



Ponts
JACQUES CARTIER +
CHAMPLAIN
Bridges
Canada

Solution Bonaventure

Environmental project to protect the
St. Lawrence River

TECHNICAL MEDIA BRIEFING
June 10, 2016

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Background

Former landfill on the river shore

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III A century of pollution



- + River shore used as a landfill site for industrial and domestic waste from 1866 to 1966
- + Area filled in for the site development
- + Bonaventure Expressway surrounds the site
- + Major contamination problem from groundwater migrating into the river



Photo from 1959



III The shoreline over time



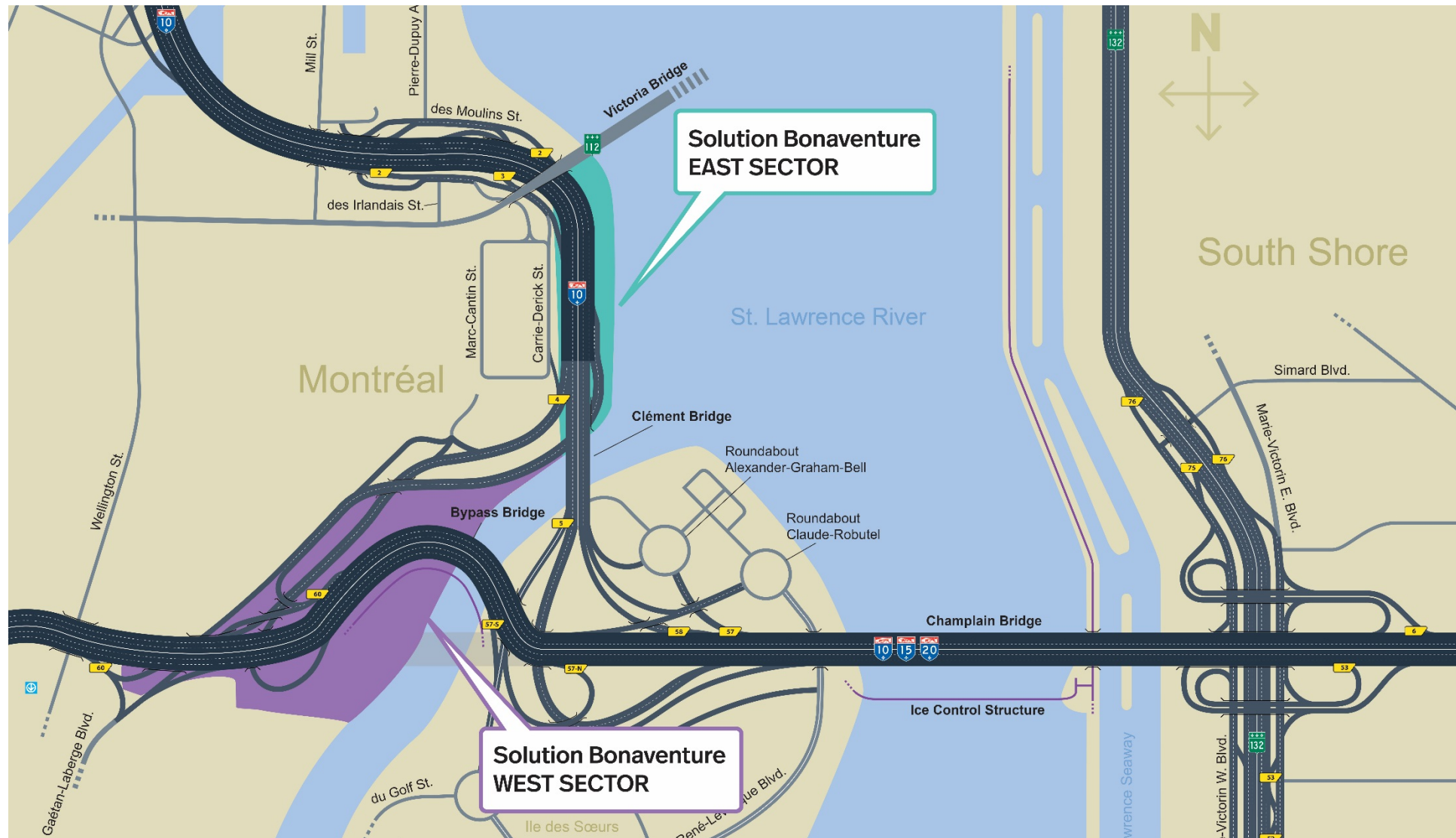


GOAL: Protect the St. Lawrence River

- + **Project:** An innovative environmental project to protect the St. Lawrence River from groundwater contaminants
- + **Challenge:** Identify an integrated solution to the environmental problem for the entire site (east and west sectors)
- + **Joint effort:**
 - The Jacques Cartier and Champlain Bridges Incorporated (JCCBI)
 - Ministère du Développement durable, de l'Environnement et de la Lutte contre les changements climatiques (MDDELCC)
 - Ville de Montréal



Location



West sector



CONTAMINANTS

- + Ammonia nitrogen
- + Polycyclic aromatic hydrocarbons (PAHs)
- + Dissolved metals

SOLUTION

- + Groundwater containment and treatment system



III East sector



CONTAMINANTS

- + Petroleum hydrocarbons (diesel) contaminated with polychlorinated biphenyls (PCBs)

SOLUTION

- + Retaining wall and hydrocarbon capture system



Site specific issues



- + Vast amount of land under the responsibility of three levels of government
- + Complex environmental problem that is different for each sector
- + Coordination and adaptation for the construction of the bypass bridge and the new Île-des-Sœurs bridge for the New Champlain Bridge Corridor project
- + Traffic flow maintained





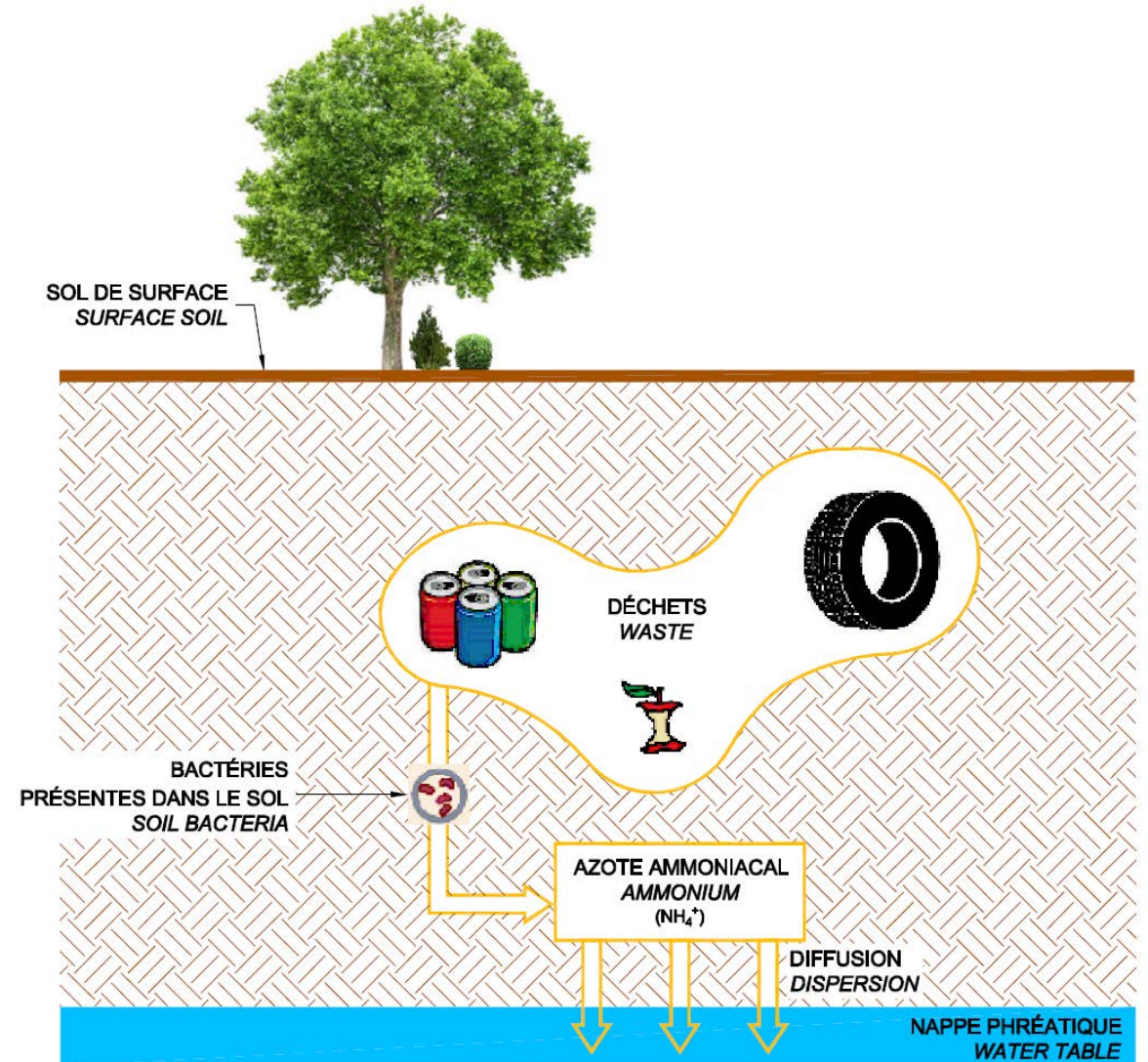
West sector project

Containment and treatment of contaminated groundwater

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III Problem

Groundwater contaminated with ammonia nitrogen, polycyclic aromatic hydrocarbons (PAHs) and dissolved metals



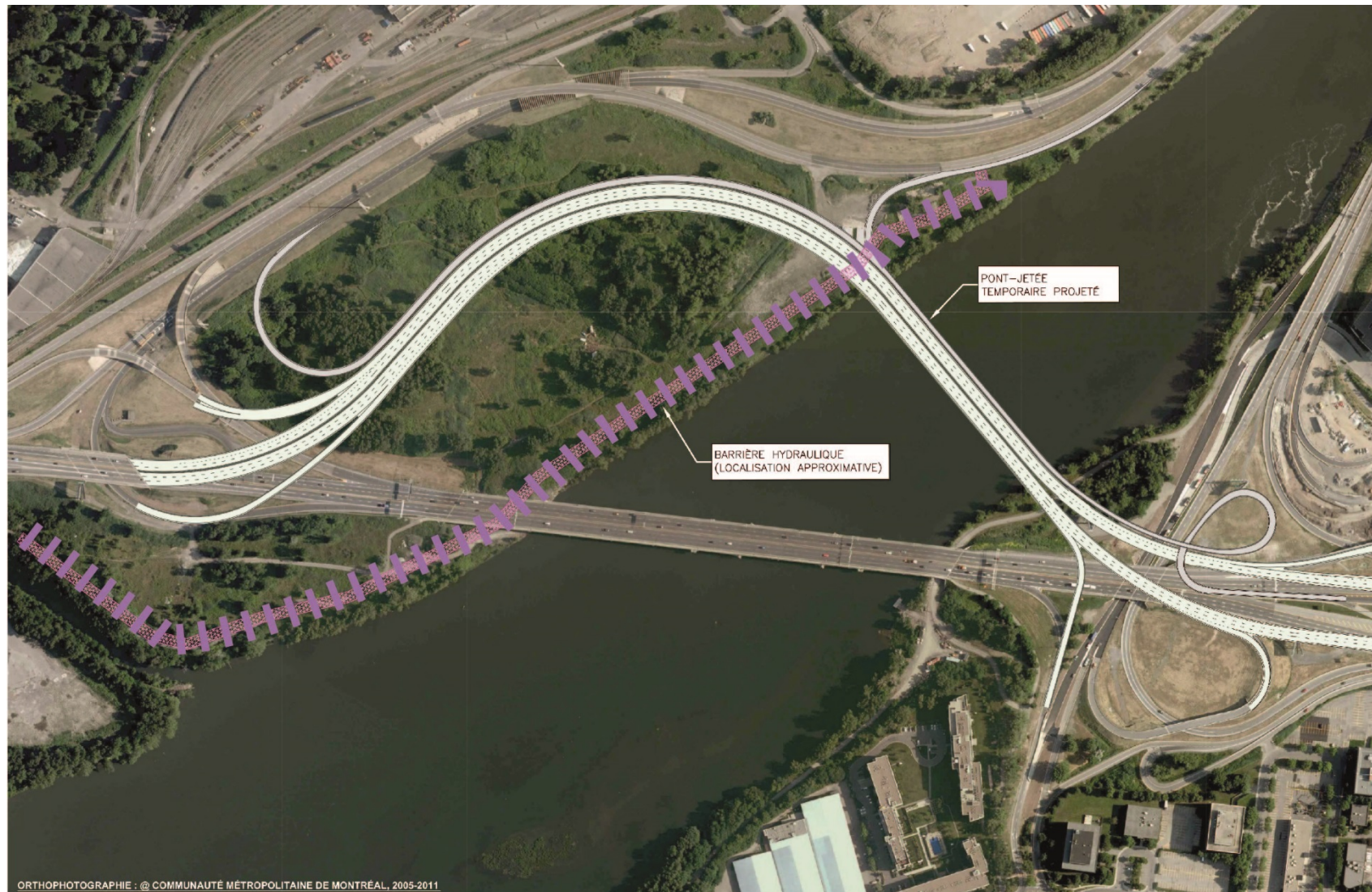


1. Installation of a hydraulic barrier made up of a series of wells along the shore

- + Number of wells: 33
- + Well depth: about 15 metres
- + Wells located at the edge of the river and installed in well bores 300 mm wide
- + 92 observation wells installed further upstream



Technical solution

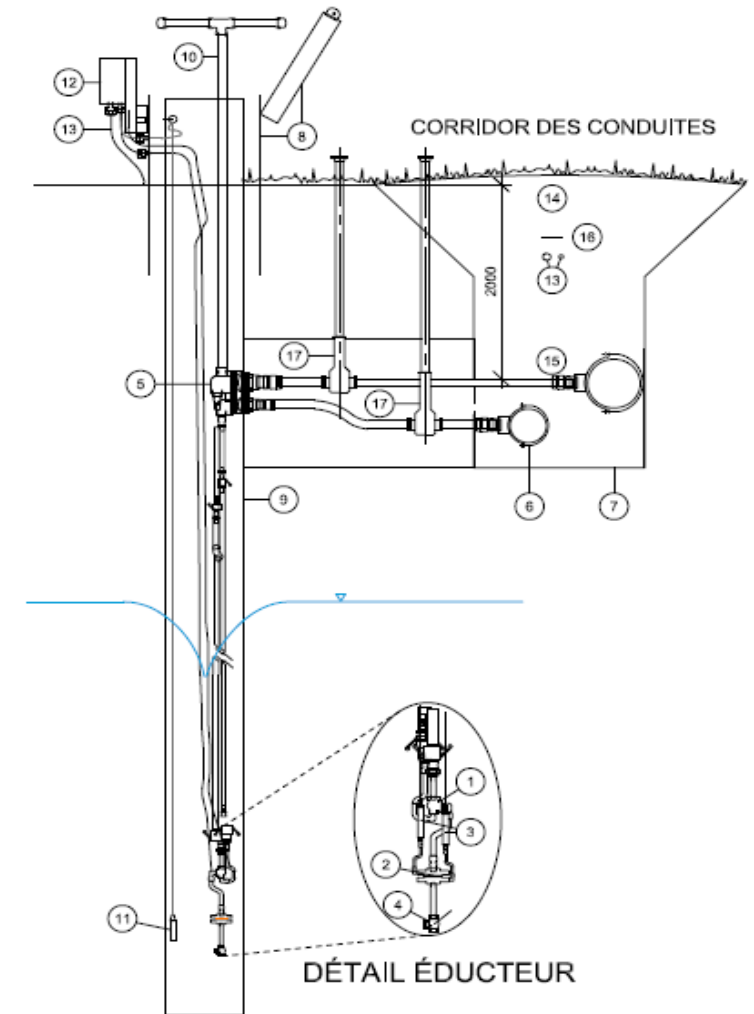


III Technical solution



2. Pumping of contaminated groundwater

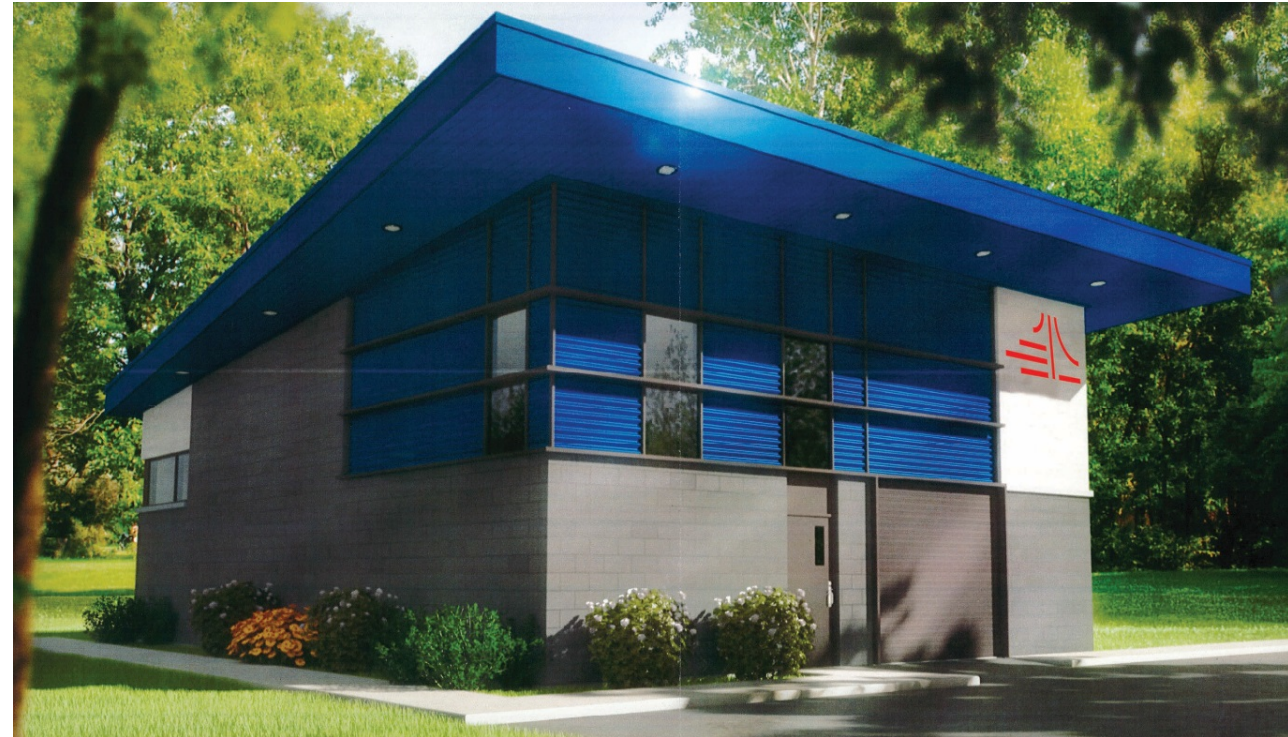
- + Flow rate: 1,5 à 35 m³/jour
- + Total pumping rate: 240 m³/day





3. Treatment of contaminated water

- + Pre-treatment (oxidation, flotation and filtration)
- + Biological treatment
- + Ion-exchange resin treatment
- + Discharge system (underground outlet)





Project conducted jointly with the MDDELCC

Private-public partnership contract awarded to Sanexen Services Environnementaux Inc.

Work schedule

- + SUMMER – FALL 2016
Work to create the hydraulic barrier and construct a treatment system will start in summer 2016
- + WINTER 2017
System run-in
- + SPRING 2017
System start-up, for a period of 15 years

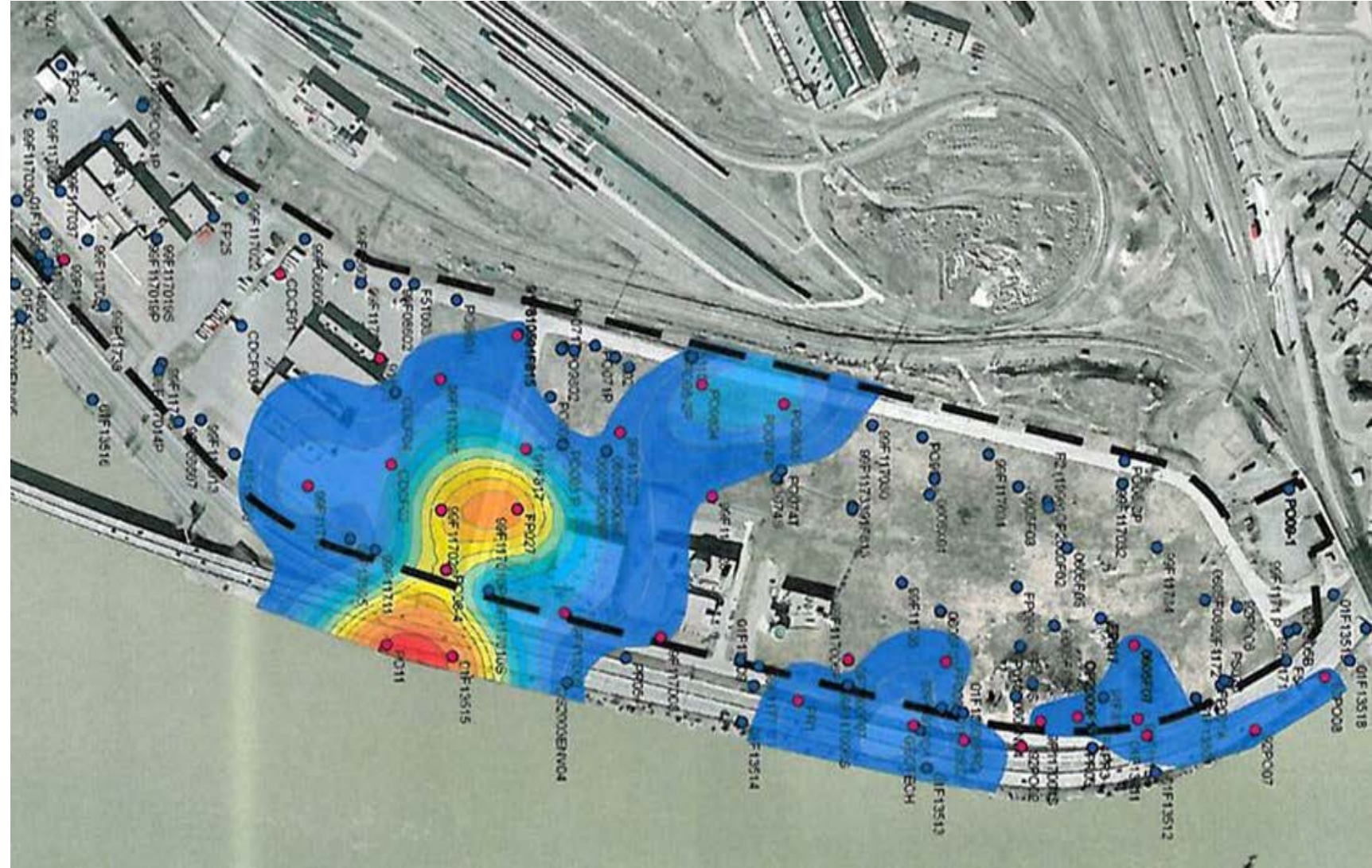




East sector project

Containment and capture of hydrocarbons

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III Technical solution



Construction of a containment system to stop the migration of hydrocarbons





1. A retaining wall will be installed along the shore

- + Length of 920 metres between Clément Bridge and Victoria Bridge
- + Depth of about 12 metres
- + Width of about 0.5 to 1.0 metre
- + Lower section of the screen placed 2.5 metres below the average groundwater table level
- + Exterior wall (surface facing the river) located about 1 metre from the river embankment
- + Layout allows for the containment of petroleum hydrocarbons

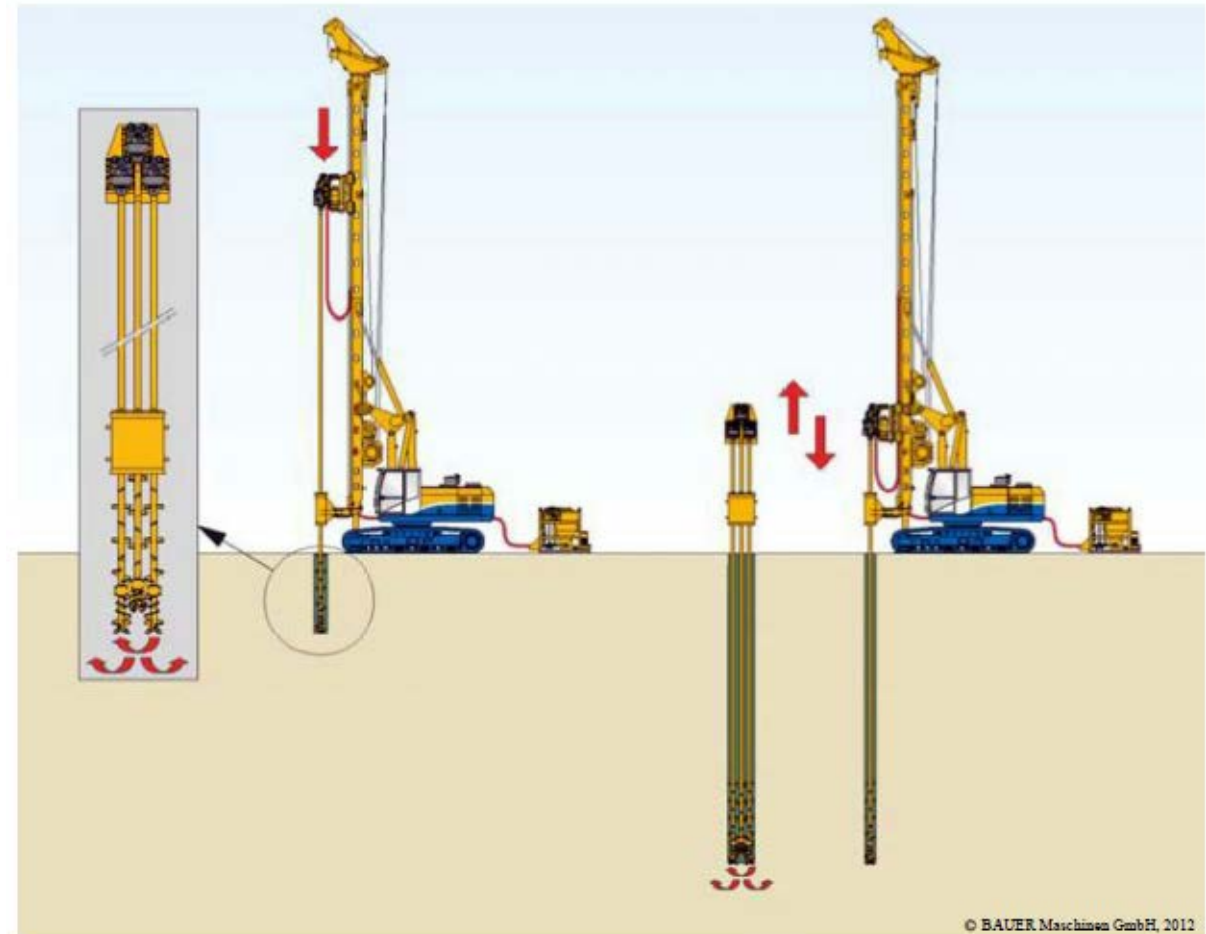


III Technical solution



1. A retaining wall will be installed along the shore

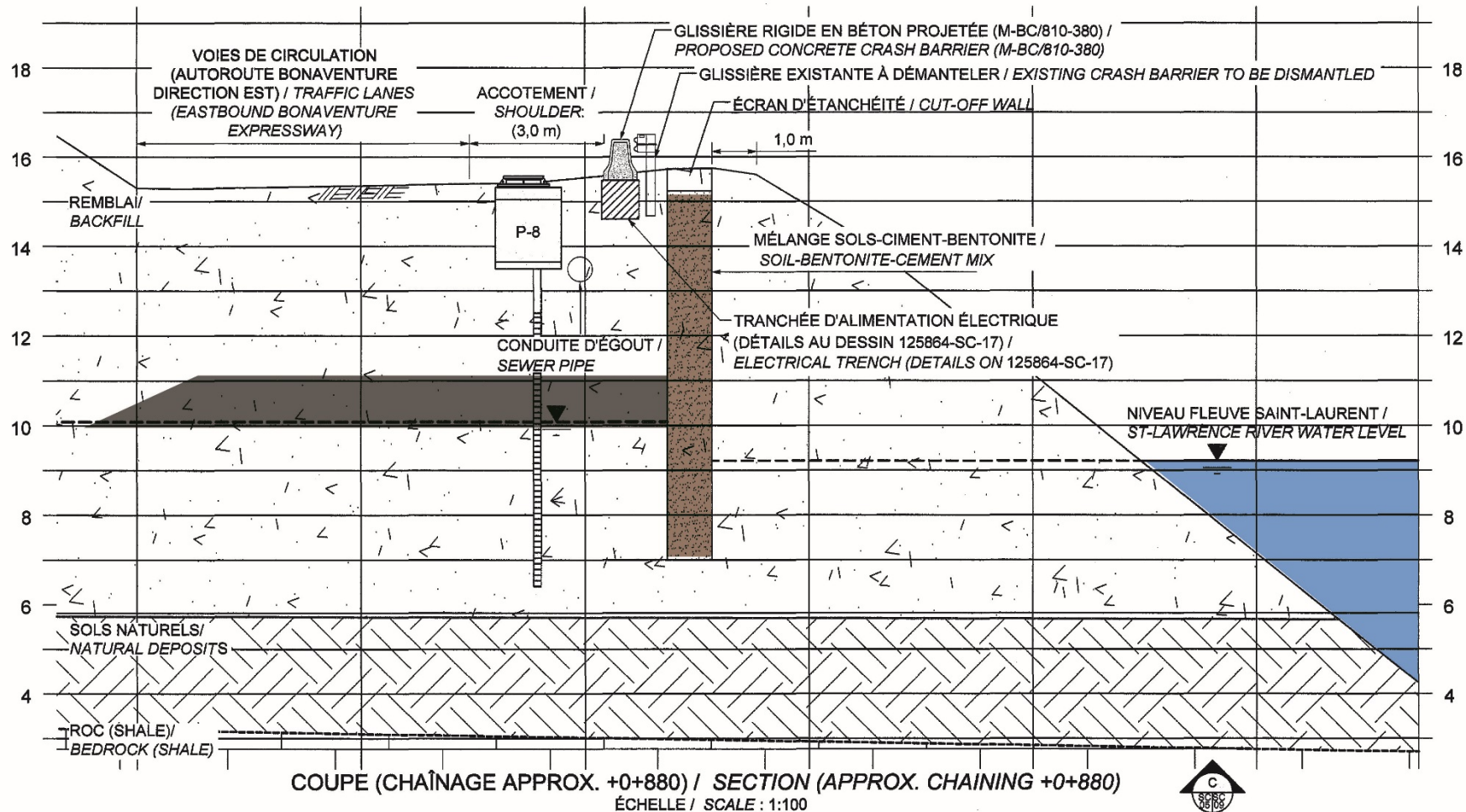
- + Deep soil mixing method
- + Drilling to a depth of about 12 m
- + Injection of cement-bentonite grout in the hollow core of the drilling auger
- + Once set, the cement-bentonite grout blends with the soil and hardens to create the retaining wall
- + Proven method for confined work sites



III Technical solution



1. A retaining wall will be installed along the shore





2. Creation of a capture system with 128 pumping wells

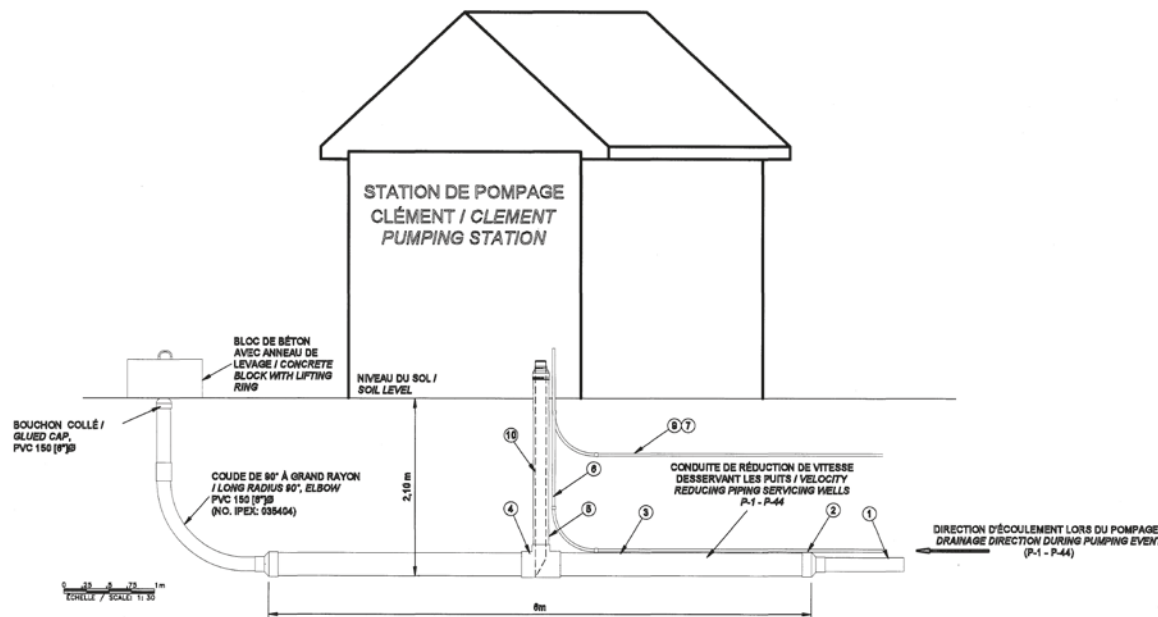
- + Vacuum extraction of PAHs with a suction tube built into the recovery well
- + The retaining wall prevents PAHs from migrating to the river; instead, they accumulate upstream from the screen and are recovered
- + Capture system that includes:
 - Pumping wells 150 mm (6 in.) wide and 7 to 12 metres deep
 - Connecting lines laid down in a tight corridor on the shoulder of the Bonaventure Expressway





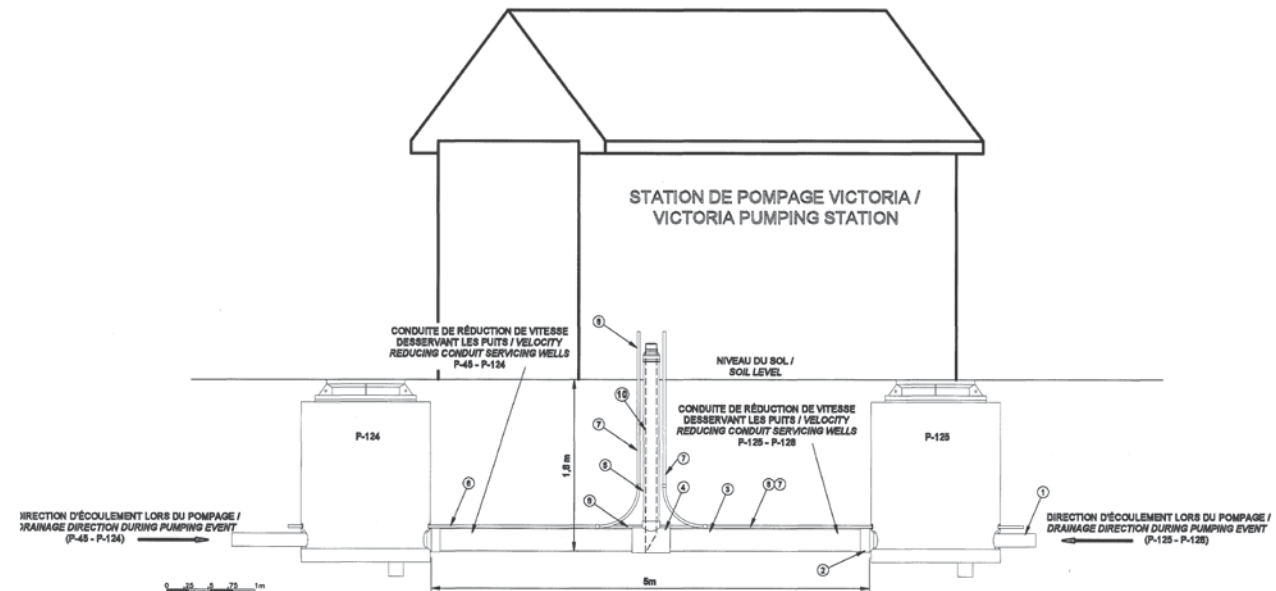
3. Construction of two hydrocarbon recovery stations

- + Two pumping stations at the east and west ends of the containment area



CONDUITE DE RALENTISSEMENT DE VITESSE - STATION DE POMPAGE CLÉMENT / VELOCITY REDUCING PIPE - CLEMENT PUMPING STATION

ÉCHELLE / SCALE: 1:30



CONDUITE DE RALENTISSEMENT DE VITESSE - STATION DE POMPAGE VICTORIA / VELOCITY REDUCING PIPE - VICTORIA PUMPING STATION

ÉCHELLE / SCALE: 1:30





4. Periodic recovery of hydrocarbons via both pumping stations

- + Variable pumping frequency modified based on how deep PAH layers are (detected from periodic testing)
- + Pumped volume of up to 10,000 L per load (mix of water and diesel)





Project closely coordinated with the Ville de Montréal

Construction contract has gone to tender

Work schedule

- + SUMMER – FALL 2016
 - Work to build containment system
 - Closure of one out of three lanes on the Bonaventure Expressway towards downtown
- + WINTER 2017
 - System start-up





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