

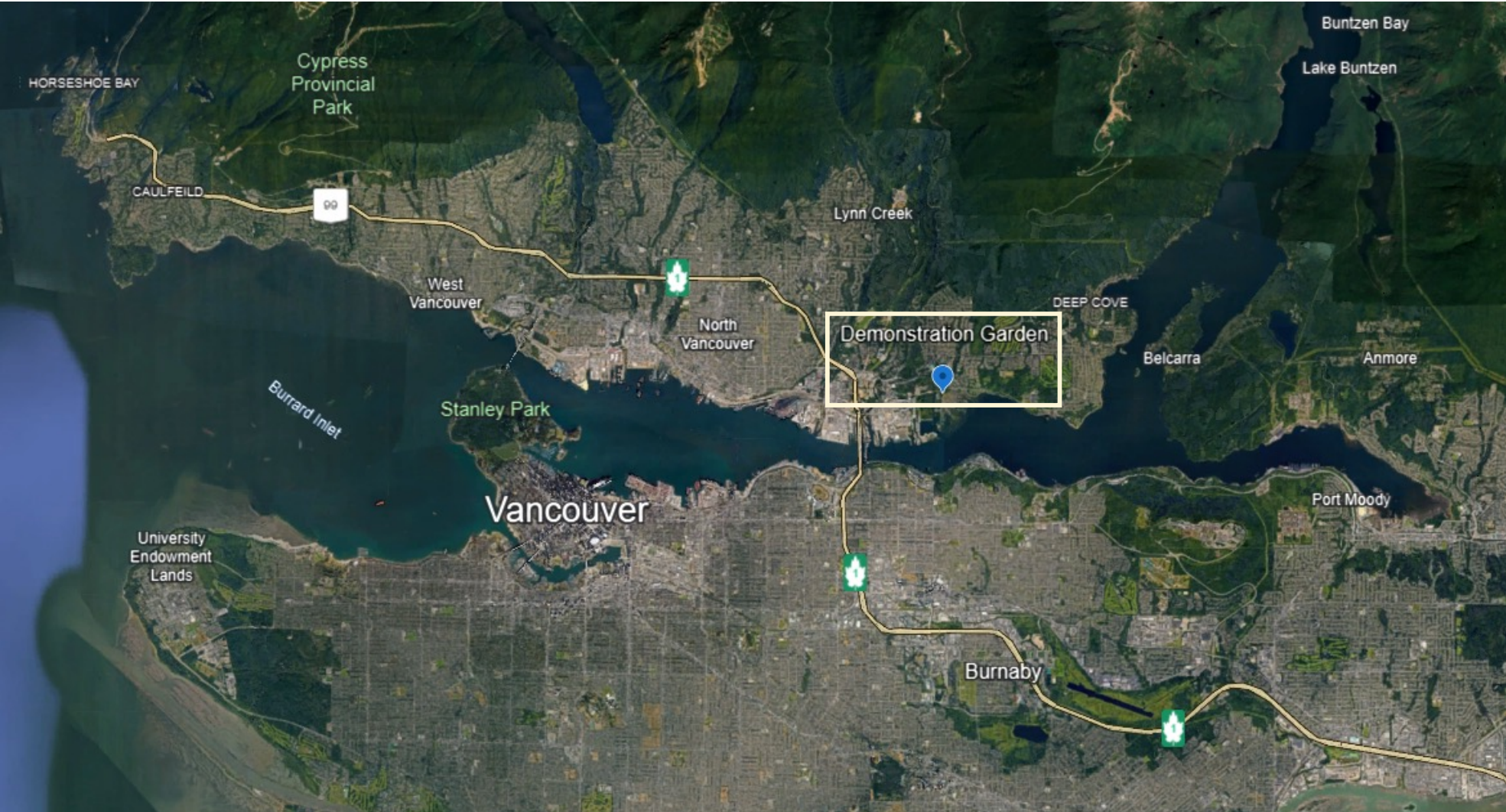


A Future First Nations Garden on Currently Contaminated Land

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September 2024



Site Location



First Nations Site History

- In **winter**, the people subsisted on stored dried foods and performed activities such as wood carving, weaving blankets, and spiritual ceremonies
- In late **spring**, families would disperse to hunt, fish and gather food, for immediate consumption and preservation during winter
- Berries and sockeye were collected during **summer** and **fall**, while fishing occurred in the Indian, Capilano and Seymour rivers

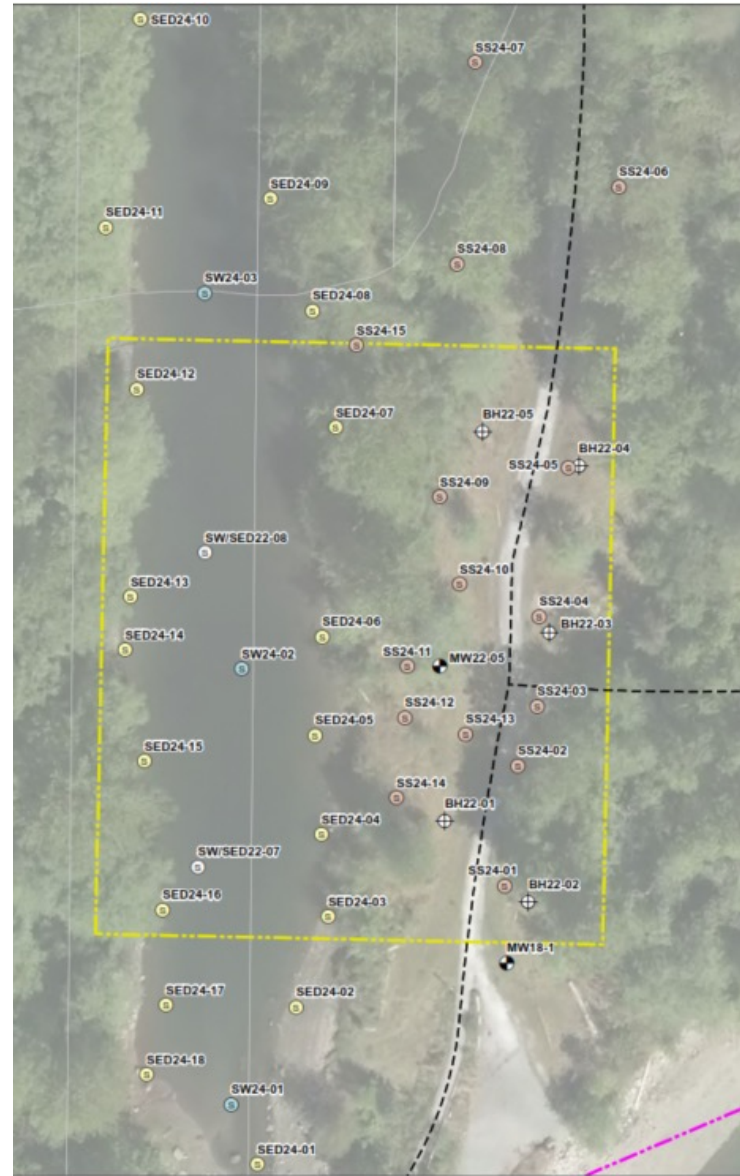
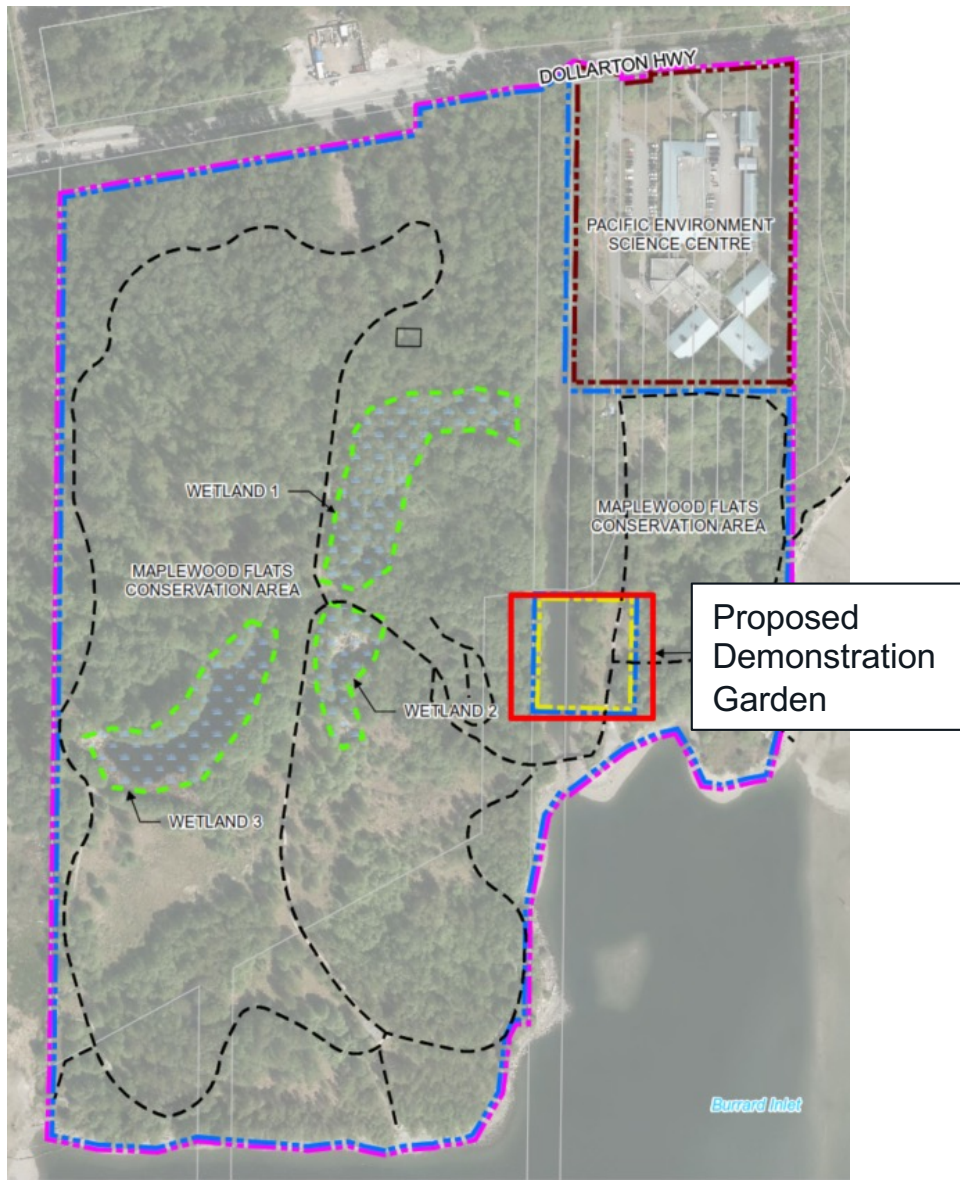


Industrial Site History

- **Historical uses** of the site included:
 - lumber and sawmills
 - chemical manufacturing
 - automotive services
 - used oil collection
 - log salvaging
 - construction paving
 - commercial vehicle equipment sales
- **Current use** of the site as the Maplewood Flats Conservation Area
- **Future use** of the site is a proposed demonstration garden



Proposed Site and Sampling Locations

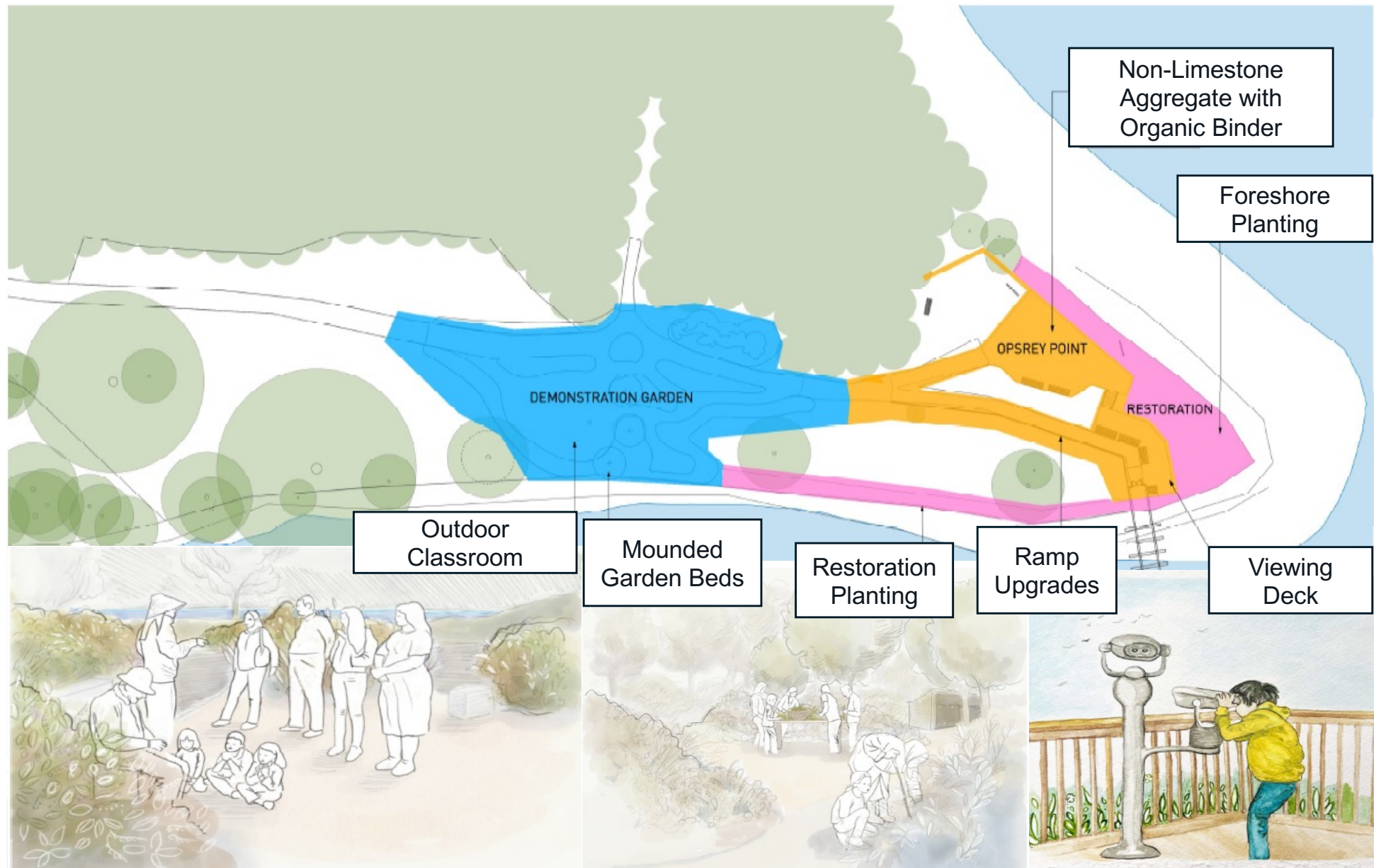


Permitting and First Nations Engagement

- Requests were sought from four nations:
 - Stó:lō Nation
 - Skwxwú7mesh Úxwumixw (Squamish Nation)
 - Tseil-Waututh Nation (TWN)
 - x^wməθk^wəyəm (Musqueam) Indian Band
- TWN engaged with Wild Bird Trust to address ecological concerns
- Acquired a Heritage Conservation Act permit
- Had an archaeological and environmental monitor on site during sampling

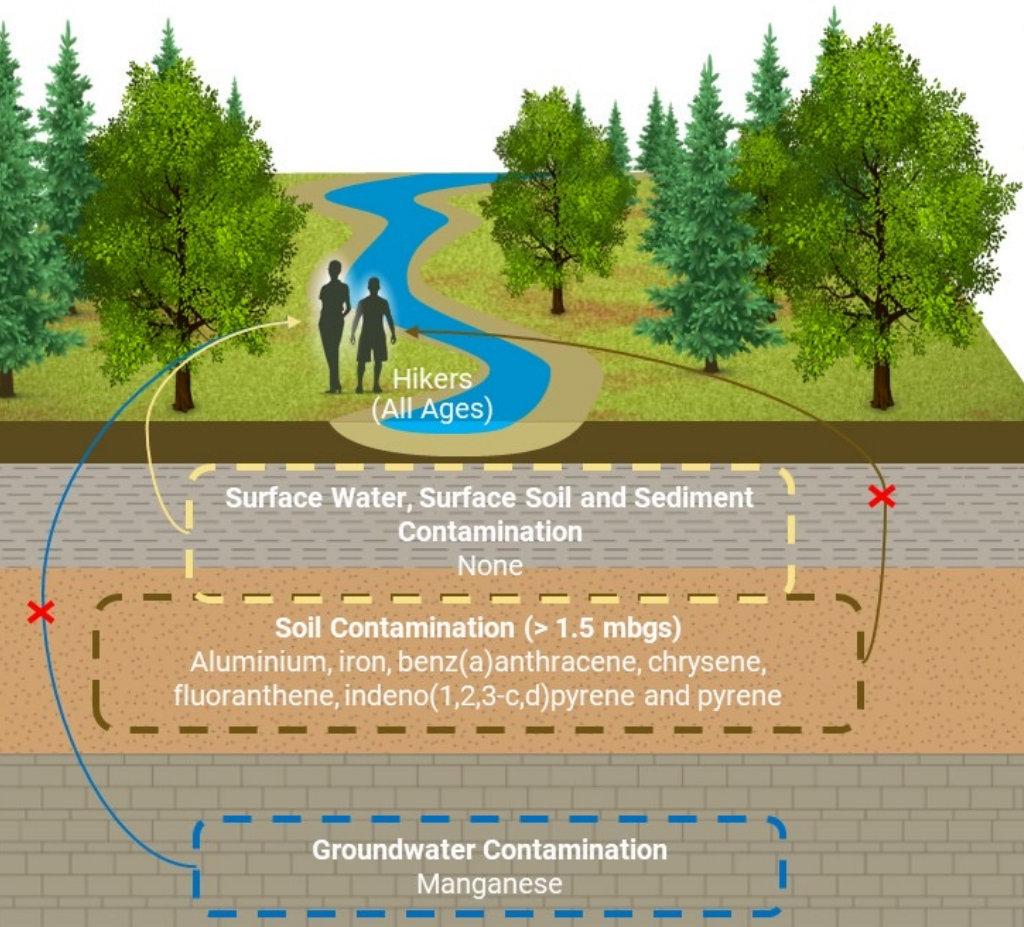


Proposed Demonstration Garden

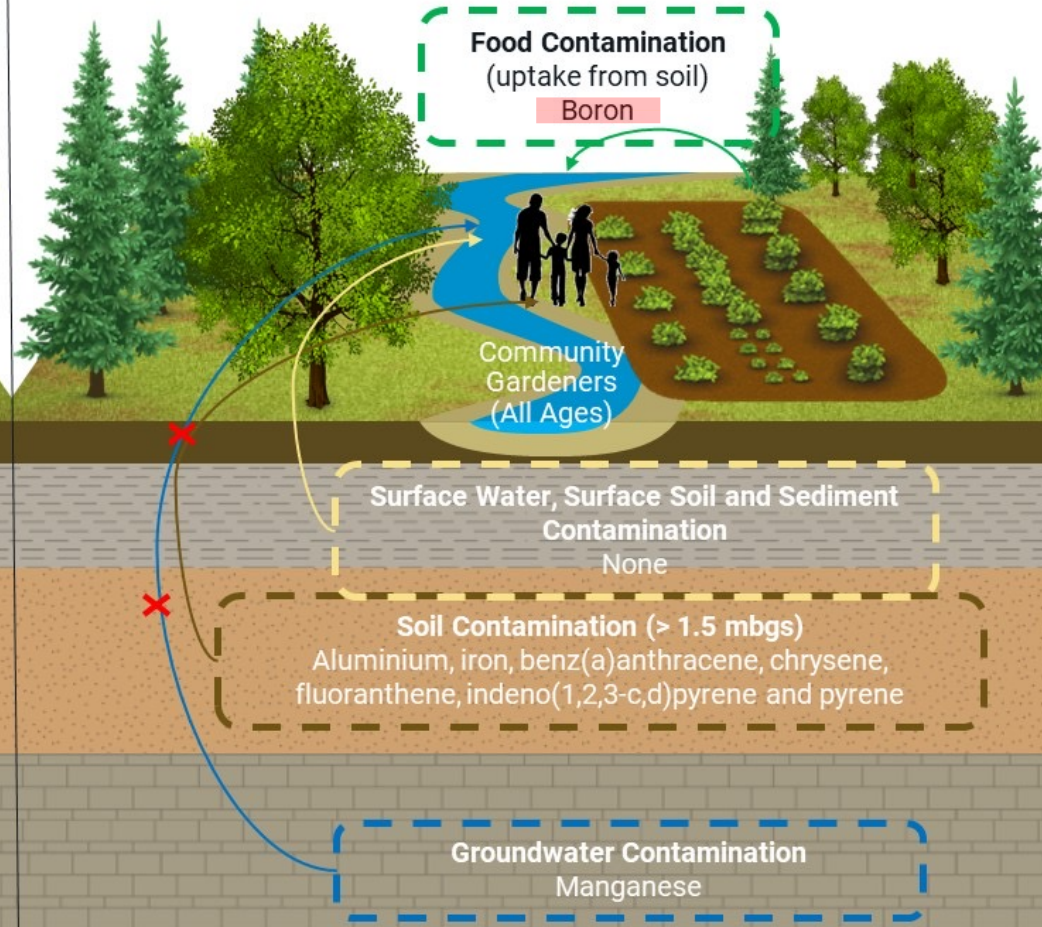


Human Health Risk Assessment

Current Scenario – Human Receptors



Future Scenario – Human Receptors



Routes of Exposure

- Gardens proposed for the demonstration garden plots:
 - Salve Making Gardens
 - Tea Garden
 - Food Garden
 - Wool Dying Garden
 - Pollinator Garden
- People potentially exposed to soil contaminants through:
 - Plant consumption from the Food and Tea Gardens
 - Direct soil exposure while gardening



Plants in Food Garden

Coastal strawberry, salal, salmon berry, thimble berry, red flowering currants, nodding onion, cow parsnip, camas, licorice fern root

Plants in Tea Garden

Kinnikinnick, wild ginger, nootka rose, western hemlock, stinging nettle, and black elderberry

From The Gardens...



Food Garden
 coastal strawberry,
 salal, salmon berry,
 thimble berry, red
 flowering currants,
 nodding onion, cow
 parsnip, camas,
 licorice fern root



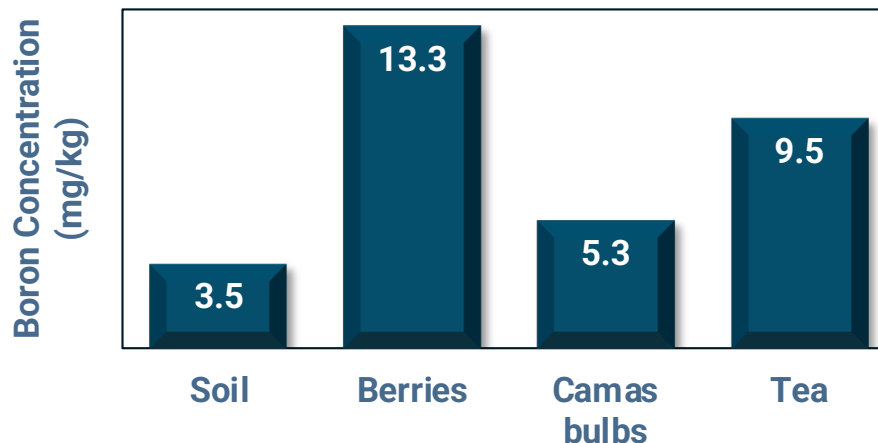
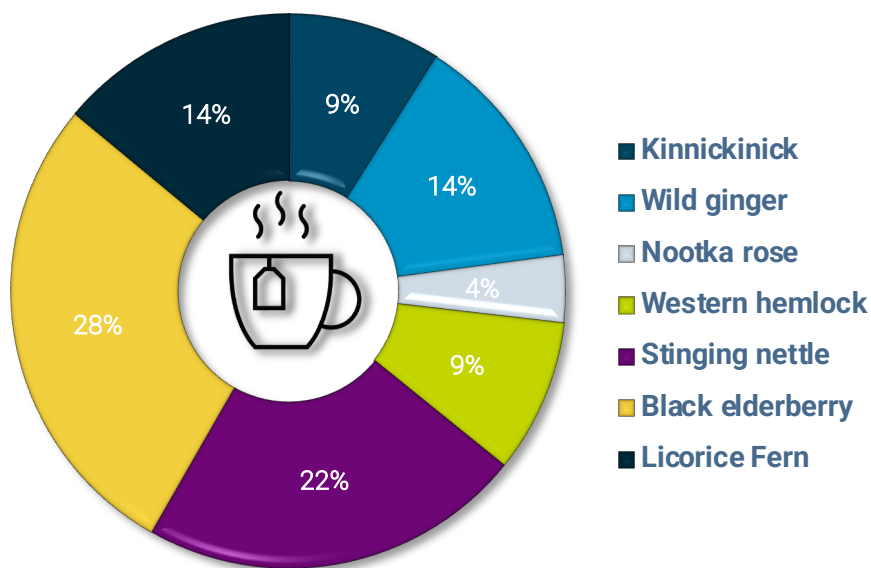
Tea Garden
 kinnikinnick, wild
 ginger, nootka
 rose, western
 hemlock, stinging
 nettle, and black
 elderberry



Exposure Concentrations

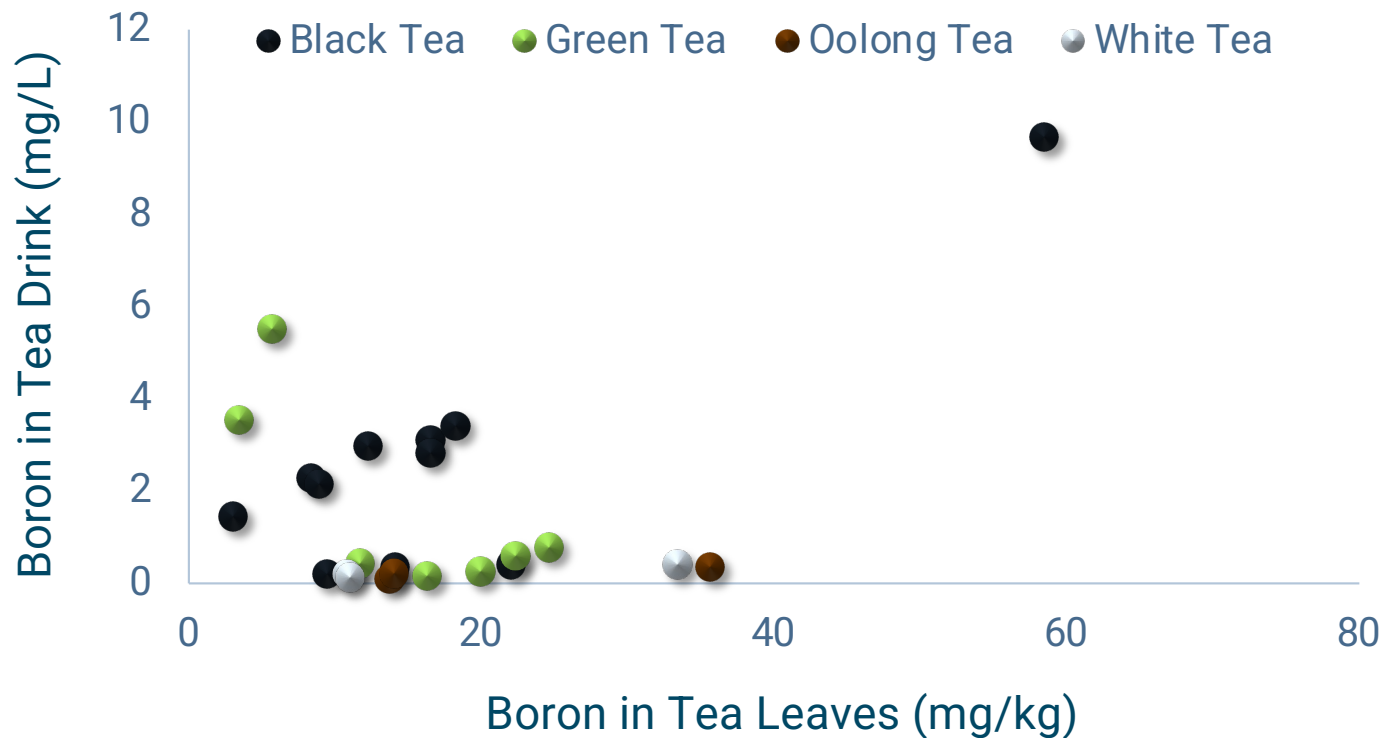
- Assessed dietary exposure – consumption of berries, roots and bulbs (camas) and tea
- Measured concentrations of Blackberries, Ferns, Plum and Lupinus – used as proxies

Dietary Input	Exposure Concentration Derivation
Soil	95 UCLM
Berries	Average Measured concentration of blackberries and plums
Camas Bulbs	Modelled – linear regression plus root:vegetation ratio of 0.5
Tea	Measured and Modelled Concentrations, based on Proportion of Plantings



Exposure Concentrations

- Concentration of boron in tea infusion – diffusion from tea leaves into tea drink
- Meta-study by Karak et al. (2017)
- Tea (drink) concentration of boron – 1.2 mg/L



Consumption Rates

- Receptor characteristics were as per Health Canada except:
 - **Berry Consumption**
 - Adults – FNFNES 2019
 - Toddlers – US EPA 2018
 - **Camas Consumption**
 - Adults and Toddlers – US EPA 2018 (root tubers)
 - **Tea Consumption**
 - Adults - FNFNES 2019
 - Toddlers - US EPA 2019
- Assumed year-round exposure



Risk Characterization

- Total daily boron dose compared to reference dose (US EPA IRIS database)
- **No unacceptable risks** were predicted for adults eating berries and camas and drinking tea
- **No unacceptable risks** were predicted for toddlers eating berries and camas or drinking tea
- **No unacceptable risks** predicted due to direct soil contact



Conclusions

- **Acceptable risks** were predicted for Future Community Gardeners exposed to boron accumulated into food and tea plants grown in the proposed garden (and via direct contact)



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Questions?





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