

September 6, 2023

FILE: 22-092-02VC

Cowichan Bay Waterworks District
1760 Pavenham Rd
Cowichan Bay, BC V0R 1N1

Attention: Cheryl Wirsz, District Administrator

Re: Review of the Municipal Wastewater Regulation Application Package for the Valleyview Shopping Centre in Cobble Hill, B.C.

Dear Cheryl:

Further to your request, Western Water Associates Ltd. (WWAL) provides this letter summarizing our review of the Municipal Wastewater Regulation (MWR) registration package, prepared by MSR Solutions Inc. (MSR), for the Valleyview Shopping Centre located at 1440 Cowichan Bay Road, Cobble Hill, B.C.

1. BACKGROUND

The Valleyview Shopping Centre, situated within the service area of the Cowichan Bay Waterworks District (CBWD), is proposing an expansion to their existing facility. WWAL previously developed a Source Water Protection Plan (SWPP) for the CBWD (final report dated January 12, 2023) that: identified potential threats to the delivery of safe drinking water, defined groundwater protection areas and established a framework and strategies for source water protection. The Centre is located within a designated groundwater protection area as outlined in the SWPP (WWAL, 2023), therefore it is critical to implement effective planning and regulatory measures to control any potential harmful activities at the Centre.

The CBWD utilizes Valleyview Wells 1 and 2 (Well Plate Identification Number's (WPID's) 38473 and 13088) as their primary production wells. These wells are situated in the northwestern corner of the Centre's parking lot, ~135 m west of the existing effluent disposal field operated by the Centre. As part of the proposed expansion to the Centre, plans call for an increase in the daily design flow of the wastewater treatment system, including the construction of rapid infiltration basins (RIBs) to replace the current disposal field. The owners of the Centre retained MSR to assist with design and permitting for modifications to the system. MSR applied for authorization to discharge wastewater (Registration Number 110826 and Application Tracking Number 405396) on April 17, 2023.

In April 2023, WWAL conducted a review of a draft hydrogeological assessment prepared by Elanco Enterprises Ltd. (Elanco) (draft dated February 13, 2023) at the request of CBWD. Elanco's report assessed the potential impacts of the proposed RIBs on the local aquifer and supply wells at the Centre. Elanco's final assessment dated March 24, 2023, which did not appear to contain any significant changes from the draft report, has been integrated into the MWR application. WWAL's main recommendation from Elanco's assessment was to install a monitoring well located between the CBWD Valleyview supply wells and the dispersal field so water quality impacts may be detected prior to reaching the water supply.

This letter provides our review of the hydrogeological aspects of the Valleyview Centre MWR application package with respect to potential impacts to the nearby CBWD supply wells.

2. REVIEW COMMENTS

2.1 Effluent Class

Based on our review of the MWR application package, it is unclear which effluent class (A, B or C) the ground discharge at the Valleyview Centre will meet as the effluent classes appear to be inconsistently referenced throughout the application.

MSR's April 13, 2023 report entitled: *21-607 Valleyview Centre MWR* (MSR, 2023a) states that, according to the MWR, effluent being discharged to ground at the Valleyview Centre must meet Class A standards as the RIBs are located with 300 m of a drinking water source (CBWD Valleyview supply wells). Section 7.4 of MSR (2023a) states that effluent being discharged to the RIBs will be Class A quality which is referenced in the design flow (Section 7.2) and RIB design (Section 7.4.1). Sections 2.6, 2.7 and 3.0 of MSR (2022), however, refer to discharge of Class B effluent to the RIBs ensuring the effluent threshold meets Class A within a 90 m horizontal distance from the supply wells. The supporting reports included in the MWR application package also show inconsistencies in defining the intended effluent class of the discharge and the required setback distance. For example, in the background section of Elanco (2023) it is stated that the effluent quality will be reduced from Class B to Class C.

We recommend that the effluent class of the wastewater being discharged to the RIBs be clearly identified in the application to ensure the system design is compliant with the MWR and an appropriate groundwater monitoring program is implemented.

2.2 Groundwater Flow Direction

MSR is proposing to reduce the current setback distance between the CBWD Valleyview supply wells and the ground disposal to the MWR's minimum setback requirement of 90 m. With a decreased setback distance, the groundwater flow direction at the site should be well understood. Based on our review of the MWR application for the Valleyview Centre, the stated flow direction is not consistent. Table 1, on the following page, summarizes the differing estimated groundwater flow directions at the Valleyview site conveyed throughout the MWR application. Also included in Table 1 is the groundwater flow direction documented by WWAL (2023) in the previously completed SWPP.

MSR (2022) determined the groundwater flow direction in the aquifer underlying the Valleyview site from the local glacial outwash topography as being toward the southwest, positioning the CBWD Valleyview supply wells downgradient of the disposal field. The limitation in this approach is that topographic gradient is not always indicative of the groundwater flow direction which is driven by potentiometric gradients.

Payne's (1995) acknowledged that groundwater flow at the Valleyview site may be complex. Payne interpreted a local groundwater divide to be present near the disposal field, with the estimated groundwater flow direction being toward the west and southwest beneath the Valleyview site, and

northwest toward Cowichan Bay north of the site. The groundwater flow direction estimated by Elanco (2023) is similar to that of WWAL (2023) which is toward the north-northwest. Based on Elanco's and WWAL's analysis, the CBWD Valleyview supply wells are located cross-gradient to the disposal field.

Table 1. Summary of estimated groundwater flow directions at the Valleyview site

| Report Title | Reference | Estimated Flow Direction | Rationale |
|--------------------------------------------------------------------------------------------------------------------------------------------------|---------------|-------------------------------|------------------------------------------------------------------------------|
| MWR Application | | | |
| 21-607 Valleyview Centre Hydrogeological Analysis | MSR (2022) | Southwest | Topography |
| Hydrogeological Assessment of Impact of Sewerage Effluent Dispersal Basins on Local Aquifer at the Valleyview Shopping Centre, Cobble Hill, B.C. | Elanco (2023) | North to northwest | Static water depths in area wells ¹ and water level contours |
| Effluent Discharge for Valleyview Centre Hydrogeological Review | Payne (1995) | Northwest, west and southwest | Static water depths in area wells ¹ |
| SWPP | | | |
| Source Water Protection Plan: Cowichan Bay Waterworks District, Cowichan Bay, BC | WWAL (2023) | North to northwest | Water level data collected at 4 monitoring wells ~2 km southeast of the site |

Notes:

¹Static water depths reported at time of construction during various seasons.

Based on the significant differences in the stated groundwater flow directions in the application, and the limitations of the methods of determination as summarized in Table 1 and described above, it is not clear what the groundwater flow direction is at the Valleyview site. Understanding the groundwater flow direction is crucial to monitoring the potential impacts to the aquifer and to CBWD's two main water supply wells from effluent disposal. We therefore recommend that a more detailed assessment of the groundwater flow direction in the area be carried out through measurement of static water levels from at least three suitable monitoring wells in the area. This may require the construction of one or more dedicated monitoring wells in the vicinity of the proposed RIBs (further on this below). Water level measurements collected from the monitoring wells should occur at the same time, and over a period of time, to account for seasonal variation in the measurements.

2.3 Monitoring Wells

The Environmental Impact Study (EIS) included in the MWR application and prepared by MSR (2023b) references Division 4, Section 85 (1) of the MWR (Monitoring Wells) which states that "a discharger must install monitoring wells in sufficient number and orientation, as determined by a qualified professional to measure background and receiving environment water quality." The EIS recommends monitoring three wells to assess water quality in the background and receiving environments. This includes monitoring existing well WTN 65065 to establish the baseline water quality and utilizing the two CBWD Valleyview supply wells (WPID 13088 and 38473) to monitor the receiving environment. The proposed monitoring

program, however, does not meet the monitoring requirements in Division 4, Section 85 (2) of the MWR for “at least 4 wells per aquifer”.

To comply with the MWR’s monitoring requirements, additional dedicated monitoring well(s) should be installed in the vicinity of the proposed RIBs. At least one of these wells should be located between the CBWD Valleyview supply wells and the RIBs, so any water quality impacts can be detected prior to reaching the water supply wells. The installation of additional monitoring well(s) is considered prudent, especially due to the conflicting groundwater flow directions presented in the MWR application.

3. CLOSURE

We trust this letter provides the information you require. If you have any questions, please contact us.

Western Water Associates Ltd.
(EGBC Permit to Practice number 1001419)



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Junior Hydrogeologist



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Senior Hydrogeologist

4. REFERENCES

Elanco Enterprises Ltd. (Elanco), 2023. *Hydrogeological Assessment of Impact of Sewerage Effluent Dispersal Basins on Local Aquifer, at the Valleyview Shopping Centre, Cobble Hill, B.C.*

MSR Solutions Inc. (MSR), 2023a. *21-607 Valleyview Centre MWR.*

MSR Solutions Inc. (MSR), 2023b. *21-607 Valleyview Centre Environmental Impact Study (EIS).*

MSR Solutions Inc. (MSR), 2022. *21-607 Valleyview Centre Hydrogeological Analysis.*

Payne Engineering Geology (Payne), 1995. *Effluent Discharge for Valleyview Centre Hydrogeology Review.*

Western Water Associates Ltd. (WWAL), 2023. *Cowichan Bay Waterworks District Source Water Protection Plan.*

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