

## UBC Sustainability Scholars Program 2019

The UBC Sustainability Initiative (USI) is pleased to offer current UBC graduate students the opportunity to work on funded sustainability internship projects. Successful candidates work under the mentorship of a partner organization, and are immersed in real world learning where they can apply their research skills and contribute to advancing organizational sustainability goals.

For more information about the Sustainability Scholars Program and to apply to work on this project, please visit the [Student Opportunities](#) page.

Please review the application guide (PDF) before applying.

Applications close **midnight Monday February 25, 2019.**

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### Research project title

Groundwater Use Regulation for Non-potable use at the Site & District Scale – Literature Review

### Research supports the following policies -

- Greenest City Action Plan
  - 6. Clean Water – reduce the City’s potable water use, contributing towards the City of Vancouver’s target of reducing per capita water consumption by 33% from 2006 levels, minimize discharge of ‘nuisance’ groundwater discharged from new and existing development thereby reducing inputs to sewers and combined sewer overflows.
  - 9. Green Economy – Sites with excess ‘nuisance’ groundwater can pump groundwater off-site, sharing it with nearby businesses, parks or other sites, providing an opportunity for waste stream from one site to become input stream to another.
  - 10. Lighter Footprint - create opportunities for de-centralized ‘district scale’ systems in areas of excess groundwater and/or large demand thereby reducing reliance upon centralized potable treatment and distribution systems at risk of failure during emergencies
  - 11. Walking the Talk – opportunity to use groundwater instead of potable water for the City’s service vehicle fleet of street sweepers, flusher trucks and mobile landscape watering trucks. Other city facilities and parks can make use of groundwater in place of potable water for toilet and urinal flushing, irrigate playing fields, for ice rinks or other purposes to reduce the City’s potable water use.
- Healthy City Strategy

- Environments to thrive in: The use of groundwater reduces the City's reliance on treated potable water, and provides the opportunity to utilize more localized sources of water – increasing the resilience of communities within the City.
- ☒ Renewable City Action Plan
  - Buildings & Environment – Groundwater can be used as part of an individual site-level or district scale geoexchange system – for instance, providing a low-carbon and renewable source of water for cooling buildings
- ☒ Vancouver Citywide Integrate Rainwater Management Plan
  - Minimize discharge of 'nuisance' groundwater discharged from new and existing development thereby reducing inputs to sewers and combined sewer overflows.

**Outline scope of project and why it is of value to City and describe how and when the scholar's work will be actionable**

A large portion of the City of Vancouver sits on top of the Quadra Sands Aquifer, as illustrated in Figure 1 below.



**Figure 1: Image illustrating the extent of the Quadra Sands Aquifer (source: BC Water Resource Atlas)**

This Aquifer presents a number of opportunities and challenges for the City and its residents and businesses. For instance, in some areas of the city, groundwater is quite close to the ground surface, which means that sub-surface infrastructure, like underground parkades and basements can intercept the groundwater, leading to the collection and discharge of 'nuisance' groundwater from the site to the city's sewer infrastructure. The volumes of groundwater pumped from these sites can be quite high, placing a strain on the city's sewer infrastructure. Groundwater is currently being used in place of potable water for landscape irrigation at some sites across the city, but this is currently very limited.

The City of Vancouver is currently exploring opportunities to make beneficial use of this resource across the city, and an exciting opportunity under consideration is to use the groundwater for non-potable applications. Non-potable use can include toilet and urinal flushing, irrigation, industrial applications, cooling tower make-up water, city service vehicles, and other non-drinking applications. Use of groundwater can be at the individual site-level (such as buildings that currently intercept the water table and pump groundwater to the sewer) or, an innovative District Scale systems that supply water to multiple sites/users. Non-potable applications are currently being prioritized in the City of Vancouver due to high proportion of water use across the city that does not require water to be of potable drinking water quality, and to reduce the operation and maintenance burden required to ensure water is of drinking water quality.

The use of groundwater for both potable and non-potable use is common across a number of jurisdictions across Canada , the US and worldwide. The use of groundwater can be tied to a lack of adequate surface water supplies, or due to higher quality of groundwater sources in particular areas. The use of groundwater exclusively for non-potable applications, particularly in an urban environment like the City of Vancouver, is much rarer, making this an area requiring research to help guide the City's approach to taking advantage of this opportunity.

### **Scope of Work:**

To support the City evaluate and identify best practices to implement this new approach to managing groundwater, the scholar will be completing the following tasks as part of their project scope:

- Review City policies and speak with staff to gain an understanding of current groundwater use policies at the City of Vancouver, identifying opportunities, challenges and gaps.
- Undertake a literature review to identify cities in Canada and the US that utilize groundwater for non-potable water use, with a focus on cities within our climate region (Lower Mainland and western Washington).
- Select three of the best cities from the literature review, based upon factors like available data, use of groundwater in an urban environment, available case studies and similarities (or differences) to the City of Vancouver. For each of the 'top 3' cities :
  - Review regulations and policies to gather information on how they implement and regulate non-potable groundwater use at both the individual site-level and at the District Scale.
  - Summarize the key facts/details on how each city implements and regulates non-potable groundwater use, focusing on water quality requirements, design, operation & maintenance requirements.
  - Identify and compile 2 to 3 case studies on non-potable groundwater systems at either the individual site-level and at the District Scale.
- Prepare a summary report of the literature review (see details below in the 'Deliverables' section).

## **Deliverables**

The Scholar will deliver a final report containing a summary of their completed work. The report must be completed in Microsoft Word and should be no more than 20 pages with any additional content included as appendices. The report will be complemented by a final presentation to key stakeholders. The report should include:

- Brief summary of current non-potable groundwater use policies in the City of Vancouver
- Details regarding the top 3 cities selected for the literature review, including the context— climate, population, why groundwater is being utilized.
- A summary table comparing and contrasting the key facts/details compiled for each of the top 3 cities and the City of Vancouver.
- Discussion on how each of the top 3 cities implemented and regulated non-potable groundwater use, including the pros and cons of each.
- Recommendations on approach(es) that the City of Vancouver should take to implement and regulate non-potable groundwater use in the city.

## **Time Commitment**

- This project will take 250 hours to complete.
- This project should be completed between April 29 to August 12, 2019\*
- The scholar is to complete hours between 8am and 5pm, Monday to Friday, approximately 15 hours per week.

*\*The scholar may undertake the project under a compressed schedule (more hours per week for fewer weeks) if desired.*

## **Skill set/background required/preferred**

From Standardized List:

- Excellent research and writing skills.
- Demonstrated interest in groundwater, water conservation and water efficiency, water re-use, green infrastructure
- Strong technical writing skills
- Familiarity with research methodologies and survey techniques
- Strong analytical skills
- Ability to work independently
- Demonstrated time management skills
- Deadline oriented
- Project management and organizational skills

Addition Skills Required/Preferred:

- Understanding of groundwater, hydrology, water quality, water conservation and water efficiency.
- Experience in literature reviews, regulatory and policy reviews, and case studies would be an asset.
- Proficiency in Microsoft Word and Excel is required.

### **Additional Project Needs**

- The scholar may accompany City staff to sites with groundwater and/or rainwater harvesting systems. Any necessary personal protection equipment will be provided by the Branch. If required for the particular site being visited the scholar should bring their own pair of steel toed boots, but a loaner pair could be provided if needed.

Applications close **midnight Monday February 25.**

Apply here:

<https://sustain.ubc.ca/student-opportunities>

To learn more about the program here:

<https://sustain.ubc.ca/ubc-sustainability-scholars-program>

Read the application guidelines to confirm your eligibility to participate in the program here:

<https://sustain.ubc.ca/student-opportunities>

Contact Karen Taylor at [sustainability.scholars@ubc.ca](mailto:sustainability.scholars@ubc.ca) if you have questions.