

# 07.04.01 - Eastern Storm Routing Brief



## NEW TOWN

January 16, 2026

**District of Lake Country**

10150 Bottom Wood Lake Road  
Lake Country, BC, L4V 2M1

Attention: **Mr. Matthew Salmon, P.Eng.**  
Director of Infrastructure and Development Engineering

Dear Sir,

**Re: Stormwater Management Plan – Chase Road to Seaton Road  
Lakestone – Phased Development Agreement  
Macdonald Lakeshore Properties Ltd.**

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**New Town Architecture & Engineering Inc.** is pleased to provide you with our Stormwater Management Plan (SWMP) for the overland flow route extending from the Chase Road stormwater outlet (existing from Sage Glenn) to the intersection of Seaton Road and Knopf Brook. The SWMP has been compiled in support of the Phased Development Agreement for the Lakestone Development site and details the existing flow route and the proposed improvements to this flow route to address existing deficiencies and accommodate upstream development.

The SWMP has been compiled based on a combination of the following documents:

- District of Lake Country Subdivision and Servicing Bylaw 1121, 2020 (Includes amendments as of May 21, 2024).
- Lakestone Area Stormwater Servicing Plan March 25, 2025 compiled by Urban Systems.
- Best Engineering Practices.

Our team would like to submit the design calculations and rationale for the SWMP to the District of Lake Country for review and approval, in support of the Phased Development Agreement. A large portion of the undeveloped (future phases) of Lakestone lands contribute to downstream stormwater overland flow routes; including Knopf Brook and ultimately Middle Vernon Creek. The catchment area in question is outlined in the Lakestone Area Stormwater Servicing Plan as MVC KP. Table 2 of the Stormwater Servicing Plan recommends a Unit Runoff Rate (URR) of 1.5 Lps/Ha for the Knopf Brook catchment. This URR has been used as a basis for the preceding calculations.

The total catchment area for the Sage Glenn Outlet bordering Chase Road is 86.5 Hectares and includes both Lakestone Lands & contributing District parcels. The total catchment area can be seen detailed in Appendix 1 = Existing Catchment Area.

It is assumed that development upstream of the Chase Road outlet have/will be designed in accordance with the Subdivision and Servicing Bylaw, capturing and controlling stormwater with release rates limited to URR. As such, the URR has been used as a foundational element of the calculation.

$$Q_T = A \times URR_T \quad \text{where } Q_T = \text{pre-development runoff rate for the return period "T" [m}^3\text{/s]}$$

$$A = \text{drainage area [ha]}$$

$$URR_T = \text{Unit Runoff Rate for the return period "T"}$$

$$Q_T = 86.5 \text{ Ha} \times 1.5 \text{ L/s/HA}$$

$$Q_T = \mathbf{129.75 \text{ L/s}}$$

The overland flow segment extending from the Chase Road outlet to the intersection of Knopf Brook and Seaton Road is currently undeveloped and as a result has been the source of complaint from the impacted property owners (9751 Chase Road & 9750 Seaton Road). Lakestone is proposing the improvement and formalization of this overland flow segment through the introduction of stormwater storage & infiltration (limiting flows conveyed downstream) and the construction of an overland flow ditch (directed any flows). The two-part design proposed is further detailed below.

1. Outlet Storage & Infiltration. A rock pit is proposed at the Sage Glenn outlet, within the Chase Road right-of-way, to minimize flows conveyed downstream. Percolation testing was completed by Valley Geotechnical, a factor of safety (FoS) of 2 has been applied to the field values for design purposes. The geotechnical report can be found attached as Appendix B.

- $Q_{\text{infiltration}} = \text{Infiltration Rate (m/s)} \times \text{Infiltration Area (m}^2\text{)}$   
 $Q_{\text{infiltration}} = 1.2 \times 10^{-4} \times (1/2) \times 350 \text{ m}^2$   
 $Q_{\text{infiltration}} = 0.021 \text{ m}^3\text{/s} = 21 \text{ L/s}$
- $V_{\text{storage}} = A_{\text{storage}} \times H_{\text{storage}} \times \text{Storage Void Ratio}$   
 $V_{\text{storage}} = 350\text{m}^2 \times 1.2\text{m} \times 0.33 = 139 \text{ m}^3$

2. Overland Flow Ditch. An overland flow ditch is proposed to extend from the Sage Glenn outlet to the intersection of Knopf Brook with Seaton Road. This will convey any flows that overwhelm the proposed rock pit, and will minimize the negative impacts currently being experience by the surrounding properties, due to no formal flow route existing. The overland flow ditch has been designed to ensure that the expected flows can be conveyed while minimizing the impact to the lands they encumber. As such, a shallow V-ditch has been selected as the best-fit mechanism for conveyance. The segment in question has been further segmented to reflect the longitudinal grades. The first segment has an approximate grade of 5% whereas the second segment has an approximate grade of 0.15%. Approximate grades are based on the LiDAR information provided by the District for the area in question. Sizing and flow calculations for the two segments of V-ditch can be found below.

- $Q_{\text{outlet}} = Q_T - Q_{\text{infiltration}}$   
 $Q_{\text{outlet}} = 129.75 \text{ L/s} - 21 \text{ L/s}$   
 $Q_{\text{outlet}} = \mathbf{108.75 \text{ L/s}}$
- $Q_{D1} = VA = (1.00/n) AR^{2/3} S^{1/2}$

$$Q_{D1} = (1.00/0.02)(0.3)(0.09926)^{2/3}(0.05)^{0.5}$$

$$Q_{D1} = \mathbf{0.719 \text{ m}^3/\text{s} = 719 \text{ L/s}}$$

- $Q_{D2} = VA = (1.00/n) AR^{2/3}S^{1/2}$

$$Q_{D2} = (1.00/0.02)(0.8)(0.25364)^{2/3}(0.0015)^{0.5}$$

$$Q_{D2} = \mathbf{0.6208 \text{ m}^3/\text{s} = 621 \text{ L/s}}$$

From review of the calculations above it can be seen that the flow capacity of both segments of the proposed ditch (719L/s & 621L/s respectively) well exceed the outlet flow rate (108.75 L/s). The combination of the drain rock storage volume and the additional flow capacities of the ditches provide additional ability for the infrastructure to convey flows exceeding the expected outlet flow rates.

The proposed improvements result in a formalized overland flow route for flows outletting from the Chase Road stormwater outlet and provide conveyance downstream to the intersection of Seaton Road and Knopf Brook. The simple nature of the design (shallow vegetated ditch) looks to minimize the impact to the bisected properties, while also allowing for the ability to further improve and increase capacities if ever deemed necessary.

It is our understanding that the District will be working to coordinate with the impacted landowners to secure the necessary rights to complete both the construction and to operate and maintain the infrastructure moving forwards.

The improvements outlined above are the responsibility of the developer, and address both the existing deficient infrastructure and the expected upstream development. The improvements outlined are the expected extent of off-site improvements necessary for Lakestone East stormwater management. Flows further downstream from the outlined segment are being addressed by the District.

We trust that the above provides the District with the required design and calculation information necessary to approve the proposed design solutions. If there are any questions regarding the design, please do not hesitate to reach out.

Sincerely,

**NEW TOWN ARCHITECTURE & ENGINEERING INC.**

Jacob Paul, P.Eng.  
Project Engineer / CA