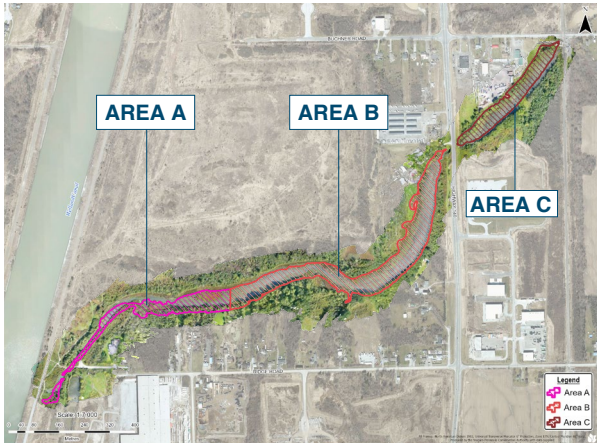
Lyons Creek East Sediment Management Options Summary

Geosyntec consultants



LAYING THE GROUNDWORK

In the 1990s, scientists found high levels of polychlorinated biphenyls (PCBs) in the bottom sediments of Lyons Creek East in Welland, Ontario. PCBs are toxic chemicals that were banned in the 1970s due to their harmful effects on the environment and human health. This site is identified as the last on the Canadian side of the Niagara River Area of Concern requiring cleanup as part of the Niagara River Remedial Action Plan.

In 2008, different options for managing the contaminated sediment were evaluated. After public input, the selected method was monitored natural recovery. This means the sediment was left untouched to recover naturally, while scientists monitored the progress. The monitoring involved checking sediments, water, fish, turtles, and other aquatic species. This was a joint effort by federal and provincial scientists, working with the Niagara Peninsula Conservation Authority.

Long-term monitoring results show that some parts of the creek (image on the left) have not naturally recovered, PCB levels in the creek sediments remain high and are still a concern. Therefore, a new approach is needed for those areas.

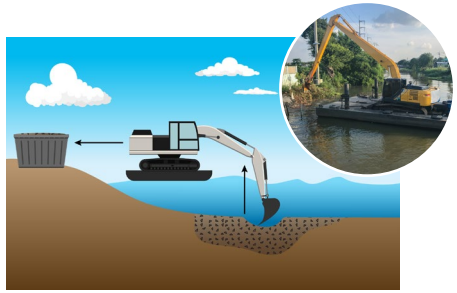
PROJECT GOAL: To prioritize the removal and off-site disposal of hazardous PCB contaminated sediment and manage remaining lower concentration PCBs to protect key ecological features.

NEW OPTIONS FOR SEDIMENT CLEANUP

The following four potential options were compared to see which fit best with the site conditions and project goals:

Hydraulic dredging

Amphibious equipment with suction pumps and pipelines remove sediment and transport it to a staging area as a slurry. The water is removed from the sediment and treated then the dry sediment is transported to a disposal facility.



Mechanical dredging

Sediment is removed using in-water excavation equipment and transported to a staging area to dry. Once dried, sediment is taken to a disposal facility.

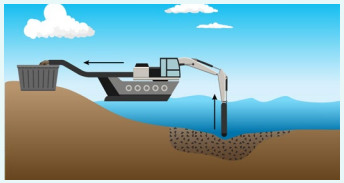
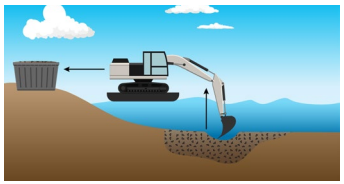
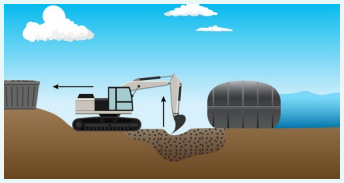
Dry excavation

Temporary dams are used to isolate and drain water from the areas of the creek where sediment is to be removed. The contaminated sediment is excavated, dried, and then transported to a disposal facility.

Thin-layer capping

A thin layer of material, typically sand, is placed over the sediment to reduce exposure and protect the natural environment.

Lyons Creek East Sediment Management Options Comparison

SEDIMENT MANAGEMENT OPTION	ADVANTAGES	LIMITATIONS	EFFECTIVENESS	COST
Hydraulic Dredging 	• Removes contamination • Long-term monitoring and maintenance not required • Can reach areas that are difficult to access, like marshes with shallow water • Contaminated sediment managed underwater, lowering risk of exposure to workers and public • Slurry is easy to transport through piping along the creek and does not require vehicle travel routes from work area to dewatering (sediment-drying) area • Sediment removal is completed from the water reducing the number of creek access points needed	• Requires dewatering and treatment of removed water at staging area • Exposure risk during transportation of sediment to licensed disposal facility needs to be managed • Heavy truck traffic in the area to transport removed sediment for disposal • Habitat restoration necessary after work • Water quality downstream of work area requires monitoring of suspended sediment • Large debris will impact efficiency of operations and would need to be removed • Cost of sediment disposal at a licensed disposal facility	Contaminated sediments completely removed	$ $
Mechanical Dredging 	• Removes contamination • Long-term monitoring and maintenance minimized	• Requires dewatering and treatment of removed water at staging area • Exposure risk during transportation of sediment to licensed disposal facility needs to be managed • Heavy truck traffic in the area to transport removed sediment for disposal • Challenges maneuvering excavation equipment in shallow water • Habitat restoration necessary after work • Higher impacts to habitat along shoreline and creek to establish equipment access to the work areas in the creek • Higher exposure risk for workers as removal work done above water • Water quality downstream of work area requires monitoring of suspended sediment • Cost of sediment disposal at a licensed disposal facility	Contaminated sediments completely removed	$ $
Dry Excavation 	• Removes contamination • Long-term monitoring and maintenance minimized • Less dewatering is needed for the removed sediment • Risk of contaminated sediment moving downstream during work is lower	• Heavy truck traffic and more temporary roads around and within the creek footprint • Higher exposure risk for workers who would be in contact with sediment during excavation • Can require more air and dust control • More site restoration to return temporary roads to original habitat conditions • Requires temporary alteration/diversion water flow in creek • Cost of sediment disposal at a licensed disposal facility	Contaminated sediments completely removed	$ $ $
Thin-Layer Capping 	• Limits disturbance to creek, including disturbance of contaminants • Limits PCB exposure to workers and public by leaving material in place • Limits impacts/disturbance to plants, animals, and people • Lower cost • Can be implemented in hard-to-access areas	• Contaminated sediments left in place under protective cap • Administrative controls for areas with cap • May require pre-removal of sediment to limit infilling of creek in shallow areas	Contaminated sediments are managed but left in place, risk is managed, but remains with continued monitoring for safety	$

THE RECOMMENDED APPROACH

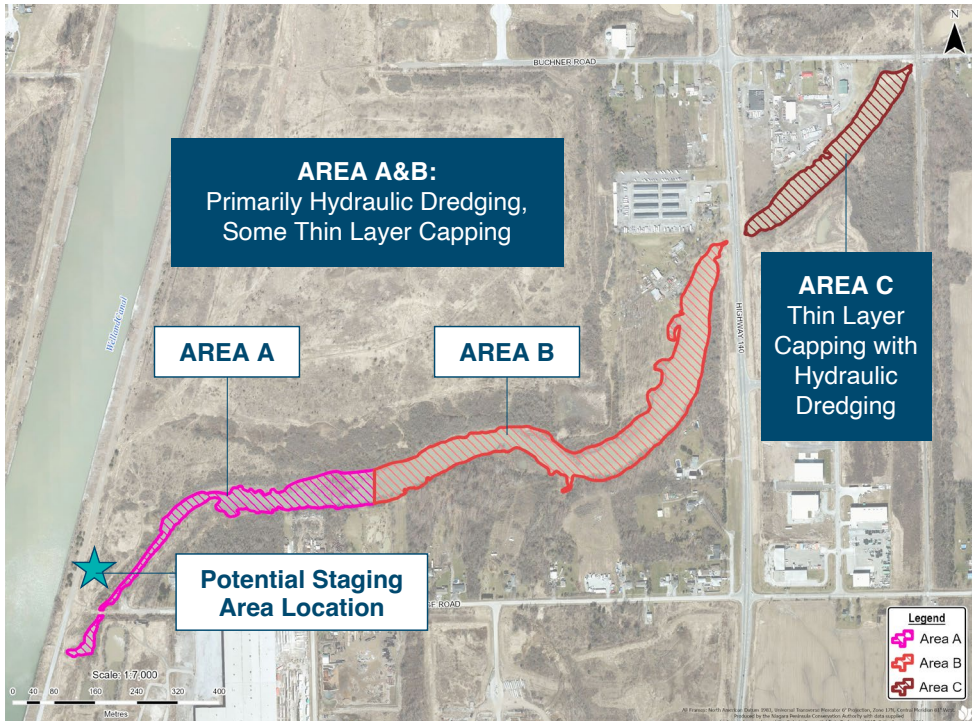
A combination of approaches was recommended after thorough review of the study area conditions, consideration of study area history, and review of over 500 sediment samples. The recommended combined remedy is:

1. Hydraulic dredging for areas with higher PCB concentrations
2. Thin-layer capping in lower concentration areas

This balanced solution addresses contamination while considering feasibility, cost, and environmental impacts.

A staging area would likely be located on Transport Canada property, separated from neighbouring residential and commercial properties.

This solution is recommended because it limits impacts to the creek, plants, animals, nearby residents, and communities downstream while effectively cleaning up the PCB contaminated sediment.



Sediment samples being collected from Lyons Creek East

WHAT TO EXPECT

Residents will notice obvious, but temporary, changes as we prepare for, implement, and restore after this work. To maintain current conditions of the creek downstream of the work area, control measures will be put in place during construction to contain disruptive impacts, such as those depicted in the icons below, within the immediate work area.

Before
You will notice workers in the area leading up to the main construction phase. They will be collecting data, sampling, and planning.

During Work
(Dredging and Capping Over 3 to 4 Construction Seasons)
You will see and hear heavy construction equipment in the creek and staging area on the north side of the creek. Below are some of the protective measures and monitoring equipment that you may see in and around the creek, to help protect the public and natural environment.

- **Water Quality Monitoring Equipment**
- **Sediment Containment Curtain**
- **Temporary Truck Wash**
- **Site Security for Public Safety**
- **Dust, Odour, and Air Quality Monitoring**
- **Sediment Dewatering and Water Treatment at Staging Area**

After
Following the main construction phase you may notice workers restoring habitat and performing monitoring of the creek.

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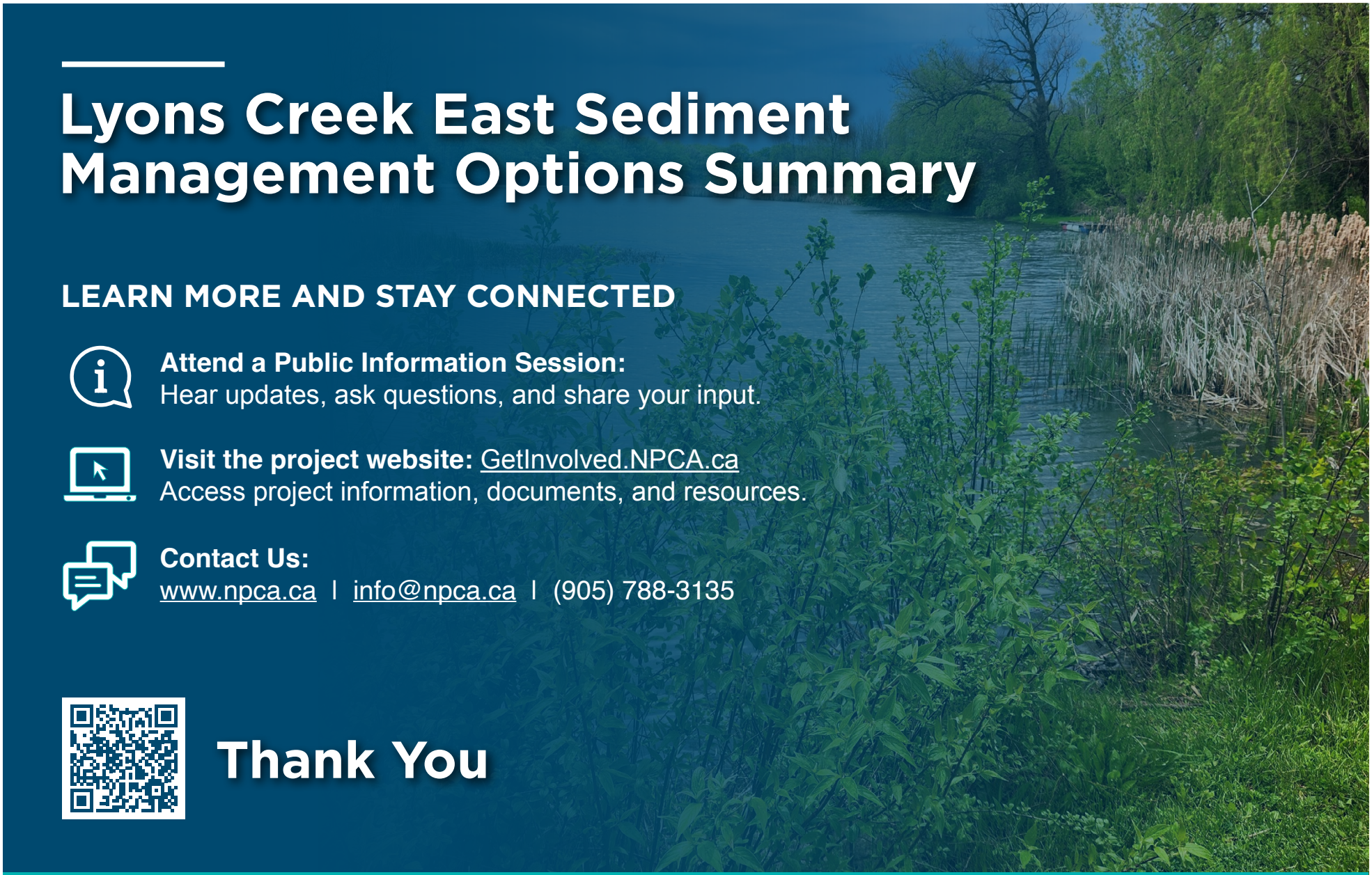

LEARN MORE AND STAY CONNECTED

Attend a Public Information Session:
Hear updates, ask questions, and share your input.

Visit the project website: GetInvolved.NPCA.ca
Access project information, documents, and resources.

Contact Us:
www.npca.ca | info@npca.ca | (905) 788-3135

Thank You

Geosyntec consultants

Niagara Peninsula CONSERVATION