



Fairmont Creek 2019 Annual Dike Inspection Report

Background

2012

Fairmont Creek experienced a significant debris flow event on July 15, 2012 which deposited approximately 65,000 m³ of debris in the creek channel, over the debris fan and along subdivision roadways and drainage ditches. Disaster Financial Assistance funds were used to reconstruct the previously existing section of dike and protected bank just below Marble Canyon. This work was completed by April 2013. In addition to reconstructing the creek channel and protecting the bank, a series of nine grade controls were constructed along this section. The engineering consultant for this work was Kerr Wood Leidal and the contractor was Max Helmer Construction.

After the 2012 debris flow, Emergency Management BC (EMBC) funds were obtained to have a debris flow hazard and risk assessment completed on Fairmont Creek. Clarke Geoscience was retained for the assessment. It was completed in January 2013 and included a series of recommendations that could be implemented to help mitigate debris flow risk.

2013

On June 20, 2013, Fairmont Creek experienced another debris flow event caused by a significant rain event on saturated soils. The magnitude of this event was approximately 6,000 m³ and the material was mostly contained in the channel and the golf course pond. The golf course pond, a few sites along the creek channel and material impacting the time share condominiums were cleaned out and repaired through EMBC Emergency Response funding. The newly constructed bank protection was not damaged in the event but six of the nine grade controls were significantly damaged or completely destroyed.

The RDEK commissioned an overview inspection of Fairmont Creek following the 2013 event. The inspection and report were funded through EMBC, and completed by Clarke Geoscience. The inspection occurred on July 29, 2013 and confirmed the findings of the January 2013 Debris Flow Hazard and Risk Assessment, which states that unlimited material available for mobilization exists in the Fairmont Creek watershed and can mobilize given the right conditions.

2014 - 2015

In 2014, the RDEK was awarded funding through the Building Canada Fund Flood Protection Program for Phase 1 of the Fairmont Creek Debris Flow Mitigation Project. Engineering for this work was completed in Fall of 2014 and construction was completed in early May 2015. The project included widening the

creek through the golf course to the pond in order to increase storage capacity. The banks were sloped appropriately and armoured and berms were constructed on both sides of the creek to further contain material in the event of a debris flow. The engineering consultant for this work was Urban Systems and the contractor was Max Helmer Construction.

2016

In 2016, the RDEK was awarded additional funding through the EMBC Flood Protection Program in order to complete Phases 2 and 3 of the Fairmont Creek Debris Flow Mitigation Project. Phase 3 consists of the installation of a weather station at the ski hill and was completed in November 2016. The weather station will be used to develop an early warning system for the community.

2017-2018

On May 12, 2017, a small amount of debris came down Fairmont Creek to the debris trap pond. An estimated 1,200 m³ of debris material was deposited in the pond and additional debris was deposited upstream along the creek bed. Removal of the debris was planned for 2019 following completion of the Fairmont Creek Debris Flow Project Phase 2 works. This was not completed because of the costs associated with the August 12, 2019 event (see below). It will be completed when funding permits. The extensive debris storage that was constructed upstream on Fairmont Creek makes this work less urgent.

Phase 2 of the Fairmont Creek Debris Flow Mitigation Project involved the construction of two large sediment basins containing three large riprap weirs upstream of the Fairmont Hot Springs Resort. Construction was started in September 2017 and was completed Fall 2018 and has added approximately 17,000 cubic metres of debris capture and storage capacity.

2019

On August 10-12, 2019, a significant weather event (isolated heavy rain) occurred in the Fairmont area. As a result, a debris flood occurred on Fairmont Creek and the uppermost of the three newly constructed debris traps was filled to capacity (1,225 cubic metres). Minor erosion between the first and second weir deposited a small amount of material in front of weir #2. There was moderate erosion in the channel below the second weir with material being deposited between the area of erosion and the third weir. The weirs successfully contained the debris flood material originating from above the project area and prevented it from being transported downstream.

May 8, 2019 Fairmont Creek Dike Inspection

An inspection was completed on May 8, 2019 and was conducted by Kara Zandbergen, RDEK Engineering Technician. All sections of the dike were found to be in good condition with no appreciable changes from 2018.

All photos were taken on May 8, 2019 unless otherwise noted.



Photo 1: Downstream extent of the dike and bank protection works at the entrance to the debris pond. The unusual colouring in the creek channel and on the deposited material at the entrance to the pond is due to minerals from the hot spring water that form a crust on the channel material over time.

The following photos show the Fairmont Creek Debris Flow Mitigation Project Phase 2 works starting from the upstream extent and working downstream.



Photo 2: The uppermost weir in the system, Weir #1, is in the foreground; Weir #2 is seen in the background.

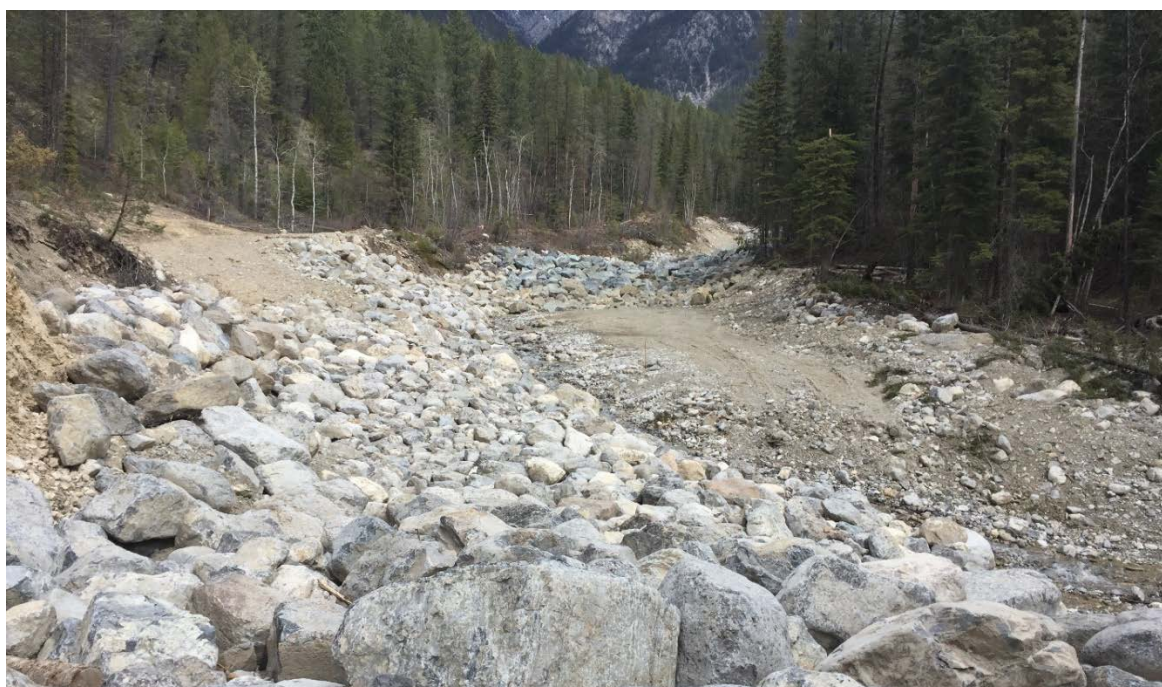


Photo 3: Looking upstream at Weir #2 from the bank armoring below.



Photo 4: Weir #2 in the foreground with bank armoring in the background.



Photo 5: Weir #3 with bank armoring slightly past it.



Photo 6: Bank armouring below Weir #3.

August 20, 2019 Fairmont Creek Dike Inspection

Another inspection was completed on August 20, 2019 after the August 12, 2019 debris flood and was also conducted by Kara Zandbergen, RDEK Engineering Technician.



Photo 7: Weir #1, looking downstream. The storage area upstream of the weir was filled to capacity with approximately 1,225 cubic metres of debris flood material.



Photo 8: Weir #2, looking downstream. There is a small amount of material in front of the weir that was eroded between weirs #1 and #2.



Photo 9: Bank protection downstream of Weir #2. Note the eroded channel below the protected bank. This material was transported downstream.



Photo 10: Weir #3, Looking downstream. There is a small amount of material deposited in front of the weir that came from the eroded channel upstream.



Photo 11: Looking upstream from the cart path bridge (upper extent of the Phase 1 works). No appreciable change from 2018.



Photo 12: Looking downstream from the cart path bridge. No appreciable change from 2018.



Photo 13: Right hand berm. The berm is in good condition.



Photo 14: Left hand berm. The berm is in good condition.



Photo 15: Looking downstream. The berms and bank protection on both sides are in good condition.



Photo 16: Entrance to the debris pond. There is a very small amount of locally eroded material recently deposited.

Upstream and Downstream Conditions

Upstream Conditions

The section of Fairmont Creek immediately above the bank protection works is experiencing minor bank erosion that could be caused by water surges from flushing the Fairmont Hot Springs Resort (FHSR) large swimming pool into Fairmont Creek. The volume of water released is significant over a short period of time and could be weakening the bank structure that could result in added material generated in a debris flow.

Downstream Conditions

The Ministry of Transportation and Infrastructure (MoTI) has increased the culvert capacity at two locations along Fairmont Creek:

1. At the creek crossing of Columbia River Road
2. At the creek crossing of Fairmont Creek Road

Both locations have had larger and twinned culverts installed. All culverts were in proper working order at the time of inspection.

2019 Maintenance

A significant amount of maintenance was completed in 2019, all in response to the August debris flood. The work was completed in November and December, 2019 by Ralph Stewart Contracting. All instream works were authorized under Section 11.

As noted above, the uppermost debris trap was filled to capacity. Approximately 1,225 cubic metres of debris was removed from the trap and access to the upper weirs was improved. EMBC has approved funds to assist with the debris removal. The work was completed in November and December, 2019 by Ralph Stewart Contracting.



Photo 16: Weir #1 basin cleared of debris. December 9, 2020.

Excess easily erodible material was removed from downstream of Weir #2. This was completed to prevent this material from being transported downstream and taking up storage space in front of Weir #3. This work was funded under the Fairmont Creek Debris Flow Mitigation Project Phase 2 grant from EMBC. Approximately 1,450 cubic metres of material was removed.



Photo 17: Creek channel below Weir #2. December 9, 2019.

Maintenance Planned for 2020

At this time, the RDEK does not have any maintenance work on the dikes or debris flood infrastructure planned for 2020.

In 2020, the RDEK will be working with the Fairmont Hot Spring Resort to establish statutory rights of ways for all of the works that have been constructed over the last several years. Discussions have already been initiated and this work has been included in the 2020 budget.