Rainwater Capture & Reuse

At the University of British Columbia Vancouver Campus In Collaboration With UBC Community & Planning and SEEDS

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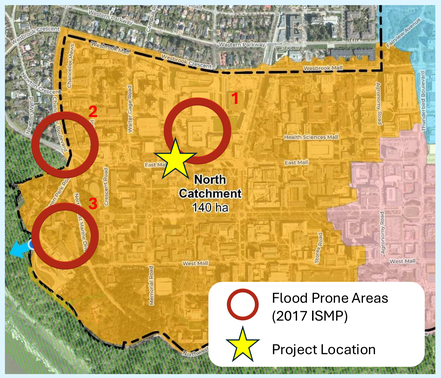
UBC Environmental Engineering

Background Information



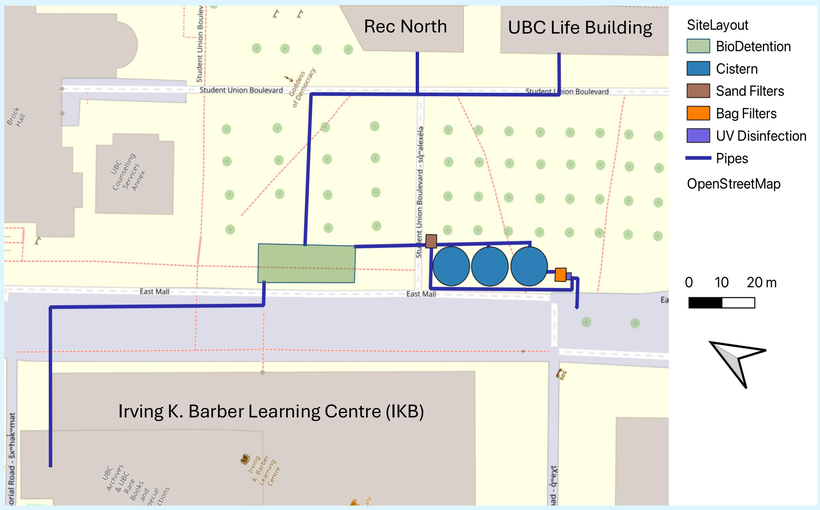
Issue: Five billion liters of rain falls on UBC Vancouver campus every year. As building development and climate change continues, flood and erosion risks increase over time.

Objective: To provide a resilient water supply by capturing, storing, and reusing rainwater within the North Catchment, while mitigating flood and erosion risks.

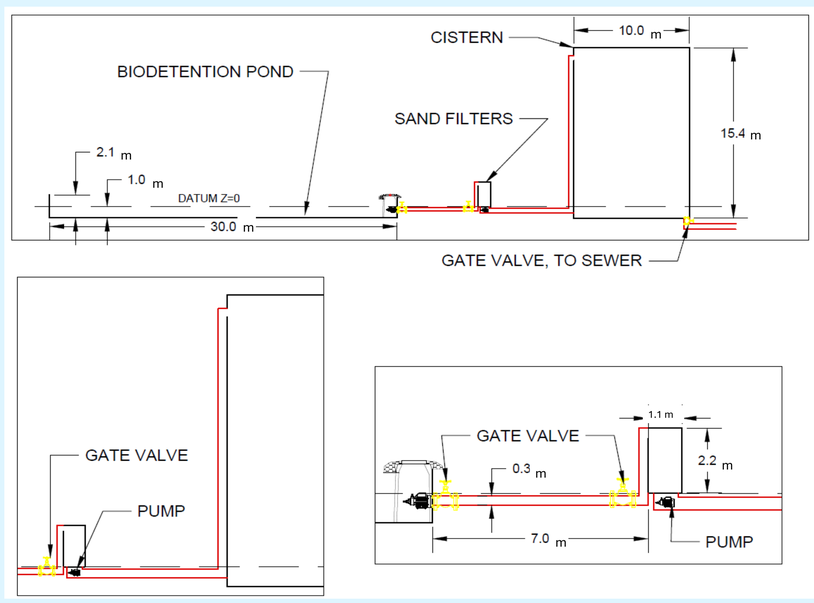
Design: A rainwater management system that enables seasonal water reuse for campus applications.

Operational Lifespan: 50 Years

Site Layout – Plan View



Site Layout – Profile View



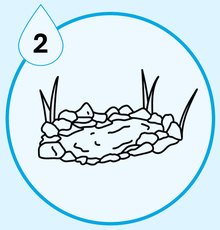
Process Overview

Capture

Rainwater will be collected from nearby roofs: Irving K. Barber Learning Centre (IKB), UBC Life Building, and the newly constructed Rec North.

Detention

Natural pond with native vegetation that detains roof catchment rainwater during the 10-year and 100-year storm events for treatment and cistern capacities.

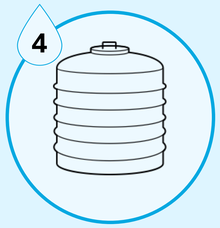


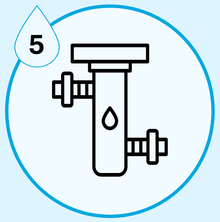
Sand Filters

Three parallel sand filters provide primary treatment by removing up to 90% of total suspended solids (TSS) and turbidity. Two operate continuously, with one on standby.

Cisterns

Three concrete cisterns work in parallel for a combined storage of 3,534 m^3 with constant uptime. The exterior will include murals designed by the Musqueam First Nations.



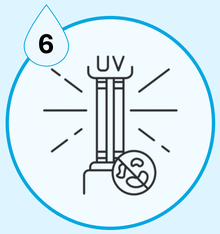


Bag Filter

A 5-micron bag filter provides secondary filtration, preparing the stored water for disinfection by removing finer particles prior to UV treatment.

UV Disinfection

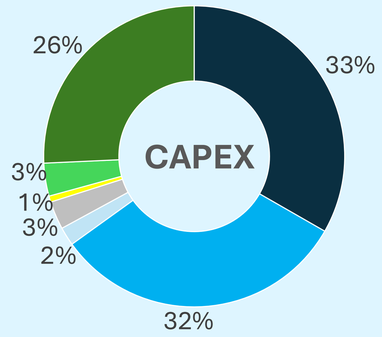
The UV disinfection system provides 4-log (99.99%) removal of harmful microorganisms, including bacteria, viruses, and protozoa, ensuring the water is clean and safe for reuse.



Reuse

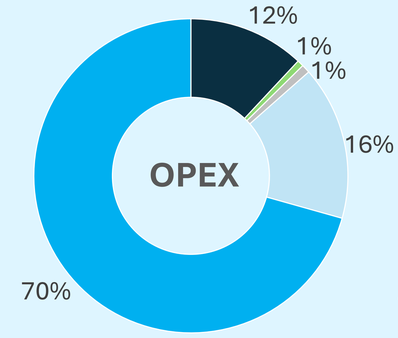
Each year, approximately 7,000 m^3 of treated water meets drinking water quality standards and is supplied to IKB for reuse. Future uses may include irrigation and supplying other nearby facilities.

Economic Analysis



CAPEX Value: $3.4M CAD

- Detention Pond
- Cistern
- Treatment
- Hydraulic Structure
- Instrumentation & Controls
- Mobilization & Demobilization
- Contingency



OPEX Value: $90,000 CAD/yr

- Operator Salary
- Hydraulic Structure
- Cistern
- Treatment
- Detention Pond

Total Lifetime Present Value Cost (50 yrs): $4.1M CAD

Social & Environmental Considerations

Musqueam First Nation & Other Indigenous Groups

Objective: Engage in respectful collaboration and integration of Indigenous culture

Method: Implement art crafted by the Musqueam people onto the cisterns for public viewing

UBC Community

Objective: Minimize negative impacts of flooding and drought, and promote learning for students

Method: Consult with relevant UBC groups for guidance and implement informational signage

General Public

Objective: Provide a pleasant experience for tourists and prospective students

Method: Incorporate aspects of education and aesthetics with signage and art on the system

Environmental Considerations

Objective: Preserve environmental integrity

Method: Rainwater will be captured to reduce risk of flooding

Method: The detention pond creates an area for wildlife growth

Acknowledgements

The Musqueam, Squamish, and Tsleil-Waututh Nations, Dr. Zeina Baalbaki, Dr. Ali Habibzadeh, Jake Li, Georgia Stanley, William Chen, UBC Campus & Community Planning, UBC SEEDS Sustainability Program, and UBC Aquatic Centre