

Title	CN Monitored Natural Attenuation project of a derailment spill site in a bog
Location	St-Joseph-de-la-pointe-de-Lévis
Project	Following the 2004 initial emergency LNAPL recovery and site characterization of a derailment site located in an ecological reserve (wetland), a combination of Monitored natural attenuation, shallow excavation followed by ecological restoration and in situ bioremediation were implemented. Remedial approaches were selected and adapted based on the many different ecological habitats at the site.
Regulatory Context	Since 2004 there have been discussions between the regulator and CN to reach a common accord on the remedial approach for the site. The regulator has been pushing for excavation of all impacted material, while CN has proposed a more sustainable approach. In 2014, the regulator approved the remedial action plan. The RAP includes a combination of limited shallow soil excavation followed by revegetation for the fen, in situ bioremediation for the open bog, monitored natural attenuation for the wooded bog and impracticability for the lag and the forest. The final RAP was developed based on field pilot testing and consultation with regulator experts and industry experts.
Sustainable elements/ approach	<p>Considering that the spill occurred in a peat bog, it was quickly established that excavation of impacted media, which consisted in large part of peat and sphagnum in different stages of decomposition, would create a disturbance of the sensitive ecosystem more damaging than the spilled diesel and gasoline. In effect the peat acted as a sponge, adsorbing the contaminants and preventing them from spreading.</p> <p>The proposed approach was based on three main elements:</p> <ol style="list-style-type: none"> 1) Vegetation health: yearly evaluations of the plant life health demonstrated improvements to plant health even in areas strongly impacted by the hydrocarbons. After a few years peat, moss and sphagnum specimens were healthy across the entire site. In addition, apart from the trees which died right after the spill, no additional trees died in the following years. 2) Surface water which was highly impacted after the spill has seen a clear improvement. This is a result of the recovery efforts but also the properties of the peat which acts as a filter and adsorbs petroleum hydrocarbons dissolved in surface and groundwater, 3) The peat which still contains PH does not represent a risk to receptors and could be remediated by various methods. <p>In this case study, the data collected is proving instrumental in demonstrating to the regulator that the selected approach is the most beneficial for this site, one which could meet the main project objectives while minimizing negative impacts to local ecological services and community (impacts to fauna and flora medium initially and gradually reached minimal, low energy, low waste, low emissions, no high risk activities for workers and public).</p> <p>In summary, the sustainable approach implemented on this site was based on the presumption that there was less long term risk to the ecosystem with MNA, enhanced bioremediation and limited shallow excavation, than full site excavation as initially requested by the regulator. The data collected over more than 10 years has supported this approach.</p>

Value Added

- Avoiding the negative impacts of large excavation in a sensitive natural habitat.
- In-situ remediation and MNA (reduction of emissions, energy consumption, low impact to health of workers and local community).
- Cost efficient remediation that attained the defined objectives.
- Stakeholders consultation and involvement in the decision-making process.