

University Endowment Lands

Integrated Stormwater Management Plan

Stage 2 Report

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1. Introduction

1.1 Overview, Goals, and Approach of the ISMP

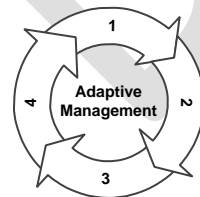
An Integrated Stormwater Management Plan (ISMP) is a comprehensive, long term strategy that focuses on protection and enhancement of a watershed's health. ISMPs combine concepts of urban planning, stormwater management, and environmental management to facilitate sustainable development within a watershed. An ISMP is an integral component of a local government's land development and growth management strategy because upstream activities including land use change have downstream consequences such as flood and environmental risks.

The primary goals of the ISMP are as follows:

- Alleviate existing and/or potential drainage, erosion, and flooding concerns
- Protect and/or restore stream health including riparian and aquatic habitat
- Remediate existing and/or potential water quality issues

The UEL is within the Greater Vancouver Sewerage & Drainage District (part of Metro Vancouver) and is developing an Integrated Stormwater Management Plan that is consistent with the requirements of Metro Vancouver's Integrated Liquid Waste and Resource Management Plan (ILWRMP). The UEL consists of approximately 1200 hectares of land and is situated between the City of Vancouver and the University of British Columbia. The majority of the land (77%) is forested and the rest is developed for residential, commercial, institutional, and recreational land uses. The management of the rainfall that falls on the developed portion of the UEL community is the focus of this ISMP. The study area includes three watercourses - Spanish Bank Creek, Canyon Creek, and Salish Creek – that flow north into the Burrard Inlet. The area of the UEL that drains south to the Fraser River is addressed through the Musqueam Integrated Stormwater Management Plan.

The UEL has retained AECOM Canada Inc. to develop the ISMP in line with the requirements of Metro Vancouver's ILWRMP and British Columbia's Environmental Management Act. Development of the ISMP will occur in four stages and is based on the approach outlined in Chapter 9: Developing and Implementing an ISMP in Stormwater Planning: A Guidebook for British Columbia.



The ISMP contains long-term goals and objectives that have a planning horizon of up to 30 years. Changes in factors such as the economy, technology, policy, land-use and public opinion over the long term horizon can be addressed through an Adaptive Management approach in which the ISMP is periodically updated to ensure that it remains relevant and applicable. The adaptive process is iterative - the last stage in the cycle focuses on monitoring, and will generate new information that should be reviewed in the first stage of the next cycle.

Table 1.1 Summary of ISMP Approach

Stage	Question Answered	Description of tasks	Relevant ISMP Sections
1	What do we have?	Review background information and summarize existing conditions	<ul style="list-style-type: none"> - Study Area - Regulatory Context - Land Use - Hydrology - Stormwater System - Hydrogeology and Soils - Environment - Hydraulic Modelling and Assessment
2	What do we want?	Establish the vision for future development	<ul style="list-style-type: none"> - Vision and Goals
3	How do we put this into action?	Development of an implementation plan, funding and enforcement strategies	<ul style="list-style-type: none"> - Implementation Plan
4	How do we stay on target?	Development of a monitoring and assessment program	<ul style="list-style-type: none"> - Adaptive Management Plan

1.2 Stage 2 Objectives

As outlined in the ISMP approach in Table 1.1, the key question that needs to be answered in Stage 2 is what do we want stormwater management at the UEL to look like? In order to answer this question, the task of Stage 2 is to identify the vision and goals for stormwater management. Stage 2 requires understanding of the existing stormwater system and input from the key stakeholders. The former has been documented in the Stage 1 report and the latter is the key objective of the Stage 2. This report summarizes the input from key stakeholders regarding stormwater management as captured through a visioning exercise and three consultations.

2. Visioning Workshop and Consultations

AECOM conducted five ISMP progress briefings and visioning input consultations with stakeholders; one with the UEL Community Advisory Council, one with City of Vancouver and Metro Vancouver staff, one with Spanish Bank Streamkeepers and Pacific Spirit Part Society staff, one with University of British Columbia Campus and Community Planning staff, and one with University Golf Course management staff.

2.1 UEL Community Advisory Council

On October 17, 2016, a brief overview of the findings of the ISMP Stage 1 report and a Stage 2 overview information sheet were presented to the UEL Community Advisory Council (CAC). The ISMP Stage 1 report was made available on the UEL website for review by the community and an open invitation was given for input into further stages of the ISMP development process. The CAC accepted the Stage 1 report for review and requested to be provided with further updates and information as the ISMP is further developed.

2.2 City of Vancouver and Metro Vancouver Visioning Workshop

On June 24, 2016 a workshop was held at the University Endowment Land Administrative Office with City of Vancouver and Metro Vancouver staff where AECOM and the UEL presented the Stage 1 report findings and obtained input from participants on the potential vision and goals of the ISMP. The follow items were discussed as part of the development of vision and goals:

Engagement with the community

- Education for residents regarding stormwater best management practices
- Utilize resources and studies conducted within the watershed to benefit stormwater management
- A library, or repository, of local knowledge about the watercourses and parks that is accessible for public
- Pursue concepts of connected community and sharing of information
- Engage Golf Course in stormwater planning, Best Management Practices (BMPs), and water conservation practices

Protect Water Quality

- Protect, enhance, and improve streams
- Protect and respect the Pacific Spirit Park area
- Implement stormwater BMPs where applicable
- Understanding of water flow patterns through the Park
- New Developments/Redevelopments
 - Increase in impermeable area is a concern
 - Infiltration is not always the best option

Protect Water Quantity

- Maintain flows in watercourses for fish habitat
- Investigate water flow from Regent College into the stormwater system and its contribution to Salish Creek and maintaining of fish habitat

Protect Life and Property

- Erosion along NW Marine Dr.
- Maintain or improve current fish values

Natural Environment

- Tree protection and management
- New developments/ redevelopments
 - Keep significant and/or valuable trees

Resiliency to Climate Change

- Increased peak flows
- Increased storm frequency

Consider Developing Bylaws

- Tree Protection
- Erosion and Sediment Control

2.3 Spanish Bank Streamkeepers and Pacific Spirit Park Society Visioning Consultation

On September 8, 2016, the Spanish Bank Streamkeepers and representative from the Pacific Spirit Park Society met with AECOM and the UEL staff to discuss issues and concerns regarding stormwater management.

The Spanish Bank Streamkeepers volunteer group is actively involved in monitoring, assessing, and safeguarding the Spanish Bank Creek, Canyon Creek, and Salish Creek. The group receives support from the Pacific Streamkeepers Federation and members are encouraged to get the Streamkeeper Certification, which provides training in watercourse monitoring and assessment. The Spanish Bank Streamkeepers have provided educational opportunities for the public, including school children programs and summer camps. The Streamkeepers have also taken on investigative work in assessing water quantity variability in the Salish Creek. Together with the UEL Operations staff, the Spanish Bank Streamkeepers have discovered that, during the dry summer months, Regent College is discharging groundwater directly into the UEL storm drains after it is utilized for the building cooling system. The flow discharges into the Salish Creek at the box culvert below Acadia Circle. The Streamkeepers are eager to determine the impact of the flow from the Regent College on the ecology in the Salish Creek, and have contacted the Pacific Streamkeepers Federation to provide further guidance on the next steps.

The Streamkeepers have noted that with presence of salmon in the Spanish Bank and Salish creeks it is important to provide a healthy stream habitat through:

- Maintaining sufficient stream flow in the summer/drought months, and controlling high storm flows in the rainy/winter seasons; and,
- Identifying if water quality is an issue, specifically concerning the size of the bugs in Salish Creek as compared to Spanish Bank Creek, and especially during the “first flush” events.

2.4 University of British Columbia ISMP Consultation

Similar to the UEL, the University of British Columbia is currently undertaking the development of an Integrated Stormwater Management Plan. This presents an opportunity for collaboration between the UEL and the UBC with respect to stormwater management. On July 28, 2016, AECOM and UEL staff met with UBC Campus and Community Planning staff to discuss the challenges and opportunities for development of an ISMP, gather information, and build on the lessons learned.

Key challenges that the UBC is facing as it develops their stormwater strategy were identified as follows:

- The underlying clay soils that limit infiltration options and lead to development of detention and system optimization options
- Stormwater outfalls are located outside UBC's jurisdictional boundaries, therefore there are opportunities for collaboration between UBC and UEL to minimize impact of the Point Grey Campus on adjacent lands
- Stability of slopes at ravines, outfalls and coastal cliffs area a concern due to the potential for damage to life and property. Erosion continues to be a focus of studies and development of a management plan.

The result of the consultation with UBC is the understanding that future stormwater management work can be done in a collaborative approach through open communication and sharing of information.

2.5 University Golf Course ISMP Consultation

The University Golf Course (UGC) has accommodated UEL's effort to gain further information regarding drainage and water consumption within the golf course property. During the meeting with UGC management on August 16, 2016, AECOM was able to introduce UEL ISMP project and request information that will help better understand the drainage and water use within the UEL.

The University Golf Course is located in the headwaters of the study area watershed, and a series of culverts, drainage lines, and open ditches, discharge from the University Golf Course property into the Salish Creek and Spanish Bank Creek. Based on the drainage information acquired after the meeting, the headwaters of the watershed delineation was able to be improved because it was discovered that a portion of the golf course property south of University Boulevard drains southward to the Musqueam and Cutthroat Creeks. Additionally, the consultation with the University Golf Course resulted in a better understanding of water use through the UGC's Water Use Plan as well as information about the pesticide use through the UGC's Integrated Pest Management Plan. On July 1st, 2016 changes in the provincial Integrate Pest Management regulation, require a licence for application of pesticides to landscaped areas on private lands. Businesses such as the UGC are required to have certified staff that obtain a licence and who use IPM, follow environmental protection requirements, and keep records of all pesticide applications.

3. Goals and Objectives

Based on the input of the key stakeholders, the vision of the UEL ISMP can be summarized as:

“The University Endowment Lands’ Integrated Stormwater Management Plan protects the natural and built environment through enhancement of natural watercourses, and provides opportunities for collaboration and engagement with community and residents on stormwater issues”

The UEL Community Advisory Council, City of Vancouver, Metro Vancouver, the Spanish Bank Streamkeepers, the Pacific Spirit Park Society, the University Golf Course, and the University of British Columbia have identified the following goals to enhance stormwater management in the University Endowment Lands.

Goal 1: Community engaged in stormwater management

- Residents and homeowners within the UEL ISMP study area are engaged in stormwater management at UEL.
- Engagement of Pacific Spirit Park users, neighbouring communities and stakeholder organizations. There is capacity for key stakeholders to share and access stormwater related information (i.e. water quality reports).

Goal 2: Healthy streams and a natural environment are part of UEL

- UEL employs stormwater Best Management Practices where applicable.
- New development or redevelopment projects at UEL abide by Erosion and Sediment Control requirements.
- Remaining combined sewers at UEL are separated respectively with implementation of Low Impact Development and stormwater Best Management Practices.

Goal 3: Stormwater infrastructure provides adequate level of service while protecting life and property

- UEL storm sewer infrastructure sufficiently conveys run-off from the 5 year design storm within the drainage system without causing significant flooding, slope stability issues or significant environmental issues.
- UEL aims for a proactive asset management program to track the state of its infrastructure.
- UEL strives towards reducing erosion and potential damage in the areas with steep slopes. Geotechnical expertise required to study areas contributing to erosion and slope instability.

Goal 4: Provide guidelines and a regulatory framework for stormwater management

- Section 20 of the Works and Services Bylaw requires stormwater management for new developments and redevelopment of existing properties in accordance with the standards established under Section 13 of Works and Services Bylaw

- UEL protects its watercourses and natural environment from deleterious substances generated by construction activity through implementation of Erosion and Sediment Control best practices.
- UEL integrates the Schedule C (specifications for boulevard trees and landscaping) of the Works and Services By-law with the stormwater management plans.
- UEL guidelines and regulatory frameworks are in line with regional stormwater management policies.

Goal 5: Stormwater management at UEL adapts to change

- UEL adapts its stormwater management to changes in climate and regulatory environments.
- The UEL ISMP is a living document and is revisited through future iterations.

4. Next Steps

The Stage 2 report summarizes the visioning and consultation process that has been undertaken to develop the vision and goals of the UEL ISMP. The next stage of the ISMP process will look at the development of an implementation plan for potential projects and initiatives that will help the UEL achieve the goals outlined in Stage 2.

Appendix A

City of Vancouver and Metro Vancouver Visioning Workshop
Minutes of the Meeting and Presentation

DRAFT

Minutes of Meeting

Date of Meeting	June 24 th , 2016	Start Time	10:00am	Project Number	60222155 (412)
Project Name	University Endowment Lands Integrated Stormwater Management Plan				
Location	UEL Administration Building				
Regarding	Visioning Workshop for Integrated Stormwater Management Plan				
Attendees	Jonn Braman (UEL), Sylvia Pendl (Metro Vancouver), Robyn Worcester (Metro Vancouver), Andrew Ling (City of Vancouver), David Lee (AECOM), Graham Walker (AECOM), Semyon Chaymann (AECOM)				
Distribution	All Attendees				
Minutes Prepared By	Semyon Chaymann				

PLEASE NOTE: If this report does not agree with your records of the meeting, or if there are any omissions, please advise, otherwise we will assume the contents to be correct.

	Action
<p>The objective of the meeting was to allow UEL, Metro Vancouver (Parks) and City of Vancouver to discuss the UEL's initial work on its Integrated Stormwater Management Plan. Pacific Spirit Regional Park is a significant component of the UEL for storm water management. Vancouver completed an ISMP for southern drainages that begin in the UEL.</p> <p>Semyon Chaymann (AECOM) provided introductory remarks regarding the UEL ISMP and presented the results of the Stage 1 of the project. The floor was open for discussion on the results of Stage 1 and participants were encouraged to add on to the findings of the summary report.</p> <p>The following are general comments from the discussion:</p> <ul style="list-style-type: none"> • Andrew Ling was not provided a copy of Stage 1 report and appendices. <ul style="list-style-type: none"> ▪ AECOM to provide • Flow monitoring in the streams was not completed as part of the ISMP study but stream flow information was acquired from the Spanish Bank Streamkeepers volunteer organization, which monitor the streams at UEL on an annual basis. • Jonn Braman noted that part of the runoff from Block F heads predominately north, but western portions feed southwards to Cutthroat Creek and requested that the southern drainage delineation be reviewed. <ul style="list-style-type: none"> ▪ AECOM to adjust drainage areas • Jonn Braman noted that there is a ditch that runs parallel to the Hydro R.O.W., which collects runoff from houses along the eastern border of Area A in the Pacific Spirit Regional Park. The ditch is piped before it 	<p>AECOM</p> <p>AECOM</p>

<p>reaches Chancellor Drive. The daylighting location is shown on UEL Detailed Stormwater and Combined System Map No. 4.</p> <ul style="list-style-type: none"> ▪ AECOM to investigate the ditch and add it to the Figure 6.1 in Stage 1 Report • Block F catchment is not delineated in Figure 5.2 of the report. Metro Vancouver wants to ensure that sufficient attention is given to the Block F stormwater management component. • Major roadways (Chancellor Blvd, University Blvd, and W 16th Avenue) in the UEL are under the MoTI management, include stormwater catchment. • Andrew Ling (City of Vancouver) will provide information regarding drainage from backyards of properties along the east side of Spanish Bank Creek <p>After the discussion of the Stage 1 findings, the participants were invited to provide their input into the creation of the vision and goals for the UEL ISMP.</p> <p>The follow items were discussed as part of the development of vision and goals:</p> <p><i>Engagement with the Local Community</i></p> <ul style="list-style-type: none"> - Education for Residents regarding stormwater best management practices - Utilize resources and studies conducted within the watershed - A library of local knowledge about the watercourses and parks - Pursue concepts of connected community and sharing of information - Engage Golf Course in stormwater planning, BMPs, and water conservation practices <p><i>Protect Water Quality</i></p> <ul style="list-style-type: none"> - Protect, Enhance, and Improve streams - Protect Park area - Implement stormwater BMPs where applicable - Understanding of water flow patterns through the Park - New Developments/Redevelopments <ul style="list-style-type: none"> ○ Increase in impermeable area ○ Infiltration is not always the best option <p><i>Protect Water Quantity;</i></p> <ul style="list-style-type: none"> - Maintain flows in watercourses - Investigate water flows to stormwater system from Regent College - Contribution to Salish Creek and maintaining fish habitat - Maintain current fish values and fish importance to the community <p><i>Protect Life and Property</i></p> <ul style="list-style-type: none"> - Erosion along NW Marine Dr. <p><i>Natural Environment</i></p> <ul style="list-style-type: none"> - Tree protection and management - New developments/ redevelopments <ul style="list-style-type: none"> ○ Keep older trees 	<p>AECOM</p> <p>Andrew Ling (CoV)</p>
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- Climate Change
 - o Higher flows
 - o Storm frequency

Develop by-laws

- Tree Protection
- Erosion and Sediment Control

In addition to the breakdown of goals/vision topics above, the participant provided comments as part of the general discussion:

- It was noted that UBC Slope Stability Study and Geotechnical Report is available for area west of Area B
 - **AECOM to consult with UBC on geotechnical studies**
- What are the agreements for the discharge of stormwater into the park?
 - o Metro Vancouver minimum requirements
 - Improve runoff quality onsite using a Best Management Practice
 - Reduce runoff quantity onsite: Capture and infiltrate 40% of the 2-year, 24 hour storm
 - Department of Fisheries and Oceans stormwater guidelines are listed in the Metro Vancouver Source Control Guidelines as follows:

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Table 1-2: DFO Stormwater Guidelines

Objective	Target
Volume Reduction	Retain the 6-month/24-hour post-development volume from impervious areas on-site and infiltrate to ground. If infiltration is not possible, the rate-of-discharge from volume reduction Best Management Practices (BMPs) will be equal to the calculated release rate of an infiltration system.
Water Quality	Collect and treat the volume of the 24-hour precipitation event equalling 90% of the total rainfall from impervious areas with suitable BMPs.
Detention or Rate Control	Reduce post-development flows (volume, shape and peak instantaneous rates) to pre-development levels for the 6-month/24-hour, 2-year/24-hour, and 5 year/24-hour precipitation events.
Notes: Flood conveyance events are not addressed in the DFO guidelines, but are stipulated by municipalities.	

Source: Greater Vancouver Sewerage & Drainage District, Stormwater Source Control Design Guidelines 2012

- It was observed that tree loss due to development or redevelopment could increase flows in streams due to increased impermeability
- The UEL Official Community Plan is in place but is dated
- AECOM need to verify stormwater attenuation requirements for Block F. Metro Vancouver requires up to 3 to 5 year events to be considered in the planning
 - o Block F stormwater runoff rates, volume, and quality requirements are as follows:
 - Reduce post-development flow (volume, shape and peak instantaneous rates) to pre-development levels for the 6-month, 24 hour and the 5-year, 24 hour precipitation events.
 - Retain the 6-month, 24 hour post-development volume from impervious areas on-site and infiltrate into ground where it will not cause instability of steep slopes. If

<p>infiltration is not possible, the rate of discharge from the “flow reduction BMPs” will be equal to the calculated release rate of an infiltration system.</p> <ul style="list-style-type: none"> ▪ Collect and treat the volume of the 24-hour precipitation event equaling 90% of the total rainfall from impervious areas with vehicular traffic with suitable BMPs. <ul style="list-style-type: none"> • Jonn Braman noted that golf course has a water management plan which should be updated in July to comply with the drought management plans; currently no water reuse <ul style="list-style-type: none"> ▪ AECOM to consult golf course as part of the ISMP • Metro Vancouver members noted that Musqueam Aquatic Stewardship program may serve as a resource for potential educational programs or serve as an education resource • Reiteration of Metro Vancouver’s mandate “to protect and connect” parks • Metro Vancouver Parks does not have a goal for fish spawning in Canyon Creek, presently there are no account of fish in this stream • Protecting life and property and maintain integrity of the cliffs should be part of the ISMP vision • Visioning for the ISMP should be complete after community consultation in the fall. 	<p>AECOM</p>
<p>Summary of Action Items</p> <ul style="list-style-type: none"> • AECOM to provide Stage 1 summary report to Andrew Ling • AECOM to adjust drainage areas based on the updated information • AECOM to investigate a ditch line parallel to Hydro R.O.W. at Area A • AECOM to consult with UBC on geotechnical studies • AECOM to consult with University Golf Course as part of the ISMP • Andrew Ling (City of Vancouver) will provide information regarding drainage from backyards of properties along the east side of Spanish Bank Creek 	
<p>Next Steps:</p> <ul style="list-style-type: none"> • Consultation with UBC and University Golf Course • Consultation with Community Advisory Council (CAC) • Visioning Workshop with Key Stakeholders – Streamkeepers, UBC, Golf Course, Metro Vancouver, and City of Vancouver (October/November) • Preparation of ISMP Implementation Plan • Preparation of ISMP Adaptive Management Plan 	

Appendix B

The UEL ISMP Information Sheet prepared for
the UEL Community Advisory Council and presented at the
October 17th, 2016 council meeting

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Integrated Stormwater Management Plan (ISMP)

An Integrated Stormwater Management Plan (ISMP) is an over-arching, long term strategy that focuses on protection and enhancement of a watershed's health. ISMPs combine concepts of urban planning, stormwater management, and environmental management to facilitate sustainable development within a watershed. An ISMP is an integral component of a local government's land development and growth management strategy because upstream activities including land use change have downstream consequences including flood and environmental risks. The primary goals of the ISMP are:

- Alleviate existing and/or potential drainage, erosion, and flooding concerns,
- Protect and/or restore stream health including riparian and aquatic habitat,
- Remediate existing and/or potential water quality issues.

The UEL is within the Greater Vancouver Sewerage & Drainage District (part of Metro Vancouver) and is developing an Integrated Stormwater Management Plan that is consistent with the requirements of Metro Vancouver's Integrated Liquid Waste and Resource Management Plan (ILWRMP). The UEL consists of approximately 1200 hectares of land and is situated between the City of Vancouver and the University of British Columbia. The majority of the land (77%) is forested and the rest (23%) is developed for residential, commercial, institutional, and recreational land uses. The management of the rainfall that falls on the developed portion of the UEL community is the focus of this ISMP. The study area includes three watercourses - Spanish Bank Creek, Canyon Creek, and Salish Creek – that flow north into the Burrard Inlet. The area of the UEL that drains south to Fraser River is addressed through Musqueam Integrated Stormwater Management Plan.

The ISMP Development Process:

The UEL has retained AECOM Canada Inc. to develop the ISMP in line with the requirements of Metro Vancouver's ILWRMP and British Columbia's Environmental Management Act. Development of the ISMP will occur in four stages and was based on the approach outlined in Chapter 9: Developing and Implementing an ISMP in Stormwater Planning: A Guidebook for British Columbia.

- Stage 1 – What do we have? – Review background information and summarize existing conditions
(Review and summary of study area, regulatory context, land use, hydrology, stormwater system, hydrogeology and soils, environment, hydraulic modelling and assessment)
- Stage 2 – What do we want? – Establish the vision, goals, and objectives for stormwater management
- Stage 3 – How do we put this into action? – Develop an implementation plan, funding and enforcement strategies
- Stage 4 – How do we stay on target? – Develop a monitoring and assessment program

Currently, AECOM is undertaking Stage 1 of the approach outlined above. The summary and review of background information is being put together to form a comprehensive report. As part of the information gathering exercise, initial contact regarding the project was made with Metro Vancouver Parks, City of Vancouver, Spanish Banks Streamkeepers, Pacific Spirit Park Society, University Golf Course, and the University of British Columbia to gain and document stormwater related information and concerns.

Next Steps?

As we move into the next phase of the project, we are asking the Community Advisory Council to weigh in. AECOM is invited to the October meeting to provide a presentation on the project, to answer any questions, and collect your feedback. There will be further opportunities for comment as the ISMP is developed.