District of Maple Ridge

Albion Flats
Storm and Sanitary Offsite Servicing Requirements

Prepared by:

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60161301

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1. BACKGROUND

The District is co-ordinating a community process to develop a concept plan to guide development in the Albion Flats. Currently, the Albion Flats is mostly within the Agricultural Land Reserve (ALR) in the District of Maple Ridge and is bounded by 240 Street to the east, Lougheed Highway to the south, and Tamarack Lane to the north and west. This Memorandum addresses the offsite sanitary sewer and drainage servicing element for the Albion Flats concept plan. Upon completion of the concept plan further analysis of servicing within the Albion Flats should be completed.

For the purpose of this report a variety of intensified land uses were considered to assess the offsite upgrades and magnitude of cost to address the additional capacity requirements. The following three land use scenarios were based on intensity of land use on the site:

Scenario A (51% impervious/PDWF 57.8L/s) – includes intense land uses such as the following:

- Commercial Centre with large scale retail,
- Multi-Family Residential including townhouse and garden apartment (4 storey) forms,
- Industrial park,
- Agricultural with accessory processing such as greenhouse, or irrigation system, and
- Incorporates existing fairgrounds and recreational facilities.

Scenario B (40% impervious /PDWF 27.8) – moderate intensity land uses including:

- Commercial in a boutique style complex,
- Townhouse and single detached residential housing,
- Non-irrigated agricultural uses, and
- Expansion of outdoor recreational facilities such as the fairgrounds and playing fields.

Scenario C (15% impervious/PDWF 27.8) – Low Intensity land uses including:

- Large lot single detached residential, and
- Expansion of additional outdoor recreational facilities such as the fairgrounds and playing fields.

2. DRAINAGE INFRASTRUCTURE

2.1 Existing Conditions

The Albion Flats study area lies within the Spencer Creek watershed and drains to a system of natural and channelized ditches including Spencer Creek. Spencer Creek outfalls to Kanaka Creek through a pump station, located north of Lougheed Highway and just east of Tamarack Lane (see Figure 1 showing the study area).

The pump station consists of a floodbox, and three (3) submersible pumps. The operation of the pump station is dependent upon the Kanaka Creek and Fraser River water levels. The floodbox provides the primary conveyance component during non-freshet periods and is currently being upgraded to include a sluice gate for increased control of the upstream and downstream water levels. The pumps operate primarily during spring freshet (May until September) and during heavy rainfall events. During the freshet, the pump station capacity is limited to the discharge rate of the three pumps (i.e. there is zero outflow through the floodbox). The Albion Master Drainage Plan, prepared in 2004 by AECOM (formerly Earth Tech), indicated that the maximum pumping capacity of the station is 2.4 m^3/s. The capacity of the floodbox is substantially greater and is dependent on the downstream Fraser River water level and upstream creek water levels.

2.2 Drainage Assessment

The analysis for this study was completed using a drainage model developed by AECOM for the 2004 Master Drainage Plan. New information that was collected and reviewed for the Albion Flats concept plan included the proposed development footprint, creek buffers, and any major modifications to existing ditches, culverts and storm sewers. Drainage system improvements include the construction of the 240 Street high flow diversion sewer.

This assessment was completed using the "Future" model scenarios given that there has been significant development in the Albion Watershed.

2.3 Drainage Summary

A summary of the model predicted peak flows upstream of Spencer Creek Pump Station for the 10-year and 100-year events are provided in Table 1. In addition, we have provided recommendations for improvements to meet existing drainage conditions.

Table 1 – Spencer Creek at Pump Station Peak Flows

Scenario	Average Imperviousness (Albion Flats area only)	1:10-Year Flow (L/s)	1:100-Year Flow (L/s)	Recommended Works	Estimated Cost
A	51%	5,998	9,323	• Construct a detention pond with volume of 26,000m^3 OR • Upgrade Spencer Creek pump station	$3,120,000 $2,500,000
B	40%	5,806	9,056	• Construct a detention pond with volume 22,000m^3 OR • Upgrade Spencer Creek pump station	$2,640,000 $2,500,000
C	15%	4,368	7,814	• Construction of detention pond with volume of 6,000m^3	$720,000

As shown in Table 1, the proposed Albion Flats development will increase stormwater runoff rates and impact the downstream drainage system unless adequate measures are implemented. In order to service development one of the two improvement options below is require for this development:

- Construction of on-site detention ponds or wetland areas with active storage volumes as noted above. The proposed volumes would require significant footprints due to the shallow groundwater table.
- Upgrade the Spencer Creek pump station to have increased capacity in excess of the future 10-year peak flow with spare pump(s) for emergency backup.

The use of on-site best management practices (BMP's) will not significantly reduce peak flows and servicing requirements because of the high groundwater level, low infiltration soils and because these measures are not effective for major storm events.

In order to accommodate future changes in agricultural use in the Albion Flats a detailed review of the pumping requirements and water levels should be completed.

3. SANITARY INFRASTRUCTURE

3.1 Existing Conditions

The review of sanitary infrastructure requirements included an assessment of the capacity of downstream sanitary sewers, under the 2031 future land-use scenario, up to the Metro Vancouver South Slope Interceptor Trunk Sewer the intersection of Lougheed Highway, Kanaka Way and Haney Bypass. Information from the 2002 Maple Ridge Master Sanitary Plan (AECOM 2002, formerly EarthTech) was used to assist with this analysis.

In the 2002 report, the future (2020) population scenario was based on a total District population of 140,736 which is greater than the current OCP population prediction for 2031 of 108,900. In such case, we have assumed that the previous 2020 population used in the report is a conservative estimate for the sanitary flows in the District and the Albion concept plan.

3.2 Sanitary Assessment

Expected design flows were generated by assuming base sanitary flows are equivalent to 80% of the base day water demand. Water demand for the study area was provided by the District and this flow was used to calculate a Harmon Peaking Factor to estimate the peak dry weather flow (PDWF) for the sanitary system loading.

The second component of the sanitary flow is the inflow and infiltration (I&I) rate of 11,200 L/day/ha that was added as per the Metro Vancouver standard to develop a peak wet weather flow (PWWF).

3.3 Sanitary Summary

For each Albion Flats concept plan scenario, the PWWF was added directly to the trunk sewer on Lougheed Highway at three approximate locations as the layout and alignments of the future sewers has not been developed yet. Figure 2 shows the locations where flows were added to the trunk sewer, the sanitary sewer catchment area and the results of the pipe capacity analysis.

Table 2 is a summary of the peak flows and recommended improvement works required for the offsite servicing of the Albion Flats concept plan for each land use scenario.

Table 2 – Sanitary Peak Flows

Scenario	PDWF (L/s)	I & I (L/s) 11,200 L/ha/day	PWWF (L/s)	Recommended Works	Estimated Cost
A	57.8	17.1	75.0	Upgrade approximately 1,500m of sanitary sewer • (590m of 450mm pipe) • (224m of 525mm pipe) • (686m of 600mm pipe)	$1,583,000
B	27.8	13.1	40.9	Upgrade approximately 562m of sanitary sewer • (442m of 450mm pipe) • (120m of 600mm pipe)	$542,000
C	27.8	7.0	34.8	Upgrade approximately 562m of sanitary sewer • (442m of 450mm pipe) • (120m of 600mm pipe)	$542,000

As shown above the sanitary sewer along Lougheed Hwy is undersized for the future with the addition of peak flows from the Albion Flats concept plan. The capacity assessment is based a maximum allowable capacity of 75% of full pipe flow.

In addition, existing elevations in the Albion Flats area range from approximately 3m to 7m above mean sea level with Lougheed Highway at approximately 6m elevation. As such it is likely that sanitary lift stations will be required to discharge flows to the trunk sewer on Lougheed Highway.

4. CONSIDERATIONS

During the development of the Albion Flats concept plan, consideration should be given to the affected government agencies such as the Ministry of Environment, Ministry of Agricultural Lands, and Department of Fisheries and Oceans, in regard to the drainage works. In addition, Metro Vancouver's Sewerage and Drainage District should be consulted prior to implementing any plans that increase flows to their system.

We trust this memorandum meets your needs at this time. If you have any questions please contact our office.

Sincerely

PER

Stephen Bridger, P.Eng.
Project Manager

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- represents Consultant's professional judgement in light of the Limitations and industry standards for the preparation of similar reports
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SPENCER CREEK
PUMP STATION

ALBION FLATS STUY AREA

KANAKA CREEK

TAMARAK LANE

FRASER RIVER

LOUGHEED HWY

240 ST

104 AVE

N

Legend

- Drainage Pump Station
- Study Area
- Creek Buffer
- Municipal Lands and Leases

FIGURE 1 - STUDY AREA

0 50 100 200 300 400
Meters

AECOM

District of Maple Ridge
Albion Flats - Storm and Sanitary Offsite Servicing Requirements

PROJECT NUMBER	ISSUE/REVISION
60161301	**1**

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KANAKA CREEK

TAMARAK LANE

ALBION FLATS SANITARY
SEWER CATCHMENT

LOUGHEED HWY

104 AVE

240 ST

EXISTING SANITARY
SEWER CATCHMENT

PWWF = 30.2 L/s
ADDED

PWWF = 17.2 L/s
ADDED

PWWF = 27.5 L/s
ADDED

N

Legend

- Undersized Sewers Scenario B/C
- Undersized Sewers Scenario A
- Existing Sanitary Sewers
- Sanitary Catchments

FIGURE 2 - SANITARY
SEWER SYSTEM REVIEW

0 50 100 200 300 400 Meters

AECOM

District of Maple Ridge
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