

Campbell River Environmental Committee (CREC)
PO Box 20092 STN. A, Campbell River, BC V9W 7Z5

Chief Inspector of Mines
PO Box 9320, STN PROV GOVT
Victoria, BC V8W 9N3

VIA EMAIL

November 30, 2020

RE: Upland Contracting Ltd. Mine Plan Application G-8-114, located at
7925 and 7311 Gold River Highway, Campbell River, British Columbia

Dear Sir,

After reading the GHD 2020 Mine Plan, Upland Sand and Gravel Pit, Campbell River, British Columbia, report ("the report") in support of this application for Upland Contracting Ltd. ("Upland"), the Campbell River Environmental Committee ("CREC") **opposes** the mine plan due to the following issues:

1. According to the Ministry of Environment (MOE) Water Resources Atlas and the FWA Watershed Atlas, the mine plan is in the Campbell River Watershed.¹

2. Drainage is from Rico Lake to Mclvor Lake, Campbell River's drinking water supply. As stated in GHD Hydrogeology and Hydrology Characterization Report, May 31, 2017: "Water flows from Rico Lake to Mclvor Lake."²

3. There are residential drinking water wells at Mclvor Lake. The proximity of drinking water wells north and west of where Rico Lake drains into Mclvor Lake is a potential concern.

"To the north and west of the Site, the land use includes lakeshore residential properties along the Mclvor Lake shoreline....There is also a lakeshore residential property west of the Site just north of Rico Lake."³ (Google Earth pdf attached).

4. Drainage to Rico Lake is from of high bedrock elevation areas.

The report states: "Shallow groundwater was identified on the K&D property and along the western flank of the bedrock ridge. Based on the presence of the competent bedrock ridge to the east and southeast, groundwater flow within the shallow aquifer is directed from high bedrock to points of lower topography (**Rico Lake or Mclvor Lake**) (emphasis added) and is interpreted to be largely controlled by bedrock surface topography."⁴

and;

"West of the bedrock ridge groundwater flow is controlled by bedrock surface topography. Flow in this area occurs from points of high bedrock elevation within the ridge to areas of low elevation."⁵

Figures 2.1 (Site Plan) and 4.1 (Development Plan) show the rock quarry as a green dotted line extending along the south shore of Rico Lake. (attached) The report states:

“The rock quarry area, which is approximately 52,750 m² is shown on Figure 2.1. Drilling and blasting of rock for the production of quarry product is planned at an approximate rate of 40,000 tonnes per year. The rock cut in this area is planned to terminate at the elevation of the rim of the Pit [approximately 191(sic) amsl*]”⁶ *amsl = Above Mean Sea Level

The topography above Rico Lake in the green dotted line ranges approximately 200 m AMSL measured in Google earth. Rico Lake was measured by GHD on April 6, 2017 at 180.4 m AMSL.⁷

The metres AMSL measurements in the green dotted line identified in the report as “rock quarry” are missing from the report and need to be provided.

5. Drainage Figure 3.4 DRAINAGE AREA MAP AND STORMWATER MANAGEMENT WORKS should show surface drainage towards Rico Lake as shown in the photo in GW Solutions, Review of GHD Technical Responses Task 7 and Task 8 - Upland Landfill, Jan. 3, 2019, p. 8 (attached)

6. Unexplained source of high levels of metals (aluminum, barium, calcium, iron, magnesium, sulphur, and zinc) found in Rico Lake sediment:

Leilane Barbosa Ronqui (biologist) working at UBC at the time, produced a “Rico Lake – Sediment and Water Surface Assessment”⁸ report following an Oct. 11, 2018 Upland Excavating Ltd. sampling of Rico Lake sediment. (attached)

See attached, Rico Lake 2018 sediment sampling and a comparison of historical metal levels in nearby lakes “Sediment Rico Lake 2018/Historical Rieberger 1982-1987” Also, see Reiberger “Metal Concentrations in Bottom Sediments From Uncontaminated BC Lakes.”⁹

In February 2017, CREC sampled water flowing from Rico Lake to Mclvor Lake and found elevated Aluminum levels.¹⁰

Considering that Rico Lake drains into Mclvor Lake, Campbell River’s drinking water, an investigation to identify the source of inorganic chemical input (elevated metals) in Rico Lake sediment before approving a mine permit and reclamation with waste at the Upland Contracting’s site is required.

7. Upland-hired hydrogeologist Patrick Consulting Inc., City of Campbell River-hired Waterline Resources and CREC-hired GW Solutions did not find the bedrock ridge between Rico Lake and the aquifer to be competent.

“In my view, GHD’s assessment understates the relevance of the fractured bedrock in conveying groundwater from Rico Lake to the Sand and Gravel Aquifer beneath the Site. Groundwater flow through the basalt occurs via secondary porosity features (i.e., open fractures), and the basalt bedrock across the Site is typically fractured (refer to Figure 3, below), as reported on all GHD borehole logs drilled into bedrock, and as I observed in rock cores from MW15A-18 and in bedrock Outcrops during my Site visit.”¹¹

“GHD appears to have repeatedly mischaracterised the hydraulic connection between the bedrock aquifer and the sand and gravel aquifer in the pit area.”¹²

“The key initial assumption that the landfill was separated from Rico Lake, which is part of the regional drinking water supply, by a bedrock ridge has now been refuted. The fact that there is likely a direct hydraulic connection between Rico Lake and the Landfill site drastically changes the perspective and foundation of the project.”¹³

“The groundwater monitoring program should include locations along the western property boundary, in the bedrock and at the locations of the identified trough(s).”¹⁴

“Bedrock elevations between Rico Lake and the Pit were initially interpreted to range in elevations from 180 to 192 m AMSL. Based on new data collected, bedrock elevations between Rico Lake and the Pit are now observed to range between 170.5 to 191.1 m AMSL. A very narrow sand and gravel filled incised trough or crevice in the bedrock surface may exist northeast of BH13-18 and BH14-18.”¹⁵

A study is needed to identify how drilling and blasting will affect the fractures and trough(s) in the western bedrock ridge. See GW Solutions “Fractures in fractured Bedrock Aquifer Potential Scenario” Modified from GHD Figure 7.1A. (attached)

8. GW Solution’s recommendations regarding a Shallow Aquifer and excavation inside Upland’s pit are:

“GW Solutions urges the Campbell River Environmental Committee (CREC) to request the regulatory agencies (in particular BC Ministry of Forests, Lands, Natural Resource Operations and Rural Development–FLNRORD) to confirm or refute the presence of a shallow aquifer with a water table at or near the ground level at the base of the existing gravel pit.”¹⁶ and;

“Upland should be prevented from modifying (i.e., blast or excavate) the bedrock under the footprint of the proposed landfill to reduce the risk of direct hydraulic contact with Rico Lake.”¹⁷

9. Studies are needed to confirm or refute the presence of a shallow aquifer, including ground water tables, at the base of the existing gravel pit as recommended in #8 above.

10. CREC requests the BC Ministry of Energy, Mines and Petroleum Resources (MOM) not permit reclamation with contaminated soil or waste unless and until the potential risks identified by expert hydrogeologists (Waterline Resources Inc. and GW Solutions) have been properly investigated and addressed.

These professional hydrogeologists identified the potential risks as:

a. Ponding:

“According to GHD, the sand and gravel is thick under the pit (Figure 4), and its hydraulic conductivity 2 x 10-2 cm/s (Technical Response to ENV Review (Auth. No.:Pr-10807) Task 8).

With such a high hydraulic conductivity, water should not be ponding, and surface water is expected to infiltrate very rapidly through the pit floor.”¹⁸

“Water has been observed ponding on the pit floor. This may be due to the presence of more than one aquifer in the sand and gravel deposit. If the presence of two aquifers is confirmed in the sand and gravel deposit under Upland property, this should be considered to **a) assess whether Upland is meeting existing mining regulations in regard to protection of aquifers** (emphasis added) and b) assess how the presence of a shallow aquifer modifies the waste discharge application under review.”¹⁹ (photo attached).

“During Waterline’s January 22, 2019 site visit, significant ponding was noted in the base of the pit (Figure 7). The Upland staff indicated that the pond remains for most of the winter but the area is consistently dry in the summer (Terry Stuart and Mark Stuart pers. comm.). The cause of ponding in the pit needs to be further investigated as it appears to contradict GHD’s interpretation of high infiltration capacity. The layered structure of the sand and gravel aquifer visible in the south pit wall, should have prompted in-situ testing to determine the site-specific infiltration capacity even for the preliminary landfill design.”²⁰

“The landfill design presented by GHD (2018a) is reproduced as Figure 3 for reference purposes. It shows the base of the landfill sloping from an elevation of 168 m AMSL on the south side to **a sump elevation of 164 m AMSL** at the center of the northern edge of the landfill. As referenced in GHD’s DOCP report, **the Landfill Criteria for Municipal Solid Waste (ENV 2016) requires that the landfill base be maintained at a minimum height of 1.5 m above the groundwater table at all times. Insufficient water level data has been collected to demonstrate that groundwater levels will remain 1.5 m below the base of landfill.** (emphasis added) In fact, groundwater levels at MW4A-15 was measured at 165.9 m AMSL on the 6 April 2017, and at 165.2 m AMSL in MW4B-1 5 on the 11 September 2015 **which are above the design elevation of the sump and likely do not meet the ENV landfill criteria.** (emphasis added). It should be specifically noted that no groundwater level measurements have been collected in the months of November or December which are generally the two wettest months of the year in the Campbell River area based on the historical precipitation record (Government of Canada 2018).”²¹

b. Potential Contaminant Pathway to Mclvor and Rico Lakes:

“**There is a possibility that groundwater from the landfill area could migrate toward Rico Lake if the water level in Rico Lake fell below the ponded water level in the infiltration ponds or gravel pit,** (emphasis added) i.e. below 170 m AMSL under normal operating conditions or below 173 m AMSL if the gravel pit was flooded. In this case the water would only flow west toward Mclvor Lake if the Mclvor Lake level was lower than Rico Lake level. As noted above BC Hydro’s current minimum operational water elevation for Mclvor Lake is 174 M AMSL, therefore in a situation where Rico lake levels are low enough to induce groundwater flow from the landfill to Rico Lake the surface water gradient would most likely be from Mclvor Lake to Rico Lake. The potential for groundwater to be a pathway for contamination of Rico Lake could be mitigated by ensuring that the lake level is maintained above the water level in the infiltration ponds and gravel pit. Ongoing monitoring of water levels in Rico Lake and

the bedrock and sand and gravel aquifer would help clarify the nature of the hydraulic connection between the lake and the proposed landfill.”²²

It is a known occurrence that the lowering of the Campbell Lake system is already in progress as outlined in BC Hydro’s e-mail dated, April 3, 2019.²³

“The role played by the groundwater regime in the fractured bedrock aquifer still needs to be defined. This should particularly be taken into account in case of a catastrophic accidental event (e.g., resulting from a large earthquake) that would cause movement of landfilled waste and interruption of the drainage system (in addition to loss of integrity of the liner system). This scenario should be addressed (taking into account the time it would take to address and remediate the situation under such circumstances) and illustrated to confirm that the water quality of both Rico Lake and the receiving environment east of the landfill would not be affected”.²⁴

11. Missing groundwater information in the northeast corner of Upland’s site:

Mine excavation is not shown in the northeast corner of Upland’s site, yet the reclamation plan identifies that the northeast corner of the site is to be reclaimed. (attached)

The northeast corner of Upland’s site is approximately 191 m AMSL. (see 3rd quote in #4). Mclvor Lake is controlled by BC Hydro at approximately 177 m AMSL.

“The elevation of Mclvor Lake is partially controlled by BC Hydro’s Ladore Dam located on the northern shore of Mclvor Lake approximately 1.7 km northwest of Site. BC Hydro attempts to maintain a preferred water elevation at Ladore Dam between 176 and 178 m AMSL and has established and a minimum operational water elevation of 174 m AMSL (BC Hydro, 2016). Based on BC Hydro records, water elevations at Ladore Dam have fluctuated between 174.5 and 177.9 m AMSL since 2008.”²⁵

“Investigation of a potential shallow aquifer and groundwater elevation from the northeast corner of Upland’s site are not provided in the report. Investigation into potential groundwater flow from Upland’s northeast corner into Mclvor lake is required. See “Groundwater Regime Not Defined in NE Quadrant.”²⁶

Are the proposed swales sufficient to stop surface overflow from the northeast of Upland’s site into Mclvor Lake, Campbell River’s drinking water, in heavy rain events?

12. Groundwater elevation in mine plan areas is required.

Groundwater elevation for Area 2, Area 5, Area 1-2021, Area 1-2022, Area 1-202, the original landfill and the western and southwestern bedrock ridge are not provided in the report.

13. Drainage from the site east to Lost Lake, Cold Creek and the Quinsam River Hatchery unresolved:

“GW Solutions has completed a preliminary conceptual model of the subsurface. It has used the data provided by GHD to map the piezometric conditions. GW Solutions interpretation of the data does not

match GHD's interpretation. **GW Solutions estimates that groundwater moves in an east-northeast direction.**" (emphasis added)²⁷

See "Sensitive Receptors." ²⁸

See "Connection of the Site with Regional Groundwater." ²⁹

14. Background Sampling is needed:

"The groundwater monitoring program should include locations along the eastern property boundary, in particular along the northeastern boundary. This should be done to properly define the groundwater regime and groundwater quality baseline, and to differentiate potential impacts originating from Upland property and impacts associated with the regional landfill."³⁰

"The monitoring program should include water and sediment sampling of Rico Lake, as a control measure to confirm that Upland's activities are not affecting the regional drinking water supply."³¹

Background sampling is needed for offsite locations east, northeast and southeast of Upland's site as well as water and sediment sampling for Rico Lake as recommended by GW Solutions.

CREC requests the information in this letter is given serious consideration in your decision regarding Upland Contracting Ltd.'s mine plan application.

Sincerely,
The Campbell River Environmental Committee,
Per,

Leroy McFarlane, President, CREC

Attachments: Google Earth Photo; GHD Figure 2.1; GHD Figure 4.1; Highland Engineering and Surveying; GW Solutions Photo 1; GW Solutions Fractures in Fractured Bedrock Aquifer; GHD Figure 3.3; GHD Figure 3.4

cc: Jim Dunkley; Maryann Sloan; Upland Contracting Ltd.; Chris Osborne; Terri Martin; Matt Rykers; Leroy McFarlane; Michele Babchuck, MLA; Sonia Furstenau, MLA

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