

## TECHNICAL MEMORANDUM

**To:** Tareq Islam, Director of Engineering and Utilities (FVRD)      **File No:** 14-158  
**From:** Wendy Yao, M.A.Sc., P.Eng.      **Date:** 2025-01-23  
**Cc:** Sterling Chen, P.Eng. (FVRD)  
Steve Brubacher, P.Eng. (Urban Systems)  
Mike Seymour, P.L. Eng. (MSR)  
**Re:** **Harrison Rise Development – Proposed Wastewater Treatment and Effluent Disposal System**  
**Response to Urban System’s Email dated December 19, 2024**

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### 1.0 INTRODUCTION

On December 19, 2024, Urban Systems, representing the Fraser Valley Regional District (FVRD), sent an email to Aplin & Martin Consultants (Aplin Martin) regarding the revised wastewater treatment plant design with the Sequencing Batch Reactor (SBR) process. The email reaffirmed that the design requirements previously outlined in the FVRD’s letter dated February 5, 2024, would still apply to the revised design, and presented additional outstanding requirements that needed to be addressed.

In summary, The FVRD February 5, 2024 letter notes the following key requirements:

- The design of the WWTP is to be based on 3 phases to service the proposed Harrison Rise Development, Sq’welets First Nation (SFN), and the existing Lake Errock Community.
- Prior to the adoption of the zoning amendment bylaw, the Municipal Wastewater Regulation (MWR) registration authorized under the Environmental management Act (EMA) with the Ministry of Environment (MoE) must be in place.
- Headworks are required to be constructed in Phase 1 for the ultimate development.
- The SBR process with effluent filtration is the preferred technology for the wastewater treatment.
- Solids handling is required.
- Odour Control is to be designed to <5 OU/m3 with 98.5% compliance over a 1-hour period.
- Latecomer agreement pertains to the solids handling facilities, with all other works as a benefit to the Lake Errock Community.
- A Local Service Area is required and must be proven to be financially sustainable

In the Urban System’s December 19, 2024 email, the following additional outstanding requirements were stated:

- They (FVRD) have noted that the Drum Screen, Dewatering and Odour Control are needed in Phase 1;
- All of the headworks and also the tankage for all three phases needed to be built in Phase 1;
- Only precast concrete or CMUs are permitted for building materials; and
- Add 20% to your O&M costs to account for insurance, overhead, and other misc. costs that the FVRD incurs.

Aplin Martin has reviewed the above requirements from both the February 5, 2024 letter and the December 19, 2024 email with MSR Solutions Inc. (MSR), the designer of the wastewater treatment plant, and would like to offer the following responses for your further review and consideration.

## 2.0 MWR REGISTRATION REQUIREMENT

Regarding the requirement for MWR registration prior to zoning amendment bylaw adoption, we would like to highlight significant concerns with the current MWR registration process through the MoE. The process typically takes a minimum three-year timeline from the submission date of a completed application. We understand that construction of the wastewater treatment plant cannot commence until the Authorization is obtained. The time required for the MWR registration application process and the construction of the proposed works would significantly delay home construction in the subdivision.

Due to these timeline constraints, requiring MWR registration prior to rezoning approval is impractical. We hereby propose an interim solution that the FVRD permits the development of an initial phase (up to 50 to 70 homes) prior to obtaining MWR registration. During this period, the wastewater treatment operation and effluent ground discharge could proceed under the Sewerage Systems Regulation (SSR) through Fraser Health East. This approach is viable as effluent discharges below 22.7 m<sup>3</sup>/day can be administered under the provincial Health Authority's jurisdiction through the SSR and we can file two systems (designed for redundancy) under the SSR. With this proposed interim approach, some development and the construction of the wastewater treatment plant can proceed prior to obtaining the MWR registration. We recommend that the FVRD allow for the zoning amendment bylaw adoption with clauses included in the bylaw to address the provincial approval requirements for the proposed wastewater treatment and effluent discharge in accordance with the development process.

## 3.0 PHASE 1 CONSTRUCTION REQUIREMENTS

The FVRD requires the following items to be constructed in Phase 1 that we trust are not needed for Phase 1:

- Drum Screens for Pretreatment
- Dewatering System
- Odour Control Facility
- Concrete Tankage for Phase 2 and Phase 3
- Electrical and controls for Phase 2 and Phase 3

We would like to provide our rationale for why these components are not necessary in Phase 1:

### 1. Drum Screens

Drums screens and screening building are uneconomical for only servicing the contributing Service Area in Phase 1. According to our design, the equalization (EQ) tank can effectively operate as a pre-treatment tank with 2 mm effluent filter for coarse solids removal in Phase 1. Given the relatively small incoming flow in Phase 1, settled solids and floatables in the EQ tank can be removed annual through hauler selective pumping with liquids returned back to the EQ tank to reduce hauling costs. This design approach is typical for initial installation on decentralized systems, providing economical initial capital cost and reduced operational cost until the system generates sufficient flow to justify mechanical screens. The effluent quality from the EQ tank in Phase 1 would be equal to or better that from mechanical screens. We recommend that drum screens become a requirement for Phase 2. In Phase 1, by-pass piping and connections for the screens will be installed, but the drum screens and the screen building are not proposed.

### 2. Dewatering System

We recommend that the wasting biosolids generated from the SBR in Phase 1 is to be handled through sludge digestion included in the design, with digested sludge to be hauled offsite for further dewatering and sludge wasting by others. The digested sludge produced would minimal during the first few months following occupancy and will gradually increase with occupancy. Our calculation shows that in the worst-case scenario at full build-up of Phase 1, sludge hauling will not exceed 3 truck loads per month.

Implementing the dewatering system in Phase 1 would require high front-end capital investment for the construction of the system and associated odour control system. Additionally, significant operating and maintaining attention would be required for the dewatering and odour control systems. Technically, operating such a system to handle the small amount of sludge is not practical.

We understand the FVRD's concerns regarding limited capacity at nearby biosolid treatment and dewatering facilities. However, given the small volume produced in the initial phase, we trust this volume would be accepted at regional facilities. Furthermore, based on our recent conversation with the Leq'á:mel First Nation, we understand they plan to construct a regional biosolids treatment and dewatering facility, which could potentially handle the digested biosolids generated from the Harrison Rise wastewater treatment plant.

### 3. Odour Control

A complex odour control system would not be required in Phase 1, as odour control would be mainly required for the screen building and the dewatering system. A provision would be made in the Phase 1 design to include a passive carbon scrubber system from Wager to handle minor odours from the EQ tank. This system requires replacement of the media typically every 6 to 12 months and is cost effective and operationally proven from existing installations.

### 4. Concrete Tankage and Electrical/Control System for Phase 2 and Phase 3

These components are only required to support the assumed future developments on the Sq'welets First Nation lands and within the region (Phase 2) and the connection from the Lake Errock Community (Phase 3). However, these assumed future developments are uncertain, and we understand the Lake Errock Community connection could be 20 years away. It is not practical to construct concrete tankage and electrical/control devices for these assumed future connections. Additionally, electrical/control devices typically have only a 25-year expected service life, making their early installation potentially wasteful.

For Phase 1, we will ensure that only works required for the Phase 1 Service Area be included. Additional tankage and electrical/control devices for future phases would require the expanded service area contributing from start up.

## 4.0 FINANCIAL IMPLICATION WITH FVRD REQUIREMENTS FOR PHASE 1

We have previously estimated the design and construction costs for our originally proposed works for the wastewater treatment plant and rapid infiltration basins for the three phases, as shown in **Table 1**. If the design and construction are to be altered according to the FVRD's requirements, the estimated costs for the three phases would be revised as that shown in **Table 2**.

The cost estimates indicate that with the FVRD's requirements for the additional components to be constructed or installed in Phase 1, the required total initial capital investment for the wastewater treatment plant with rapid infiltration basins would be increased from \$6.875 million to \$11.677 million, an over \$4.8 million increase. Such an impact to the required budget would make the development project unfeasible.

In addition, the construction and installation of the components that are not required for Phase 1 would also increase the operation and maintenance costs in Phase 1 and the associated further replacement costs.

**Table 1: WWTP Design and Construction Cost Estimate Per Originally Proposed**

No.	Item	Estimated Construction Cost (\$)		
		Phase 1	Phase 2	Phase 3
1	Screens Building	\$ 20,000	\$ 794,564	\$ -
2	Pre EQ Tankage	\$ 356,669	\$ 34,500	\$ 34,500
3	SBR Tankage	\$ 609,066	\$ 609,066	\$ 609,066
4	Post EQ Tankage	\$ 203,389	\$ -	\$ -
5	Sludge Tank (Aerobic Digestion)	\$ 302,123	\$ -	\$ -
6	Disc Filters	\$ 556,883	\$ -	\$ 278,441
7	UVs	\$ 138,020	\$ -	\$ -
8	Effluent Pump Chamber	\$ 116,570	\$ -	\$ -
9	MCCs, Chemicals, Blowers Building	\$ 1,312,886	\$ 103,500	\$ 103,500
10	Dewatering	\$ -	\$ 560,120	\$ -
11	Odour Control	\$ -	\$ 435,000	\$ -
12	Additional Mechanical & Electrical	\$ 300,000	\$ 300,000	\$ 300,000
13	Gazebo Cover Structure	\$ 200,000	\$ 150,000	\$ 150,000
14	Generator	\$ 350,000	\$ -	\$ -
15	Rapid Infiltration Basins	\$ 258,500	\$ -	\$ 129,250
16	Site Landscaping	\$ 21,326	\$ 21,326	\$ 21,326
<b>Total Construction Cost</b>		<b>\$ 4,745,433</b>	<b>\$ 3,008,077</b>	<b>\$ 1,626,084</b>
Regulatory Approval		\$ 375,184		\$ 375,184
Engineering		\$ 379,635	\$ 240,646	\$ 130,087
Tax and Contingency		\$ 1,375,063	\$ 812,181	\$ 532,839
<b>Total WWTP+RIB Capital Cost</b>		<b>\$ 6,875,000</b>	<b>\$ 4,061,000</b>	<b>\$ 2,664,000</b>

<b>Grand Total</b>	<b>\$ 13,600,000</b>
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**Table 2: Revised WWTP Design and Construction Cost Estimate Per FVRD Phase 1 Requirements**

No.	Item	Estimated Construction Cost (\$)		
		Phase 1	Phase 2	Phase 3
1	Screens Building	\$ 794,564	\$ -	\$ -
2	Pre EQ Tankage	\$ 356,669	\$ 34,500	\$ 34,500
3	SBR Tankage	\$ 1,497,117	\$ 165,041	\$ 165,041
4	Post EQ Tankage	\$ 203,389	\$ -	\$ -
5	Sludge Tank (Aerobic Digestion)	\$ 302,123	\$ -	\$ -
6	Disc Filters	\$ 556,883	\$ -	\$ 278,441
7	UVs	\$ 138,020	\$ -	\$ -
8	Effluent Pump Chamber	\$ 116,570	\$ -	\$ -
9	MCCs, Chemicals, Blowers Building	\$ 1,312,886	\$ 103,500	\$ 103,500
10	Dewatering	\$ 560,120	\$ -	\$ -
11	Odour Control	\$ 435,000	\$ -	\$ -
12	Additional Mechanical & Electrical	\$ 900,000	\$ -	\$ -
13	Gazebo Cover Structure	\$ 500,000	\$ -	\$ -
14	Generator	\$ 350,000	\$ -	\$ -
15	Rapid Infiltration Basins	\$ 258,500	\$ -	\$ 129,250
16	Site Landscaping	\$ 21,326	\$ 21,326	\$ 21,326
<b>Total Construction Cost</b>		<b>\$ 8,303,168</b>	<b>\$ 324,368</b>	<b>\$ 732,059</b>
Regulatory Approval		\$ 374,384		\$ 374,384
Engineering		\$ 664,253	\$ 25,949	\$ 58,565
Tax and Contingency		\$ 2,335,451	\$ 87,579	\$ 291,252
<b>Total WWTP+RIB Capital Cost</b>		<b>\$ 11,677,000</b>	<b>\$ 438,000</b>	<b>\$ 1,456,000</b>

<b>Grand Total</b>	<b>\$ 13,571,000</b>
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## 5.0 CONCLUSIONS AND RECOMMENDATIONS

Based on our review of the FVRD's requirements, we recommend that the zoning amendment bylaw adoption proceed with appropriate clauses addressing provincial approval requirements, rather than requiring MWR registration as a prerequisite. We propose allowing the initial development phase of up to 20 homes under the SSR through Fraser Health East, with development controls implemented through subdivision approval and building permit occupancy stages.

For Phase 1 construction of the wastewater treatment plant, we recommend implementing only the infrastructure components necessary for immediate operations while reserving space for future expansion. This includes utilizing the EQ tank with 2 mm effluent filter for pre-treatment, implementing sludge digestion with offsite hauling, and installing a basic carbon scrubber for odour control. Major components such as drum screens, dewatering system, comprehensive odour control, and Phase 2/3 infrastructure should be deferred until justified by increased flows and confirmed development timelines. This approach would provide a cost-effective and operationally efficient solution while maintaining flexibility for future expansion.

Please note that with the FVRD's requirements for additional components constructed in Phase 1, the required initial budget for the wastewater treatment plant with the rapid infiltration basins would be increased from \$6,875 million to \$11,677 million, an over \$4.8 million increase.

## 6.0 CLOSING

We trust that the above responses and recommendations address the FVRD's requirements while presenting practical solutions that maintain operational efficiency and environmental protection. We would like to discuss these recommendations in detail and work collaboratively with the FVRD to move this project forward.

Should you have any questions or require additional information, please do not hesitate to contact us.

Yours truly,

**APLIN & MARTIN CONSULTANTS LTD.**

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Wendy Yao, M.A.Sc., P.Eng.  
Senior Project Manager, Infrastructure Planning

WY:

14-158 To address FVRD Requests for WWTP\_Tech Memo