

Unlocked development potential of a chlorinated solvent impacted land, using enhanced bioremediation techniques

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Intersol

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GreenSoil introduction

Spain

- DNAPL, chloroform (Full scale)

Brazil

- LNAPL bioremediation of TPH
- DNT (Lab test)

South Africa

- Arsenic, Chlorobenzenes (Pilot test)

Finland

- cVOC bioremediation

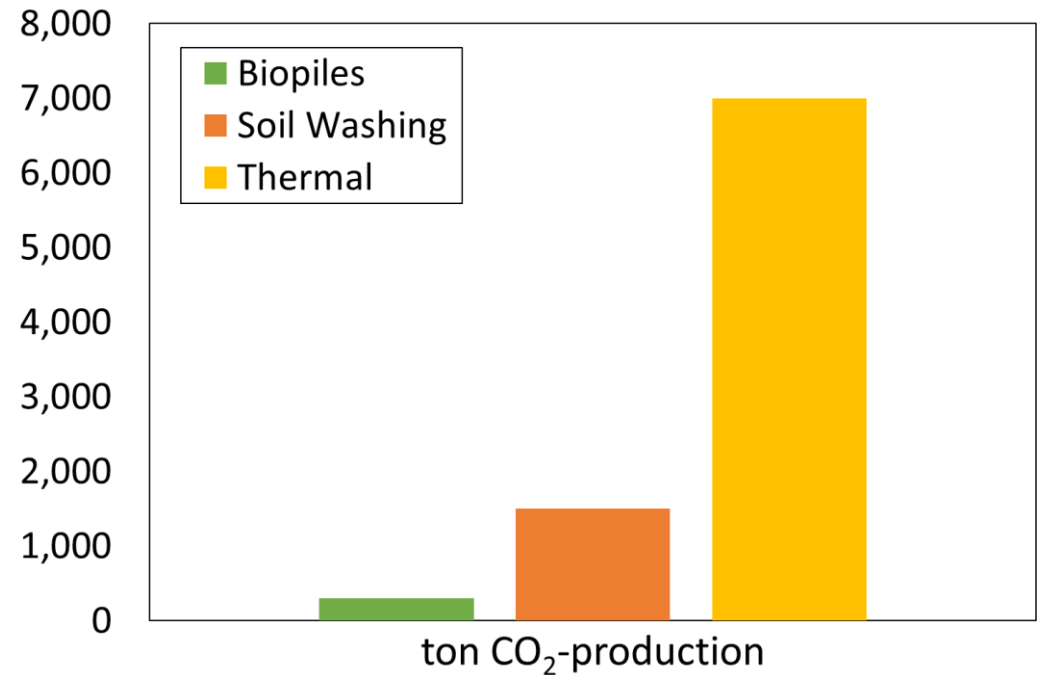
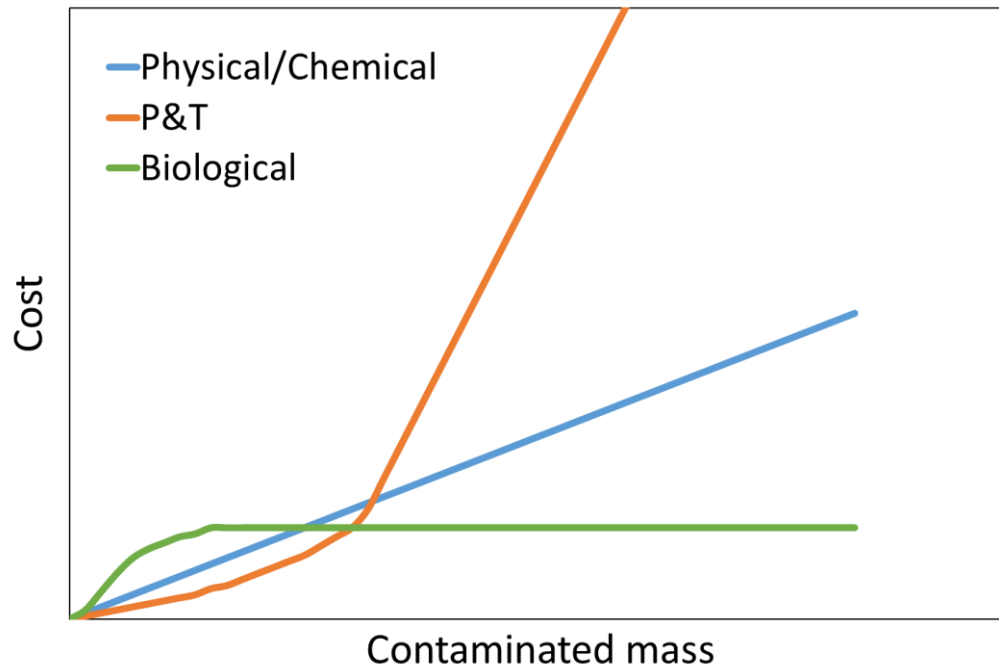
Benelux

- Xylene in-situ and on-site bioremediation
- cVOC (Full scale)
- BTEX, MTBE, (di)chlorobenzene (Pilot test)
- 1,4 – dioxane (Pilot test)
- Phtalates (Full scale)

France

- DCM, 1,2 DCA (Full scale)
- TPH, volatile oil, BTEX (Full scale)

Why biological treatments?



- Cost effective: Risk reduced in case of large volume
- Robust technology
- Sustainable : CO₂ footprint

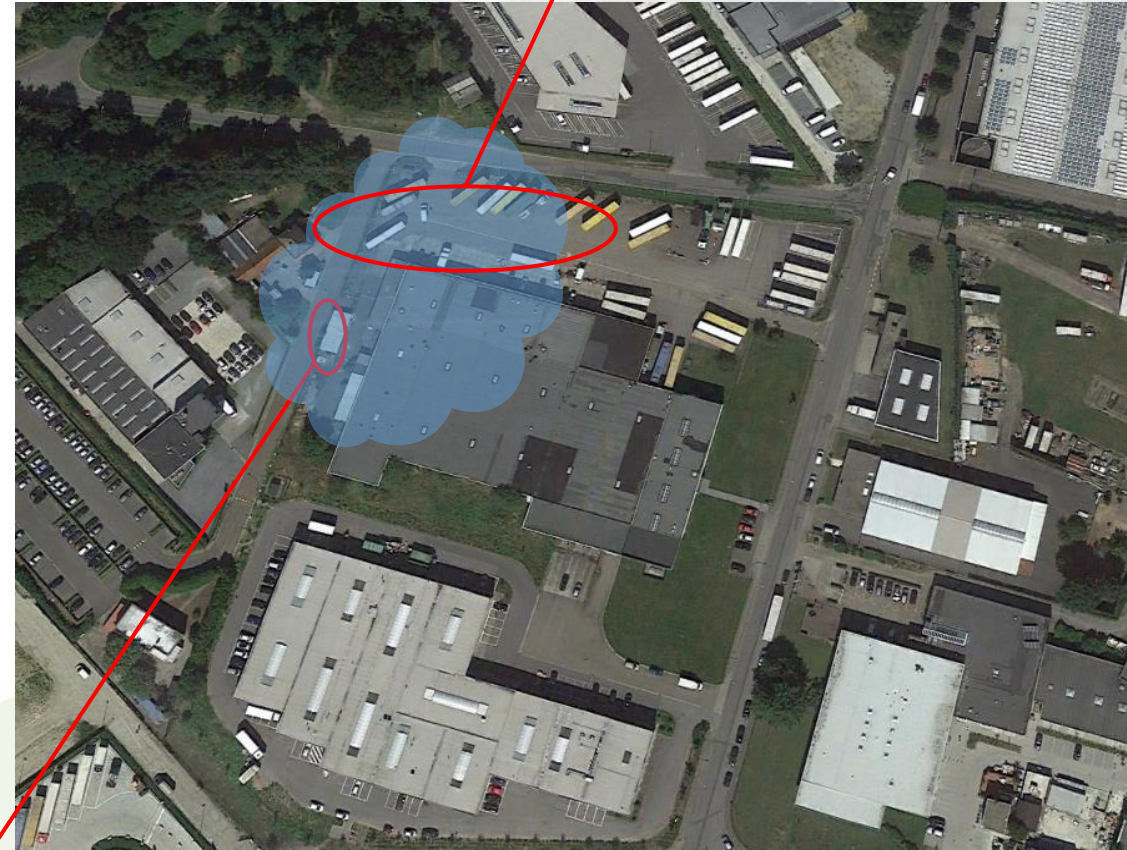
Full-scale project	
Location	Belgium (Mechelen)
Period	Q2 2016-Q2 2021
Contaminant type	PCE in soil and groundwater
Project scope	Full scale cVOC remediation in function of redevelopment. Critical project timing.
Remedial strategy	Excavation of source areas and off site treatment. In-situ anaerobic degradation of groundwater.
Type of contract	RB
Project budget	1.300 – 1.500 k€

Project Background

- Former metal treatment company 1970-2012
- PCE and TCE in groundwater till 16 m-bgl
- Contaminated groundwater volume > 5.000m³
- 2001-2013 hydraulic barrier (10m³/h)
 - Minimal mass removal
 - No source identified
 - Contamination migration due to P&T



Former PER storage



Sewer system

cVOC Remediation History

2003-2012:
PUMP & TREAT
Low efficiency

2012-2014:
2nd OPINION & SITE CLOSURE
Stop of the Pump & Treat (BATNEEC)
Additional investigations:

- Sewer inspection
- Soil vapor sampling
- MIP
- DNAPL?

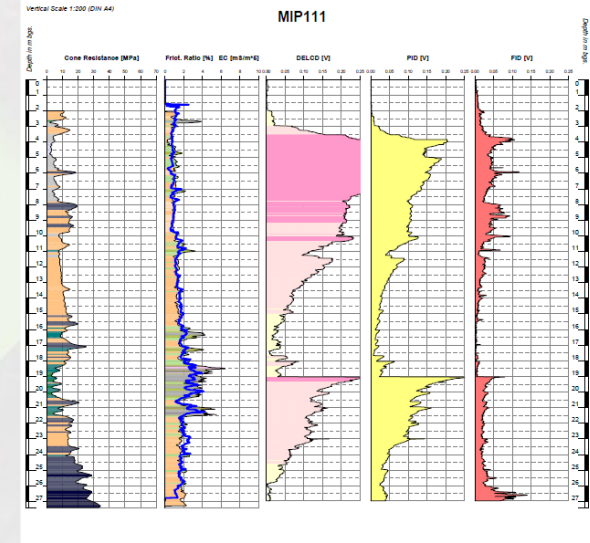
2014-2016:
REMEDIAL REASSESSMENT & CONTRACTING
Different stakeholders
Result driven
Payment upon milestones
5-year period

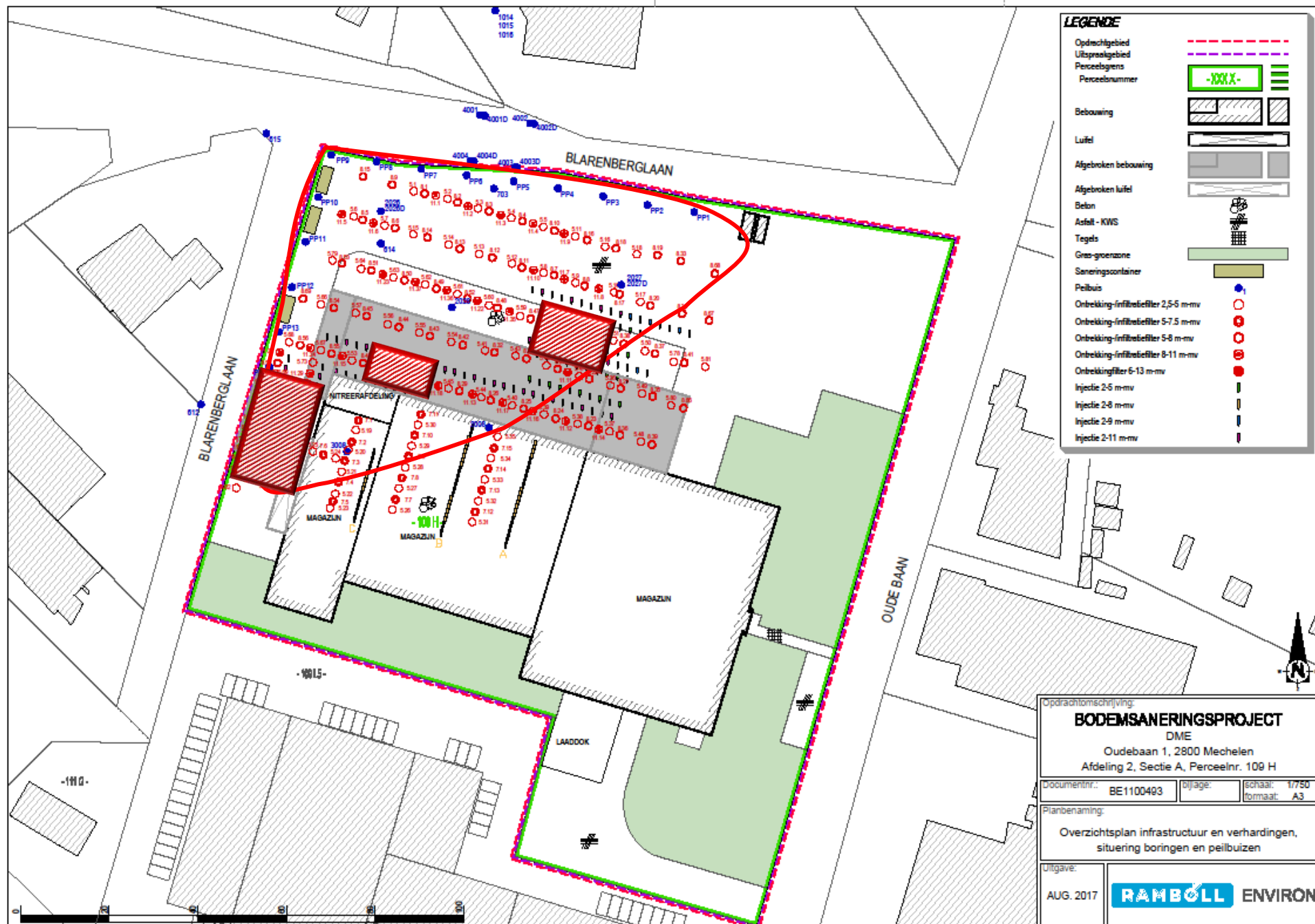
2016:
ON SITE WORKS
Excavation source areas
Direct-push injections
carbon source
In-situ extraction and infiltration filters with aboveground addition of carbon source

2017-2021:
IN SITU REMEDIATION & REDEVELOPMENT
Ongoing

Project GreenSoil approach

- Demolition & asbestos removal
- Additional source investigation (sewer system)
- Source remediation by excavation
- In-situ enhanced anaerobic degradation of groundwater contamination
- Remedial works





Project #9: Excavation source area

- 3 source areas



Installation in-situ system 2m-bgl



Installation in-situ system 2m-bgl



Ready for redevelopment





View on the green remediation units



Ongoing remediation during redevelopment



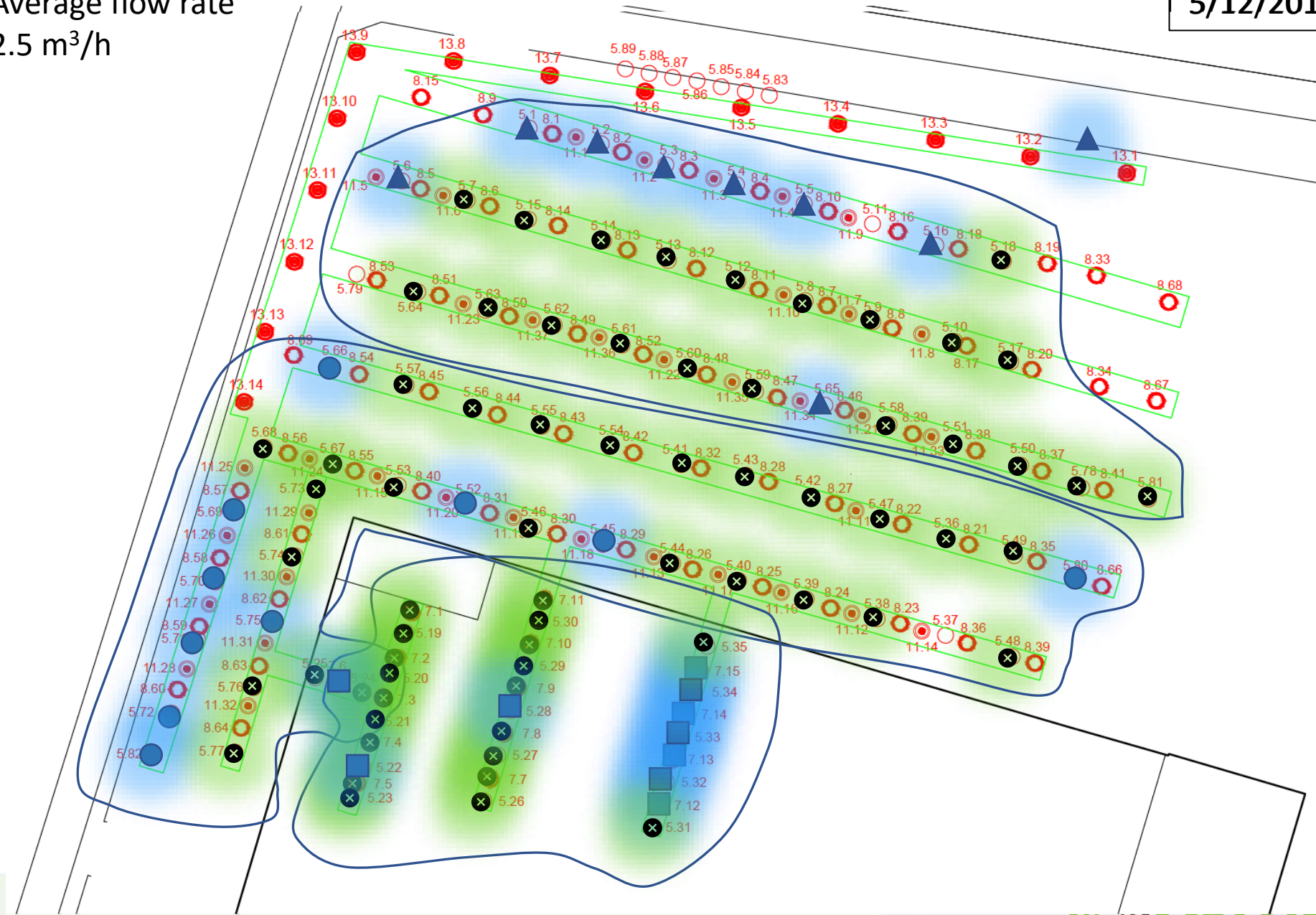
Carbon source



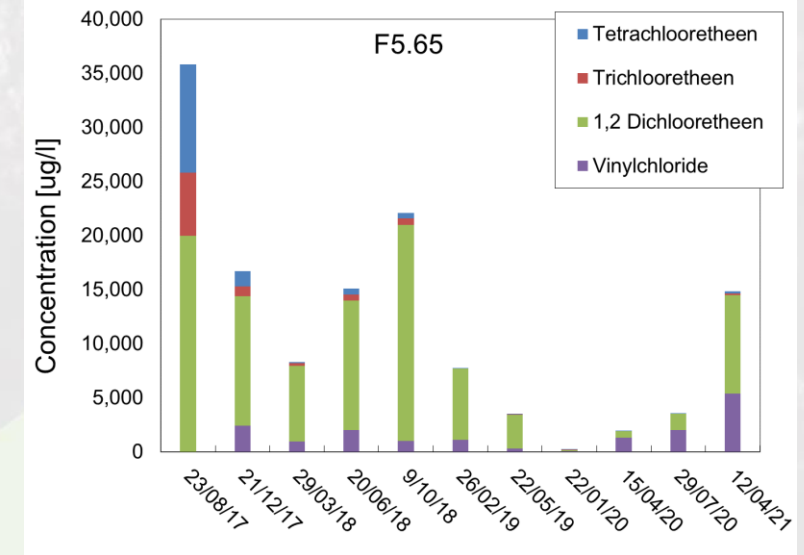
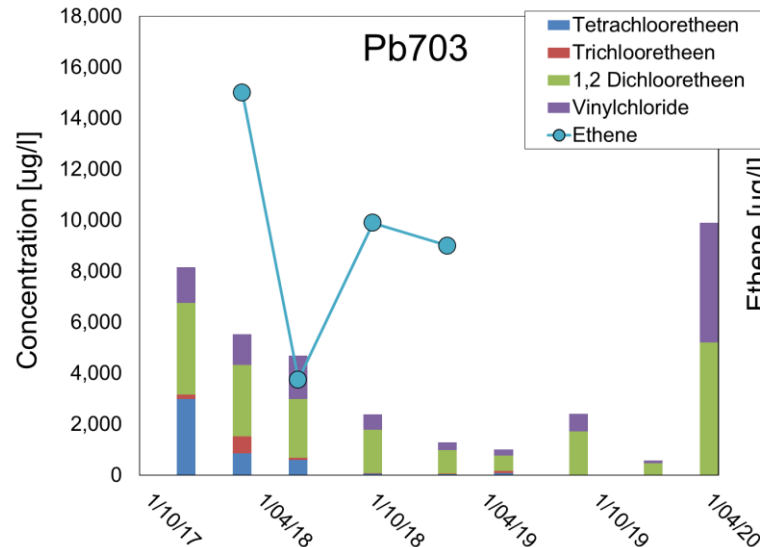
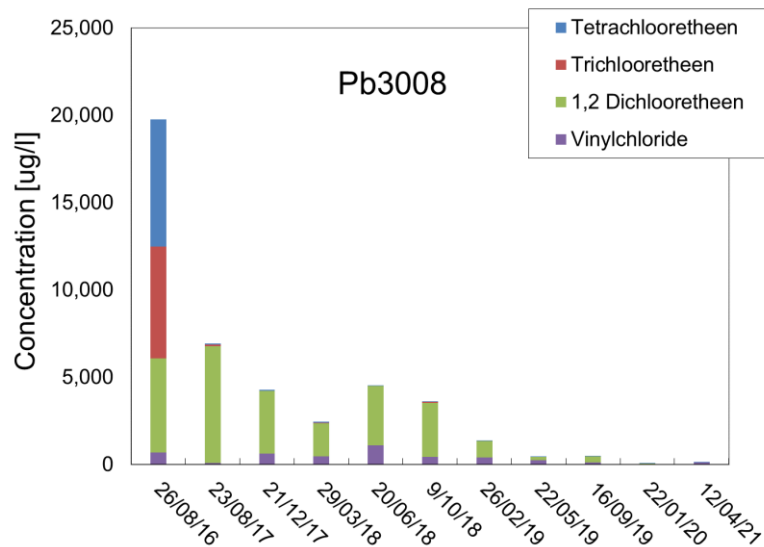
Groundwater recirculation

Average flow rate
2.5 m³/h

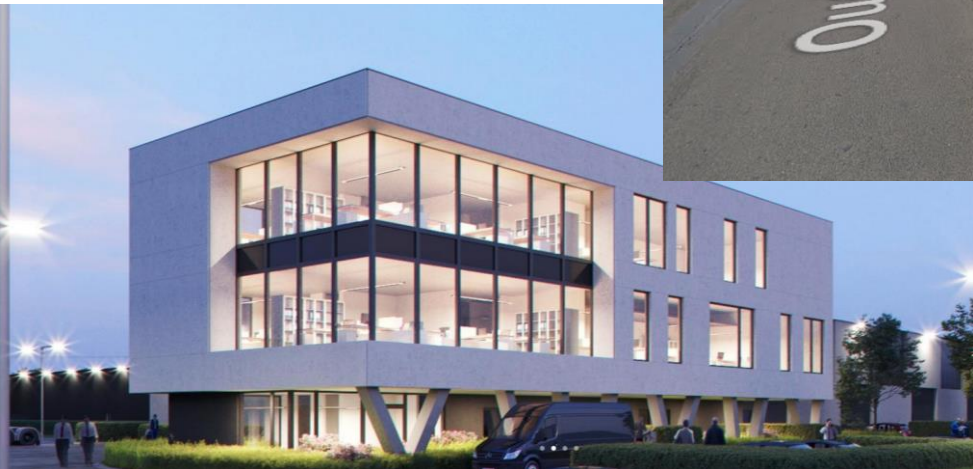
5/12/2018



Groundwater monitoring results



Remedial target values		
PCE	30 mg/kg	500 µg/l
TCE	30 mg/kg	500 µg/l
C-DCE	30 mg/kg	1,500 µg/l
VC	5 mg/kg	





Contact and Questions

For soil related questions, Greensoil can always be contacted

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