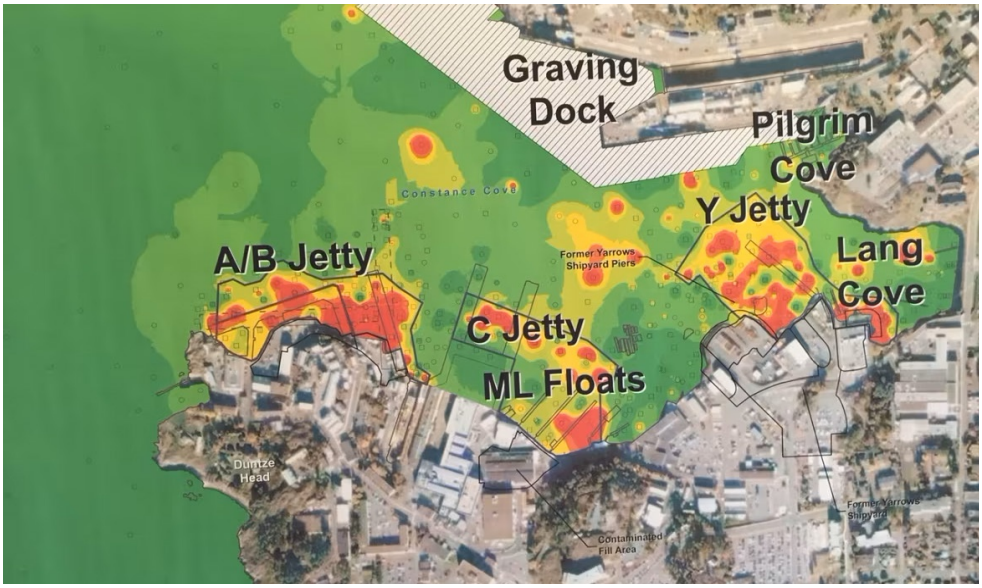
Canadian Brownfields Case Study

Esquimalt Harbour Remediation



Source: CBC News

Figure 1: A map of Esquimalt Harbour which highlights the areas of the harbour where most of the contamination is concentrated. The dredging project focuses on those areas.

Project Summary

The Esquimalt Harbour Remediation Project is a federally funded brownfields project on Crown land located in the Township of Esquimalt, Victoria, British Columbia. As seen in Figure 1, the project consists of six sites: Lang Cove, "A" Jetty, "B" Jetty, "C" Jetty, "Y" Jetty, and "ML" Floats. There are however six other projects taking place within the Esquimalt Harbour area making for a total of seven projects, five of which have been already completed (including the Esquimalt Harbour Remediation Project). This particular case study focuses on the Esquimalt Harbour Remediation Project that sought to dredge out contaminated sediments and physical debris from subtidal seabeds that made it's way into the aquatic ecosystem through long-term naval uses along the harbour such as ship building and sandblasting. This site is notable for its successes in strengthening the local ecosystem, supporting the sustainable operation of the Canadian Forces Base Esquimalt, and generating employment for the Indigenous people of the area. It is anticipated that a monitoring program will soon be implemented assess the improved environmental health of the sites which this project focused on[1]. This remediation project was undertaken by Milestone Environmental Contracting Inc. and won a Brownie award in 2022 under the Reinvest category. Milestone Environmental Contracting Inc. is an industry expert in soil and groundwater remediation, decommissioning and reclamation services, marine remediation, and heavy civil construction.

Site History

The Esquimalt Harbour established itself as a major industrial port in the early 1800s[2]. The site abuts First Nations Land (Songhees and Esquimalt First Nations) in all surrounding directions. Traditionally the land is the territory of the Lekwungen People of the Coast Salish Nation (now known as the Songhees and Esquimalt). The Township of Esquimalt's population is 17,655 and the median income of the Township was $44,800 in 2020, which is a $9,207 increase since 2015. Additionally, 5.6% of the township are Indigenous, and 13.7% are considered visible minorities[3]. Historically, the site has been used for a multiplicity of industrial uses such as shipbuilding, ship operations, sawmilling, coal storage, and gristmilling (i.e. Industrial). The site was subject to a large

QUICK FACTS

Location
Esquimalt Harbour, Township of Esquimalt, Victoria, British Columbia

Project Type
Contaminated Sediment Remediation

Site Size
342.7 hectares

Land Uses
Military, Crown Land, Industrial

Keywords
Dredging, Contaminated Sediment, Wood Debris, Industrial Uses, Navy Base, Ship Repair/Maintenance, Indigenous Benefits Plan

Website
https://milestoneenv.ca/featured-projects/esquimalt-harbour-marine-remediation/

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Please Note:

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amount of logging operations over the period in which it was used as a sawmill, resulting in the seabed becoming covered in wood debris. From 1893 to 1994, the site functioned as an operational shipyard commonly referred to as the "Yarrows"[4]. This marks the onset of the Esquimalt Harbour as a military base (see Figure 2), where it played a role for Canada's Merchant Marine Service and the Royal Canadian Navy throughout World War II. The site to this day serves as a location of key importance for the Department of National defense and Canadian Armed forces and is Canada's west coast navy's homeport. There is an ongoing recapitalization project by the Department of National Defense which will renovate the utility services on the site as well as increase room for two new jetties.

Source: Canadian Department of National Defense

Figure 2: HMCS (i.e. Royal Canadian Nay Surface Ship) Esquimalt heading to Esquimalt Harbour.

Site Conditions

Historic and ongoing industrial uses along Esquimalt Harbour have led to sediment contamination within subtidal seabeds. The aquatic habitat was impacted by both chemical contaminants (e.g. aluminum, copper, iron, lead, and mercury) and physical debris (e.g. metal, sawdust, wood, and concrete) from industrial operations such as the sandblasting of ship hulls, sawmilling, grist milling and coal storage. The deteriorated remnants of old jetties and marine railways were also found within pockets of the harbour.[5]

Much of this pollution has degraded environmentally significant vegetation such as eelgrass and green/brown kelp that serve as both habitat and sustenance for several aquatic species. Many rocky nearshore areas (e.g. Ashe Head, Fisgard Island), shorelines (e.g. Rodd Point, Yew Point), and coves and small bays (e.g. Tovey Bay, Limekiln Bay, Thetis Cove, Lang Cove) are home to rich algae and kelp communities that support diverse invertebrates. In contrast, eelgrass beds that are critical habitat for juvenile fish and invertebrates such as chinook, salmon, dungeness crab, and lingcod are uncommon to the harbour due to their sensitivity to environmental disturbances. Only 0.5 hectares of eelgrass scattered in seven to eight different locations have survived the impacts of industrial development.[6]

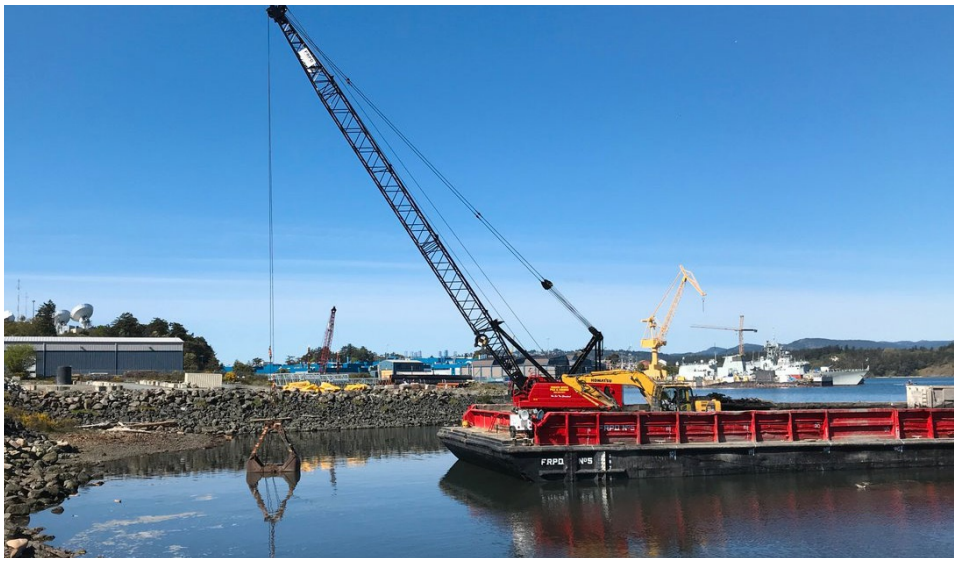
Overall, industrial waste has adversely affected the ecological structure and function of the harbour and remediation efforts are being deployed to reverse these impacts and repopulate important flora and fauna native to the area.

Assesment & Cleanup

An environmental investigation and analysis of subtidal seabeds was carried out to identify the location, depth, and quantity of contaminants and debris present in the harbour. During this process, the Department of National Defence constructed three underwater reef habitats at the entrance of the harbour to minimize disturbances on aquatic life that may occur during remediation.

The majority of contaminated sediment and physical debris was removed through dredging (see Figure 3). The pockets of dredged seabed were backfilled with clean sand to support and accelerate the natural recovery of the aquatic habitat.

Figure 3: A dredging operation to remove contaminated sediment from the subtidal seabeds.



Source: Milestone Environmental Contracting Inc.

All of the dredged up sediment is processed and transported to a facility where the material is either treated or disposed of.

Sediment that was dredged during the remediation of Y-Jetty and Lang Cove contained chemical contaminants such as aluminum, copper, iron, lead, and mercury, as well as physical debris like metal, timber, and concrete.

In areas where dredging was not possible and/or viable, the sediment was capped with layers of sand, gravel, or rock to contain the contaminated material and limit its exposure to marine life.[7]

To aid in ecosystem restoration, angular rocks have been placed along the seabed to encourage and support the growth of eelgrass and kelp. The effectiveness of the restored habitats in reintroducing important flora and fauna is being continually monitored post-remediation[8].

Planning & Regulatory Issues

All projects taking place on the Esquimalt Harbourfront follow/followed standards set out by the Federal Contaminated Sites Action Plan (FCSAP) established in 2005. This plan lays out the federal standards for remediation, assessment and risk management[9]. There was no public consultation for the six sites (Lang Cove, "A" Jetty, "B" Jetty, "C" Jetty, "Y" Jetty, "ML" Floats) that this project focused on. There was however a Comprehensive Indigenous Benefits Plan (described below) that generated roughly 225 jobs for the community. There had thus far been two public comment periods for the G Jetty and Jetty 11 site, which took place near the site this project focuses on. The first took place in 2019 and the second took place in 2022. Both were hosted by the Department of National Defense with the intention of understanding all environmental risks on the site[10].

A planning challenge this project faced was ensuring the protection of archaeologically and historically significant artifacts, and the safe removal of unexploded munitions (UXO) that were embedded in areas of the seabed that required dredging. This resulted in the use of an innovative dredging methodology, that involved modifying equipment with a screening technology which allowed for every quarter inch to be scanned for UXOs and artifacts. The remediators were able to successfully remove 970 artifacts from the areas which will be displayed at the Royal BC museum in a that documents the history of the harbourfront[11].

Source: Milestone Environmental Contracting Inc.

Figure 4: Indigenous Peoples Day being celebrated on site by staff and community members.

Indigenous Engagement & Benefits

As part of the Y-Jetty and Lang Cove Sediment Remediation Project a comprehensive Indigenous Benefits Plan (IBP) was developed by Milestone to engage with and provide socioeconomic benefits to the surrounding Indigenous communities. Esquimalt Harbour is located on the lands of the Esquimalt and Songhees Nations and to better address Indigenous needs, rights, and title on the lands that the project is occurring on, an IBP was co-produced with the community. The IBP follows four main scopes: employment, training, goods and services, and additional community benefits.

Employment:

- Created 16,000+ hours of employment for Indigenous community members
- Majority of barge operations were staffed by Indigenous community members
- Provided rotating positions for staff to develop transferable skills

Training:

- Provided staff with over 2,490 hours of on-the-job and classroom training
- 83 different courses were available to the staff and those interested (e.g. Safe Boat Operation, ER Spill Response, Personal Finance Bootcamp)
- Created mentorship opportunities with supervisors and peers

Goods & Services:

- Accounted for the procurement of over $1,400,000 worth of goods and services from Indigenous owned businesses (e.g. Salish Sea Industrial Services, Cultural Centre Rentals)

Additional Benefits:

- Hosted community events and drives (e.g. Esquimalt Food Bank Donation, Lekwungen Daze Donation, solstice holiday events, Indigenous Peoples Day) (see Figure 4).[12]

Financing

The remediation project was funded by the federal government as it is on crown land. The project is part of the the 15-year Federal Contaminated Sites Action Plan[13]. It was announced in October 2022 that an additional $13 million dollars will be granted to the QM Environmental & PPM Civil Constructors from the Federal government to aid in gravedocking within the harbourfront[14]. While the total cost of the project once all the sites within the harbourfront have been remediated, it is likely that more funding will be required to complete the project in whole.

Building Development

Esquimalt Harbour continues to be used for military operations and is home to the Canadian Forces Base Esquimalt (see Figure 5). The naval base has implemented a number of strict environmental procedures for its use of the harbour to ensure the surrounding seabed is not recontaminated through ship operations and maintenance.[15]

Key Challenges & Bene its

Benefits:

- Strengthening ecosystem services provided by subtidal seabed habitats (e.g. flood mitigation, climate regulation, nutrient cycling)
- Reducing the likelihood of aquatic life coming in contact with contaminated sediment
- Enabling the sustainable operation of the Canadian Forces Base Esquimalt (CFB Esquimalt)
- Generating employment and economic opportunity for community members, with a special focus on members of the Esquimalt and Songhees Nations.[16]

Challenges:

- Dredging processes may have been prolonged to safely and carefully remove historically and archaeologically important artifacts, as well as unexploded explosive ordnance that lined the seabed[17]

Source: Canadian Department of National Defense

Figure 5: Esquimalt Harbour being used for military operations at Canadian Forces Base Esquimalt.

Lessons Learned

- Sediment remediation has been successful in improving the local biodiversity of Esquimalt Harbour. Wildlife such as grey whales, orcas, shrimp, Pacific herring and seals have returned to the aquatic ecosystem as contamination levels have dropped and kelp and eelgrass communities have repopulated (see Figure 6).[18]
- A community liaison is instrumental to the successful co-production and delivery of an Indigenous Benefits Plan that aligns with the community's socio-economic needs.
- Historical aspects should not prevent brownfields or environmentally damaged areas from being remediated. While it can pose challenges, innovation can produce a way to preserve and promote the area's history while protecting the environment.

Source: CFB Esquimalt

Figure 6: Seals have returned to the shorelines of Esquimalt Harbour .

Endnotes

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