



Cold Spring Creek 2020 Annual Dike Inspection Report

Background

2013

Cold Spring Creek experienced a small debris flow event on June 20, 2013 that deposited material in the creek channel, the small mid-section debris trap and the lower debris trap. Debris material was also deposited behind the Cold Spring Creek Dam which is located upstream of the works. The Cold Spring Creek Dam is not part of the debris containment works and is not owned by the RDEK but debris is contained in the reservoir.

Material removals in 2013 were completed at the Cold Spring Creek Dam reservoir, small mid-section debris trap along the bank protection works, at the last culvert along the bank protected section and in the upstream half of the lower debris trap. All these locations were cleared of transported gravel from the debris flow and the front half of the lower debris trap was also cleared of material that had been deposited over several years. The funding for removal of the transported debris flow material was primarily from Emergency Management BC (EMBC) emergency response funds. The RDEK provided some funds for additional material removal on the lower debris trap.

2015

The July 15, 2012 Fairmont Creek debris flow and June 20, 2013 debris flow events on Fairmont Creek and Cold Spring Creek prompted the need to have a hazard and risk assessment completed for Cold Spring Creek. This assessment was completed by Clarke Geoscience in January 2015 and included some recommendations for debris flow mitigation along the channel.

2016

The downstream half of the lower debris trap and the culvert just upstream of the debris trap was cleared of sediment in August 2016 by the RDEK.

Some vegetation was removed around the debris pond in 2016 prior to the pond clean out to reduce the spread of noxious weeds.

2017

The Cold Spring Creek Dam reservoir was cleaned out again in May 2017 after a small debris flow event that completely filled the reservoir with debris flow material.

2018

There were no events on Cold Spring Creek in 2018 and no maintenance was completed on the creek.

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 Cold Spring Creek. The Cold Spring Creek Dam reservoir was filled to capacity, the culverts at the crossings of Fairway Drive and Hot Spring Road were blocked by debris and the creek flowed over the roads and partially through private property before returning to the channel.

The lower debris trap was also filled with debris (gravels and fine grained material). The armouring along the creek channel was not damaged during the event.

2020

On May 20, 2020 there was a small debris flood event that partially filled the reservoir with material. The lower channel was not impacted. On May 31, 2020 there was a significant debris flood event in response to heavy precipitation on snow following a few days of very warm weather. This event filled the upper reservoir to overflowing, caused some damage to the channel, blocked several culvert crossings and filled the lower debris trap. The precipitation event had a 10 year return period, the clear water flood event had a 10 to 20 year return period and the debris flood had a 5 year return period.

2021

On May 24, 2021 there was a significant precipitation event. The event was less intense than the 2020 event but had a longer duration and resulted in sediment being deposited in the Cold Spring Creek Dam Reservoir. The material was removed as soon as practical to restore debris capacity. There was a small amount of material deposited in the lower pond by the maintenance shed.

In 2021, the RDEK was successful in obtaining fund to design and construct a large debris barrier and basin on Cold Spring Creek. This project will take place from 2021 to 2023.

Cold Spring Creek Dike Inspections

An inspection was completed on May 5, 2021 and was conducted by Kara Zandbergen, RDEK Engineering Technician. All sections of the dike were found to be in good condition at that time and ready for freshet. Subsequent inspections were completed after each event, as the cleanup progressed and on October 21.

The infrastructure will be described from upstream to downstream and will include photos for each site showing the condition of the infrastructure pre-freshet, post-event and after clean up (where appropriate).

Upstream Conditions

The channel conditions as far upstream as the Cold Spring Creek Dam are monitored and inspected at the same time as the dike/bank protection works. The dam is owned and operated by the Fairmont Hot Springs Resort. A small amount of material was removed from the reservoir in late 2015/early 2016 by the contractor that was working just upstream of the dam. The dam was cleaned out again in May 2017 after a small debris flow event that completely filled the reservoir with debris flow material and again after the 2020 event.

The dam and reservoir were in good condition during the May 5, 2021 inspection. During the May 24, 2021 event it was approximately 75% filled with debris. The debris was removed from the reservoir immediately after the May 24 event.



Photo 1: Cold Spring Creek Dam Reservoir approximately 75% filled with debris. May 28, 2021.



Photo 2: The reservoir with the debris removed. October 21, 2021.

Culvert Conditions

All of the culverts between the dam and Highway 93/95 were functioning properly at the time of the May 5, 2021 inspection. Additional culvert capacity had been installed by MoTI through the installation of high water culverts at two road crossings.

The water level at the time of the inspection was low and contained in the creek channel however the channel is infilled with debris material and does not have much capacity. Creek avulsion is possible in a moderately high water situation.

The channel from Highway 93/95 to the debris trap (dike/bank protected area) was in good condition. The complete bank protection works were brushed in 2012 is required again.

The last culvert along Cold Spring Creek before the lower debris trap is experiencing some very minor underflow piping. The situation is being monitored. The same culvert was approximately 30% filled with gravels and was cleaned out in August 2016. Both upstream culverts along the bank protected works are in good condition and functioning properly.

The culverts along Cold Spring Creek were well maintained by Mainroad (MOTI contractor) through 2021 and were able to pass the high flows.

Debris Trap Conditions

The upstream half of the debris trap was cleaned out in 2013. Some sediment and gravels had been deposited at the inlet to the pond since that time. The downstream half of the debris trap still had several years of sediment build up. The inlet to the pond and the lower half of the pond were both cleaned out in August 2016. The trap was cleaned again during the fall of 2019 and after the 2020 event.

The debris trap was in good condition during the April 23 inspection. The trap was filled to capacity during the May 31, 2020 event and was cleaned in the fall of 2020.



Photo 3: The lower debris trap, May 5, 2021.



Photo 4: The lower debris trap after the May 24 event. July 15, 2021. The material deposition was minor and the material was not removed.



Photo 5: The lower debris trap near completion of debris removal. December 4, 2020.

Lower Channel Conditions

The lower channel was in good condition during the May 5 and October 21 inspection. Vegetation removal should be completed.



Photo 6: Channel immediately upstream of the lowest culvert. October 21, 2021.

2021 Maintenance

Maintenance completed in 2021 was in response to the May 24 debris flood. This work was paid for with a combination of EMBC emergency funding and Fairmont Flood and Landslide Service area reserves.

The Cold Spring Creek debris flood infrastructure has been filled to capacity a number of times over the past several years. After the 2019 event, the RDEK asked Northwest Hydraulic Consultants to assess the creek and provide a conceptual design and cost estimate for additional debris flood mitigation on the creek. This report was used to apply for funding under the UBCM CEPF 2019 Structural Flood Mitigation funding stream. The funding application was successful.

McElhanney Ltd was retained for the engineering design and construction management of the debris flood mitigation project. As part of their proposal, they included BGC Engineering to complete an updated hazard assessment for the creek. The outcome of that assessment was that Cold Spring Creek has a significant large debris flow hazard. With this in mind, the project changed direction from debris flood to debris flow mitigation and a debris net is currently being designed.

In early 2021, the RDEK submitted an application to the Adaptation, Resilience and Disaster Mitigation funding program and was successful in obtaining funding to design and construct a large debris barrier and basin on Cold Spring Creek. The CEPF funding is going to be put towards the large project to maximize risk reduction for the community. The engineering contract for this project has been awarded to McElhanney and the design began in 2021. The project will continue through to the end of 2023.

Maintenance Planned for 2022

Work planned for the 2022 will be associated primarily with the large project described above.