

## Attachment D – Ritchie Brook Memo

**Project:** 17052

**Date:** November 17, 2017

**To:** Luke Dempsey, City of Kelowna

**Subject:** Ritchie Brook Feasibility Study Scope – Interim Deliverables

This memo addresses the following interim deliverables for the Ritchie Brook Study to daylight portions of Ritchie Brook within the Capri-Landmark Plan area:

1. Identify two cross-sections for the Ritchie Brook corridor as shown on the plan on page 3: a basic cross-section to allow for long-term maintenance and basic public access and a cross-section in areas that are less constrained that provides greater stormwater benefits and a neighbourhood amenity.
2. Provide rationale, dimensions and high level cost per metre estimate for the proposed cross-sections
3. Identify issues with the alignment of the corridor (between Burtch and Dayton). Also, if necessary identify alternative alignment for this constrained section to support feasibility and implementation.
4. Investigate flow levels expected for Ritchie Brook under the recommended Daylighting corridor and cross-sections.
5. Quantify the anticipated stormwater benefit for the proposed daylighting corridor and cross-sections identified.

### **1. Cross sections**

Cross section A (page 3) illustrates a typical location where the alignment would be constrained between existing development.

At cross section A, where the right of way may be constrained, the width of the right of way would be a minimum of 15 m. The channel cross section would have a bottom width of 1 m with 2:1 sideslopes and a top width of 5 m. The channel would be situated on one side of the right of way allowing for a 10 m wide access route on the other side that would include the walking trail and access for equipment if required for maintenance. A preliminary cross section is provided on page 3.

### **2. Channel design rationale and Class D construction cost estimates for channel Burtch and Dayton**

The recommended channel cross section of 1 m bottom width, 2:1 sideslopes with a depth of 1 m and a slope of 0.5% would provide a channel capacity of ~8 m<sup>3</sup>/s which would be far in excess of the expected maximum design flow.

The Class D costs to construct the channel, including lining with riprap is ~\$375/m. Assuming a 5 m wide walking/access trail, the estimated cost would be ~\$50/m. It is important to note that the cost estimates do not include any costs to remove and dispose of any existing pipe on this route, any required land acquisition and any demolition of buildings within the new corridor if this is required.

### **3. Potential issues with Burtch/Dayton alignment corridor**

There may be an issue securing the necessary 15 m width for the channel corridor between Burtch Road and Dayton Street with the existing development. If a 15 m wide corridor was not available, then the design may be modified to fit. It is important that the corridor have sufficient width to allow for the required channel capacity plus access for equipment.

#### **4. Flow levels in daylighted channel**

The Central Area Drainage Plan (2008) provides an estimated base flow for Ritchie Brook of  $0.018 \text{ m}^3/\text{s}$  that would have an estimated depth of  $\sim 0.2 \text{ m}$ . The report also provides a maximum storm flow at Burch Road of  $1.4 \text{ m}^3/\text{s}$  that would have a depth of  $\sim 0.50 \text{ m}$ .

#### **5. Stormwater benefits from daylighting**

The anticipated stormwater benefits from daylighting Ritchie Brook are:

- Reducing flooding impacts on Mill Creek from Ritchie Brook by detaining storm water within stormwater ponds in the daylighted catchment.
- Reduced storm drain system and maintenance costs.
- Improved water quality of water released into Mill Creek through additional filtration and capture of pollutants and nutrients in stormwater ponds and open channel.
- Ecological benefits from open channel flow versus piped flow.

In summary, the proposed cross section reflects a constrained 15 metre right-of-way with a top channel width of 5m. Channel design rationale provides a capacity of  $8 \text{ m}^3/\text{s}$  and class D construction cost estimates are approximately \$375 per lineal metre of constructed channel. Potential conflicts with existing developments will be explored in further analysis. The base flows of Ritchie Brook from the Central Area Drainage Plan (2008) are reasonably similar to areas of Brandt's Creek. In cases where Ritchie Brook flows are lower, velocities may be increased by decreasing the width of the channel. The stormwater benefits include improved water quality, additional conveyance capacity with open channel drainage course and options to include off-stream storage.

Future analysis will include the some of the following tasks:

- Estimate the quantifiable anticipated stormwater management and flood mitigation benefits from daylighting the corridor.
- Class D cost estimates to design, construct and maintain the proposed daylighted stream and corridor.
- Determine any implications to the corridor concept of the redesign of Sutherland Avenue to connect with Dolphin Avenue.

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Attach.

Cross Section A: Preliminary Cross Section for Ritchie Brook Stormwater Gardens

