TECHNICAL MEMORANDUM

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TO Derek Holmes
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MCNAB VALLEY PROJECT - GEOLOGICAL SETTING AND DESCRIPTION

1.0 INTRODUCTION

BURNCO Rock Products Ltd. (BURNCO) and 0819042 B.C. Ltd. are proposing to develop a sand and gravel pit, processing facility and marine barge load-out facility as primary components of the McNab Valley Aggregate Project (the Project). McNab valley is located on the western shore of Howe Sound immediately north of Gambier Island, and northeast of Gibsons, BC. See the McNab Valley Aggregate Project Description for additional details (Golder 2010a).

This memorandum provides a geological description of the setting, structure and composition of the site, to provide a geological basis of the site and to serve as context for other reporting.

2.0 SETTING

2.1 Site Location

The project site covers land on the west side of Howe Sound, a large fjord that extends north from its entrance on Burrard Inlet and the Strait of Georgia. The property is centered on Latitude: 49^0 28’ N Longitude: 123^0 23’W. Map coverage is provided by the 92G map sheet.

The location of the property is shown in Figure 1, and is within the New Westminster District. BURNCO and 0819042 B.C. Ltd own the subject property on a fee simple basis, it’s location is shown in Figure Z, and comprises the following lots:

- DL 6612
- DL 677
- DL 677A
- North 2775 feet of DL 677B Parcel A
- DL 7025
- DL 6657

2.2 Physiography

McNab Creek is a south-flowing drainage, approximately 12.7 km long, fourth order watercourse that drains directly into the marine environment of Howe Sound. The mountainous terrain that typifies the Coast Mountains also characterizes the McNab valley, with mountains that rise from sea level to elevations of approximately 1500 m. The McNab valley is broadly U-shaped in form.

McNab Creek currently occupies this glaciated valley, cutting into, mobilizing and redepositing sediments that are sourced from upstream.

The region is characterized by a coastal maritime climate, with mild winters, moderate summers and heavy precipitation.

3.0 GEOLOGY

3.1 Bedrock Geology

McNab valley is set within a series of primarily plutonic and metamorphic rock bodies of variable characteristics, generally known as the Coast Plutonic Complex. McNab Creek itself may occupy a fault system that distinguishes rocks to the west that are mapped by the Geological Survey of Canada (GSC) and the BC Geological Survey (BCGS) as metamorphic, from rocks to the east which are mapped as plutonic.

The granitic rocks generally correspond to a granodiorite composition, with some latitude of mineralogy. Occasional volcanic material, possibly dike rock, and finer-grained xenolithic rock is observed within or as a part of the granitic ‘package’ of rocks.

Metamorphic rock tends to comprise fine-grained metasedimentary rock, characterized by planar structure that is subfoliated; these rocks may correspond broadly to a meta-argillite, a low-grade slate or meta-siltstone. An existing claim for “slate” is located to the extreme southwestern corner of the BURNCO property.

These general rock types are observed in the mountains seen on either side of the creek, and are also observed in the sediments that comprise the alluvial fan in the lower ~ 1.0 km of McNab Creek.

A geological survey was undertaken in 1980 by Silverado Mining; however, their work concentrated on geochemical assays of samples collected throughout the McNab Valley.

3.2 Surficial Geology

The sediments in the valley exhibit characteristics of glaciofluvial outwash sediments for the most part. These have formed a valley fill that has encouraged the development of a u-shape to the McNab valley. The valley fill sediments are present as a series of terraces of varying elevation. In the upper terraces, the valley fill sediments are capped by till. In the lower terraces, the sediments appear to have an alluvial veneer. This is common in valleys on the BC coast.

In the lower reaches of McNab Creek (e.g., the lower 1 km of the channel), the stream has deposited a bed of alluvial sediments derived from erosion of the terraces upstream. This has formed a fan-delta at the mouth of the stream. The alluvial material associated with the stream channel overlies the glaciofluvial valley fill. McNab Creek is presently reworking these alluvial sediments and continues to build the fan-delta into Howe Sound at the mouth of the stream.

Surficial geologic materials within the valley range from thick deposits of sand and gravel, as observed within the fan-delta, to very thin veneers of silt and/or till materials, as exposed in the valley walls/slopes.

A series of geophysical seismic refraction lines, drillholes and test pits, combined with visual mapping indicates that the slopes of the valley are characterized by variable combinations of these granular materials, with thickness ranging from nil to several meters thickness, in some locations.

The bedrock surface on which the valley fill and subsequent fan-delta has accumulated is likely to be undulating and irregular, and the thickness of the deposit may range from approximately 50 to 100 m. The nature of the stratigraphy of the fan-delta is variable, with textural and compositional range consistent with the variable prevailing sedimentological and hydraulic conditions at the time and locale of deposition.

Sediment provenance reflects local bedrock geology, and is dominated by granitic rock, with some volcanic, and metamorphic components.

3.2.1 Fan-Delta Structure and Development

The fan-delta is approximately 1,250 m in width at the mouth, with a poorly-defined ‘apex’ that is located roughly some 2,000 m upstream. Its overall thickness has not been determined precisely, but it is thought to be on the order of 100 m, depending upon location within the fan-delta. Drillholes have a defined thickness of at least 50 m depths of sediments within the fan-delta. It currently extends into Howe Sound a distance of few hundred meters.

Fan-delta deposits that are progressively built up in these settings tend to begin with the initial deposition of very fine sediments at depth. The presence of shell fragments in some drillholes, reported in Stirland (1970), reflects the notion of the fan-delta’s origins by deposition into the ocean.

As additional sediment is supplied to the fan-delta, hydraulic sorting dictates that the fine sediments will be deposited at a greater distance, and that coarser material will be deposited in shallower water. The resulting prograded structure is typical of stream system fan-deltas, such that fines are often located near the bottom of a sequence, and coarser materials are deposited atop of the finer sediments.

As the prograding stream transports additional materials, the fan-delta develops further into deeper water. The stream supplying sediment to the fan-delta also tends to wander or migrate across the width of the fan-delta surface that it is developing. As a result, it is frequently observed that an interbedded, cross-bedded structure evolves.

Glacial/post-glacial outwash during the time of glacial decay within the valley is projected to have resulted in high water volumes and accompanying greater sediment transport capacity, such that thick deposits of quite coarse-textured materials resulted. Exposures of some of these former glaciofluvial deposits are observed on the flanks of the valley, and at the location of the first major bend in the creek upstream of its mouth. At this site, the stream has cut through these earlier glacial outwash deposits, exposing them and transporting the sediments downstream.

Interpretation of the sedimentary sequences observable in the terraces indicates a geologic history in which McNab Creek has incised into glaciofluvial valley fill over the post-glacial period (i.e., the last approximately 10,000 years), leaving till-capped glaciofluvial deposits exposed at or near surface, or overlain by more recent alluvial deposits along the past and current creek channels. Sediments from local erosion of the glaciofluvial deposits, as well as more recent alluvial sediments, have been deposited in the lower reach as a fan-delta structure.

Thus, the current understanding of the nature of the glaciofluvial valley fill and alluvial sediments on which the sand and gravel deposit of interest for the Project is located is that it has been built up by McNab Creek, and projects into Howe Sound. The model is that of a valley fill and fan-delta structure that has been built up over geologic time and progressively reworked by McNab Creek.

3.2.2 Exploration of Fan-Delta Structure

Prior to exploration efforts undertaken by BURNCO at the McNab site, a 1970 drilling program was undertaken by Stirland on behalf of Construction Aggregates Ltd. (now Lehigh Hanson). Stirland reported on the order of 34,000,000 metric tonnes of marketable aggregate products, and provided a proposed mining plan for this extraction.

Exploration of the McNab valley deposit by BURNCO was initiated in 2008, beginning with a series of test pits to assess ground conditions and provide samples for preliminary grain-size distribution characterization of samples. Following those efforts, additional test pitting work was carried out in 2009, along with a geophysical program of seismic refraction survey that was conducted on the western slopes of the valley above the stream.

In June 2010, a program of drilling was undertaken primarily on the fan itself, with samples taken from the site for further analyses. The results of the testing program conducted on the samples are provided in the Golder reports titled “Concrete aggregate assessment McNab Creek, British Columbia dated April 13, 2012” (Golder 2012) and “Summary Report on Sub-Surface Geology- Particle Size Distribution, BURNCO McNab Creek dated April 30, 2015” (Golder 2015).

3.2.3 Groundwater Channel Description – Exposed Deposit

A channel was constructed prior to BURNCO’s ownership of the property; it was sited in the middle of the glaciofluvial deposit in the valley as a groundwater channel for fisheries habitat and as compensation for aquatic habitat loss in other areas of Howe Sound by other proponents. The groundwater channel consists of a trough that has been excavated into the valley glacial fill sediments. The exposed sediments observed in the channel are typically sandy gravel and cobbles with small boulders to maximum observed sizes of about 0.5 m.

Throughout much of the channel length, fine sediments are observed to have been deposited in the bed of the channel (Golder 2010b). This suggests limited flow velocities are available to renew the habitat and flush the fine sediment clear. The channel appears to have limited diversity associated with the characteristics of known viable fish habitat (i.e., it flows fast enough to maintain a spawning gravel sized substrate – if flows are too slow, the substrate fills in with embedded fines, if the flow is too fast, the substrate erodes).

Given the generally low velocity flows in the groundwater channel, the channel sideslopes would not be subject to flow-based erosion at the toe of banks, but to gravity-related surface failures (Golder 2010c). Surface erosion by runoff is also likely to be low, given the porous nature of the valley sands/gravels, but gravity-induced failure of the loose sediments on the relatively steep sideslopes (approximately 3H:1V) of the channel may occur. The characteristics of the deposit around the channel and the size of material on the slope of the channel banks suggests the channel is an efficient deposition zone for finer sediments eroded from the channel sideslopes. The channel therefore would have a short lifespan as viable fish habitat, possibly already exceeded and independent of vegetation cover, complexity, temperature, or fish food sources.

4.0 INTERPRETATION OF GEOLOGIC DATA

In general, the surficial geologic data indicates that the upper portion of the deposit is or can be frequently characterized by very coarse material, with boulders to 1.5 m diameter or more. In this zone of the deposit, the sand fraction of the sediments (i.e., the minus 4.75/5.0 mm size fraction) is commonly quite coarse, with Fineness Moduli of >3.0 noted.

Additionally, some significant zones of silt were encountered in drilling in the upper 10 m of the deposit, in some drillholes.

Overall, the drilling exploration encountered sand and sand-and-gravel units throughout much of the “target” area for potential aggregate extraction, with sand:gravel ratios on the order of 1:1, and minimal silt/fines contents.

4.1 Engineering Quality

The assessment of the engineering quality of the sand and gravel samples is provided in the Golder report titled “Concrete Aggregate Assessment, McNab Creek Project dated April 13, 2012”. Previous work suggests that the overall quality is reasonable and would provide for an economic aggregate resource, subject to selection and use of appropriate processing equipment.

5.0 CONCLUSIONS

The geological assessments conducted to date suggest that the fan-delta deposit in the McNab valley consists predominantly of layered, typically granular glaciofluvial soils deposited within the valley during the time of glacial decay. During this glacial/post glacial period, water volumes and accompanying greater sediment transport capacity would have been much greater than that at present, such that thick deposits of quite coarse-textured materials resulted.

Subsequently, McNab Creek has locally incised into and reworked some of the upper portions of the glaciofluvial valley fill deposits over the post-glacial period (i.e., the last approximately 10,000 years), in addition to transporting generally granular sediments from higher terrain along the upstream reaches of the creek. These reworked glaciofluvial and recent alluvial sediments have been deposited in the lower reach as a fan-delta structure

The predominantly glacial/post glacial glaciofluvial deposits within the McNab valley presents a resource of potential aggregate material of significant volume, and of reasonable engineering quality.

6.0 CLOSURE

We trust that the information in this technical memorandum is sufficient for your needs at this time. Should you have any questions please do not hesitate to contact the undersigned.

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7.0 REFERENCES

Golder 2010a. McNab Valley Aggregate Project, Howe Sound, BC, Project Description. October 6, 2010. Submitted to BC Environmental Assessment Office, Victoria, BC. 17p. Appendices A, B and C.

Golder 2009. McNab Groundwater Channel Technical Review. December 11, 2009. Submitted to BURNCO Rock Products Ltd. 8p.

Golder 2010b. McNab Groundwater Channel Fisheries Technical Review: Fisheries Update. October 6, 2010. Submitted to BURNCO Rock Products Ltd.

Golder 2010c. McNab Groundwater Channel Geotechnical Review. Submitted to BURNCO Rock Products Ltd.

Golder 2012. Concrete aggregate assessment McNab Creek, British Columbia. April 13, 2012. Submitted to BURNCO Rock Products.

Golder 2015. Summary Report on Sub-Surface Geology- Particle Size Distribution, BURNCO McNab Creek. April 30, 2015. Submitted to BURNCO Rock Products.

Stirland, H.R. 1970 Sand and Gravel West of McNab Creek, B.C. Located on District Lots 677, 677A and TL 7566. Report for Construction Aggregates Ltd. File 11-12, January 1970.