

MEMORANDUM



Date: August 08, 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 – ISMP Overview

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 conducted a broad review of the ISMP and other documents associated with this application, including but not limited to the following:

- The Lakes District and Schooner Cove Integrated Stormwater Management Plan (ISMP) – Kerr Wood Leidal, Draft Report, July 2012
- Fairwinds Lakes District and Schooner Cove Rainwater Management Standards – Kerr Wood Leidal, Rev A, July 2012
- The Lakes District Neighbourhood Plan, Section 4.3.3 Master Rainwater (Stormwater) Concept – Ekistics, February 2011
- Schooner Cove Neighbourhood Plan, Section 4.3.3. Master Stormwater Concept Plan – Ekistics, February 2011
- Fairwinds Resort Community Project Specific Street Standards – Ekistics, July 2012
- The Lakes District Infrastructure Phasing and Land Use Phasing Plan – Ekistics, date unknown
- Schooner Cove Infrastructure Phasing and Land Use Phasing Plan – Ekistics, date unknown
- Detailed Biophysical Assessment – Cascadia Biological Services, February 2009
- Environmental Impact Assessment – Pottinger Gaherty Environmental Consultants Ltd., February 2010
- Terms of Reference, Enos Lake Protection and Monitoring Program – Pottinger Gaherty Environmental Consultants Ltd., July 2013

For clarity, we conducted this review consistent with a typical local government development application review, as an extension of RDN engineering and planning staff. This was not a formal peer review. Out of professional courtesy, the applicant and the developer's consulting team was made aware of our involvement in the development application review, and we will (through the RDN) continue to seek information and clarity on the submission from the application as required.

This review forms a small component of a much larger and coordinated development application process involving the Official Community Plan, Neighbourhood Plans, Zoning, Phased Development Agreement, Subdivision, Development Permit, and other agreements as required. The scope of this review is limited to the ISMP and its relation to the other documents associated with this application, and is not meant to comment on the specific merits of the development proposal.

MEMORANDUM

Date: August 08, 2013
File: 1984.0007.01
Subject: Fairwinds Development Review – ISMP Overview
Page: 2 of 9



What is an ISMP?

An Integrated Stormwater Management Plan (ISMP) is a comprehensive study that examines the linkages between drainage servicing, land use planning and environmental protection. Its purpose is to present a blueprint that supports the growth of a community (or neighbourhood) in a way that maintains or ideally enhances the overall health of a watershed.

The objectives of an ISMP are watershed-specific, but generally encompass the following:

- Drainage Objectives – Alleviate existing and/or potential drainage, erosion, and flooding concerns.
- Stream Protection Objectives – Protect and/or restore stream health, including riparian and aquatic habitat.
- Water Quality Objectives – Remediate existing and/or potential water quality problems.

(source: Stormwater Planning: A Guidebook for British Columbia, Province of BC, 2002)

The ISMP focus is on the integration of stormwater management, environmental protection and land use planning. An ISMP is an integral component of a local government's land development and growth management strategy because upstream activities (land use change) have downstream consequences (flood risk and environmental risk). That said, an ISMP is a significant undertaking which will require a commitment on many levels – technical, administrative, political, financial, and operational. For additional information, the provincial stormwater planning guidebook (referenced above) has a section devoted to "Developing and Implementing an Integrated Stormwater Management Plan (ISMP)".

The provincial guidebook identifies a "layered approach" to developing an ISMP, which provides a comprehensive and integrated approach to stormwater management, as follows:

- First Layer – Identify the stormwater-related objectives for a watershed (e.g. protection of aquatic resources, protection of life and property, protection of water quality). These objectives define what the ISMP is striving to achieve.
- Second Layer – Develop strategies to achieve the watershed objectives. This includes setting performance targets to guide selection of site design solutions.
- Third Layer – Implement appropriate site design solutions (e.g. source controls) for achieving performance targets that suit local objectives and conditions.

This approach is recommended for both the review and implementation of the Fairwinds ISMP, as it allows for the phasing and scheduling of the required information and analysis needed for this comprehensive study. The broad objectives and strategies will be required now and at time of site rezoning, additional details will be required at time of subdivision for each phase, and further site-specific design will be required on a lot-by-lot basis. As identified in the Neighbourhood Plan policy 4.3.3(a) for both the Lakes District and Schooner Cove, ISMP requirements should be coordinated with specific schedules within a Phased Development Agreement (PDA) based on the layered approach within the provincial guidebook. This will both keep the development moving forward while coordinating the appropriate amount of analysis and level of detail at various stages in the application process.

MEMORANDUM

Date: August 08, 2013
File: 1984.0007.01
Subject: Fairwinds Development Review – ISMP Overview
Page: 3 of 9

**Fairwinds Draft ISMP Review**

The following are comments related to the Lakes District and Schooner Cove Integrated Stormwater Management Plan, prepared by Kerr Wood Leidal Associates Ltd, July 2012. Given the scope of the assignment this is not an exhaustive review, but attempts to cover the fundamentals

Environmental Overview in relation to the ISMP

As noted in the provincial stormwater guidebook, in order “to select appropriate stormwater management strategies and site design solutions, it is first necessary to identify the resources to be protected, the threats to those resources, and the alternative management strategies for resource protection” (*source: Stormwater Planning: A Guidebook for British Columbia, Province of BC, 2002*). The applicant has undertaken significant environmental studies of the site, including:

- Detailed Biophysical Assessment (BA), prepared by Cascadia Biological Services (2009)
- Environmental Impact Assessment (EIA), prepared by Pottinger Gaherty Ltd. (2010)
- Terms of Reference – Enos Lake Protection and Monitoring Program, prepared by Pottinger Gaherty Ltd. (2013)

General comments related to the integration of environmental site features and values into the ISMP are as follows:

- The ISMP only very broadly and lightly follows the BC Stormwater Planning Guidebook and, as a result, does not follow a truly integrated approach to stormwater management planning.
- The ISMP does not appear to incorporate any previous environmental work completed, in particular, the Biophysical Assessment and the Environmental Impact Assessment. In fact, the ISMP does not reference either of these documents as the basis for setting environmental objectives and targets.
- The ISMP is very light on the *integration* component and should more clearly integrate stormwater management planning with land use, drainage servicing, and the environment. Integration could be better achieved by viewing stormwater management planning through a watershed lens; currently, the connection between activities in the watershed, their impact on the environment, and effective stormwater management planning to mitigate the impacts of these activities, is unclear.
- The ISMP describes the planned stormwater conveyance methods; however, there is little supporting evidence provided for why the methods were selected with respect to environmental protection and there is no discussion of alternatives or of costs.
- There is very little discussion regarding how the performance of the systems with respect to environmental protection will be measured and what actions should be taken if any components underperform or if land use, environment conditions, or other factors change (i.e., no adaptive management plan).
- The Stormwater Plan Commitments are generally qualitative in nature and do not connect with the stormwater quantity and quality criteria previously discussed in the ISMP. Furthermore, with the exception of a few (e.g., 80% removal of total suspended solids), most of the criteria are qualitative and it is not clear if they are based on existing hydrometric and environmental data.

MEMORANDUM

Date: August 08, 2013
File: 1984.0007.01
Subject: Fairwinds Development Review – ISMP Overview
Page: 4 of 9



- Opportunities to support integrated stormwater management planning efforts with component plans such as: an Erosion and Sediment Control Plan, a Source Control Plan, and an Environmental Monitoring Program, are unclear.
- The ISMP simply outlines the overall setting, identifies Enos Lake as a priority, and then commits to a set of stormwater management practices which, conceptually, should achieve qualitative improvement to water quality through a reduction in total suspended solids and attenuation of flows. It does not include a guiding vision and objectives, convey an understanding of existing baseline conditions, or outline a comprehensive implementation strategy for achieving the objectives.
- The Enos Lake Protection and Monitoring Program (which was prepared after the Draft ISMP) should inform all stages of the ISMP and components of the program should be applied to the performance of infrastructure for protection of other watercourses as well as the marine environment.

ISMP Overview and Modeling Approach

The general principles of the stormwater management strategy as originally laid out in the Neighbourhood Plan appear to have been followed, albeit with some configuration adjustments likely to suit a more refined look at the development layout and topography. However, the depth of technical analysis is somewhat limited for an ISMP, and seems to derive a number of conclusions without the appropriate depth of data to support it (elaboration below).

The Neighbourhood Plan includes the following policy: “Ensure that the stormwater management system is designed and constructed in compliance with the BC Stormwater Guidebook and Water Balance Model”. The ISMP has argued that because there is so much bedrock and a thin veneer of soil, there is virtually no infiltration, therefore development will cause little change in runoff. They therefore argue that the stormwater management approach is to focus on conveyance and quality. They have omitted continuous, or “water balance”, simulation and have gone straight to single event modeling. There does not appear to be sufficient data to support their assumptions on existing hydrology to support their decision to skip water balance modeling.

The Provincial Stormwater Guidebook promotes analysing / managing the following events:

- Tier A events (<50% of the Mean Annual Rain, or about the 6 month – 24 hour event) should be retained on site to match predevelopment hydrology.
- Tier B events (the Mean Annual Rain (MAR), or about the 1:2 year – 24 hour event) should be detained and its release rate managed to pre-development levels.
- Tier C events (greater than MAR) require safe conveyance and flood control.

While it promotes the Water Balance Model (WBM), page 9-1 of the Provincial Guidebook states that the Water Balance Model is an example application. The primary need is to conduct Water Balance “Modeling”, which means **continuous simulation** and attention to the three tiers of precipitation events, as noted above. The RDN should not be too concerned that the ISMP has not specifically used the Water Balance Model, but we do feel that the ISMP is lacking by not taking a water balance modeling **approach**, or at least provide more substantial evidence to support their statements about the relative

MEMORANDUM

Date: August 08, 2013
File: 1984.0007.01
Subject: Fairwinds Development Review – ISMP Overview
Page: 5 of 9



difference between pre and post development hydrology. This relationship can be quite different in the summer versus winter and why an annual cycle should be considered. The ISMP has applied XPSWMM which can satisfy a water balance approach – XPSWMM is recognized in the Provincial Guidebook for continuous simulation – however, it has not been used to the degree it should be for comprehensive assessment.

Additional model criteria comments are provided as follows:

- For single event modeling, the ISMP has applied an 18 hour storm, which is very unusual and with no reasoning given. A 24 hour event is common.
- The ISMP has focused analysis on a 6 month event and a 200 year event – two widespread extremes. The 6 month event is common for water quality and volume control, however in this case the ISMP only applies it to water quality. The 200 year is common for flood control of major waterways and water bodies, but is not common for typical conveyance routes. Lake levels and establishing flood protection around the lake makes sense using the 200 year, but seems extreme for the conveyance along roadways and in the community. Depending on what system is proposed, 5 or 10 year is usually used for minor system, 100 year usually used for major system. MOT usually has mixed criteria involving the 25 or 50 year as well.
- It is not clear what local conveyance systems are being designed for. Are all management features to be designed to the 200 year level? If so, perhaps the study should still demonstrate performance over a range of typical criteria. It's also not clear on what the community wide conveyance system is comprised of – is it only rain gardens and bioswales, or are there storm sewers too?
- Climate change might be something to be considered as well – if nothing else, a sensitivity assessment on how system performance may change. Given that wetlands are proposed, drier summers will be as important to understand as wetter winters. This is another argument for continuous simulation and considering an annual cycle, as well as the impact on natural wetland and lake levels.

Additional ISMP Comments

The ISMP review highlighted a number of the comments and questions for clarification and further analysis through the development application process. For ease of review, the comments are separated into Phase 1 (clarification of objectives and concepts) to be addressed at time of PDA and rezoning stage, and Phase 2 (detailed information and analysis) to be addressed later on in the process, such as at time of subdivision or development permit (DP) stage, or development of the stormwater Local Service Area (LSA).

Phase 1 – Clarification of objectives and concepts

- Has there been any hydrometric monitoring? There should likely be moving forward.
- The Draft ISMP does not include a detailed discussion of the bedrock conditions. Has there been a geotechnical / hydrogeology assessment study? Sometimes bedrock can be highly fractured and still have the ability to “take in” a lot of water. Page 6-1 of the ISMP speaks to concern for

MEMORANDUM

Date: August 08, 2013
File: 1984.0007.01
Subject: Fairwinds Development Review – ISMP Overview
Page: 6 of 9



water “travelling down fissures into private property” and as a result suggests the rain gardens need to be lined and with a sub-drain.

- How important is the veneer of soil to natural hydrology? This will have significant impacts to lot grading, requirements for depth of soil, and landscaping (both within the public ROW and on individual parcels).
- Aside from rainfall retention, continuous simulation would assist with an impact assessment on the natural lakes and wetlands. How will water level patterns change? How will that alter shore line conditions and health?
- Depending on the outcomes of more comprehensive hydrologic analysis, existing watercourses may warrant an erosion sensitivity assessment.
- It is unclear whether the concept incorporates a piped system as a backup to the roadside bioswales and rain gardens, and whether individual parcels will have piped systems, given the lack of infiltration due to bedrock. Clarification and more detailed analysis will be required (see additional questions under Phase 2).
- The berm to “back-stop” the Enos Wetland beaver pond is not quantified. Is this creating a dam that has regulatory and specific operation and maintenance (O&M) requirements? The ISMP should include an inventory of dams within the development area and should consider the O&M requirements and associated costs of these structures in relation to stormwater management.
- With regards to Schooner Cove, the portions discharging to the ocean should not pose a concern for erosion or capacity, so long as the outfall is done appropriately. For the portion of Schooner Cove draining to the existing storm sewer system, capacity may be an issue and needs to be assessed. Water quality is a concern for all of Schooner Cove and there is no information presented on how that will be addressed. The Neighbourhood Plan offered more detail than the ISMP does.
- The ISMP should document any records of existing drainage concerns, including contact with the MoTI contractor (Emcon).
- The ISMP should confirm existing downstream system capacity to inform the need, if any, for stormwater detention or other upgrades. If such works are required, the ISMP should describe the merits and impacts of alternatives as well as costs.
- How do the Ekistics Infrastructure Phasing Plans fit into this review? These plans, the Neighbourhood Plans, and the ISMP all seem to generally suggest a common approach, but each with their individual nuances. They are all at a concept level and none of them appear to provide sufficient detail to support subdivision review.

Phase 2 – Detailed information and analysis

- The ISMP speaks to only treating runoff from roads and driveways, and suggests in the “standards” document that “where a regional facility is constructed two parallel storm mains will be required in the catchment. One will carry roof and footing drain water directly to the discharge points and bypass the rain gardens. The second will be dedicated for roads and sidewalks and driveways that drain to the street and will be directed to the rain garden.” This again raises questions of what the proposed collection and conveyance system is to be.

MEMORANDUM

Date: August 08, 2013
File: 1984.0007.01
Subject: Fairwinds Development Review – ISMP Overview
Page: 7 of 9



- The report graphics do not appear to show storm sewers, but only roadside rain gardens with a minor 150 mm perforated underdrain. Second, the cost effectiveness of providing a dual pipe system should be reviewed. Separating the flow will likely require a smaller regional treatment facility, but there are significant capital and long term O&M costs associated with two systems.
- There is still debate over the cleanliness of roof runoff. Some argue that air pollutants settling on roofs and the roof construction materials themselves release pollutants worth treating. Is roof runoff to directly connect to the “storm mains” or are splash pads required such that some form of treatment and recharge will occur on-lot?
- The criteria document says the longitudinal slope of roadside rain gardens should be 1-2% yet Figure 1-1 shows rain gardens to be applied in what appears to be steep terrain. Are weirs to be used to create cascading rain gardens? Perhaps sample design templates should be prepared – what is the maximum grade threshold where geometrically this becomes impractical?
- Topography suggests that many private lots will be substantially lower than the fronting roadway, which appear to be serviced only with a shallow rain garden. Will it be possible in all cases for foundation drains and roof leaders to drain / connect to the communal system? If not, how must site drainage be managed to prevent downstream impact.
- What foundation depths are permitted and how will they be adequately drained? The servicing relationship between the private lot and communal system is not clear.
- It is proposed that Enos Lake and Enos Wetland serve as detention ponds using modified controls. There is very little environmental information presented in the report. How will natural water bodies be impacted over the full spectrum of events and are the environmental regulators on-board with this approach?
- The report indicated that Dolphin Lake is difficult to model and detailed topographic survey is required. It also says that “there are several detention ponds downstream for Dolphin Lake that will mitigate most of all of any flow increases”. Again, there needs to be sufficient technical work to support this conceptual statement.
- What would the “roadway drainage to regional facility” look like? If the ISMP argues that there is little to no infiltration, and if the roadside rain gardens are to be lined, what is the cost / benefit comparison between the “rain garden within roadway” versus “roadway draining to regional facilities”. What is the basis for where these two approaches are applied?
- It would appear that “rainwater creeks” are to be located on some very steep terrain. More site specific information will be required to provide comfort that these can be built and be maintained in a stable form, as maintenance of these systems and associated liability must be considered (particularly where these features are to be located on parkland).

ISMP Review Summary

The submitted report is a very “light” ISMP technically and closer to a stormwater management plan. There are not enough technical details and analyses included in order to provide confidence in the overall understanding of the natural hydrology, nor function and sizing of the proposed systems. To move forward, further detail at the site level is required to offer more clarity on how things will “fit and function”, and how the private lots will interface with the communal system. Some of the proposed strategies also warrant further consideration of cost / benefit given the capital outlay and long term commitments to look after this infrastructure.

MEMORANDUM

Date: August 08, 2013
File: 1984.0007.01
Subject: Fairwinds Development Review – ISMP Overview
Page: 8 of 9

**Recommended Phased Approach to ISMP Approval**

Integrated Stormwater Management Plans are a comprehensive but complex approach to managing stormwater, environment and land use objectives in a coordinated fashion. A number of municipalities in BC are noting the challenge of incorporating and administering ISMPs within their communities, even with full ownership and control of roads and stormwater infrastructure; this becomes all the more challenging in a regional district context, with ownership of roads and stormwater vested with the Ministry of Transportation and Infrastructure (MoTI). The RDN has been working closely with MoTI in developing a unique agreement/understanding and service arrangement by which the RDN can take on responsibility of stormwater infrastructure within the Lakes District and Schooner Cove neighbourhoods, likely through the creation of a Local Area Service. This will require a clear understanding of the guiding principles, objectives and concepts first, before addressing the details surrounding design, operations, maintenance, ownership, funding and liability of stormwater infrastructure within the Lakes District and Schooner Cove. Consideration will also be required with respect to downstream implications (particularly O&M requirements) to existing stormwater systems (ie., within existing Fairwinds), that are owned and operated by others.

It is for this reason that a phased approach to the ISMP has been suggested, which can also be incorporated into the Phased Development Agreement (PDA) prior to consideration of rezoning. Taking into account the comments provided above, in summary the phased approach would consider the following:

ISMP Phase 1 (in support of PDA and rezoning):

- Identify objectives, approach and concepts.
- Identify and integrate environmental objectives and values into stormwater management plan, including targets set out in the Enos Lake Monitoring Program.
- Undertake comprehensive hydrologic analysis based on environmental and stormwater objectives.
- Undertake continuous modeling (i.e., water balance approach) or provide detailed rationale on why it is not required.
- Clarify conveyance systems required for 5 year, 25 year and 100 year events, specifically identifying whether a piped system is required and proposed routing of overland flows.
- Provide detailed rationale and concepts regarding the use of “rainwater creeks” and “rain gardens” on steep topography with a shallow veneer of soil.
- Provide details regarding individual lot stormwater management (i.e. on-site infiltration or connection to a common stormwater system), and how the interface between the individual lots and public stormwater system will function.

ISMP Phase 2 (in support of subdivision, Development Permit and Local Area Service):

- Provide detailed analysis, design, cost estimates, and agreements .
- Development of drainage plans at a detailed level for each lot at each phase of development.
- Detailed utility designs and capital cost estimates.

MEMORANDUM

Date: August 08, 2013
File: 1984.0007.01
Subject: Fairwinds Development Review – ISMP Overview
Page: 9 of 9



- Provide cost estimates for Operations and Maintenance (O&M) requirements in support of a potential Local Area Service and agreement with MoTI.
- Provide cost estimates for environmental monitoring or other on-going analysis, to be included within the annual costs of the Local Area Service.
- Detailed landscape plans both within the right-of-way and for individual parcels (e.g. site grading)
- All other detailed information to support subdivision and DP approval.

Summary and Next Steps

We understand that the Regional District of Nanaimo is committed to working closely with the applicant, its consultants, and appropriate agencies (e.g. MoTI, MOE) in reviewing and seeing through the completion of the ISMP for the Fairwinds development in a timely fashion. Although the Draft ISMP addresses stormwater conditions based on pre- and post- development conditions, it does not fully integrate the environmental nor the land use parameters into its stormwater objectives and concepts, as per the provincial guidebook.

In order to continue to move this application forward, a phased approach to the ISMP revisions has been recommended, allowing the developer to achieve the next milestone (PDA and rezoning) without undertaking a significant amount of analysis, design and cost estimating. The first phase, however, will require coordination and integration of previous environmental reports (including the Enos Lake Monitoring Program) into the ISMP objectives, clarification of the modeling approach (i.e. continuous simulation), and preparation of updated concepts respecting the comments provided in this memo. We are also committed to working closely with you and the applicant in seeing this phased approach through, which will potentially include operating and maintenance agreements between the RDN and MoTI, as well as the establishment of a Local Area Service for stormwater management in the Fairwinds neighbourhood.

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.

A handwritten signature in black ink, appearing to read "Dan Huang".

Dan Huang, MCIP, RPP
Senior Planner / Principal

A handwritten signature in black ink, appearing to read "Ehren Lee".

Ehren Lee, P.Eng.
Water Engineer / Principal

/dh/el/gb/bd

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