



September 15, 2023

Mr. Pierre Aubin, RPF,
BC Timber Sales, Chinook Business Area
7077 Duncan Street. Powell River, BC V8A 1W1

RE: Mt Elphinstone South Watershed Assessment Phase 1 and 2 Report (July 2023)

Dear Mr. Aubin

Thank you for providing The Sunshine Coast Conservation Association (SCCA) and Elphinstone Community Association (ECA) additional time to comment on the final version of the Mt Elphinstone South Watershed Assessment Phase 1 and 2, released by BCTS July 2023 (Report).

We are concerned about what we feel are some serious shortcomings in the Report. Particularly its risk assessment methodology.

We ask that BC Timber Sales put a moratorium on logging in the recharge areas of Aquifera 560 and 552, until a Water Sustainability Plan (WSP) is developed under the Water Sustainability Act (WSA) that addresses the interests of all stakeholders in this area. We ask that BCTS support our request for a WSP and participate in the planning process.

The SCCA and ECA appreciate BCTS's novel efforts in reaching out to the community to identify the values and the hydrogeomorphic hazards associated with logging to support a new assessment framework, which was also created by the Reports' authors¹ in the midst of undertaking the study and writing this Report. The report correctly identifies many values of interest to downstream communities and adds needed clarity to the Chaster Creek watershed mapping. Our comments on the proposed logging developments and assessment methodology are focused on the Chaster Creek watershed but may also be applicable to the other seven watersheds in the study area, and throughout the Mount Elphinstone aquifer recharge areas.

Our analysis of the data (in this report and other research and sources) leads us to conclude that in order build resiliency against increasing climate change challenges, every effort must be made to reduce anthropogenic risks to the identified downstream community values². This precludes logging of any kind in Mt. Elphinstone watersheds in the near future. The following letter provides an *outline* of how our conclusion was reached based on the information contained in the Report, and supported by current research and data.

¹Watershed Risk Management Framework, Guidance Document, Revision 1.0. Prepared for BC Timber Sales, Chinook & Strait of Georgia Business Area. March 2022

² Community values include human safety, private property, public property (Chaster Hall, roads, utilities), water rights & use, agricultural land use, salmonids and habitat.

Study Methodology: Partial v. Full Risk Assessment

We are concerned that if the recommendations in this report are implemented, they would have profoundly negative effects on residents, and local governments in our area. And may set a negative new precedent for forest management in BC.

Mt Elphinstone South Watershed Assessment Phase 1 and 2, released by BCTS July 2023 (Report) is predicated on the concept of “risk analysis” which, in Section 2, defines the hazards³ resulting from logging coupled with climate change into low, moderate and high risk categories. The analysis and ratings are based on the author’s qualitative assessment of the likelihood of a hazard occurring and the likelihood of the hazard affecting a given “element-at-risk” or value. (Table 2.2, Vol. 1, page 8).

This methodology is incorrectly described as a *partial risk assessment* because it neglects to assess the consequences of the loss of the element-at-risk on those being affected.

This may seem like a painstaking critique, but in the world of risk assessment, the term risk has a well established definition. As this Report and many other definitions of risk state: Risk calculation is a formula. A combination of the probability of the occurrence of harm and the severity of that harm. $\text{Probability} \times \text{Consequences} = \text{Risk}$.

However, in this report “partial risk” only considers the probability of the event occurring and the probability that it would affect the element-at-risk. It does not assess the consequences of the effect. Consequently, “partial risk” is not describing a true risk assessment. Not even a partial one. It is merely an assessment of the probability of a hazard affecting downstream values.

Knowing the probability of a hazard occurrence may well be useful to BC Timber Sales in determining viability of a logging plan, but it falls short of addressing the impacts (consequences/outcomes/fallout) of this activity on downstream communities. A true risk assessment would consider the value of the element-at-risk to affected parties, i.e. ~~I.e. Costs~~ of the harm done and whether the affected parties are able to recover from damages suffered.

Assessing the risk of logging without the full participation of those affected by the proposed logging is, with all due respect, a charade.

The following table summarizes the Authors’ comments on the specific “partial risk” ratings given in the report. It provides a qualitative assessment of the consequences of the hazard occurring on the identified community values in the lowest section of Chaster Creek. The

³ Identified hazards are changes to stream flow regime (peak flows, low flows, groundwater/aquifer recharge), sediment yield (roads, landslides), riparian function, channel stability and water contamination

conclusions expressed in the table illustrate the difference in outcomes and conclusions had a true risk assessment, that includes assessment of harm severity, been conducted.

Chaster Creek Lower Ravine Risk Assessment

Hazard	“Partial Risk” Assmnt. Rating	Comments on “Partial Risk” assessment	True Risk Assmnt. Rating	Comments on actual consequences of damage	Climate Change Effect on Risk
Peak Flow	High	Damage is already occurring annually. The partial risk <u>of</u> damage occurring should be rated as very high.	Very High	Cost to repair or replace structures and land losses are in the millions. Consequences are high.	Increases Risk
Low Flow	Moderate	There is just a trickle of water in some reaches in the dry season. Any less flow may cause a localized dry out and high water temperatures. Should be high.	High	Value is high mainly due to irreplaceable damage to salmon runs and summer water availability to residents.	Increases Risk
Aquifer Recharge	Low	The actual effects of logging on the aquifer recharge are unknown. Chaster Creek Watershed contributes to aquifer recharge. The partial risk should be rated as moderate.	High	Loss of aquifer recharge would be very costly to replace. Ten thousand residents of the Sunshine Coast depend either fully or partially on Aquifer 560. Consequence is very high	Unknown
Sediment Yield	Moderate	There have been at least two large landslides in the last two years and the slumping material is almost all sand and silt. The likelihood of further sediment deposition is high.	High	Sedimentation in lower Chaster Creek deprives salmon aelvin/eggs of oxygen. Property owners are losing valuable land. Consequence of additional erosion is high.	Increases Risk
Channel Stability	Moderate	We agree, the channel through the lower ravine can move around. However, a sudden peak flow can and has forced the channel close to an eroding ravine wall	High	Changes to the channel in the ravine are on private or public property. Property owners are losing land. Consequences of instability are high.	Increases Risk
Pollutants	Low	Agree but this basically assumes that an accidental release during logging is unlikely	Moderate	Potential for accidental release of contaminants could have severe effects on surface water users, salmon fry and vegetation. A large release would be costly to clean up.	Probably none
Wildfire	Out of scope	Not identified as a community value	Moderate	Clearcut provides more access to forest land. Logging dries out the landscape, resulting in increased likelihood of incendiary fires. Debris creates a new combustion threat. Older forest ecosystems are more fire resistant. There is already a deficit of old and mature forests in the watershed.	Increases risk

Study Methodology: Risk Definitions Inadequate

The low, moderate and high definitions of partial risk are too coarse to adequately identify changes caused by logging a small area. Consequently, this manipulates the results of the analysis. Risk is determined in a series of steps commensurate with the scale of the impact (logging) otherwise the effect of that impact (logging) becomes skewed or even lost. On downstream values, a small amount of logging will generally have a small effect and a larger amount of logging will have a larger effect. Upstream logging will always have some proportional effect on downstream values. To suggest that there will be no effect, and to imply that there will be no change in the level of risk to downstream resident values by upstream logging (as the report does) is a manipulation of the data. This is the natural outcome of using a coarse definition/categorization of risk.

For example, the report indicates that logging an additional 2.5% (27.2 Ha of 1072.9 Ha total) of the Chaster Creek watershed will “maintain current peak flow hazard levels” which are stated as “high” for the lower ravine (Vol. 1, p 106). Notwithstanding the fact that a hazard level rated as “high” is not a tolerable risk level for residents, even a small amount of logging is sure to increase the peak flow hazard. - To suggest that new logging in the watershed would “maintain”, and not increase the risk hazard level even slightly, is deceptive.

Hazard Assessments

Peak Flow Hazard

At a 37% equivalent clearcut area (ECA), Chaster Creek watershed is already at a disadvantage in its ability to withstand significant precipitation events that can generate peak flows. Forest hydrology studies appear to show that harvested areas equalling 20% ECA can have an effect (Vol. 1, p. 23) on peak flows, however urban hydrologists note that “stream ecosystem impairment begins when roughly 10% of a watershed is covered by impervious area” (Vol. 1, p. 28). The translation of impervious area may not be equal to ECA’s but even at a slightly reduced value one can understand that Chaster Creek is currently compromised.

Further, Johnson & Alila, 2023,⁴ recently proved that there is a causal relationship between

⁴ <https://globalnews.ca/news/9872712/clear-cut-logging-flood-risk-ubc-research/>

clear-cutting and flood risks across watersheds with only a 21% ECA. The lower incised ravine of Chaster Creek, for example, categorized as high risk for peak flow hazard, cannot withstand even a small increase in risk without increasing bank erosion, sedimentation and flooding as demonstrated in the Report by Figures 6.9- 6.13, 6.16, 6.17 and 7.1. (Vol. 1, pages 127-129, 134, 150).

Given the unpredictable and rapidly increasing nature of climate change related events as evidenced these last three years (2021-2023), and the fact that "...there is an increased potential for high winter stream flows in the future" (Vol. 1, p. 69) it is no longer acceptable to incrementally increase peak flow hazards. Forestry development must plan to decrease risk if we are to maintain existing community values.

In addition to the problem of property damage, which to date includes erosion of private property, flooding of agricultural land, damage to public roads and infrastructure (SCRD Chaster Hall and the SCR D water main) other natural resources are being adversely affected. Coho and chum salmon spawning beds have been greatly affected by the peak flow as shown in the aforementioned figures.⁵

Looking closely at the landslide photographs (Figures 6.9 to 6.13, [Vol. 1, pages 127-129](#)), it is clear that sand and silt enters the creek during these events. This is bad news for salmon spawning beds as identified in the Report (Vol. 1, page 50). Sediment yield and channel stability are more than a moderate partial risks (Vol. 1 page 152) as they are occurring yearly across multiple stream reaches in and above an area where salmon spawn, eggs/aelvin are deposited/reared and Coho fry must overwinter - the value to the salmon is therefore high.

It must be pointed out that pre-contact, it is reported (The Gibson's Landing Story, Lester Ray Peterson, January 1, 1962) that the Squamish Nation had a fish camp established at the mouth of Chaster Creek - testimony to the abundance of fish in this watershed. ~~S-~~

Low Flow Hazard

It concerns us that proposed logging activity is expected to reduce summer low flows (Vol. 1, page 114) even if that is estimated to be a short term effect. In recent years with droughts beginning in late spring and extending well into the fall, Chaster Creek has become just a trickle of water and tributaries dry up much earlier in the season. We agree that at the very least there is a moderate likelihood that current forest structure is adversely affecting low flows (Vol.1, p.114). Reducing flows further by logging increases that risk.

Due to historical logging and wildfires there is approximately only 10% of the forest that is over 110 years old in this watershed – these trees are less than half the age of an old growth forest. Although forestry science seems to indicate that 80 year old trees suddenly have the same hydrological ability to process precipitation and groundwater as an old growth baseline this is not

⁵ Note: Some of the documented events pre-date the Atmospheric River events of 2021.

true. Indeed, the authors quote a 2020 study that showed a 40-53 year old Douglas Fir forest had 50% less run-off than a 90-170 year old Douglas Fir forest (Vol 1, page 112). We recognize that the proposed area to be logged may be a different forest ecotype but nonetheless would expect the results to be similar.

On page 24, Vol. 1, the authors note that few studies have been conducted on the long term low flow effects of logging. At such a high level of disturbance and 37% ECA (~27 % residential/commercial and ~10% forestry related) the resiliency of Chaster Creek and the ability to maintain critical low flows needs to be increased by recruiting trees to become older not creating additional younger ones.

Aggradation of cobbles and boulders that causes the lowest section of the Creek to dry out completely would be problematic (Vol 1: Page 136). Water temperature increases would stress salmon fry (Vol 1: page 16). Coho fry and Cutthroat trout stay in the creek over summer and need a continuous supply of cool water to survive. The partial risk of reduced low flows may be moderate but the consequence of reduced flow on salmonids is high.

Aquifer Recharge Hazard

As of the summer 2023, at least 10,000 residents rely on Aquifer 560 either fully or in part. In addition, many residents above Highway 101 utilize Aquifer 555 and ground water in the Capilano formation for domestic water. The value of those aquifers to the users is very substantial (i.e. making their property habitable). A “low” partial risk rating on aquifer recharge in the report (Vol. 1, page 151) considers only the likelihood of the incident affecting recharge. That low likelihood needs to be combined with the high value of adequate aquifer recharge to the residents of the area to get an accurate assessment of full risk (Vol. 1, page 5). The report fails to do this.

To estimate the value of Aquifer 560 one could consider that the loss of the aquifer would result in the need for the community to build a reservoir. The neighbouring Sechelt Nation has applied for a grant from the federal government in the summer of 2023 to build two reservoirs to capture water from the Chapman Creek water supply system . The total volume of these reservoirs is 2.9 million cubic meters. The grant application: \$100 million. It is not even clear that 2.9 million cubic meters of storage volume would be sufficient to replace Aquifer 560. The consequences of damaging Aquifer 560 in any way are very large.

The precise location of the recharge areas of the aquifers in the Elphinstone South area are currently unknown, but a significant number are estimated to be located within the Chaster Creek watershed which is located directly above these aquifers. It is thus unacceptable to suggest that the risk to aquifer recharge is low. At best it is unknown.

The report is seriously misleading in reporting of well water use by residents living at the foot of Mt. Elphinstone. The report indicates that there are only a few wells being used by residents living at the foot of Mt. Elphinstone and that the wells are only used seasonally! This is completely misleading and gives the impression that logging activity will not endanger the drinking water of residents simply because there are no or only a few seasonally used wells in the area.

The Report is based on a poorly maintained BC database (Figure 4.27, [Vol. 1, page 91](#)) which does not appear to have been updated in years. To demonstrate the inaccuracy of the information provided in the BC database on which the report is based, ECA residents have surveyed well water use in an area extending about 200 metres south of DL1313 (approximately Jenean Rd to Highland Rd). The BC database shows in this area 5 wells (4 of them being used, one is not used). Whereas our survey showed that in fact, there are at least 13 full time used wells in this area plus two additional wells that will be in full use once houses are built. Thus, the report seriously underestimates well use in this area alone and likely, well use in the whole study area.

Importantly, based on the town of Gibsons' aquifer studies, it appears that wells located at the foot of Mt. Elphinstone most likely draw their water from the Capilano aquifer. An aquifer that is less stable than other aquifer formations in the area and that responds more quickly to precipitation changes. Logging, and its negative effects on groundwater cycles, thus has a real potential to disrupt drinking water supply from this aquifer.

Sediment Yield Hazard

The report highlights sediment yield issues from road construction and from landslides in the lower ravines. Our main concern is from landslides in the lower ravine of Chaster Creek. While these may be partially caused by improper drainage systems and land development it would be important to avoid increasing peak flows that tend to erode the ravine edges. Further, sedimentation in the Aquifers 560, 555 and Capilano ground water recharge areas need to be avoided. We are in agreement with the need to maintain upslope drainage patterns to avoid disturbances in the lower ravine (Vol. 1, page 129).

The consequences of fine sedimentation in the lower creek are to smother salmon eggs and aelvin as mentioned above; in addition such events can alter the salmonid habitat by filling in pools and in extreme cases lead to deposition in riffles. Property owners lose land in landslides. If water runs down creeks instead of penetrating into the ground, ground and aquifer recharge may be affected. We would consider salmon, lost property and groundwater all to be difficult if not impossible to replace. The consequences of sedimentation are high.

Channel Stability Hazard

Chaster creek is alluvial on the Gibsons bench below the mountain slope and its channel is not well established in most areas. The stream channels are underlain by impervious clay and therefore tend to overflow rather than incise the land. Various high flow events have caused flooding in this area (Russell Rd culvert, Reed Rd water main break, farmland flooding). All are costly for landowners and local governments alike to repair.

In the lower ravine, Chaster Creek is confined to a heavily incised area; however the ravine edges are active as shown in the report Figures 6.9- 6.13 (Vol. 1 pages 127 -129). This activity causes land owners to lose valuable real estate at the top edge of the ravine and beyond as these steep sidewalls unravel.

Near the mouth of Chaster Creek public and private property is being eroded at Chaster Park and at Bonniebrook Lodge ([Figures 6.16 & 7.1, pages 134 & 150 respectively](#)). In these highly developed areas channel stability is of utmost importance. Future climate change and sea level rise will only make these areas more susceptible to damage. It is a big undertaking to make repairs and sometimes there is no realistic repair possible and the asset is lost.

In consideration of these issues with channel stability, the consequences of changes in the channel alignment caused by even incremental increases in flow are high.

Pollutant Hazard

We recognize that safety standards regarding releases of pollutants like oil, fuel, and antifreeze have improved over the years. Contractors are more aware of their responsibility and enforcement of environmental standards occurs. We agree the likelihood of a spill is low. However, given the downstream importance of clean non-polluted water to property owners adjacent to Chaster Creek, for aquifer recharge and to salmon the consequences of a significant spill must be considered as high.

The low partial risk given in the report is basically legislated to be low because the consequences of an uncontrolled release are high. This demonstrates the balance needed between probability of occurrence and consequences of occurrence present for pollutants but absent for the rest of the hazards recognized in the Polar report.

Wildfire Hazard

One morning, in mid June 2023, following a short but spectacular lightning and thunderstorm the previous night, a wildfire was detected in what BC Wildfire Service called “North Chaster”. Located in the BCTS chart area, this lightning-caused wildfire was mercifully extinguished later that day.⁶ If local residents weren’t already concerned about the risk of wildfires in our community, this short-lived event most-assuredly put the concern in the forefront.

When Polar first was retained by BCTS to conduct watershed assessments of the eight watersheds and to identify the community watershed values and analyse the risks that forest development in these areas may pose, mitigating wildfire risk did not make the list.

Much to their credit Polar did address this issue in their Risk Summary in the context of climate change. They noted that the projected temperature increase of 4.7C by the 2080’s could lead to not only elevated stream temperatures reducing the water quality for fish, increased water demands for irrigation, increased potential for drought but also increased severity and extent of wildfires (Vol. 1, p. 153). Polar again restates this projection in their Conclusions upon the examination of the effects on stream flows (peak & low flows) and aquifer recharge (#5, Vol. 1, p.156). Given the historic drought conditions, number and extent of wildfires burning in the province during 2023, we would only argue that these risks have already arrived!

Now is the time for BCTS to forgo the status quo timber harvesting and concentrate on building resilience into previously harvested areas and consult with adjacent communities on how to fireproof the community interface. Such efforts must be specific to the biogeoclimatic ecosystem zones, subzones and variants and the legacies of past forestry.

Polar suggests that forest management could play a role in mitigating climate change and supporting long-term sustainable water supply through the establishment of a broad range of seral stages across each watershed thereby reducing the potential for interface wildfires (Vol. 1, page 166). However, there is no discussion of what an optimum proportioning of seral, or ages of trees might be that would be helpful specifically in the reduction of wildfire threat.

⁶ <https://www.coastreporter.net/local-news/wildfire-discovered-in-elphinstone-on-sunday-7161895>

It has been argued that old-growth forests are the most fire resistant; in today's increasing temperatures and drought conditions this assessment still holds with respect to our coastal forest as recently re-stated by Christenson and Franklin.⁷

The limited information in the Report shows that within the BCTS chart area (Figure 6.5, Vol. 1, page 113) for Chaster Creek., 57% of the trees are thought to be older than 80 years; however ~ only 40% are between 101-110 years old, with almost no trees older than 131 years – effectively **no old** trees are left. Further, Table 4.9 (Vol. 1, page 70) shows the peak level of disturbance and the decade it occurred in each watershed: Chaster Creek lost 38% during 1911-1920 – hence the lack of trees of that age grouping.

This leads to about 43% of the area deemed by forestry standards not to be hydrologically recovered, let alone possess old-growth attributes and therefore less able to withstand future wildfires. Stands of older trees and their accompanying ecosystems need to be left to grow old and to become more resilient. In addition, following best management practices, younger recovering stands may, for example, need to be thinned to reduce fuel. A total multi-jurisdictional resource planning approach with not only water sustainability as a key objective but also wildfire resiliency would undoubtedly be supported by the community.

Climate Change Hazard

In B.C., it is understood that “...interactions between forestry and hydrological processes are highly dependent on the weather”.⁸ Future climate change means warmer temperatures with more dramatic precipitation events in the fall and winter but drier and extending summer conditions (Vol. 1, page 14). The effect of those conditions is to increase all partial risk assessments in the report. Polar advises working together with local, provincial and First Nations governments plus other stakeholders (fisheries, land owners, water right holders) to develop and implement control measures to reduce near- and long-term hazards (Vol. 1, page 154). We are in agreement with this recommendation and believe it should be BCTS guiding principle for determining forest development in a participatory rather than this consultative fashion with the community.

Conclusions

The SCCA and ECA commend BCTS for taking steps to develop a new provincial watershed assessment framework and trialling it on the eight watersheds on the south side of Mt. Elphinstone. We welcome the opportunity to review the resulting prototype Report.

From the communities' viewpoint the most serious shortcomings are in the methodology applied and how this skews the results. Specifically, the definition of risk which omits the consequence

⁷ <https://www.politico.com/news/magazine/2023/06/11/to-fight-wildfire-our-forests-need-to-grow-old-00101360>
Accessed August 9, 2023

⁸ https://www.for.gov.bc.ca/hfd/pubs/docs/lmh/Lmh66/Lmh66_ch07.pdf page 202, accessed September 05, 2023

of the hazards occurring on identified downstream community values. We use the example of the hazards in the lowest reach of the Chaster Creek watershed to illustrate the difference between outcomes of the Report's assessment versus a standard risk assessment.

In addition, the definitions of risk are too broad to adequately capture the effects of logging on downstream values.

With respect to pollution, it is noted that this is an example where the Report has applied the correct risk assessment because of existing legislation that requires this risk to be low because it is understood that the consequence of a hazardous spill in any stream would be high.

Our focus on the Chaster Creek watershed, does not indicate agreement of the Report's assessments on the other seven watersheds. It serves to illustrate the importance of engaging community members with intimate knowledge of the area of study, and how this results in a more accurate analysis of risks and hazards.

We believe there is a lack of data to support the Author's analysis of the Aquifer recharge areas (Capilano, 560 & 555) and impacts on groundwater users across the watersheds. Consequently, we do not accept the reports findings on this subject. We understand that the Town of Gibsons will have its consultants Waterline Resources undertake a peer review of the hydrogeological aspects of the study. We expect BCTS to integrate peer review recommendations into its planning.

The Report has captured most of the community values excepting that of carbon capture and wildfires though the Authors' do reference the latter as a consequence of climate change. It is precisely because of the much earlier arrival of devastating climatic events, that the SCCA and ECA will not support any logging across the south face of Mt. Elphinstone.

We urge BCTS to continue their leadership role within the Ministry of Forestry by halting all logging within their Mt. Elphinstone chart area; focusing on rebuilding forest resilience for the protection of downstream community values (including wildfire) and participating in the development of a Watershed Sustainability Plan as alluded to by the authors on page 166 of Volume 1.

Thank you for your time and consideration of our feedback.

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