

ECOSYSTEM SERVICES & POTENTIAL HAZARDS

CLAY

Clay sedimentation forms the downstream valleys along the bank. Since this stream is located at Vancouver west side, we find this site was originally covered by glaciers and this clay may be grounded and deposited by the retreating glaciers during the last glaciation. This clay is named quick clay, which is prone to sudden strength loss named liquefaction upon disturbance. The potential collapse of the valley walls may contribute to mass movements and immense sediments, which may further block the stream flows; these sediments could lead to dike breaching, upstream flooding, and insufficient discharge downstream.



ROUGH CHANNEL BED

The rough channel beds with logs and rocks provide significant ecosystem services. Small channels can absorb significant amounts of rainwater, surface runoff and snow melt before flooding. With respect to Vancouver's recent abnormal weather with affluent precipitation, this natural stream channel's gravel bed, rocks, and dams of leaf litter and twigs slow storm water as it moves downstream; slower moving water is more likely to seep into a stream's natural water storage system-its bed and banks-and to recharge groundwater. That's to say, this narrow channel surpasses artificial storm sewers and conduits (which often increase storm frequencies downstream) regarding storm events: it has an indispensable function of providing natural flood control especially in the urban environment, which often has flushy events due to the high percentage of impervious surfaces and lack of vegetation. The ample vegetation here provides not only a buffer for high discharge events but organic materials as food and shading for aquatic organisms; trees and shrubs near the stream are in return nourished by sediment loads and water in the stream; vegetation helps reduce the urban heat island effect and global climate change.

FISH HABITAT

This sign posted up on the bridge warns people to be aware of fish, as a stakeholder who lives in the stream. It demonstrates the potential contamination from human and dogs which may bring to the riparian ecosystem and demise biodiversity. Considering Vancouver's geographical location, this stream may be a spawning and hatching site for Pacific salmon; salmon are keystone species which means their impacts on other life is greater than would be expected in relation to their biomass. Therefore, this stream may not only provide habitats for fish but face the potential hazard of human intrusion. Behind this sign is this stream' entrance into the sea. This sign further addresses and mitigates the possibility that anthropocentric debris could impede events like salmon run or be transferred through the stream into the oceanic ecosystem.



CHALLENGES & PRESSURES

UNDERGROUND PIPES

The narrow stream with limited discharge is redirected to the underground tube that crosses the overlying road. Although this tube helps move water down stream, it also leaves sediment behind.

This aggregation pattern has a few indications:

- If deposition exceeds the equilibrium condition, the flow discharge may try to find its way and shift the original channel location (Mugade & Sapkale, 2015)
- People can mistakenly recognize this stream as a surface runoff of sewage which drains off into some treatment facilities and therefore dumping human waste into the stream.
- Blocks/Traps aquatic life passages.



STAKEHOLDERS



STUDENTS

Serving as an educational tool for children and students, the stream is actively used by the surrounding community. Students from U-Hill Primary School can visit the stream on field trips since this stream is only 3-minute walk away. Located within a 30-minute walking distance and as the nearest stream from UBC, this steam provides educational services for the university studies in various fields. An example of this shown here is the water depth gouging experiment, which utilizes a depth gage located near the mouth of the stream.



CITIZENS

Beginning in Pacific Spirit Regional Park, the Salish Trail follows the path of the stream down to shore, at Arcadia Beach, which functions as a famous recreational space for not only the nearby neighbourhood but farther communities. Since it is open to the public, the local ecosystem is impacted by anthropocentric activities such as people's light, air, and noise pollution, the depositing of human trash into the stream which contaminates the water flow and habitat. The concern to protect the habitat is indicated by signs asking park-goers to keep dogs out of the fish habitat, as well as the removal of all garbage from the area. Although the development of a trail may have led to increased human impacts along the stream, accessibility to the stream along the trail increases its social value. It provides educations, promotes the public physical and mental health, boosts tourism and the economy, provides a safety space for community's interaction and communication, creates human's tamed beauty of nature, reconnects people's sense of place and belonging, etc. The trail and the stream further link two recreational areas, Pacific Spirit Park and Arcadia Beach: this also helps wildlife considering better connection between their living habitats. The ample built structures in Arcadia beach by the stream like trails, benches, picnic tables, outhouses, fences, bridges, and even a nearby parking lot improve public accessibility to the mouth of the stream. These amenities makes the stream a point of interest and thus increasing its social value.

REDESIGN & CONSERVATION

*This stream does not carry the same function as it once did before urban development within the area. However, the conservation of the stream would provide social, ecological, and economic benefits for society. In an urban environment, stream restoration should increase the quality of biodiversity, habitat space, and human recreational space.*

STORM DRAINS

The study of the surrounding urban built environment is useful for understanding our biological impact on the stream. Roofs, parking lots, paved roads and other urban impervious structures increase runoff in the city. The rapid rising urbanization restricts the movement of water in the hydrological system. By understanding the water flow in the built and natural environment in the area, we are better able to construct storm drains to help redirect water to the stream.

PIPES

We have identified several manhole covers and possible underground pipes for waste water transfer. Considering that potential failures of the system may happen in the future, the stream's close location to such a waste water system could cause severe contamination of that would certainly lead to many ecological problems such as the adaptation and deaths of fish. To improve on this design of the sewage system, we believed that the pipes needed to be relocated away from the stream to mitigate potential hazards to the stream ecosystem.



TRIBUTARIES

The restoration of this stream also involves the restoration of its tributaries. Tributaries contribute water and sediment resources to the main channel. Stream restoration methods could help manage the velocity of the water flow as well as the flow of biological debris. Stream restoration on stream tributaries is beneficial to the entire stream ecosystem.



TREE COVER

The maintenance of tree cover is indispensable, because vegetation has a critical role in reducing rainwater runoff. Tree leaves intercept and transpire water, reducing the likelihood of flooding and erosion of the area. In particular, undercutting of the stream may erode the land, impacting the people who live in homes along the stream.