Comments on
Conceptual Sediment Management Plan for the
Kingston Inner Harbour. Transport Canada and Parks Canada Water Lot, Kingston, Ontario,
WSP Canada, Sept 19, 2023

Peter Hodson, Kingston, ON [redacted]
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The case for KIH remediation sediment dredging, capping and 'natural' remediation is derived from ecological and human health risk assessments of measured contaminants of concern in sediments, water and biota. However, sediment dredging and capping carry additional ecological and human health risks and at a significant financial cost. Therefore, it is critically important that the risk assessments are technically correct, comprehensive and trusted by those whose interests may be affected. Decisions on remediation must be based on sound and comprehensive science and integrated with other decisions about development in the watershed. This report presents some useful responses to concerns about earlier versions of the plan, and the authors are to be commended for their consideration. Nevertheless, some important issues remain to be resolved.

Risk Assessment models and strength of supporting data

1. **Ecological context** - Models predicting contaminant transfer to water, aquatic species and human beings are derived from research and experience in other ecosystems. But these models are subject to ecological context. The ecological conditions in one ecosystem that control chemical fate and effects (e.g., water quality, sediment organic content, benthic food web structure, etc) do not necessarily correspond to conditions in another.
    a. The models provide general guidance, not accurate thresholds when applied to new systems. In the KIH, suspended sediments, dense vegetation beds and high planktonic productivity all mitigate bioavailability of many chemicals and their ecological risks.
    b. Despite the past loadings of chemicals from a variety of sources, the KIH appears remarkably productive in terms of vegetation, benthos, fish and wildlife. This implies a capacity of natural remediation if the harbour's ecosystem is left undisturbed, suggesting an on-going, low-cost solution to contamination. However, little effort has been expended to document the health and productivity of the KIH ecosystem and to validate the worst case predictions of risk - "If it ain't broke, don't fix it!"
2. **Lacustrine Processes - Section 5.8.1** – The description of circulation within the KIH is simplistic and hypothetical with lots of 'mays' and no data on actual water movements during late fall and spring when winds are strongest and vegetation is least, and during winter ice cover when currents would be driven by sewer outfalls and the Cat R. No account is taken of sediment resuspension and movement in late spring when spawning carp disturb surface sediments or of the likely effects of climate warming.
    a. What hydrological studies are planned to describe and predict the influence of bioturbation and seasonal water circulation on disposition of sewer effluents and movements of sediments?
    b. What is the fate of submerged and decaying aquatic vegetation in the winter and what role does it play in contaminant fate and transport?

3. **Species at risk -** The most direct way to verify model predictions is to measure chemical concentrations in specific tissues of endemic species of fish, turtles, birds, otters, etc to judge whether toxicity thresholds have been exceeded. Risk assessments are stronger when they include species at risk, although the relevant example in KIH would likely be American eel. No data are presented on contaminants in birds, mammals, or herptiles that are part of KIH food webs. Such data would also strengthen risk assessments and decisions on remediation. Ontario's Guide to Eating Sports Fish, a risk management tool, indicates that mercury concentrations in brown bullheads merit moderate restrictions on human consumption. However, consumption guidelines alone are not a sufficient basis for decisions on KIH remediation. Otherwise, every ecosystem in Ontario would be dredged.
    a. Given that Hg levels in bullhead are moderate and risk is managed by consumptions advisories, does KIH have a sufficient problem that it merits remediation?
    b. Why are there no data on species higher in the food web, and will they be included?
    c. Why are there redactions in the species at risk section 7.0? What is there to hide, and why?
    d. What specific actions are planned to monitor the presence and health of eels?
4. **Spatial scale** - Section 5.1 "Identification of zones with a spatial scale that is relevant to home ranges of wildlife that have high site fidelity, and spatial scale appropriate for preliminary sediment management options evaluation."
    a. Does this include species that are seasonal but which rely on KIH for habitat to support reproduction and foraging (e.g., fish-eating birds such as terns, osprey, eagles, kingfishers, ducks etc)?
    b. What pre- and post-remediation monitoring is planned to assess the abundance and reproductive performance of these species?
    c. Mobile fish species such as carp and walleye represent a risk to human health, but they are seasonal migrants and much of their contaminant loads are accumulated elsewhere in Lake Ontario and the St. Lawrence River. How can contaminants in these species be used to justify dredging in KIH?
5. **Overstated risks of metals.** The risks of metals in sediments are invoked repeatedly without reference to their chemical form in sediments (e.g., P 54 – metals among "exposure parameters of greatest interest"). Section 10.3.3 – p 106 – "**Chromium (marsh wren)"** reports a criterion for the protection of marsh wren (250 mg Cr/kg), an herbivorous species that inhabits marsh areas and is unlikely to be directly exposed to sediment metals. In contrast, the proposed criterion for mallard ducks, a species exposed directly to marsh sediments through ingestion, is much higher (2500 mg/kg). Cationic metals are immobilized by complexation with organic and inorganic matter. In particular, the highly toxic Cr-VI is likely present as the much less toxic Cr-III when in the open waters of KIH (p 41). Similarly, other metals would not be a significant risk in the alkaline waters of KIH. Other than PCBs and PAH, the real issue is Hg exposure because Hg is mobilized by microbial methylation. Table 3, p 95 - "Approaches **assume** that the benefits of contaminant removal or isolation (i.e., chemical risk reduction) offset the disruption to existing natural resources and infrastructure"
    a. How will this critical assumption be tested before remediation rather than relying on what appear to be unrealistic model predictions?
    b. How will the costs and benefits of a leave-in-place solution be assessed?

6. **Evidence for chemical toxicity is slim.** Section 54: "….although few indications of harm were documented for the benthic community….". Sediment toxicity tests demonstrated moderate effects on some species of benthic invertebrates but not others, and the distribution of toxic sediments within KIH and north of Belle Island has been patchy and inconsistent. The presence of bullheads, sunfish and bass in KIH are consistent with abundant benthic organisms. Signs of internal and external pathology in brown bullhead similar to those caused by PAH, are NOT conclusive evidence of PAH toxicity. The same symptoms can be caused by bacterial, viral and parasitic infections. Without studies by fish pathologists experienced with PAH toxicity, the proposed causal relationship to PAH exposure is weak and not proved. Given the cost of remediation ($70 million), the excuses of uncertainty, ethical issues, destructive sampling and technical complexity (P 48) do not justify proceeding.
    a. What work is planned to verify toxicity and food web contamination of species of concern?
    b. Will pathology in bullheads be assessed through a comprehensive survey by a qualified fish pathologist experienced in studies of PAH?
7. **Ongoing chemical loadings -** Remediation is proposed because the decline of contamination in surface sediments appears slow. **However, no inventories of current loadings of contaminants of concern are shown**. P 35 suggests such evaluations were done, but that more are required, including improved storm sewer monitoring (p 53). For example, 'Free-product staining' in the SW corner of Anglin Bay (section 5.5.1.1) indicates on-going seepage of coal tar with groundwater from downtown Kingston although the discussion (p 43) treats this as a past problem.
    a. What monitoring is planned to assess on-going loadings from industrial lands via groundwater seepage (Belle Island Landfill; coal tar from downtown Kingston), storm sewers, combined sewer overflows and land disturbance if adjacent lands are re-developed?
    a. Will monitoring include surveys of both dissolved and particulate compounds in storm sewer effluents, combined sewer overflows, and groundwater seepage during complete cycles of run-off from rainstorms and spring melt, and low flows during dry spells?
    b. Will analytical methods include sensitivity limits sufficiently sensitive to avoid long lists of NDs (Not detected) and to quantify concentrations associated with bioaccumulation by fish?

Remediation

8. **Environmental management of dredging, capping and sediment disposal** Section 12 implies a considerable risk of sediment resuspension and dispersal due to sediment disturbance by the dredge and by barge and vessel traffic moving in and out of dredge zones. The same concerns hold for transfer to land-based transport (i.e., trucks).
    a. Does sediment dewatering take place on a barge or at a facility on land?
    b. How will turbidity and suspended solids moving off-site be detected and measured and its fate in the Harbour and on land be documented?
    c. What does sediment treatment *ex situ* mean? And where? What treatment will be applied and what measures taken to ensure no spread of dust or volatilisation of CoC's?
    d. What frequency of chemical and toxicity assessments of de-watered sediments and discharged liquids be prescribed?
    e. What management responses are planned for observed incidents of sediment re-suspension and redistribution? Would dredging cease if problems are observed?

   f. What are the plans for post-dredging monitoring of contamination and effects on receptors? Who will do the monitoring, and will there be dredging performance standards and consequences/penalties for exceedances?

9. **Shoreline protection** - Section 4.2.7 - The City of Kingston's 'Ribbon of Life' policy is "…. protective of a 30 m naturalized buffer along waterfronts and includes a 30 m setback for construction activities from the highwater mark". This policy seems to conflict with plans for a single row of vegetation to discourage the public from accessing the water along much of the western shoreline. Similarly, in section 4.2.8: "Based on CRCA mapping, a regulatory limit of 120 metres from Greater Cataraqui Marsh and 15 metres from the flood plain of the Cataraqui River (whichever is greater) has been applied around the majority of the harbour area."
   a. How will these apparent conflicts be resolved?
   b. Does the limit extend inland from the highwater mark or does it also encompass portions of the waterbody? For example if a landing area is created for the movement, storage and disposal of dredge spoil, would an environmental assessment be required for any land-based activities AND water-based activities (e.g., docks, pipes, pumps, dredged channels, etc).
10. **A "nature-based shoreline" rehabilitation** - P 110 avoids any words implying engineered construction and is very misleading about the nature of the work and the changes to shoreline and benthic ecosystems. The phrase implies that any changes to these highly managed ecosystems are due entirely to natural recovery and therefore positive and beneficial. This is a crass sales job that misrepresents a highly engineered remediation project.
    a. What steps will be taken to describe this work in more realistic terms?

Questions and Concerns Regarding the Fate of the Dredged Sediment in the Conceptual Sediment Management Plan for the Kingston Inner Harbour:

Where will this stuff go?

Laura Jean Cameron, Kingston, ON [redacted]
23 March 2024

On 8th March 2024 I attended a meeting of the Belle Island Caretakers with representatives of the Kingston Inner Harbour (KIH) Sediment Management Project. I am a settler-identified member of the Caretakers and was permitted to join. In the Q & A I asked the question 'where will they take the stuff that is dredged up?' The question was asked again later by a Caretaker. I was alarmed at the first answer to me which was: we don't know yet but don't worry we'll "truck it away". I had to respond that as a historical geographer, I was duty bound to assert the non-existence of "away". It is a tough truth to swallow, but there is no such place as "away". While I agree with those that underline the significant risks to ecological and human health in relation to dredging and capping *in situ*, my comments here are directed to the question of 'where things go'.

My work is focused on wetland histories but it is striking how often this field intersects with waste studies. That is because wetlands have long been considered wastelands by those with capital and power – and in this area of southern Ontario, over 90% of wetlands already have been destroyed. Here in Kingston this story is alive in the Inner Harbour: 60 years ago, the wetland that became the Belle Park dump was thought of as "away" – out of sight and out of mind for those who did not live in the North of Princess area. Wetlands were destroyed and the City has been dealing with complex consequences ever since. One of Kingston's current "away" places includes Moose Creek Landfill, the site of a destroyed peat bog, north of Akwesasne. A peat bog that used to sequester carbon and would have assisted in mitigating climate change now is part of the garbage network that massively contributes to it. When I last checked, the key landfill for Kingston was Twin Creeks which is past Toronto, near Sarnia. The driving distance to Twin Creeks for the garbage trucks that dump off Kingston's garbage is 490 km. According to the calculations of Queen's researcher Gabriella Dee, **165 tons of CO2 eq emissions were generated in transporting Kingston's Municipal Solid Waste to landfills in 2020 alone** (p. 18). And that is the CO2 emitted just for driving *there*, not *back again*.

Where will the dredged sediment from WSP's plan for Kingston Inner Harbour end up? And how will it be transported?

According to the WSP website, WSP doesn't know where it will go. "These details will be developed further during the detailed design phase." A few notes are offered in lieu of detail: "Generally, dredged sediment will first be dewatered, or dried out slightly, so that it is more stable to transport and then will likely be transported by haul trucks to approved and regulated landfills for disposal."

It is worth noting that 'where will Ontario's garbage go?' in general is a very hot question. According to the latest W2RO report (from 2021), "Ontario's available landfill capacity is expected to be exhausted by 2032". And if we stopped sending our garbage south of the border**,** Ontario's landfills would be full by 2028, before the proposed dredging is expected to even begin.

When dealing with waste, ***who*** and ***what*** are also key questions to ask according to waste expert Dr. Myra Hird, author of the book *Canada's Waste Flows*.

Who (what company) will be contracted to take the sediments away?

This is key because who takes the 'waste' directly impacts where it will go. Where things go also depends upon what is in the waste, so,

What contaminants are in the sediment (and do these contaminants degrade over time or become more toxic through proposed removal processes)?

From what I understand from Dr. Peter Hodson and other scientists, the risks of metals in the river sediment have been overstated. A real potential danger though is that by dredging, metals otherwise benign become toxic. This is the case with Chromium 3 which is relatively safe when immobilized by matter at the river bottom but becomes the highly toxic Chromium 6 when exposed to air.

If WSP's plan is to "dry out" the sediment on barges before trucking it away, will it be creating toxins in the process? How will WSP mitigate the hazards of their drying and removal process?

If the sediment is, or is made, toxic by WSP's plan, extreme care will need to be taken to ensure that contaminated dust does not spread in the drying process. It will need to be deposited in a specially designed engineered landfill that will need special care well into a future that is increasingly precarious.

So, where will the dredged sediment go? I don't know and, more importantly, neither does WSP. Assuming 'somewhere' still exists, this decision would be up to the contracted waste company and involve its profit margin. The receiving landfill could be, like Twin Creeks, very far away, and taking it there would create the significant CO_2 emissions noted earlier. In the context of climate change and the sixth mass extinction, I would repeat the geographical mantra: there is no "away." This is true here in Kingston and everywhere *on* or *in* or *above* this fragile planet now increasingly encircled with orbital debris. Toxic burdens go somewhere. In making more waste, we make more complex problems down the line, if not for us here, for others elsewhere and for future generations. So, if there is a strong probability that dredging is neither necessary nor wise, as many others are saying, please do carefully consider the question: ***why create more waste problems? Why dredge at all?***

References

Laura Jean Cameron, *Where does Kingston's Garbage Go? Part One*, Belle Park Project Blog, September 2021
Gabriella Dee, *Climbing up the Waste Hierarchy: The Devil is in the Details*, MA thesis, Queen's University, 2023
Myra Hird, *Canada's Waste Flows* (2021)
OWMA, State of Waste in Ontario: Landfill Report, January 2021