MEMORANDUM

URBAN systems

Date:	October 31, 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 – Revised 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 previously conducted a broad review of the original ISMP (which was originally submitted to RDN in July 2012), the results of which were summarized in a memorandum to the RDN dated August 8, 2013. The initial review was conducted in a manner consistent with a typical local government development application review, as an extension of RDN engineering and planning staff.

In response to the ISMP review memorandum, the developer and their consulting team submitted a revised ISMP to the RDN on October 3, 2013. In addition to the documents listed in our August 8th memorandum, the following three documents associated with the development application were also reviewed:

Document	***Intent***
The Lakes District and Schooner Cove Integrated Stormwater Management Plan – Kerr Wood Leidal, Draft Report, July 2012 (*revised October 2013)*	Protect the existing ecological health of the Fairwinds area aquatic resources, while enabling development to occur.
Terms of Reference, Enos Lake Protection and Monitoring Program (TOR) – Pottinger Gaherty Environmental Consultants Ltd., July 2013 *(revised October 2013)*	Monitor the effectiveness of the ISMP relative to significant changes to water quality and quantity in Enos Lake, and inform decisions regarding stormwater management as required.
Draft Phased Development Agreement (PDA), October 8, 2013	Enable phased implementation of the stormwater drainage plan and environmental monitoring program in support of achieving the long-term goals of the ISMP.

Further to this, during the course of our review, the developer submitted a Draft Memorandum of Understanding (MOU) dated October 15, 2013 which incorporated components of the ISMP and stormwater management. We have revised this memo to now incorporate the three components related to stormwater for the Fairwinds development – the ISMP, the PDA and the MOU.

The overall goal of this evaluation is to support the advancement of the Fairwinds Development such that it does not compromise the environmental integrity of the area in any phase of the development process or post development. Given that these three documents are the principle tools by which this goal may be achieved, our recommendations focus on integrating the three documents and answering the question: *how can this development occur such that the environment is protected through all phases of development?*

1.1 LIMITATIONS

Our review of the PDA (dated October 8, 2013) was limited to the following sections which pertain to stormwater management and environmental protection:

- Preamble – Part E
- Part A (Definitions), Section 1
- Part B (Phasing), Section 8(a)
- Part C (Amenities and Amenity Payments), Section 28-29
- Part D (Subdivision and Development), Section 39-42
- Schedule "G", Lakes District Infrastructure Phasing Plan
- Schedule "K", Schooner Cove Infrastructure Phasing Plan
- Schedule "Z", Land Use and Subdivision Bylaw – servicing provisions, and
- Schedule "CC" – Enos Lake Protection and Monitoring Program Terms of Reference

Our review of the MOU (dated October 15, 2013) was limited to the following sections which pertain to stormwater management and environmental protection:

- Context, Part D
- Overview, Definitions and Schedules
    - Part B.2 (Definitions)
    - Part C (Storm Drainage), and
    - Part D (Transportation) as it relates to stormwater management

We trust that the remainder of the PDA and MOU documents are being reviewed by the appropriate RDN departments (e.g. Parks, Engineering, Finance) and legal advisors to ensure that it is a comprehensive and coordinated approach.

1.2 METHODOLOGY

1.2.1 Approach

In broad terms, this review was conducted consistent with the previous ISMP review, but with additional focus on how the contents of the ISMP, the Enos Lake Terms of Reference (TOR), the PDA and the MOU should cohesively support the overall goals of the Neighbourhood Plan. Specifically, our evaluation was comprised of a number of key components:

- A comparison of the contents of the revised ISMP and the revised TOR with our initial comments in the August 8, 2013 memorandum;
- An assessment of the plan's ability to achieve the goals and objectives stated in Section 1.1 of the ISMP and to meet the criteria for stormwater, drainage and environmental protection described in Section 1.2 of the ISMP (discussed below).
- An evaluation of the PDA for its ability to provide assurance to the RDN that stormwater management practices throughout the phased development process (and post-development) will protect the environmental integrity of the area; and
- A review of the MOU to determine how it aligns with the PDA to provide the commitments necessary for the RDN to approve the development.

Given that the recommendations of this memorandum will be relevant to both the developer and the RDN, and that the recommendations should relate to the PDA and the MOU, they have been categorized as follows to support the development process:

- Integrated stormwater management: proof of concept
- Detailed design needs
- Long-term servicing analyses

1.2.2 Criteria

The goals and objectives of the ISMP, as stated in Section 1.1, include the following:

- Safeguard human life and property from flood and erosion damage
- Preserve watershed ecological health while allowing development to proceed
- Employ green infrastructure by utilizing innovative best practices for rainwater management
- Conserve ecological integrity by protecting both significant aquatic species and habitats
- Develop cost effective solutions (capital, operation, and maintenance)

The stormwater management criteria are outlined in Table 1 below:

Table 1: Stormwater management criteria for Fairwinds ISMP

Application		Criteria/Methodology
Flood & Erosion Protection	Minor Drainage System	10-year return period design event. [1]
	Major Drainage System	100-year return period design event. [1]
Environmental & Erosion Protection	Volume Reduction 💧	On-site rainfall capture (runoff volume reduction) for 50% mean annual rainfall (50% of the 2-year 24-hour storm). [2]
	Water Quality Treatment ❁	Remove 80% of Total Suspended Solid based on 50 µm particle size from 6-month 24-hour storm (72% of the 2-year 24-hour storm). [2] Limit construction discharge water quality to the lesser of turbidity of 25 NTU or total suspended solids of 25 mg/L at all times expected in the 24 hour period following significant rainfall events (≥25 mm/day) at which time the turbidity can be up to 100 NTU. [3]
	Rate Control 💧	Detain post-development flows to pre-development levels for 50% MAR[3], and 2-year 24-hour event [3] and 5-year 24-hour event.[1]
	Riparian ❁	Establish riparian setbacks to comply with RAR requirements. [4]

1. MOTI, 2007
2. Stormwater Planning, A Guidebook for B.C., MOE, May 2002
3. Land Development Guidelines for the Protection of Aquatic Habitat, Fisheries and Oceans Canada, September 1993.
4. Riparian Areas Regulation (RAR), 2006

❁ Apply to all water bodies – streams, wetlands, lakes, ocean 💧 Apply to streams susceptible to erosion

Source: Draft Report: The Lakes District and Schooner Cover ISMP, KWL (October 2013)

By focusing on the criteria that are to be met and targets that are to be achieved, stormwater management shifts from a focus on inputs (for example, number and variety of BMPs being implemented) to **outputs** – that being, what volume and quality of water is being discharged to the receiving environment, and does the receiving environment have the capacity to receive these flows? It is important that these criteria and targets are incorporated into any future stormwater designs, and as such should be part of the Phased Development Agreement, as discussed further in this memo.

2.0 EVALUATION AND RECOMMENDATIONS: ISMP

2.1 Overall Evaluation

Overall, the revised ISMP is much improved from the previous submission, and provides targets for flood, erosion, and environmental protection, as shown in Table 1. The ISMP describes a series of best management practices (BMPs) that intend to achieve these targets; however, no assurance is provided that these BMPs *will* achieve these targets. It is unclear whether the preferred BMPs will enhance or maintain the water quality and fisheries resources (where applicable) of receiving waters, and if property will be protected by overland flows. The drainage plan is therefore conceptual in nature, and the feasibility of the preferred BMPs versus alternatives (given topography, soil veneer, etc.) remains unclear. Therefore, **the ISMP requires proof of concept** as there is still limited justification for the application of these BMPs and limited assurance that the BMPs will achieve the stated targets. That said, most of the details can be provided in phases further along in the process, thus the importance of using the PDA. The following comments therefore should be read as "end-state design requirements" which could be phased, rather than requirements needed prior to re-zoning.

2.2 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 the targets for flood, erosion, and environmental protection. These include the following:

- There is no assurance that roadside rain gardens up to 10% slope will achieve the targets described in Table 1.
- Many of the proposed roads shown on Figure 13 as having "rain gardens within roads" for water quality treatment actually follow topography that is greater than 10%. Furthermore, all segments of road shown on Figure 13 as being greater than 10% appear to drain to sewers that directly discharge to a water body without local or regional treatment. How will the receiving environment be impacted from water that discharges without treatment?
- 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.
- Because continuous modeling of peak flows was not performed, seasonal variation in pre- and post-development flows is still unclear.
- The ISMP does not assess the capacity of wetlands to accept post-development flows.
- The ISMP does not comment on the implications of the historical Enos Lake water quality data or provide context for the results, with the exception of some commentary on manganese, the Trophic State Index, and dissolved oxygen. Can this data be used to begin to establish baseline conditions? How do the collective results compare to other fish-bearing water bodies, and to water quality guidelines? What about Dolphin Lake, Enos Creek (fish bearing) and the other watercourses?
- It is unclear whether the preferred BMPs will enhance or maintain the water quality and fisheries (if applicable) of receiving waters.
- No water treatment measures are illustrated for Schooner Cove on Figure 14.

Recommendations for providing proof of concept in future design submissions include the following:

- Conduct a high-level analysis of pollutant loading on the receiving waters, and compare this loading to the treatment that may be achieved by these BMPs.
- Illustrate the private/public stormwater system interface for a typical single-family and multi-family property, and for each, a typical property that is adjacent / upslope of natural areas and a typical property that is not. Table 13 indicates that pervious areas will drain to lots downslope of road – does this include municipal ROW areas? ROW should not typically drain to private property.
- Provide constructed examples / photos of rain gardens on steep slopes and evidence that they can achieve water quality and volume/rate reduction targets (e.g., the Silver Ridge development in Maple Ridge, for which KWL states that four years of monitoring shows that the systems are meeting their design objectives).
- The ISMP states that further study is needed to assess the capacity of wetlands to accept post-development flows. Given that a significant feature of this ISMP is the use of wetlands for rainwater treatment and attenuation, the function of these wetlands should be assessed as part of this ISMP; if they are inadequate, it will have significant impacts on the ISMP. Continuous water balance modeling should be completed for wetlands in addition to the two lakes.
- In addition to the above, the ISMP recommends continuous (water balance) modeling to determine changes in frequently occurring events.
- Indicate what water treatment BMPs will be applied to Schooner Cove for treatment prior to discharge to the ocean (e.g. CDS unit).

2.3 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:

- The impacts of climate change were not considered, nor at the very least was a sensitivity assessment completed of how system performance may change in response to different flows.
- The ISMP does not provide evidence for how cost effective the recommended BMPs are relative to the alternatives.
- It is unclear if roadside rain gardens and swales will be on one side or both sides of the road. How will grading, rain gardens/bioswales, and underground sewers be configured to protect private property?
- The capacity assessment for downstream existing infrastructure was based on assumed pipe diameters and materials.
- There is no evidence for how the phased infrastructure plan in the PDA supports achieving the targets in Table 1 throughout the development process.

Recommendations for design and analysis include the following:

- The ISMP should include a sensitivity analysis to assess the impacts of increased flows on proposed infrastructure and wetland/lake levels. This may be achieved by modeling the impacts of a 17% increase in rainfall due to climate change, as per the recommendations in the Metro

Vancouver report, *Vulnerability of Vancouver Sewerage Area Infrastructure to Climate Change* (March, 2008). This scenario is being modeled as part of infrastructure master planning for the City of Nanaimo.

- Confirm the capacity of downstream existing infrastructure and its ability to convey post-development flows. If upgrades are in fact required, it may have significant cost implications and will present additional construction-related risks to the environment.
- The ISMP recommends continuous lake water level monitoring and recording of withdrawals for more accurate water balance modeling, to make recommendations on lake outlet modifications. Provide order-of-magnitude cost estimate for the monitoring program.
- Provide order-of-magnitude cost estimates for the preferred BMPs, including long-term operation and maintenance costs.

2.4 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:

- The ISMP does not capitalize on the existing Enos Lake water quality data that is simply reported. This data may have been utilized to establish preliminary performance targets for stormwater management; however, the ISMP defers to the Enos Lake Monitoring Program TOR.
- There is no discussion of monitoring of any receiving water bodies other than Enos Lake.

Recommendations for long-term monitoring include the following:

- Utilize the existing Enos Lake water quality data to establish preliminary performance targets for stormwater infrastructure prior to Phase I of the development. Ongoing monitoring can then be used to track the response of the lake to development and targets can be adjusted if required.

3.0 EVALUATION AND RECOMMENDATIONS: PHASED DEVELOPMENT AGREEMENT

Sections of the PDA were reviewed as discussed in Section 1.1, and the following recommendations are made to provide assurance to the RDN that the phased development process will support the overall goals and objectives of the ISMP. Specific PDA text amendments including the following:

- A. Definitions:
  - Include a new definition for ISMP, such as "***ISMP*** *means The Lakes District and Schooner Cove Integrated Stormwater Management Plan, October 3, 2013 as amended, prepared by the Owner's consultant and approved by the RDN."*
- The PDA should acknowledge that the ISMP has been included within a Memorandum of Understanding with the RDN and, along with the PDA, forms the basis for long-term stormwater management within the Fairwinds development.
- Section 8(a) – provision of Enos Lake water for irrigating the Fairwinds Golf Course. There should be provisions stated in the PDA regarding the annual quantity of water that may be pumped by the Owner and at what cost, if any.
- Section "(2) Storm Drainage" - This section needs significant work to describe the ISMP, and integrate the ISMP recommendations with the Enos Lake Monitoring Program within a phased program within the PDA.
  - Rename "(2) Storm Drainage" to "(2) Integrated Stormwater Management Plan"
  - Section 28: change the word "study" to "review"
  - Add the following clause: "The Owner has completed and submitted an ISMP, approved by the RDN, for the long-term management of stormwater for the Owner's Land, based on the following goals and objectives:
    - Safeguard human life and property from flood and erosion damage
    - Preserve watershed ecological health while allowing development to proceed
    - Employ green infrastructure by utilizing innovative best practices for rainwater management
    - Conserve ecological integrity by protecting both significant aquatic species and habitats
    - Develop cost effective solutions (capital, operation, and maintenance)"
  - Add the following clause: "The Owner acknowledges that ISMP sets out a series of stormwater management criteria and targets, attached as Schedule 'EE' to be achieved to the design and installation of stormwater infrastructure and other best management practices." – Insert Table 1 from this memo as a Schedule to the PDA.
  - Add the following clause: "The Owner acknowledges the link between the Enos Lake Protection and Monitoring Program and the ISMP, and will design a program to:
    a) Monitor the effectiveness of the ISMP relative to significant changes to the water quality and quantity in Enos Lake;
    b) Determine the most appropriate stormwater Best Management Practices suitable to the Enos Lake receiving environment; and
    c) Inform decisions regarding water management as required."
  - Add the following clause: "Prior to the subdivision approval of Phase 1 of the development, the Owner commits to confirming the following:

URBAN systems

        - Endorsement (i.e. sign-off) from the Owner's professional engineer that the proposed BMPs are appropriate for the on-site geotechnical / geological conditions, specifically but not limited to the disconnection of roof leaders and direct discharge to ground; and
        - Endorsement (i.e. sign-off) from the Owner's professional engineer that the proposed wetlands have the capacity to accept post-development flow, while maintaining water quality objectives outlined in the ISMP and the Enos Lake Protection and Monitoring Program."
    - Add the following clause: "Prior to the subdivision approval of Phase 1 of the development, the Owner commits to the following:
        - Conduct a high-level analysis of pollutant loading on the receiving waters, and compare this loading to the treatment that may be achieved by these BMPs.
        - Illustrate the private/public stormwater system interface for a typical single-family and multi-family property, and for each, a typical property that is adjacent / upslope of natural areas and a typical property that is not
        - Provide constructed examples / photos of rain gardens on steep slopes and evidence that they can achieve water quality and volume/rate reduction targets.
        - Provide a program for continuous (water balance) modeling to determine changes in frequently occurring events.
        - Provide design details regarding the water treatment BMPs to be applied to Schooner Cove for treatment prior to discharge to the ocean.
        - Include a sensitivity analysis to assess the impacts of increased flows on proposed infrastructure and wetland/lake levels. This may be achieved by modeling the impacts of a 17% increase in rainfall due to climate change, as per the recommendations in the Metro Vancouver report, Vulnerability of Vancouver Sewerage Area Infrastructure to Climate Change (March, 2008).
        - Confirm the capacity of downstream existing infrastructure and its ability to convey post-development flows.
        - Provide a program for continuous lake water level monitoring and recording of withdrawals for more accurate water balance modeling, to make recommendations on lake outlet modifications."
    - Add the following clause: "Prior to final approval of the Zoning Bylaw, the Owner commits to the following:
        - Provide order-of-magnitude cost estimates for the preferred BMPs, including monitoring programs, long-term operation and maintenance costs."

- Section 40(d): Clarify what dimension the depth of topsoil is required to be ("300" is provided only; we assume this is 300 *millimetres* of topsoil). Also, clarify whether this applies to public land, private land, or both.
- Section 41: There is no value provided for what the capacity of the drinking water source should be (i.e. "having a capacity of no less than …"). This needs to be provided and approved by the RDN.

4.0 EVALUATION AND RECOMMENDATIONS: MEMORANDUM OF UNDERSTANDING

Sections of the MOU were reviewed as discussed in Section 1.1. It is proposed that the entire ISMP be attached as a schedule to the MOU, rather than the PDA. As long as the ISMP targets and performance criteria are incorporated into to the PDA, as well as the "proof of concept" and other recommendations above, the remainder of the ISMP could be housed within the MOU. After review of the stormwater components in the MOU, the following recommendations are provided:

- Section D.(e)(iii) - Page 3 - add the following to the end of "the fact the Regional District does not presently provide a storm drainage service*, and stormwater systems within road rights-of-way fall within the jurisdiction of the Ministry of Transportation and Infrastructure*"
- Section B.1(2)(a) - Page 4 - rename "storm drainage (Part C)" to "integrated stormwater management (Part C)".
- Section B.2 Definitions - Page 5 - add a definition for ISMP: Integrated Stormwater Management Plan.
- Section B.3(C)(5) - Page 7/8 - in addition to storm drainage works, and funding for O&M, there should be a bit more commitment to "preserving and enhancing ecological health". There should also be reference to Enos Lake water quality, incorporating the recommendation in this memo (e.g. "Utilize the existing Enos Lake water quality data to establish preliminary performance targets for stormwater infrastructure prior to Phase I of the development. Ongoing monitoring can then be used to track the response of the lake to development and targets can be adjusted if required.")
- Section B.3(C)(6) - Page 8 - add after "particulars may be modified by the Owner, *where approved by the Regional District and the Approving Officer*"
- Section B.3(C)(7) - Page 8 - there should be reference to the BMPs and the Enos Lake Monitoring Program in this section.
- Section C.2(9)(a) - Page 8 - charges to be based on a "flat rate (equal amount per parcel) parcel tax". The RDN may want to consider other options to the parcel tax, such as a cost/acre, or a frontage tax. A flat rate parcel tax might not be the fairest allocation for the requisition. (the same comment could be applied to transportation, Section D.2(15)(a)).
- Section D.3(17) - page 11 - there is reference to an "Implementation Agreement" between RDN and MOTI for transportation. This should be expanded to include the program for stormwater management.

5.0 CLOSING

The revised ISMP is much improved over the initial submission, and identifies appropriate criteria and targets to manage stormwater quantity and quality within the proposed development. The Phased Development Agreement (PDA) is the instrument which commits the developer to certain actions at specific milestones. As such, the ISMP targets and stormwater management criteria, as well as a commitment to proof of concept and order-of-magnitude cost estimates for long-term BMP operations and maintenance need to incorporated into the PDA.

The PDA needs to be crafted to ensure that the recommendations in the ISMP are followed throughout the phases of the development, and that there is a close linkage between the ISMP and the Enos Lake Protection and Monitoring Program. Most of the proposed recommendations provided in this memo can be phased throughout the development process, and as such should not affect the timing of the rezoning application. However, additional monitoring, analysis, design, and cost estimates (both capital and operational) will be need to be undertaken, within the requirements outlined in the Phased Development Agreement.

The Memorandum of Understanding (MOU) acts as a non-binding reference document which, while providing valuable information, does not commit the developer to specific actions or requirements. Documents and clauses listed within the MOU, including the proposed ISMP document, can be referenced by the RDN and other approving agencies (e.g. MOTI, MOE), throughout the rezoning process and all phases of the development and beyond.

We look forward to continuing to work with you on this innovative and comprehensive approach. Please contact the undersigned if you have any questions or require clarification of our comments.

URBAN SYSTEMS LTD.

Dan Huang, MCIP, RPP
Senior Planner / Principal

Ehren Lee, P.Eng.
Water Engineer / Principal

/dh/el/gs/bd

U:\Projects_VAN\1984\0007\01\R-Reports-Studies-Documents\DRAFT\2013-10-15-MEMO-RDN Fairwinds - Revised ISMP and PDA Review Final.docx