MEMORANDUM

URBAN systems

Date: November 21, 2013
To: Jeremy Holm, Regional District of Nanaimo
cc: Geoff Garbutt, Regional District of Nanaimo
From: Dan Huang / Ehren Lee
File: 1984.0007.01
Subject: Fairwinds Development Review – Final ISMP and PDA / MOU overview

1.0 INTRODUCTION

Urban Systems has been asked to assist the Regional District of Nanaimo (RDN) in reviewing the Integrated Stormwater Management Plan (ISMP) for the Fairwinds Development (Schooner Cove and The Lakes Neighbourhood Plans) in Nanoose Bay within the RDN. Within the scope of this assignment, we have participated in an iterative process of reviewing the ISMP, providing recommendations to provide assurance that ISMP goals and objectives will be met, and reviewing the revised document. To date, we have reviewed the following ISMP documents from the developer and their consulting team, and communicated our review and recommendations in the following memoranda:

Table 1 Reviewed documents and submitted memoranda

ISMP Document	*Memorandum Response*
The Lakes District and Schooner Cove Integrated Stormwater Management Plan Kerr Wood Leidal, Draft Report, July 2012	Fairwinds Development Review – ISMP Overview August 8, 2013
Draft Report, Revised October 3, 2013	Fairwinds Development Review – Revised ISMP and PDA / MOU overview, October 31, 2013
Final Report, Revised November 19, 2013	Fairwinds Development Review – Final ISMP and PDA / MOU overview (current document)

Additional documents reviewed as part of this process are described in greater detail in the Urban Systems memorandum dated October 31, 2013. This memorandum also details the overall goals of this review process and limitations of the review, which remain applicable to this stage of the process.

1.1 METHODOLOGY

1.1.1 Approach

The approach to conducting this review was generally consistent with the previous ISMP reviews. Specific to this stage of the process, our evaluation focused on a comparison of the contents of the Final ISMP with the gaps and recommendations provided in our October 31, 2013, memorandum.

We have categorized our comments and recommendations as follows to support the development process:

- Overall evaluation
  - Integrated stormwater management: proof of concept
  - Detailed design needs
  - Long-term servicing analyses
- Recommendations for further study through the phased development process

2.0 EVALUATION AND RECOMMENDATIONS: ISMP

2.1 Overall Evaluation

Overall, the current ISMP has been enhanced from the previous submissions. The following key points have been addressed by the developer and their consultant to provide more assurance that the BMPs and overall drainage plan in the current ISMP will achieve the general targets for flood, erosion, and environmental protection outlined in Table 1 of the ISMP.

Integrated Stormwater: Proof of Concept

A key concern with earlier versions of the ISMP was that it required further proof of concept to justify the application of the selected BMPs over alternatives to achieve the Table 2 criteria. The ISMP in its current form provides more support for the BMPs and for the overall drainage plan through the following improvements:

- The ISMP includes a continuous modeling assessment of the capacity of existing wetlands to accept post-development flows. This assessment showed that six of the nine existing wetlands require upstream detention facilities and flow splitters to detain overland flows or divert high flows, respectively, prior to discharging to the wetlands.
- Some water treatment measures (rain gardens and an oil-grit separator) are included in the Schooner Cove neighbourhood to treat overland flows prior to discharging to the ocean. Additional end-of-pipe measures may be required at all outlets to the ocean, pending the results of more detailed analysis of this neighbourhood area.
- The ISMP references the Silver Ridge subdivision rain gardens in Maple Ridge, which were designed for and constructed along steep slopes. Evidence was provided that water quantity objectives are being met by the system; the level of water treatment achieved by these systems was assumed by KWL to correlate to volume reduction, as quantitative water quality data were not collected.
- A range of removal efficiencies was provided for various urban pollutants (metals, TSS, nutrients, etc.). These ranges were cited from reviewed literature; pollutant-loading analyses were not conducted for this particular study area.

- Illustrated in the ISMP is an example interface of roadside rain gardens with underground piped infrastructure and private residences.

Detailed Design Needs

- A climate change sensitivity analysis was conducted on downstream piped infrastructure to assess its response to increased peak flows due to a 10% and 20% increase in precipitation.
- The current ISMP references two existing water licenses for withdrawal from Enos Lake; however, the impact of these withdrawals under the existing and/or post-development hydrologic regimes was not included and should be as part of detailed design.

2.3 Recommendations for Further Study Under the Phased Development Process

There are still several recommendations for the ISMP that should be addressed in phases further along in the process. The Phased Development Agreement (PDA) and the Memorandum of Understanding (MOU) provide the basis to carry these recommendations forward. The following recommendations should be read as "end-state design requirements" to be phased, rather than requirements needed prior to re-zoning. A recommendation for whether a commitment by the developer should be made to address the outstanding through the PDA or the MOU is provided for each point.

Integrated Stormwater: Proof of Concept

A number of gaps were identified with respect to how the developer will provide assurance that preferred BMPs and the overall drainage plan will achieve targets for flood, erosion, and environmental protection. These include the following:

- The stormwater management criteria in the current ISMP should be confirmed following the baseline results of the Enos Lake Protection and Monitoring Program. Once the environmental threshold of the lake is understood, BMPs should be selected that are appropriate to this receiving environment. This may require revising the ISMP and/or drainage plan. **A commitment to the Enos Lake Protection and Monitoring Program should be in the PDA.**
- The current drainage plan relies heavily on existing wetlands to accommodate post-development flows. Results of the recently conducted wetlands hydrologic assessment showed that some will receive significantly more post-development flow while others will receive less. We recommend that baseline environmental data (water level, water quality, and specific species, organisms and communities) be collected to bridge the ISMP with the Environmental Impact Assessment and Biophysical Assessment that were completed for the Neighbourhood Plan. This will inform the selection of BMPs to mitigate post-development impacts to wildlife, and water quality and quantity. Ongoing performance monitoring will also be required to measure the effectiveness of BMPs and inform any adaptive management measures. **A commitment to wetland monitoring should be in the PDA.**

- The Draft ISMP does not include a detailed discussion of the bedrock conditions, or comment by a geologist on the suitability of the BMPs (e.g., disconnecting roof leaders) given the geological conditions in the area. Based on correspondence with KWL, a geotechnical professional is in agreement with the proposed BMPs; however, further analyses and review by a geotechnical professional are required prior to selecting and implementing specific measures, including roadside rain gardens and disconnecting roof leaders to drain to ground. **A commitment to address this prior to any subdivision approval should be in the PDA.**
- A high-level analysis of post-development pollutant-loading on the receiving waters should be completed. In combination with the results of the Enos Lake Protection and Monitoring Program, this should inform the selection and implementation of specific BMPs. **A commitment to address this should be in the MOU.**

Detailed Design Needs

The following gaps were identified with respect to the design and cost (construction and operation/maintenance) of the BMPs and overall drainage plan:

- It is recommended that cost estimates be provided for the long-term operating and maintenance of the final stormwater management infrastructure. **A commitment to address this should be in the MOU.**
- It is recommended that operating and maintenance plans be developed for stormwater management infrastructure to appropriately maintain the systems. **A commitment to providing long-term operating and maintenance costs of all systems prior to construction should be made in the PDA.**
- Further evaluation should be conducted at the detailed design stage to determine the impacts of climate change in all areas of servicing, such as major systems, wetland design, and water quality and quantity measures. Piped infrastructure sizing and materials should also be confirmed at this stage. **A commitment to address this should be in the MOU.**
- Seasonal variation in pre- and post-development flows remains unclear; continuous modeling of overland flows should be conducted to understand the impacts to downstream systems. It is recommended that this be completed as part of the climate change sensitivity analysis of all overland flow systems. **A commitment to address this should be in the MOU.**

Long-term Servicing Analyses

The following gaps were identified with respect to the long-term monitoring of the system's performance and the impacts of post-development flows on the receiving environment:

- Performance monitoring and adaptive management must be incorporated into the overall stormwater management strategy for Fairwinds. Two sources to guide this include the D*raft Adaptive Management Framework* developed for Metro Vancouver and the Enos Lake Protection and Monitoring Program Terms of Reference.

3.0 CLOSING

The Integrated Stormwater Management Plan (ISMP) for the Fairwinds Development provides for an innovative approach to stormwater management, especially within the context of a Regional District. Incorporating the ISMP into the Phased Development Agreement (PDA) will ensure that the appropriate targets and stormwater criteria are being met within a phased approach, along with the appropriate level of funding required for long-term operations and maintenance of the stormwater system.

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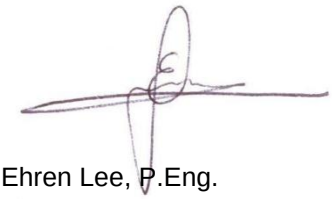

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