



Sunshine Coast
Conservation
Association

PO Box 1969 Sechelt, British Columbia V0N 3A0
www.thesc.ca

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British Columbia Environmental Assessment Office
PO Box 9426 STN PROV GOVT
Victoria, BC
V8W 9V1

RESPONSE TO BURSCO STATEMENT OF ENVIRONMENTAL IMPACT

The Sunshine Coast Conservation Association (SCCA) submits the following questions and comments on the review of BURSCO Rock Products Ltd.'s Proposed Burnco Aggregate Project (Howe Sound) Environmental Impact Statement. These comments and questions are compiled from concerns raised by professionals including fishery biologists. As emphasised in the previous submission for the draft Application Information Requirements our emphasis focuses on fish, fish habitat values and Glass Sponge reefs.

Howe Sound was closed in 1963 to commercial fishing for the purposes of stock management and to preserve the sports fishery. In the 1970's McNab Creek was identified as one of three more gently sloping streams on the west side of Howe Sound with a significant estuary (there being none on the east side) and therefore had significant capabilities, along with the Squamish River, for supporting the fishery in Howe Sound. Escapement records for McNab Creek go back to 1950, with sport fishing for Cutthroat Trout and Steelhead recognized as early as 1935. In 1991, workers of Canadian Forest Products, Mainland Logging Division, were recognized for their ten years of Salmon Enhancement Program efforts at McNab Creek by the Head of the Public Involvement Program, Department of Fisheries & Oceans. In 1999, a provincial Fish and Fish Habitat Inventory noted that the creek still contained important spawning and rearing habitat for anadromous salmonids, Cutthroat and Steelhead. McNab Creek is considered a major Chum system within the Howe Sound/Sunshine Coast Area with a management escapement goal of 10,000 (2009).

The above is only a partial account of the high, long-known, historical values of salmonids, Cutthroat Trout and Steelhead in the McNab Creek watershed. BURSCO, in their first two unsuccessful attempts to obtain authorizations from Fisheries & Oceans Canada (DFO), and in acknowledging in the *Purpose of Application* that the proposed project is subject to a comprehensive study review under the former Canadian Environmental Assessment Act as a result of a required approval under the Fisheries Act, should recognize the primary importance of these species.

Yet, BURSCO's *Project Description of the Summary* does not refer to the expected impact of the Project on these specific valued components. **It should include a statement of maintaining or improving salmonid, Cutthroat and Steelhead (Salmonidae) populations and habitats during construction, operation and effective closure.**

Vol. 2, 5.1.6 Conclusions notes that "All potential Project-related residual adverse effects (on fish and fish habitat valued components) were determined to be negligible – not significant and requiring no further consideration." This statement is based largely on a hydrological model that would set the hydrostatic pressure in the 30 ha, 30 m deep wetted pit during the 16 years of operation slightly above the baseline water conditions in McNab Creek. The proponent expects that there would then be no ground water loss in McNab Creek, as presently occurs to the upper reaches of the existing compensation channel; the slight net increase is evaluated as positive. This model also believes that the downslope impact on the estuarine waterways would increase and the net benefit is seen as positive.

The SCCA disagrees with this assessment. The baseline studies on the Salmonidae utilizing the surrounding fresh and marine waterways are not comprehensive enough to judge the potential impact of a failure, in particular pit containment. Further, a suite of Spill & Emergency Response Plans and Compensation Plans must be developed prior to construction for the variety of failures possible (e.g. sudden loss of water in McNab Creek, sudden overwhelming and or sediment contamination of estuarine waterways). In order to develop appropriate plans, baseline studies must be completed to determine which species, their age and their behaviour (e.g. transit, rearing, spawning) are expected to be in the water ways at any given time. Further studies and changes to fisheries habitat protection during construction and operations, and climate change (extreme meteorological events) must be incorporated. This would include, but not be limited, to the following:

Environmental Impact Statement – Volume 2 Section 5.1 - Fisheries And Freshwater Habitat

➤ Values Component (VC) (Sec 5.1.3.1)

- Selection and rationale omits Steelhead Trout (*Oncorhynchus mykiss*). This species has suffered significant declines over that last 20 years and is susceptible to changes and loss of key habitats that include; degradation to rearing (most importantly parr rearing) and access to holding and spawning areas.

It is assumed that the rationale for the omission of Steelhead is that the project footprint does not directly impact their habitat. While no direct impacts may occur, alteration of mainstem flow does have the potential to impact both Steelhead adult migration and alter accessible juvenile rearing habitats that are located adjacent to and above the project footprint area. It is known that Box Canyon Creek, found immediately upstream of the project area provides both Steelhead rearing and spawning. The McNab Creek mainstem immediately above and below Box Canyon Creek confluence also supports Steelhead rearing and spawning.

Given the importance of this species regionally and the concern regarding potential effects of gravel mining on stream flows, **Steelhead must be included as a VC.**

- Selection and rationale omits Chinook Salmon (*Oncorhynchus tshawytscha*). Chinook in the Strait of Georgia have shown many years of low returns and there is still uncertainty about their long term abundance. Given that Species-at-Risk designated Orcas depend on Chinook, populations of Chinook regardless of size need to be protected. Perhaps the project footprint will not directly impact their habitat but the alteration of mainstem flow in McNab Creek can impact adult and juvenile migration. Impacts to the foreshore caused by the flow from the pit could also impact the juveniles as they transit to the salt water. **Chinook must also be included as a VC.**

➤ Table 5.1-2

The Table states Chinook have similar habitat needs to other species. The habitat requirements of Chinook salmon are not similar to that of other salmonids that are being considered in the assessment. Therefore the effects on anadromous Chinook salmon must be separately assessed of the other salmonid VC's.

➤ Table 5.1-2

The table states Steelhead have similar habitat needs to other species. Certainly they do coexist with both Coho and Cutthroat but Steelhead and in particular adults and parr have specific and limiting habitat preferences. On the South Coast Steelhead parr habitat is typically the limiting factor to their success. This habitat (boulder dominated riffles) is found along the project interface and should be included in any project risk analysis, and mitigation strategy.

➤ Spatial Boundaries (Sec 5.1.3.2.1) & Assessment of Existing Conditions (Sec 5.1.3.3.1)

The planned mining is within the historic alluvial fan and it should be assumed that alteration to the centre of this deposition will also have implication on the sections of this geomorphic feature surrounding the centre excavation. The upper boundary of this historic deposition should be the upper boundary of the LSA, thereby pushing the LSA closer to the confluence with Box Canyon Creek.

➤ Temporal Boundaries (Sec 5.1.3.2.2)

- “...the assessment of adverse Proposed Project effects on freshwater fish and fish habitat encompass three major Proposed Project phases, as defined in Volume 2, Part A - Section 2.0 of the EAC Application/EIS:” The SCCA was unable to locate Part A of Volume 2 on the BC Environmental Project Information Centre. (Sept. 23, 2016). A fourth “predevelopment” phase of assessment should be added to determine baseline populations of Salmonidae and their habitats (freshwater & marine).
- Temporal boundaries are presumably timeframes for continued study. **The idea that fish and fish habitat is examined only one-year post operations is unacceptable. A framework for documenting positive or negative change must be provided. This must be a meaningful, statistically robust, comparison that also provides options for additional compensation and/or restoration, resulting from unforeseen impacts. A detailed monitoring plan must be developed that uses predevelopment baseline, operations and post operations data to ascertain the impacts of effects of the project on the Salmonidae. This report must be publicly posted.**

➤ Changes In Flow (Sec 5.1.3.3.2.1.2)

- Base flows are reported as a net improvement over the life of the project. What appears to be missing is an instream flow assessment that looks at changes, positive or negative, on fish habitat, including migration and rearing. This assessment should present all possible scenarios and link clearly the surface water analysis to fish habitat (and impacts on amphibians) to the creation of the wetted pit. It is assumed that the net increase is an average over 12 months. How does this look monthly and during critical life history periods of each of the identified Salmonidae? **A detailed instream flow assessment with appropriate surveys of channels cross sections and appropriate modelling should be provided.**

- Base flow conclusions are based on a model that assumes current area ground waters and the created off-channel WC2 draw base flow from the mainstem of McNab Creek. There are a lot of assumptions that hinge on the model being correct. **Modelling of all possible outcomes and potential mitigative measures should be presented. What, for example, if the model is wrong and the base flows drop even for one season due to climate change? It would be expected that the operations of the mine cease until baseline conditions return and should be stated in the Spills & Emergency Response Plans.**

➤ Summary of RSA-McNab Creek (Sec 5.1.4.2)

- It was reported that few Steelhead were captured in McNab mainstem. Recent sampling for the upstream Box Canyon Hydro project has resulted in a significant number of juvenile Steelhead captured in the mainstem and habitats around Box Canyon Creek. In addition, spawning Steelhead were documented in Box Canyon in 2016. Potential effects on Steelhead (as noted earlier) should be included.
- This section downplays the population size and area importance of the remaining salmon and anadromous trout returning to McNab Creek. Rather than enumerating the average number of historic spawners, maximum historic numbers for each species given would be appropriate – e.g. 1,500 Chum and 3,500 Pinks were recorded in the escapement record for 1951.
- Recent numbers have been depressed (except Pink Salmon) and are likely the result of lower ocean survivals. The assessments and proposed design does not provide any assurance or mitigative suggestions to ensure that the quality and quantity of existing salmonid habitats remain in the Regional Study Area – McNab Creek.

➤ Potential Project-Related Effects (Sec 5.1.5.2)

Indirect loss of salmonid habitat is actually reported. There seems to be some contradiction between sections. Earlier the document suggested there was a net increase and/or base flows will not change so habitat remains the same. There is no breakdown of how losses would occur and when. Clarification is needed.

➤ Proposed Monitoring (Sec 5.1.5.3.2)

- This section refers to the proposed approach during construction and follow-up. This is unclear. A monitoring program that includes typical construction and operations environmental parameters should be required. There should also be a robust monitoring program designed that compared VC's (Including Steelhead and Chinook) pre and post development in the expanded LSA and immediately outside the expanded LSA. In this case, expanded baseline data in McNab would be established before development, during operations (16 years), and then for a statistically appropriate period post operations.
- In addition to the environmental monitor preparing and submitting to FLNRO and to DFO regular environmental monitoring reports documenting construction activities, effectiveness of mitigation measures, incidents, non-compliant events, corrective action taken and photograph documentation during construction, reports shall also be submitted during operation of the mine.
- Further and in accordance with the recent revisions to the fisheries protection provisions of the Fisheries Act; in the event of a non-compliant incident during construction and/or **operation the monitor must immediately contact DFO's Observe, Record and Report and then report the non-compliant incident to the BC Environmental Assessment Office.**

➤ Residual Effects (Sec 5.1.4)

We challenge the statements that 'Residual Effects' to fish habitats are low. The proponent states there is a potential to impact habitats through surface water change, coupled with only modelled data. The risk can not be low; at the very least it should be moderate.

➤ Conclusion (Sec 5.1.6)

As stated on page 1, the SCCA challenges the statement that the net residual effects for anadromous and resident fish are negligible. The premise that there are negligible effects is based on the creation of new habitat and that the base flows remain unchanged. In the event the model is flawed, the potential to impact migrating adult and juvenile salmonids is high. In the event the base flows become lower/higher through piping, avulsions, dyke failure or dam failure, the impact to rearing and spawning habitats become high.

It should be noted that the calculations and opinions are based on the proponents' LSA; it should be based on the extended LSA which would include the entire historic alluvial fan.

Fish and Fish Habitat Baseline Report-Burnco Aggregate Project (Appendix 5.1.A)

- The lack of mainstem sampling (electrofishing in particular) is questioned. It is our understanding that the mainstem MC 1 through 5 were sampled only in 2010. There is a conclusion here and elsewhere that Steelhead impact is negligible because of the lack of fish in the system. If this conclusion is only based on one year of sampling, this is inadequate. Baseline should have been repeated along the LSA and into the Regional Study Area (RSA) over a longer time period.
- There was no sampling conducted in January or February of any year in the mainstem, for example. At the least this and instream flow assessments must be conducted to determine Salmonidae presence and requirements.
- Trap data show limited smolt catches in the mainstem. An alternative method would have made more sense and may have increased success, such as a Rotary Screw in the upper areas above the lower depositional area, or fixed channel traps in the lower reaches of the mainstem. Fyke nets, while effective in the right areas (intertidal) provide limited catch data for larger smolts (Steelhead and Cutthroat).
- The baseline should provide a robust and statistically significant study of pre and post development. This requires multiple years' pre and post data.
- There was no effort to enumerate adult migrating anadromous Cutthroat and Steelhead. Both species migrate past the LSA to the upper reaches. This data would provide evidence for determination of VC's.
- Instream flow assessment using potential changes in base flow to model habitat changes and channel connectivity must be incorporated.

Fish Habitat Offset Plan (Appendix 5.1.B)

- A plan was developed to address loss of WC2 (the DFO Channel) and the footprint of the loading facility. The approach adopted to address the loss of WC2 (the compensation channel) was to develop a new area of off channel and "hard" habitat located in the in marine near shore. The marine offset plan requires more supporting information and the very small **areas proposed should be enlarged.**

- **The SCCA is concerned with the long-term viability of any constructed channel. In the event that the off channel is accepted, there should be a legal, long-term commitment to maintain the channel for numerous years post operations.** The failure rate of created off-channels is high. In most cases, this is a result of proponents meeting their post construction commitments, and then ceasing to maintain the habitats, which leads to channel failure. This is a significant concern with the proposed offset proposal but can be rectified by a long-term legal commitment.

Groundwater Resources (Vol 2, Part B, Sec 5.6)

➤ Hydrostratigraphy (Sec 5.6.4.3)

The consultants state that the hydrogeological properties of a possible fault structure within the bedrock that may parallel McNab Creek valley is not known. Further they note that "...the hydrogeological significance of this fault structure, if it exists, would only be high relative to the groundwater flow system in the valley fill aquifer if it is laterally continuous, highly permeable and of considerable width." The properties should be evaluated to determine the significance of this geological structure.

➤ Project – VC Interactions (Sec 5.6.5.1)

Although project – VC Interactions are identified there is no *recognition* that probable climate changes have the ability to affect groundwater flows during the lifetime of the proposed project. **Further studies prior to construction must be conducted to prepare for these effects.**

➤ Operations (Sec 5.6.5.2.1.2)

The water removed from groundwater during operations to provide make-up water to the wash plant is identified as representing a reduction in groundwater flow. The effect of this water on surface water flow needs to be further accounted for.

➤ Mitigation (Sec 5.6.5.3)

It is stated that "Monitoring of the groundwater flow rates, hydraulic heads and quality will be conducted during construction and reclamation and closure".

Monitoring must also be conducted through the operations phase should this project be approved

➤ Conclusions (Sec 5.6.6)

More details need to be provided in the assertion that the quality of the groundwater resulting from the wetted pit and entering the down slope waterways during operations will not be compromised and negatively affect the ecosystems.

Surface Water Resources (Vol 2 Part B Sec 5.5)

➤ Technical Boundaries (Sec 5.5.3.2)

- It is noted that the assessment of the Proposed Project's potential effects and residual effects on base flow and extreme low flow were based on numerical modelling with limited calibration. It is also noted that the proponent plans to continue monitoring site conditions (presumably groundwater and surface water) and to recalibrate the model as the project progresses. **This technical boundary must be dealt with before the project begins.** If the project is approved before this is resolved, then re-calibration of the model as the project progresses must be made a mandatory condition of the environmental certificate. Changes to the water balance model and water management practices resulting from the re-calibration must be communicated immediately to the BC Assessment Office and DFO.
- The consultants correctly recognize the limitations of the climate and hydrological baselines conditions used because they were largely based on available long term regional data as there was limited local data. The use of the Water Survey Canada (WSC) hydrometric station located at Chapman Creek above Sechelt is troubling as it does not provide current data and that watershed has a distinctively different climate regime; therefore the water flows are expected to be different. Further **hydrological studies should be conducted on McNab Creek directly to determine baseline conditions throughout the year which then need to be entered into the model.**

➤ Changes in Surface Flows (Sec 5.5.5.2.1.)

- The statement that "The extent of the proposed pit will be re-evaluated if the calibrated and refined results suggest that a negative impact to aquatic habitat in McNab Creek is anticipated" must be a condition of the environmental certificate should the project be approved.

- Although increased baseline flows in McNab Creek as a result of operations and reclamation/closure can be viewed as a positive as it would resume creek flow during current summer “droughts”, the same can not be concluded for the lower segments of WC2 and the Minor Foreshore Streams. **The benefit/harm needs to be evaluated against the individual fish species requirements of each waterway. Increased flow and wetted area are not suitable evaluations.** It is not understood, for example, how a predicted increase of 53% in the closure phase of base flow in the Minor Foreshore Streams can be evaluated as positive to the fish and fish habitats.
- Climate change modeling elsewhere in the document has indicated an increase in extreme events, increased intensity of rainfall and increased periods of drought. Such events and conditions must be evaluated in the model and appropriate plans created before the Project were to begin.
- Not stated in this Section is how the evaporation loss from a 30 ha wetted pit versus the evapotranspiration of the initial vegetation cover is considered in the water model.

➤ **Conclusions (Sec. 5.5.6)**

- See bullet Changes in Surface Flows (Sec 5.5.5.2.1.)
- With respect to the reduced base flow in WC2 during the proposed project operations it should be stated that they are projected to have **negative** potential effects. Further, it needs to be stated how the proponent will deal with this expected impact on the Salmonidae and their habitats
- If the proposed project is accepted there must be a legal long-term commitment to monitoring and maintenance of the relocated compensation channel for numerous years post operations. Monitoring for more than 1-year post closure and reclamation of the McNab Creek and the Minor Foreshore Streams must also be committed to.

Marine Resources (Vol 2 Part B Sec 5.2)

In order to comply with Sec 38(4) of the Fisheries Act R.S.C 1985, **a survey specific to intertidal spawning forage fish (winter and summer Surf Smelt and Pacific Sand Lance) needs to be conducted across the entire intertidal area.** The habitat survey must be conducted according to current forage fish sampling protocols. It is recognized that forage fish are a cornerstone of the marine food web.

Forage fish make up a minimum of 50% of the diet of adult Coho salmon and Pacific Sand Lance & Herring comprise 72% of an adult Chinook salmon's diet. Larval and juvenile Sand Lance form a major portion of a juvenile Chinook's diet. Chinook salmon, in turn, are a major food source for the SARA identified South Coast population of Orcas.

➤ Marine Fish (Sec 5.2.4.6)

Please provide the assessments that conclude that “No sensitive fish habitats overlap with the proposed Project Area, including no known spawning sites for key forage fish species (e.g., herring or capelin).”

➤ Baseline Conditions (Sec 5.2.4) & Marine Resources Baseline Report (Appendix 5.2-A, Vol 4, Part G - Sec 22.0)

- The consultants note “... local marine waters are known to support herring and other important forage fish species such as Pacific sand lance, capelin and surf smelt,” and “... no forage fish were identified during baseline sampling using beach seining techniques”. Beach seining is not the accepted protocol for determining the absence or presence of intertidal spawning forage fish such as Pacific Sand Lance (PSL) and Surf Smelt. In addition, the beach seining dates would have missed the winter spawning PSL and winter spawning Surf Smelt.
- The SCCA agrees that “Juvenile and fish would be particularly sensitive to smothering and toxic effects of increased levels of turbidity and other contaminants, or from indirect effects of reduced food base (planktonic and benthic invertebrates) caused by Proposed Project activities” and that intertidal spawning forage fish are included in this statement.

➤ Injury / Disturbance from Underwater Noise (Sec 5.2.5.3.1.2) &

➤ Effects of Underwater Noise (Sec 5.2.5.2.3.1.3)

If it is confirmed that PSL and Surf Smelt are spawning in the intertidal zone then the timing of the pile driving within the fisheries work window for Howe Sound (August 16- January 31) must also take these species into consideration.

Fish and Fish Habitat Baseline Report (Appendix 5.1.A)

➤ 2.3.5 Beach Seining (Sec 2.3.5)

The sampling conducted once or twice a month at various sites between May and October, 2011 at various times of day and tidal stages would have missed the winter spawning window for PSL and Surf Smelt.

Climate Projections for Proposed Project Region (Sec. 5.8.4.3)

➤ Climate Station Selection (Sec 5.8.4.2.1)

- Although it is appreciated that the selection should follow an established protocol, it must be stated that the weather (temperature and precipitation) is significantly different from this location to that of the proposed Project especially with regards to precipitation – both rainfall totals and duration of events. A comparison of the marine weather reporting station at Pam Rocks (Climate ID 10459NN) for temperature and Port Mellon (Climate ID 1046330) for precipitation will verify this difference.
- The other drawback to the protocol is in examining data only to 2010, 2015 was the warmest year on record in the world and 2016 is expected to surpass that record. Including data from 2010-2015 in the Gower Pt records would undoubtedly show an increased trend for a warmer and drier climate. It would indicate that **climate change is already occurring and that should be noted in the report.**

➤ Project Considerations due to a Changing Climate (Sec 5.8.5.4)

Given that the National Oceanic & Atmospheric Administration has confirmed that 2015 had the warmest average surface temperatures on the planet and that the consultants' own modeling predicts a warmer but wetter future at the projected project site, and has produced a Table (5.8-7) with specific climate factors, the SCCA disagrees with the statement that "Only Proposed Project components during the reclamation and closure phase could be affected as climate change will take many years to occur." **The likelihood of climate infrastructure interactions occurring as early as the construction phase is high and the project should be designed to meet these changing conditions.**

➤ Climate Risk Matrix (Table 5.8-8)

As per arguments above that a base climate station was chosen with much reduced precipitation records, and did not include the last 5-6 years of climate data, this skews not only the arrival of climate change but also the extent of potential interactions with the project. The description of potential interactions with climate change across all phases of the proposed project is challenged with the exception of reclamation and closure. It is agreed that “For example, future changes in temperature, rainfall and storm events may impact the rate at which the aggregate pit refills with water” and that “Changes to climate may impact species found in the area.” Revised modelling would likely prove that these changes would arrive much earlier in the life of the proposed project.

➤ Project Considerations due to Changing Climate (Sec. 5.8.5.4)

- Although it is stated that the “Proposed Project will consider the potential for climate factors such as extreme weather events, increased precipitation and temperatures, while designing Proposed Project infrastructure to minimize potential impacts of a changing climate on the Proposed Project”, there is no reference to specifics, which should be included.
- The effects of increased drought, changes in rainfall patterns and extreme weather events must be considered not only in the context of infrastructure interactions but also on impacts of Salmonidae (and other wildlife). Mitigation plans and Spill Response & Emergency Plans must be specifically developed prior to the construction of any kind to deal with the possibility of failure in the models caused by weather events thereby ensuring that there is no harm to fish and fish habitat caused directly or indirectly by the proposed project.

In addition to the SCCA’s concerns regarding fish and fish habitat, Glass Sponge Reefs have recently been discovered in Georgia Strait and Howe Sound. The unique, rare and "at risk" animals have been recognized by DFO with mandatory fishing closures around some of the reefs. The provincial government also recognized their global importance with the expansion of Halkett Marine Park (2016) at the southern tip of Gambier Island to protect the animals discovered there. **Thorough surveys must be completed to determine their presence within 200m of the land-based project area and proposed barging route.**

In conclusion, the SCCA disagrees with the current environmental impact assessment that the proposed Project will have negligible effects on Salmonidae and their habitats. It is our belief that the proponent's assessment is premature. At the least the following actions should be taken to create a more robust assessment:

The baseline surveys of specific habitat requirements for of each of the salmon species (including Cutthroat and Steelhead Trout) need to be determined for each species' life cycle and across runs of different years in both freshwater and nearshore marine habitats. In addition, the water balance model based in part on the historic water flows of Chapman Creek (which had a different climate regime than McNab Creek is currently experiencing) should be calibrated with direct water flow measurements recorded over a number of years from McNab Creek itself to determine baseline conditions. Thirdly, it must be recognised that the meteorological effects of climate change are occurring now and must be factored into the water balance model and the climate infrastructure interactions with respect to fish and fish habitat.

Sincerely,

Cindy Harlow

Director
Sunshine Coast Conservation Association
office@thescca.ca