragg_Lott	47,148	1196.41	1198.04	1198.50	1198.75	1198.98	1199.16	1199.26	1199.39	1199.47	1199.68	1199.86	1199.98	1200.12	1200.23	XS 678
Elbow River	E13_Bragg_Lott	47,049	1195.88	1197.67	1198.18	1198.39	1198.58	1198.73	1198.83	1198.94	1199.02	1199.21	1199.38	1199.49	1199.62	1199.71	XS 679
Elbow River	E13_Bragg_Lott	46,949	1195.61	1197.36	1197.84	1198.02	1198.19	1198.34	1198.43	1198.54	1198.62	1198.79	1198.95	1199.06	1199.18	1199.27	XS 680
Elbow River	E13_Bragg_Lott	46,849	1195.42	1196.89	1197.27	1197.46	1197.64	1197.80	1197.89	1198.02	1198.10	1198.28	1198.44	1198.54	1198.65	1198.73	XS 681
Elbow River	E13_Bragg_Lott	46,748	1195.06	1196.28	1196.63	1196.88	1197.10	1197.25	1197.35	1197.47	1197.55	1197.73	1197.88	1197.98	1198.09	1198.18	XS 682
Elbow River	E13_Bragg_Lott	46,661	1194.10	1195.83	1196.21	1196.48	1196.67	1196.80	1196.89	1196.99	1197.06	1197.23	1197.39	1197.49	1197.61	1197.70	XS 683
Elbow River	E13_Bragg_Lott	46,577	1193.97	1195.34	1195.68	1195.98	1196.14	1196.29	1196.37	1196.47	1196.54	1196.73	1196.90	1197.00	1197.12	1197.21	XS 684
Elbow River	E13_Bragg_Lott	46,474	1193.55	1194.71	1195.02	1195.21	1195.40	1195.55	1195.65	1195.76	1195.85	1196.06	1196.24	1196.34	1196.45	1196.54	XS 685
Elbow River	E13_Bragg_Lott	46,374	1192.49	1193.92	1194.35	1194.57	1194.79	1194.96	1195.06	1195.17	1195.25	1195.43	1195.60	1195.70	1195.82	1195.91	XS 686
Elbow River	E13_Bragg_Lott	46,275	1191.81	1193.42	1193.75	1193.97	1194.18	1194.35	1194.45	1194.56	1194.65	1194.85	1195.04	1195.16	1195.28	1195.39	XS 687
Elbow River	E13_Bragg_Lott	46,165	1191.19	1192.97	1193.29	1193.49	1193.68	1193.85	1193.95	1194.06	1194.13	1194.34	1194.52	1194.64	1194.77	1194.87	XS 688
Elbow River	E13_Bragg_Lott	46,074	1190.27	1192.27	1192.51	1192.66	1192.81	1192.96	1193.05	1193.16	1193.24	1193.41	1193.55	1193.64	1193.75	1193.83	XS 689
Elbow River	E13_Bragg_Lott	45,996	1190.28	1191.42	1191.79	1191.98	1192.16	1192.30	1192.38	1192.47	1192.53	1192.68	1192.81	1192.89	1192.99	1193.06	XS 690
Elbow River	E13_Bragg_Lott	45,896	1189.34	1190.76	1191.21	1191.45	1191.63	1191.76	1191.83	1191.91	1191.97	1192.12	1192.24	1192.32	1192.41	1192.48	XS 691
Elbow River	E13_Bragg_Lott	45,800	1188.98	1190.26	1190.71	1190.97	1191.18	1191.30	1191.38	1191.45	1191.51	1191.65	1191.76	1191.83	1191.91	1191.97	XS 692
Elbow River	E13_Bragg_Lott	45,705	1188.47	1189.81	1190.21	1190.43	1190.63	1190.76	1190.83	1190.91	1190.95	1191.07	1191.17	1191.24	1191.32	1191.37	XS 693
Elbow River	E13_Bragg_Lott	45,611	1188.15	1189.32	1189.64	1189.83	1190.01	1190.13	1190.20	1190.27	1190.32	1190.43	1190.53	1190.60	1190.68	1190.73	XS 694
Elbow River	E13_Bragg_Lott	45,514	1187.34	1188.74	1189.06	1189.23	1189.41	1189.53	1189.60	1189.68	1189.73	1189.88	1189.98	1190.04	1190.12	1190.18	XS 695
Elbow River	E13_Bragg_Lott	45,419	1186.27	1188.25	1188.61	1188.82	1189.00	1189.13	1189.21	1189.30	1189.37	1189.53	1189.65	1189.73	1189.82	1189.89	XS 696

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Table E3: Flood Frequency Profiles – Elbow River

River	Model Reach	River Station (m)	Minimum Channel Elevation (m)	Simulated Water Levels for Various Flood Events (m)													Notes
				2-year	5-year	10-year	20-year	35-year	50-year	75-year	100-year	200-year	350-year	500-year	750-year	1,000-year	
Elbow River	E13_Bragg_Lott	45,309	1186.11	1187.62	1188.17	1188.39	1188.57	1188.72	1188.81	1188.90	1188.97	1189.13	1189.27	1189.35	1189.44	1189.51	XS 697
Elbow River	E13_Bragg_Lott	45,216	1185.12	1187.02	1187.63	1187.90	1188.08	1188.23	1188.32	1188.43	1188.51	1188.69	1188.82	1188.91	1189.00	1189.07	XS 698
Elbow River	E13_Bragg_Lott	45,115	1184.51	1186.53	1187.01	1187.24	1187.40	1187.52	1187.60	1187.69	1187.75	1187.91	1188.04	1188.12	1188.22	1188.28	XS 699
Elbow River	E13_Bragg_Lott	45,016	1184.25	1186.09	1186.53	1186.71	1186.85	1186.95	1187.02	1187.10	1187.16	1187.29	1187.42	1187.50	1187.60	1187.67	XS 700
Elbow River	E13_Bragg_Lott	44,931	1183.93	1185.37	1185.79	1185.94	1186.09	1186.20	1186.27	1186.35	1186.41	1186.56	1186.69	1186.78	1186.88	1186.95	XS 701
Elbow River	E13_Bragg_Lott	44,835	1182.54	1184.68	1185.08	1185.28	1185.43	1185.55	1185.62	1185.71	1185.77	1185.94	1186.06	1186.14	1186.24	1186.30	XS 702
Elbow River	E13_Bragg_Lott	44,722	1182.51	1184.00	1184.45	1184.71	1184.89	1185.03	1185.11	1185.20	1185.27	1185.46	1185.62	1185.70	1185.80	1185.87	XS 703
Elbow River	E13_Bragg_Lott	44,643	1181.72	1183.53	1184.01	1184.20	1184.39	1184.52	1184.61	1184.71	1184.78	1184.97	1185.14	1185.26	1185.40	1185.49	XS 704
Elbow River	E13_Bragg_Lott	44,541	1181.15	1182.89	1183.35	1183.56	1183.73	1183.87	1183.96	1184.06	1184.14	1184.35	1184.53	1184.65	1184.83	1184.92	XS 705
Elbow River	E13_Bragg_Lott	44,448	1180.45	1182.32	1182.69	1182.92	1183.12	1183.29	1183.39	1183.50	1183.59	1183.84	1184.00	1184.10	1184.23	1184.32	XS 706
Elbow River	E13_Bragg_Lott	44,344	1180.02	1181.59	1182.01	1182.29	1182.54	1182.73	1182.84	1182.97	1183.07	1183.32	1183.57	1183.69	1183.81	1183.90	XS 707
Elbow River	E13_Bragg_Lott	44,243	1178.92	1180.94	1181.45	1181.73	1181.97	1182.15	1182.27	1182.40	1182.50	1182.76	1183.08	1183.16	1183.28	1183.37	XS 708
Elbow River	E13_Bragg_Lott	44,141	1178.43	1180.59	1180.98	1181.20	1181.41	1181.57	1181.69	1181.82	1181.92	1182.19	1182.43	1182.64	1182.75	1182.84	XS 709
Elbow River	E13_Bragg_Lott	44,042	1178.45	1180.17	1180.51	1180.74	1180.96	1181.13	1181.24	1181.38	1181.48	1181.72	1181.94	1182.09	1182.25	1182.37	XS 710
Elbow River	E13_Bragg_Lott	43,929	1178.14	1179.48	1179.83	1180.05	1180.26	1180.43	1180.55	1180.67	1180.76	1180.98	1181.17	1181.30	1181.42	1181.52	XS 711
Elbow River	E13_Bragg_Lott	43,842	1177.43	1178.96	1179.27	1179.47	1179.66	1179.80	1179.90	1180.01	1180.08	1180.28	1180.48	1180.58	1180.69	1180.78	XS 712
Elbow River	E13_Bragg_Lott	43,744	1177.38	1178.43	1178.69	1178.87	1179.05	1179.19	1179.28	1179.37	1179.44	1179.64	1179.83	1179.95	1180.06	1180.14	XS 713
Elbow River	E13_Bragg_Lott	43,641	1176.79	1177.54	1177.82	1178.03	1178.23	1178.39	1178.50	1178.61	1178.69	1178.87	1179.02	1179.13	1179.23	1179.31	XS 714
Elbow River	E13_Bragg_Lott	43,543	1175.70	1176.98	1177.31	1177.51	1177.69	1177.84	1177.94	1178.07	1178.14	1178.30	1178.44	1178.53	1178.63	1178.71	XS 715
Elbow River	E13_Bragg_Lott	43,445	1175.41	1176.57	1176.94	1177.13	1177.28	1177.40	1177.49	1177.60	1177.66	1177.83	1177.95	1178.03	1178.12	1178.19	XS 716
Elbow River	E13_Bragg_Lott	43,319	1174.34	1175.97	1176.23	1176.39	1176.54	1176.66	1176.75	1176.85	1176.91	1177.07	1177.20	1177.29	1177.38	1177.46	XS 717
Elbow River	E13_Bragg_Lott	43,248	1174.00	1175.39	1175.76	1175.97	1176.15	1176.30	1176.39	1176.49	1176.55	1176.70	1176.83	1176.91	1177.01	1177.09	XS 718
Elbow River	E13_Bragg_Lott	43,137	1173.17	1174.63	1175.19	1175.45	1175.66	1175.81	1175.91	1176.00	1176.07	1176.25	1176.39	1176.47	1176.57	1176.65	XS 719
Elbow River	E13_Bragg_Lott	43,039	1172.10	1173.82	1174.35	1174.65	1174.88	1175.05	1175.17	1175.29	1175.37	1175.58	1175.74	1175.84	1175.95	1176.04	XS 720
Elbow River	E13_Bragg_Lott	42,937	1171.29	1173.31	1173.73	1173.98	1174.23	1174.41	1174.54	1174.68	1174.77	1174.97	1175.13	1175.23	1175.34	1175.42	XS 721
Elbow River	E13_Bragg_Lott	42,838	1171.27	1172.80	1173.15	1173.39	1173.65	1173.85	1173.98	1174.12	1174.22	1174.44	1174.61	1174.71	1174.83	1174.91	XS 722
Elbow River	E13_Bragg_Lott	42,736	1170.60	1172.04	1172.40	1172.66	1172.89	1173.08	1173.20	1173.34	1173.44	1173.68	1173.85	1173.96	1174.07	1174.16	XS 723
Elbow River	E13_Bragg_Lott	42,638	1169.87	1171.25	1171.64	1171.86	1172.10	1172.29	1172.41	1172.56	1172.66	1172.91	1173.08	1173.17	1173.28	1173.37	XS 724
Elbow River	E13_Bragg_Lott	42,536	1169.06	1170.47	1170.99	1171.25	1171.48	1171.66	1171.77	1171.90	1171.99	1172.24	1172.43	1172.55	1172.69	1172.79	XS 725
Elbow River	E13_Bragg_Lott	42,439	1168.11	1169.91	1170.38	1170.66	1170.89	1171.05	1171.15	1171.27	1171.36	1171.54	1171.68	1171.78	1171.90	1171.99	XS 726
Elbow River	E13_Bragg_Lott	42,343	1167.70	1169.30	1169.61	1169.85	1170.09	1170.26	1170.37	1170.49	1170.57	1170.79	1170.97	1171.09	1171.23	1171.33	XS 727
Elbow River	E13_Bragg_Lott	42,265	1167.51	1168.65	1169.03	1169.31	1169.56	1169.74	1169.86	1170.01	1170.09	1170.29	1170.47	1170.60	1170.73	1170.84	XS 728
Elbow River	E13_Bragg_Lott	42,142	1166.23	1167.94	1168.46	1168.74	1168.96	1169.12	1169.22	1169.34	1169.42	1169.63	1169.81	1169.93	1170.06	1170.17	XS 729
Elbow River	E13_Bragg_Lott	42,043	1165.53	1167.38	1167.87	1168.11	1168.32	1168.50	1168.60	1168.70	1168.77	1168.96	1169.13	1169.25	1169.39	1169.50	XS 730
Elbow River	E13_Bragg_Lott	41,942	1165.23	1166.53	1166.96	1167.21	1167.43	1167.65	1167.77	1167.90	1167.99	1168.23	1168.44	1168.59	1168.75	1168.88	XS 731
Elbow River	E13_Bragg_Lott	41,844	1163.94	1165.89	1166.30	1166.55	1166.77	1166.97	1167.10	1167.24	1167.34	1167.60	1167.83	1167.98	1168.15	1168.29	XS 732
Elbow River	E13_Bragg_Lott	41,751	1164.03	1165.41	1165.78	1166.06	1166.32	1166.50	1166.62	1166.76	1166.86	1167.12	1167.35	1167.50	1167.68	1167.82	XS 733
Elbow River	E13_Bragg_Lott	41,649	1163.61	1164.95	1165.33	1165.64	1165.90	1166.08	1166.19	1166.32	1166.42	1166.68	1166.90	1167.05	1167.22	1167.35	XS 734

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Table E3: Flood Frequency Profiles – Elbow River

River	Model Reach	River Station (m)	Minimum Channel Elevation (m)	Simulated Water Levels for Various Flood Events (m)													Notes
				2-year	5-year	10-year	20-year	35-year	50-year	75-year	100-year	200-year	350-year	500-year	750-year	1,000-year	
Elbow River	E13_Bragg_Lott	41,551	1162.48	1164.49	1164.85	1165.13	1165.37	1165.55	1165.67	1165.80	1165.89	1166.13	1166.35	1166.49	1166.66	1166.79	XS 735
Elbow River	E13_Bragg_Lott	41,448	1162.21	1163.81	1164.15	1164.36	1164.57	1164.74	1164.85	1164.99	1165.09	1165.35	1165.58	1165.74	1165.92	1166.06	XS 736
Elbow River	E13_Bragg_Lott	41,348	1161.56	1163.12	1163.50	1163.75	1163.99	1164.18	1164.30	1164.44	1164.55	1164.83	1165.08	1165.25	1165.44	1165.59	XS 737
Elbow River	E13_Bragg_Lott	41,246	1160.98	1162.39	1162.80	1163.14	1163.44	1163.69	1163.84	1164.01	1164.14	1164.46	1164.73	1164.91	1165.11	1165.27	XS 738
Elbow River	E13_Bragg_Lott	41,149	1159.96	1161.91	1162.36	1162.70	1163.04	1163.30	1163.43	1163.59	1163.69	1163.97	1164.22	1164.38	1164.57	1164.71	XS 739
Elbow River	E13_Bragg_Lott	41,047	1159.52	1161.40	1161.79	1162.09	1162.40	1162.64	1162.78	1162.95	1163.07	1163.33	1163.56	1163.69	1163.87	1163.99	XS 740
Elbow River	E13_Bragg_Lott	40,947	1159.39	1160.82	1161.19	1161.45	1161.71	1161.87	1161.98	1162.10	1162.19	1162.43	1162.61	1162.76	1162.88	1162.99	XS 741
Elbow River	E13_Bragg_Lott	40,847	1159.14	1160.26	1160.59	1160.82	1161.05	1161.24	1161.36	1161.49	1161.58	1161.81	1161.99	1162.11	1162.24	1162.34	XS 742
Elbow River	E13_Bragg_Lott	40,749	1157.80	1159.39	1159.75	1160.05	1160.28	1160.45	1160.56	1160.67	1160.74	1160.93	1161.08	1161.19	1161.30	1161.39	XS 743
Elbow River	E13_Bragg_Lott	40,651	1157.20	1158.76	1159.15	1159.44	1159.71	1159.90	1160.01	1160.11	1160.19	1160.38	1160.54	1160.66	1160.79	1160.89	XS 744
Elbow River	E13_Bragg_Lott	40,547	1157.10	1158.27	1158.68	1158.93	1159.14	1159.33	1159.44	1159.57	1159.67	1159.89	1160.08	1160.20	1160.35	1160.46	XS 745
Elbow River	E13_Bragg_Lott	40,447	1156.62	1157.63	1158.09	1158.36	1158.56	1158.74	1158.86	1158.99	1159.09	1159.32	1159.51	1159.63	1159.78	1159.89	XS 746
Elbow River	E13_Bragg_Lott	40,347	1155.52	1157.12	1157.55	1157.81	1158.08	1158.30	1158.44	1158.60	1158.70	1158.96	1159.13	1159.26	1159.40	1159.51	XS 747
Elbow River	E13_Bragg_Lott	40,246	1154.62	1156.37	1156.84	1157.12	1157.39	1157.58	1157.70	1157.83	1157.92	1158.14	1158.36	1158.45	1158.56	1158.65	XS 748
Elbow River	E13_Bragg_Lott	40,147	1154.43	1156.04	1156.45	1156.71	1156.95	1157.12	1157.22	1157.34	1157.42	1157.61	1157.76	1157.86	1157.97	1158.08	XS 749
Elbow River	E13_Bragg_Lott	40,047	1154.02	1155.72	1156.09	1156.31	1156.51	1156.65	1156.73	1156.83	1156.90	1157.07	1157.23	1157.32	1157.42	1157.50	XS 750
Elbow River	E13_Bragg_Lott	39,946	1153.76	1155.14	1155.53	1155.78	1156.00	1156.16	1156.26	1156.36	1156.44	1156.61	1156.75	1156.84	1156.94	1157.02	XS 751
Elbow River	E13_Bragg_Lott	39,851	1153.19	1154.64	1155.01	1155.27	1155.52	1155.69	1155.79	1155.89	1155.98	1156.13	1156.24	1156.34	1156.42	1156.49	XS 752
Elbow River	E13_Bragg_Lott	39,744	1152.99	1154.05	1154.42	1154.67	1154.89	1155.06	1155.15	1155.27	1155.35	1155.55	1155.69	1155.79	1155.89	1155.97	XS 753
Elbow River	E13_Bragg_Lott	39,645	1152.12	1153.51	1153.78	1153.98	1154.18	1154.34	1154.43	1154.55	1154.63	1154.80	1154.94	1155.03	1155.13	1155.21	XS 754
Elbow River	E13_Bragg_Lott	39,546	1151.72	1152.98	1153.22	1153.38	1153.52	1153.62	1153.70	1153.79	1153.86	1154.00	1154.12	1154.19	1154.30	1154.37	XS 755
Elbow River	E13_Bragg_Lott	39,444	1150.79	1152.21	1152.49	1152.66	1152.84	1152.97	1153.05	1153.14	1153.21	1153.36	1153.51	1153.60	1153.70	1153.77	XS 756
Elbow River	E13_Bragg_Lott	39,400	1150.38	1151.87	1152.19	1152.37	1152.56	1152.71	1152.81	1152.89	1152.95	1153.11	1153.27	1153.36	1153.46	1153.53	XS 757
Elbow River	E13_Bragg_Lott	39,231	1149.23	1151.01	1151.47	1151.77	1152.00	1152.14	1152.23	1152.31	1152.38	1152.56	1152.70	1152.79	1152.88	1152.95	XS 758
Elbow River	E13_Bragg_Lott	39,141	1149.03	1150.48	1150.89	1151.19	1151.45	1151.64	1151.74	1151.89	1151.96	1152.17	1152.32	1152.43	1152.50	1152.56	XS 759
Elbow River	E13_Bragg_Lott	39,043	1148.10	1149.98	1150.40	1150.70	1150.99	1151.18	1151.30	1151.44	1151.52	1151.71	1151.85	1151.95	1152.05	1152.12	XS 760
Elbow River	E13_Bragg_Lott	38,941	1147.64	1149.39	1149.85	1150.16	1150.41	1150.58	1150.68	1150.79	1150.86	1151.03	1151.16	1151.26	1151.35	1151.42	XS 761
Elbow River	E13_Bragg_Lott	38,842	1147.34	1148.88	1149.29	1149.58	1149.77	1149.90	1149.99	1150.08	1150.15	1150.30	1150.43	1150.51	1150.60	1150.67	XS 762
Elbow River	E13_Bragg_Lott	38,745	1147.24	1148.42	1148.81	1149.05	1149.25	1149.38	1149.46	1149.54	1149.60	1149.75	1149.87	1149.95	1150.03	1150.10	XS 763
Elbow River	E13_Bragg_Lott	38,646	1146.02	1147.87	1148.21	1148.40	1148.55	1148.68	1148.75	1148.82	1148.88	1149.02	1149.13	1149.21	1149.29	1149.36	XS 764
Elbow River	E13_Bragg_Lott	38,541	1146.25	1147.25	1147.57	1147.77	1147.93	1148.06	1148.13	1148.22	1148.28	1148.44	1148.56	1148.64	1148.73	1148.81	XS 765
Elbow River	E13_Bragg_Lott	38,442	1145.22	1146.76	1147.04	1147.22	1147.37	1147.50	1147.58	1147.67	1147.74	1147.90	1148.03	1148.11	1148.21	1148.28	XS 766
Elbow River	E13_Bragg_Lott	38,342	1144.90	1146.14	1146.42	1146.59	1146.75	1146.87	1146.95	1147.04	1147.10	1147.26	1147.39	1147.48	1147.58	1147.65	XS 767
Elbow River	E13_Bragg_Lott	38,246	1144.75	1145.67	1145.95	1146.12	1146.29	1146.41	1146.48	1146.57	1146.63	1146.79	1146.93	1147.02	1147.12	1147.20	XS 768
Elbow River	E13_Bragg_Lott	38,144	1143.99	1145.19	1145.48	1145.66	1145.80	1145.90	1145.97	1146.04	1146.10	1146.25	1146.38	1146.47	1146.57	1146.64	XS 769
Elbow River	E13_Bragg_Lott	38,044	1143.27	1144.58	1144.94	1145.15	1145.32	1145.46	1145.54	1145.62	1145.68	1145.83	1145.96	1146.05	1146.15	1146.23	XS 770
Elbow River	E13_Bragg_Lott	37,957	1142.43	1143.94	1144.32	1144.61	1144.83	1144.99	1145.09	1145.20	1145.27	1145.45	1145.59	1145.69	1145.81	1145.90	XS 771
Elbow River	E13_Bragg_Lott	37,869	1141.91	1143.45	1143.87	1144.22	1144.46	1144.63	1144.73	1144.85	1144.93	1145.13	1145.31	1145.43	1145.57	1145.67	XS 772

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Table E3: Flood Frequency Profiles – Elbow River

River	Model Reach	River Station (m)	Minimum Channel Elevation (m)	Simulated Water Levels for Various Flood Events (m)													Notes
				2-year	5-year	10-year	20-year	35-year	50-year	75-year	100-year	200-year	350-year	500-year	750-year	1,000-year	
Elbow River	E13_Bragg_Lott	37,771	1141.48	1142.95	1143.39	1143.72	1143.99	1144.20	1144.32	1144.47	1144.58	1144.87	1145.09	1145.23	1145.38	1145.49	XS 773
Elbow River	E13_Bragg_Lott	37,687	1140.87	1142.58	1143.00	1143.31	1143.61	1143.81	1143.94	1144.10	1144.21	1144.49	1144.75	1144.90	1145.04	1145.15	XS 774
Elbow River	E13_Bragg_Lott	37,589	1140.36	1142.00	1142.44	1142.79	1143.12	1143.38	1143.55	1143.73	1143.86	1144.16	1144.39	1144.59	1144.73	1144.83	XS 775
Elbow River	E13_Bragg_Lott	37,512	1140.23	1141.59	1142.06	1142.42	1142.70	1142.92	1143.05	1143.22	1143.34	1143.66	1143.94	1144.10	1144.28	1144.39	XS 776
Elbow River	E13_Bragg_Lott	37,389	1139.29	1141.05	1141.50	1141.80	1142.07	1142.27	1142.40	1142.55	1142.66	1142.94	1143.20	1143.35	1143.52	1143.63	XS 777
Elbow River	E13_Bragg_Lott	37,289	1138.73	1140.51	1140.94	1141.23	1141.48	1141.71	1141.83	1141.96	1142.05	1142.27	1142.47	1142.60	1142.74	1142.85	XS 778
Elbow River	E13_Bragg_Lott	37,189	1138.39	1139.88	1140.40	1140.65	1140.85	1141.02	1141.13	1141.25	1141.33	1141.52	1141.69	1141.80	1141.92	1142.02	XS 779
Elbow River	E13_Bragg_Lott	37,092	1137.69	1139.46	1139.94	1140.13	1140.29	1140.44	1140.53	1140.63	1140.71	1140.89	1141.04	1141.15	1141.27	1141.36	XS 780
Elbow River	E13_Bragg_Lott	36,989	1137.28	1138.94	1139.35	1139.53	1139.71	1139.85	1139.94	1140.04	1140.11	1140.28	1140.44	1140.54	1140.66	1140.76	XS 781
Elbow River	E13_Bragg_Lott	36,908	1136.75	1138.43	1138.88	1139.12	1139.31	1139.45	1139.54	1139.64	1139.72	1139.90	1140.06	1140.17	1140.29	1140.38	XS 782
Elbow River	E13_Bragg_Lott	36,781	1136.16	1137.86	1138.19	1138.43	1138.66	1138.82	1138.91	1139.03	1139.11	1139.31	1139.48	1139.59	1139.72	1139.82	XS 783
Elbow River	E13_Bragg_Lott	36,698	1135.80	1137.39	1137.77	1138.03	1138.26	1138.43	1138.53	1138.65	1138.73	1138.93	1139.10	1139.21	1139.35	1139.45	XS 784
Elbow River	E13_Bragg_Lott	36,605	1135.26	1136.90	1137.35	1137.65	1137.84	1138.00	1138.09	1138.21	1138.29	1138.49	1138.66	1138.79	1138.93	1139.04	XS 785
Elbow River	E13_Bragg_Lott	36,502	1135.01	1136.36	1136.77	1137.00	1137.21	1137.38	1137.50	1137.65	1137.70	1137.96	1138.17	1138.30	1138.46	1138.59	XS 786
Elbow River	E13_Bragg_Lott	36,404	1133.93	1135.86	1136.27	1136.56	1136.83	1137.03	1137.17	1137.33	1137.33(2)	1137.44	1137.62	1137.74	1137.88	1137.98	XS 787
Elbow River	E13_Bragg_Lott	36,299	1133.57	1135.31	1135.77	1136.06	1136.33	1136.53	1136.67	1136.83	1136.92	1136.95	1137.14	1137.27	1137.41	1137.52	XS 788
Elbow River	E13_Bragg_Lott	36,212	1133.03	1134.81	1135.29	1135.54	1135.79	1135.98	1136.12	1136.26	1136.35	1136.60	1136.81	1136.94	1137.10	1137.21	XS 789
Elbow River	E13_Bragg_Lott	36,116	1132.31	1134.42	1134.82	1135.10	1135.37	1135.59	1135.72	1135.87	1135.98	1136.22	1136.43	1136.56	1136.72	1136.83	XS 790
Elbow River	E13_Bragg_Lott	36,012	1132.32	1134.03	1134.43	1134.69	1134.93	1135.11	1135.23	1135.36	1135.45	1135.67	1135.85	1135.97	1136.09	1136.19	XS 791
Elbow River	E13_Bragg_Lott	35,912	1131.53	1133.33	1133.83	1134.18	1134.48	1134.71	1134.85	1134.98	1135.05	1135.23	1135.38	1135.49	1135.60	1135.69	XS 792
Elbow River	E13_Bragg_Lott	35,816	1131.48	1132.77	1133.27	1133.57	1133.86	1134.07	1134.20	1134.34	1134.43	1134.64	1134.80	1134.91	1135.03	1135.12	XS 793
Elbow River	E13_Bragg_Lott	35,710	1130.50	1132.38	1132.93	1133.18	1133.42	1133.60	1133.71	1133.83	1133.91	1134.09	1134.24	1134.35	1134.46	1134.55	XS 794
Elbow River	E13_Bragg_Lott	35,616	1130.36	1131.94	1132.47	1132.72	1132.96	1133.15	1133.26	1133.38	1133.46	1133.64	1133.79	1133.89	1134.00	1134.09	XS 795
Elbow River	E13_Bragg_Lott	35,513	1129.85	1131.35	1131.89	1132.17	1132.45	1132.65	1132.78	1132.92	1133.01	1133.20	1133.36	1133.46	1133.58	1133.67	XS 796
Elbow River	E13_Bragg_Lott	35,414	1129.39	1130.90	1131.41	1131.72	1131.98	1132.18	1132.32	1132.46	1132.55	1132.76	1132.92	1133.02	1133.14	1133.23	XS 797
Elbow River	E13_Bragg_Lott	35,327	1129.04	1130.58	1131.01	1131.31	1131.54	1131.75	1131.88	1132.02	1132.11	1132.32	1132.48	1132.59	1132.70	1132.79	XS 798
Elbow River	E13_Bragg_Lott	35,210	1128.76	1129.98	1130.37	1130.67	1130.93	1131.16	1131.30	1131.45	1131.54	1131.74	1131.90	1132.00	1132.12	1132.21	XS 799
Elbow River	E13_Bragg_Lott	35,105	1128.00	1129.64	1129.98	1130.23	1130.46	1130.66	1130.79	1130.93	1131.02	1131.21	1131.36	1131.46	1131.57	1131.65	XS 800
Elbow River	E13_Bragg_Lott	35,004	1127.74	1129.26	1129.56	1129.77	1129.99	1130.16	1130.28	1130.42	1130.50	1130.70	1130.85	1130.95	1131.06	1131.15	XS 801
Elbow River	E13_Bragg_Lott	34,916	1127.88	1128.77	1129.07	1129.28	1129.49	1129.67	1129.79	1129.91	1129.98	1130.16	1130.31	1130.41	1130.54	1130.62	XS 802
Elbow River	E13_Bragg_Lott	34,816	1126.62	1128.21	1128.56	1128.78	1128.93	1129.04	1129.11	1129.21	1129.28	1129.46	1129.61	1129.71	1129.82	1129.91	XS 803
Elbow River	E13_Bragg_Lott	34,725	1125.56	1127.75	1128.10	1128.35	1128.56	1128.72	1128.84	1128.89	1128.96	1129.12	1129.26	1129.34	1129.43	1129.50	XS 804
Elbow River	E13_Bragg_Lott	34,615	1125.76	1127.30	1127.59	1127.77	1127.90	1128.01	1128.08	1128.25	1128.30	1128.43	1128.52	1128.61	1128.72	1128.80	XS 805
Elbow River	E13_Bragg_Lott	34,516	1125.31	1126.82	1127.11	1127.31	1127.48	1127.59	1127.67	1127.76	1127.83	1128.00	1128.15	1128.25	1128.36	1128.45	XS 806
Elbow River	E13_Bragg_Lott	34,419	1124.45	1126.34	1126.68	1126.93	1127.15	1127.31	1127.44	1127.55	1127.62	1127.80	1127.95	1128.04	1128.15	1128.24	XS 807
Elbow River	E13_Bragg_Lott	34,312	1124.58	1125.81	1126.14	1126.38	1126.60	1126.78	1126.91	1127.01	1127.08	1127.25	1127.39	1127.49	1127.60	1127.68	XS 808
Elbow River	E13_Bragg_Lott	34,238	1124.20	1125.44	1125.76	1126.00	1126.22	1126.40	1126.51	1126.62	1126.72	1126.90	1127.04	1127.14	1127.24	1127.31	XS 809
Elbow River	E13_Bragg_Lott	34,158	1123.34	1124.96	1125.34	1125.63	1125.87	1126.00	1126.09	1126.17	1126.24	1126.40	1126.55	1126.64	1126.74	1126.82	XS 810

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Table E3: Flood Frequency Profiles – Elbow River

River	Model Reach	River Station (m)	Minimum Channel Elevation (m)	Simulated Water Levels for Various Flood Events (m)													Notes
				2-year	5-year	10-year	20-year	35-year	50-year	75-year	100-year	200-year	350-year	500-year	750-year	1,000-year	
Elbow River	E13_Bragg_Lott	34,080	1122.89	1124.56	1124.98	1125.28	1125.51	1125.66	1125.75	1125.84	1125.91	1126.08	1126.23	1126.32	1126.43	1126.51	XS 811
Elbow River	E13_Bragg_Lott	34,003	1122.71	1124.25	1124.68	1124.99	1125.27	1125.47	1125.56	1125.65	1125.72	1125.85	1125.98	1126.07	1126.17	1126.25	XS 812
Elbow River	E13_Bragg_Lott	33,920	1122.48	1123.86	1124.23	1124.53	1124.79	1124.98	1125.09	1125.20	1125.26	1125.45	1125.60	1125.70	1125.82	1125.91	XS 813
Elbow River	E13_Bragg_Lott	33,840	1122.12	1123.32	1123.81	1124.11	1124.38	1124.59	1124.72	1124.86	1124.96	1125.19	1125.36	1125.46	1125.59	1125.69	XS 814
Elbow River	E13_Bragg_Lott	33,760	1121.09	1122.96	1123.51	1123.80	1124.04	1124.22	1124.34	1124.49	1124.58	1124.84	1125.03	1125.15	1125.28	1125.38	XS 815
Elbow River	E13_Bragg_Lott	33,681	1120.86	1122.72	1123.23	1123.51	1123.73	1123.90	1124.02	1124.15	1124.23	1124.44	1124.59	1124.69	1124.80	1124.88	XS 816
Elbow River	E13_Bragg_Lott	33,603	1120.69	1122.41	1122.88	1123.17	1123.44	1123.64	1123.77	1123.88	1123.96	1124.14	1124.27	1124.36	1124.46	1124.54	XS 817
Elbow River	E13_Bragg_Lott	33,521	1119.98	1121.99	1122.39	1122.64	1122.85	1123.01	1123.11	1123.25	1123.34	1123.52	1123.69	1123.79	1123.91	1124.00	XS 818
Elbow River	E13_Bragg_Lott	33,442	1119.77	1121.56	1121.95	1122.22	1122.45	1122.60	1122.71	1122.82	1122.90	1123.11	1123.28	1123.40	1123.52	1123.61	XS 819
Elbow River	E13_Bragg_Lott	33,363	1119.61	1121.17	1121.59	1121.87	1122.12	1122.28	1122.38	1122.48	1122.56	1122.75	1122.91	1123.02	1123.14	1123.23	XS 820
Elbow River	E13_Bragg_Lott	33,280	1119.40	1120.79	1121.17	1121.44	1121.68	1121.84	1121.93	1122.03	1122.10	1122.28	1122.43	1122.53	1122.65	1122.74	XS 821
Elbow River	E13_Bragg_Lott	33,200	1118.82	1120.24	1120.57	1120.82	1121.05	1121.20	1121.31	1121.42	1121.50	1121.69	1121.85	1121.95	1122.07	1122.16	XS 822
Elbow River	E13_Bragg_Lott	33,124	1118.11	1119.88	1120.22	1120.44	1120.65	1120.82	1120.93	1121.04	1121.11	1121.30	1121.45	1121.56	1121.67	1121.75	XS 823
Elbow River	E13_Bragg_Lott	32,951	1117.38	1119.16	1119.50	1119.71	1119.91	1120.06	1120.15	1120.26	1120.33	1120.50	1120.66	1120.77	1120.90	1120.99	XS 824
Elbow River	E13_Bragg_Lott	32,883	1117.23	1118.83	1119.23	1119.48	1119.69	1119.81	1119.90	1119.98	1120.05	1120.23	1120.39	1120.50	1120.63	1120.72	XS 825
Elbow River	E13_Bragg_Lott	32,808	1117.16	1118.37	1118.72	1118.93	1119.13	1119.30	1119.40	1119.52	1119.61	1119.83	1120.01	1120.13	1120.27	1120.36	XS 826
Elbow River	E13_Bragg_Lott	32,729	1116.57	1118.12	1118.49	1118.73	1118.94	1119.10	1119.20	1119.32	1119.41	1119.61	1119.79	1119.91	1120.04	1120.16	XS 827
Elbow River	E13_Bragg_Lott	32,650	1116.03	1117.89	1118.31	1118.57	1118.77	1118.91	1119.01	1119.11	1119.20	1119.38	1119.54	1119.63	1119.74	1119.83	XS 828
Elbow River	E13_Bragg_Lott	32,570	1116.10	1117.42	1117.82	1118.06	1118.26	1118.43	1118.53	1118.67	1118.75	1118.93	1119.10	1119.20	1119.32	1119.42	XS 829
Elbow River	E13_Bragg_Lott	32,488	1115.48	1117.13	1117.57	1117.81	1117.99	1118.13	1118.23	1118.34	1118.41	1118.58	1118.74	1118.85	1118.97	1119.06	XS 830
Elbow River	E13_Bragg_Lott	32,410	1115.30	1116.82	1117.26	1117.51	1117.68	1117.80	1117.87	1117.95	1118.01	1118.18	1118.32	1118.42	1118.53	1118.61	XS 831
Elbow River	E13_Bragg_Lott	32,329	1114.86	1116.45	1116.75	1116.95	1117.11	1117.25	1117.34	1117.47	1117.53	1117.70	1117.85	1117.95	1118.06	1118.15	XS 832
Elbow River	E13_Bragg_Lott	32,249	1114.13	1116.08	1116.39	1116.58	1116.75	1116.89	1116.98	1117.09	1117.16	1117.35	1117.50	1117.60	1117.72	1117.81	XS 833
Elbow River	E13_Bragg_Lott	32,167	1114.38	1115.82	1116.16	1116.35	1116.52	1116.66	1116.74	1116.84	1116.90	1117.08	1117.22	1117.31	1117.42	1117.50	XS 834
Elbow River	E13_Bragg_Lott	32,088	1114.05	1115.48	1115.81	1116.00	1116.15	1116.29	1116.38	1116.47	1116.54	1116.70	1116.83	1116.92	1117.02	1117.09	XS 835
Elbow River	E13_Bragg_Lott	32,008	1113.35	1114.96	1115.33	1115.53	1115.72	1115.87	1115.96	1116.06	1116.12	1116.28	1116.42	1116.51	1116.61	1116.69	XS 836
Elbow River	E13_Bragg_Lott	31,927	1112.41	1114.54	1114.94	1115.17	1115.37	1115.52	1115.61	1115.72	1115.79	1115.94	1116.08	1116.17	1116.27	1116.35	XS 837
Elbow River	E13_Bragg_Lott	31,850	1112.16	1114.16	1114.55	1114.76	1114.94	1115.08	1115.16	1115.26	1115.33	1115.48	1115.61	1115.69	1115.79	1115.87	XS 838
Elbow River	E13_Bragg_Lott	31,769	1111.91	1113.73	1114.14	1114.33	1114.48	1114.61	1114.70	1114.79	1114.86	1115.02	1115.15	1115.23	1115.33	1115.41	XS 839
Elbow River	E13_Bragg_Lott	31,688	1111.85	1113.28	1113.61	1113.80	1113.98	1114.13	1114.20	1114.29	1114.35	1114.51	1114.64	1114.73	1114.82	1114.90	XS 840
Elbow River	E13_Bragg_Lott	31,615	1111.88	1112.94	1113.22	1113.40	1113.58	1113.71	1113.79	1113.86	1113.92	1114.05	1114.17	1114.25	1114.34	1114.41	XS 841
Elbow River	E13_Bragg_Lott	31,523	1111.25	1112.61	1112.88	1113.04	1113.19	1113.28	1113.35	1113.41	1113.46	1113.59	1113.70	1113.77	1113.86	1113.93	XS 842
Elbow River	E13_Bragg_Lott	31,450	1110.49	1111.99	1112.30	1112.47	1112.62	1112.72	1112.79	1112.88	1112.94	1113.07	1113.19	1113.26	1113.35	1113.42	XS 843
Elbow River	E13_Bragg_Lott	31,377	1110.77	1111.51	1111.77	1111.95	1112.11	1112.23	1112.30	1112.38	1112.43	1112.57	1112.68	1112.76	1112.85	1112.91	XS 844
Elbow River	E13_Bragg_Lott	31,283	1110.19	1111.29	1111.53	1111.70	1111.85	1111.97	1112.03	1112.10	1112.15	1112.28	1112.39	1112.46	1112.53	1112.59	XS 845
Elbow River	E13_Bragg_Lott	31,208	1108.79	1111.03	1111.24	1111.37	1111.50	1111.62	1111.68	1111.75	1111.80	1111.92	1112.02	1112.09	1112.17	1112.23	XS 846
Elbow River	E13_Bragg_Lott	31,123	1109.22	1110.70	1110.93	1111.08	1111.20	1111.31	1111.36	1111.43	1111.48	1111.60	1111.70	1111.78	1111.86	1111.92	XS 847
Elbow River	E13_Bragg_Lott	31,047	1108.92	1110.43	1110.65	1110.79	1110.93	1111.04	1111.10	1111.18	1111.23	1111.35	1111.47	1111.55	1111.64	1111.71	XS 848

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Table E3: Flood Frequency Profiles – Elbow River

River	Model Reach	River Station (m)	Minimum Channel Elevation (m)	Simulated Water Levels for Various Flood Events (m)													Notes
				2-year	5-year	10-year	20-year	35-year	50-year	75-year	100-year	200-year	350-year	500-year	750-year	1,000-year	
Elbow River	E13_Bragg_Lott	30,944	1107.93	1109.96	1110.28	1110.45	1110.59	1110.71	1110.78	1110.86	1110.92	1111.08	1111.21	1111.30	1111.40	1111.48	XS 849
Elbow River	E13_Bragg_Lott	30,825	1107.85	1109.46	1109.80	1110.02	1110.21	1110.34	1110.43	1110.53	1110.60	1110.79	1110.94	1111.04	1111.15	1111.24	XS 850
Elbow River	E13_Bragg_Lott	30,725	1107.44	1108.92	1109.34	1109.60	1109.81	1109.97	1110.08	1110.19	1110.27	1110.48	1110.66	1110.78	1110.91	1111.00	XS 851
Elbow River	E13_Bragg_Lott	30,648	1106.92	1108.55	1108.98	1109.27	1109.48	1109.64	1109.75	1109.86	1109.95	1110.15	1110.32	1110.44	1110.57	1110.67	XS 852
Elbow River	E13_Bragg_Lott	30,559	1106.42	1108.26	1108.64	1108.92	1109.13	1109.28	1109.39	1109.50	1109.59	1109.81	1110.01	1110.14	1110.28	1110.39	XS 853
Elbow River	E13_Bragg_Lott	30,478	1106.34	1107.93	1108.33	1108.59	1108.79	1108.96	1109.07	1109.17	1109.26	1109.49	1109.69	1109.83	1109.97	1110.08	XS 854
Elbow River	E13_Bragg_Lott	30,398	1106.42	1107.63	1108.06	1108.32	1108.55	1108.73	1108.85	1108.93	1109.01	1109.24	1109.45	1109.57	1109.71	1109.82	XS 855
Elbow River	E13_Bragg_Lott	30,318	1105.61	1107.24	1107.70	1107.93	1108.16	1108.34	1108.45	1108.54	1108.64	1108.89	1109.10	1109.23	1109.38	1109.51	XS 856
Elbow River	E13_Bragg_Lott	30,237	1105.22	1106.89	1107.32	1107.55	1107.74	1107.90	1108.01	1108.12	1108.21	1108.44	1108.67	1108.84	1109.05	1109.21	XS 857
Elbow River	E13_Bragg_Lott	30,170	1104.74	1106.67	1107.07	1107.31	1107.48	1107.63	1107.73	1107.84	1107.92	1108.18	1108.46	1108.67	1108.91	1109.09	XS 858
Elbow River	E13_Bragg_Lott	30,081	1104.41	1106.26	1106.70	1106.93	1107.15	1107.32	1107.42	1107.55	1107.65	1107.96	1108.33	1108.57	1108.82	1109.02	XS 859
Elbow River	E13_Bragg_Lott	30,012	1104.24	1105.96	1106.43	1106.64	1106.86	1107.01	1107.12	1107.25	1107.35	1107.74	1108.16	1108.42	1108.69	1108.89	XS 860
Elbow River	E13_Bragg_Lott	29,935	1104.17	1105.65	1106.08	1106.30	1106.51	1106.67	1106.79	1106.93	1107.06	1107.56	1108.04	1108.32	1108.60	1108.80	XS 861
Elbow River	E13_Bragg_Lott	29,859	1103.74	1105.32	1105.79	1106.03	1106.22	1106.39	1106.53	1106.70	1106.86	1107.45	1107.95	1108.24	1108.52	1108.73	XS 862
Elbow River	E13_Bragg_Lott	29,776	1103.20	1104.93	1105.40	1105.68	1105.93	1106.13	1106.29	1106.50	1106.69	1107.35	1107.88	1108.17	1108.46	1108.66	XS 863
Elbow River	E13_Bragg_Lott	29,716	1102.83	1104.72	1105.17	1105.48	1105.75	1105.98	1106.15	1106.38	1106.59	1107.30	1107.83	1108.13	1108.41	1108.61	XS 864
Elbow River	E13_Bragg_Lott	29,647	1102.27	1104.45	1104.83	1105.14	1105.43	1105.69	1105.90	1106.18	1106.41	1107.19	1107.75	1108.05	1108.32	1108.52	XS 865
Elbow River	E13_Bragg_Lott	29,548	1102.18	1104.00	1104.41	1104.67	1104.97	1105.31	1105.58	1105.91	1106.18	1107.04	1107.62	1107.92	1108.19	1108.38	XS 866
Elbow River	E13_Bragg_Lott	29,454	1101.53	1103.45	1103.88	1104.19	1104.62	1105.05	1105.36	1105.73	1106.03	1106.93	1107.52	1107.83	1108.09	1108.27	XS 867
Elbow River	E13_Bragg_Lott	29,343	1101.50	1102.88	1103.46	1103.94	1104.47	1104.94	1105.27	1105.65	1105.95	1106.88	1107.47	1107.77	1108.03	1108.21	XS 868
Elbow River	E13_Bragg_Lott	29,280	1100.60	1102.70	1103.28	1103.75	1104.27	1104.74	1105.05	1105.43	1105.72	1106.65	1107.23	1107.56	1107.84	1108.03	XS 869; U/S of Highway 8 Bridge & Culvert
Elbow River	E13_Bragg_Lott	29,225	1101.17	1102.51	1103.05	1103.46	1103.87	1104.16	1104.37	1104.60	1104.76	1105.18	1105.55	1105.78	1106.02	1106.20	XS 870; D/S of Highway 8 Bridge & Culvert
Elbow River	E13_Bragg_Lott	29,099	1100.12	1102.03	1102.58	1102.98	1103.35	1103.62	1103.81	1104.01	1104.16	1104.51	1104.80	1104.98	1105.18	1105.33	XS 871
Elbow River	E13_Bragg_Lott	28,952	1099.94	1101.60	1102.17	1102.54	1102.85	1103.09	1103.23	1103.39	1103.51	1103.81	1104.05	1104.21	1104.37	1104.46	XS 872
Elbow River	E13_Bragg_Lott	28,810	1099.03	1101.16	1101.83	1102.19	1102.47	1102.69	1102.76	1102.85	1102.91	1103.07	1103.18	1103.26	1103.36	1103.47	XS 873
Elbow River	E13_Bragg_Lott	28,664	1098.35	1100.67	1101.25	1101.58	1101.83	1101.96	1102.09	1102.21	1102.30	1102.52	1102.70	1102.82	1102.96	1103.07	XS 874
Elbow River	E13_Bragg_Lott	28,497	1098.16	1100.06	1100.65	1100.99	1101.25	1101.40	1101.43	1101.53	1101.62	1101.82	1102.00	1102.11	1102.25	1102.35	XS 875
Elbow River	E13_Bragg_Lott	28,338	1097.14	1099.35	1099.95	1100.26	1100.51	1100.68	1100.78	1100.89	1100.94	1101.17	1101.34	1101.48	1101.64	1101.76	XS 876
Elbow River	E13_Bragg_Lott	28,169	1096.32	1098.83	1099.42	1099.75	1100.03	1100.23	1100.35	1100.45	1100.54	1100.80	1100.91	1101.05	1101.22	1101.35	XS 877
Elbow River	E13_Bragg_Lott	28,113	1096.49	1098.68	1099.20	1099.51	1099.77	1099.97	1100.09	1100.09 (2)	1100.17	1100.42	1100.59	1100.73	1100.90	1101.03	XS 878
Elbow River	E13_Bragg_Lott	27,993	1096.12	1098.27	1098.74	1098.97	1099.18	1099.38	1099.50	1099.58	1099.68	1099.92	1100.14	1100.28	1100.45	1100.57	XS 879
Elbow River	E13_Bragg_Lott	27,871	1096.17	1097.94	1098.43	1098.75	1098.83	1099.03	1099.15	1099.29	1099.39	1099.63	1099.85	1099.99	1100.16	1100.28	XS 880
Elbow River	E13_Bragg_Lott	27,712	1095.85	1097.43	1097.90	1098.23	1098.30	1098.43	1098.56	1098.67	1098.74	1098.93	1099.12	1099.24	1099.39	1099.50	XS 881
Elbow River	E13_Bragg_Lott	27,540	1094.24	1096.49	1096.98	1097.25	1097.50	1097.67	1097.78	1097.91	1098.00	1098.24	1098.45	1098.59	1098.76	1098.88	XS 882
Elbow River	E13_Bragg_Lott	27,385	1093.78	1096.14	1096.62	1096.90	1097.14	1097.32	1097.43	1097.56	1097.66	1097.89	1098.11	1098.25	1098.41	1098.54	XS 883
Elbow River	E13_Bragg_Lott	27,226	1094.28	1095.77	1096.22	1096.51	1096.75	1096.94	1097.07	1097.22	1097.33	1097.59	1097.83	1097.97	1098.14	1098.26	XS 884
Elbow River	E13_Bragg_Lott	27,083	1093.35	1095.44	1095.92	1096.25	1096.51	1096.72	1096.86	1097.02	1097.14	1097.42	1097.66	1097.81	1097.97	1098.10	XS 885
Elbow River	E12_Lott_Dam	26,984	1092.92	1095.15	1095.60	1095.89	1096.15	1096.35	1096.48	1096.63	1096.74	1097.05	1097.28	1097.42	1097.58	1097.71	XS 886

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Classification: Public

Table E3: Flood Frequency Profiles – Elbow River

River	Model Reach	River Station (m)	Minimum Channel Elevation (m)	Simulated Water Levels for Various Flood Events (m)													Notes
				2-year	5-year	10-year	20-year	35-year	50-year	75-year	100-year	200-year	350-year	500-year	750-year	1,000-year	
Elbow River	E12_Lott_Dam	26,810	1092.44	1094.83	1095.27	1095.57	1095.83	1096.03	1096.16	1096.32	1096.43	1096.72	1096.96	1097.12	1097.28	1097.41	XS 887
Elbow River	E12_Lott_Dam	26,672	1092.78	1094.56	1094.98	1095.23	1095.47	1095.65	1095.77	1095.91	1096.01	1096.28	1096.50	1096.66	1096.83	1096.95	XS 888
Elbow River	E12_Lott_Dam	26,530	1092.15	1094.10	1094.57	1094.85	1095.06	1095.21	1095.32	1095.43	1095.52	1095.74	1095.94	1096.09	1096.24	1096.35	XS 889
Elbow River	E12_Lott_Dam	26,418	1091.61	1093.75	1094.17	1094.44	1094.69	1094.87	1094.99	1095.12	1095.21	1095.45	1095.66	1095.81	1095.97	1096.09	XS 890
Elbow River	E12_Lott_Dam	26,235	1091.40	1093.21	1093.63	1093.89	1094.10	1094.25	1094.34	1094.45	1094.53	1094.75	1094.94	1095.08	1095.23	1095.35	XS 891
Elbow River	E12_Lott_Dam	26,088	1091.26	1092.82	1093.27	1093.55	1093.76	1093.93	1094.03	1094.14	1094.23	1094.45	1094.65	1094.79	1094.95	1095.08	XS 892
Elbow River	E12_Lott_Dam	26,001	1090.90	1092.54	1093.05	1093.34	1093.56	1093.72	1093.82	1093.94	1094.02	1094.25	1094.45	1094.59	1094.75	1094.88	XS 893
Elbow River	E12_Lott_Dam	25,923	1090.66	1092.26	1092.74	1093.00	1093.24	1093.39	1093.50	1093.62	1093.71	1093.94	1094.14	1094.29	1094.45	1094.57	XS 894
Elbow River	E12_Lott_Dam	25,819	1090.02	1091.93	1092.36	1092.57	1092.80	1092.98	1093.10	1093.24	1093.34	1093.58	1093.79	1093.94	1094.10	1094.22	XS 895
Elbow River	E12_Lott_Dam	25,679	1089.06	1091.45	1091.89	1092.15	1092.43	1092.66	1092.81	1092.96	1093.06	1093.31	1093.53	1093.68	1093.83	1093.95	XS 896
Elbow River	E12_Lott_Dam	25,556	1089.21	1091.10	1091.60	1091.94	1092.24	1092.47	1092.61	1092.76	1092.88	1093.13	1093.35	1093.51	1093.64	1093.76	XS 897
Elbow River	E12_Lott_Dam	25,432	1089.06	1090.91	1091.39	1091.72	1092.00	1092.21	1092.34	1092.50	1092.61	1092.88	1093.11	1093.29	1093.41	1093.52	XS 898
Elbow River	E12_Lott_Dam	25,370	1088.86	1090.74	1091.24	1091.61	1091.91	1092.13	1092.25	1092.40	1092.50	1092.77	1093.00	1093.18	1093.28	1093.39	XS 899
Elbow River	E12_Lott_Dam	25,223	1088.35	1089.86	1090.24	1090.49	1090.95	1091.26	1091.45	1091.58	1091.69	1091.90	1092.06	1092.15	1092.39	1092.50	XS 900
Elbow River	E12_Lott_Dam	25,076	1088.04	1089.63	1090.05	1090.35	1090.59	1090.78	1090.91	1091.04	1091.14	1091.39	1091.61	1091.76	1091.93	1092.06	XS 901
Elbow River	E12_Lott_Dam	24,997	1087.77	1089.53	1089.95	1090.25	1090.48	1090.66	1090.79	1090.92	1091.01	1091.26	1091.48	1091.64	1091.80	1091.92	XS 902
Elbow River	E12_Lott_Dam	24,824	1086.44	1089.15	1089.56	1089.83	1090.07	1090.26	1090.38	1090.51	1090.61	1090.85	1091.07	1091.22	1091.38	1091.50	XS 903
Elbow River	E12_Lott_Dam	24,686	1087.07	1088.59	1089.00	1089.27	1089.54	1089.76	1089.88	1090.02	1090.12	1090.38	1090.63	1090.77	1090.93	1091.06	XS 904
Elbow River	E12_Lott_Dam	24,527	1086.07	1087.99	1088.39	1088.67	1088.92	1089.13	1089.26	1089.40	1089.50	1089.77	1090.02	1090.16	1090.33	1090.46	XS 905
Elbow River	E12_Lott_Dam	24,444	1086.56	1087.87	1088.25	1088.51	1088.73	1088.92	1089.04	1089.17	1089.27	1089.52	1089.74	1089.88	1090.04	1090.17	XS 906
Elbow River	E12_Lott_Dam	24,343	1086.38	1087.69	1088.02	1088.29	1088.50	1088.70	1088.83	1088.96	1089.06	1089.30	1089.51	1089.65	1089.81	1089.93	XS 907
Elbow River	E12_Lott_Dam	24,188	1085.54	1087.34	1087.70	1087.97	1088.20	1088.39	1088.52	1088.65	1088.74	1088.98	1089.19	1089.32	1089.49	1089.61	XS 908
Elbow River	E12_Lott_Dam	24,049	1085.27	1086.77	1087.16	1087.42	1087.65	1087.86	1087.98	1088.11	1088.21	1088.47	1088.69	1088.83	1089.00	1089.13	XS 909
Elbow River	E12_Lott_Dam	23,936	1085.27	1086.52	1086.98	1087.24	1087.45	1087.62	1087.73	1087.86	1087.95	1088.19	1088.40	1088.54	1088.70	1088.82	XS 910
Elbow River	E12_Lott_Dam	23,739	1084.38	1086.33	1086.82	1087.05	1087.24	1087.40	1087.50	1087.61	1087.69	1087.90	1088.09	1088.22	1088.37	1088.49	XS 911
Elbow River	E12_Lott_Dam	23,509	1083.41	1086.12	1086.63	1086.89	1087.08	1087.23	1087.33	1087.44	1087.52	1087.72	1087.91	1088.03	1088.18	1088.30	XS 912
Elbow River	E12_Lott_Dam	23,360	1083.76	1085.94	1086.47	1086.74	1086.95	1087.11	1087.21	1087.32	1087.40	1087.60	1087.78	1087.91	1088.06	1088.17	XS 913
Elbow River	E12_Lott_Dam	23,242	1083.66	1085.79	1086.35	1086.61	1086.84	1087.00	1087.10	1087.21	1087.29	1087.49	1087.67	1087.79	1087.95	1088.07	XS 914
Elbow River	E12_Lott_Dam	23,121	1082.70	1085.58	1086.15	1086.42	1086.64	1086.82	1086.93	1087.04	1087.12	1087.33	1087.53	1087.67	1087.83	1087.96	XS 915
Elbow River	E12_Lott_Dam	22,970	1083.33	1085.33	1085.94	1086.23	1086.45	1086.62	1086.73	1086.84	1086.93	1087.15	1087.36	1087.50	1087.67	1087.80	XS 916
Elbow River	E12_Lott_Dam	22,844	1082.55	1084.98	1085.61	1085.94	1086.18	1086.36	1086.48	1086.62	1086.72	1086.98	1087.21	1087.36	1087.54	1087.68	XS 917
Elbow River	E12_Lott_Dam	22,691	1082.48	1084.63	1085.24	1085.59	1085.87	1086.09	1086.22	1086.37	1086.47	1086.72	1086.95	1087.10	1087.28	1087.42	XS 918
Elbow River	E12_Lott_Dam	22,582	1082.41	1084.36	1085.00	1085.39	1085.70	1085.92	1086.04	1086.17	1086.26	1086.47	1086.68	1086.83	1087.00	1087.14	XS 919
Elbow River	E12_Lott_Dam	22,401	1082.00	1083.89	1084.33	1084.63	1084.89	1085.12	1085.28	1085.45	1085.58	1085.90	1086.16	1086.33	1086.53	1086.68	XS 920
Elbow River	E12_Lott_Dam	22,268	1082.39	1083.68	1084.19	1084.54	1084.83	1085.04	1085.18	1085.33	1085.43	1085.71	1085.95	1086.11	1086.30	1086.44	XS 921
Elbow River	E12_Lott_Dam	22,105	1081.27	1083.40	1083.99	1084.35	1084.65	1084.85	1084.97	1085.11	1085.21	1085.45	1085.67	1085.82	1086.00	1086.13	XS 922
Elbow River	E12_Lott_Dam	21,983	1080.86	1083.30	1083.81	1084.12	1084.36	1084.54	1084.66	1084.78	1084.88	1085.13	1085.36	1085.52	1085.70	1085.84	XS 923
Elbow River	E12_Lott_Dam	21,842	1081.20	1083.13	1083.53	1083.79	1084.02	1084.22	1084.35	1084.51	1084.61	1084.89	1085.13	1085.29	1085.48	1085.63	XS 924

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Table E3: Flood Frequency Profiles – Elbow River

River	Model Reach	River Station (m)	Minimum Channel Elevation (m)	Simulated Water Levels for Various Flood Events (m)													Notes
				2-year	5-year	10-year	20-year	35-year	50-year	75-year	100-year	200-year	350-year	500-year	750-year	1,000-year	
Elbow River	E12_Lott_Dam	21,708	1080.62	1082.80	1083.26	1083.53	1083.77	1083.98	1084.12	1084.27	1084.37	1084.63	1084.87	1085.02	1085.21	1085.35	XS 925
Elbow River	E12_Lott_Dam	21,560	1080.69	1082.56	1082.98	1083.24	1083.50	1083.72	1083.85	1084.00	1084.10	1084.37	1084.61	1084.77	1084.96	1085.10	XS 926
Elbow River	E12_Lott_Dam	21,434	1080.10	1082.38	1082.81	1083.09	1083.34	1083.56	1083.69	1083.82	1083.92	1084.19	1084.43	1084.59	1084.78	1084.92	XS 927
Elbow River	E12_Lott_Dam	21,261	1079.83	1082.20	1082.67	1082.94	1083.18	1083.40	1083.51	1083.64	1083.74	1084.00	1084.24	1084.40	1084.59	1084.74	XS 928
Elbow River	E12_Lott_Dam	21,119	1080.25	1081.86	1082.27	1082.55	1082.84	1083.05	1083.18	1083.32	1083.42	1083.71	1083.96	1084.13	1084.32	1084.47	XS 929
Elbow River	E12_Lott_Dam	20,971	1079.21	1081.42	1081.87	1082.19	1082.49	1082.73	1082.86	1083.02	1083.14	1083.44	1083.70	1083.87	1084.07	1084.22	XS 930
Elbow River	E12_Lott_Dam	20,860	1079.30	1081.17	1081.68	1082.01	1082.30	1082.54	1082.68	1082.84	1082.96	1083.25	1083.50	1083.67	1083.86	1084.01	XS 931
Elbow River	E12_Lott_Dam	20,714	1079.02	1080.83	1081.43	1081.78	1082.07	1082.30	1082.44	1082.59	1082.69	1082.97	1083.20	1083.36	1083.53	1083.67	XS 932
Elbow River	E12_Lott_Dam	20,522	1078.07	1080.54	1081.15	1081.55	1081.89	1082.12	1082.26	1082.41	1082.52	1082.79	1083.01	1083.16	1083.33	1083.46	XS 933; U/S of Grey Eagle Drive Bridge
Elbow River	E12_Lott_Dam	20,483	1077.94	1080.48	1081.09	1081.49	1081.83	1082.06	1082.19	1082.35	1082.44	1082.71	1082.92	1083.06	1083.22	1083.35	XS 934; D/S of Grey Eagle Drive Bridge
Elbow River	E12_Lott_Dam	20,370	1078.59	1080.22	1080.86	1081.30	1081.66	1081.91	1082.03	1082.19	1082.28	1082.53	1082.73	1082.86	1083.02	1083.14	XS 935
Elbow River	E12_Lott_Dam	20,222	1077.74	1079.83	1080.36	1080.69	1080.96	1081.14	1081.35	1081.45	1081.60	1081.82	1082.06	1082.23	1082.40	1082.54	XS 936
Elbow River	E12_Lott_Dam	20,087	1077.46	1079.42	1079.87	1080.20	1080.51	1080.75	1080.89	1081.05	1081.17	1081.43	1081.66	1081.81	1081.99	1082.14	XS 937
Elbow River	E12_Lott_Dam	19,953	1077.24	1079.19	1079.68	1080.02	1080.34	1080.59	1080.73	1080.89	1081.00	1081.27	1081.50	1081.66	1081.84	1081.99	XS 938
Elbow River	E12_Lott_Dam	19,781	1076.17	1078.82	1079.35	1079.77	1080.12	1080.39	1080.54	1080.69	1080.80	1081.08	1081.31	1081.47	1081.65	1081.81	XS 939
Elbow River	E12_Lott_Dam	19,701	1076.90	1078.19	1078.81	1079.30	1079.70	1079.99	1080.15	1080.32	1080.44	1080.72	1080.94	1081.09	1081.28	1081.45	XS 940
Elbow River	E12_Lott_Dam	19,508	1075.65	1077.70	1078.43	1078.96	1079.44	1079.78	1079.95	1080.13	1080.25	1080.53	1080.74	1080.89	1081.08	1081.26	XS 941
Elbow River	E12_Lott_Dam	19,387	1075.04	1077.62	1078.37	1078.90	1079.37	1079.70	1079.88	1080.05	1080.16	1080.44	1080.64	1080.79	1080.98	1081.16	XS 942
Elbow River	E12_Lott_Dam	19,232	1074.90	1077.49	1078.20	1078.67	1079.09	1079.38	1079.54	1079.69	1079.77	1079.97	1080.22	1080.43	1080.69	1080.92	XS 943
Elbow River	E12_Lott_Dam	19,089	1074.47	1077.36	1077.96	1078.37	1078.71	1078.92	1079.09	1079.24	1079.37	1079.71	1080.03	1080.27	1080.57	1080.81	XS 944
Elbow River	E12_Lott_Dam	18,926	1074.21	1077.24	1077.81	1078.23	1078.57	1078.82	1078.98	1079.14	1079.27	1079.59	1079.92	1080.16	1080.46	1080.72	XS 945
Elbow River	E12_Lott_Dam	18,777	1074.78	1077.15	1077.64	1078.01	1078.32	1078.55	1078.71	1078.88	1079.00	1079.36	1079.72	1079.99	1080.32	1080.59	XS 946
Elbow River	E12_Lott_Dam	18,630	1074.84	1077.08	1077.50	1077.83	1078.12	1078.35	1078.50	1078.67	1078.81	1079.19	1079.58	1079.86	1080.20	1080.49	XS 947
Elbow River	E12_Lott_Dam	18,475	1074.14	1077.01	1077.34	1077.63	1077.91	1078.16	1078.32	1078.50	1078.64	1079.05	1079.46	1079.75	1080.10	1080.39	XS 948
Elbow River	E12_Lott_Dam	18,361	1074.39	1076.97	1077.26	1077.53	1077.81	1078.05	1078.21	1078.40	1078.53	1078.95	1079.38	1079.68	1080.04	1080.34	XS 949; U/S of Weaselhead Glenmore Pathway Bridge
Elbow River	E12_Lott_Dam	18,060	1074.03	1076.88	1076.96	1077.10	1077.30	1077.58	1077.76	1077.98	1078.15	1078.63	1079.09	1079.42	1079.81	1080.13	XS 950; D/S of Weaselhead Glenmore Pathway Bridge
Elbow River	E12_Lott_Dam	17,868	1072.99	1076.86	1076.91	1076.99	1077.17	1077.47	1077.67	1077.90	1078.07	1078.57	1079.04	1079.37	1079.77	1080.09	XS 951
Elbow River	E12_Lott_Dam	17,759	1072.97	1076.86	1076.90	1076.96	1077.12	1077.43	1077.63	1077.87	1078.05	1078.55	1079.02	1079.36	1079.76	1080.08	XS 952
Elbow River	E12_Lott_Dam	17,619	1073.06	1076.86	1076.89	1076.94	1077.09	1077.41	1077.61	1077.85	1078.03	1078.54	1079.01	1079.35	1079.75	1080.07	XS 953
Elbow River	E12_Lott_Dam	17,284	1072.96	1076.85	1076.87	1076.90	1077.02	1077.32	1077.53	1077.78	1077.97	1078.48	1078.96	1079.30	1079.71	1080.03	XS 954
Elbow River	E12_Lott_Dam	17,154	1072.92	1076.85	1076.87	1076.90	1077.00	1077.30	1077.51	1077.75	1077.94	1078.46	1078.94	1079.29	1079.69	1080.02	XS 955
Elbow River	E12_Lott_Dam	16,978	1072.47	1076.85	1076.86	1076.87	1076.93	1077.23	1077.45	1077.70	1077.89	1078.42	1078.91	1079.26	1079.67	1080.00	XS 956
Elbow River	E12_Lott_Dam	16,668	1071.69	1076.85	1076.86	1076.87	1076.94	1077.24	1077.45	1077.70	1077.90	1078.42	1078.91	1079.26	1079.67	1079.99	XS 957
Elbow River	E12_Lott_Dam	16,279	1071.11	1076.85	1076.86	1076.87	1076.94	1077.23	1077.45	1077.70	1077.89	1078.42	1078.91	1079.25	1079.66	1079.99	XS 958
Elbow River	E12_Lott_Dam	15,873	1071.40	1076.85	1076.86	1076.87	1076.94	1077.23	1077.45	1077.70	1077.89	1078.42	1078.91	1079.25	1079.66	1079.99	XS 959
Elbow River	E12_Lott_Dam	15,420	1071.08	1076.85	1076.86	1076.87	1076.94	1077.23	1077.45	1077.69	1077.89	1078.41	1078.90	1079.24	1079.65	1079.98	XS 960
Elbow River	E12_Lott_Dam	14,646	1066.80	1076.85	1076.86	1076.87	1076.94	1077.23	1077.45	1077.69	1077.89	1078.41	1078.90	1079.25	1079.65	1079.98	XS 961

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Table E3: Flood Frequency Profiles – Elbow River

River	Model Reach	River Station (m)	Minimum Channel Elevation (m)	Simulated Water Levels for Various Flood Events (m)													Notes
				2-year	5-year	10-year	20-year	35-year	50-year	75-year	100-year	200-year	350-year	500-year	750-year	1,000-year	
Elbow River	E12_Lott_Dam	13,936	1067.68	1076.85	1076.86	1076.87	1076.94	1077.23	1077.45	1077.69	1077.88	1078.41	1078.90	1079.24	1079.64	1079.97	XS 962
Elbow River	E12_Lott_Dam	13,555	1066.28	1076.85	1076.86	1076.87	1076.94	1077.23	1077.44	1077.69	1077.88	1078.40	1078.89	1079.23	1079.64	1079.96	XS 963
Elbow River	E12_Lott_Dam	13,171	1064.27	1076.85	1076.86	1076.87	1076.94	1077.23	1077.44	1077.69	1077.88	1078.41	1078.89	1079.23	1079.64	1079.96	XS 964
Elbow River	E12_Lott_Dam	12,780	1062.82	1076.85	1076.86	1076.87	1076.94	1077.23	1077.44	1077.69	1077.88	1078.41	1078.89	1079.23	1079.64	1079.96	XS 965
Elbow River	E12_Lott_Dam	12,492	1062.43	1076.85	1076.86	1076.87	1076.94	1077.23	1077.44	1077.69	1077.88	1078.40	1078.88	1079.22	1079.62	1079.95	XS 966
Elbow River	E12_Lott_Dam	12,368	1062.93	1076.85	1076.86	1076.86	1076.93	1077.22	1077.42	1077.66	1077.85	1078.35	1078.81	1079.13	1079.51	1079.81	XS 967; U/S of Glenmore Trail Bridge
Elbow River	E12_Lott_Dam	12,269	1064.63	1076.85	1076.85	1076.85	1076.89	1077.15	1077.34	1077.56	1077.72	1078.16	1078.54	1078.81	1079.11	1079.35	XS 968; D/S of Glenmore Trail Bridge
Elbow River	E12_Lott_Dam	12,174	1060.90	1076.85	1076.85	1076.85	1076.90	1077.17	1077.36	1077.59	1077.76	1078.21	1078.63	1078.91	1079.24	1079.50	XS 969
Elbow River	E12_Lott_Dam	12,042	1059.56	1076.85	1076.85	1076.85	1076.90	1077.17	1077.36	1077.59	1077.76	1078.21	1078.63	1078.91	1079.24	1079.50	XS 970
Elbow River	E12_Lott_Dam	11,837	1059.09	1076.85	1076.85	1076.85	1076.90	1077.17	1077.36	1077.59	1077.76	1078.22	1078.63	1078.91	1079.25	1079.51	XS 971
Elbow River	E12_Lott_Dam	11,486	1058.74	1076.85	1076.85	1076.85	1076.90	1077.17	1077.36	1077.59	1077.76	1078.21	1078.62	1078.91	1079.24	1079.50	XS 972; Downstream End of Upper Elbow River Model reach
Elbow River	E9_Dam_Roxboro	11,417	1073.97	1076.85[6]	1076.85[6]	1076.85[6]	1076.90[6]	1077.17[6]	1077.36[6]	1077.59[6]	1077.76[6]	1078.21[6]	1078.62[6]	1078.91[6]	1079.24[6]	1079.50[6]	XS 973; U/S of Glenmore Dam; Upstream end of Lower Elbow River Model reach
Elbow River	E9_Dam_Roxboro	11,343	1056.07	1058.21	1058.97	1059.69	1060.42	1061.04	1061.48	1061.97	1062.32	1063.17	1063.86	1064.29	1064.79	1065.19	XS 974
Elbow River	E9_Dam_Roxboro	11,303	1056.13	1058.20	1058.94	1059.66	1060.38	1060.98	1061.41	1061.89	1062.23	1063.05	1063.71	1064.12	1064.59	1064.98	XS 975
Elbow River	E9_Dam_Roxboro	11,267	1056.49	1058.15	1058.89	1059.61	1060.32	1060.93	1061.35	1061.82	1062.17	1062.98	1063.63	1064.04	1064.49	1064.88	XS 976
Elbow River	E9_Dam_Roxboro	11,241	1056.75	1058.00	1058.83	1059.56	1060.28	1060.88	1061.30	1061.78	1062.12	1062.93	1063.58	1063.98	1064.43	1064.82	XS 977
Elbow River	E9_Dam_Roxboro	11,204	1056.67	1057.88	1058.74	1059.48	1060.18	1060.77	1061.18	1061.65	1061.98	1062.79	1063.41	1063.81	1064.24	1064.63	XS 978
Elbow River	E9_Dam_Roxboro	11,153	1055.55	1057.85	1058.68	1059.38	1060.05	1060.59	1060.98	1061.41	1061.74	1062.50	1063.08	1063.44	1063.83	1064.17	XS 979
Elbow River	E9_Dam_Roxboro	11,099	1055.95	1057.71	1058.52	1059.20	1059.87	1060.45	1060.85	1061.32	1061.66	1062.45	1063.05	1063.41	1063.81	1064.18	XS 980
Elbow River	E9_Dam_Roxboro	11,048	1055.79	1057.54	1058.28	1058.96	1059.66	1060.27	1060.69	1061.16	1061.52	1062.29	1062.86	1063.21	1063.59	1063.92	XS 981
Elbow River	E9_Dam_Roxboro	10,989	1055.51	1057.41	1058.12	1058.77	1059.50	1060.11	1060.53	1060.99	1061.33	1061.99	1062.47	1062.73	1062.98	1063.32	XS 982
Elbow River	E9_Dam_Roxboro	10,947	1055.49	1057.25	1058.04	1058.72	1059.49	1060.13	1060.56	1061.03	1061.37	1062.06	1062.55	1062.82	1063.07	1063.39	XS 983
Elbow River	E9_Dam_Roxboro	10,889	1054.94	1057.26	1058.03	1058.74	1059.50	1060.15	1060.58	1061.05	1061.39	1062.08	1062.57	1062.83	1063.08	1063.39	XS 984
Elbow River	E9_Dam_Roxboro	10,844	1055.15	1057.23	1058.01	1058.70	1059.46	1060.11	1060.54	1061.01	1061.36	1062.06	1062.56	1062.84	1063.10	1063.43	XS 985
Elbow River	E9_Dam_Roxboro	10,797	1055.61	1057.15	1057.92	1058.62	1059.39	1060.04	1060.47	1060.95	1061.31	1062.02	1062.52	1062.80	1063.08	1063.44	XS 986
Elbow River	E9_Dam_Roxboro	10,757	1055.65	1057.02	1057.83	1058.56	1059.35	1060.01	1060.45	1060.95	1061.31	1062.03	1062.54	1062.81	1063.08	1063.41	XS 987
Elbow River	E9_Dam_Roxboro	10,705	1055.56	1056.93	1057.76	1058.49	1059.27	1059.94	1060.40	1060.91	1061.28	1062.02	1062.54	1062.83	1063.10	1063.44	XS 988
Elbow River	E9_Dam_Roxboro	10,657	1055.44	1056.83	1057.71	1058.45	1059.25	1059.92	1060.40	1060.92	1061.29	1062.04	1062.56	1062.85	1063.13	1063.41	XS 989
Elbow River	E9_Dam_Roxboro	10,611	1055.06	1056.80	1057.67	1058.40	1059.18	1059.83	1060.28	1060.83	1061.22	1062.00	1062.55	1062.85	1063.17	1063.48	XS 990
Elbow River	E9_Dam_Roxboro	10,542	1054.47	1056.74	1057.61	1058.33	1059.09	1059.75	1060.22	1060.76	1061.17	1061.96	1062.48	1062.80	1063.17	1063.48	XS 991
Elbow River	E9_Dam_Roxboro	10,500	1054.67	1056.65	1057.49	1058.18	1058.91	1059.53	1060.01	1060.60	1061.06	1061.89	1062.45	1062.74	1063.13	1063.45	XS 992
Elbow River	E9_Dam_Roxboro	10,427	1054.72	1056.55	1057.39	1058.08	1058.81	1059.42	1059.87	1060.43	1060.89	1061.76	1062.32	1062.66	1063.06	1063.39	XS 993
Elbow River	E9_Dam_Roxboro	10,382	1054.82	1056.47	1057.32	1058.00	1058.70	1059.29	1059.70	1060.15	1060.49	1061.32	1061.97	1062.38	1062.85	1063.22	XS 994
Elbow River	E9_Dam_Roxboro	10,307	1054.23	1056.33	1057.14	1057.84	1058.56	1059.16	1059.58	1060.04	1060.41	1061.26	1061.89	1062.30	1062.75	1063.12	XS 995
Elbow River	E9_Dam_Roxboro	10,253	1054.61	1056.16	1056.78	1057.35	1058.03	1058.63	1059.06	1059.55	1059.91	1060.83	1061.61	1062.11	1062.63	1063.02	XS 996
Elbow River	E9_Dam_Roxboro	10,194	1054.55	1055.85	1056.55	1057.17	1057.87	1058.48	1058.90	1059.38	1059.73	1060.57	1061.20	1061.67	1062.21	1062.61	XS 997
Elbow River	E9_Dam_Roxboro	10,149	1054.23	1055.81	1056.53	1057.14	1057.85	1058.46	1058.88	1059.37	1059.71	1060.52	1061.15	1061.53	1062.02	1062.39	XS 998

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Table E3: Flood Frequency Profiles – Elbow River

River	Model Reach	River Station (m)	Minimum Channel Elevation (m)	Simulated Water Levels for Various Flood Events (m)													Notes
				2-year	5-year	10-year	20-year	35-year	50-year	75-year	100-year	200-year	350-year	500-year	750-year	1,000-year	
Elbow River	E9_Dam_Roxboro	10,091	1053.71	1055.76	1056.46	1057.07	1057.79	1058.42	1058.85	1059.35	1059.70	1060.54	1061.10	1061.46	1061.85	1062.18	XS 999
Elbow River	E9_Dam_Roxboro	10,013	1054.20	1055.53	1056.30	1056.96	1057.71	1058.36	1058.81	1059.32	1059.69	1060.59	1061.25	1061.65	1062.09	1062.42	XS 1000
Elbow River	E9_Dam_Roxboro	9,916	1052.93	1055.50	1056.21	1056.83	1057.50	1058.08	1058.48	1058.94	1059.28	1060.12	1060.71	1061.13	1061.56	1061.90	XS 1001
Elbow River	E9_Dam_Roxboro	9,873	1053.09	1055.48	1056.17	1056.79	1057.46	1058.04	1058.44	1058.90	1059.23	1060.05	1060.67	1061.10	1061.56	1061.93	XS 1002
Elbow River	E9_Dam_Roxboro	9,791	1053.86	1055.29	1055.95	1056.56	1057.26	1057.86	1058.28	1058.74	1059.07	1059.87	1060.61	1061.09	1061.60	1061.98	XS 1003
Elbow River	E9_Dam_Roxboro	9,707	1053.63	1055.06	1055.82	1056.49	1057.21	1057.83	1058.26	1058.75	1059.08	1059.93	1060.69	1061.17	1061.66	1062.03	XS 1004
Elbow River	E9_Dam_Roxboro	9,618	1052.75	1054.85	1055.68	1056.36	1057.08	1057.68	1058.11	1058.58	1058.92	1059.83	1060.63	1061.12	1061.62	1062.00	XS 1005
Elbow River	E9_Dam_Roxboro	9,540	1052.21	1054.81	1055.61	1056.26	1056.94	1057.51	1057.91	1058.36	1058.64	1059.54	1060.46	1061.00	1061.53	1061.93	XS 1006
Elbow River	E9_Dam_Roxboro	9,484	1053.02	1054.64	1055.40	1056.04	1056.72	1057.30	1057.70	1058.14	1058.48	1059.35	1060.28	1060.88	1061.44	1061.85	XS 1007
Elbow River	E9_Dam_Roxboro	9,462	1052.83	1054.67	1055.44	1056.08	1056.76	1057.34	1057.74	1058.20	1058.54	1059.41	1060.32	1060.89	1061.44	1061.84	XS 1008
Elbow River	E9_Dam_Roxboro	9,442	1052.58	1054.64	1055.40	1056.04	1056.73	1057.31	1057.72	1058.17	1058.51	1059.39	1060.20	1060.71	1061.20	1061.59	XS 1009
Elbow River	E9_Dam_Roxboro	9,426	1052.84	1054.61	1055.36	1056.00	1056.67	1057.24	1057.64	1058.08	1058.42	1059.23	1059.99	1060.50	1061.02	1061.42	XS 1010
Elbow River	E9_Dam_Roxboro	9,375	1052.49	1054.55	1055.30	1055.94	1056.64	1057.22	1057.63	1058.08	1058.42	1059.25	1059.99	1060.50	1061.00	1061.39	XS 1011
Elbow River	E9_Dam_Roxboro	9,323	1052.59	1054.43	1055.14	1055.74	1056.41	1056.97	1057.36	1057.79	1058.09	1058.90	1059.59	1060.03	1060.64	1061.09	XS 1012
Elbow River	E9_Dam_Roxboro	9,294	1052.71	1054.40	1055.11	1055.73	1056.41	1056.97	1057.37	1057.80	1058.11	1058.90	1059.59	1060.11	1060.74	1061.20	XS 1013
Elbow River	E9_Dam_Roxboro	9,263	1052.65	1054.35	1055.07	1055.69	1056.37	1056.94	1057.33	1057.76	1058.07	1058.86	1059.55	1060.06	1060.70	1061.16	XS 1014
Elbow River	E9_Dam_Roxboro	9,221	1052.64	1054.25	1054.97	1055.59	1056.27	1056.85	1057.25	1057.69	1058.00	1058.79	1059.49	1060.00	1060.65	1061.12	XS 1015
Elbow River	E9_Dam_Roxboro	9,147	1052.49	1054.10	1054.84	1055.48	1056.18	1056.79	1057.21	1057.67	1057.99	1058.80	1059.50	1059.99	1060.60	1061.04	XS 1016
Elbow River	E9_Dam_Roxboro	9,083	1052.22	1054.05	1054.80	1055.45	1056.17	1056.79	1057.21	1057.68	1058.01	1058.82	1059.51	1059.93	1060.42	1060.79	XS 1017
Elbow River	E9_Dam_Roxboro	9,031	1052.06	1053.98	1054.72	1055.37	1056.08	1056.71	1057.14	1057.61	1057.93	1058.74	1059.43	1059.84	1060.30	1060.66	XS 1018
Elbow River	E9_Dam_Roxboro	8,957	1052.40	1053.86	1054.65	1055.32	1056.06	1056.71	1057.15	1057.63	1057.97	1058.80	1059.52	1059.97	1060.46	1060.83	XS 1019
Elbow River	E9_Dam_Roxboro	8,899	1052.41	1053.76	1054.59	1055.27	1056.01	1056.67	1057.11	1057.59	1057.93	1058.78	1059.50	1059.96	1060.46	1060.84	XS 1020
Elbow River	E9_Dam_Roxboro	8,854	1052.26	1053.71	1054.51	1055.17	1055.88	1056.51	1056.95	1057.44	1057.78	1058.64	1059.37	1059.83	1060.34	1060.71	XS 1021; U/S of Sandy Beach Bridge
Elbow River	E9_Dam_Roxboro	8,850	1052.16	1053.69	1054.50	1055.15	1055.85	1056.48	1056.91	1057.40	1057.73	1058.57	1059.27	1059.73	1060.24	1060.61	XS 1022; D/S of Sandy Beach Bridge
Elbow River	E9_Dam_Roxboro	8,745	1051.52	1053.64	1054.46	1055.12	1055.83	1056.47	1056.90	1057.37	1057.70	1058.53	1059.22	1059.67	1060.17	1060.54	XS 1023
Elbow River	E9_Dam_Roxboro	8,696	1051.22	1053.60	1054.39	1055.01	1055.69	1056.29	1056.70	1057.15	1057.45	1058.23	1058.88	1059.31	1059.78	1060.12	XS 1024
Elbow River	E9_Dam_Roxboro	8,601	1051.56	1053.48	1054.22	1054.84	1055.52	1056.13	1056.54	1056.97	1057.27	1058.02	1058.63	1059.04	1059.50	1059.85	XS 1025
Elbow River	E9_Dam_Roxboro	8,535	1051.74	1053.39	1054.14	1054.76	1055.45	1056.07	1056.48	1056.92	1057.21	1057.95	1058.56	1059.00	1059.50	1059.88	XS 1026
Elbow River	E9_Dam_Roxboro	8,486	1051.58	1053.28	1054.06	1054.71	1055.42	1056.06	1056.48	1056.92	1057.23	1058.00	1058.67	1059.14	1059.66	1060.05	XS 1027
Elbow River	E9_Dam_Roxboro	8,423	1051.68	1053.18	1053.97	1054.64	1055.37	1056.02	1056.44	1056.89	1057.21	1058.02	1058.72	1059.21	1059.73	1060.13	XS 1028
Elbow River	E9_Dam_Roxboro	8,326	1051.33	1053.02	1053.83	1054.51	1055.23	1055.87	1056.31	1056.80	1057.13	1057.98	1058.70	1059.19	1059.72	1060.12	XS 1029
Elbow River	E9_Dam_Roxboro	8,251	1051.22	1052.94	1053.78	1054.46	1055.20	1055.85	1056.30	1056.79	1057.12	1057.94	1058.63	1059.09	1059.61	1059.99	XS 1030
Elbow River	E9_Dam_Roxboro	8,217	1051.16	1052.89	1053.71	1054.37	1055.07	1055.70	1056.11	1056.55	1056.84	1057.48	1058.01	1058.38	1058.75	1059.03	XS 1031
Elbow River	E9_Dam_Roxboro	8,181	1051.13	1052.84	1053.65	1054.31	1055.02	1055.64	1056.06	1056.49	1056.78	1057.43	1057.93	1058.28	1058.64	1058.91	XS 1032
Elbow River	E9_Dam_Roxboro	8,121	1050.96	1052.78	1053.59	1054.24	1054.95	1055.56	1055.97	1056.40	1056.68	1057.33	1057.87	1058.21	1058.61	1058.90	XS 1033
Elbow River	E9_Dam_Roxboro	8,068	1050.89	1052.67	1053.46	1054.10	1054.79	1055.39	1055.80	1056.22	1056.49	1057.09	1057.58	1057.90	1058.24	1058.50	XS 1034
Elbow River	E9_Dam_Roxboro	8,023	1050.84	1052.60	1053.40	1054.05	1054.75	1055.37	1055.78	1056.21	1056.49	1057.11	1057.61	1057.94	1058.30	1058.56	XS 1035
Elbow River	E9_Dam_Roxboro	7,985	1050.75	1052.53	1053.32	1053.98	1054.70	1055.33	1055.75	1056.18	1056.45	1057.07	1057.56	1057.89	1058.25	1058.50	XS 1036

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Table E3: Flood Frequency Profiles – Elbow River

River	Model Reach	River Station (m)	Minimum Channel Elevation (m)	Simulated Water Levels for Various Flood Events (m)													Notes
				2-year	5-year	10-year	20-year	35-year	50-year	75-year	100-year	200-year	350-year	500-year	750-year	1,000-year	
Elbow River	E9_Dam_Roxboro	7,916	1050.81	1052.40	1053.18	1053.89	1054.64	1055.28	1055.71	1056.15	1056.43	1057.06	1057.56	1057.89	1058.25	1058.50	XS 1037
Elbow River	E9_Dam_Roxboro	7,849	1051.07	1052.26	1053.07	1053.79	1054.56	1055.21	1055.64	1056.08	1056.35	1056.98	1057.48	1057.81	1058.17	1058.43	XS 1038
Elbow River	E9_Dam_Roxboro	7,813	1050.32	1052.10	1052.98	1053.73	1054.49	1055.14	1055.57	1056.01	1056.29	1056.91	1057.40	1057.73	1058.08	1058.33	XS 1039
Elbow River	E9_Dam_Roxboro	7,746	1049.81	1052.02	1052.90	1053.62	1054.36	1055.00	1055.43	1055.87	1056.14	1056.73	1057.19	1057.49	1057.81	1058.04	XS 1040
Elbow River	E9_Dam_Roxboro	7,710	1050.27	1051.92	1052.81	1053.55	1054.30	1054.95	1055.39	1055.83	1056.11	1056.70	1057.16	1057.47	1057.80	1058.03	XS 1041
Elbow River	E9_Dam_Roxboro	7,658	1050.13	1051.80	1052.72	1053.47	1054.23	1054.89	1055.34	1055.78	1056.05	1056.64	1057.08	1057.38	1057.70	1057.93	XS 1042
Elbow River	E9_Dam_Roxboro	7,614	1049.95	1051.67	1052.60	1053.35	1054.11	1054.79	1055.25	1055.68	1055.96	1056.55	1056.98	1057.29	1057.62	1057.84	XS 1043
Elbow River	E9_Dam_Roxboro	7,605	1049.71	1051.66	1052.59	1053.32	1054.05	1054.72	1055.18	1055.61	1055.89	1056.45	1056.84	1057.13	1057.44	1057.65	XS 1044; U/S of Riverdale Ave Bridge
Elbow River	E9_Dam_Roxboro	7,595	1049.52	1051.66	1052.60	1053.34	1054.09	1054.77	1055.22	1055.67	1055.94	1056.52	1056.96	1057.27	1057.60	1057.83	XS 1045; D/S of Riverdale Ave Bridge
Elbow River	E9_Dam_Roxboro	7,577	1049.18	1051.65	1052.59	1053.34	1054.08	1054.75	1055.20	1055.62	1055.89	1056.45	1056.87	1057.18	1057.50	1057.73	XS 1046
Elbow River	E9_Dam_Roxboro	7,518	1049.09	1051.56	1052.48	1053.22	1053.95	1054.62	1055.05	1055.47	1055.71	1056.28	1056.68	1056.99	1057.32	1057.55	XS 1047
Elbow River	E9_Dam_Roxboro	7,480	1049.15	1051.52	1052.42	1053.16	1053.89	1054.54	1054.97	1055.37	1055.60	1056.11	1056.48	1056.73	1057.01	1057.25	XS 1048
Elbow River	E9_Dam_Roxboro	7,426	1049.41	1051.45	1052.36	1053.12	1053.87	1054.54	1054.99	1055.40	1055.63	1056.16	1056.55	1056.81	1057.11	1057.35	XS 1049
Elbow River	E9_Dam_Roxboro	7,390	1049.29	1051.42	1052.34	1053.11	1053.86	1054.53	1054.98	1055.39	1055.63	1056.16	1056.53	1056.79	1057.09	1057.33	XS 1050
Elbow River	E9_Dam_Roxboro	7,345	1049.68	1051.33	1052.28	1053.06	1053.82	1054.50	1054.94	1055.35	1055.60	1056.12	1056.49	1056.75	1057.05	1057.29	XS 1051
Elbow River	E9_Dam_Roxboro	7,321	1049.73	1051.26	1052.22	1053.01	1053.78	1054.46	1054.91	1055.34	1055.58	1056.10	1056.48	1056.74	1057.04	1057.28	XS 1052
Elbow River	E9_Dam_Roxboro	7,282	1049.00	1051.22	1052.21	1053.00	1053.77	1054.45	1054.89	1055.32	1055.56	1056.08	1056.44	1056.70	1056.99	1057.23	XS 1053
Elbow River	E9_Dam_Roxboro	7,238	1049.22	1051.17	1052.17	1052.95	1053.72	1054.40	1054.84	1055.27	1055.51	1056.01	1056.36	1056.61	1056.91	1057.13	XS 1054
Elbow River	E9_Dam_Roxboro	7,221	1049.16	1051.16	1052.16	1052.94	1053.70	1054.37	1054.83	1055.24	1055.48	1055.98	1056.34	1056.59	1056.89	1057.11	XS 1055; U/S of Elboya Bridge
Elbow River	E9_Dam_Roxboro	7,195	1049.10	1051.12	1052.11	1052.89	1053.63	1054.20	1054.55	1054.94	1055.22	1055.77	1056.13	1056.37	1056.69	1056.91	XS 1056; D/S of Elboya Bridge
Elbow River	E9_Dam_Roxboro	7,181	1048.99	1051.07	1052.07	1052.84	1053.57	1054.13	1054.49	1054.87	1055.15	1055.70	1056.10	1056.35	1056.65	1056.88	XS 1057
Elbow River	E9_Dam_Roxboro	7,146	1049.03	1051.03	1052.02	1052.80	1053.53	1054.10	1054.46	1054.84	1055.12	1055.67	1056.07	1056.33	1056.62	1056.88	XS 1058
Elbow River	E9_Dam_Roxboro	7,104	1048.73	1050.99	1051.98	1052.75	1053.49	1054.06	1054.42	1054.81	1055.07	1055.61	1056.01	1056.28	1056.59	1056.83	XS 1059
Elbow River	E9_Dam_Roxboro	7,063	1048.58	1050.96	1051.95	1052.73	1053.48	1054.06	1054.43	1054.81	1055.09	1055.67	1056.08	1056.35	1056.66	1056.91	XS 1060
Elbow River	E9_Dam_Roxboro	7,012	1048.51	1050.90	1051.90	1052.68	1053.43	1054.01	1054.38	1054.76	1055.05	1055.63	1056.05	1056.33	1056.65	1056.89	XS 1061
Elbow River	E9_Dam_Roxboro	6,985	1048.57	1050.88	1051.89	1052.67	1053.42	1054.00	1054.37	1054.76	1055.04	1055.64	1056.06	1056.33	1056.65	1056.90	XS 1062
Elbow River	E9_Dam_Roxboro	6,935	1048.33	1050.80	1051.83	1052.62	1053.38	1053.98	1054.34	1054.75	1055.05	1055.63	1056.06	1056.33	1056.65	1056.91	XS 1063
Elbow River	E9_Dam_Roxboro	6,881	1048.33	1050.75	1051.73	1052.50	1053.28	1053.91	1054.30	1054.71	1055.02	1055.61	1056.03	1056.30	1056.62	1056.87	XS 1064
Elbow River	E9_Dam_Roxboro	6,837	1048.41	1050.66	1051.67	1052.51	1053.35	1053.99	1054.37	1054.78	1055.08	1055.67	1056.09	1056.36	1056.68	1056.93	XS 1065
Elbow River	E9_Dam_Roxboro	6,800	1048.14	1050.62	1051.63	1052.45	1053.28	1053.94	1054.34	1054.76	1055.06	1055.65	1056.07	1056.34	1056.66	1056.91	XS 1066
Elbow River	E9_Dam_Roxboro	6,748	1048.10	1050.57	1051.58	1052.38	1053.23	1053.91	1054.32	1054.74	1055.04	1055.64	1056.05	1056.33	1056.64	1056.89	XS 1067
Elbow River	E9_Dam_Roxboro	6,710	1047.96	1050.56	1051.57	1052.37	1053.21	1053.89	1054.29	1054.70	1055.00	1055.60	1056.01	1056.29	1056.60	1056.85	XS 1068
Elbow River	E9_Dam_Roxboro	6,602	1048.62	1050.43	1051.46	1052.26	1053.13	1053.82	1054.23	1054.64	1054.95	1055.55	1055.96	1056.23	1056.55	1056.80	XS 1069
Elbow River	E9_Dam_Roxboro	6,557	1048.31	1050.38	1051.41	1052.21	1053.06	1053.76	1054.17	1054.59	1054.90	1055.51	1055.92	1056.18	1056.50	1056.75	XS 1070
Elbow River	E9_Dam_Roxboro	6,521	1047.63	1050.36	1051.38	1052.17	1053.00	1053.69	1054.09	1054.50	1054.82	1055.42	1055.83	1056.10	1056.42	1056.66	XS 1071
Elbow River	E9_Dam_Roxboro	6,498	1047.55	1050.33	1051.35	1052.13	1052.98	1053.67	1054.08	1054.48	1054.80	1055.40	1055.81	1056.08	1056.39	1056.64	XS 1072
Elbow River	E9_Dam_Roxboro	6,470	1047.12	1050.29	1051.27	1052.03	1052.83	1053.47	1053.91	1054.33	1054.63	1055.25	1055.69	1055.97	1056.30	1056.55	XS 1073
Elbow River	E9_Dam_Roxboro	6,427	1046.80	1050.26	1051.19	1051.90	1052.64	1053.27	1053.73	1054.16	1054.44	1055.08	1055.58	1055.88	1056.22	1056.49	XS 1074

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Classification: Public

Table E3: Flood Frequency Profiles – Elbow River

River	Model Reach	River Station (m)	Minimum Channel Elevation (m)	Simulated Water Levels for Various Flood Events (m)													Notes
				2-year	5-year	10-year	20-year	35-year	50-year	75-year	100-year	200-year	350-year	500-year	750-year	1,000-year	
Elbow River	E9_Dam_Roxboro	6,381	1046.61	1050.23	1051.14	1051.84	1052.60	1053.26	1053.71	1054.13	1054.44	1055.08	1055.57	1055.87	1056.20	1056.47	XS 1075
Elbow River	E9_Dam_Roxboro	6,339	1047.17	1050.21	1051.12	1051.82	1052.58	1053.23	1053.68	1054.08	1054.41	1055.05	1055.54	1055.82	1056.16	1056.42	XS 1076
Elbow River	E9_Dam_Roxboro	6,287	1048.07	1050.12	1051.05	1051.75	1052.51	1053.14	1053.56	1054.00	1054.31	1054.98	1055.47	1055.76	1056.09	1056.35	XS 1077
Elbow River	E9_Dam_Roxboro	6,230	1047.42	1050.09	1050.99	1051.67	1052.40	1053.00	1053.40	1053.81	1054.12	1054.76	1055.29	1055.59	1055.94	1056.21	XS 1078
Elbow River	E9_Dam_Roxboro	6,181	1047.19	1050.08	1050.98	1051.66	1052.38	1052.97	1053.37	1053.78	1054.09	1054.72	1055.23	1055.52	1055.86	1056.13	XS 1079
Elbow River	E9_Dam_Roxboro	6,112	1047.49	1050.03	1050.90	1051.55	1052.24	1052.79	1053.16	1053.56	1053.83	1054.43	1054.90	1055.23	1055.61	1055.89	XS 1080
Elbow River	E9_Dam_Roxboro	6,034	1047.31	1050.02	1050.88	1051.53	1052.24	1052.82	1053.21	1053.62	1053.89	1054.43	1054.90	1055.20	1055.55	1055.82	XS 1081
Elbow River	E9_Dam_Roxboro	5,953	1048.05	1049.92	1050.76	1051.43	1052.16	1052.76	1053.15	1053.56	1053.83	1054.38	1054.84	1055.14	1055.49	1055.76	XS 1082
Elbow River	E9_Dam_Roxboro	5,887	1048.22	1049.81	1050.67	1051.35	1052.07	1052.65	1053.04	1053.43	1053.69	1054.31	1054.82	1055.13	1055.50	1055.79	XS 1083
Elbow River	E9_Dam_Roxboro	5,785	1047.88	1049.74	1050.63	1051.32	1052.06	1052.67	1053.06	1053.46	1053.74	1054.35	1054.84	1055.15	1055.51	1055.79	XS 1084
Elbow River	E9_Dam_Roxboro	5,709	1047.24	1049.71	1050.57	1051.23	1051.94	1052.51	1052.87	1053.23	1053.48	1054.09	1054.58	1054.90	1055.28	1055.57	XS 1085
Elbow River	E9_Dam_Roxboro	5,658	1046.72	1049.70	1050.54	1051.18	1051.86	1052.39	1052.72	1053.08	1053.34	1053.97	1054.46	1054.78	1055.15	1055.42	XS 1086
Elbow River	E9_Dam_Roxboro	5,582	1046.73	1049.67	1050.49	1051.11	1051.76	1052.28	1052.62	1052.97	1053.23	1053.85	1054.33	1054.63	1054.99	1055.26	XS 1087
Elbow River	E9_Dam_Roxboro	5,513	1047.00	1049.65	1050.46	1051.07	1051.72	1052.25	1052.59	1052.96	1053.22	1053.83	1054.30	1054.60	1054.95	1055.22	XS 1088; U/S of Rideau Park Bridge
Elbow River	E9_Dam_Roxboro	5,495	1047.45	1049.63	1050.42	1051.02	1051.66	1052.17	1052.52	1052.89	1053.15	1053.75	1054.23	1054.52	1054.88	1055.16	XS 1089; D/S of Rideau Park Bridge
Elbow River	E9_Dam_Roxboro	5,428	1047.35	1049.57	1050.34	1050.91	1051.55	1052.04	1052.36	1052.71	1052.95	1053.51	1053.99	1054.28	1054.65	1054.93	XS 1090
Elbow River	E9_Dam_Roxboro	5,392	1047.64	1049.54	1050.30	1050.86	1051.50	1052.00	1052.33	1052.67	1052.91	1053.47	1053.94	1054.24	1054.60	1054.88	XS 1091
Elbow River	E9_Dam_Roxboro	5,337	1047.36	1049.49	1050.24	1050.80	1051.43	1051.92	1052.24	1052.59	1052.83	1053.38	1053.86	1054.14	1054.51	1054.78	XS 1092
Elbow River	E9_Dam_Roxboro	5,303	1047.44	1049.45	1050.20	1050.76	1051.39	1051.89	1052.22	1052.56	1052.80	1053.36	1053.81	1054.09	1054.43	1054.69	XS 1093
Elbow River	E8_Roxboro_Cliff	5,259	1047.00	1049.41	1050.16	1050.72	1051.37	1051.86	1052.19	1052.54	1052.78	1053.32	1053.77	1054.04	1054.37	1054.62	XS 1094
Elbow River	E8_Roxboro_Cliff	5,216	1047.69	1049.31	1050.10	1050.67	1051.33	1051.83	1052.16	1052.52	1052.77	1053.33	1053.79	1054.07	1054.41	1054.67	XS 1095
Elbow River	E8_Roxboro_Cliff	5,172	1047.55	1049.18	1049.98	1050.58	1051.28	1051.79	1052.13	1052.50	1052.76	1053.33	1053.80	1054.09	1054.44	1054.70	XS 1096
Elbow River	E8_Roxboro_Cliff	5,124	1046.55	1049.11	1049.87	1050.49	1051.21	1051.76	1052.12	1052.50	1052.77	1053.35	1053.82	1054.10	1054.45	1054.72	XS 1097
Elbow River	E8_Roxboro_Cliff	5,073	1047.14	1049.02	1049.75	1050.39	1051.14	1051.72	1052.09	1052.47	1052.74	1053.32	1053.79	1054.07	1054.42	1054.69	XS 1098
Elbow River	E8_Roxboro_Cliff	5,032	1047.15	1048.94	1049.66	1050.28	1051.05	1051.65	1052.02	1052.41	1052.68	1053.25	1053.71	1053.99	1054.33	1054.59	XS 1099
Elbow River	E8_Roxboro_Cliff	4,984	1046.94	1048.81	1049.53	1050.14	1050.92	1051.54	1051.92	1052.30	1052.56	1053.11	1053.55	1053.81	1054.13	1054.38	XS 1100
Elbow River	E8_Roxboro_Cliff	4,931	1046.73	1048.67	1049.41	1050.04	1050.81	1051.44	1051.83	1052.21	1052.47	1053.00	1053.42	1053.66	1053.95	1054.18	XS 1101
Elbow River	E8_Roxboro_Cliff	4,877	1046.41	1048.56	1049.30	1049.99	1050.78	1051.43	1051.82	1052.21	1052.47	1053.01	1053.44	1053.68	1053.98	1054.22	XS 1102
Elbow River	E7_Cliff_Roxboro	4,830	1046.21	1048.48	1049.18	1049.87	1050.69	1051.36	1051.76	1052.17	1052.44	1052.99	1053.44	1053.69	1054.01	1054.25	XS 1103
Elbow River	E7_Cliff_Roxboro	4,795	1046.08	1048.45	1049.16	1049.86	1050.69	1051.35	1051.75	1052.15	1052.42	1052.96	1053.39	1053.63	1053.94	1054.18	XS 1104; U/S of Mission Bridge
Elbow River	E7_Cliff_Roxboro	4,768	1046.46	1048.37	1049.05	1049.74	1050.51	1051.06	1051.39	1051.72	1051.94	1052.54	1053.07	1053.35	1053.70	1053.95	XS 1105; D/S of Mission Bridge
Elbow River	E7_Cliff_Roxboro	4,747	1047.02	1048.13	1048.95	1049.68	1050.46	1051.01	1051.34	1051.67	1051.89	1052.49	1053.02	1053.30	1053.64	1053.89	XS 1106
Elbow River	E7_Cliff_Roxboro	4,708	1046.69	1048.06	1048.88	1049.61	1050.39	1050.93	1051.25	1051.57	1051.80	1052.39	1052.91	1053.18	1053.52	1053.77	XS 1107
Elbow River	E7_Cliff_Roxboro	4,652	1046.15	1047.98	1048.78	1049.49	1050.24	1050.76	1051.06	1051.36	1051.56	1052.11	1052.60	1052.82	1053.10	1053.33	XS 1108
Elbow River	E7_Cliff_Roxboro	4,573	1046.09	1047.89	1048.67	1049.36	1050.10	1050.59	1050.87	1051.15	1051.34	1051.81	1052.28	1052.45	1052.72	1052.92	XS 1109
Elbow River	E7_Cliff_Roxboro	4,520	1046.27	1047.83	1048.61	1049.31	1050.06	1050.55	1050.83	1051.12	1051.31	1051.80	1052.27	1052.44	1052.70	1052.90	XS 1110
Elbow River	E7_Cliff_Roxboro	4,473	1046.39	1047.68	1048.53	1049.27	1050.04	1050.55	1050.85	1051.15	1051.36	1051.88	1052.39	1052.59	1052.88	1053.11	XS 1111
Elbow River	E7_Cliff_Roxboro	4,417	1046.06	1047.54	1048.40	1049.13	1049.92	1050.43	1050.74	1051.05	1051.27	1051.82	1052.34	1052.54	1052.84	1053.08	XS 1112

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Classification: Public

Table E3: Flood Frequency Profiles – Elbow River

River	Model Reach	River Station (m)	Minimum Channel Elevation (m)	Simulated Water Levels for Various Flood Events (m)													Notes
				2-year	5-year	10-year	20-year	35-year	50-year	75-year	100-year	200-year	350-year	500-year	750-year	1,000-year	
Elbow River	E7_Cliff_Roxboro	4,365	1045.54	1047.46	1048.29	1048.95	1049.72	1050.23	1050.53	1050.85	1051.07	1051.65	1052.21	1052.39	1052.70	1052.94	XS 1113
Elbow River	E7_Cliff_Roxboro	4,323	1045.26	1047.44	1048.29	1048.98	1049.75	1050.25	1050.55	1050.87	1051.09	1051.67	1052.23	1052.42	1052.73	1052.97	XS 1114
Elbow River	E6_Roxboro_25AV	4,281	1045.24	1047.38	1048.21	1048.87	1049.66	1050.19	1050.51	1050.83	1051.04	1051.59	1052.15	1052.31	1052.59	1052.81	XS 1115
Elbow River	E6_Roxboro_25AV	4,223	1044.97	1047.22	1047.97	1048.57	1049.27	1049.67	1049.87	1050.08	1050.23	1050.69	1050.84	1051.46	1051.71	1051.88	XS 1116
Elbow River	E6_Roxboro_25AV	4,168	1044.95	1047.07	1047.84	1048.47	1049.24	1049.66	1049.88	1050.09	1050.24	1050.61	1051.01	1051.31	1051.64	1051.86	XS 1117
Elbow River	E6_Roxboro_25AV	4,098	1044.00	1046.96	1047.76	1048.44	1049.25	1049.70	1049.92	1050.15	1050.30	1050.69	1051.09	1051.38	1051.70	1051.92	XS 1118
Elbow River	E6_Roxboro_25AV	4,083	1043.99	1046.93	1047.74	1048.42	1049.22	1049.66	1049.89	1050.11	1050.26	1050.67	1051.07	1051.37	1051.68	1051.91	XS 1119
Elbow River	E5_25AV_22AV	4,052	1044.96	1046.88	1047.69	1048.38	1049.20	1049.65	1049.89	1050.15	1050.32	1050.77	1051.19	1051.50	1051.83	1052.06	XS 1120; U/S of 25th Ave SW Bridge
Elbow River	E5_25AV_22AV	4,034	1044.94	1046.88	1047.69	1048.38	1049.04	1049.42	1049.66	1049.93	1050.12	1050.66	1051.14	1051.47	1051.81	1052.05	XS 1121; D/S of 25th Ave SW Bridge
Elbow River	E5_25AV_22AV	3,989	1045.37	1046.73	1047.53	1048.24	1048.95	1049.35	1049.60	1049.87	1050.07	1050.61	1051.09	1051.42	1051.76	1052.00	XS 1122
Elbow River	E5_25AV_22AV	3,931	1044.65	1046.68	1047.44	1048.11	1048.72	1049.09	1049.33	1049.59	1049.79	1050.34	1050.83	1051.16	1051.51	1051.74	XS 1123
Elbow River	E5_25AV_22AV	3,889	1044.09	1046.65	1047.39	1048.05	1048.69	1049.07	1049.31	1049.58	1049.77	1050.31	1050.80	1051.13	1051.48	1051.71	XS 1124
Elbow River	E5_25AV_22AV	3,869	1043.87	1046.65	1047.38	1048.02	1048.64	1049.01	1049.26	1049.54	1049.75	1050.30	1050.79	1051.13	1051.47	1051.70	XS 1125; Erlton Flood Control Weir on ROB
Elbow River	E5_25AV_22AV	3,851	1043.72	1046.63	1047.33	1047.94	1048.51	1048.86	1049.11	1049.39	1049.59	1050.14	1050.64	1050.97	1051.31	1051.53	XS 1126; Erlton Flood Control Weir on ROB
Elbow River	E5_25AV_22AV	3,834	1043.72	1046.62	1047.30	1047.89	1048.41	1048.72	1048.94	1049.22	1049.42	1049.97	1050.48	1050.83	1051.17	1051.37	XS 1127; Erlton Flood Control Weir on ROB
Elbow River	E5_25AV_22AV	3,809	1043.95	1046.61	1047.28	1047.86	1048.37	1048.68	1048.89	1049.16	1049.35	1049.87	1050.37	1050.70	1051.03	1051.21	XS 1128; Erlton Flood Control Weir on ROB
Elbow River	E5_25AV_22AV	3,777	1043.89	1046.59	1047.24	1047.82	1048.31	1048.58	1048.77	1048.99	1049.17	1049.73	1050.27	1050.62	1050.96	1051.15	XS 1129; Erlton Flood Control Weir on ROB
Elbow River	E5_25AV_22AV	3,738	1044.07	1046.56	1047.22	1047.82	1048.35	1048.64	1048.84	1049.06	1049.24	1049.80	1050.34	1050.69	1051.04	1051.23	XS 1130; Erlton Flood Control Weir on ROB
Elbow River	E4_Talisman	3,671	1045.11	1046.40	1047.09	1047.75	1048.32	1048.64	1048.87	1049.12	1049.32	1049.91	1050.46	1050.82	1051.17	1051.38	XS 1131; Erlton Flood Control Weir on ROB
Elbow River	E4_Talisman	3,610	1044.63	1046.11	1046.97	1047.69	1048.30	1048.63	1048.86	1049.12	1049.32	1049.92	1050.47	1050.83	1051.19	1051.40	XS 1132
Elbow River	E4_Talisman	3,568	1044.17	1045.95	1046.91	1047.66	1048.28	1048.61	1048.84	1049.11	1049.31	1049.91	1050.46	1050.83	1051.18	1051.39	XS 1133
Elbow River	E4_Talisman	3,498	1043.19	1045.68	1046.44	1046.95	1047.74	1048.21	1048.51	1048.82	1049.06	1049.72	1050.31	1050.69	1051.05	1051.26	XS 1134; U/S of Lindsay Park Bridge
Elbow River	E4_Talisman	3,478	1043.40	1045.60	1046.30	1046.86	1047.40	1047.96	1048.31	1048.64	1048.90	1049.61	1050.23	1050.62	1050.99	1051.18	XS 1135; D/S of Lindsay Park Bridge
Elbow River	E4_Talisman	3,455	1043.40	1045.57	1046.30	1046.88	1047.48	1047.98	1048.31	1048.64	1048.89	1049.60	1050.21	1050.60	1050.97	1051.17	XS 1136
Elbow River	E4_Talisman	3,438	1043.57	1045.52	1046.26	1046.87	1047.47	1047.96	1048.29	1048.61	1048.86	1049.56	1050.18	1050.53	1050.90	1051.10	XS 1137
Elbow River	E4_Talisman	3,386	1043.74	1045.41	1046.14	1046.76	1047.37	1047.86	1048.19	1048.51	1048.76	1049.46	1050.07	1050.44	1050.78	1050.97	XS 1138
Elbow River	E4_Talisman	3,346	1043.68	1045.29	1046.00	1046.60	1047.25	1047.77	1048.11	1048.43	1048.68	1049.39	1050.01	1050.38	1050.73	1050.89	XS 1139
Elbow River	E4_Talisman	3,297	1043.42	1045.14	1045.85	1046.47	1047.13	1047.64	1047.98	1048.30	1048.54	1049.24	1049.85	1050.22	1050.55	1050.70	XS 1140
Elbow River	E4_Talisman	3,263	1043.26	1045.12	1045.87	1046.51	1047.17	1047.68	1048.02	1048.33	1048.57	1049.27	1049.88	1050.25	1050.59	1050.75	XS 1141
Elbow River	E4_Talisman	3,251	1043.18	1045.10	1045.85	1046.50	1047.16	1047.68	1048.01	1048.33	1048.57	1049.26	1049.88	1050.24	1050.60	1050.76	XS 1142; U/S of Lindsay Park CNR Bridge
Elbow River	E4_Talisman	3,236	1043.04	1045.02	1045.76	1046.39	1047.04	1047.56	1047.90	1048.20	1048.45	1048.98	1049.44	1049.78	1050.16	1050.41	XS 1143; D/S of Lindsay Park CNR Bridge
Elbow River	E4_Talisman	3,224	1042.71	1045.01	1045.74	1046.38	1047.04	1047.56	1047.90	1048.21	1048.45	1048.99	1049.45	1049.78	1050.17	1050.41	XS 1144
Elbow River	E4_Talisman	3,188	1043.05	1044.92	1045.65	1046.27	1046.93	1047.46	1047.81	1048.13	1048.37	1048.91	1049.38	1049.72	1050.09	1050.34	XS 1145
Elbow River	E4_Talisman	3,146	1043.05	1044.45	1045.26	1045.89	1046.61	1047.20	1047.58	1047.90	1048.15	1048.69	1049.16	1049.51	1049.89	1050.15	XS 1146
Elbow River	E4_Talisman	3,073	1042.33	1044.17	1044.95	1045.57	1046.26	1046.90	1047.30	1047.61	1047.87	1048.42	1048.92	1049.29	1049.72	1050.00	XS 1147
Elbow River	E4_Talisman	3,027	1042.41	1044.04	1044.81	1045.43	1046.20	1046.90	1047.32	1047.65	1047.92	1048.49	1049.00	1049.38	1049.82	1050.09	XS 1148
Elbow River	E4_Talisman	2,982	1041.76	1043.98	1044.73	1045.37	1046.20	1046.93	1047.36	1047.70	1047.98	1048.56	1049.09	1049.47	1049.90	1050.17	XS 1149
Elbow River	E4_Talisman	2,966	1041.39	1044.02	1044.80	1045.45	1046.26	1046.96	1047.38	1047.72	1048.00	1048.59	1049.11	1049.48	1049.91	1050.19	XS 1150; U/S of Pattison Bridge

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Table E3: Flood Frequency Profiles – Elbow River

River	Model Reach	River Station (m)	Minimum Channel Elevation (m)	Simulated Water Levels for Various Flood Events (m)													Notes
				2-year	5-year	10-year	20-year	35-year	50-year	75-year	100-year	200-year	350-year	500-year	750-year	1,000-year	
Elbow River	E4_Talisman	2,939	1039.61	1044.01	1044.80	1045.45	1046.12	1046.70	1047.10	1047.55	1047.89	1048.52	1049.06	1049.45	1049.89	1050.17	XS 1151; D/S of Pattison Bridge
Elbow River	E4_Talisman	2,911	1042.17	1043.74	1044.44	1045.04	1045.77	1046.45	1046.89	1047.40	1047.78	1048.46	1049.02	1049.41	1049.86	1050.14	XS 1152
Elbow River	E4_Talisman	2,882	1042.12	1043.59	1044.31	1044.97	1045.73	1046.43	1046.89	1047.42	1047.79	1048.46	1049.02	1049.42	1049.87	1050.15	XS 1153
Elbow River	E4_Talisman	2,840	1042.01	1043.38	1044.15	1044.87	1045.68	1046.41	1046.90	1047.43	1047.80	1048.48	1049.03	1049.43	1049.87	1050.16	XS 1154
Elbow River	E4_Talisman	2,802	1041.33	1043.28	1044.07	1044.80	1045.62	1046.37	1046.87	1047.41	1047.79	1048.47	1049.03	1049.42	1049.87	1050.15	XS 1155
Elbow River	E4_Talisman	2,767	1041.59	1043.05	1043.95	1044.71	1045.55	1046.33	1046.81	1047.35	1047.75	1048.44	1049.00	1049.40	1049.85	1050.14	XS 1156
Elbow River	E3_22AV_25AV	2,742	1041.72	1043.03	1043.97	1044.76	1045.60	1046.37	1046.84	1047.36	1047.74	1048.40	1048.94	1049.33	1049.78	1050.05	XS 1157; U/S of Victoria Bridge
Elbow River	E3_22AV_25AV	2,699	1041.52	1042.90	1043.91	1044.72	1045.55	1046.26	1046.70	1047.19	1047.54	1048.29	1048.87	1049.28	1049.73	1050.01	XS 1158; Between Victoria Bridge and LRT Bridge
Elbow River	E3_22AV_25AV	2,656	1041.12	1042.82	1043.87	1044.69	1045.53	1046.22	1046.66	1047.15	1047.48	1048.16	1048.83	1049.26	1049.74	1050.04	XS 1159; D/S of LRT Bridge; Stampede Floodwall on LOB
Elbow River	E3_22AV_25AV	2,636	1041.04	1042.72	1043.76	1044.58	1045.42	1046.11	1046.56	1047.05	1047.40	1048.11	1048.74	1049.20	1049.70	1050.00	XS 1160; Stampede Floodwall on LOB
Elbow River	E2_Stampede_Clif	2,608	1040.62	1042.67	1043.66	1044.43	1045.21	1045.82	1046.21	1046.63	1046.97	1047.61	1048.27	1048.69	1049.15	1049.39	XS 1161; Stampede Floodwall on LOB
Elbow River	E2_Stampede_Clif	2,588	1040.58	1042.67	1043.67	1044.45	1045.22	1045.83	1046.22	1046.64	1046.97	1047.60	1048.24	1048.63	1049.05	1049.28	XS 1162; Stampede Floodwall on LOB
Elbow River	E2_Stampede_Clif	2,536	1040.21	1042.63	1043.63	1044.40	1045.18	1045.78	1046.16	1046.58	1046.90	1047.47	1048.05	1048.41	1048.80	1048.96	XS 1163; Stampede Floodwall on LOB
Elbow River	E2_Stampede_Clif	2,481	1040.26	1042.51	1043.42	1044.17	1044.95	1045.55	1045.94	1046.36	1046.66	1047.17	1047.75	1048.09	1048.48	1048.53	XS 1164; Stampede Floodwall on LOB
Elbow River	E2_Stampede_Clif	2,469	1040.37	1042.50	1043.45	1044.24	1045.05	1045.69	1046.10	1046.54	1046.86	1047.43	1048.03	1048.39	1048.78	1048.91	XS 1165; U/S of Stampede Park Access Bridge; Stampede Floodwall on LOB
Elbow River	E2_Stampede_Clif	2,443	1039.88	1042.51	1043.45	1044.20	1044.98	1045.59	1045.96	1046.34	1046.62	1047.04	1047.52	1047.87	1048.27	1048.57	XS 1166; D/S of Stampede Park Access Bridge; Stampede Floodwall on LOB
Elbow River	E2_Stampede_Clif	2,424	1039.32	1042.50	1043.41	1044.13	1044.88	1045.44	1045.78	1046.12	1046.35	1046.56	1046.87	1047.13	1047.52	1047.88	XS 1167; Stampede Floodwall on LOB
Elbow River	E2_Stampede_Clif	2,387	1039.21	1042.49	1043.39	1044.10	1044.83	1045.38	1045.69	1046.01	1046.24	1046.35	1046.53	1046.68	1046.99	1046.99(2)	XS 1168; Stampede Floodwall on LOB
Elbow River	E2_Stampede_Clif	2,332	1040.39	1042.35	1043.19	1043.85	1044.56	1045.09	1045.39	1045.68	1045.86	1046.26	1046.51	1046.72	1047.11	1047.12	XS 1169; Stampede Floodwall on LOB
Elbow River	E2_Stampede_Clif	2,272	1040.25	1042.17	1042.98	1043.63	1044.38	1044.96	1045.27	1045.56	1045.74	1046.32	1046.55	1046.75	1047.12	1047.14	XS 1170; Stampede Floodwall on LOB
Elbow River	E2_Stampede_Clif	2,212	1040.14	1041.72	1042.73	1043.51	1044.33	1044.97	1045.31	1045.63	1045.83	1046.31	1046.54	1046.74	1047.11	1047.13	XS 1171; Stampede Floodwall on LOB
Elbow River	E2_Stampede_Clif	2,146	1039.76	1041.67	1042.65	1043.42	1044.24	1044.88	1045.23	1045.57	1045.77	1046.28	1046.51	1046.71	1047.10	1047.11	XS 1172; Stampede Floodwall on LOB
Elbow River	E2_Stampede_Clif	2,090	1039.52	1041.64	1042.62	1043.40	1044.22	1044.87	1045.21	1045.53	1045.72	1046.26	1046.49	1046.69	1047.08	1047.09	XS 1173; Stampede Floodwall on LOB
Elbow River	E2_Stampede_Clif	2,048	1038.52	1041.58	1042.54	1043.29	1044.08	1044.75	1045.17	1045.56	1045.80	1046.24	1046.47	1046.67	1047.07	1047.07	XS 1174
Elbow River	E2_Stampede_Clif	2,020	1038.35	1041.55	1042.47	1043.21	1043.97	1044.59	1044.97	1045.46	1045.73	1046.20	1046.43	1046.64	1047.04	1047.04	XS 1175
Elbow River	E2_Stampede_Clif	1,999	1038.49	1041.48	1042.40	1043.14	1043.91	1044.51	1044.88	1045.34	1045.67	1046.16	1046.39	1046.60	1047.01	1047.01(2)	XS 1176
Elbow River	E2_Stampede_Clif	1,969	1037.56	1041.51	1042.42	1043.16	1043.93	1044.54	1044.89	1045.31	1045.56	1046.06	1046.28	1046.50	1046.95	1046.95(2)	XS 1177
Elbow River	E2_Stampede_Clif	1,944	1038.67	1041.46	1042.35	1043.08	1043.83	1044.40	1044.75	1045.14	1045.42	1045.76	1046.01	1046.36	1046.90	1046.90(2)	XS 1178
Elbow River	E2_Stampede_Clif	1,910	1039.32	1041.40	1042.26	1042.99	1043.74	1044.31	1044.64	1044.98	1045.26	1045.82	1046.07	1046.39	1046.90	1046.90(2)	XS 1179; U/S of Horse Barn Bridge (New)
Elbow River	E2_Stampede_Clif	1,894	1039.47	1041.38	1042.23	1042.96	1043.71	1044.25	1044.54	1044.86	1045.30	1045.89	1046.12	1046.41	1046.90	1046.90(2)	XS 1180; D/S of Horse Barn Bridge (New)
Elbow River	E2_Stampede_Clif	1,861	1039.09	1041.34	1042.17	1042.88	1043.62	1044.16	1044.48	1044.84	1045.36	1045.91	1046.13	1046.41	1046.90	1046.90(2)	XS 1181; U/S of Horse Barn Bridge (Old)
Elbow River	E2_Stampede_Clif	1,848	1039.17	1041.35	1042.19	1042.89	1043.62	1044.12	1044.43	1044.88	1045.32	1045.88	1046.11	1046.40	1046.89	1046.89(2)	XS 1182; D/S of Horse Barn Bridge (Old)
Elbow River	E2_Stampede_Clif	1,755	1039.71	1041.13	1041.96	1042.66	1043.38	1043.91	1044.20	1044.59	1044.97	1045.68	1045.89	1046.23	1046.79	1046.79(2)	XS 1183
Elbow River	E2_Stampede_Clif	1,698	1039.27	1041.05	1041.89	1042.60	1043.32	1043.89	1044.23	1044.66	1044.97	1045.70	1045.89	1046.22	1046.78	1046.78(2)	XS 1184
Elbow River	E2_Stampede_Clif	1,621	1038.67	1040.90	1041.70	1042.37	1043.07	1043.70	1044.13	1044.62	1044.95	1045.65	1045.84	1046.18	1046.75	1046.75(2)	XS 1185
Elbow River	E2_Stampede_Clif	1,561	1038.81	1040.78	1041.64	1042.36	1043.13	1043.74	1044.11	1044.57	1044.90	1045.58	1045.74	1046.09	1046.69	1046.69(2)	XS 1186

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Table E3: Flood Frequency Profiles – Elbow River

River	Model Reach	River Station (m)	Minimum Channel Elevation (m)	Simulated Water Levels for Various Flood Events (m)													Notes
				2-year	5-year	10-year	20-year	35-year	50-year	75-year	100-year	200-year	350-year	500-year	750-year	1,000-year	
Elbow River	E2_Stampede_Clif	1,530	1038.33	1040.74	1041.62	1042.35	1043.11	1043.71	1044.08	1044.52	1044.84	1045.56	1045.70	1046.07	1046.68	1046.68(3)	XS 1187
Elbow River	E2_Stampede_Clif	1,506	1038.51	1040.62	1041.46	1042.14	1042.85	1043.40	1043.72	1044.10	1044.34	1045.40	1045.45	1046.02	1046.67	1046.67(2)	XS 1188
Elbow River	E2_Stampede_Clif	1,448	1038.05	1040.50	1041.35	1042.00	1042.68	1043.19	1043.46	1043.78	1043.96	1044.35	1045.42	1046.00	1046.65	1046.65(2)	XS 1189
Elbow River	E2_Stampede_Clif	1,374	1038.49	1040.37	1041.19	1041.85	1042.53	1043.01	1043.27	1043.57	1043.78	1044.74	1045.50	1046.02	1046.66	1046.66(2)	XS 1190
Elbow River	E2_Stampede_Clif	1,303	1038.31	1040.26	1041.07	1041.74	1042.43	1042.91	1043.18	1043.54	1043.79	1044.73	1045.45	1045.96	1046.61	1046.61(2)	XS 1191
Elbow River	E2_Stampede_Clif	1,249	1038.19	1040.19	1040.99	1041.65	1042.33	1042.81	1043.07	1043.47	1043.75	1044.70	1045.44	1045.95	1046.60	1046.60(2)	XS 1192; U/S of Weadick Crossing
Elbow River	E2_Stampede_Clif	1,238	1038.10	1040.15	1040.95	1041.62	1042.31	1042.79	1043.04	1043.44	1043.75	1044.73	1045.45	1045.96	1046.61	1046.61(2)	XS 1193; D/S of Weadick Crossing
Elbow River	E2_Stampede_Clif	1,205	1038.39	1040.09	1040.91	1041.60	1042.32	1042.84	1043.15	1043.60	1043.89	1044.75	1045.42	1045.92	1046.58	1046.58(2)	XS 1194
Elbow River	E2_Stampede_Clif	1,193	1038.34	1040.04	1040.86	1041.56	1042.29	1042.83	1043.15	1043.62	1043.91	1044.75	1045.42	1045.93	1046.59	1046.59(2)	XS 1195
Elbow River	E2_Stampede_Clif	1,135	1038.12	1039.92	1040.69	1041.31	1041.95	1042.53	1042.95	1043.55	1043.87	1044.75	1045.43	1045.94	1046.59	1046.59(2)	XS 1196
Elbow River	E2_Stampede_Clif	1,085	1038.42	1039.73	1040.50	1041.13	1041.83	1042.46	1042.88	1043.50	1043.83	1044.74	1045.42	1045.93	1046.58	1046.58(2)	XS 1197
Elbow River	E2_Stampede_Clif	999	1037.72	1039.64	1040.44	1041.10	1041.81	1042.39	1042.76	1043.32	1043.65	1044.63	1045.35	1045.88	1046.55	1046.55(2)	XS 1198; U/S of Agriculture Trail Bridge
Elbow River	E2_Stampede_Clif	979	1036.51	1039.66	1040.46	1041.12	1041.83	1042.41	1042.78	1043.30	1043.62	1044.59	1045.33	1045.85	1046.53	1046.53(2)	XS 1199; D/S of Agriculture Trail Bridge
Elbow River	E2_Stampede_Clif	955	1037.39	1039.58	1040.34	1040.97	1041.64	1042.21	1042.59	1043.20	1043.57	1044.56	1045.30	1045.83	1046.50	1046.50(2)	XS 1200
Elbow River	E2_Stampede_Clif	918	1037.74	1039.46	1040.20	1040.81	1041.46	1042.03	1042.42	1042.88	1043.29	1044.41	1045.19	1045.73	1046.43	1046.43(2)	XS 1201
Elbow River	E2_Stampede_Clif	858	1037.85	1039.38	1040.11	1040.72	1041.37	1041.95	1042.34	1042.81	1043.14	1044.28	1045.08	1045.64	1046.35	1046.35(2)	XS 1202
Elbow River	E2_Stampede_Clif	800	1037.24	1039.31	1040.03	1040.63	1041.28	1041.86	1042.24	1042.72	1043.06	1044.24	1045.06	1045.63	1046.35	1046.35(2)	XS 1203
Elbow River	E2_Stampede_Clif	755	1037.83	1039.17	1039.91	1040.54	1041.21	1041.81	1042.21	1042.72	1043.08	1044.21	1044.98	1045.54	1046.25	1046.25(2)	XS 1204
Elbow River	E2_Stampede_Clif	659	1037.23	1038.83	1039.62	1040.27	1040.95	1041.59	1042.02	1042.55	1042.91	1044.04	1044.77	1045.30	1046.00	1046.00(2)	XS 1205
Elbow River	E2_Stampede_Clif	588	1036.73	1038.70	1039.48	1040.11	1040.77	1041.39	1041.81	1042.33	1042.67	1043.83	1044.59	1045.14	1045.88	1045.88(2)	XS 1206; U/S of Macdonald Ave Bridge
Elbow River	E2_Stampede_Clif	568	1036.94	1038.69	1039.49	1040.12	1040.78	1041.33	1041.70	1042.17	1042.45	1043.59	1044.35	1044.89	1045.62	1045.62(2)	XS 1207; D/S of Macdonald Ave Bridge
Elbow River	E2_Stampede_Clif	464	1036.67	1038.53	1039.30	1039.89	1040.51	1041.03	1041.44	1041.98	1042.31	1043.56	1044.31	1044.84	1045.56	1045.56(2)	XS 1208
Elbow River	E2_Stampede_Clif	457	1036.32	1038.54	1039.32	1039.92	1040.55	1041.09	1041.50	1042.04	1042.37	1043.59	1044.35	1044.87	1045.59	1045.59(2)	XS 1209
Elbow River	E2_Stampede_Clif	418	1036.25	1038.46	1039.20	1039.77	1040.35	1040.89	1041.33	1041.89	1042.22	1043.47	1044.21	1044.73	1045.44	1045.44(2)	XS 1210
Elbow River	E1_Cliff_Bow	343	1035.90	1038.43	1039.14	1039.67	1040.23	1040.73	1041.09	1041.56	1041.77	1042.93	1043.45	1044.97	1045.72	1045.72(2)	XS 1211; U/S of CP Bridge
Elbow River	E1_Cliff_Bow	324	1036.00	1038.40	1039.08	1039.57	1040.03	1040.46	1040.76	1041.14	1041.29	1042.91(1)	1043.49(1)	1044.51(1)	1045.09(1)	1045.09(2)	XS 1212; D/S of CP Bridge
Elbow River	E1_Cliff_Bow	295	1036.24	1038.34	1038.98	1039.46	1039.92	1040.32	1040.61	1040.99	1041.05	1042.88	1043.56	1043.79	1044.09	1044.30	XS 1213; U/S of 9th Avenue Bridge (Inglewood)
Elbow River	E1_Cliff_Bow	275	1036.20	1038.32	1038.95	1039.43	1039.87	1040.26	1040.49	1040.77	1040.98	1041.42	1042.92	1042.92(2)	1043.19	1043.42	XS 1214; D/S of 9th Avenue Bridge (Inglewood); Deane House Flood Barrier on ROB
Elbow River	E1_Cliff_Bow	171	1036.44	1038.20	1038.77	1039.22	1039.65	1040.03	1040.26	1040.52	1040.74	1041.15	1042.37(1)	1042.53(1)	1042.84(1)	1043.09(1)	XS 1215; U/S of Traverse Bridge; Riverwalk Berm on LOB; Deane House Flood Barrier on ROB
Elbow River	E1_Cliff_Bow	156	1036.17	1038.17	1038.74	1039.19	1039.62	1040.00	1040.23	1040.49	1040.71	1041.11	1042.29(1)	1042.48(1)	1042.79(1)	1043.04(1)	XS 1216; D/S of Traverse Bridge; Riverwalk Berm on LOB; Deane House Flood Barrier on ROB
Elbow River	E1_Cliff_Bow	84	1035.80	1038.14	1038.72	1039.20	1039.65	1040.07	1040.32	1040.63	1040.87	1041.53	1041.91	1042.21	1042.55	1042.81	XS 1217; Deane House Flood Barrier on ROB

Notes:
1) Simulated water level replaced with interpolated value using upstream and downstream water levels.
2) Simulated water level replaced with higher water level from lower flow profile to avoid profile crossing.
3) Simulated water level replaced with lower water level from higher flow profile to avoid profile crossing.
4) Simulated water level replaced with higher water level from higher flow profile to avoid profile crossing.
5) Simulated supercritical flow water level.
6) Water level upstream of Glenmore Dam based on outflow rating curve for flows higher than 350 m^3/s and full supply level for flows less than 350 m^3/s.

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Table E4: Flood Frequency Profiles – Elbow River Side Channels

Branch	Model Reach	River Station (m)	Minimum Channel Elevation (m)	Simulated Water Levels for Various Flood Events (m)													Notes
				2-year	5-year	10-year	20-year	35-year	50-year	75-year	100-year	200-year	350-year	500-year	750-year	1,000-year	
ES1_CliffST	ES1_CliffST	3,547	1050.39	1048.54	1049.29	1050.00	1050.83	1051.49	1051.86	1052.23	1052.46	1052.92	1053.23	1053.40	1053.58	1053.71	XS 1248
ES1_CliffST	ES1_CliffST	3,414	1051.36	1048.15	1048.90	1049.61	1050.83	1051.44	1051.78	1052.12	1052.35	1052.79	1053.12	1053.32	1053.53	1053.69	XS 1249
ES1_CliffST	ES1_CliffST	3,294	1052.02	1047.80	1048.55	1049.26	1050.83	1051.37	1051.67	1051.98	1052.18	1052.58	1052.87	1053.04	1053.23	1053.36	XS 1250
ES1_CliffST	ES1_CliffST	3,193	1052.37	1047.50	1048.26	1048.97	1050.82	1051.31	1051.57	1051.85	1052.02	1052.38	1052.64	1052.79	1052.96	1053.07	XS 1251
ES1_CliffST	ES1_CliffST	3,065	1052.03	1047.13	1047.88	1048.59	1050.73	1051.12	1051.35	1051.59	1051.74	1052.06	1052.31	1052.46	1052.62	1052.74	XS 1252
ES1_CliffST	ES1_CliffST	2,867	1051.28	1046.55	1047.30	1048.01	1049.24	1050.40	1050.57	1050.80	1050.93	1051.25	1051.42	1051.54	1051.69	1051.79	XS 1253
ES1_CliffST	ES1_CliffST	2,834	1051.01	1046.45	1047.20	1047.91	1048.58	1049.93	1050.14	1050.23	1050.35	1050.48	1050.75	1050.97	1051.16	1051.31	XS 1254
ES1_CliffST	ES1_CliffST	2,658	1049.25	1045.93	1046.68	1047.40	1048.54	1049.09	1049.37	1049.65	1049.83	1050.15	1050.42	1050.56	1050.74	1050.87	XS 1255
ES1_CliffST	ES1_CliffST	2,437	1048.73	1045.28	1046.04	1046.75	1048.49	1048.96	1049.19	1049.40	1049.53	1049.79	1050.02	1050.13	1050.28	1050.39	XS 1256
ES1_CliffST	ES1_CliffST	2,232	1047.88	1044.68	1045.44	1046.15	1048.11	1048.52	1048.74	1048.95	1049.07	1049.32	1049.54	1049.65	1049.79	1049.91	XS 1257
ES1_CliffST	ES1_CliffST	1,985	1047.78	1043.96	1044.71	1045.43	1047.77	1048.22	1048.41	1048.58	1048.69	1048.90	1049.08	1049.19	1049.32	1049.44	XS 1258
ES1_CliffST	ES1_CliffST	1,740	1046.96	1043.24	1044.00	1044.72	1047.05	1047.32	1047.44	1047.59	1047.68	1047.90	1048.10	1048.20	1048.34	1048.42	XS 1259
ES1_CliffST	ES1_CliffST	1,530	1046.12	1042.62	1043.39	1044.11	1046.02	1046.31	1046.46	1046.63	1046.74	1046.95	1047.12	1047.21	1047.30	1047.39	XS 1260
ES1_CliffST	ES1_CliffST	1,361	1045.25	1042.13	1042.90	1043.63	1044.95	1045.51	1045.66	1045.83	1045.94	1046.17	1046.38	1046.49	1046.68	1046.76	XS 1261
ES1_CliffST	ES1_CliffST	1,211	1044.85	1041.69	1042.47	1043.20	1044.75	1045.14	1045.33	1045.54	1045.67	1045.94	1046.19	1046.29	1046.51	1046.58	XS 1262
ES1_CliffST	ES1_CliffST	1,054	1044.48	1041.24	1042.02	1042.76	1044.74	1045.08	1045.25	1045.45	1045.57	1045.84	1046.09	1046.18	1046.42	1046.47	XS 1263
ES1_CliffST	ES1_CliffST	930	1044.48	1040.88	1041.68	1042.41	1044.73	1045.01	1045.14	1045.30	1045.41	1045.63	1045.89	1045.92	1046.20	1046.20(1)	XS 1264
ES1_CliffST	ES1_CliffST	792	1044.23	1040.49	1041.29	1042.02	1044.23	1044.48	1044.62	1044.77	1044.87	1045.10	1045.11	1045.40	1046.03	1046.03(1)	XS 1265
ES1_CliffST	ES1_CliffST	617	1043.80	1040.00	1040.81	1041.55	1043.55	1043.86	1044.00	1044.13	1044.19	1044.30	1044.91	1045.32	1046.01	1046.01(1)	XS 1266
ES1_CliffST	ES1_CliffST	461	1042.93	1039.57	1040.40	1041.13	1042.86	1043.09	1043.24	1043.40	1043.53	1044.13	1044.87	1045.29	1046.00	1046.00(1)	XS 1267
ES1_CliffST	ES1_CliffST	371	1042.54	1039.32	1040.17	1040.89	1042.55	1042.84	1043.05	1043.27	1043.43	1044.10	1044.86	1045.28	1045.99	1045.99(1)	XS 1268
ES1_CliffST	ES1_CliffST	152	1041.79	1038.76	1039.62	1040.33	1041.80	1042.23	1042.41	1042.58	1042.90	1044.02	1044.81	1045.24	1045.96	1045.96(1)	XS 1269
ES1_CliffST	ES1_CliffST	103	1042.13	1038.64	1039.50	1040.21	1041.26	1041.74	1042.06	1042.55	1042.90	1044.02	1044.82	1045.24	1045.96	1045.96(1)	XS 1270
ES1_CliffST	ES1_CliffST	94	1041.98	1038.62	1039.48	1040.19	1041.18	1041.65	1042.02	1042.54	1042.90	1044.02	1044.82	1045.24	1045.96	1045.96(1)	XS 1271
ES1_CliffST	ES1_CliffST	65	1041.04	1038.55	1039.41	1040.12	1040.86	1041.51	1041.97	1042.52	1042.86	1044.02	1044.81	1045.24	1045.96	1045.96(1)	XS 1272
ES2_25AV	ES2_25AV	517	1049.15	1048.73	1048.73	1048.73	1049.34	1049.80	1050.04	1050.27	1050.42	1050.83	1051.19	1051.43	1051.70	1051.89	XS 1230
ES2_25AV	ES2_25AV	449	1048.43	1043.96	1043.98	1044.83	1048.94	1049.39	1049.61	1049.81	1049.94	1050.27	1050.56	1050.75	1050.95	1051.12	XS 1231
ES2_25AV	ES2_25AV	366	1048.09	1043.34	1043.98	1044.83	1048.65	1049.03	1049.20	1049.35	1049.45	1049.67	1049.86	1050.03	1050.41	1050.75	XS 1232
ES2_25AV	ES2_25AV	288	1047.94	1042.89	1043.98	1044.83	1048.40	1048.68	1048.81	1048.93	1049.00	1049.21	1049.46	1049.85	1050.36	1050.74	XS 1233
ES2_25AV	ES2_25AV	236	1047.78	1042.89	1043.98	1044.83	1048.22	1048.43	1048.50	1048.58	1048.68	1048.77	1049.35	1049.80	1050.34	1050.72	XS 1234
ES2_25AV	ES2_25AV	203	1047.61	1042.89	1043.98	1044.83	1047.85	1047.99	1048.10	1048.17	1048.17(1)	1048.73	1049.34	1049.80	1050.34	1050.72	XS 1235
ES2_25AV	ES2_25AV	159	1047.16	1042.89	1043.98	1044.83	1047.11	1047.45	1047.67	1047.93	1048.14	1048.72	1049.33	1049.80	1050.34	1050.72	XS 1236
ES2_25AV	ES2_25AV	123	1046.93	1042.89	1043.98	1044.83	1046.91	1047.39	1047.63	1047.91	1048.12	1048.71	1049.33	1049.80	1050.34	1050.72	XS 1237
ES2_25AV	ES2_25AV	32	1045.40	1042.89	1043.98	1044.83	1045.95	1046.64	1047.05	1047.29	1047.43	1047.85	1048.26	1048.56	1048.91	1049.15	XS 1238
ES3_22AV	ES3_22AV	443	1045.97	1046.51	1047.23	1047.90	1048.50	1048.84	1049.07	1049.33	1049.52	1050.11	1050.63	1050.98	1051.33	1051.55	XS 1239; U/S of Erlton Flood Control Weir
ES3_22AV	ES3_22AV	435	1047.81	1046.49	1047.22	1047.89	1048.49	1048.82	1049.05	1049.30	1049.49	1050.06	1050.57	1050.92	1051.27	1051.48	XS 1240; D/S of Erlton Flood Control Weir
ES3_22AV	ES3_22AV	392	1047.46	1046.14	1046.86	1047.57	1048.13	1048.52	1048.77	1049.03	1049.24	1049.84	1050.38	1050.75	1051.11	1051.33	XS 1241

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Table E4: Flood Frequency Profiles – Elbow River Side Channels

Branch	Model Reach	River Station (m)	Minimum Channel Elevation (m)	Simulated Water Levels for Various Flood Events (m)													Notes
				2-year	5-year	10-year	20-year	35-year	50-year	75-year	100-year	200-year	350-year	500-year	750-year	1,000-year	
ES3_22AV	ES3_22AV	314	1047.02	1045.50	1046.22	1047.13	1047.94	1048.27	1048.48	1048.71	1048.89	1049.40	1049.87	1050.17	1050.48	1050.67	XS 1242
ES3_22AV	ES3_22AV	252	1047.18	1044.98	1045.71	1046.70	1047.75	1048.01	1048.17	1048.34	1048.46	1048.83	1049.18	1049.45	1049.78	1050.03	XS 1243
ES3_22AV	ES3_22AV	200	1046.88	1044.52	1045.27	1046.21	1047.58	1047.81	1047.95	1048.10	1048.22	1048.65	1049.10	1049.44	1049.84	1050.10	XS 1244
ES3_22AV	ES3_22AV	142	1047.00	1043.99	1044.78	1045.65	1047.37	1047.58	1047.69	1047.81	1047.95	1048.54	1049.07	1049.45	1049.89	1050.18	XS 1245
ES3_22AV	ES3_22AV	126	1046.85	1043.84	1044.64	1045.50	1047.34	1047.56	1047.68	1047.81	1047.95	1048.56	1049.10	1049.49	1049.93	1050.21	XS 1246
ES3_22AV	ES3_22AV	79	1046.86	1043.36	1044.23	1045.01	1046.96	1047.18	1047.30	1047.41	1047.86	1048.54	1049.10	1049.48	1049.93	1050.21	XS 1247
ES4_Roxboro	ES4_Roxboro	915	1050.71	1050.71	1050.71	1050.86	1051.56	1052.10	1052.46	1052.84	1053.10	1053.70	1054.19	1054.50	1054.87	1055.15	XS 1218
ES4_Roxboro	ES4_Roxboro	832	1051.31	1050.71	1050.71	1050.85	1051.56	1052.08	1052.42	1052.77	1053.01	1053.56	1054.02	1054.31	1054.66	1054.92	XS 1219
ES4_Roxboro	ES4_Roxboro	770	1051.46	1050.71	1050.71	1050.83	1051.41	1051.98	1052.24	1052.55	1052.75	1053.22	1053.65	1053.93	1054.26	1054.52	XS 1220
ES4_Roxboro	ES4_Roxboro	715	1051.44	1050.71	1050.71	1050.82	1051.16	1051.54	1051.82	1052.11	1052.31	1052.79	1053.26	1053.54	1053.88	1054.14	XS 1221
ES4_Roxboro	ES4_Roxboro	671	1051.36	1050.71	1050.71	1050.81	1051.09	1051.39	1051.66	1051.93	1052.12	1052.61	1053.09	1053.37	1053.71	1053.97	XS 1222
ES4_Roxboro	ES4_Roxboro	569	1051.16	1050.71	1050.71	1050.73	1050.77	1051.03	1051.26	1051.53	1051.75	1052.32	1052.85	1053.12	1053.47	1053.73	XS 1223
ES4_Roxboro	ES4_Roxboro	444	1050.09	1049.17	1049.17	1049.46	1050.03	1050.60	1050.94	1051.29	1051.53	1052.15	1052.70	1052.96	1053.31	1053.57	XS 1224
ES4_Roxboro	ES4_Roxboro	367	1049.37	1049.17	1049.17	1049.44	1050.03	1050.59	1050.91	1051.26	1051.50	1052.11	1052.67	1052.92	1053.26	1053.52	XS 1225
ES4_Roxboro	ES4_Roxboro	254	1049.23	1049.17	1049.17	1049.40	1050.03	1050.58	1050.91	1051.25	1051.48	1052.09	1052.64	1052.89	1053.22	1053.48	XS 1226
ES4_Roxboro	ES4_Roxboro	169	1049.15	1049.16	1049.16	1049.21	1050.03	1050.58	1050.91	1051.24	1051.48	1052.08	1052.63	1052.87	1053.21	1053.46	XS 1227
ES4_Roxboro	ES4_Roxboro	116	1048.69	1047.53	1048.46	1049.21	1050.03	1050.58	1050.91	1051.24	1051.48	1052.07	1052.62	1052.86	1053.19	1053.45	XS 1228
ES4_Roxboro	ES4_Roxboro	43	1048.53	1047.53	1048.46	1049.21	1050.03	1050.58	1050.91	1051.24	1051.47	1052.06	1052.59	1052.82	1053.14	1053.38	XS 1229

Notes:
1) Simulated water level replaced with higher water level from lower flow profile to avoid profile crossing.

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Classification: Public

Table E5: Flood Frequency Profiles – Bragg Creek

River	Model Reach	River Station (m)	Min. Channel Elevation (m)	Simulated Water Levels for Various Flood Events (m)													Notes
				2-year	5-year	10-year	20-year	35-year	50-year	75-year	100-year	200-year	350-year	500-year	750-year	1000-year	
Bragg Creek	Bragg Creek	1,169	1312.06	1313.26	1313.65	1313.96	1314.16	1314.32	1314.42	1314.55	1314.64	1314.87	1315.08	1315.27	1315.46	1315.60	XS 1273
Bragg Creek	Bragg Creek	1,143	1312.32	1313.14	1313.54	1313.85	1314.05	1314.21	1314.32	1314.45	1314.54	1314.78	1315.01	1315.22	1315.42	1315.57	XS 1274
Bragg Creek	Bragg Creek	1,084	1311.97	1312.77	1313.22	1313.60	1313.83	1314.00	1314.11	1314.24	1314.35	1314.64	1314.92	1315.16	1315.39	1315.55	XS 1275; U/S of Centre Avenue Bridge
Bragg Creek	Bragg Creek	1,042	1311.44	1312.69	1313.14	1313.49	1313.68	1313.81	1313.89	1313.97	1314.04	1314.19	1314.31	1314.38	1314.46	1314.51	XS 1276; D/S of Centre Avenue Bridge
Bragg Creek	Bragg Creek	948	1311.20	1312.40	1312.73	1312.90	1313.07	1313.11	1313.14	1313.17	1313.19	1313.25	1313.31	1313.35	1313.41	1313.45	XS 1277
Bragg Creek	Bragg Creek	824	1310.68	1311.20	1311.42	1311.58	1311.72	1311.83	1311.90	1311.98	1312.04	1312.20	1312.33	1312.42	1312.52	1312.59	XS 1278
Bragg Creek	Bragg Creek	592	1308.28	1309.26	1309.62	1309.89	1310.10	1310.25	1310.33	1310.45	1310.56	1310.76	1310.87	1310.91	1310.98	1311.03	XS 1279
Bragg Creek	Bragg Creek	443	1307.59	1308.09	1308.39	1308.56	1308.81	1308.97	1309.05	1309.10	1309.10	1309.20	1309.33	1309.44	1309.57	1309.67	XS 1280
Bragg Creek	Bragg Creek	311	1305.85	1306.67	1306.91	1307.10	1307.28	1307.40	1307.49	1307.65	1307.83	1308.29	1308.68	1308.83	1309.01	1309.17	XS 1281
Bragg Creek	Bragg Creek	196	1304.78	1305.41	1305.81	1306.03	1306.27	1306.55	1306.83	1307.20	1307.51	1308.06	1308.62	1308.80	1309.00	1309.17	XS 1282
Bragg Creek	Bragg Creek	137	1303.98	1304.91	1305.30	1305.60	1305.98	1306.38	1306.73	1307.14	1307.46	1308.05	1308.61	1308.79	1309.00	1309.17	XS 1283; U/S of Bracken Road Bridge
Bragg Creek	Bragg Creek	110	1303.57	1304.56	1305.05	1305.39	1305.83	1306.26	1306.55	1306.90	1307.18	1307.94	1308.59	1308.78	1308.99	1309.17	XS 1284; D/S of Bracken Road Bridge
Bragg Creek	Bragg Creek	94	1303.55	1304.46	1304.99	1305.35	1305.80	1306.25	1306.55	1306.91	1307.18	1307.94	1308.59	1308.78	1308.99	1309.17	XS 1285
Bragg Creek	Bragg Creek	40	1303.36	1304.33	1304.94	1305.32	1305.80	1306.25	1306.55	1306.91	1307.18	1307.95	1308.59	1308.78	1308.99	1309.16	XS 1286

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Classification: Public

Table E6: Flood Frequency Profiles – Lott Creek

River	Model Reach	River Station (m)	Min. Channel Elevation (m)	Simulated Water Levels for Various Flood Events (m)													Notes
				2-year	5-year	10-year	20-year	35-year	50-year	75-year	100-year	200-year	350-year	500-year	750-year	1,000-year	
Lott Creek	L3_USBC_EVL	7,278	1125.10	1125.90	1126.35	1126.58	1126.75	1126.87	1126.94	1127.01	1127.06	1127.16	1127.24	1127.29	1127.35	1127.38	XS 1287
Lott Creek	L3_USBC_EVL	7,175	1124.63	1125.42	1125.81	1125.95	1126.09	1126.20	1126.26	1126.32	1126.37	1126.49	1126.59	1126.66	1126.73	1126.78	XS 1288
Lott Creek	L3_USBC_EVL	7,099	1124.24	1125.02	1125.42	1125.62	1125.79	1125.92	1126.00	1126.09	1126.15	1126.30	1126.41	1126.48	1126.55	1126.61	XS 1289
Lott Creek	L3_USBC_EVL	7,027	1123.80	1124.68	1125.09	1125.34	1125.52	1125.66	1125.74	1125.84	1125.90	1126.04	1126.15	1126.22	1126.30	1126.35	XS 1290
Lott Creek	L3_USBC_EVL	6,903	1123.31	1123.97	1124.49	1124.75	1124.97	1125.13	1125.23	1125.33	1125.40	1125.55	1125.67	1125.73	1125.80	1125.85	XS 1291
Lott Creek	L3_USBC_EVL	6,819	1122.55	1123.51	1124.08	1124.36	1124.59	1124.76	1124.87	1124.97	1125.04	1125.18	1125.28	1125.33	1125.39	1125.42	XS 1292
Lott Creek	L3_USBC_EVL	6,701	1122.01	1122.65	1123.20	1123.46	1123.66	1123.81	1123.90	1124.01	1124.08	1124.22	1124.33	1124.40	1124.48	1124.52	XS 1293
Lott Creek	L3_USBC_EVL	6,606	1121.16	1121.87	1122.20	1122.50	1122.69	1122.81	1122.88	1122.95	1123.00	1123.11	1123.18	1123.23	1123.27	1123.30	XS 1294
Lott Creek	L3_USBC_EVL	6,527	1120.30	1120.81	1121.47	1121.78	1122.00	1122.13	1122.19	1122.26	1122.30	1122.40	1122.48	1122.52	1122.57	1122.61	XS 1295
Lott Creek	L3_USBC_EVL	6,439	1119.42	1120.56	1121.16	1121.39	1121.56	1121.66	1121.72	1121.78	1121.82	1121.91	1121.97	1122.01	1122.05	1122.08	XS 1296
Lott Creek	L3_USBC_EVL	6,345	1119.51	1120.28	1120.84	1121.02	1121.16	1121.25	1121.31	1121.37	1121.42	1121.51	1121.57	1121.61	1121.65	1121.69	XS 1297
Lott Creek	L3_USBC_EVL	6,238	1118.79	1119.75	1120.38	1120.59	1120.75	1120.84	1120.89	1120.95	1120.98	1121.06	1121.12	1121.16	1121.20	1121.23	XS 1298
Lott Creek	L3_USBC_EVL	6,156	1118.44	1119.29	1119.93	1120.15	1120.31	1120.40	1120.45	1120.50	1120.54	1120.62	1120.70	1120.74	1120.79	1120.82	XS 1299
Lott Creek	L3_USBC_EVL	6,045	1117.74	1118.55	1118.95	1119.19	1119.41	1119.57	1119.67	1119.77	1119.83	1119.96	1120.03	1120.06	1120.10	1120.13	XS 1300
Lott Creek	L3_USBC_EVL	6,025	1117.39	1118.52	1118.86	1119.03	1119.18	1119.29	1119.34	1119.39	1119.43	1119.56	1119.67	1119.76	1119.79	1119.81	XS 1301
Lott Creek	L3_USBC_EVL	6,015	1117.55	1118.49	1118.75	1118.91	1119.06	1119.17	1119.22	1119.28	1119.31	1119.38	1119.41	1119.43	1119.46	1119.47	XS 1302
Lott Creek	L3_USBC_EVL	5,932	1116.74	1117.37	1117.84	1118.04	1118.17	1118.26	1118.32	1118.38	1118.43	1118.53	1118.63	1118.69	1118.76	1118.81	XS 1303
Lott Creek	L3_USBC_EVL	5,871	1115.93	1117.13	1117.58	1117.80	1117.98	1118.10	1118.18	1118.26	1118.31	1118.44	1118.54	1118.60	1118.67	1118.73	XS 1304
Lott Creek	L3_USBC_EVL	5,783	1115.88	1116.96	1117.32	1117.47	1117.59	1117.68	1117.74	1117.80	1117.84	1117.92	1117.97	1118.00	1118.03	1118.04	XS 1305
Lott Creek	L3_USBC_EVL	5,712	1115.58	1116.77	1117.14	1117.25	1117.33	1117.39	1117.43	1117.45	1117.48	1117.54	1117.61	1117.65	1117.70	1117.74	XS 1306
Lott Creek	L3_USBC_EVL	5,605	1115.15	1116.28	1116.71	1116.84	1116.95	1117.04	1117.11	1117.18	1117.23	1117.33	1117.43	1117.48	1117.55	1117.59	XS 1307
Lott Creek	L3_USBC_EVL	5,519	1114.78	1115.88	1116.45	1116.71	1116.87	1116.99	1117.06	1117.13	1117.18	1117.29	1117.39	1117.45	1117.51	1117.56	XS 1308
Lott Creek	L3_USBC_EVL	5,459	1114.48	1115.73	1116.33	1116.65	1116.84	1116.95	1117.03	1117.10	1117.16	1117.26	1117.36	1117.42	1117.49	1117.53	XS 1309
Lott Creek	L3_USBC_EVL	5,396	1114.49	1115.59	1116.30	1116.63	1116.82	1116.93	1117.00	1117.07	1117.13	1117.23	1117.33	1117.39	1117.45	1117.50	XS 1310
Lott Creek	L3_USBC_EVL	5,322	1114.32	1115.49	1116.29	1116.62	1116.81	1116.92	1116.99	1117.06	1117.11	1117.21	1117.31	1117.37	1117.43	1117.47	XS 1311
Lott Creek	L3_USBC_EVL	5,262	1114.35	1115.39	1116.25	1116.59	1116.77	1116.88	1116.95	1117.01	1117.07	1117.16	1117.25	1117.31	1117.37	1117.42	XS 1312; U/S of Misty Morning Drive Culvert
Lott Creek	L3_USBC_EVL	5,231	1114.14	1115.28	1115.57	1115.74	1115.93	1115.99	1116.05	1116.11	1116.20	1116.72	1116.99	1117.07	1117.16	1117.21	XS 1313; D/S of Misty Morning Drive Culvert
Lott Creek	L3_USBC_EVL	5,181	1113.65	1115.25	1115.52	1115.68	1115.91	1115.98	1116.06	1116.15	1116.27	1116.71	1116.96	1117.05	1117.13	1117.19	XS 1314
Lott Creek	L3_USBC_EVL	5,132	1113.49	1115.24	1115.49	1115.64	1115.88	1115.92	1116.00	1116.09	1116.21	1116.68	1116.94	1117.02	1117.10	1117.15	XS 1315
Lott Creek	L3_USBC_EVL	5,080	1113.39	1115.23	1115.48	1115.62	1115.85	1115.89	1115.96	1116.04	1116.17	1116.65	1116.91	1116.99	1117.07	1117.12	XS 1316
Lott Creek	L2_EVL_LCDrive	5,043	1113.55	1115.22	1115.47	1115.60	1115.83	1115.87	1115.95	1116.03	1116.16	1116.64	1116.90	1116.98	1117.05	1117.10	XS 1317; U/S of Elbow Valley Lake Culvert
Lott Creek	L2_EVL_LCDrive	5,009	1112.88	1114.06	1114.13	1114.16	1114.21	1114.21	1114.23	1114.25	1114.30	1114.94	1115.14	1115.24	1115.35	1115.42	XS 1318; D/S of Elbow Valley Lake Culvert
Lott Creek	L2_EVL_LCDrive	4,960	1112.97	1114.05	1114.12	1114.15	1114.19	1114.20	1114.21	1114.24	1114.29	1114.94	1115.14	1115.25	1115.37	1115.44	XS 1319
Lott Creek	L2_EVL_LCDrive	4,906	1112.64	1114.04	1114.11	1114.14	1114.19	1114.19	1114.21	1114.23	1114.28	1114.94	1115.13	1115.24	1115.36	1115.43	XS 1320
Lott Creek	L2_EVL_LCDrive	4,858	1112.17	1114.04	1114.11	1114.14	1114.18	1114.19	1114.20	1114.23	1114.28	1114.93	1115.13	1115.23	1115.35	1115.42	XS 1321
Lott Creek	L2_EVL_LCDrive	4,837	1112.77	1114.01	1114.08	1114.11	1114.15	1114.15	1114.17	1114.19	1114.24	1114.92	1115.11	1115.21	1115.31	1115.38	XS 1322
Lott Creek	L2_EVL_LCDrive	4,816	1112.84	1113.86	1113.91	1113.94	1113.97	1113.98	1113.99	1114.01	1114.07	1114.91	1115.09	1115.19	1115.29	1115.35	XS 1323
Lott Creek	L2_EVL_LCDrive	4,757	1112.66	1113.65	1113.72	1113.76	1113.81	1113.82	1113.84	1113.87	1113.93	1114.89	1115.07	1115.15	1115.25	1115.30	XS 1324

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Table E6: Flood Frequency Profiles – Lott Creek

River	Model Reach	River Station (m)	Min. Channel Elevation (m)	Simulated Water Levels for Various Flood Events (m)													Notes
				2-year	5-year	10-year	20-year	35-year	50-year	75-year	100-year	200-year	350-year	500-year	750-year	1,000-year	
Lott Creek	L2_EVL_LCDrive	4,703	1112.44	1113.59	1113.67	1113.71	1113.77	1113.77	1113.79	1113.82	1113.89	1114.88	1115.05	1115.13	1115.21	1115.26	XS 1325
Lott Creek	L2_EVL_LCDrive	4,658	1112.38	1113.58	1113.66	1113.70	1113.76	1113.76	1113.78	1113.81	1113.88	1114.88	1115.05	1115.12	1115.21	1115.26	XS 1326
Lott Creek	L2_EVL_LCDrive	4,611	1112.58	1113.56	1113.64	1113.68	1113.73	1113.74	1113.76	1113.79	1113.85	1114.87	1115.03	1115.11	1115.19	1115.24	XS 1327; U/S of Lott Creek Hollow Culvert
Lott Creek	L2_EVL_LCDrive	4,551	1112.30	1113.19	1113.27	1113.31	1113.37	1113.38	1113.40	1113.43	1113.52	1114.31	1114.54	1114.57	1114.69	1114.75	XS 1328; D/S of Lott Creek Hollow Culvert
Lott Creek	L2_EVL_LCDrive	4,503	1112.00	1113.11	1113.19	1113.23	1113.30	1113.31	1113.33	1113.36	1113.45	1114.27	1114.51	1114.51	1114.60	1114.65	XS 1329; U/S of Wolfwillow Lane Culvert
Lott Creek	L2_EVL_LCDrive	4,462	1111.76	1112.38	1112.43	1112.45	1112.49	1112.49	1112.50	1112.52	1112.56	1112.86	1113.07	1113.20	1113.38	1113.48	XS 1330; D/S of Wolfwillow Lane Culvert
Lott Creek	L2_EVL_LCDrive	4,408	1110.45	1111.75	1111.81	1111.84	1111.88	1111.89	1111.90	1111.93	1111.98	1112.36	1112.64	1112.78	1112.78	1112.84	XS 1331
Lott Creek	L2_EVL_LCDrive	4,359	1110.51	1111.38	1111.43	1111.46	1111.51	1111.51	1111.53	1111.55	1111.60	1112.11	1112.41	1112.50	1112.59	1112.65	XS 1332
Lott Creek	L2_EVL_LCDrive	4,318	1110.35	1111.19	1111.26	1111.30	1111.35	1111.36	1111.38	1111.40	1111.47	1112.03	1112.34	1112.44	1112.53	1112.59	XS 1333; U/S of Coulee Ridge Culvert
Lott Creek	L2_EVL_LCDrive	4,221	1107.63	1108.75	1108.84	1108.88	1108.94	1108.95	1108.99	1109.04	1109.14	1109.92	1110.32	1110.45	1110.56	1110.64	XS 1334; D/S of Coulee Ridge Culvert
Lott Creek	L2_EVL_LCDrive	4,185	1107.25	1108.72	1108.80	1108.85	1108.91	1108.92	1108.95	1109.01	1109.11	1109.90	1110.30	1110.45	1110.58	1110.67	XS 1335
Lott Creek	L2_EVL_LCDrive	4,145	1107.46	1108.66	1108.74	1108.78	1108.84	1108.85	1108.89	1108.95	1109.05	1109.86	1110.30	1110.45	1110.57	1110.66	XS 1336
Lott Creek	L2_EVL_LCDrive	4,096	1107.24	1108.51	1108.58	1108.61	1108.66	1108.68	1108.72	1108.80	1108.91	1109.77	1110.25	1110.41	1110.54	1110.63	XS 1337; U/S of Fisherman's Lake Pedestrian Bridge
Lott Creek	L2_EVL_LCDrive	4,090	1107.48	1108.45	1108.51	1108.54	1108.59	1108.62	1108.67	1108.76	1108.88	1109.75	1110.22	1110.37	1110.51	1110.60	XS 1338; D/S of Fisherman's Lake Pedestrian Bridge
Lott Creek	L2_EVL_LCDrive	4,046	1107.21	1108.03	1108.12	1108.15	1108.25	1108.37	1108.47	1108.61	1108.76	1109.69	1110.16	1110.31	1110.46	1110.55	XS 1339
Lott Creek	L2_EVL_LCDrive	3,995	1106.74	1107.98	1108.08	1108.12	1108.24	1108.36	1108.46	1108.61	1108.76	1109.70	1110.16	1110.31	1110.46	1110.55	XS 1340
Lott Creek	L2_EVL_LCDrive	3,944	1106.76	1107.94	1108.04	1108.07	1108.20	1108.33	1108.45	1108.60	1108.74	1109.68	1110.14	1110.29	1110.42	1110.51	XS 1341; U/S of Owl Haven Culvert
Lott Creek	L2_EVL_LCDrive	3,917	1106.54	1107.22	1107.56	1107.79	1107.98	1108.16	1108.28	1108.42	1108.52	1108.75	1108.93	1109.04	1109.15	1109.23	XS 1342; D/S of Owl Haven Culvert
Lott Creek	L1_LCDrive_Elbow	3,877	1106.03	1107.22	1107.53	1107.74	1107.89	1108.05	1108.15	1108.27	1108.35	1108.57	1108.75	1108.86	1108.99	1109.08	XS 1343; U/S of Lott Creek Drive Bridge
Lott Creek	L1_LCDrive_Elbow	3,845	1105.92	1107.21	1107.51	1107.68	1107.80	1107.91	1107.99	1108.07	1108.12	1108.24	1108.33	1108.38	1108.41	1108.45	XS 1344; D/S of Lott Creek Drive Bridge
Lott Creek	L1_LCDrive_Elbow	3,795	1106.68	1107.20	1107.49	1107.66	1107.77	1107.89	1107.96	1108.05	1108.10	1108.23	1108.33	1108.38	1108.43	1108.47	XS 1345
Lott Creek	L1_LCDrive_Elbow	3,685	1106.74	1107.17	1107.45	1107.61	1107.71	1107.81	1107.89	1107.97	1108.02	1108.15	1108.24	1108.30	1108.33	1108.37	XS 1346
Lott Creek	L1_LCDrive_Elbow	3,652	1106.32	1107.13	1107.41	1107.58	1107.67	1107.78	1107.85	1107.94	1107.99	1108.11	1108.21	1108.26	1108.29	1108.33	XS 1347
Lott Creek	L1_LCDrive_Elbow	3,633	1106.45	1106.82	1107.31	1107.54	1107.62	1107.74	1107.83	1107.92	1107.97	1108.10	1108.19	1108.25	1108.28	1108.32	XS 1348
Lott Creek	L1_LCDrive_Elbow	3,585	1105.57	1106.59	1107.12	1107.37	1107.37(1)	1107.43	1107.55	1107.67	1107.72	1107.87	1107.97	1108.03	1108.03(1)	1108.06	XS 1349
Lott Creek	L1_LCDrive_Elbow	3,535	1105.41	1106.49	1106.99	1107.19	1107.29	1107.40	1107.53	1107.65	1107.70	1107.86	1107.96	1108.02	1108.02(1)	1108.04	XS 1350; U/S of Golf Course Bridge 1
Lott Creek	L1_LCDrive_Elbow	3,526	1105.33	1106.46	1106.93	1107.12	1107.24	1107.40	1107.53	1107.65	1107.70	1107.85	1107.96	1108.02	1108.02(1)	1108.04	XS 1351; D/S of Golf Course Bridge 1
Lott Creek	L1_LCDrive_Elbow	3,478	1105.31	1106.24	1106.72	1106.95	1107.19	1107.38	1107.51	1107.64	1107.70	1107.85	1107.96	1108.02	1108.02(1)	1108.04	XS 1352
Lott Creek	L1_LCDrive_Elbow	3,435	1104.77	1106.14	1106.53	1106.75	1107.08	1107.33	1107.47	1107.59	1107.66	1107.81	1107.91	1107.97	1107.97(1)	1107.97	XS 1353; U/S of Golf Course Bridge 2
Lott Creek	L1_LCDrive_Elbow	3,427	1104.61	1106.14	1106.53	1106.74	1107.03	1107.23	1107.35	1107.49	1107.56	1107.71	1107.82	1107.89	1107.89(1)	1107.89(1)	XS 1354; D/S of Golf Course Bridge 2
Lott Creek	L1_LCDrive_Elbow	3,393	1105.06	1106.10	1106.39	1106.46	1106.70	1106.87	1106.99	1107.21	1107.28	1107.46	1107.57	1107.61	1107.86	1107.90	XS 1355; U/S of Golf Course Bridge 3
Lott Creek	L1_LCDrive_Elbow	3,386	1105.10	1106.09	1106.33	1106.33(1)	1106.34	1106.50	1106.61	1106.91	1106.96	1107.06	1107.12	1107.16	1107.20	1107.22	XS 1356; D/S of Golf Course Bridge 3
Lott Creek	L1_LCDrive_Elbow	3,356	1105.35	1105.85	1105.94	1106.06	1106.17	1106.25	1106.30	1106.35	1106.40	1106.48	1106.54	1106.58	1106.62	1106.64	XS 1357
Lott Creek	L1_LCDrive_Elbow	3,304	1104.76	1105.59	1105.86	1106.01	1106.13	1106.21	1106.26	1106.31	1106.36	1106.44	1106.50	1106.54	1106.57	1106.60	XS 1358
Lott Creek	L1_LCDrive_Elbow	3,255	1104.67	1105.57	1105.85	1105.99	1106.11	1106.19	1106.24	1106.29	1106.34	1106.42	1106.48	1106.51	1106.55	1106.57	XS 1359
Lott Creek	L1_LCDrive_Elbow	3,206	1104.79	1105.52	1105.81	1105.95	1106.06	1106.14	1106.19	1106.24	1106.29	1106.37	1106.42	1106.45	1106.49	1106.51	XS 1360
Lott Creek	L1_LCDrive_Elbow	3,155	1104.16	1105.37	1105.67	1105.81	1105.91	1105.97	1106.01	1106.05	1106.07	1106.14	1106.18	1106.20	1106.23	1106.24	XS 1361
Lott Creek	L1_LCDrive_Elbow	3,107	1104.03	1105.27	1105.37	1105.42	1105.47	1105.50	1105.52	1105.54	1105.56	1105.60	1105.62	1105.64	1105.66	1105.68	XS 1362

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Classification: Public

Table E6: Flood Frequency Profiles – Lott Creek

River	Model Reach	River Station (m)	Min. Channel Elevation (m)	Simulated Water Levels for Various Flood Events (m)													Notes
				2-year	5-year	10-year	20-year	35-year	50-year	75-year	100-year	200-year	350-year	500-year	750-year	1,000-year	
Lott Creek	L1_LCDrive_Elbow	2,863	1103.38	1104.58	1104.69	1104.75	1104.79	1104.83	1104.85	1104.87	1104.89	1104.93	1104.96	1104.97	1104.99	1105.01	XS 1363
Lott Creek	L1_LCDrive_Elbow	2,789	1103.03	1104.45	1104.63	1104.69	1104.73	1104.76	1104.78	1104.80	1104.81	1104.85	1104.88	1104.89	1104.90	1104.92	XS 1364
Lott Creek	L1_LCDrive_Elbow	2,703	1103.04	1104.27	1104.27	1104.50	1104.52	1104.54	1104.56	1104.57	1104.58	1104.59	1104.60	1104.61	1104.63	1104.64	XS 1365
Lott Creek	L1_LCDrive_Elbow	2,624	1103.03	1104.04	1104.15	1104.16	1104.21	1104.24	1104.26	1104.28	1104.30	1104.33	1104.36	1104.38	1104.40	1104.41	XS 1366
Lott Creek	L1_LCDrive_Elbow	2,464	1102.43	1103.43	1103.72	1103.85	1103.87	1103.89	1103.90	1103.91	1103.92	1103.94	1103.96	1103.97	1103.98	1103.98	XS 1367
Lott Creek	L1_LCDrive_Elbow	2,457	1102.35	1103.39	1103.57	1103.77	1103.80	1103.81	1103.82	1103.83	1103.84	1103.86	1103.87	1103.88	1103.88	1103.89	XS 1368
Lott Creek	L1_LCDrive_Elbow	2,383	1102.02	1103.16	1103.27	1103.29	1103.32	1103.34	1103.35	1103.37	1103.38	1103.42	1103.45	1103.47	1103.50	1103.52	XS 1369
Lott Creek	L1_LCDrive_Elbow	2,311	1102.49	1102.65	1102.89	1102.96	1103.03	1103.08	1103.11	1103.15	1103.18	1103.24	1103.29	1103.34	1103.38	1103.40	XS 1370
Lott Creek	L1_LCDrive_Elbow	2,222	1101.59	1102.00	1102.34	1102.54	1102.71	1102.82	1102.88	1102.93	1102.97	1103.05	1103.11	1103.17	1103.21	1103.23	XS 1371
Lott Creek	L1_LCDrive_Elbow	2,145	1100.70	1101.65	1101.94	1102.11	1102.25	1102.36	1102.42	1102.47	1102.51	1102.59	1102.66	1102.70	1102.74	1102.77	XS 1372
Lott Creek	L1_LCDrive_Elbow	2,064	1100.33	1101.30	1101.54	1101.65	1101.74	1101.81	1101.85	1101.89	1101.92	1101.99	1102.04	1102.07	1102.11	1102.14	XS 1373
Lott Creek	L1_LCDrive_Elbow	1,985	1100.44	1101.10	1101.28	1101.37	1101.44	1101.50	1101.53	1101.56	1101.59	1101.65	1101.70	1101.72	1101.76	1101.78	XS 1374
Lott Creek	L1_LCDrive_Elbow	1,898	1100.21	1100.79	1100.96	1101.06	1101.14	1101.20	1101.23	1101.26	1101.28	1101.33	1101.37	1101.40	1101.42	1101.44	XS 1375
Lott Creek	L1_LCDrive_Elbow	1,822	1099.27	1100.22	1100.58	1100.64	1100.70	1100.73	1100.76	1100.80	1100.82	1100.88	1100.93	1100.96	1100.99	1101.02	XS 1376
Lott Creek	L1_LCDrive_Elbow	1,744	1098.77	1099.56	1100.03	1100.29	1100.43	1100.53	1100.57	1100.62	1100.66	1100.74	1100.80	1100.84	1100.88	1100.90	XS 1377
Lott Creek	L1_LCDrive_Elbow	1,658	1098.61	1099.38	1099.89	1100.16	1100.34	1100.45	1100.50	1100.56	1100.60	1100.69	1100.75	1100.79	1100.82	1100.85	XS 1378
Lott Creek	L1_LCDrive_Elbow	1,587	1098.46	1099.29	1099.79	1100.05	1100.24	1100.36	1100.39	1100.45	1100.49	1100.58	1100.65	1100.68	1100.71	1100.74	XS 1379
Lott Creek	L1_LCDrive_Elbow	1,502	1098.39	1099.20	1099.71	1099.96	1100.16	1100.25	1100.26	1100.31	1100.35	1100.41	1100.46	1100.49	1100.52	1100.54	XS 1380
Lott Creek	L1_LCDrive_Elbow	1,423	1098.25	1099.05	1099.57	1099.82	1100.01	1100.08	1100.14	1100.19	1100.23	1100.28	1100.32	1100.34	1100.37	1100.39	XS 1381
Lott Creek	L1_LCDrive_Elbow	1,348	1097.85	1098.76	1099.27	1099.51	1099.68	1099.80	1099.86	1099.93	1099.96	1100.03	1100.09	1100.12	1100.15	1100.18	XS 1382
Lott Creek	L1_LCDrive_Elbow	1,267	1097.41	1098.68	1099.13	1099.29	1099.41	1099.50	1099.54	1099.59	1099.62	1099.70	1099.76	1099.79	1099.83	1099.85	XS 1383
Lott Creek	L1_LCDrive_Elbow	1,189	1097.80	1098.60	1099.03	1099.17	1099.28	1099.35	1099.39	1099.44	1099.46	1099.53	1099.58	1099.61	1099.64	1099.67	XS 1384
Lott Creek	L1_LCDrive_Elbow	1,083	1097.57	1098.31	1098.82	1099.00	1099.13	1099.21	1099.25	1099.30	1099.32	1099.39	1099.44	1099.47	1099.51	1099.53	XS 1385
Lott Creek	L1_LCDrive_Elbow	1,025	1097.19	1098.05	1098.62	1098.87	1099.02	1099.11	1099.16	1099.21	1099.24	1099.31	1099.36	1099.39	1099.43	1099.45	XS 1386
Lott Creek	L1_LCDrive_Elbow	941	1096.93	1097.93	1098.48	1098.71	1098.85	1098.94	1098.98	1099.03	1099.06	1099.13	1099.18	1099.21	1099.24	1099.27	XS 1387
Lott Creek	L1_LCDrive_Elbow	864	1097.21	1097.80	1098.33	1098.56	1098.69	1098.78	1098.83	1098.88	1098.91	1098.98	1099.03	1099.06	1099.09	1099.12	XS 1388
Lott Creek	L1_LCDrive_Elbow	789	1096.83	1097.60	1098.16	1098.39	1098.52	1098.60	1098.65	1098.70	1098.73	1098.80	1098.84	1098.88	1098.91	1098.93	XS 1389
Lott Creek	L1_LCDrive_Elbow	704	1096.60	1097.43	1097.97	1098.18	1098.30	1098.38	1098.42	1098.47	1098.50	1098.57	1098.62	1098.65	1098.70	1098.73	XS 1390
Lott Creek	L1_LCDrive_Elbow	625	1096.34	1097.33	1097.81	1098.01	1098.13	1098.21	1098.25	1098.30	1098.33	1098.40	1098.46	1098.51	1098.57	1098.63	XS 1391
Lott Creek	L1_LCDrive_Elbow	546	1096.31	1097.22	1097.68	1097.88	1098.00	1098.07	1098.11	1098.16	1098.19	1098.26	1098.34	1098.40	1098.49	1098.56	XS 1392
Lott Creek	L1_LCDrive_Elbow	464	1096.23	1096.98	1097.46	1097.69	1097.82	1097.91	1097.95	1098.00	1098.04	1098.13	1098.23	1098.32	1098.43	1098.52	XS 1393
Lott Creek	L1_LCDrive_Elbow	386	1095.98	1096.72	1097.13	1097.37	1097.59	1097.70	1097.77	1097.83	1097.89	1098.02	1098.17	1098.27	1098.40	1098.50	XS 1394
Lott Creek	L1_LCDrive_Elbow	305	1095.62	1095.96	1096.59	1096.98	1097.28	1097.47	1097.57	1097.66	1097.73	1097.91	1098.10	1098.22	1098.36	1098.47	XS 1395
Lott Creek	L1_LCDrive_Elbow	224	1094.57	1095.77	1096.37	1096.75	1097.06	1097.27	1097.37	1097.48	1097.57	1097.79	1098.01	1098.14	1098.29	1098.41	XS 1396
Lott Creek	L1_LCDrive_Elbow	146	1094.76	1095.62	1096.10	1096.43	1096.71	1096.93	1097.07	1097.25	1097.38	1097.66	1097.91	1098.05	1098.22	1098.35	XS 1397
Lott Creek	L1_LCDrive_Elbow	65	1093.92	1095.61	1096.09	1096.42	1096.71	1096.93	1097.08	1097.24	1097.37	1097.64	1097.90	1098.04	1098.21	1098.33	XS 1398

Notes:
1) Simulated water level replaced with higher water level from lower flow profile to avoid profile crossing.

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Table E7: Flood Frequency Profiles – Lott Creek Lakes

Branch	Model Reach	River Station (m)	Min. Channel Elevation (m)	Simulated Water Levels for Various Flood Events (m)													Notes
				2-year	5-year	10-year	20-year	35-year	50-year	75-year	100-year	200-year	350-year	500-year	750-year	1,000-year	
Lott Creek Lakes	Lott Creek Lakes	1,071	1115.00	1115.23	1115.46	1115.59	1115.72	1115.82	1115.89	1115.96	1116.11	1116.61	1116.88	1116.98	1117.05	1117.10	XS 1399; U/S of Drop Inlet Structure - Weir
Lott Creek Lakes	Lott Creek Lakes	1,047	1112.40	1112.58	1113.68	1113.98	1114.39	1114.87	1115.24	1115.74	1116.10	1116.60	1116.87	1116.96	1117.04	1117.09	XS 1400; Between Drop Inlet Structure Weir & Culvert
Lott Creek Lakes	Lott Creek Lakes	1,006	1112.36	1112.42	1113.63	1113.79	1113.93	1114.03	1114.09	1114.16	1114.20	1114.26	1114.28	1114.29	1114.30	1114.30	XS 1401; D/S of Drop Inlet Structure - Culvert
Lott Creek Lakes	Lott Creek Lakes	980	1112.13	1112.41	1113.63	1113.79	1113.93	1114.03	1114.10	1114.16	1114.21	1114.26	1114.29	1114.30	1114.30	1114.31	XS 1402
Lott Creek Lakes	Lott Creek Lakes	932	1112.14	1112.41	1113.63	1113.79	1113.93	1114.03	1114.09	1114.16	1114.21	1114.26	1114.28	1114.29	1114.30	1114.31	XS 1403
Lott Creek Lakes	Lott Creek Lakes	859	1112.15	1112.41	1113.63	1113.79	1113.93	1114.03	1114.09	1114.16	1114.20	1114.26	1114.28	1114.29	1114.30	1114.30	XS 1404
Lott Creek Lakes	Lott Creek Lakes	797	1112.16	1112.41	1113.63	1113.79	1113.93	1114.03	1114.09	1114.16	1114.20	1114.26	1114.28	1114.29	1114.30	1114.30	XS 1405
Lott Creek Lakes	Lott Creek Lakes	682	1112.15	1112.41	1113.63	1113.79	1113.93	1114.03	1114.09	1114.16	1114.20	1114.26	1114.28	1114.29	1114.30	1114.30	XS 1406
Lott Creek Lakes	Lott Creek Lakes	620	1112.28	1112.41	1113.63	1113.79	1113.92	1114.03	1114.09	1114.16	1114.20	1114.25	1114.28	1114.29	1114.29	1114.30	XS 1407
Lott Creek Lakes	Lott Creek Lakes	613	1112.18	1112.29	1113.62	1113.78	1113.91	1114.00	1114.06	1114.12	1114.16	1114.21	1114.23	1114.24	1114.25	1114.25	XS 1408; U/S of Elbow Valley Lake Outlet Culvert
Lott Creek Lakes	Lott Creek Lakes	599	1111.49	1111.74	1112.14	1112.35	1112.55	1112.72	1112.82	1112.93	1113.00	1113.10	1113.14	1113.15	1113.17	1113.18	XS 1409; D/S of Elbow Valley Lake Outlet Culvert
Lott Creek Lakes	Lott Creek Lakes	587	1111.33	1111.44	1111.81	1111.99	1112.14	1112.27	1112.34	1112.41	1112.45	1112.51	1112.56	1112.57	1112.57	1112.58	XS 1410
Lott Creek Lakes	Lott Creek Lakes	480	1110.19	1110.54	1111.21	1111.39	1111.53	1111.64	1111.70	1111.77	1111.81	1111.86	1111.93	1111.94	1111.95	1111.95	XS 1411
Lott Creek Lakes	Lott Creek Lakes	405	1110.06	1110.22	1110.77	1110.91	1111.03	1111.14	1111.20	1111.24	1111.24	1111.25(2)	1111.25	1111.26	1111.26	1111.26	XS 1412
Lott Creek Lakes	Lott Creek Lakes	366	1109.01	1109.15	1109.55	1109.73	1109.90	1110.02	1110.11	1110.28	1110.39	1110.45	1110.53	1110.53	1110.54	1110.54	XS 1413
Lott Creek Lakes	Lott Creek Lakes	310	1108.39	1108.47	1108.69	1108.80	1108.89	1108.96	1109.01	1109.06	1109.09	1109.12	1109.14	1109.18	1109.26	1109.34	XS 1414
Lott Creek Lakes	Lott Creek Lakes	213	1108.25	1108.47	1108.66	1108.77	1108.85	1108.93	1108.97	1109.02	1109.05	1109.09	1109.11	1109.15	1109.25	1109.33	XS 1415
Lott Creek Lakes	Lott Creek Lakes	127	1108.21	1108.47	1108.65	1108.75	1108.84	1108.91	1108.95	1109.00	1109.03	1109.07	1109.09	1109.14	1109.24	1109.32	XS 1416
Lott Creek Lakes	Lott Creek Lakes	59	1108.31	1108.47	1108.61	1108.69	1108.77	1108.83	1108.87	1108.92	1108.95	1108.98	1109.00	1109.06	1109.19	1109.29	XS 1417; U/S of Fisherman's Lake Outlet Weir
Lott Creek Lakes	Lott Creek Lakes	38	1106.49	1107.22	1107.55	1107.77	1107.95	1108.13	1108.25	1108.38	1108.48	1108.71	1108.91	1109.04	1109.18	1109.29	XS 1418; D/S of Fisherman's Lake Outlet Weir

Notes:
1) Simulated water level replaced with lower water level from higher flow profile to avoid profile crossing.

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APPENDIX F

Model Sensitivity Analysis

Classification: Public

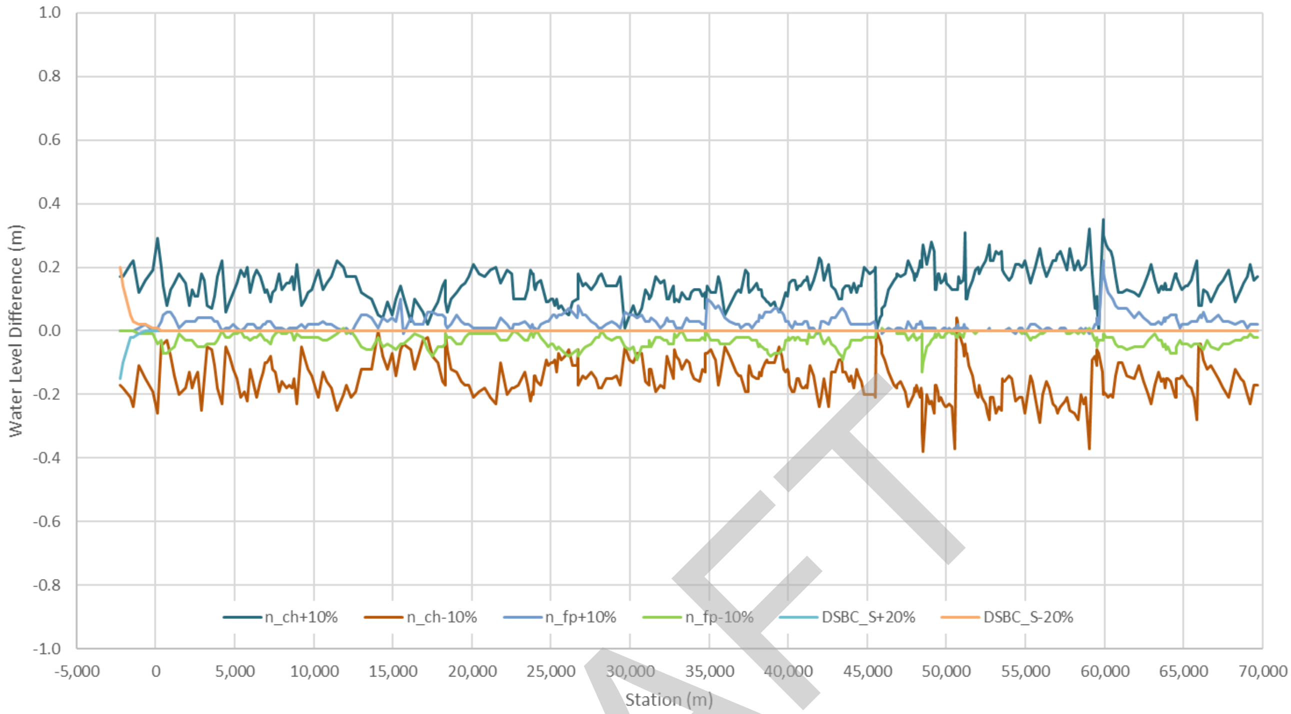

Figure F-1: Sensitivity Analysis – Bow River

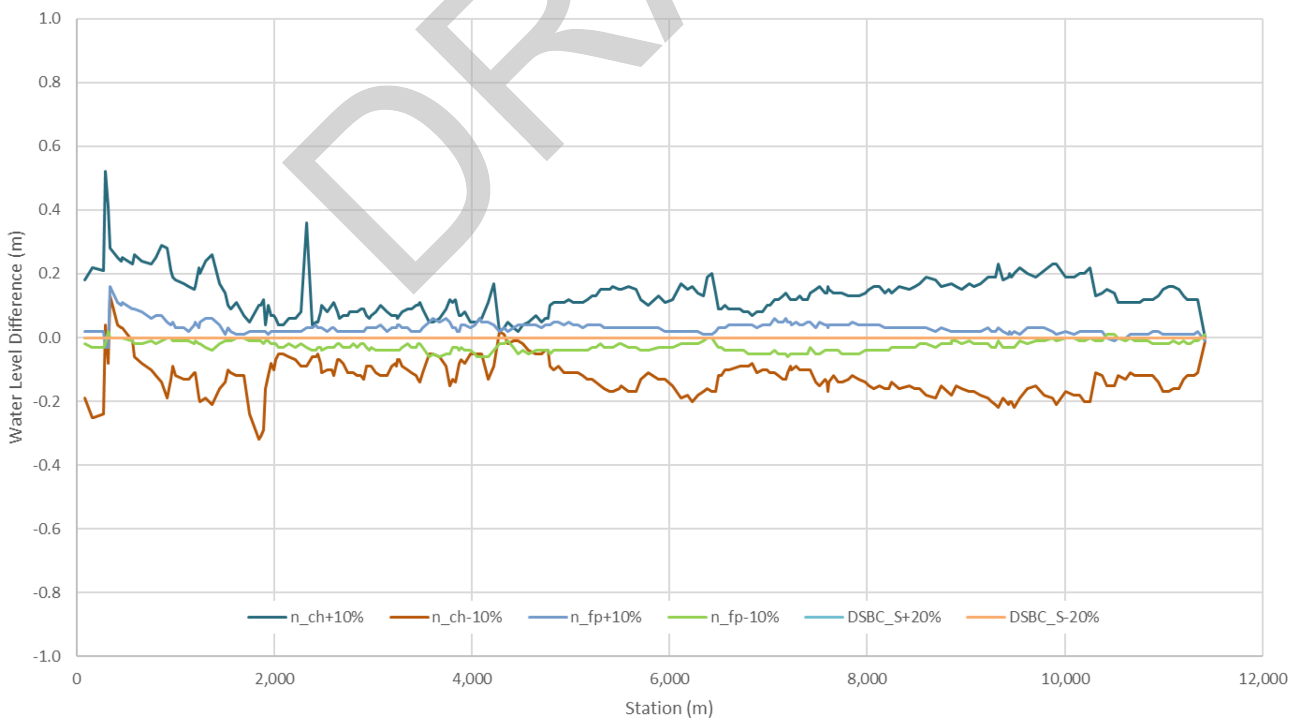

Figure F-2: Sensitivity Analysis – Lower Elbow River

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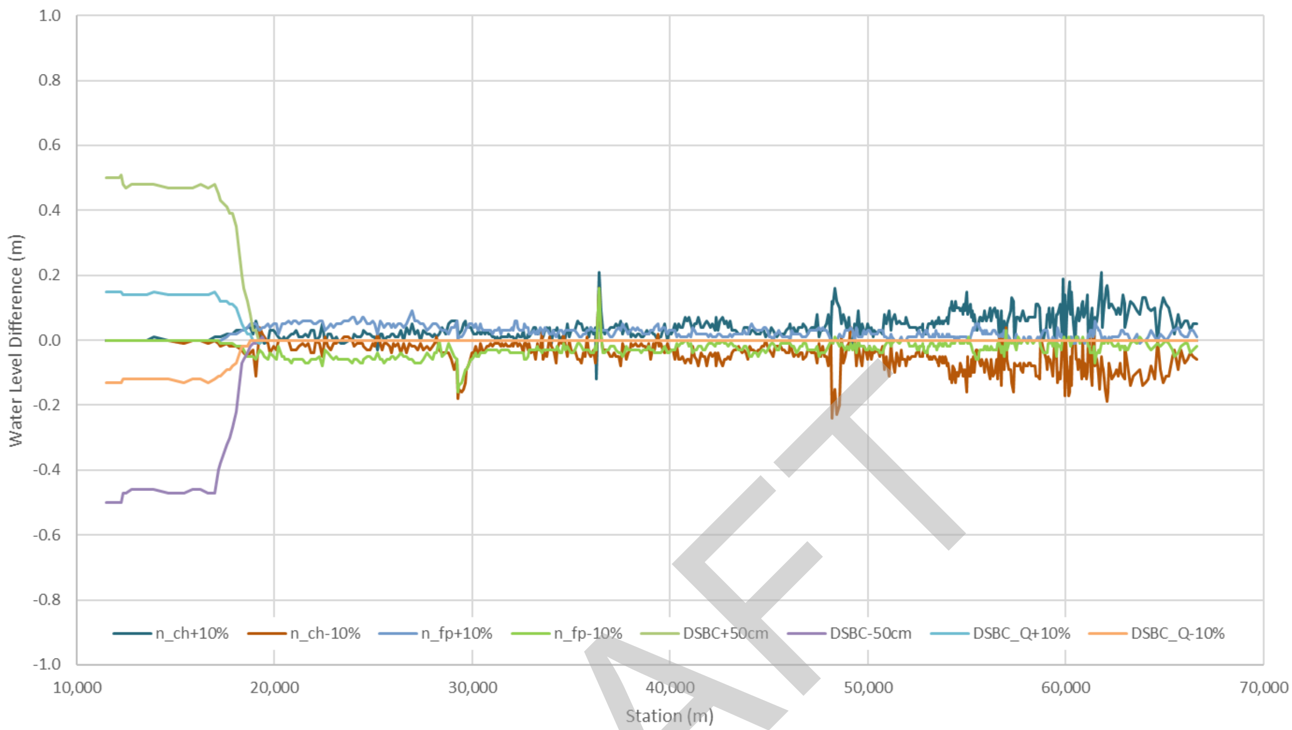

Figure F-3: Sensitivity Analysis – Upper Elbow River

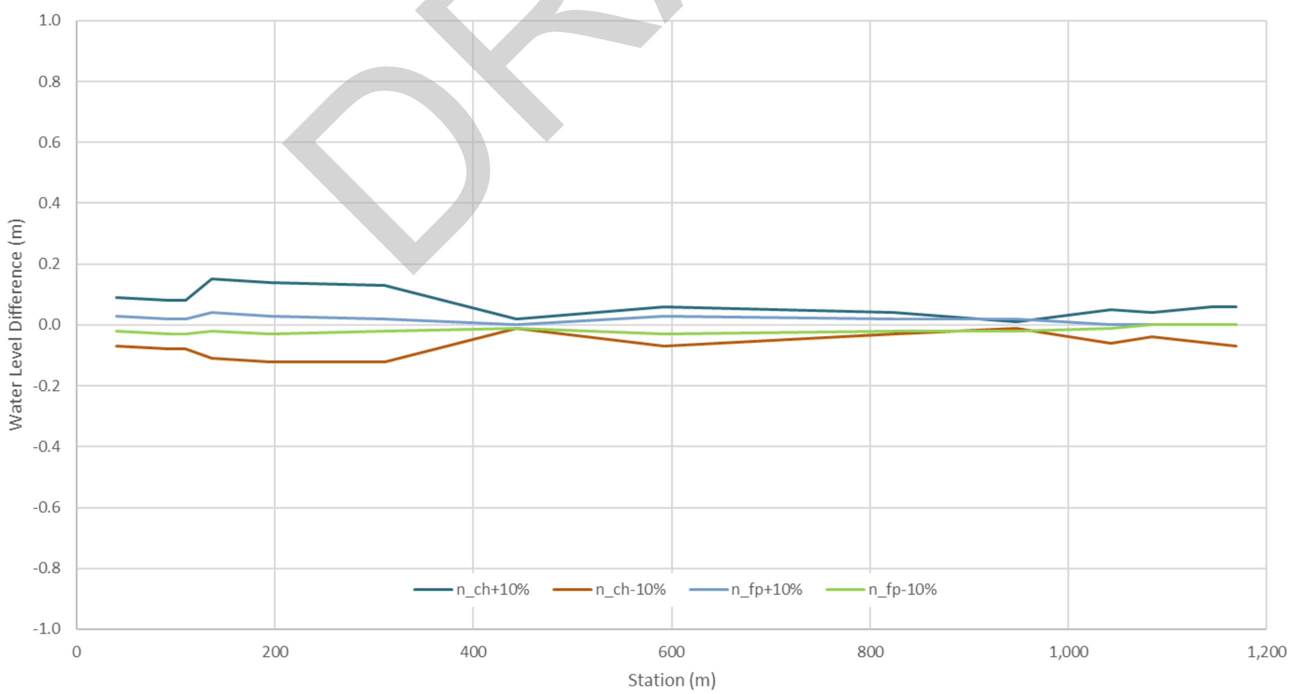

Figure F-4: Sensitivity Analysis – Bragg Creek

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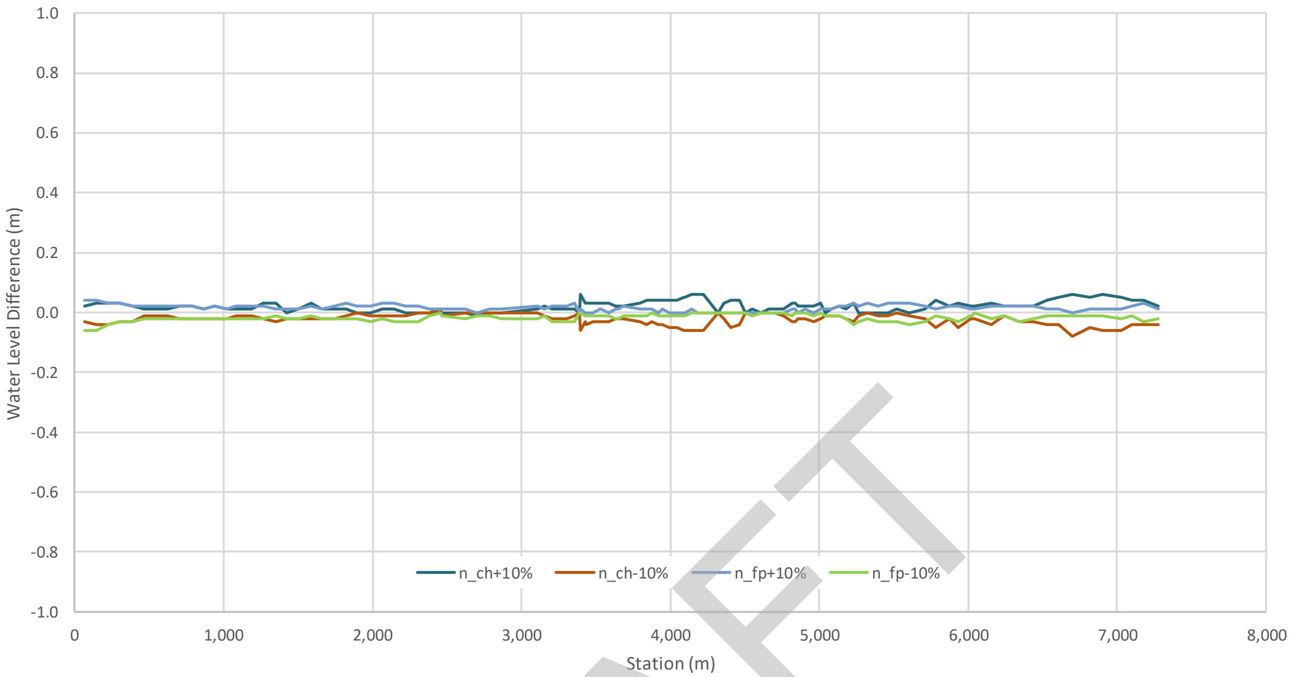

Figure F-5: Sensitivity Analysis – Lott Creek

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