TRC

Results you can rely on

2019 Battelle Sediments Conference
Remediation of a Former Oil Well, Leaking into a Freshwater Lake

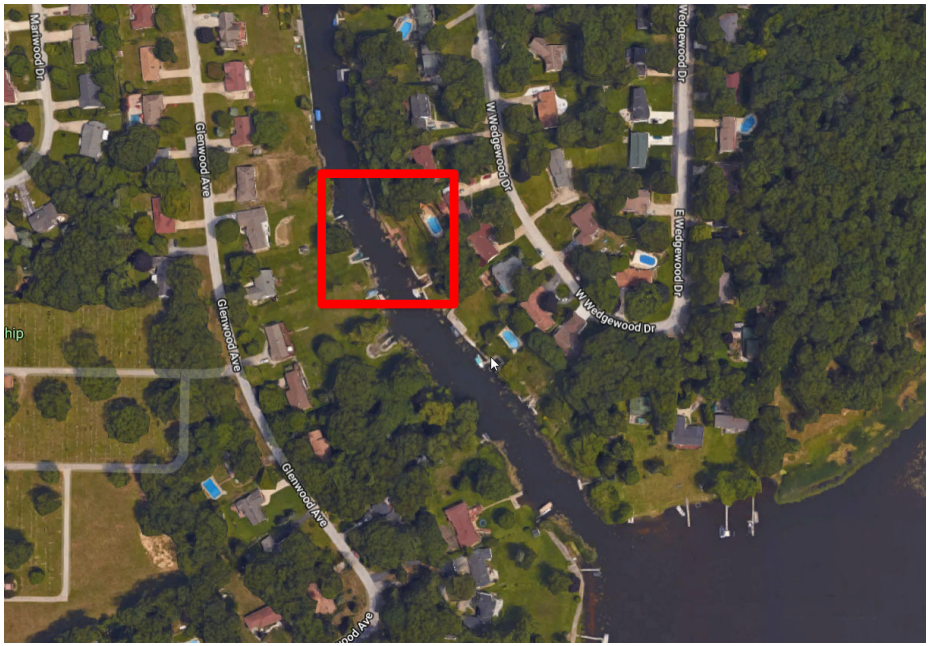
TRC Environmental Corporation

February 13, 2019

Outline of Topics

- **Project Background**
- **Investigation, Feasibility Study, & Final Design**
- **Remedial Construction Highlights**
- **Initial O&M Observations**
- **Achievement of Cleanup & Community Success**
- **Questions**

Project Background



Project Location, North Muskegon, MI

- LNAPL, consisting of weathered crude-oil, has been venting through the sediment, causing sheening on a tributary within the Muskegon Lake AOC.
- Sheens and oil slicks documented in Fenner's Ditch as early as 1978.
- An investigation performed in 2010 by the MDEQ indicated oil was migrating upward from depth.

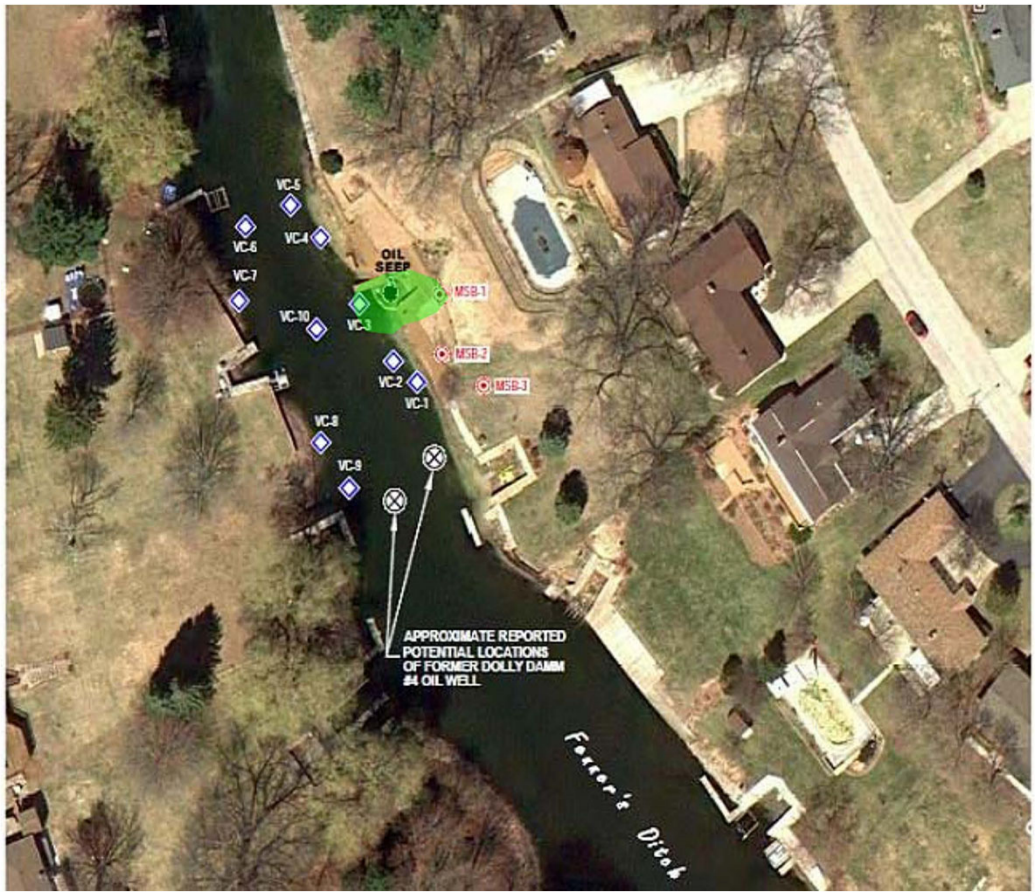
Site Setting

Fall 2016

Spring 2017

Historic Oil Production

2010 Investigation- Area of Impact

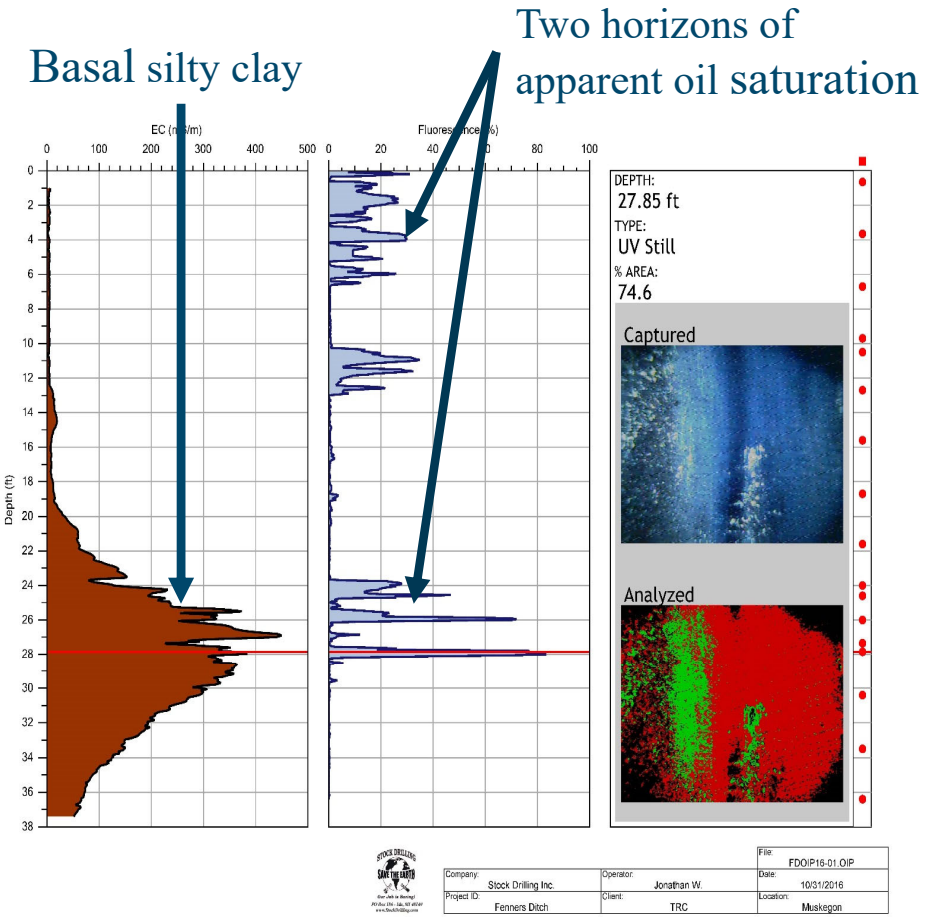


Scope of Work

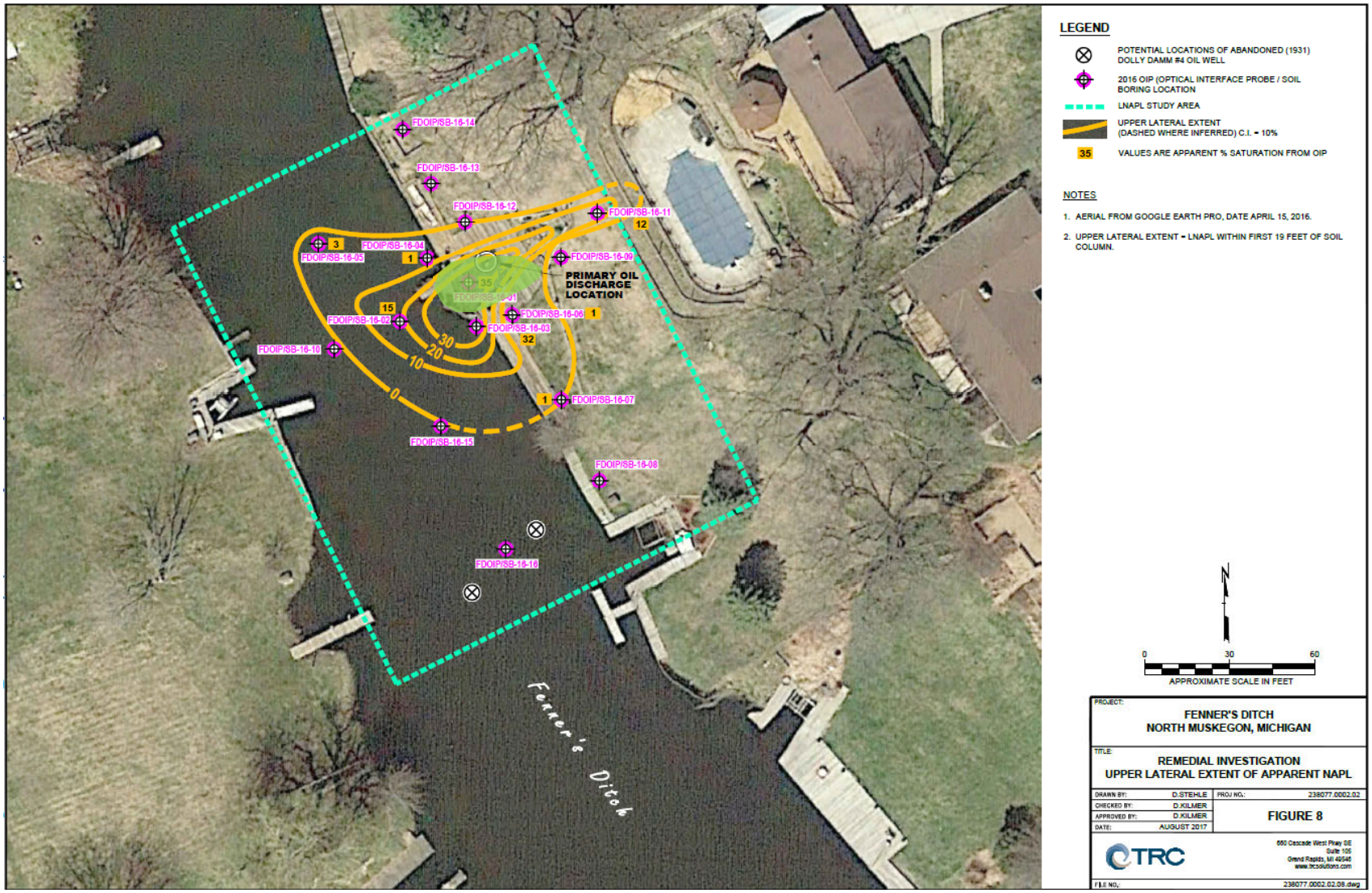
- Vibracore Sediment Sampling
- Soil/Groundwater Sampling
- Geophysical Survey
- Residential Drinking Water Well Sampling

November 2016 Field Investigation

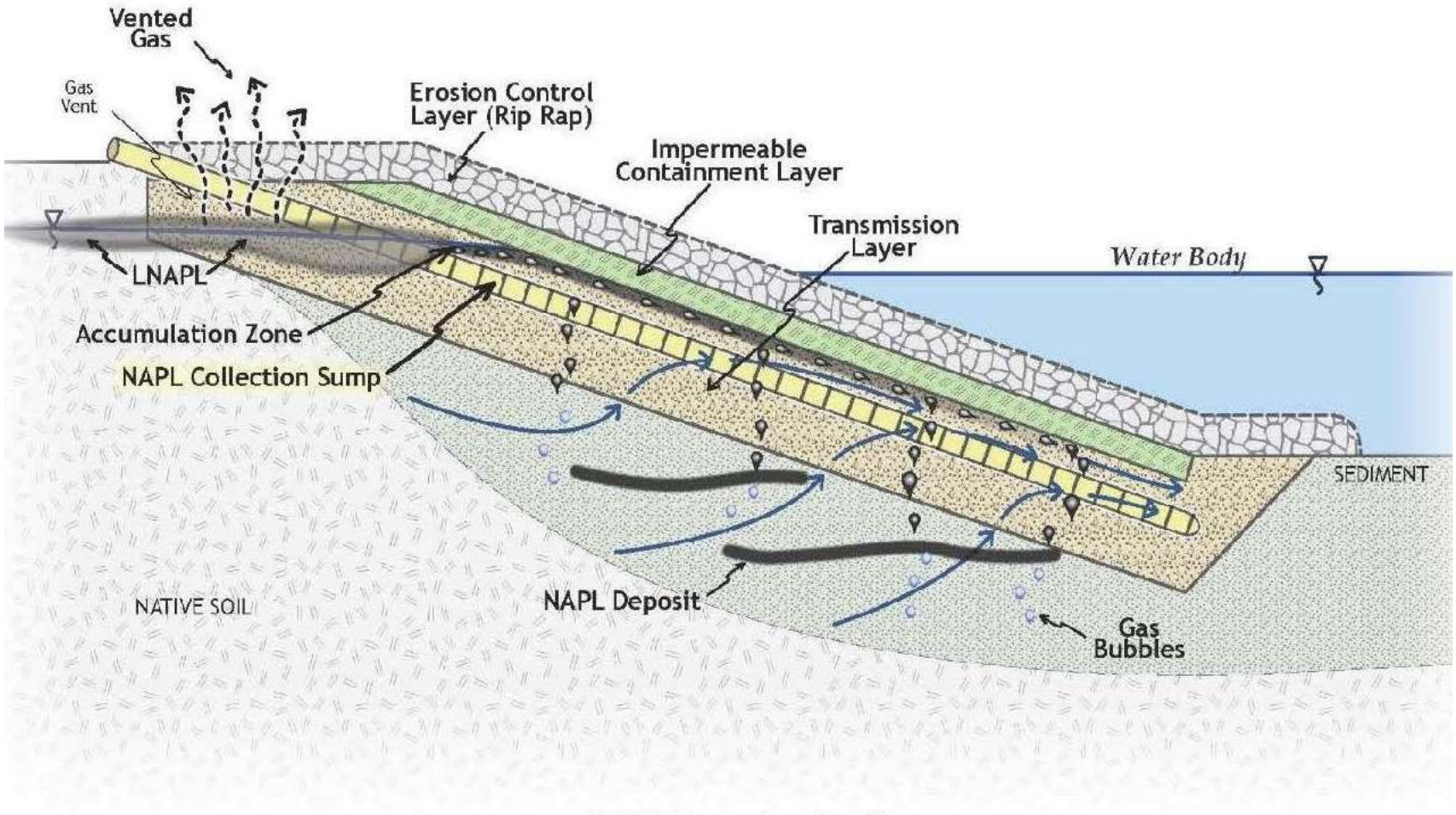
Barge-Mounted Geoprobe



November 2016 Investigation Results



Remedy Selection

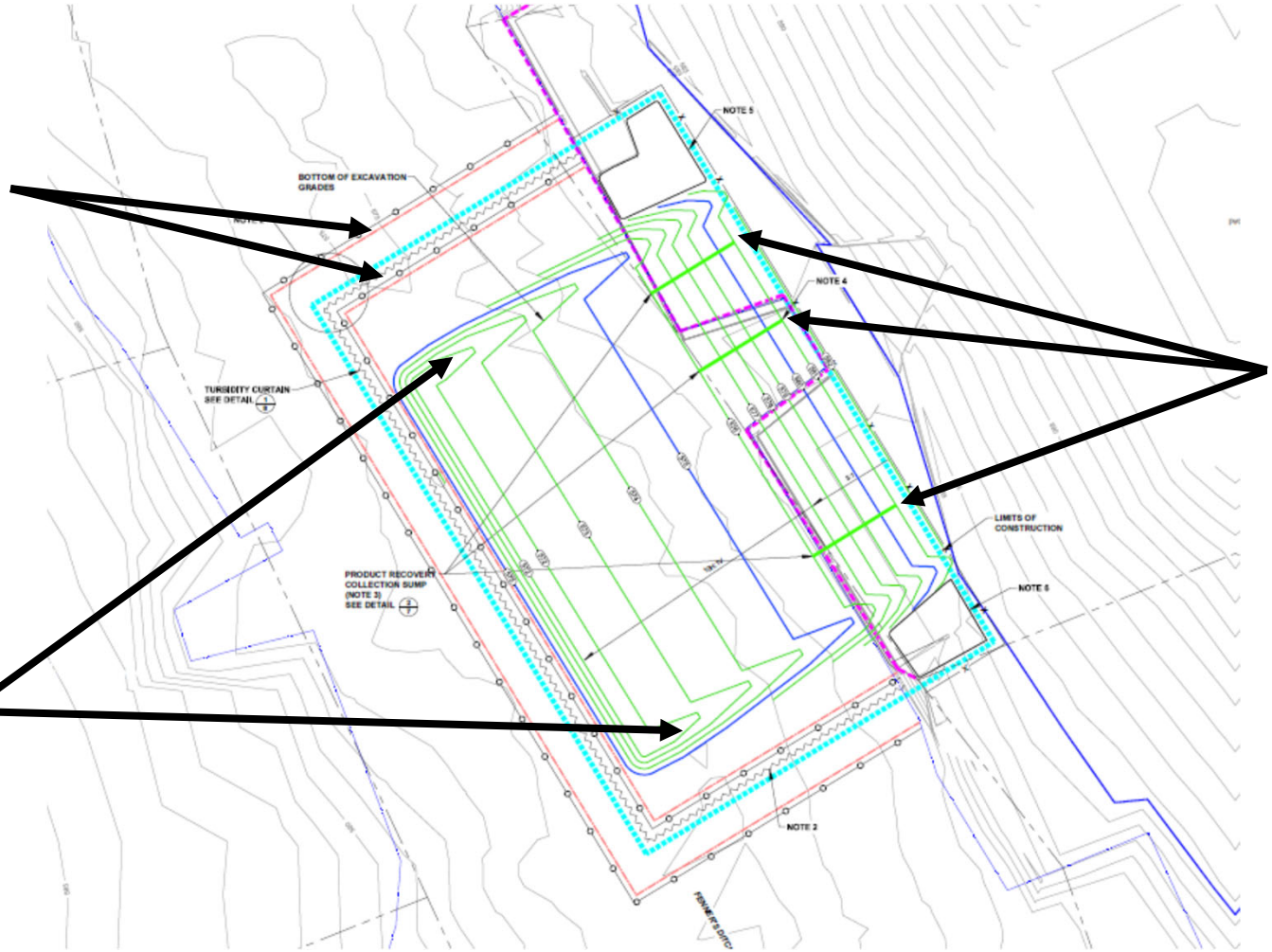


NAPL Trapping Cap®

Bench-Scale (Sand Box) Testing

Design Overview

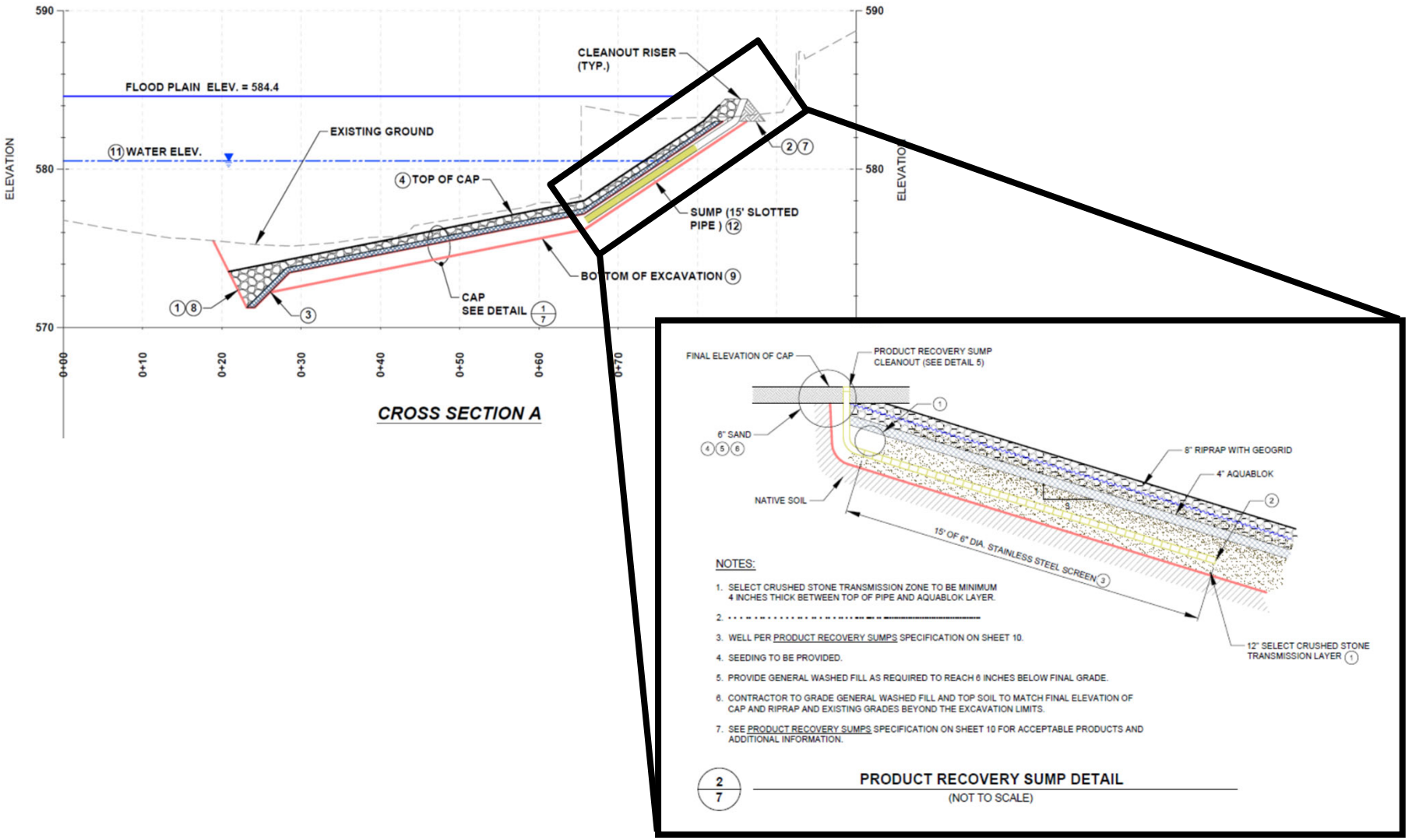
Primary & Secondary Turbidity & Oil Controls



Collection Sumps

Perimeter Key Trench

Design Overview



Expedited Remediation Timeline

- Construction Bidding & Award (Winter/Spring 2018)
- Permitting (Spring 2018)
  - Joint Permit obtained from the DEQ/US Army Corp of Engineers for work in the waterway.
  - MDNR approval for dredging during critical spawning window.
  - Contractor obtained local SESC Permit.
- Construction (June/July 2018)
  - 5 week duration from late June through July 2018.
  - Efforts coordinated with the July 4th holiday schedule and Township Park renovation schedule.

Remediation Overview

- Approximate Cap Area of 5,200 SF (65’ x 80’)
- Mechanical dredging resulted in the removal and disposal of approximately 480 CY of sediment
  - Sediment transported via hopper barge to staging area for T&D
  - Limited sediment stabilization required some water disposal- 10,500 gal.
  - Primary and Secondary silt/oil containment (silt curtain, turbidity curtains, & absorbent oil booms)
- Backfilled to achieve design grades for each layer
- Restoration of shoreline

Remediation Overview- Excavation

Excavation & Grade Checking

Observed Oil During Excavation

Remediation Overview-Aquablok® Placement

Upland Aquablok® Placement

Protection Layer Placement

Before & After

Pre-Construction

Post-Construction

Initial O&M Observations

- Monthly Inspections performed
  - Sheens not observed in waterway.
  - Oil accumulation observed in 1 out of the 3 installed sumps (visual to 1.5” thickness in center sump)

- Preliminary Indicators of Biodegradation Observed
  - Gas readings in sump headspace indicate intrinsic biodegradation is occurring.
  - Low level methane (1%) and CO2 present (0% to 2%) within 3 months.

Achievement of Remediation and Community Success

- Remediation was effective
  - Mitigated sheen generation
  - Mitigated ambient odor issues
  - Low Long-Term Operation and Maintenance Costs for MDEQ
- Township & adjacent homeowners were pleased
  - Minimized waterway access limitations during construction
  - Minimized impacts to neighbors and community
  - Canal and shoreline have been restored and the Fenner's Ditch community is able to enjoy this natural resource once again

Questions

Scott Pawlukiewicz, PE
TRC Environmental Corporation
spawlukiewicz@trcsolutions.com

John Rice, PE, PH
TRC Environmental Corporation
jrice@trcsolutions.com

Project Challenges

Challenges

- Methods for hydrating of Aquablok® Material
- Management/Removal of submerged posts.
- Minor post-construction corrections of final grade near shore.
- Keeping channel open during peak summer months.

Community Outreach

FENNER'S DITCH OIL SEEP PROJECT

LAKETON TOWNSHIP, MUSKEGON COUNTY, MICHIGAN
OCTOBER 2016

The Michigan Department of Environmental Quality (DEQ) and the United States Environmental Protection Agency (EPA) have partnered to address an oil seep that has been observed discharging to a canal known as Fenner's Ditch, a 0.34 mile long canal on the north side of Bear Lake in Laketon Township. Oil sheens and slicks have been observed on Fenner's Ditch for many years. Oil containment booms have been used to control the venting oil; however, this is not considered to be an adequate long-term strategy. The purpose of the project is to conduct an investigation to better define the nature and extent of the oil seep, and then to select, design, and implement a remedy to control the venting oil. This work will be conducted by the DEQ and their approved consultants and contractors. Costs for the work will be administered by the EPA from a funding source made available from the Oil Pollution Act.

PROJECT BACKGROUND
Previous investigations have concluded that the likely source of the oil seep is an improperly abandoned oil well that was drilled and "plugged" around 1930. It is possible that crude oil is migrating up the old borehole and venting to the surface water. Attempts to locate the borehole have been unsuccessful, in part because the upper portion of steel casing used during well construction was removed when the well was abandoned. In 2015-2016, a feasibility study was conducted to identify the best investigation options and potential solutions to address the venting oil. This project will be focused on implementing the findings of that study.

FOR ADDITIONAL INFORMATION PLEASE CONTACT:

Michigan Department of Environmental Quality
Remediation and Redevelopment Division

DAVID BANDLOW
DEQ Project Manager
BandlowD@michigan.gov
616-745-5337

Grand Rapids District Office
350 Ottawa Ave NW Unit 10
Grand Rapids MI 49503

Map depicting the general location of the oil seep at Fenner's Ditch

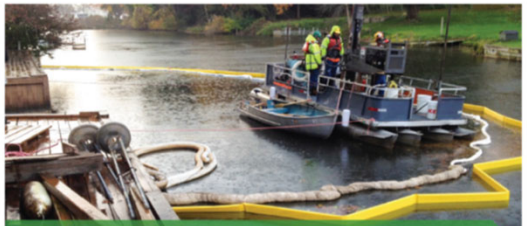
OIL SEEP INVESTIGATION
The first phase of work will involve investigating the oil seep through a series of soil borings and sediment cores. Field work is scheduled to begin October 31, 2016 and last through November 18, 2016. The soil borings and sediment cores will be drilled in the canal and on land at the magenta-colored locations shown on the map below.

PROJECT CONSIDERATIONS
Some of this work will involve the use of a small barge in the canal so that sediment cores from the canal bottom can be collected. While this work is occurring, oil containment booms will be deployed in the canal to intercept oil slicks that may be generated as a result of the work. Boat traffic will be allowed to pass through the canal on the outside of the containment booms while work is occurring. On land, soil borings will only be conducted at properties where DEQ has been granted written access by the property owner.

ENVIRONMENTAL CONCERNS
The oil seep is preventing home owners and other users from enjoying the natural resources of the canal. There is potential that the oil is accumulating on vegetation and in sediments, which could have adverse effects on the local ecosystem. Contact with oil slicks on the water surface should be avoided. No petroleum constituents were detected in residential drinking water wells that were previously sampled in the area of the oil seep.

FUTURE WORK
Information from the investigation will be used in the development of a long-term strategy for the site. It is expected that data from the investigation will be processed during the winter of 2016-2017 and an additional phase of work will be initiated in the spring/summer of 2017. The next phase of work may involve additional investigation or implementation of a remedy designed to contain the venting oil.

Department of Environmental Quality



FENNER'S DITCH OIL SEEP PROJECT

Laketown Township, Muskegon County, Michigan | May 2018

The Michigan Department of Environmental Quality (DEQ) and the United States Environmental Protection Agency (EPA) have partnered to address an oil seep that has been observed discharging to a canal known as Fenner's Ditch, a 0.34 mile long canal on the north side of Bear Lake in Laketon Township. Oil sheens and slicks have been observed on Fenner's Ditch for many years. Oil containment booms have been used to control the venting oil, including the construction of Non-Aqueous Phase Liquids (NAPL) trapping cap. This work will be conducted by the DEQ and their approved consultants and contractors. Costs for the work will be administered by the EPA from a funding source made available from the Oil Pollution Act.

PROJECT BACKGROUND

Previous investigations have concluded that the likely source of the oil seep is a historic oil well that was drilled and "plugged" around 1930. It is possible that crude oil is migrating up the old borehole and venting to the surface water. Attempts to locate the borehole have been unsuccessful, in part because the upper portion of steel casing used during well construction was removed when the well was abandoned. In 2015-2016, a feasibility study was conducted to identify the best investigation options and potential solutions to address the venting oil. This project will be focused on implementing the findings of that study.

FOR ADDITIONAL INFORMATION PLEASE CONTACT:

Michigan D
Environme
Remediatio
Redevelopn

David Banc
DEQ Projec
BandlowD@
616-745-5

Grand Rapi
350 Ottaw
Grand Rapi

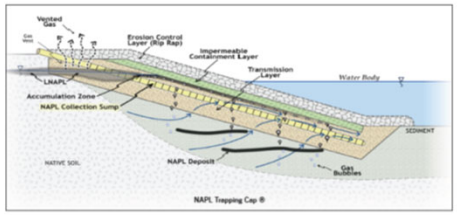
Department of Environmental Quality

PROPOSED CONSTRUCTION
The MDEQ Project Team determined the most feasible and cost-effective approach to managing the venting oil long term was the construction of a NAPL Trapping Cap (see example below) to contain the crude oil. The cap collects the venting oil and prevents it from entering the surface water. The oil is contained in the structure until either it degrades, or if necessary, is removed and disposed. Once installed, the cap will be at the same elevation as the current base of the ditch, so boat access and other uses of the ditch will not be affected.

WHAT YOU NEED TO KNOW

- Construction of the cap is proposed to start in June 2018 and take 3 to 4 weeks.
- Construction equipment and materials will be temporarily staged at the Laketon Township's Horton Beach Park for access to Fenners Ditch. This will not significantly affect the public's use of the park.
- **Boat traffic in Fenners Ditch will be suspended during construction to allow work to be completed quickly and safely – we hope to be complete by the middle of July.**

ENVIRONMENTAL CONCERNS
The oil seep is preventing home owners and other users from enjoying the natural resources of the canal. There is potential that the oil is accumulating on vegetation and in sediments, which could have adverse effects on the local ecosystem. Contact with oil slicks on the water surface should be avoided. No petroleum constituents were detected in residential drinking water wells that were previously sampled in the area of the oil seep.



TRC
trcsolutions.com