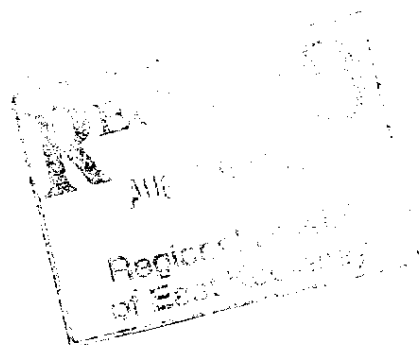


August 9, 1999

Our File: 35329

Regional District Of East Kootenay
% J E Farrell & Associates Inc.
5025 Delmonte Avenue
Victoria, BC
V8Y 1W7



Attention: Ms. Lee-Ann Crane
Administrator

Dear Ms. Crane:

RE: Flood Protection Works Inspection – Coldspring Creek at the Water Supply Dam

Cochrane Engineering Ltd. was engaged to undertake an inspection of the debris flow control works on Cold Spring Creek at the water supply dam for Fairmont Hot Springs Resort Ltd. The dam acts as a part of the debris control works as a debris trap. The dam was originally designed and constructed to store water for diversion to the resort. The dam also functions as a debris trap and requires periodic cleaning to restore its capacity.

On June 10, 1999 we carried out an inspection of the Cold Spring Creek at the water supply dam. A visual inspection of the works was undertaken to verify their integrity and ability to provide ongoing protection. As a result series of photographs and notes were made during the inspection and these are summarized here.

There are three areas where concern may arise in relation to the dam. The first is the downstream face of the dam. The second is the capacity of the dam to hold debris and the third is a potential overflow point upstream of the dam.

The dam appears to have been overtopped by flood flows at some time, resulting in erosion of the soils from the downstream face of the dam. **Photo 1** shows the exposed downstream face of the dam. A detailed stability assessment or review of the design of the dam to verify safety factors has not been undertaken at this time. However, the size of the trees and vegetation on the ground surface in this area tends to indicate that there is a degree of stability associated with the current situation. We recommend that the backfill along the downstream face of the dam be replaced.

**Flood Protection Works Inspection
Coldspring Creek at the Water Supply Dam**



Photo 1, Coldspring Creek Dam

The reservoir has been dredged out recently, perhaps last year and there is capacity in the reservoir to receive and to contain a debris flow. The reservoir can be seen in **Photo 2**. We believe that the bank, on the right of the photo, is composed of material previously removed from the reservoir and can be excavated to provide more capacity within the reservoir. The upstream end of the reservoir has an amount of deposition which will require removal in future as more material accumulates. The removal of material would be a part of the ongoing maintenance program for the reservoir.

The channel upstream of the dam has been identified by MOE staff as having the potential to overflow which would allow debris flows to leave the creek channel. We have visually inspected the area upstream of the dam and can find only a single area which could have this potential. At this location the north bank of the channel is lower than the bank either upstream or downstream. The longitudinal slope of the creek is visibly steeper than the overbank at this location which results in a tendency for flows to remain within the channel. If debris flows were to escape the channel, there would be an accumulation of deposited material and a resulting tendency to return to the creek channel. If this continues to be an issue with MOE, a small amount of rock fill can be placed to increase the depth of the north channel bank at this location.

**Flood Protection Works Inspection
Coldspring Creek at the Water Supply Dam**



Photo 2, Coldspring Creek Reservoir

At this time we recommend only removal of material from the reservoir as part of a continuing maintenance program for the reservoir.

If you have any questions or comments, do not hesitate to contact this office.

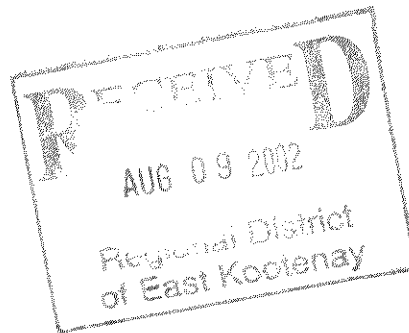
Yours truly,
COCHRANE ENGINEERING LTD.

J. M. K. (Jim) Dumont, P. Eng., P. Ag.
Group Manager, Civil Engineering

JD/

August 9, 1999

Regional District Of East Kootenay
% J E Farrell & Associates Inc.
5025 Delmonte Avenue
Victoria, BC
V8Y 1W7



Our File: 35329

Attention: Ms. Lee-Ann Crane
Administrator

Dear Ms. Crane:

RE: Flood Protection Works Inspection – Coldspring Creek

Cochrane Engineering Ltd. was engaged to undertake an inspection of the debris flow control works on Coldspring Creek downstream of Highway 93 to the debris collection pond adjacent to the Columbia River at Fairmont Hot Springs Resort Ltd. This reach of Coldspring Creek has been modified to allow the free passage of debris flows into a debris trap adjacent to the Columbia River. The debris trap will prevent outflows of debris into the Columbia River. A layer of stone rip rap has been placed in the channel to prevent erosion and degradation of the channel.

On June 10, 1999 we carried out an inspection of the Coldspring Creek downstream of Highway 93 to the debris collection pond adjacent to the Columbia River. A visual inspection of the works was undertaken to verify their integrity and ability to provide ongoing protection. As a result series of photographs and notes were made during the inspection and these are summarized here.

The channel appears to be stable functioning as it was designed. Along portions of the channel, there has been a placement of soil on the rip rap of the south bank. This soil and resulting grasses will not decrease the functionality of the channel. The condition of the channel can be seen in **Photo 1** and **Photo 2**.

**Flood Protection Works Inspection
Coldspring Creek Downstream of Highway 93**



Photo 1, Coldspring Creek downstream of Highway 93

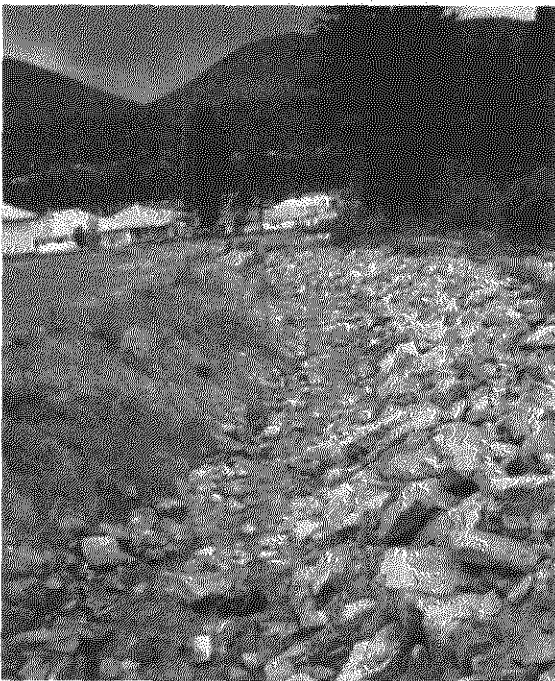


Photo 2, Coldspring Creek at Riverside Golf Course

**Flood Protection Works Inspection
Coldspring Creek Downstream of Highway 93**

The debris trap adjacent to the Columbia River is almost free of sediment and debris accumulation. **Photo 3** shows the general condition of this facility.

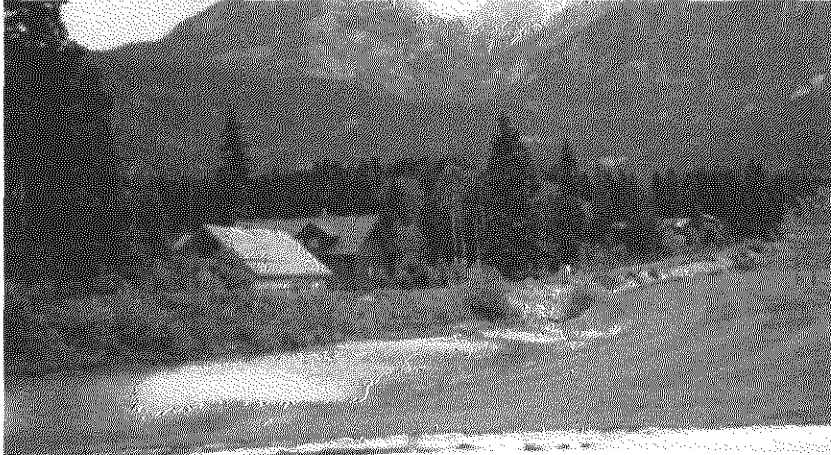


Photo 3, Coldspring Creek Debris Trap

At this time we recommend only continued monitoring of this system which includes Coldspring Creek downstream of Highway 93 and the debris trap adjacent to the Columbia River.

If you have any questions or comments, do not hesitate to contact this office.

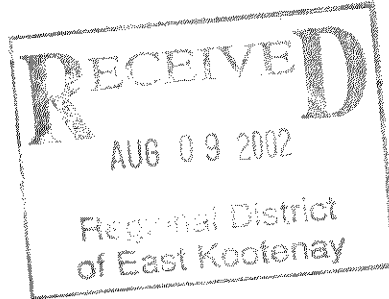
Yours truly,
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J. M. K. (Jim) Dumont, P. Eng., P. Ag.
Group Manager, Civil Engineering

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5025 Delmonte Avenue
Victoria, BC
V8Y 1W7



Our File: 35329

Attention: Ms. Lee-Ann Crane
Administrator

Dear Ms. Crane:

RE: Flood Protection Works Inspection – Fairmont Creek

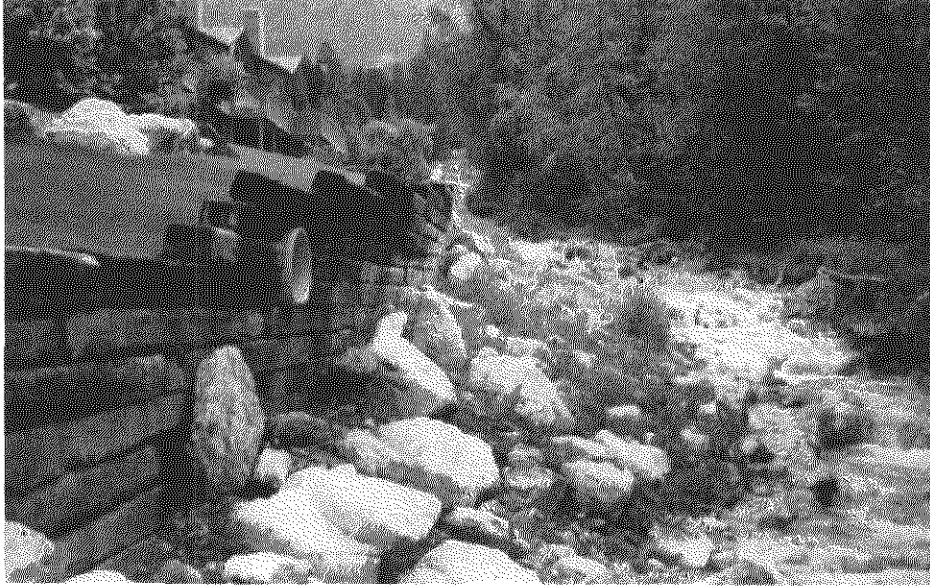
Cochrane Engineering Ltd. was engaged to undertake an inspection of the debris flow control works on Fairmont Creek at the Fairmont Hot Springs Resort Ltd. The debris control works were originally designed and constructed to convey any debris flows past the adjacent development to an area downstream.

On June 10, 1999 we carried out an inspection of the Fairmont Creek Debris Flow works located upstream of the golf course. A visual inspection of the works was undertaken to verify their integrity and ability to provide ongoing protection. As a result series of photographs and notes were made during the inspection and these are summarized here.

Since the construction of the retaining walls two notable features have developed. The first is the deposition of a calcareous encrustation on the bed of Fairmont Creek. This is occurring as the flow from the hot springs is cooled as it passes down the creek. This solid encrustation tends to stabilize the bed of the creek throughout this reach.

The second, and more problematic, occurrence has been the tilting of the retaining wall. We speculate that a combination of factors may have lead to the current situation. The watering of the lawns along the top of the wall could have provided the hydraulic pressures, which are acting to push the wall off of a vertical alignment. This may be combined with a poor drainage system or possibly a limited tieback system. A photo of the wall is shown below.

Flood Protection Works Inspection
Fairmont Creek



It can be seen that there is no visible evidence of movement along the bottom rails. The tilting seems to be limited to rails located above the storm sewer outlet.

At this time we recommend that the upper portions of the wall be restored to a vertical position. Further, an adequate drainage system should be placed behind the wall along with appropriate tiebacks.

If you have any questions or comments, do not hesitate to contact this office.

Yours truly,
COCHRANE ENGINEERING LTD.

J. M. K. (Jim) Dumont, P. Eng., P. Ag.
Group Manager, Civil Engineering

JD/