RGC
Rock Glen Consulting

MEMORANDUM

To: Peter Mortifee
6771 Indian Rock Road
Naramata, BC
V0H 1N1

Date: October 7, 2020

From: Paul Glen, P. Eng.
Rock Glen Consulting Ltd.
Okanagan Falls, BC

File: RGC-3076

Subject: ***New Dock Hydrotechnical Report***
6771 Indian Rock Road, Naramata, BC

SUMMARY

The proposed location of a new dock to replace an existing dock with deteriorating wooden pilings is considered to be acceptable from a hydrotechnical point of view. Notwithstanding that the flood events of 2017 and 2018 added significant material to the Chute Creek delta, the planned new dock is situated beyond the terminus of the present delta.

Episodic large flood events are the primary source of new material and morphological changes on the Chute Creek delta. Wind action is not considered to significantly impact the delta configuration.

Continuing seasonally high Okanagan Lake levels would likely necessitate some form of weighting to protect the new dock decking. In this regard, RGC understands that decking designed to allow water movement through it will be used for this installation.

1.0 Introduction and Background

The existing dock at 6771 Indian Rock Road is in need of repairs due to rotting timber support piles. The current dock is located too close to the south property line of the subject property and is not allowed to be repaired and remain in its present location. Accordingly, a new dock will be constructed several metres to the north. The proposed new dock location is shown on a Topographic Survey plan attached to this report.

The new dock will be situated along the southern edge of the small delta that has formed at the mouth of Chute Creek.

Chute Creek currently discharges into Okanagan Lake through a concrete flume constructed when the Chute Creek fan area was subdivided in the 1960s. The concrete flume discharges the flow of Chute Creek across the fan and into Okanagan Lake.

Substantial damage occurred at the outlet of the Chute Creek flume during high runoff flows in Chute Creek in 2017 and 2018.

Riprap protection works were installed at the outlet of the Chute Creek flume in March 2019 to protect the integrity of the Chute Creek flume and reduce the potential for flooding and erosion for adjacent properties.

Riprap was placed several metres to the southwest of the concrete flume outlet to create a wider channel downstream of the flume to guide discharge flows westward to the lake and to provide an outlet channel that does not restrict the flow capacity of the flume and lowers flow velocities beyond the flume to reduce erosion and scour potential.

Given the proximity of the Chute Creek delta to the proposed new dock, Mr. Yi Li, P.Eng., Assistant Water Manager of the Thompson Okanagan Region of the Ministry of Forests, Lands, Natural Resource Operations and Rural Development (MFLNRORD) requested that a hydrotechnical report be completed to assess potential impacts to the new structure from flood flows, wave action and sediment movement on the delta.

A topographical and bathymetric survey of the Chute Creek outlet and adjacent delta area was completed on March 25, 2019 by McElhanney Associates Land Surveying Ltd. (McElhanney) from Penticton, BC. A copy of this topographic survey plan is attached to this report.

2.0 Description of the Chute Creek Delta

The present configuration of the Chute Creek delta is shown on the attached McElhanney survey plan. An examination of this plan shows the terminus of the Chute Creek concrete flume with an east-west outlet channel flanked along both the north and south sides by large boulders. Along the south side, these boulders terminate some 12 to 13 m west of the concrete while the north side has large boulders extending about 20 m beyond the end of the flume.

Photos attached to this report show these prominent boulder lines. Photo No. 3 with a mid-summer lake level shows clearly the relative height of these boulder lines that guide water flowing out of the Chute Creek flume westward across the delta out to Okanagan Lake. The survey plan shows that the higher portions of these boulder lines extend up almost to elevation 343 m.

Flood events on Chute Creek in 2017 and 2018 deposited large quantities of rocky debris onto the Chute Creek delta, extending the delta to the size shown on the attached McElhanney survey plan.

This reach of Okanagan Lake is oriented in a NW – SE direction. The maximum fetch distance for northerly summer winds to impact the Chute Creek delta is about 12 km. Southerly winter winds have a maximum fetch length that could impact the Chute Creek delta of 17 km.

The average elevation across much of the delta is about 342 m. Photo No. 2, taken at a low lake level in spring 2020, shows approximately where the 342 m contour is situated on the delta with a portion of the delta extending under the present dock.

The regulated high water level on Okanagan Lake is 342.6 masl (metres above sea level) with the corresponding regulated low water level elevation of 341.3 masl. This means that during the winter months, when prevailing winds typically blow from the south, much of the delta surface is above water levels so that any sediment shifted during the winter would be limited to the peripheral areas of the delta.

Conversely, in the summer months, with typical water levels at or above 342.5 masl, most of the delta would be submerged allowing the predominant northerly winds during this season to impact the shoreline. However, the overall configuration of the delta, with very coarse gravel to cobble and boulder sized materials, would not be significantly modified by wave action.

In summary, the shape, size and configuration of the Chute Creek delta is most significantly affected by flood events on Chute Creek and not by wind action. Recently deposited flood debris will likely continue to experience some rearrangement during subsequent spring runoff events. High flood flows similar to 2017 will deposit additional materials on the delta.

3.0 New Dock Design

Dock design drawings for the replacement dock at 6771 Indian Rock Road in Naramata, prepared by Shoreline Pile Driving & Boat Lifts (SPDBL) are attached to this report. They show a dock similar in shape and length to the existing dock but several metres north of the current dock in order to meet 5 m setback requirements from the adjacent property line. This dock location has been added by RGC to the attached topographical survey plan.

The new dock profile, as presented by SPDBL, shows the underside of the dock decking would be situated at 343.1 masl. By comparison, the maximum lake level was 343.251 masl in 2017 and 342.5 masl in 2018. The 2019 maximum lake level was just under 342.2 masl, with a 2020 maximum lake level of 342.7 masl.

It should be noted that the Okanagan Lake full pool elevation of 342.48 masl was exceeded in 3 of the last 4 years. RGC understands that the present dock has had to be weighted down to protect the deck from lifting. This may continue to be required if the current high spring lake levels continue.

4.0 Conclusions and Recommendations

The proposed location of a new dock to replace an existing dock with deteriorating wooden pilings is considered to be acceptable from a hydrotechnical point of view. Notwithstanding that the flood events of 2017 and 2018 added significant material to the Chute Creek delta, the planned new dock is situated beyond the area of the delta.

Episodic large flood events have the most significant impact on the morphology of the Chute Creek delta with wind action considered a minor factor impacting the delta configuration

Continuing seasonally high Okanagan Lake levels would likely necessitate some form of weighting to protect the new dock decking.

RGC understands that decking designed to allow water movement through it will be used for this installation.

5.0 Closure

This report was prepared for Mr. Peter Mortifee for the planned replacement of an existing dock extending into Okanagan Lake from property at 6771 Indian Rock Road north of Naramata B.C.

This assessment work was completed following generally accepted engineering practice. No other warranty, expressed or implied, is intended.

Please contact us if you have any questions regarding this work.

Yours truly,

Paul Glen, P.Eng.
Rock Glen Consulting Ltd.

Attachments: 1) Photos

2) McElhanney Drawing No. 3654-00-V-TOPO
Topographic Survey (March 25, 2019) annotated by RGC

3) Shoreline Pile Driving and Boat Lifts Dock Design Drawings – Plan and Profile

Photo No. 1: Chute Creek delta with existing Mortifee dock. (April 10, 2020)

Photo No. 2: View of Chute Creek delta from end of existing Mortifee dock. (April 10, 2020)

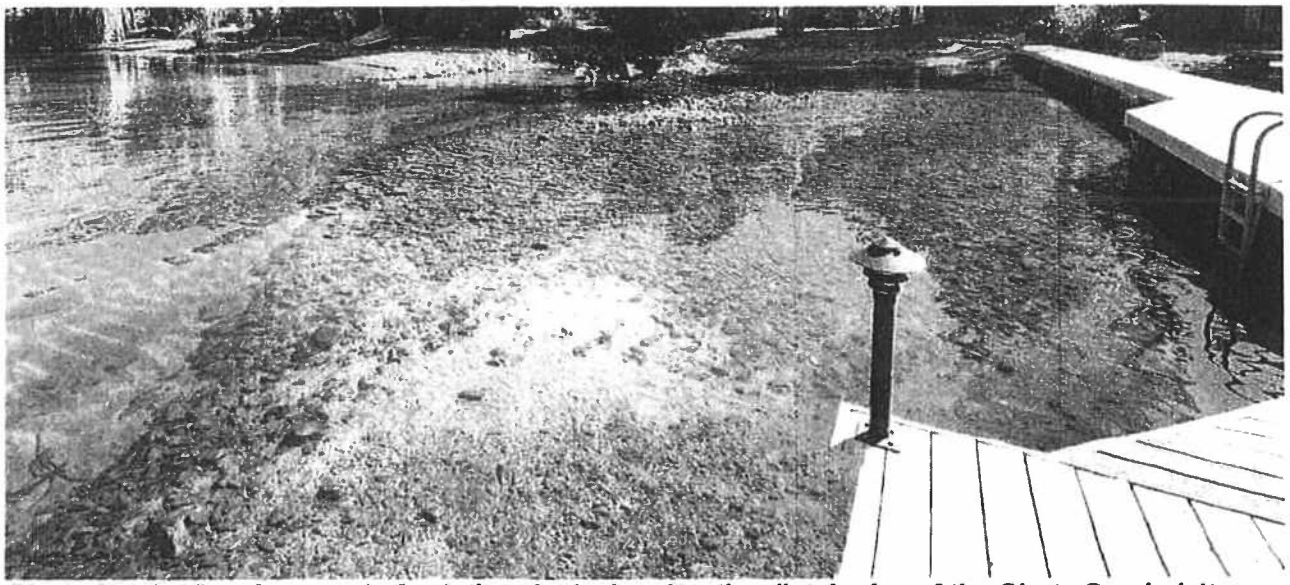

Photo No. 3: View from end of existing dock showing the distal edge of the Chute Creek delta. (August 14, 2020)