

# Management Plan

## Newport Landing Stormwater Discharge

**Prepared for:**

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**Prepared by:**



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**Project No.: 586-01-02**

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## 1 Background

### 1.1 Project Overview

Newport Land Ltd. and their general contractor Kerkhoff Construction Ltd. are developing a 29 townhouse project on their lands at 38684 Britannia Avenue, in Squamish BC. As part of the development, a Stormwater Management Plan has been prepared by Omega & Associates Engineering Ltd. (Omega). As shown on the attached General arrangement Plan (Omega drawing No. 14.161.Sk.01), the Stormwater Management Plan includes three infiltration trenches, and an infiltration swale. Infiltration will accommodate storm water flows up to the 10 year return period after which water that cannot be infiltrated being discharged at a controlled rate to Britannia Slough via a 250 mm diameter pipe.

The stormwater discharge will travel through approximately 25 m through District of Squamish owned land ( for which the proponent has permission) and then will traverse approximately 10 m through crown land to Britannia Slough (Photos 1).



Photo 2: Looking east from the Newport landing property through the riparian vegetation adjacent to Britannia Slough

### 1.2 Investigative Work

Investigative work included Omega preparing the Stormwater Management Plan, and Cascade Environmental Resource Group Ltd. (Cascade) preparing and submitting a Water Act notification for the proposed stormwater discharge, and compilation of the information contained in this document.

### 1.3 Confirmation of Safety Plan

The general contractor, Kerkhoff Construction, have been in business since 1968. They will follow all applicable Worksafe BC procedures during construction of the storm sewer. Post construction, the maintenance of the storm sewer will be the responsibility of the District of Squamish, who will follow their standard operating procedures.



#### 1.4 First Nations

The lands fall with the traditional territory of the Squamish Nation. There is no known heritage or traditional use values associated with this property. If any archaeological artifacts are encountered during the installation of the stormwater line, all work will be halted immediately to allow for survey and retrieval by a professional archaeologist.

## 2 Location

#### 2.1 General Description

The applicable section of stormwater statutory right-of-way is located immediately west of 38684 Britannia Avenue in the District of Squamish, within the polygon shown on the attached plan, with the following boundaries:

Northwest corner	49.709652 (lat.)	-123.151809 (long.)
Northeast corner	49.709676 (lat.)	-123.151658 (long.)
Southeast corner	49.709632 (lat.)	-123.151642 (long.)
Southwest corner	49.709613 (lat.)	-123.151759 (long.)

#### 2.2 Location Justification

The chosen location is the shortest distance through the Britannia Sough riparian area, and avoids cutting any trees.

#### 2.3 Seasonal Justification of Use

The buried stormwater line will be required to be functional as an emergency overflow on a year round basis.

## 3 Infrastructure

#### 3.1 New Facilities or Infrastructure

As shown on Omega drawing no. 14.161.Sk.02, new infrastructure will include installation of 0f 38.4 m of 250 mm storm drain pipe from a manhole adjacent to the development to an outlet on Britannia Slough, with 7.5 m of the stormwater pipe within crown land. The storm drain will outlet through a precast concrete headwall, armoured with 200 mm diameter riprap.

#### 3.2 Access

Access will be via municipal road from Buckley Avenue.

#### 3.3 Utilities Requirements and Sources

The storm drain pipe is a municipality utility required for the project.

#### 3.4 Water Supply

Water is supplied to the development via existing services and the subject lands are not affected.



### 3.5 Waste Collection, Treatment and Disposal

The subject lands will not be used for waste collection, treatment or disposal.

## 4 Environmental

### 4.1 Land Impacts

#### 4.1.1 Vegetation Removal

The location of the pipe is designed to avoid the need to cut any trees within the riparian area beside Britannia Slough (Photos 2 & 3). Vegetation to be removed for installation of the stormwater drainage pipe would be limited to that essentially required to install the pipe (estimated at 3-4 m wide), and presently includes a very sparse cover of juvenile bigleaf maple (less than 2 cm dbh), salmonberry, sword fern and horsetail, with invasive periwinkle. After installation of the pipe, the disturbed area would be capped with a suitable growing medium and then planted with native riparian species on 0.5 m centres. Plant species to be used for rehabilitation of the site would include salmonberry, vine maple, snowberry, red-osier dogwood, among other native species.



Photo 2: Looking east from approx. manhole 7 to discharge point on Britannia Slough. Approx. discharge pipe location shown in blue.



Photo 3: Looking west from the discharge point on Britannia Slough to approx. manhole 7. Approx. discharge pipe location shown in blue.

#### 4.1.2 Soil Disturbance

Soil disturbances will be limited to the excavation of the trench of the installation of the storm drain.





#### **4.1.3 Riparian Encroachment**

The works will entail encroachment in the riparian area of Britannia Slough. A Water Act notification has been filed in conjunction with this application (Tracking Number 100150803).

#### **4.1.4 Pesticides and Herbicides**

No pesticides or herbicides will be used.

#### **4.1.5 Visual Impacts**

No trees will be cut, and the disturbed area will be promptly replanted with shrubs on completion of the works to mitigate visual impacts.

#### **4.1.6 Archaeological Sites**

There are no known archaeological sites; however, the area of crown land has been previously impacted by an old access road,

#### **4.1.7 Construction Methods/Materials**

The storm drain will be installed using conventional construction equipment. An excavator will create a trench, salvaging and stockpiling the top soil material. The 250 mm diameter pipe will then be installed in bedding material (sand or fine gravels, as specified by the engineer). The trench will then be backfilled, with the final lift of material being the stockpile topsoil. The area will then be replanted with native riparian vegetation as specified by the environmental monitor.

#### **4.2 Atmospheric Impacts**

No impacts to the atmosphere are anticipated.

#### **4.3 Water or Land Covered by Water Impacts**

##### **4.3.1 Drainage Effect**

All of the works will be conducted in isolation of Britannia Slough by installation of a steel plate (or similar) along the wetted edge of the slough during construction of the outlet. A precast concrete headwall will be used to eliminate the need for pouring concrete near the water course. No impacts to the watercourse are anticipated.



Photo 4: Stormwater discharge location on Britannia Slough.



#### 4.3.2 Public Access

The public can currently access the site via public roads and the Discovery trail, which parallels Britannia Slough (Photo 5). Other than a temporary disruption during the actual installation of the storm drain, public access will not be curtailed in the area. After construction the trail tread will be returned to its current condition.



Photo 5: Looking north at the Discovery trail with Britannia Slough to the right (looking upstream) from the approximate location of the stormwater discharge pipe crossing of the trail. The townhouse project is located to the left of the photo.

#### 4.3.3 Flood Potential

The installation of the storm drain will not exacerbate the flooding in the area, nor will it be affected by flooding in the area. The onsite drainage infiltration system is designed to infiltrate waters up to the 10 year storm, and then release excess waters at a controlled rate.

#### 4.4 Fish and Wildlife Habitat

Fisheries Information Summary System (FISS) records do not exist for the Britannia Slough, however, the slough ultimately drains into the Mamquam Blind Channel, for which FISS records include coho salmon (*Oncorhynchus kisutch*), cutthroat trout (*O. clarkii clarkii*), lamprey (*Petromyzontiformes* spp.), and threespine stickleback (*Gasterosteus aculeatus*) (MOE, 2015). Britannia Slough is part of the Mamquam Reunion project, a multi-agency initiative to increase fisheries habitat in the central Squamish area. The project diverts water from the Mamquam River, approximately 3 km northeast of the subject property, through a series of enhancement channels, before the water is directed into Britannia Slough, and then the Mamquam Blind Channel. These upstream habitat enhancement efforts centred primarily on coho salmon spawning and rearing habitat, but chum (*O. keto*) and pink salmon (*O. gorbuscha*) have also been found in the system, as have rainbow and cutthroat trout, threespine stickleback and lamprey.

The riparian vegetation presently includes a very sparse cover of juvenile bigleaf maple (less than 2 cm dbh), salmonberry, sword fern and horsetail, with invasive periwinkle under a canopy of young red alder, with occasional black cottonwood. Invasive Himalayan blackberry is also common in the area. The riparian vegetation is anticipated to provide habitat for small mammals, song birds and amphibians that occur in similar habitats in the Squamish area.

Impacts to fish and fish habitat will be avoided by following best management practices and the construction procedures outlined above in sections 4.17. and 4.3.1; specifically working in isolation of the waters of Britannia Slough, avoiding the cutting of trees, and prompt revegetation of the area with native riparian shrubs.

## **5 Socio-Community**

### **5.1 Land Use**

The project lies within a developed area of Squamish. The Discovery Trail is located immediately beside Britannia Slough in this area, and other than temporary disruptions during construction, the trail will not be affected.

#### **5.1.1 Land Management Plans and Regional Growth Strategies**

The Newport Landing townhouse project is in keeping with the zoning of the area.

### **5.2 Socio-Community Conditions**

#### **5.2.1 Adjacent Users or Communities**

Other than the temporary disruption to the trail, the storm drain will not impact adjacent users of the local community.

#### **5.2.2 Existing Services**

As shown on the attached Omega drawing no. 14.161.SK.01 and 14.161.Sk.02, a municipal watermain is located in the immediate vicinity of the proposed works. The proponent is aware of the watermain's location, and the storm drain is designed to avoid impacts to that infrastructure by providing for proper separation. Due diligence will be taken during the storm drain installation.



**CASCADE ENVIRONMENTAL**  
RESOURCE GROUP LTD

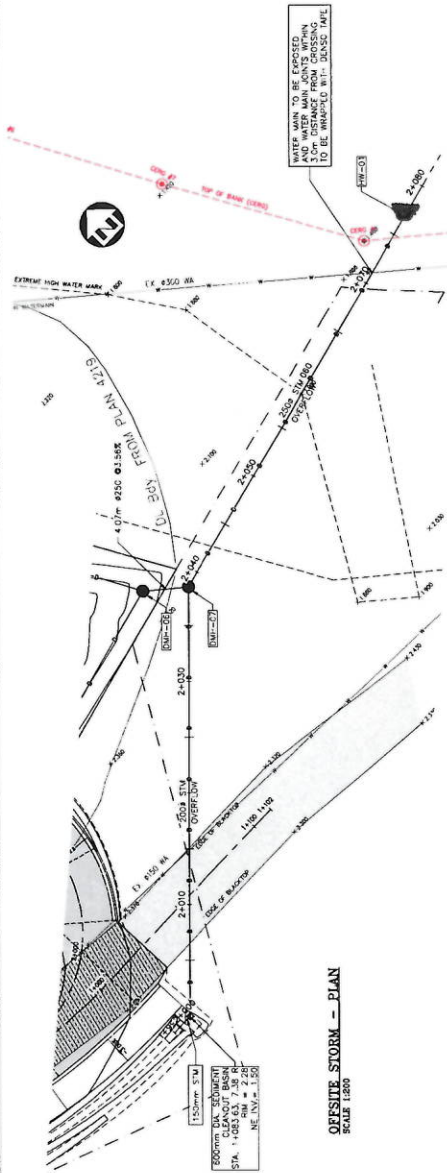
## **Appendices**

Omega & Associates Engineering Ltd. Drawing No. 14.161.SK.01

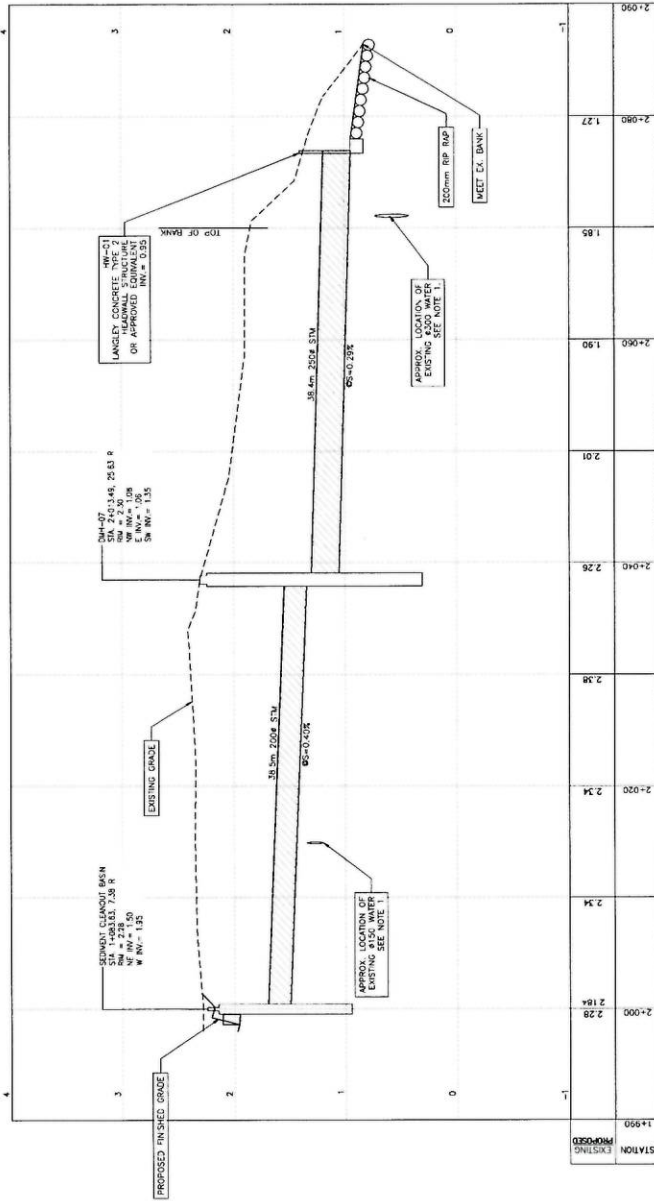
Omega & Associates Engineering Ltd. Drawing No. 14.161.SK.02







OFFSITE STORM - PLAN  
SCALE 1:800



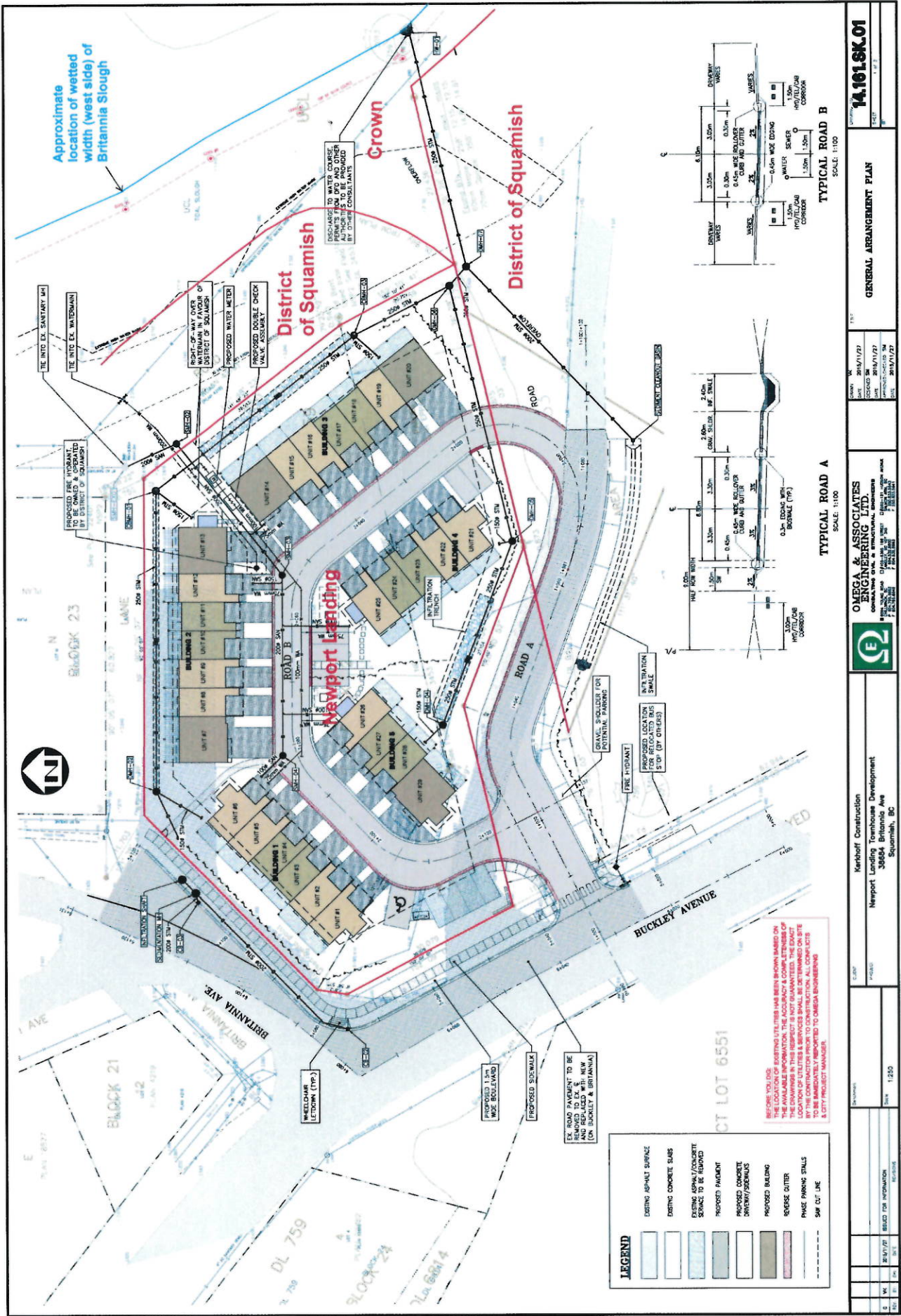
OFFSITE STORM - PROFILE  
SCALE 1:50

NOTES:

1. LOCATION AND ELEVATION OF EX. WATER MAINS TO BE FIELD VERIFIED AND RECORDED TO OMEGA PRIOR TO CONSTRUCTION FOR FUTURE DESIGN CHANGE.

SHEET <b>14.161.SK.02</b> OF 3		TITLE <b>STORM SYSTEM DISCHARGE PLAN &amp; PROFILE</b>	
CLIENT Kerkhoff Construction Newport Landing Townhouse Development 3884 Britannia Ave Squamish, BC	PROJECT 2014/11/21 2014/11/21 2014/11/21	DESIGNER OMEGA & ASSOCIATES ENGINEERING LTD. 1000 10th Ave Vancouver, BC V6H 2G6 TEL: 604-271-8888 FAX: 604-271-8889 WWW.OMEGA-BC.COM	DATE 2014/11/21 2014/11/21 2014/11/21





14.161SK.01

GENERAL ARRANGEMENT PLAN

DATE: 2014/1/27  
CHECKED BY: 2014/1/27  
DATE: 2014/1/27

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