

## EXECUTIVE SUMMARY

### Discussion of Hydrogeomorphic and Terrain Stability Assessments

#### Who we are

We are stewards and stakeholders of the Glade Creek Watershed, and our mandate is to protect the ecosystem of the Glade watershed, and maintain current water quality, quantity, and timing of flow, influence the watershed processes to restore historical natural levels of water quality, quantity and timing of flow and provide for the health and wellbeing of the Glade community.

We believe that the first question facing the Glade Creek Watershed is whether logging or other forms of development are consistent with the need to restore the natural ecological integrity of the watershed.

Dr. Martin Carver, who answered the question ‘Is there a Threat to Glade Creek Drinking Water?’ in the affirmative, stated in his professional Opinion Letter:

Based on the information available, there exists a threat to the Glade community’s drinking water supply. It may become non-potable due to elevated turbidity and potential contamination. In addition, potential changes in the timing of flow may threaten the supply of water during seasonal periods of low flow. This threat is increasing with the forestry activities being planned; particularly those that are situated close to the water intake. As the climate continues to change, the magnitude of the threat is rising and can be expected to rise further in the coming decades and beyond.

#### Our objectives

- To obtain detailed information for the licensees proposed Cut Blocks. We would respectfully request that permit applications for the proposed logging be delayed until Glade stakeholders have had time to analyze the information and to review our findings with the Glade Community, and appropriate government agencies.
- To offer community concerns about the impact of forest development in the Glade Community Watershed.
- To provide credible commentary, backed by current research, on the Hydrogeomorphic and Terrain Stability Assessments that form the basis of rationale for logging in the Glade Watershed.
- We recommend that the implementation of the licensees’ proposed logging be delayed pending the results of water monitoring research currently being conducted in the Glade watershed. This research is vital to protecting the integrity of our watershed and the future health of our water. We believe that ATCO and Kalesnikoff would agree with us that this information is a valuable resource that should inform decisions about the future of logging in the Glade Watershed.

## Addressing the concerns of stakeholders

Although confirming that they are meeting their government objectives, the FSPs, and the professional assessments do not alleviate our concerns for the health of our watershed and our community water. We continue to be concerned about

- our water quality
- wildlife: including the imminent disappearance of wildlife habitat for ungulates, grizzly bears and other animals, when key movement corridors and places of importance (i.e. the Elk Wallow) are not fully protected and the habitat of animals are disrupted for decades after clear cutting
- the proposed road building and proposed cutting of seventy acres of mature forest (ATCO Cut block R10) above the north fork tributary will impact our drinking water in a negative way
- the proposed road building and proposed cutting of cut blocks above our water intake (KLC Cut blocks) will impact our drinking water in a negative way
- due to the current structure of an industry that relies on professional reliance, we are concerned about the professional assessments that were completed and the fact that they will serve as guidance for the resource extraction.

## Priorities:

The community of Glade, as invested stakeholders and stewards, should be a first priority. This is a public forest that provides water to the community of Glade since Doukhobors settled here in 1910, with a water license in 1908. It is the sole domestic water source for approximately 110 households; an additional 25-30 homes get water from PODs on small upper face watersheds, while only about 5 additional households have wells as their sole water source.

## EXECUTIVE SUMMARY: APPENDIX

The assessments were commissioned by ATCO and Kalesnikoff Lumber Company and one of the objectives of the Apex Assessment was to “provide guidance for forest development” and to determine “hydrogeomorphic risk to water quality, quantity and timing of flows ... associated with existing and proposed forest development.”

The appendix outlines a number of concerns Glade residents have with the Apex assessment.

There are a number of issues that come into play in regards to our concerns. One is that we feel the objectives of the FSPs, of FRPA and of the report itself are not being met. The second is that this Apex assessment is part of Professional Reliance model and as such will be used for the licensees’ forest development. Both licensees agree that the Apex report is satisfactory for their purposes and is valid for a 10-year span, while the community of Glade feels that there are a number of serious concerns about the report, including a limitation of data. We feel that to rely on such a report as a guide for forest development is naive. The Assessments need to be updated to be considered complete.

The following is an outline of some of the concerns that we have with the Glade Creek Hydrogeomorphic Assessment by Dr. Kim Green of Apex Geoscience Consultants Ltd., (Apex Assessment) and the Terrain Stability Assessment North Glade Creek (Perdue) and the Terrain Stability/Road Drainage Site Review/Powerline Road Deactivation (W. Halleran).

**Does the Apex assessment meet its own objectives?** The Apex Assessment does not meet its own objectives. It is unable to determine the risk to the quality of the water due to incomplete data, there is no knowledge of proposed cut block sites and it does not address the impacts of landslides, runoff timing, climate change and proposed roads.

**Does the Apex assessment meet FSP and FRPA objectives?** FRPA, and therefore the licensees, state the following as an objective: “to prevent the cumulative hydrological effects of primary forest activities within the community watershed from resulting in a material adverse impact on the quantity of water or the timing of the flow of the water...”

Because the Apex Assessment cannot offer guidance on potential landslide activity, the impacts of roads on hydrological function, how climate change disturbances will affect the proposed logging and Glade watershed processes; it cannot quantify the hazard of runoff timing changes or flood related impacts to water quality at the intake, and the lack of discharge gauging makes it impossible for this assessment to correlate turbidity with characteristics of the flow regime in Glade Creek, it appears that FRPA, and therefore FSP objectives have not been met by this assessment.

**Timing of field survey in Glade watershed is questionable:** Spring freshet is the best time to conduct successful terrain or hydrogeomorphic fieldwork due to the fact that ephemeral streams and other water features hidden during drier times of the year are visible. The Apex assessment fieldwork was completed over three days in late September, both the Terrain report fieldwork was completed in November.

**Turbidity data:** Dr. Green emphasized turbidity as an extremely important factor to understand and include in an analysis in regards to the health of Glade Creek water. Even though Glade Creek has a detailed history of high turbidity, some of this data was not included in the graph analysis, and other data was minimized.

**Lack of discharge data limits scope of Apex assessment:** Only one year of discharge gauging data from 1968 is available for Glade Creek. Dr. Green states that one year of 48 year old discharge gauging data “provides a limited amount of information”, but still uses that limited data to extrapolate conclusions. This limited data affects and severely curtails the scope of the Apex assessment in a major way.

**Flow, timing and snow accumulation minimized:** Hydrology scientists within most interior watersheds state that snow accumulation and snow melt dominate the watershed hydrology of those watersheds. In the Kootenay wet belt, the Glade watershed experiences significant rain on snow events. As an important added concern to the impacts on Glade Creek water, the information pertaining to these snow events was minimized in the Apex report.

**Slope gradient data minimized:** In the Apex assessment, “An analysis of slope gradient reveals that the majority of the watershed has moderate to gentle gradient slopes that are generally less than 50 percent. This appears to be an understatement of the slope throughout significant portions of the watershed, including portions of currently proposed cut blocks.

**ECA and hydrological recovery:** Dr. Green links ECA directly to hydrological recovery. Showing the range of professional opinions on this matter, Dr. Martin Carver, in his abstract *Using Indicators to Assess Hydrologic Risk* states that “The use of Equivalent Clear cut Area as a single indicator of hydrologic impact continues to be evident in British Columbia at all management levels despite knowledge that Equivalent Clearcut Area can be only weakly linked to hydrologic impact.”

**Are Impending and current climate change disruptions adequately addressed?** In the Apex Assessment, some climate change disruptions are mentioned, but the implications of climate changes are hardly discussed, especially in relation to proposed forest development. In addition, the Assessment minimizes climate changes that are occurring now.

**Flood data incomplete:** Risk assessment is based on how often an event occurs, and the Apex assessment will be inaccurate as a significant unrecorded flood event occurred in 2006. Since the Apex assessment extrapolates conclusions from historical events, *all* events need to be recorded and considered for the Apex assessment to be considered valid.

**Terrain stability assessment:** The 11 page assessment Terrain Stability Assessment North Glade Creek, Road R10-1 (Perdue Geotechnical Services, Jan2016) was commissioned by ATCO and at their request, the geotechnical assessment was limited to a 735m section of a 2.4km road situated upslope of TSC IV terrain rated, the only section of road that ATCO deemed potentially hazardous. No other proposed roads were reviewed, including any proposed within the block. Atco did not review any existing problems areas and have not shared their deactivation plans for older roads. The assessment was completed in early November 2015, when any ephemeral watercourses and spring runoff would (obviously) not be apparent. There are numerous culverts recommended, even though culverts do not maintain 'natural drainage' as is stated in the report. Since all creeks and tributaries drain into Glade Creek, the community water source is potentially at great risk. Our concerns are not alleviated by a report that examined (per ATCO's direction) only 735m of proposed road.

The 16 page assessment commissioned by KLC was an examination of road stability concerns, among them specifically whether a flat-over-steep assessment was required for proposed roads, including the road (2050) that traverses block 66-4. When asked specifically by KLC to investigate that exact issue, Mr. Halleran answers simply: construction of this road will not increase the likelihood of landslide initiation.

Mr. Halleran's Terrain Stability assessment was reviewed by his spouse, Dr. Kim Green, not exactly an 'arm's length' review. Given these variables and the nature of the proposed logging (clear cut yarding) on this terrain, one would think that a terrain specialist might lean towards caution, but that is not the case.

**Overall limitations of assessments for Glade Creek Watershed:** Professional assessments have limitations when they do not consider all data, including recent events like the spring 2017 slide. As part of the industry model of 'professional reliance', these assessments are an example of the professional work that the licensees and the Ministry are relying on to provide guidance in their timber extraction development. That being the case, the information in these professional assessments would need to be extensively investigated, updated, and reassessed using new proposed cut block data, new slide event information, the missing historical flood information, and relevant scientific research.