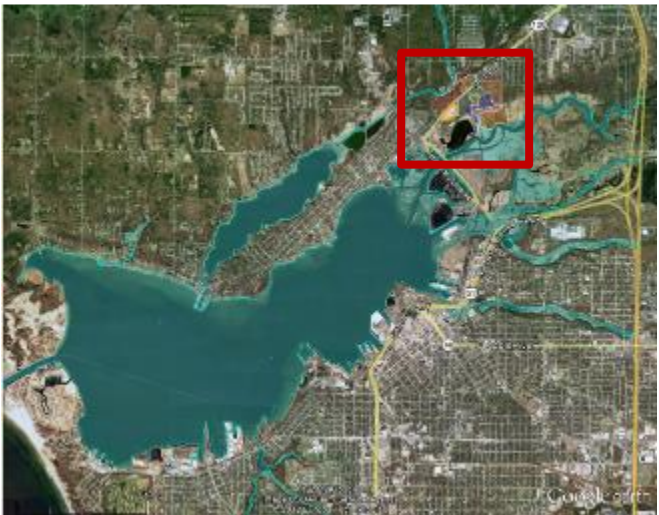


# Zephyr Upland Remediation Spring 2018 Update

Michigan Department of Environmental Quality



# *Former Zephyr Refinery*



# ***Zephyr History***

## Historical Perspectives on Refinery Operations

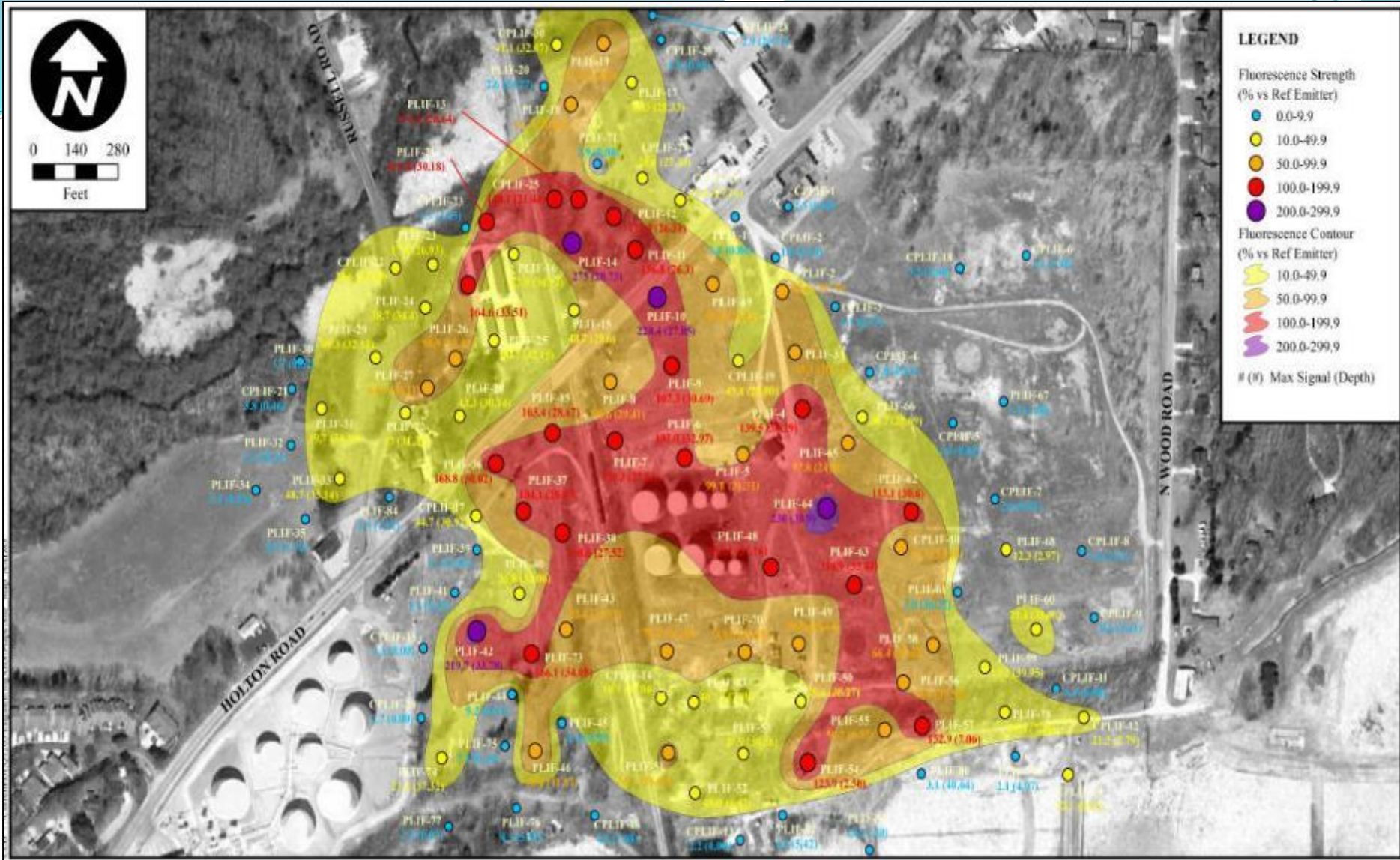
- **1931 – 1968 Property Used for Refining Crude Petroleum**
- **1968 - early 1990s Property was used for Petroleum Storage until Zephyr bankruptcy**

***1990s Aerial***



# ***Sand saturated with petroleum***

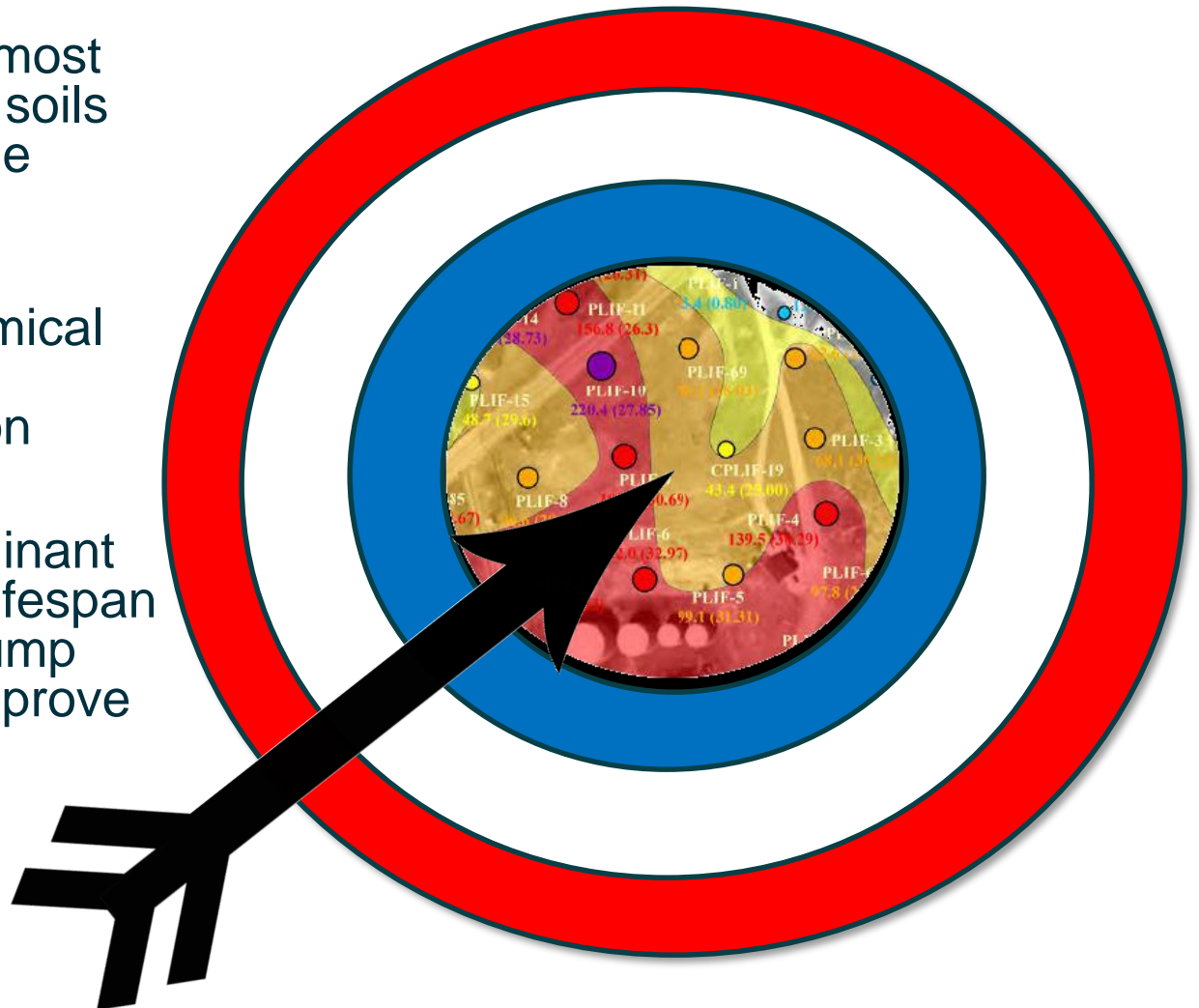




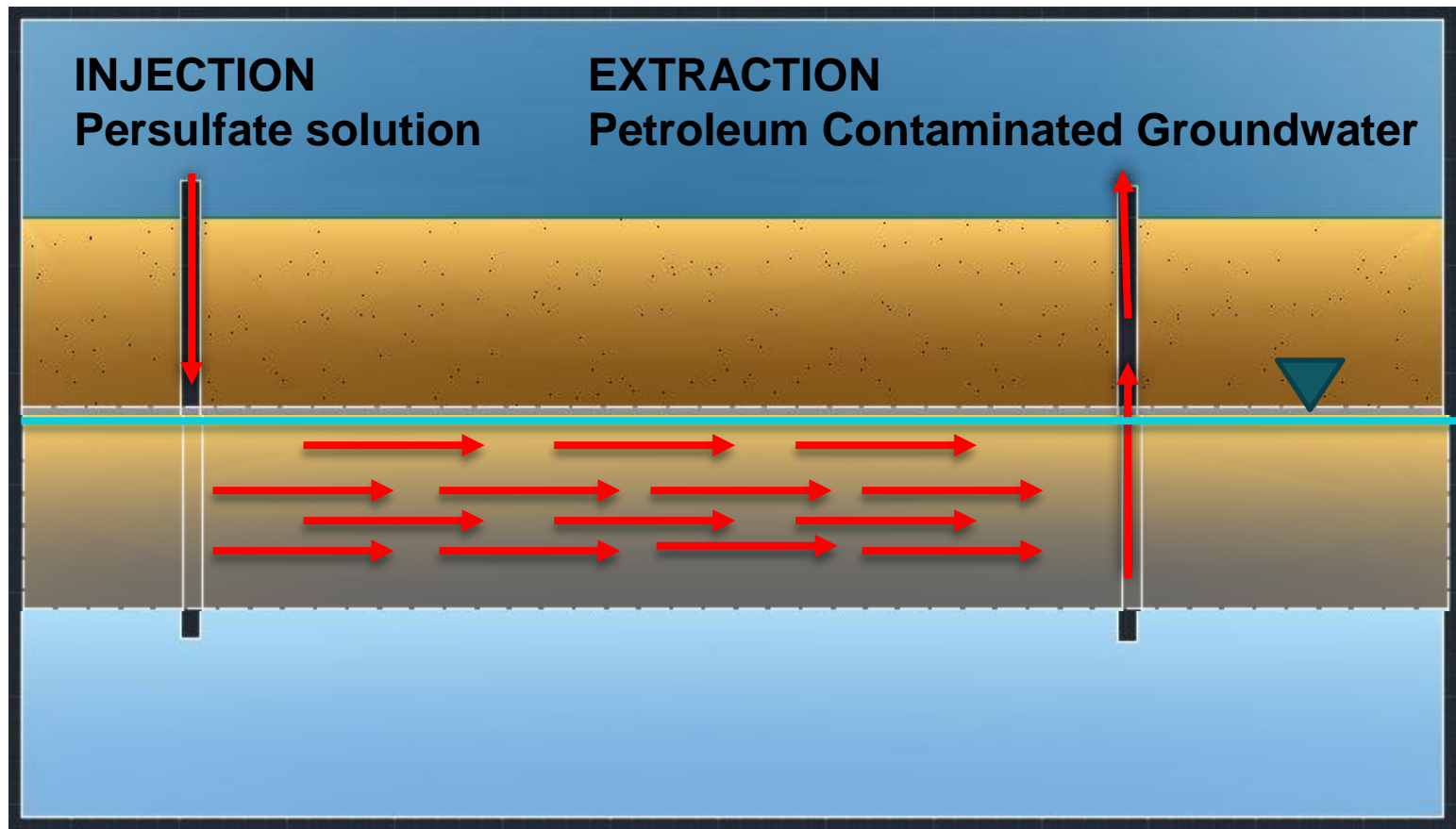
**Zephyr Petroleum Contamination Footprint**

# ***MDEQ Upland Remediation Project***

- Objective: Target the most grossly contaminated soils and groundwater in the former refining area
- Remedy: In-Situ Chemical Oxidation - persulfate injection and extraction
- Goal: Reduce contaminant levels to shorten the lifespan of the groundwater pump and treat system & improve opportunities for redevelopment

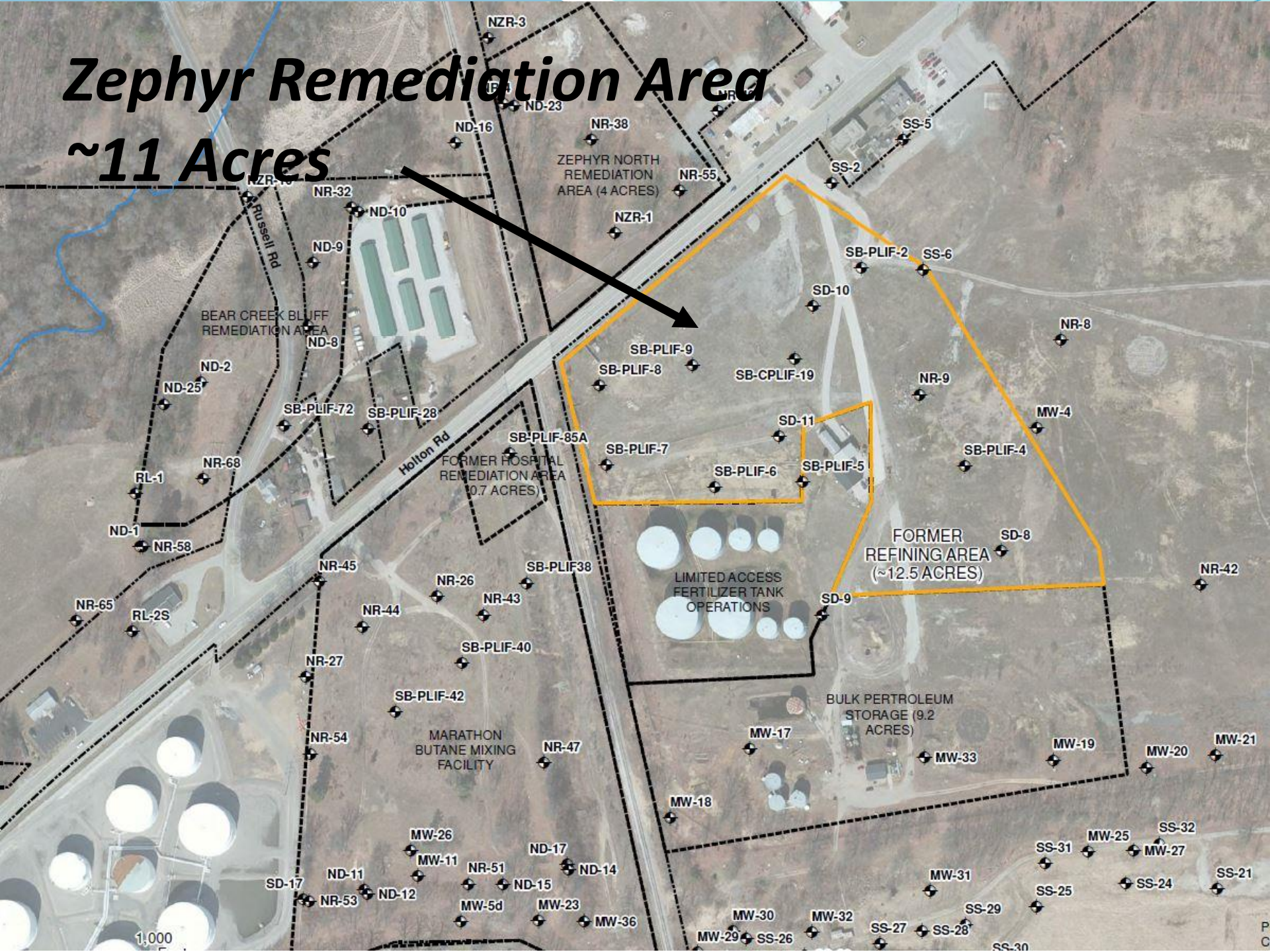


# In-Situ Oxidation Process

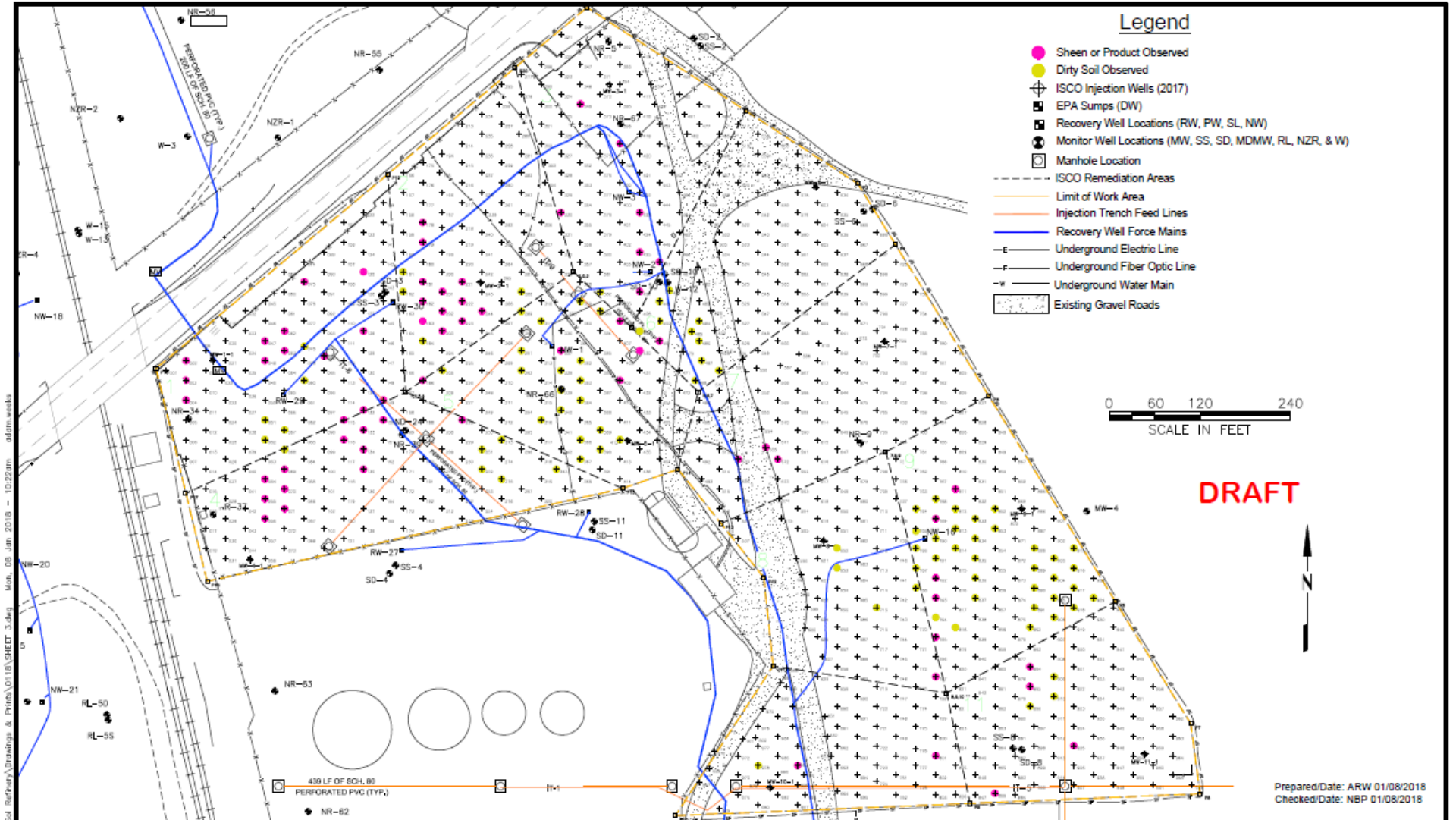


# Zephyr Remediation Area

*~11 Acres*







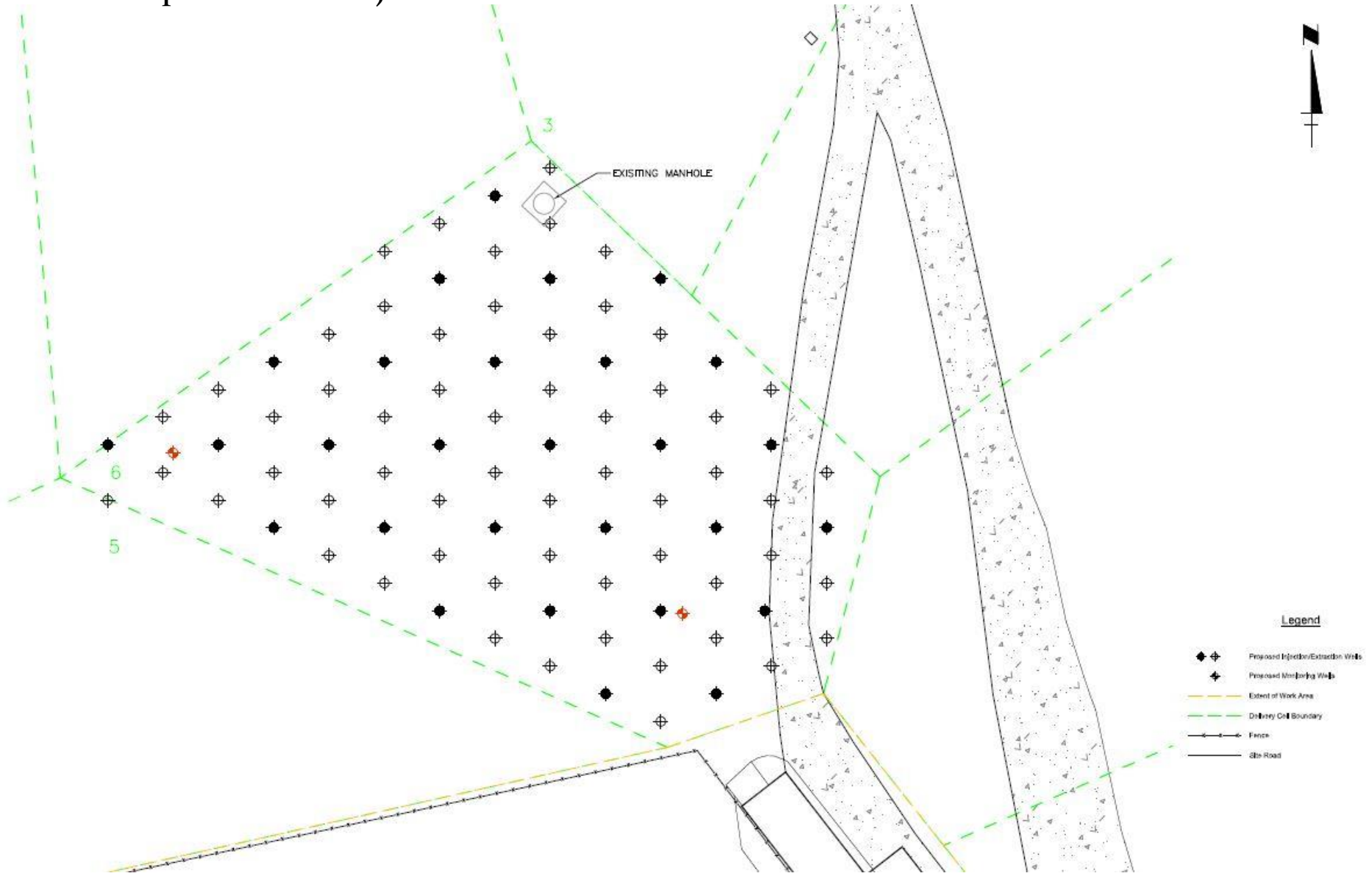
F:\Zephyr\_Naph-Sol Refinery\Drawings & Prints\0118\SHEET 3.dwg  
 Mon, 08 Jan 2018 - 10:22am  
 adam.wicks

ISCO ENHANCED NAPL RECOVER  
FORMER ZEPHYR REFINERY  
MUSKEGON, MICHIGAN



FIELD OBSERVATIONS OF CONTAMINATION  
FIGURE 1

# Example Grid for Injection Remediation



The view from above  
during injection point installation

1,011 points installed



Photo courtesy of EA Engineering, Science, and Technology (MI) PLC and its Affiliate EA Science and Technology and Drone Pro Media, LLC 2018

The view from above during injection point installation



# *Additional Remediation Activities Completed in Fall 2017*

More than 4,000 tons of lead contaminated soil was stabilized, removed, and properly disposed of in an approved landfill



# Michigan Department of Environmental Quality

800-662-9278

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