

NHC Ref. No. 3005607

28 July 2020

Regional District of East Kootenay

19-24th Avenue

Cranbrook, BC

V1C 3H8

Attention: **Brian Funke**
Engineering Services Manager

Copy to: **Kara Zandbergen**

Via email: bfunke@rdek.bc.ca

Re: **Macaulay Creek May 31 2020 Turbidity Event**
June 1st Overflight Observations

Dear Mr. Funke:

This report provides a brief assessment of the increased turbidity witnessed at Lake Baptiste during the 2020 May 31st flood events.

On May 31 2020, 38 mm of rain fell at the Redstreak rain gauge in Radium¹ following two days of extremely hot weather. This led to substantial snowmelt, clearwater flooding, and mass wasting events throughout the region. A more in depth discussion of this event and the infrastructure damage it caused near Fairmont Hot Springs was provided in NHC (2020). This document focuses on the increased turbidity in Lake Baptiste that occurred during this event.

Lake Baptiste is a reservoir approximately 2 km southeast of Edgewater, BC. It is dammed on its north edge and has a drinking water intake on its northwest corner. Water enters the reservoir from the north east through an uncontrolled diversion on Macaulay Creek. The provincial Freshwater Atlas Database shows a stream channel running into the south end of the reservoir, but this is not visible from aerial photographs or satellite imagery of the area. NHC conducted an aerial survey of the reservoir and Macaulay Creek watershed on 2020 June 1st, in the aftermath of the regional flood and debris flow events.

Turbidity increased in the reservoir and at the reservoir intake during the flood events (**Photo 1**), leading to a one month long boil-water notice issued to the residents of Edgewater by the Regional District of the East Kootenay (RDEK). The reservoir was visibly more turbid along its east side and most turbid at the north east corner where water enters from the Macaulay Creek diversion. There are no additional

¹ The Redstreak rain gauge is operated by Kootenay National Park and located 8 km south of Lake Baptiste.

channels that enter the reservoir visible from the aerial photographs or satellite imagery. While there was likely some local erosion of the road network and its associated drainage structures surrounding the reservoir, we attribute the primary source of reservoir turbidity to Macaulay Creek.

The aerial survey covered the entire watershed of Macaulay Creek. There were some small mass wasting events on the hillslopes in the upper watershed (**Photo 2**) - mostly associated with spring avalanche cycles - but none of these were coupled to a stream channel. Localized erosion (**Photo 3**) and deposition (**Photo 4**) was observed along stream channels in between the upper hillslopes and the diversion intake, but there was no evidence of the channel being affected by large mass wasting events such as debris flows or debris floods. We therefore attribute the source of reservoir turbidity to sediment entrained from the channel banks and bed in the Macaulay Creek stream network as water levels rose during the flood event.



Photo 1 **Turbidity at the Lake Baptiste Water Intake on 2020 June 1. The reservoir was more turbid on the east (left in this photograph) side, and most turbid at the north east corner, where water enters from the Macaulay Creek diversion.**



Photo 2 Hillslopes in the upper watershed of Macaulay Creek. A small mass wasting event can be seen in the avalanche gully on the right side of the frame, but this was not coupled to the stream channel network and we therefore do not consider it a source of reservoir turbidity.



Photo 3 Photo showing localized erosion and incision of the Macaulay Creek channel. We attribute the reservoir turbidity to sediment entrained during clearwater flooding as water levels rose along the banks of the creek during the flood event.



Photo 4 **Localized sediment deposition along stream channels in the Macaulay Creek Watershed. No evidence of debris flows or debris floods were observed in the watershed.**

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Closing Statement

Thank you for providing us the opportunity to conduct this assessment of the Macaulay Creek May 31 2020 Turbidity Event. Please do not hesitate to direct any further questions to either Matt Henn or Andre Zimmermann (mhenn@nhcweb.com | azimmermann@nhcweb.com).

Sincerely,

Northwest Hydraulic Consultants Ltd.

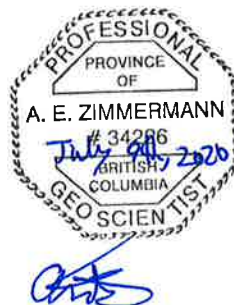
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Principal Geomorphologist

References

NHC (2020), Fairmont Creek Debris Flood Mitigation: Construction Completion Document, Final Report, Prepared for Regional District of East Kootenay by Northwest Hydraulic Consultants Ltd., North Vancouver, BC, pp. 80.