Graduate Internship Opportunity

Summer 2025

PROJECT TITLE

Assessing the Role of Street Sweeping in Stormwater Runoff Quality

Organization

City of Victoria, Engineering & Public Works

Background & Purpose

As cities like Victoria continue to grow and urbanize, managing the impact of stormwater runoff on local ecosystems and infrastructure has become a critical sustainability challenge. The City of Victoria's stormwater system, originally constructed over 120 years ago, was designed to manage rainwater by directing it away from homes and businesses, helping to prevent flooding. However, as urban development expanded and more areas became paved or covered with impermeable surfaces, the natural water cycle was disrupted. Instead of being absorbed into the ground, rainwater now flows over streets, parking lots, and rooftops, collecting contaminants such as oil, heavy metals, sediments, and debris along the way. These pollutants eventually enter the stormwater system and are discharged into local waterways and the ocean, where they degrade water quality and harm aquatic ecosystems.

To address the growing challenges of stormwater pollution, the City of Victoria has adopted an integrated approach that includes both traditional stormwater infrastructure and Green Stormwater Infrastructure (GSI). GSI is designed to mimic natural systems by capturing and treating rainwater where it falls, using techniques such as rain gardens, permeable pavements, and bioswales. These features not only slow down the flow of water, reducing the risk of flooding, but also filter out pollutants before the water re-enters local water bodies. By implementing GSI, the City aims to protect the health of its waterways, increase infrastructure resilience to climate change, and reduce the long-term costs associated with stormwater management.

Despite the benefits of GSI, street cleaning remains a critical component of the City's stormwater management strategy. Streets serve as a source of pollution, with contaminants like sediment, litter, and chemicals being washed into the storm drains

during rain events. Regular street sweeping plays a key role in removing these contaminants before they enter the stormwater system, reducing the burden on GSI and other infrastructure. However, questions remain about the overall effectiveness of current street cleaning practices, particularly in terms of how much and what types of contaminants are being captured versus those that continue to flow into local waterways.

Project Description

This project will assess the types and quantities of contaminants being captured by the City of Victoria's street cleaning efforts, evaluate the existing program's effectiveness in capturing contaminants from stormwater runoff, and identify opportunities for improvement. The goal is to provide actionable insights to optimize street cleaning practices, enhance downstream water quality, and improve overall watershed health.

By improving street cleaning practices, this project aims to reduce the volume of contaminants entering the stormwater system, which in turn helps protect aquatic habitats, maintain ecosystem services, and preserve water resources for recreational, commercial, and community use. Cleaner waterways also support marine and wildlife health, promote biodiversity, and enhance the resilience of ecosystems to climate change.

The findings will contribute to both immediate operational enhancements and long-term strategies for improving water quality and stormwater management, with potential implications for infrastructure planning and maintenance practices.

Key Deliverables

The project will involve the following key activities:

- **Literature Review**: Conduct a comprehensive review of the fate and transport of contaminants in stormwater runoff. The review will focus on studies from relevant regional sources, such as the Capital Regional District, Vancouver Island University, and University of Washington, whose work is geographically and contextually applicable to the City's conditions.
- **Waste Characterization**: Using data provided by the City, analyze the waste currently captured by the City's street sweeping efforts to understand the types and quantities of contaminants being removed from streets.
- **Process Efficacy Evaluation**: Assess the effectiveness of the City's street sweeping program by evaluating its success in removing contaminants and identifying opportunities to optimize or enhance existing practices.

- **Identification of Uncaptured Contaminants**: Investigate what contaminants are not being captured by street sweeping and explore additional methods, such as stormwater rehabilitation units, that could help address these gaps.
- **Operations & Maintenance (O&M) Considerations**: Review the impacts of O&M practices on contaminant removal, such as sidewalk cleaning and catch basin maintenance, and recommend improvements to further support the City's water quality goals.
- **Disposal Impacts**: Evaluate how the disposal of street sweeping waste compares to best practices and landfill requirements, with a focus on minimizing environmental impacts.
- **End-of-Pipe Impacts**: Analyze the downstream effects of street sweeping on water quality at the point where stormwater enters local waterways, e.g., Cecelia Creek, Bowker Creek, and stormwater outfalls.
- **Recommendations for Future Approaches**: Provide recommendations for enhancing the City's water quality program. This could include identifying locations or street types that may require more frequent street sweeping or additional stormwater treatment units based on contaminant capture rates.

Scope of Work

A final report containing a summary of the work completed. The report should cover:

1. Executive summary
2. Introduction and background
3. Literature review
4. Waste characterization
5. Process evaluation
6. Discussion
7. Recommendations

Time Commitment

- This project will require a total of 250 hours to complete and is scheduled to run from May 1, 2025, to August 15, 2025.

- The Scholar should aim to dedicate approximately 17–20 hours per week to the project, ideally during regular work hours (8:30 am to 4:30 pm) to allow for collaboration and support from City of Victoria staff.

At the start of each week, the Scholar will provide a brief project plan via email outlining their goals and intended tasks for the week. This plan will serve as the agenda for a weekly check-in meeting with City staff at the end of each week.

Preferred Skills & Background

- Excellent research and writing skills
- Familiarity with research methodologies and survey techniques
- Statistical analysis
- Strong analytical skills
- Ability to work independently
- Deadline oriented
- Project management and organizational skills
- Programming skills
- Strong technical and drafting skills
- Experience with data analysis

Program Information

Dates: May 1—August 15, 2025

Compensation: Scholars are paid approximately $7,950 for 250 hours of work (based on UVic Research Assistant pay rate)

Application Deadline: January 31, 2025

Contact: Laurel Currie (sustainability-scholars@uvic.ca)

Visit our website to learn more about eligibility and application requirements.