A New Science Risk Assessment: Addressing Sediment Contamination in a Creek Using Multiple Lines of Evidence and Long-Term Monitoring

Sediment contamination in water bodies can present significant challenges when obtaining a Record of Site Condition (RSC) in Ontario, particularly where published sediment standards are limited. This presentation describes a case study involving a creek impacted by soil, groundwater, and sediment contamination, including metals, PHCs and PAHs, originating from an adjacent former industrial property. An RSC was required under a lender agreement, and a risk assessment approach with ongoing monitoring was pursued in lieu of invasive dredging or remediation. A New Science Risk Assessment (NSRA) was completed due to limitations within O. Reg. 153/04 for addressing sediment contamination.

The project was characterized by several complicating factors, including steep site grading that created logistical challenges for sampling and monitoring, multiple stakeholders, iterative field investigations to adequately delineate impacts, and a firm timeline driven by property sale conditions. Non-standard delineation approaches were required in certain areas due to site constraints.

The NSRA process presented challenges across site characterization, risk characterization, and risk management. New toxicity reference values were developed to adequately quantify ecological risks, and the assessment included several unique receptors. A beaver dam located near the site necessitated a quantitative assessment of risks to semi-aquatic mammals. In addition, the MECP required the potential presence of Redside Dace, a species at risk, to be specifically assessed. Human health risks to recreational receptors, including swimmers and foragers, were also evaluated.

Risk calculations identified unacceptable risks to both human and ecological receptors that would typically require engineered risk management measures. However, conventional approaches such as dredging or capping were inconsistent with project objectives, as they would have removed existing species and caused significant ecological disturbance to the creek. Instead, administrative controls including site restrictions, selective fencing, and signage—were implemented along with a robust ongoing monitoring program.

To address ecological risks, multiple lines of evidence were used to assess the health of benthic invertebrates and species at risk within the creek. This included detailed sediment sampling, benthic community analyses, and sediment toxicity testing. This work was able to show that the current health of the benthic community was not being adversely affected by the current sediment impacts. While this approach resolved MECP concerns regarding current risks, robust long-term monitoring was required to demonstrate natural attenuation, manage potential risks associated with soil erosion, and track the ongoing health of the ecological community within the creek.

The monitoring program includes site access restrictions, ongoing soil and sediment sampling, repeated benthic community assessments, and monitoring of tree health. A silt fence was installed to control potential erosion of impacted soils into the creek, supported by ongoing sampling and monitoring. Clearly defined triggers and contingency measures were incorporated to support MECP approval of the NSRA and long-term risk management strategy.

This presentation will include practical insights, lessons learned, and regulatory perspectives on the NSRA process, sediment contamination management, and effective coordination with the MECP.

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