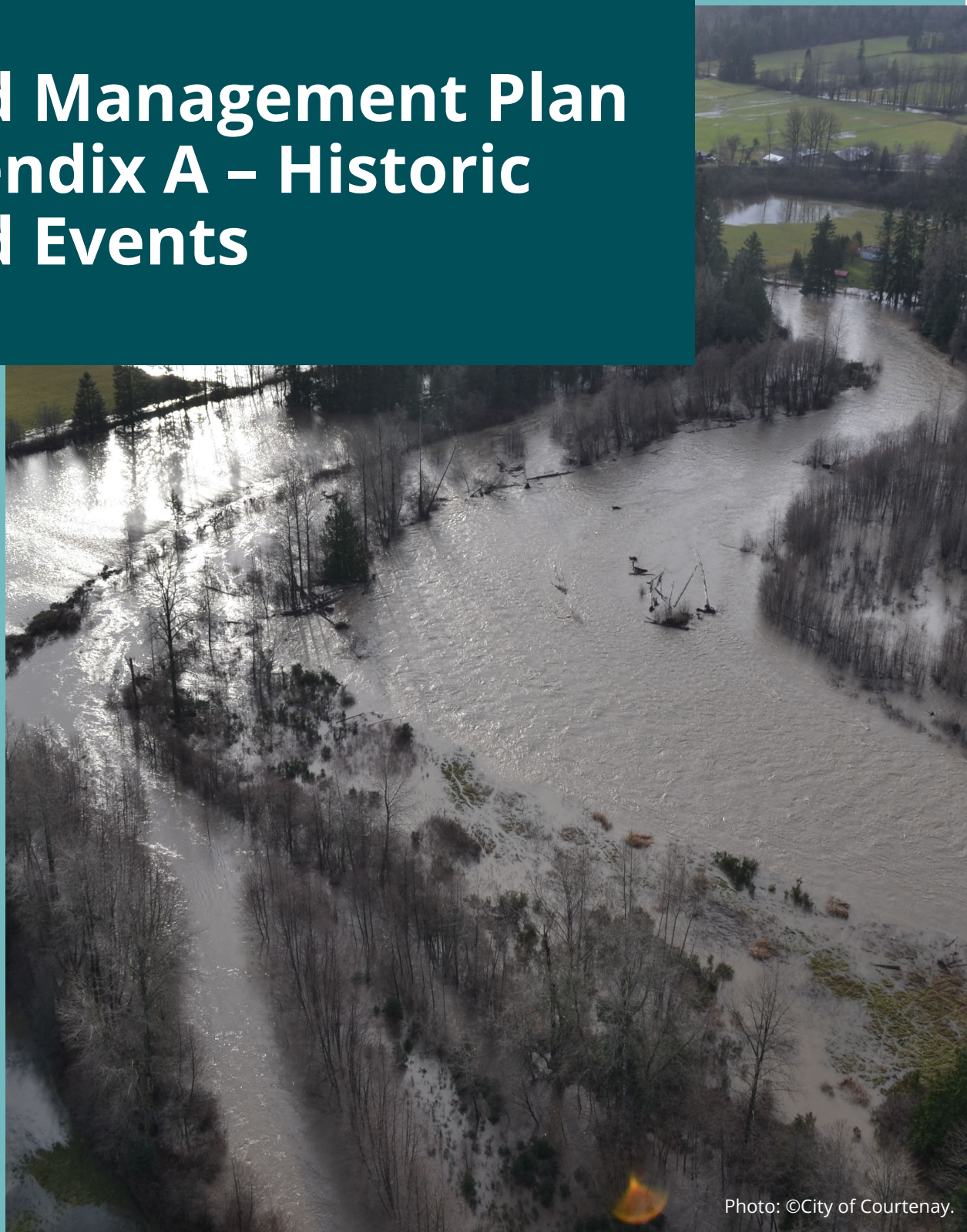
City of Courtenay

Flood Management Plan Appendix A – Historic Flood Events



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1 Introduction

The City of Courtenay (City, Courtenay) initiated a Flood Management Plan project and retained Ebbwater Consulting Inc. (Ebbwater) and its team to conduct this work. The main report (Ebbwater Consulting Inc., 2024) provides information regarding project goals, risk and resilience background, project area background, flood management plan approach, risk assessment results, option analysis, and recommended flood management strategies.

This Appendix A provides supporting information for the project background (Chapter 1), specifically, on historic flood events in the City.

2 Historic Flood Events

Table 1 provides details on historic flood hazard events in the City of Courtenay, which are mentioned in abbreviated form in the main report.

Table 1: Recorded flood events in the Courtenay River Watershed, including estimates of peak daily flows as reported by Water Survey Canada (WSC) for the Puntledge and Tsolum Rivers in cubic meters per second (m^3/s), where available.

Date	Puntledge River Peak Daily Flow[1]	Tsolum River Peak Daily Flow[2]	Description and Source
October 13, 1905	Not recorded	Not recorded	9 m of dike failed near floodgates on Comox Road. *Source: The Daily Columbian, October 11, 13, and 14, 1905; Victoria Daily Colonist, October 13, 1905; (Kerr Wood Leidal Associates Ltd., 2021)*
February 1, 1935	Not recorded	Not recorded	Flow records indicate that a moderate flood occurred on the Puntledge River. Reports that Lewis Park was under about 1 m of water and that log debris collected on Condensory Road bridge resulting in the collapse of the bridge. *Source: The Daily Colonist, January 31, February 1, 2, and 3, 1935; Saywell 1967 (p. 118); Environment Canada 1991; (Kerr Wood Leidal Associates Ltd., 2021)*
November 15, 1939	Not recorded	Not recorded	Flood waters rose rapidly during the night of the 14th and peaked on the 15th just before a high tide of 1.32 m geodetic, which crested at 11:00 am. Southeast gale-force winds accompanied the heavy rain, which set a precipitation record of 83 mm in 24 hours on the 15th. Newspapers reported that residents found this flood to be more severe than the 1935 flood. *Source: The Daily Colonist, November 18 and 26, 1939; The Vancouver News-Herald, November 18 and 21, 1939; December 2, 1939; Comox District Free Press, November 16, 1939; The*

Date	Puntledge River Peak Daily Flow[1]	Tsolum River Peak Daily Flow[2]	Description and Source
			Zeballos Miner, November 18, 1939; Environment Canada 1991; (Kerr Wood Leidal Associates Ltd., 2021)
December 7-8, 1939	Not recorded	Not recorded	The second flood in 3 weeks occurred along the Courtenay River, however, the maximum stage did not reach the levels attained in the November flood. *Source: The British Columbian, December 8, 9 and 11 1939; The Daily Colonist, December 8 and 10, 1939; The Zeballos Miner, December 9, 1939; (Kerr Wood Leidal Associates Ltd., 2021)*
November 28-30, 1941	Not recorded	Not recorded	The Courtenay River flooded "as usual", Lewis Park was submerged and the highway to Sandwick was flooded and closed for transportation. Comox Road was under water in several places and many basements in low-lying areas were flooded. *Source: Comox District Free Press, December 4, 1941 B.C. Ministry of Public Works 1943 (p. T 4, T 7); Environment Canada 1991; (Kerr Wood Leidal Associates Ltd., 2021)*
November 13, 1953	Not recorded	Not recorded	A total of 229 mm of rain in 5 days was measured at Courtenay, with 57 mm falling on the 13th. The storm was accompanied by a 59 km/h southeast wind. From the newspaper accounts. It appears that the 1953 flood was not as high as the 1939 flood. A new dike around Lewis Park was credited for reducing the extent of damage to the Park in comparison to the effects of the 1935 and 1939 floods. *Source: https://www.env.gov.bc.ca/wsd/data_searches/fpm/reports/bc-floodplain-design-briefs/courtenay_puntledge_tsolum.pdf (Kerr Wood Leidal Associates Ltd., 2021)*
November 5-13, 1975	263 m^3/s	170 m^3/s (est.)	Floodwaters caused considerable damage in the Rye Road area, entering homes and businesses in the lowlands north of Ryan Road. Some residents expressed the opinion that the construction of Ryan Road caused higher flood levels in this area. Flooding also occurred along with the approaches to the Condensory Road bridge. Puntledge Park and Lewis Park were heavily inundated. The Courtenay Flats received some floodwaters from the rivers but were not filled as they had been in earlier floods. *Source: https://www.env.gov.bc.ca/wsd/data_searches/fpm/reports/bc-floodplain-design-briefs/courtenay_puntledge_tsolum.pdf (Kerr Wood Leidal Associates Ltd., 2021)*

Date	Puntledge River Peak Daily Flow[1]	Tsolum River Peak Daily Flow[2]	Description and Source
December 26-27, 1980	281 m^3/s	136 m^3/s	Several days of record warm temperatures and heavy rain resulted in very high discharges, especially in the Puntledge basin. The highest record peak inflow to Comox Lake occurred with this event; however, the high flows were not sustained over a long period. The peak instantaneous flow for the Puntledge River also set a record. The Tsolum River flows, however, were not as extreme. *Source: https://www.env.gov.bc.ca/wsd/data_searches/fpm/reports/bc-floodplain-design-briefs/courtenay_puntledge_tsolum.pdf; (Kerr Wood Leidal Associates Ltd., 2021)*
October 25-26, 1982	319 m^3/s	105 m^3/s (est.)	This was not a large flood, but it was associated with a high inflow to Comox Lake. *Source: https://www.env.gov.bc.ca/wsd/data_searches/fpm/reports/bc-floodplain-design-briefs/courtenay_puntledge_tsolum.pdf (Kerr Wood Leidal Associates Ltd., 2021)*
February 11, 1983	246 m^3/s	180 m^3/s	Warm temperature, high winds, and heavy rains of 80.2 mm on the 11th caused flooding along the Tsolum and Courtenay Rivers. In contrast to the 1980 and 1982 flood events, this flood was more extreme in the Tsolum River than in the Puntledge and was similar in some respects to the 1975 event. Dove Creek Road near its crossing of the Tsolum River was overtopped by floodwaters. The Old Island Highway near Ryan Road and the Rye Road area were flooded once again. Water did not, however, inundate the Courtenay Flats on this occasion. The tide was very low at the time when the Tsolum and Puntledge Rivers peaked. *Source: https://www.env.gov.bc.ca/wsd/data_searches/fpm/reports/bc-floodplain-design-briefs/courtenay_puntledge_tsolum.pdf (Kerr Wood Leidal Associates Ltd., 2021)*
March 5, 1987	354 m^3/s	136 m^3/s	No documented newspaper etc. records of this high flow event were found, i.e., it is not known if the peak flows led to flooding. *Source: (Kerr Wood Leidal Associates Ltd., 2021)*

Date	Puntledge River Peak Daily Flow[1]	Tsolum River Peak Daily Flow[2]	Description and Source
November 11-12,1990	324 m^3/s	73 m^3/s	No documented newspaper etc. records of this high flow event were found, i.e., it is not known if the peak flows led to flooding. During that date there were high precipitation events reported in many locations in BC such as Kemano, Hartley Bay, Kildala, Terrace, Pallant Creek and Bella Coola. *Source: (Kerr Wood Leidal Associates Ltd., 2021)*
January 30 - February 3, 1992	345 m^3/s	154 m^3/s	No documented newspaper etc. records of this high flow event were found, i.e., it is not known if the peak flows led to flooding. *Source: (Kerr Wood Leidal Associates Ltd., 2021)*
October 2-10, 1997	285 m^3/s	158 m^3/s	No documented newspaper etc. records of this high flow event were found, i.e., it is not known if the peak flows led to flooding. *Source: (Kerr Wood Leidal Associates Ltd., 2021)*
December 24-26, 2005	236 m^3/s	140 m^3/s	No documented newspaper etc. records of this high flow event were found, i.e., it is not known if the peak flows led to flooding. *Source: (Kerr Wood Leidal Associates Ltd., 2021)*
November 12-19, 2009	303 m^3/s	220 m^3/s	Major frontal weather system, with heavy rain. Water level at 5th Street Bridge measured at 3.154 m which is roughly equivalent to the 5% AEP water level. State of emergency declared in Courtenay, B.C in response to major flooding. *Source: https://bc.ctvnews.ca/state-of-emergency-declared-in-courtenay-b-c-1.454838 ; (Kerr Wood Leidal Associates Ltd., 2021)*
January 14-16, 2010	378 m^3/s[#]	155 m^3/s	High flow in Browns, Tsolum and Puntledge Rivers, due to heavy rain and unseasonably warm weather (snow melt). Water level at 5th Street Bridge measured at 3.096 m. State of emergency declared in Courtenay, B.C in response to major flooding. *Source: https://bc.ctvnews.ca/state-of-emergency-declared-in-courtenay-b-c-1.472952 ; (Kerr Wood Leidal Associates Ltd., 2021)*

Date	Puntledge River Peak Daily Flow[1]	Tsolum River Peak Daily Flow[2]	Description and Source
December 24, 2010	157 m^3/s	256 m^3/s	Prior to the event, some localized flooding had already occurred across Vancouver Island. The City of Courtenay experienced high water levels in the Courtenay, Tsolum and Puntledge Rivers, but no evacuations were ordered. Water level at 5th Street Bridge measured at 3.002 m. The City issued a flood alert, warning people about the potential for flooding for the next several days because of a combination of heavy rain, rising freezing levels, melting snow and high tides. *Source:* *https://www.thespec.com/news/canada/2010/12/24/b-c-coast-hit-by-wild-wet-weather.html ; (Kerr Wood Leidal Associates Ltd., 2021)*
December 8-10, 2014	359 m^3/s	258 m^3/s*	Over 200 mm of rain fell in the Comox Lake watershed, in combination with high tides. This resulted in flooding along the Courtenay River. The event flooded Lewis Park, closed the Lewis Park recreation center, several roads and the 5th Street Bridge and resulted in damage to commercial properties. The water level exceeded the dike crest in multiple locations and the East Bank of the Courtenay River was overtopped. The City of Courtenay declared a state of emergency (Evacuation Alert and Evacuation Order). This event has led to most flood impacts in recent years. *Source: https://www.courtenay.ca/EN/meta/news/news-archives/2014-archives/flood-update-wednesday-december-10-7-45-pm.html ; (Kerr Wood Leidal Associates Ltd., 2021).* City of Courtenay (Operations) communications (2024).
November 3-9, 2016	333 m^3/s	227 m^3/s	Heavy rain resulted in high flows in the Courtenay River. This triggered the City of Courtenay to install temporary flood protection in the form of Aqua Dam along the Old Island Highway and Comox Road to reduce the potential of flooding to properties in the Puntledge Business District. Some flood impacts occurred due to minor flooding on roadways attributed to storm sewer system surcharge, and floodwaters reached below the crest. *Source:* *https://www.cbc.ca/news/canada/british-columbia/vancouver-island-state-of-emergency-flood-warnings-1.3838154* *(Kerr Wood Leidal Associates Ltd., 2021). City of Courtenay (Operations) communications (2024).*

Date	Puntledge River Peak Daily Flow[1]	Tsolum River Peak Daily Flow[2]	Description and Source
November 17, 2020	78 m^3/s (92 m^3/s on November 16)	58 m^3/s	Powerful winds and high tides raise flooding concerns as storm sweeps across B.C. The system arrives at the same time as unusually high tides, raising the potential for flooding and prompting cities such as Courtenay to issue storm surge advisories or install portable flood barriers along low-lying areas. *Source: https://vancouverisland.ctvnews.ca/powerful-winds-high-tides-raise-flooding-concerns-as-storm-sweeps-across-b-c-1.5192493. (Kerr Wood Leidal Associates Ltd., 2021)*
October 25-26, 2021	220 m^3/s	161 m^3/s	Atmospheric river event – intense precipitation. In Courtenay, some flood impacts occurred due to minor flooding on roadways attributed to storm sewer system surcharge, and floodwaters reached within below the crest. Flood impacts were however not as substantial as in 2014, or in other parts of the Province during the 2021 atmospheric river event. *Source: City of Courtenay (Operations) communications (2024).*

Notes:
[1] From recorded flows at WSC hydrometric station 08HB006 Puntledge River at Courtenay, from WSC timeseries (available until 2022 at time of processing (July 2024). and also as noted in 2021 Coastal Flood Mapping Project (Kerr Wood Leidal Associates Ltd., 2021).
[2] From recorded flows at WSC hydrometric station 08HB011 Tsolum River near Courtenay, from WSC timeseries (available until 2022 at time of processing (July 2024). and also as noted in 2021 Coastal Flood Mapping Project (Kerr Wood Leidal Associates Ltd., 2021).
Maximum flood of record for Puntledge River with peak inst. Flow of 378 m^3/s on Jan 11, 2010.
* Maximum flood of record for Tsolum River with peak inst. flow of 327 m^3/s on Dec 9, 2014.

3 References

Ebbwater Consulting Inc. (2024). Ebbwater Consulting Inc. (2024). City of Courtenay Flood Management Plan. Prepared for the City of Courtenay.

Kerr Wood Leidal Associates Ltd. (2021). CVRD - Coastal Flood Mapping Project - Final Report. Prepared for Comox Valley Regional District.