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# Excess Soils to Construction Aggregate

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# Problem 1 – Excess Soil

## Soils from development projects require off-site disposal

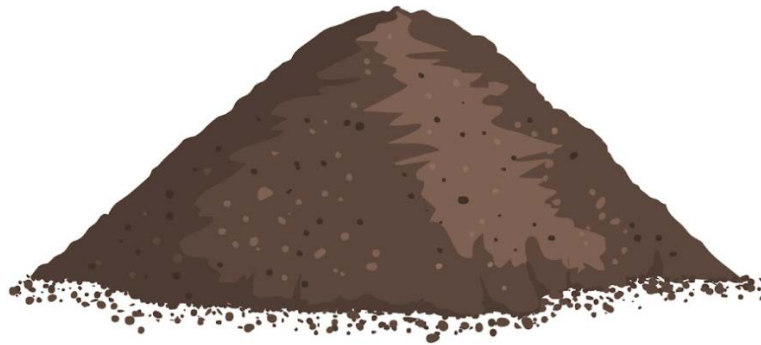
- New building developments, parkade excavations, tunnels, and remediations
- Some soils need to be replaced - don't meet geotechnical or environmental requirements
  - Other times there is simply too much soil
- Problem persists worldwide and is most prevalent in large metropolitan areas

## Why is this a problem?

- Soils are filling exceedingly limited landfill airspace (or dumped offshore or on farmland)
- Extensive greenhouse gas emissions to transport soils to distant landfills
- Disposal process is costly - deferring development
- Valuable materials end up in landfills

# Excess Soil – The Facts

- **Millions of tonnes of excess soil generated annually** in the Lower Mainland of BC.
- Excess soil **costs increase with trucking costs**
- **Ocean disposal permits are harder to get**, effectively removing that disposal option
- **Illegal dumping persists** in the absence of affordable alternatives, causing pollution impacts on farmland\*
- **A worldwide problem:** Seattle and San Francisco have issues, Ontario has new regulations, and London faced large issue during the Olympics

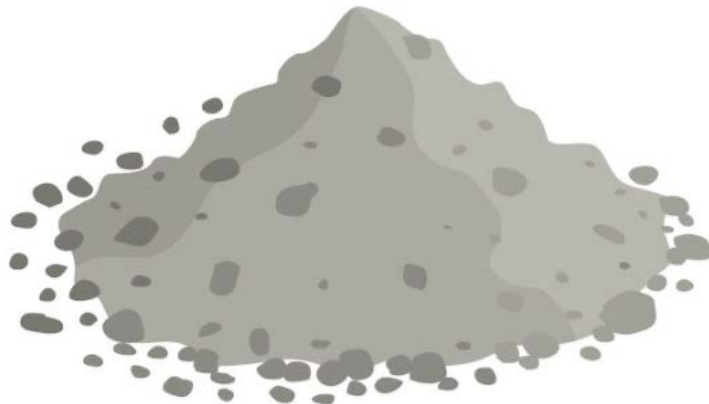


\*<https://www.cbc.ca/news/canada/british-columbia/alc-alr-farmland-dumping-illegal-fill-1.4654479>

# Problem 2 – Depleting Aggregate Supply

## Growth cycle fuels demand for sand and aggregate

- Escalating worldwide demand to support concrete production and urban development



## Why is this a problem?

- Virgin aggregate and sand are finite resources, especially globally
- Mining is hard on the environment & ecosystems
- Aggregate sources close to urban areas are mined out.
- Aggregates are shipped further distances to market at higher transportation and environmental cost

# Depleting Aggregate – The Facts

- Annual global demand for sand exceeds **40 - 50 billion tonnes per year.\***
- **Sand use has tripled** over the past two decades.\*
- Areas of the world **running out of sand.\***
  - Concrete sand from Northern Vancouver Island is used in California
  - China and India are mining lakes and the coastline for sand.
- **90 million tonnes of concrete** were produced in the USA in 2020\*\*
- Over **165 million tonnes of rock mined in Canada** in 2019, with **11 million + tonnes in BC alone\*\***

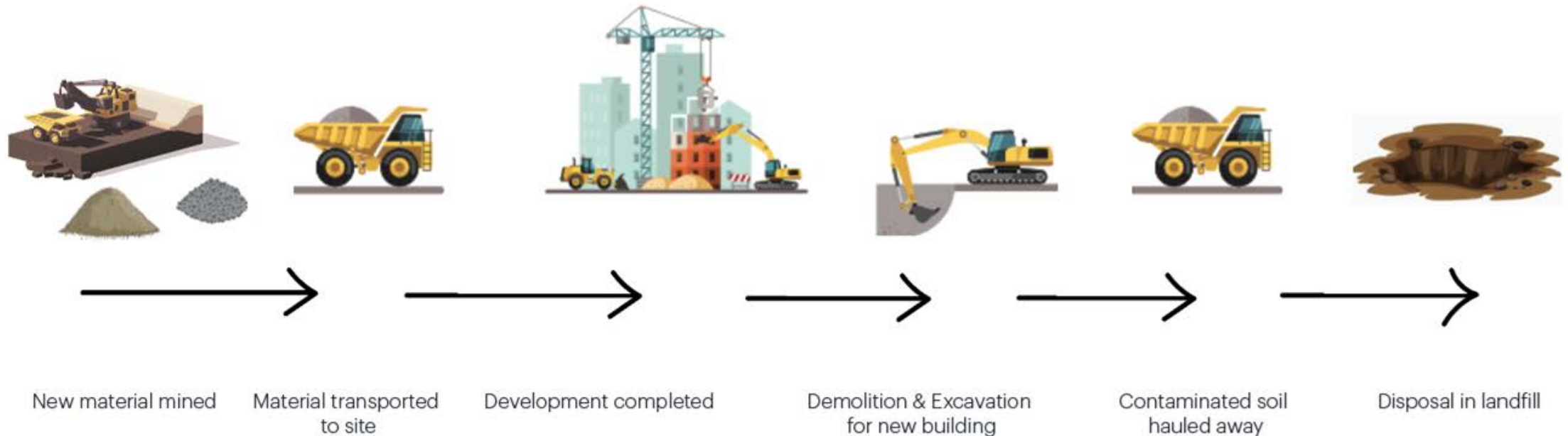


\*Pascal Peduzzi - director of UNEP's Global Resource Information Database <https://www.cnbc.com/2021/03/05/sand-shortage-the-world-is-running-out-of-a-crucial-commodity.html>

\*\*Statista, Major countries in worldwide cement production 2010-2020; Statista, Production of stone in Canada by province 2019

# Typical lifecycle of soil today...

Cradle-to-grave process of **'mine, fill, excavate, dispose'** is inefficient & poor environmentally





# Moving to a Circular Economy – Waste to Product





# Reuse Solution

The background image shows an industrial wastewater treatment facility. A large, circular, grey metal tank dominates the center, with a blue circular hatch visible on its side. To the left, there are green rectangular structures, possibly part of a conveyor system or storage bins. Below the tank, various mechanical components are visible, including a large blue motor, pipes, and a green rectangular unit. The overall scene is industrial and technical.



# Soil Washing Background

- Soil Washing used more in Europe than NA.
- 1990s US used soil washing on 8 Superfund Sites.
- Achieved 90% reduction in contaminant soil volume.
- When allowable concentrations decreased, percent volume reduction decreased.
- Technology could not move contaminant from clay, silt, and sand.
- Technology could not clean the wash water.
- Advances in technology allows for more effective washing and removal of contaminants from water.



Technology had to catch up to Standards set by Toxicology



*A cleaner world with a  
sustainable resource economy.*



## Turning waste soils into construction aggregate

GRT takes in excess waste soils from construction projects, then washes, sorts and cleans that soil to produce specification construction aggregates.

Our process dramatically reduces waste entering landfills, as well as mining, transportation and their associated greenhouse gas emissions.

***GRT's Resource Regeneration Facility***, located at Duke Point Nanaimo on Snuneymuxw First Nations territory, on land managed by the Nanaimo Port Authority.





### Waste Soil

*Non-structural, mixed material, would have gone to the landfill...*



## Resource Regeneration Facility produces:



### Rock

*Xeriscaping, backfill,  
Large rock for dike armourstone*



### Silty Clay

*Dike core, concrete clinker, landfill liner*



### Aggregate / Gravel

*Xeriscaping, concrete, pathways, backfill*



### Sand

*Concrete, bedding sand, winter roads*

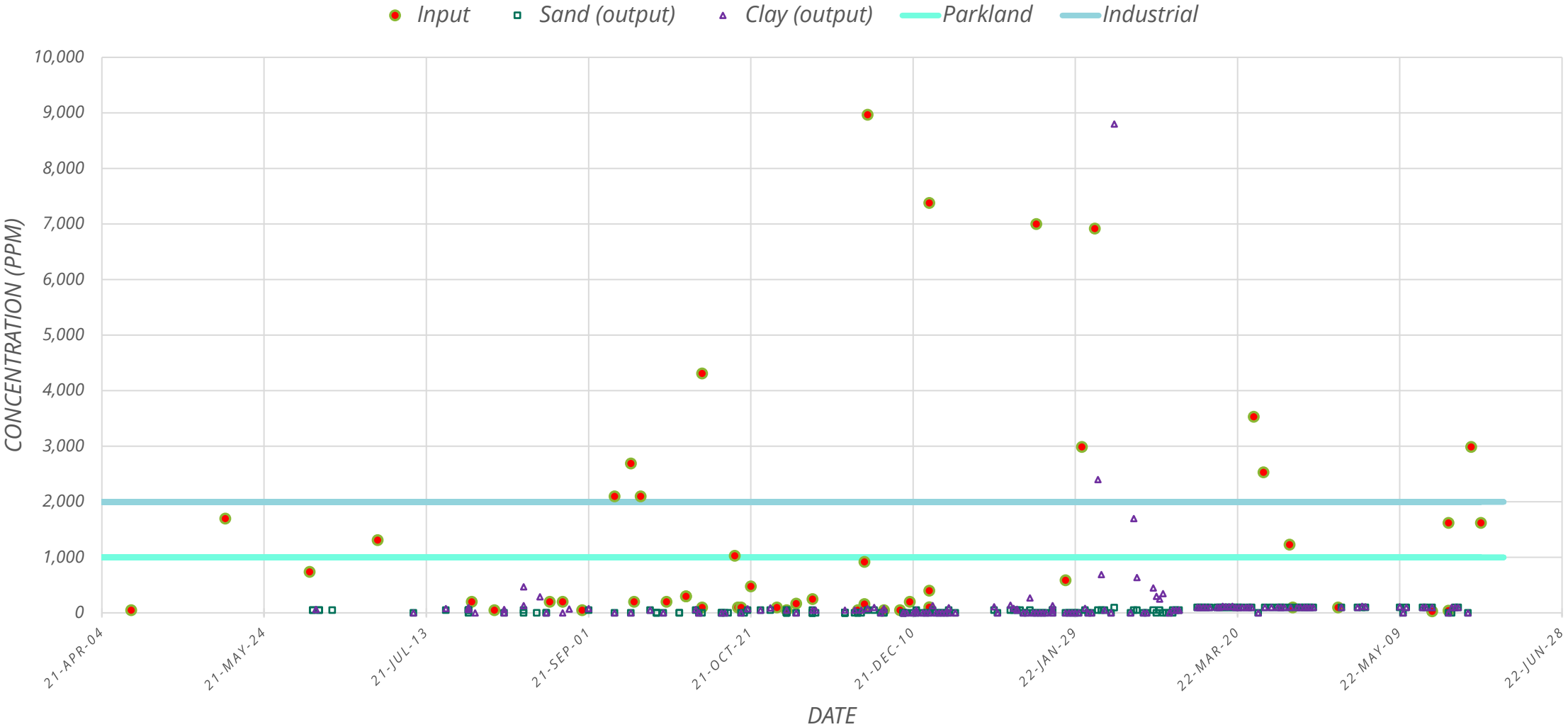
## GRT Regenerated Sand:

- Sand currently meets C33 specification but could be adjusted to meet other specs.
- 100% upcycled, waste-to-product resource
- Volume diverted tonne-for-tonne from regional landfills
- Nominal carbon required for regeneration process, a fraction of what's required for virgin extraction
- None of the carbon required for the disposal
- Net negative carbon compared to mining and disposal
- All wash water is treated and recirculated
- It meets the environmental requirements

How is regenerated sand different than virgin mined sand. It is the same geotechnically, it has a much lower embedded carbon. It is regulated and tracked.

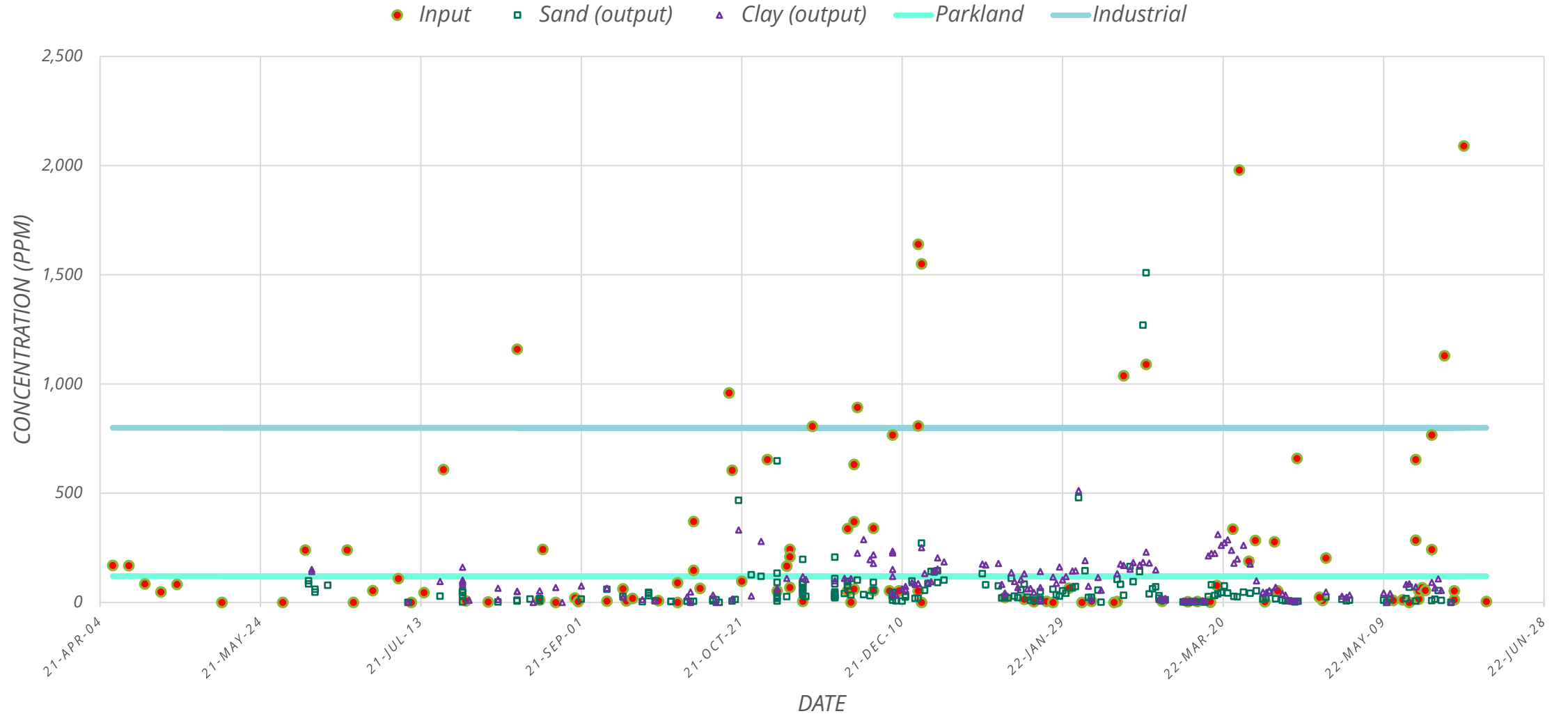


PRE/POST-PROCESSING CONCENTRATIONS (LEPH)





## PRE/POST-PROCESSING CONCENTRATIONS (LEAD)







## Lab Analysis

### Larger Particle Sizes

- BC Lab Manual is based on analyzing smaller particle size.
- BC CSR is used for all particle sizes
- GRT initiated a study with BV to look at the concentrations of the larger particle sizes.
- Preliminary analysis of the results for larger particle sizes have not identified any unexpected concerns and finding will be presented after analysis is complete.
- Future presentation

# Rethinking the Built Environment

We're looking for ways to pull from what already exists to make what is required—from the ground up.

## Extract not, dispose less

By viewing excess or contaminated soil as a resource instead of waste, we can support urban development that treads lighter on the earth.

We strive to find highest-value uses for all our plant outputs and continue to innovate new treatments and applications internally and with our partners.

**90%+**

Of material  
reintegrated back  
into local markets



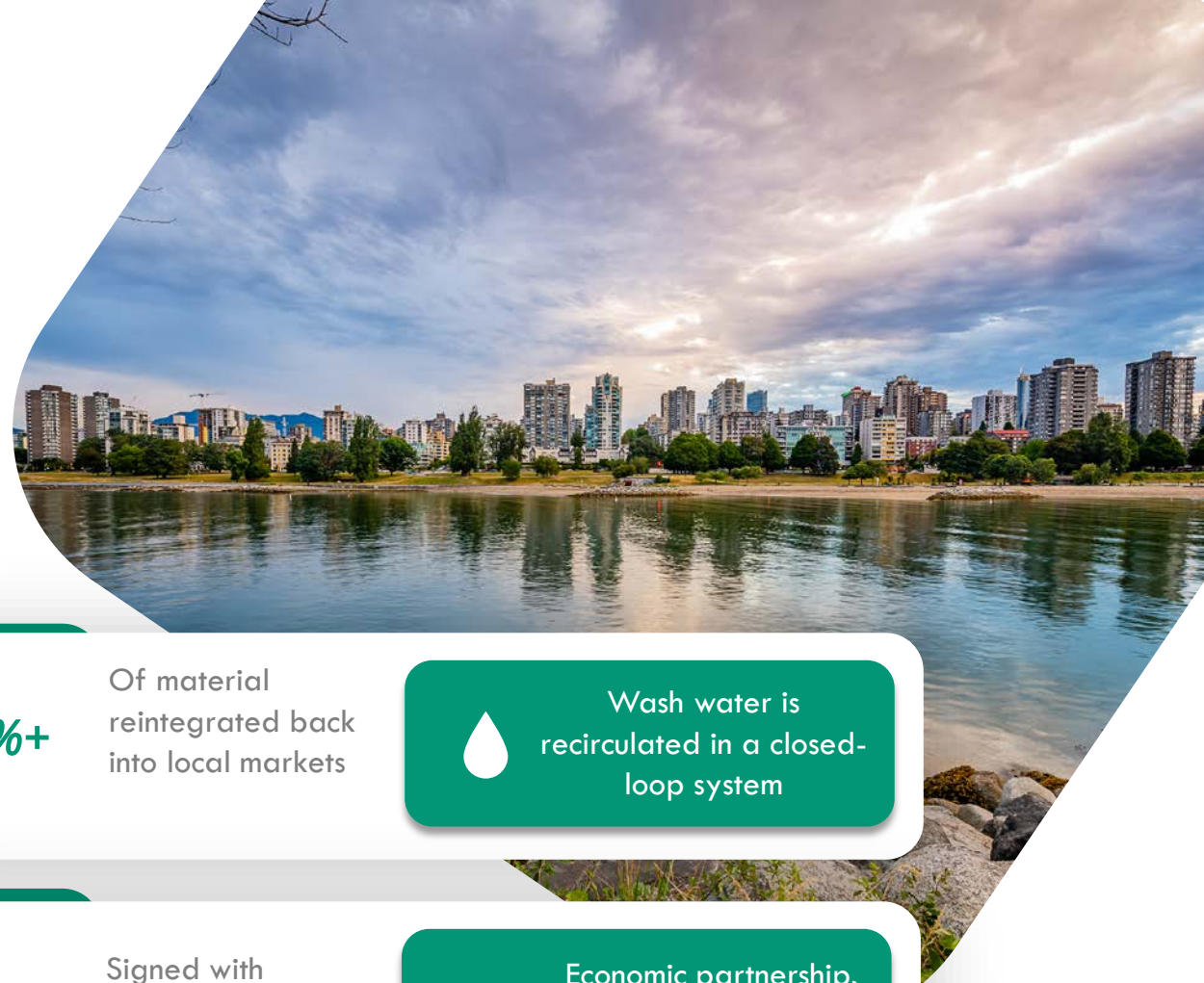
Wash water is  
recirculated in a closed-  
loop system

**IBA**

Signed with  
Snuneymuxw FN  
In 2021



Economic partnership,  
jobs, R&D



## Nanaimo Facility

Opened 2021

**40 tph**

Processing Speed

4 acres

Barge ramp adjacent

Hydrovac receiving bins

18,000 tonnes storage

capacity

8000 tonnes output cells

40 employees

## Future Facilities

Vancouver, Seattle, etc.

**160-500 tph**

Processing Speed (depending on  
market size)

Nanaimo is our validation  
plant. We have the conceptual  
design complete, and we are  
ready to build larger plants in  
larger markets.

We need land.







Thank You.

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