CATEGORY: Environmental Remediation

CANADIAN CONSULTING engineer

ASSOCIATION OF CONSULTING ENGINEERING COMPANIES | CANADA
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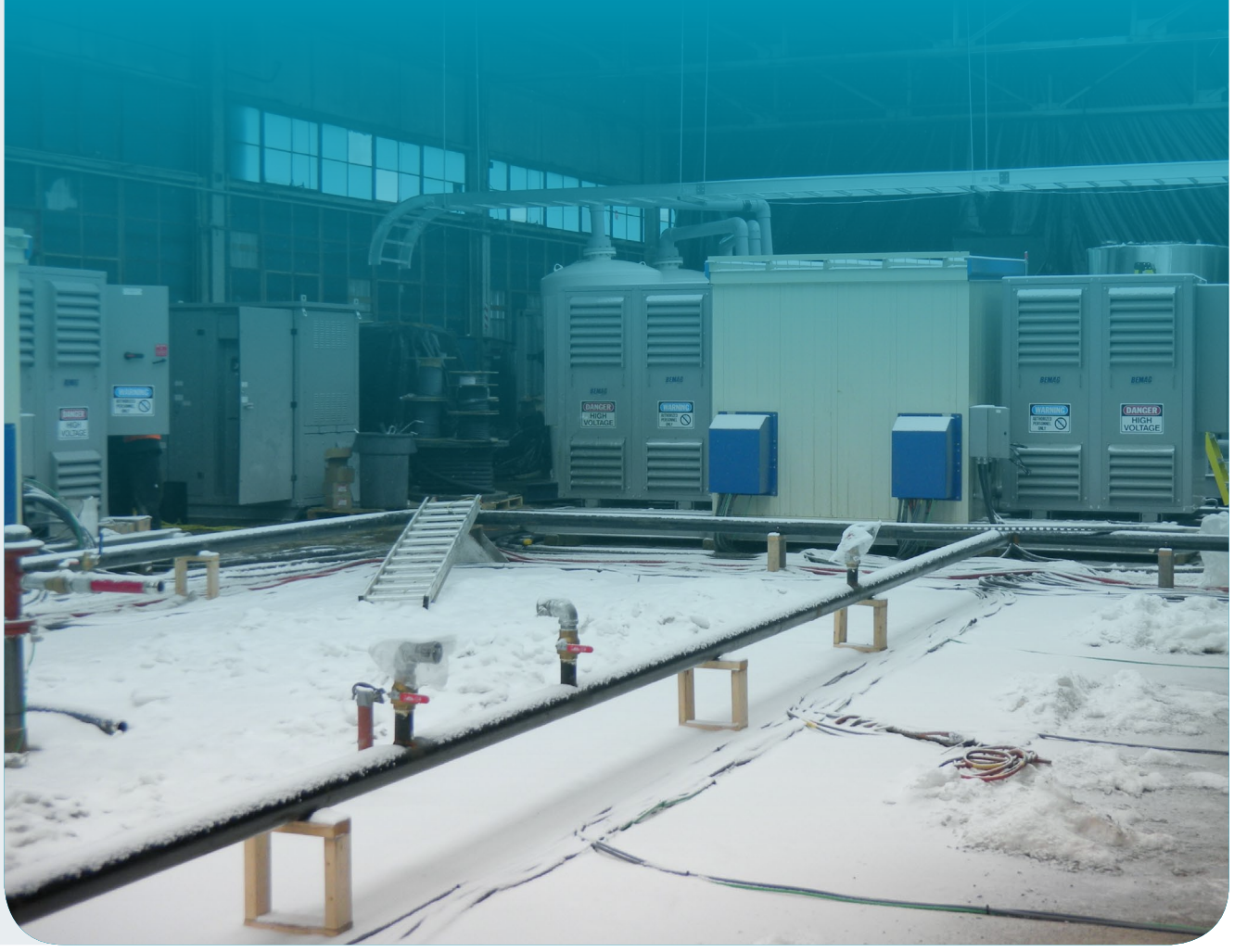
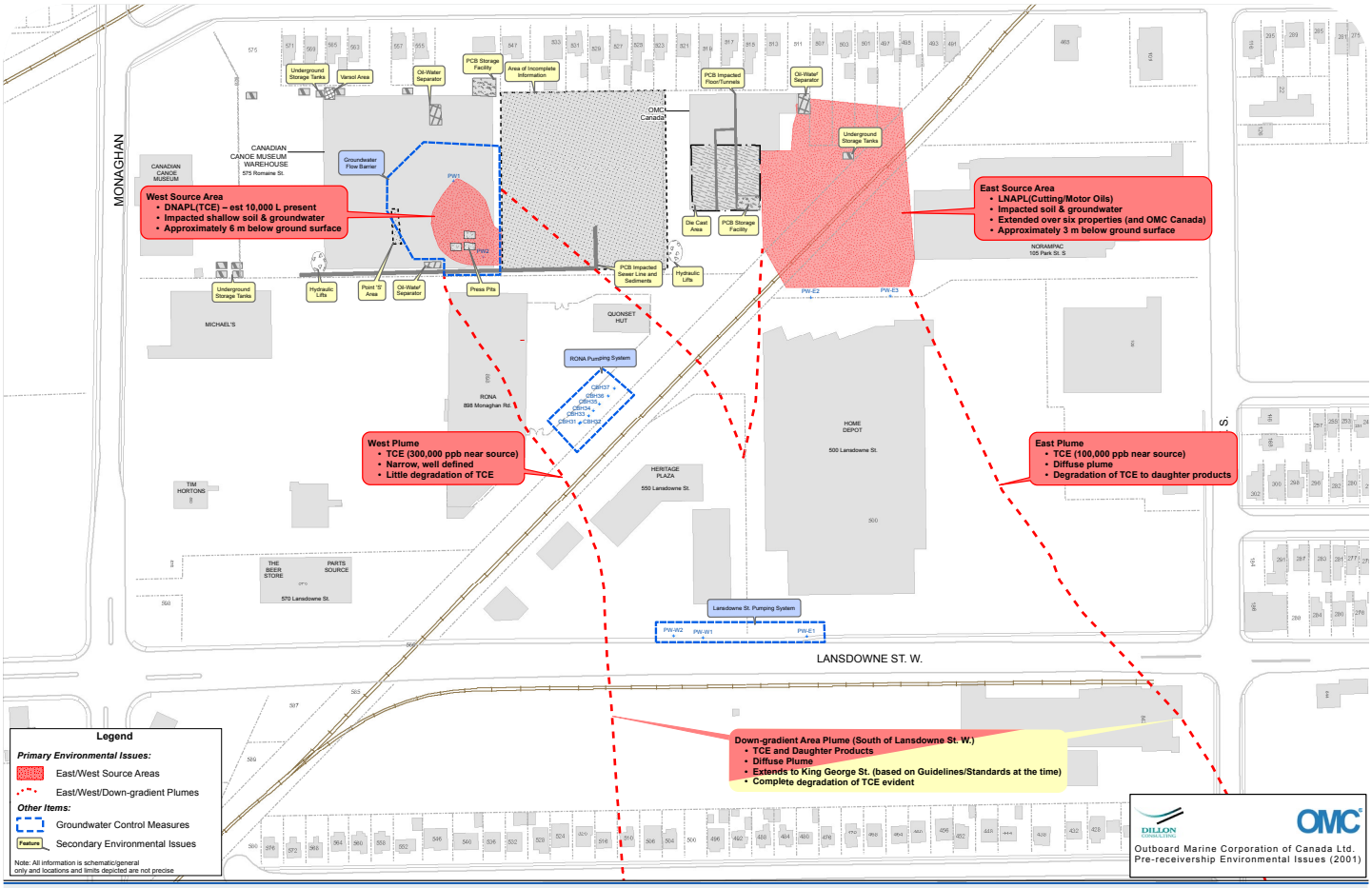
SUBMITTED BY:

DILLON CONSULTING

CANADIAN CONSULTING ENGINEERING AWARDS 2015

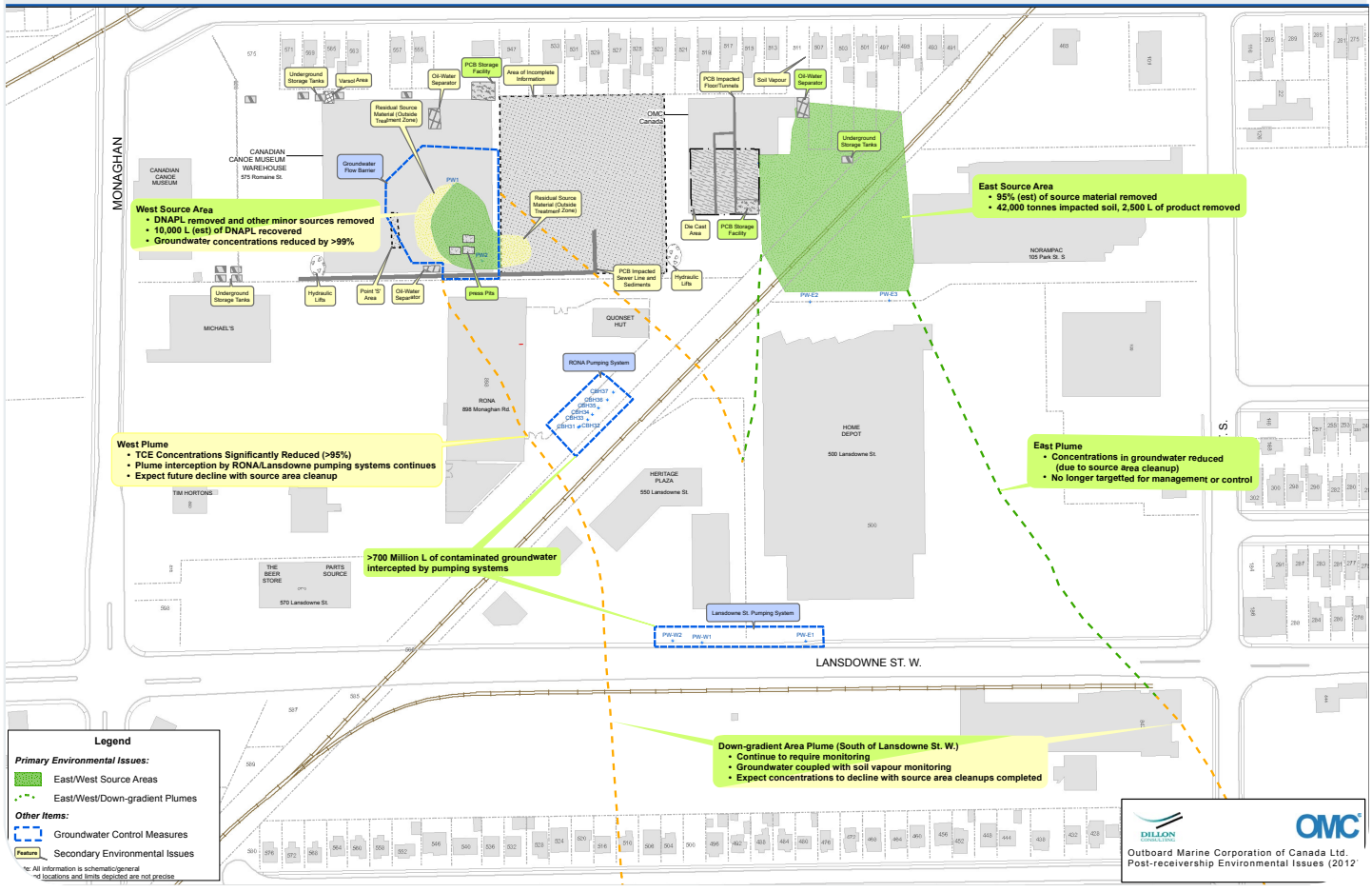
Outboard Marine Corporation of Canada Environmental Remediation Project





ABOVE: **Pre-Treatment**

BELOW: **Post-Treatment**



PROJECT INFORMATION

Project Name:

OUTBOARD MARINE CORPORATION OF CANADA - Environmental Remediation Project

Entering Firm:

DILLON CONSULTING LIMITED

DILLON CONSULTING

Project Location:

PETERBOROUGH, ONTARIO

Year Completed:

2013

Role of Entering Firm:

CONSULTANT

(Technical expert in site assessment and remediation needs and as court-appointed Environmental Remediation Receiver)

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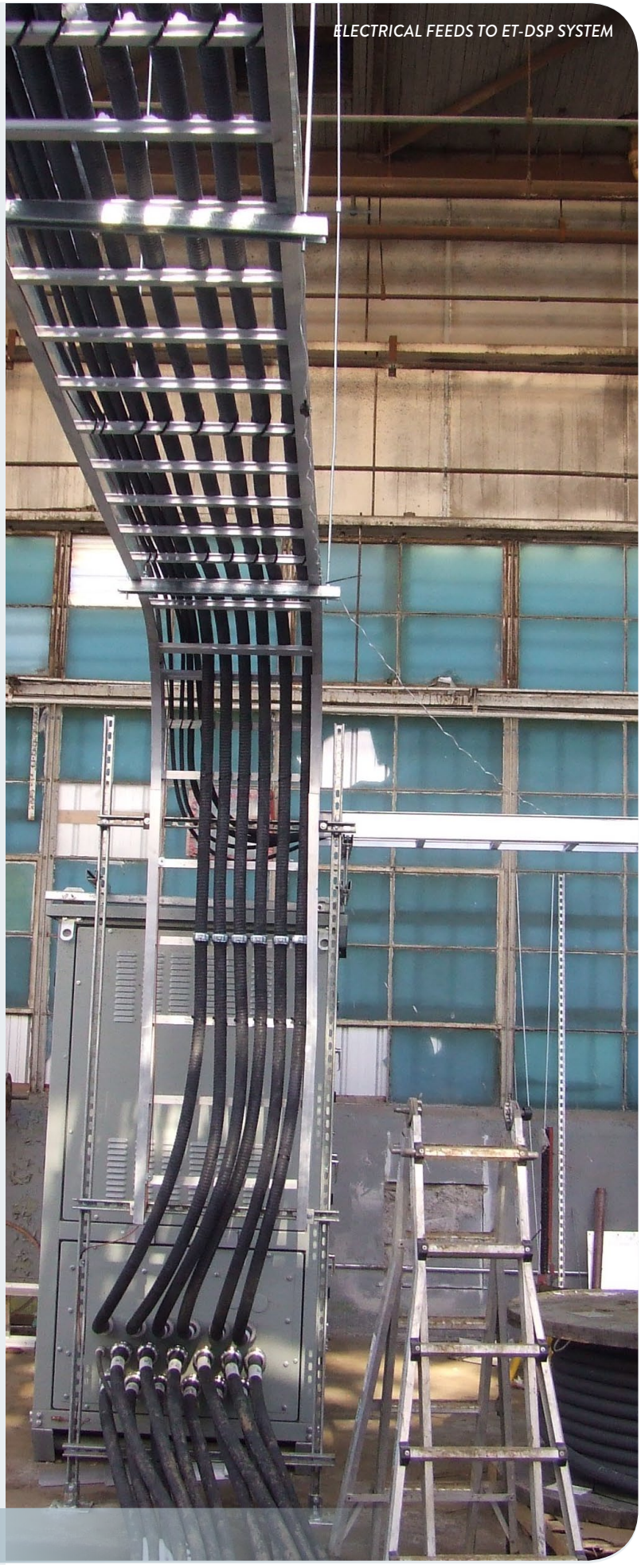
SUMMARY

Outboard Marine Corporation of Canada (OMCC) operated a small-engine manufacturing facility in Peterborough, Ontario for nearly 75 years, prior to becoming insolvent. Dillon conducted environmental investigations that revealed legacy contamination from lubricating oils and degreasing fluids and identified impacted groundwater extending into a predominantly residential area. Acting as court-appointed receiver in addition to its technical role, Dillon completed the remediation using the first full-scale Canadian application of a remedial technology, significantly reducing environmental liabilities.



ELECTRICAL FEEDS TO ET-DSP SYSTEM

Innovation

In the late 1980s, Outboard Marine Corporation of Canada (OMCC) began wrapping up operations at their Peterborough manufacturing facility where they had been building small engines for nearly 75 years. Various investigations by Dillon revealed the presence of a significant number of legacy environmental issues including a subterranean pool of degreasing fluid used in the manufacturing processes at the facility. The pool consisted of an estimated 10 000 litres of dense non-aqueous phase liquid (DNAPL), composed primarily of trichloroethylene. Emanating from this pool was a dissolved-phase groundwater plume of volatile organic compounds extending some 800 metres from the OMCC facility into an area comprised of residential dwellings and small commercial establishments.

In 2000, OMCC filed for creditor protection under the Companies Creditors Arrangement Act (CCAA) and in 2001, Dillon was court-appointed as Environmental Remediation Receiver for Outboard Marine Corporation of Canada (ER Receiver) with a court mandate to act on behalf of OMCC on environmental matters. This receivership structure was the first of its kind to be established within the CCAA framework and is an example of a traditional consulting engineering firm expanding beyond the boundaries of traditional engineering services.

Between 2001 and 2010, activities to isolate and manage the DNAPL contamination were implemented. Acting as ER Receiver, Dillon successfully administered the remediation of the DNAPL pool between 2010 through 2013 using an in-situ thermal process: Electro-Thermal Dynamic Stripping Process™ (ET-DSP). While used successfully in the United States and despite being a Canadian technology (McMillan-McGee Corp), this was the first full-scale application of ET-DSP in Canada. ET-DSP involves heating soil in the saturated and unsaturated zones by passing current between buried electrodes with simultaneous circulation of water through the electrodes. A network of extraction wells were installed to act as collection points for the contaminants and a multi-phase extraction system was employed to induce a high vacuum at each of the extraction wells promoting flow of contaminants into these wells. The application of ET-DSP allowed for the extracted contaminants to be treated at a centralized treatment system. The vapour was treated by passing through activated carbon, phase-separated liquids were collected and disposed, and water treated using air-stripping and carbon filtration.

This project is distinguishable for its application of a novel remediation technology in Canada and for its performance-based contracting arrangement within the receivership structure, which achieved remediation of the legacy issues in a cost-effective and timely manner.

Complexity

The OMCC project was challenging from both an execution and engineering perspective. Execution of the project within the structure of the OMCC receivership, and Dillon's role as ER Receiver, was the first instance of such an arrangement in Ontario.

ELECTRICAL DISCONNECT

> *"It is clear that a number of parties have been working cooperatively on this effort for a number of years, culminating in this request for an order which, among other things, releases and discharges the Environmental Remediation Receiver (Dillon)."*

- REGIONAL SENIOR JUSTICE G. MORAWETZ
Ontario Superior Court

The remediation of the DNAPL source zone was complex given the nature of the contaminant. Its presence 3 to 4 metres below the water table at a depth of 6 to 7 metres below ground under an active warehouse containing museum artifacts (Canadian Canoe Museum), and the need to achieve complete cleanup provided additional complications to the clean-up. Further, the site position within a mixed commercial/residential area of Peterborough required that the remediation activities minimize the exposure of residents and workers to contaminants and related construction activities. Disruption to the operation of the site and neighbours was minimized, and the remediation was completed in the shortest possible time. To address these challenges, Dillon proceeded with a unique approach that included the use of a fixed-price, performance-based remediation contract whereby targets and timelines were developed and the proponent was responsible for demonstration of success through a process of their choosing. Dillon completed a Request for Proposal and a quantitative metric-based evaluation process. Through this process a remediation technology, ET-DSP developed by McMillan McGee of Calgary, AB, was selected (first full-scale application in Canada). This approach minimized building disruption and exposure to remediation activities, provided the greatest certainty of success, was cost-effective and could be completed in a relatively short timeframe.

ELECTRICAL FEEDS AND ABOVE-GROUND PIPING

Social and/or Economic Benefits

The social and economic benefits of the OMCC project are realized on a number of levels. The Environmental Remediation Receiver concept provided a means of addressing legacy environmental issues left by an insolvent company in an effective manner, avoiding a protracted process that would have delayed or derailed the environmental remediation indefinitely.

The remediation of the OMCC facility and the subsequent improvement on impacted adjacent and off-site properties was realized in the removal of a multi-million dollar environmental liability on property located within the City of Peterborough is a benefit for re-use of the facility as a converted brownfield site. A portion of the former OMCC Canada lands (approximately 75%) is now owned by the Canadian Canoe Museum. The removal of the DNAPL source area significantly increases the ability of the Canoe Museum to utilize the property for a wider variety of purposes, or relocate the museum to a property adjacent to water and divest the property.

A significant socio-economic benefit of the project was the use of local sub-consultants and sub-contractors for design, construction, operation and maintenance of various components of the remedial action plan (e.g., pump-and-treat systems, remote monitoring systems, excavations, infrastructure works, etc.). They provided direct economic stimulus for local businesses and knowledge transfer resulting in a broader skill set for the local companies, including expansion of their core business to include environmental assessment and remediation.

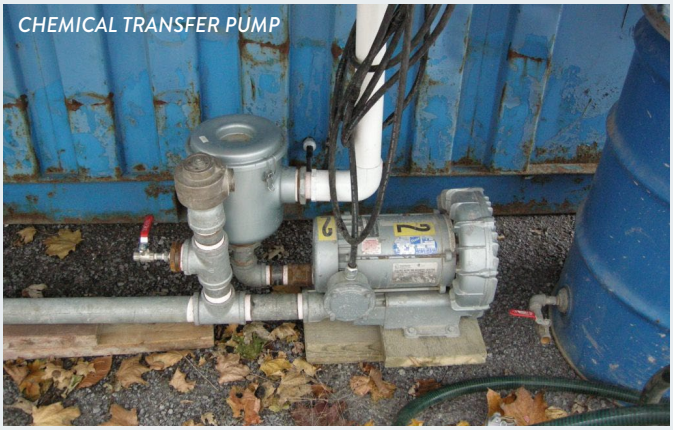
Environmental Benefits

The remediation of the legacy environmental contamination at the OMCC facility resulted in two positive outcomes. The first was removing a major environmental liability on the former OMCC property, and the second was that it negated the need for off-site measures to address contamination emanating from the OMCC facility.

Remediation of the DNAPL source mitigated the risk to human health and the natural environment on the former OMCC facility. The removal of the potential hazards associated with the DNAPL contamination is a direct environmental benefit to the current owners of the site. Remediation of the DNAPL mitigated the groundwater plume travelling into the residential area south of the site. Prior to remediation, pump-and-treat systems were operating to control groundwater plume migration into the residential area since the volatile nature of the contaminants posed a potential inhalation risk to residents and workers in the impacted area. Risk assessments completed as part of the OMCC project identified the need for continuous soil vapour monitoring in the impacted area to ensure human health was protected. Since remediation monitoring has shown this risk no longer exists, the pump and treat systems were shut down as of July 2014.

A specific example of a net environmental benefit incorporated into the remediation technology was the innovative use of steam regeneration of carbon within the vapour treatment system. Carbon was regenerated using steam-flushing during the remediation rather than continuous replacement. Building steam regeneration into the system eliminated the need to dispose of large volumes of spent carbon.

> *"The Ministry of the Environment (the ministry) would like to take this opportunity to acknowledge the long-standing cooperative relationship we have shared with Dillon Consulting Limited (Dillon) as the Environmental Remediation Receiver on the Outboard Marine Corporation Canada (OMCC) project. The ministry would also like to recognize the many successes Dillon has achieved during their tenure as ERR in the remediation of this site."*
>
> **- MINISTRY OF THE ENVIRONMENT**,
> *Peterborough District Office*



CHEMICAL TRANSFER PUMP

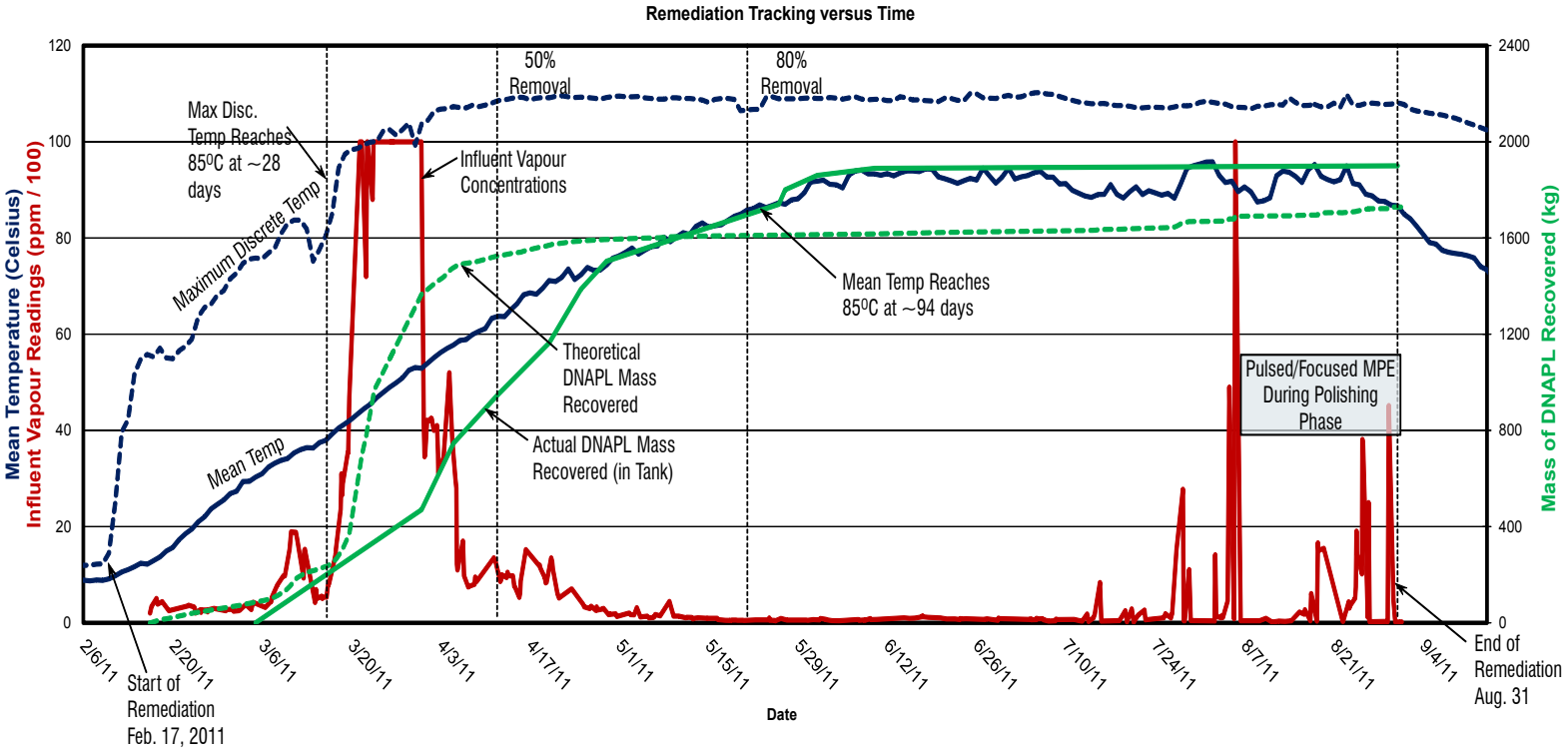
PROJECT LAYOUT - ELECTRICAL COMPONENTS AND EXTRACTION WELLS

Meeting Client's Needs

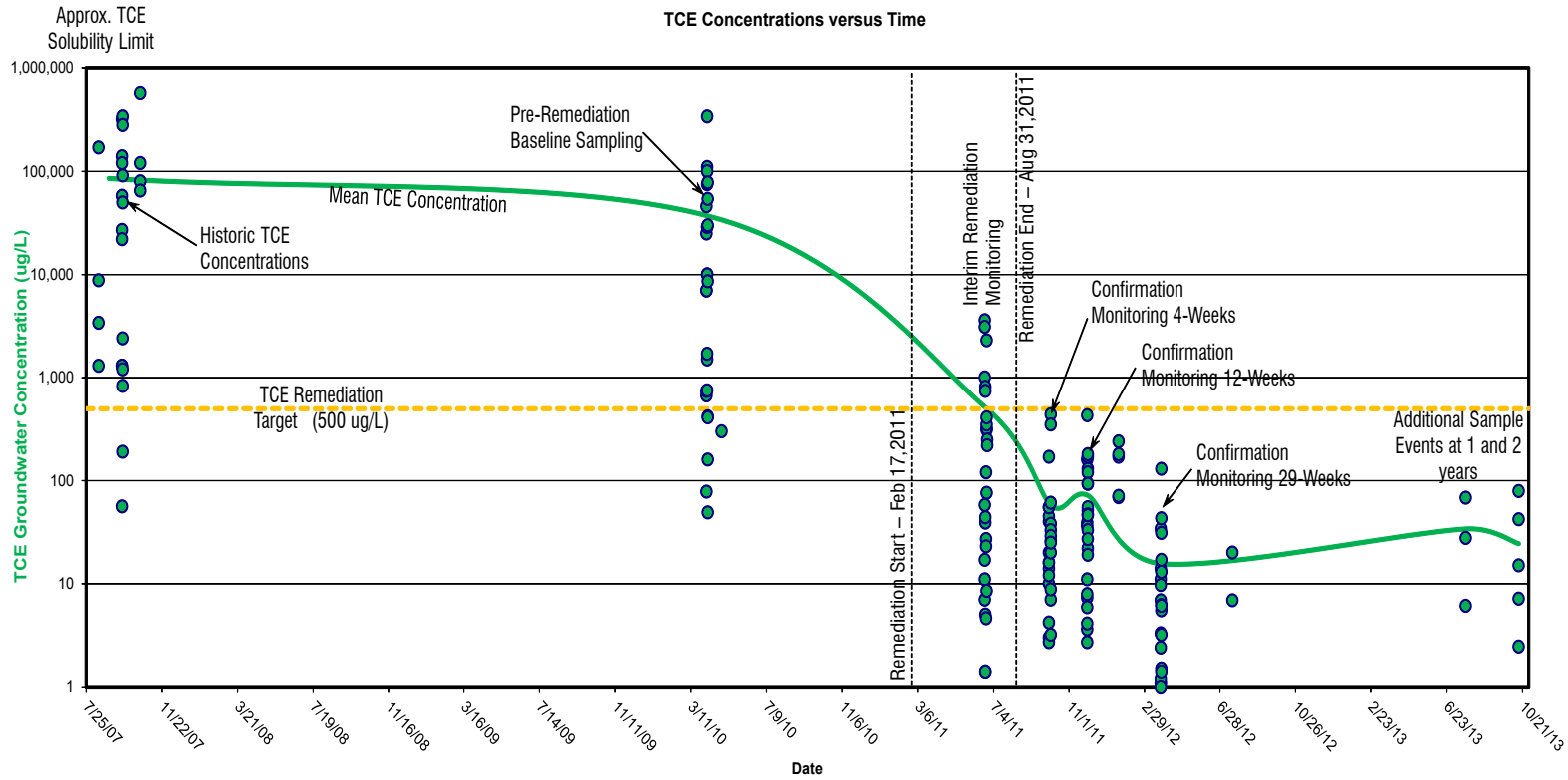
The main project goal was to implement remediation of the OMCC property in an effective manner and without inordinate delay due to insolvency, to a degree that would mitigate off-site environmental impacts and eliminate the need for future controls or risk management measures. By undertaking the remediation within the receivership structure and on a priority basis, this goal was achieved through a coordinated approach where the steps were carefully planned and executed to maximize the funds available, and lengthy process delays were avoided. This required the use of innovative partnership arrangements, such as the use of a fixed-price, performance-based contract for the remediation of the DNAPL source area whereby performance standards and timelines were established and it was the responsibility of the proponent to establish the design, build and operation of the methodology. This was an effective means of completing the remediation while balancing the risk more equitably across the ER Receiver and remediation contractor.

The selection of the remedial method for the DNAPL source area was carefully considered and assessed. The selected approach proved highly successful in remediating the DNAPL source area in a shortened timeframe while minimizing disruption to the facility.

Post-remediation monitoring by the Ontario Ministry of Environment and Climate Change confirmed levels of contaminants in groundwater have remained low. As a result, other measures implemented as part of the Remedial Action Plan (e.g., pump-and-treat system) have recently been suspended.

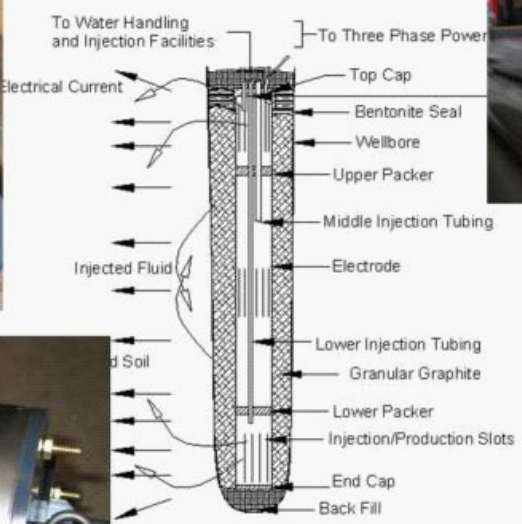


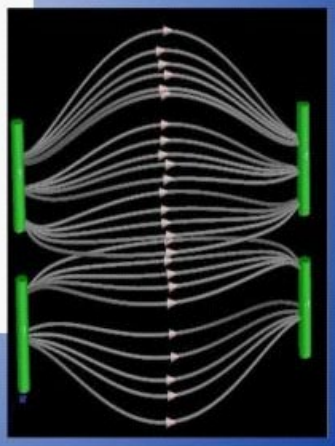
REMEDIATION PROGRESS MONITORING

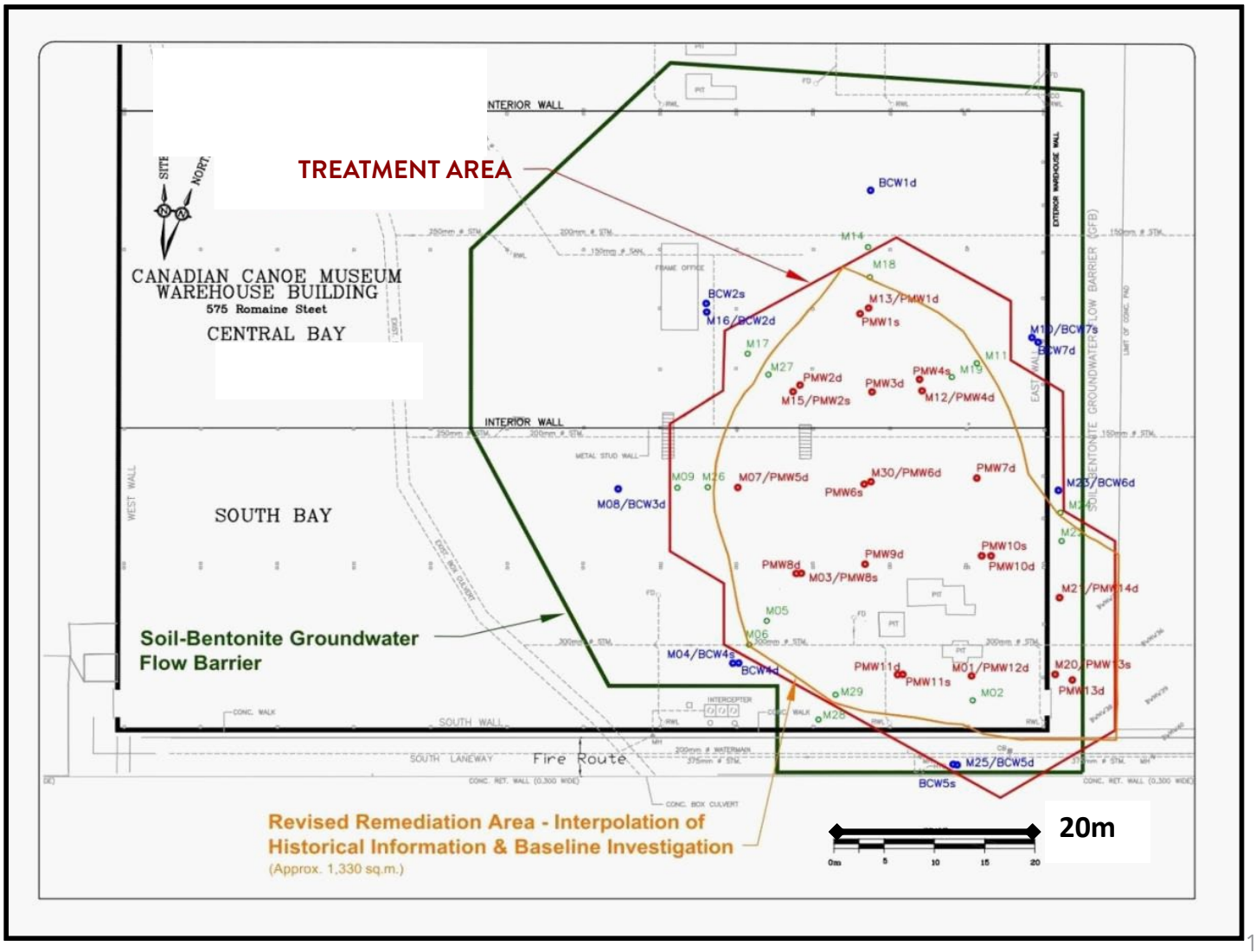


PERFORMANCE MONITORING

ET-DSP ELECTRODES







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