

Garland Environmental Site Feasibility Study

Presented to

Northglenn Urban Renewal Authority / City of Northglenn
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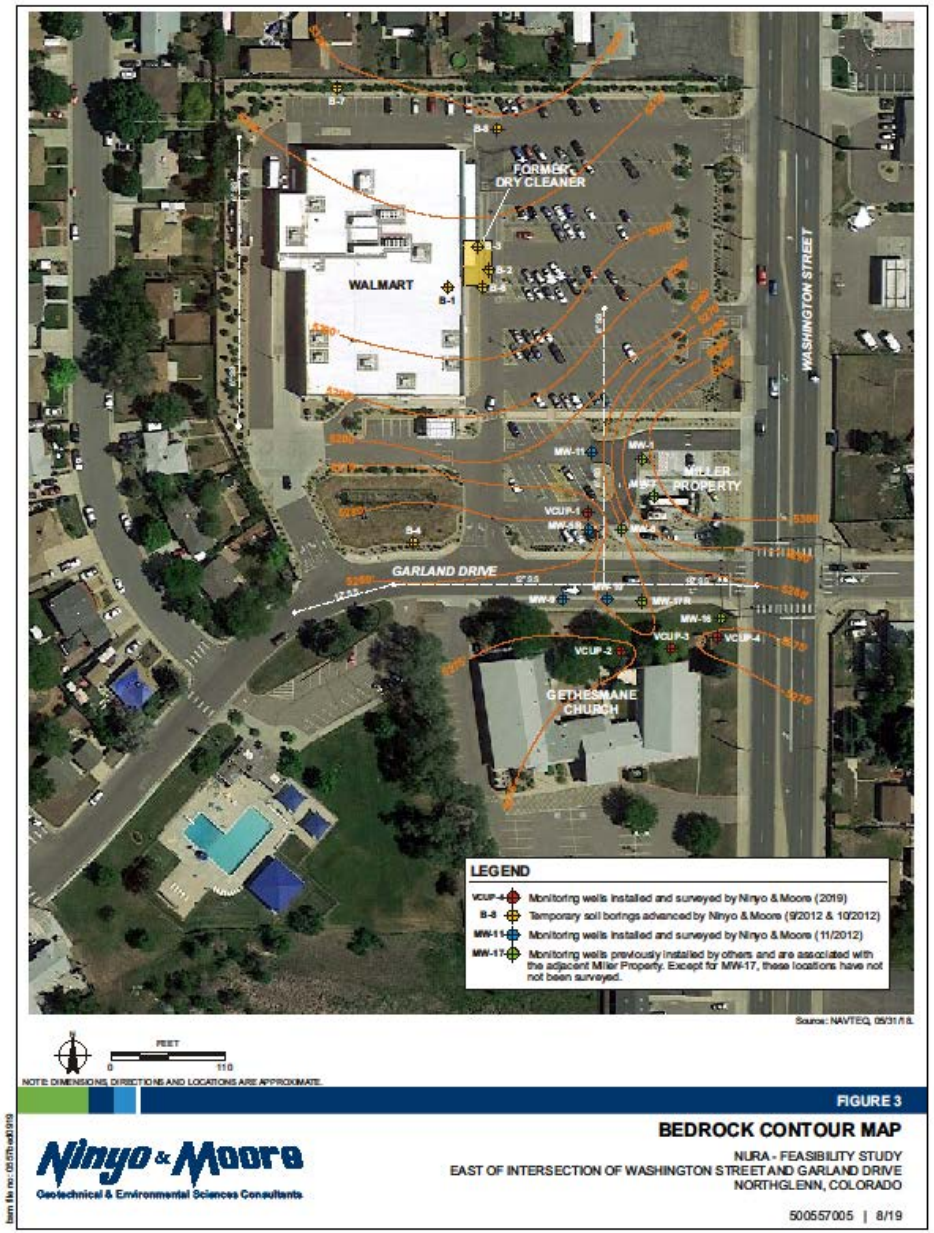
PCE
TCE
cDCE
VC
ETHENE
Reductive Dechlorination
Chlorine
Carbon
Hydrogen

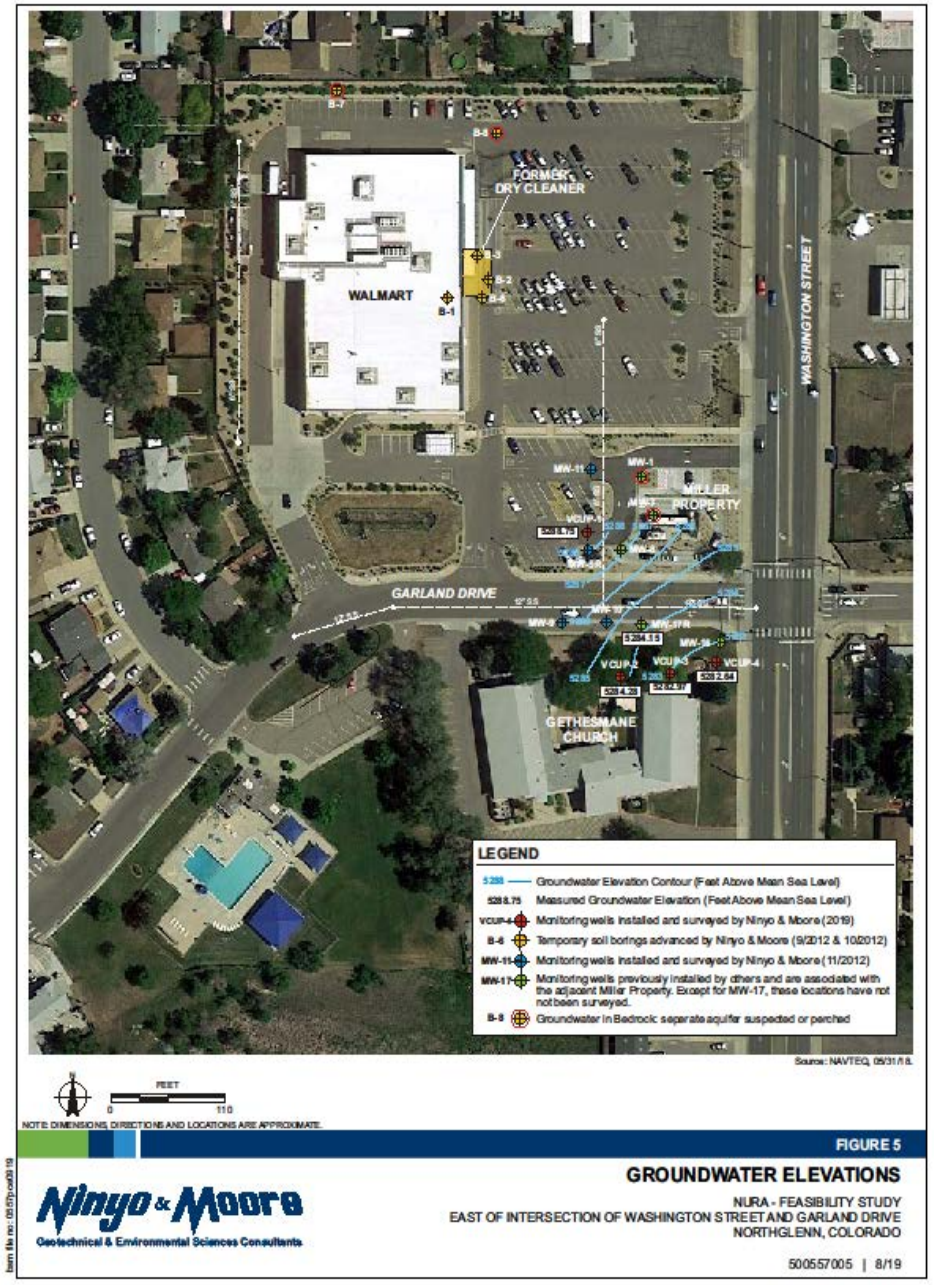
Feasibility Study: Summary

In summary, four groundwater monitoring wells were installed at the site as part of the Feasibility Study. One well, VCUP-1, was installed on the WalMart property, and the remaining three wells, VCUP-2, VCUP-3, and VCUP-4, were installed on the Gethesmane Lutheran Church property.

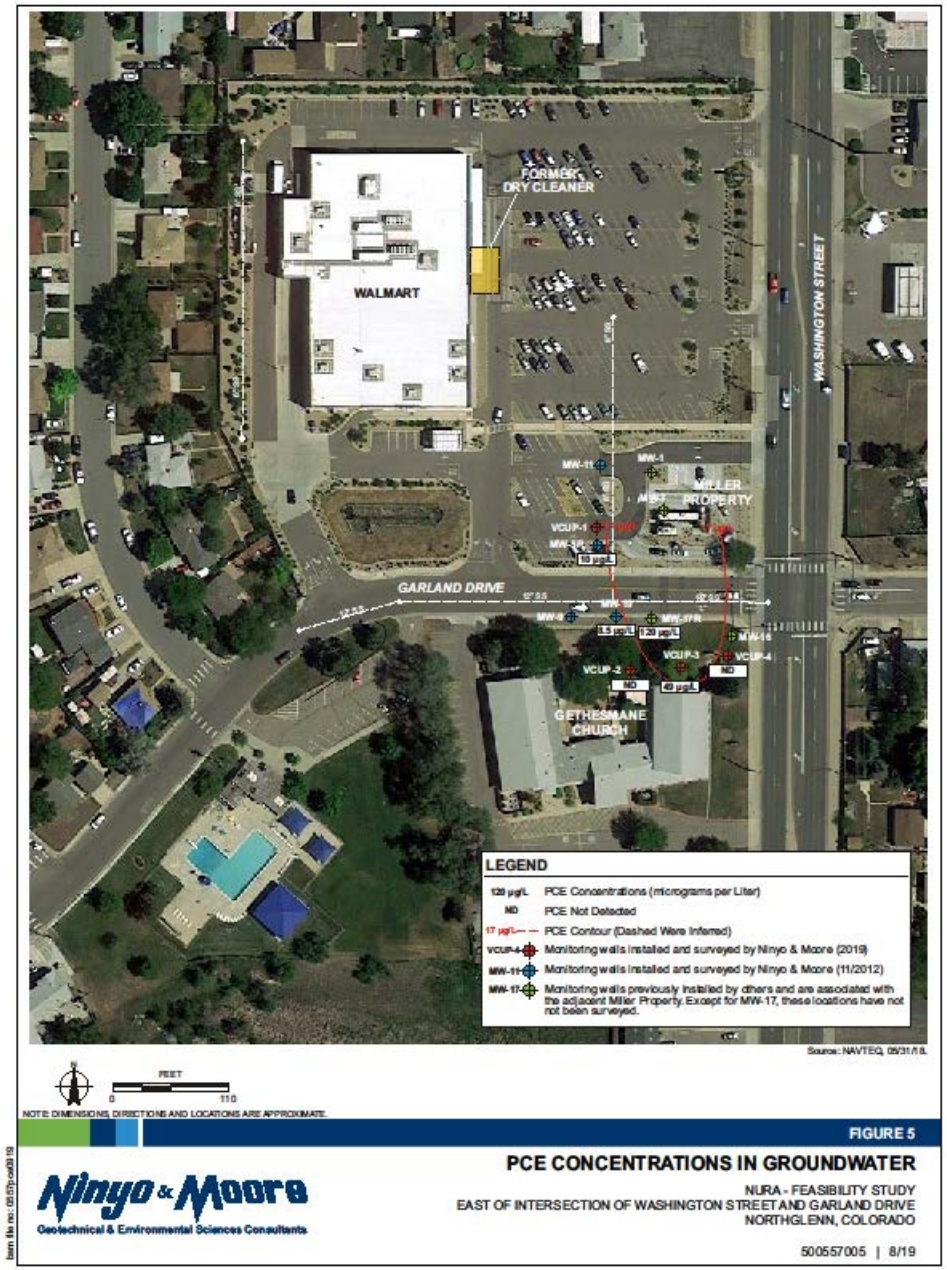
One groundwater sample was collected from each of the four wells and analyzed for VOCs, ethene, iron, ferrous iron, ferric iron, manganese, chloride, sulfate, nitrate, alkalinity, pH, carbon dioxide, and dissolved organic carbon.



- Bedrock contour map shows a depression/channel-like feature



- Groundwater contours indicate flow generally follows the bedrock surface



- PCE concentrations exceed the state cleanup standard of 17 µg/l in MW-17R and the new VCUP-3
- No PCE was detected in the new wells VCUP-1, VCUP-2, and VCUP-4

Feasibility of Biosubstrate Injections

- Based on the findings of this Feasibility Study, this method would likely be ineffective
  - Indicator parameters suggest reductive dechlorination is not active in the groundwater at the site
    - PCE was detected but no degradation products (no TCE, cis-1,2-DCE, or Vinyl Chloride)
    - Anions/cations act as electron donors/acceptors in the reductive dechlorination process; an abundance of electron acceptors indicates an oxidative environment at the site rather than reductive
    - Previous injections of oxidants may have contributed to the current groundwater conditions

Feasibility of E-Redox® Method

- This method appears to be chemically feasible
- Feasibility of the E-Redox® method at the Garland site depends more on the power supply, system placement, etc.

Feasibility of Zero-Valent Iron (ZVI) Method

- This method appears to be chemically feasible
- Feasibility of the ZVI method at the Garland site depends more on the physical injection process
- Due to clay and silty clay soils observed in the saturated alluvial aquifer, nanoZVI would be required
- Hydrofracturing the aquifer prior to injection may also be required
- Mulitple rounds of nZVI may be required due to passivation of the media over time
- This is not considered a viable option for the Garland site

Action Items/Conclusions

- Ninyo & Moore concludes the E-Redox® method is the viable option for remediation of the PCE plume at the Garland site
- This option includes a pilot study and continued system operation for approximately
- We recommend re-application to the CDPHE's Voluntary Cleanup and Redevelopment Program (VCUP)

E-Redox Method Implementation

- AET would conduct one 3-month pilot test consisting of one E-Redox unit (with one set of two electrodes) prior to the full-scale remediation.
- Expand the pilot test to a 2-unit cleanup project to remediate the PCE plume to be operated for an additional 12 months.
- Of the wells newly installed during the Feasibility Study, 2 wells would be utilized for the expanded 12-month remediation system.

CDPHE VCUP Process

- Preparation of the VCUP application according to the CDPHE required format.
- The VCUP application will be accompanied by a Tax Credit Request letter including a cost estimate for the selected remediation option. This letter will reserve the funds allotted to this project for the 40% Brownfield Tax Credit and will be finalized with the submittal of a closure report and No Action Determination Petition after remediation is concluded.
- Periodic groundwater monitoring and reporting.
- Preparation of the NAD Petition and Tax Credit Request.