

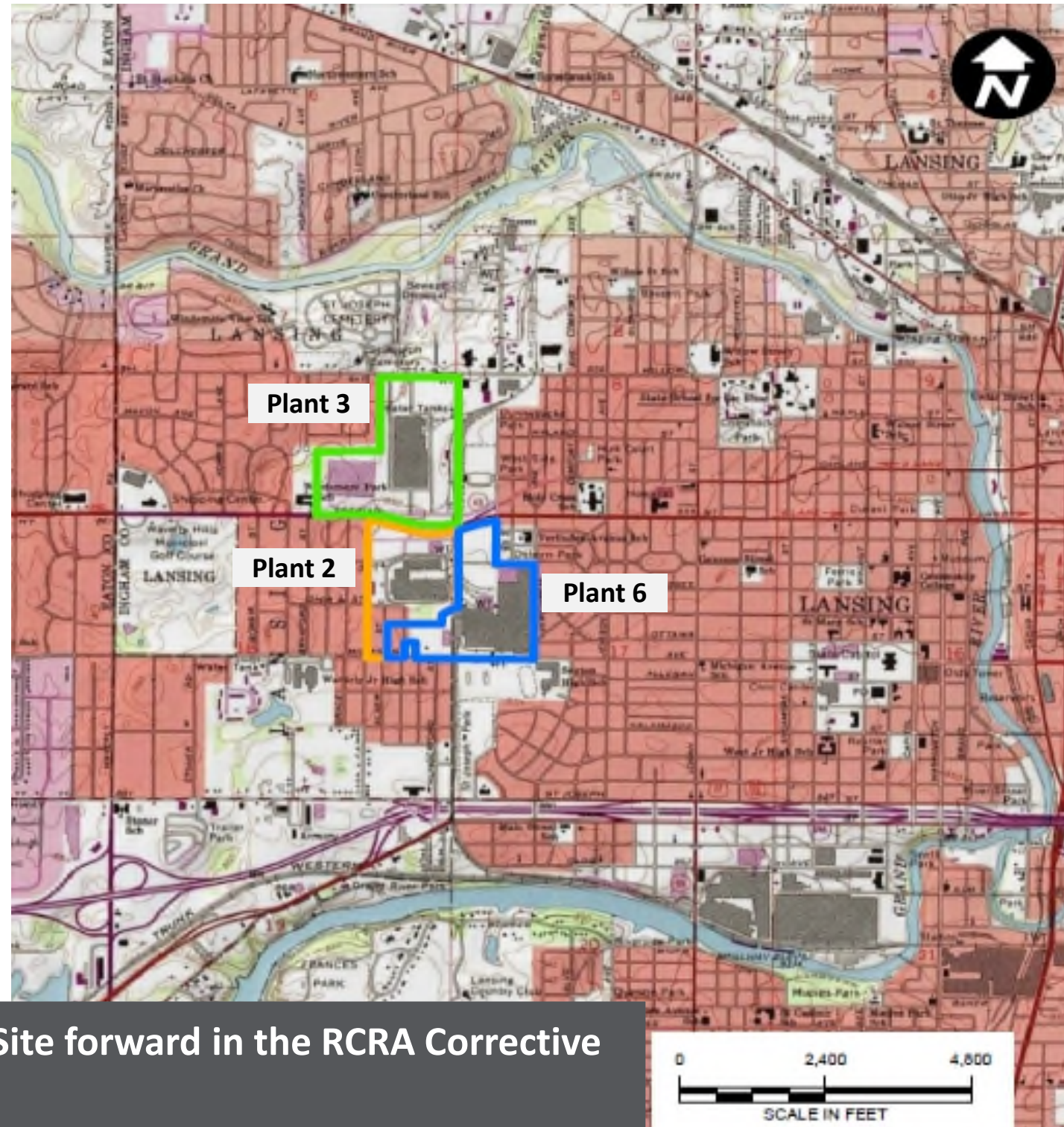
RACER TRUST LANSING PLANTS 2, 3, & 6

3Q 2020 Quarterly Progress Report | October 15, 2020



Site Introduction

- Remediation at the RACER Lansing Site is being performed through the Resource Conservation and Recovery Act (RCRA) Corrective Action program under the oversight of the Michigan Department of Environment, Great Lakes and Energy (EGLE). Current activities include focused site characterization, interim remedial actions, and evaluation of remedial alternatives.
- There is currently no known exposure pathways for area residents associated with the site contaminants.
- Characterization of the 1,4-dioxane plume in weathered bedrock at a depth of approximately 60 to 75 feet below the ground surface is complete. Remediation of 1,4-dioxane in the weathered bedrock includes operation of the Plant 2 and Plant 3 biosparge systems (Plant 2 system started operations during 3Q 2020). It is anticipated that portions of the Plant 2 biosparge system may need to operate for 10 to 15 years. See the appendix at the end of this report for more information on biosparging.
- Characterization of per and polyfluoroalkyl substances (PFAS) is ongoing. Interim actions for PFAS include storm sewer modifications on Plants 2, 3 and 6 to eliminate PFAS discharge offsite through the storm sewers.
- Characterization of potential soil vapor intrusion (VI) to indoor air is ongoing and will continue in the northeast portion of Plant 6 and the adjacent off-site area.
- Routine groundwater monitoring on Plants 2, 3, and 6 in the shallow (perched) zone, weathered bedrock, shallow bedrock and deep bedrock is ongoing and is anticipated to continue for 25 to 30 years.



Activities completed during this period move the Site forward in the RCRA Corrective Action process

Remediation of 1,4-Dioxane in the Weathered Bedrock

Plant 2 Biosparge System Update

- System located in the central portion of Plant 2
- System construction was completed, and system start-up/operations began in August
- Sparging 3-5 cubic feet per minute (cfm) of air/propane mixture per well, total of 41 wells, six zones, 1-hour for each zone with 1-hour rest
- Strong dissolved oxygen response observed in monitoring wells within sparge radius of influence (ROI) which indicates biodegradation of 1,4-dioxane is occurring



System Building and Nutrient Injection Tanks



Biosparge Transect With Hoses Covered in Gravel

Remediation of 1,4-Dioxane in the Weathered Bedrock

Plant 3 Biosparge System Update

- System located on the southwest portion of Plant 3
- System operations continued during 3Q 2020.
- Sparging 3-5 cfm of air/propane mixture per well, 7 wells, three zones, 1-hour for each zone with 1-hour rest
- System down from May 13, 2020 – July 21, 2020 due to compressor issues
- Compressor was replaced in July and system restarted



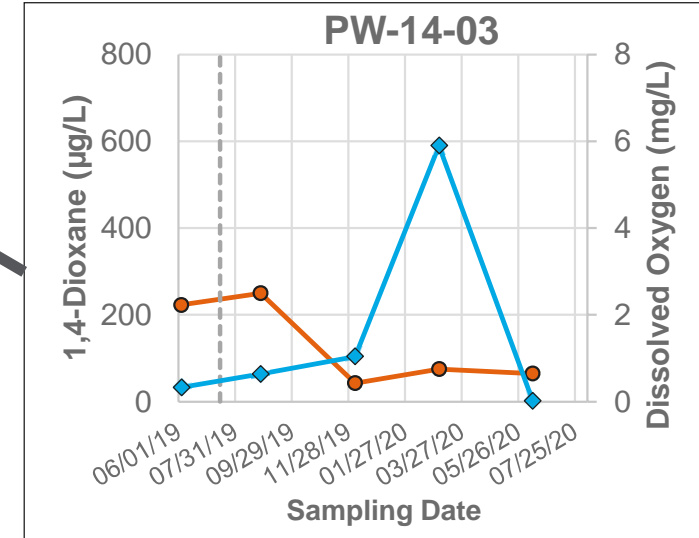
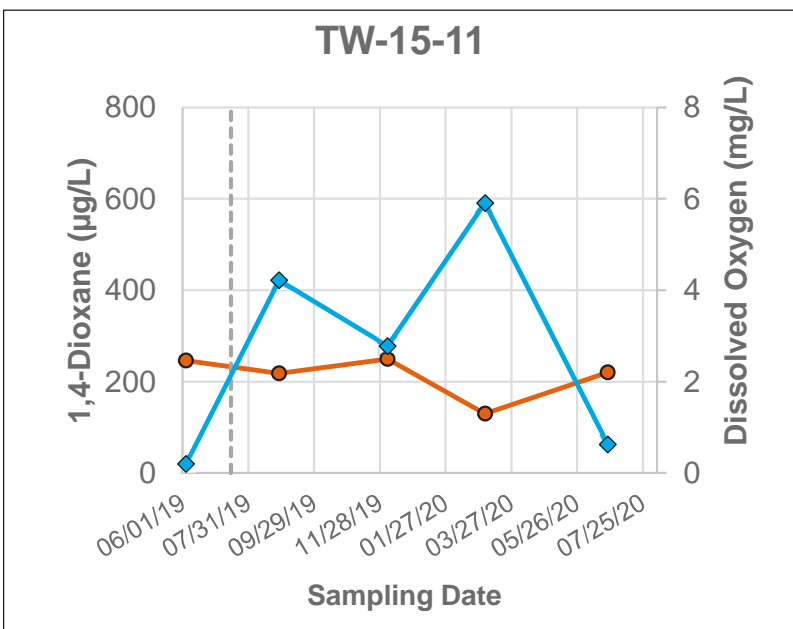
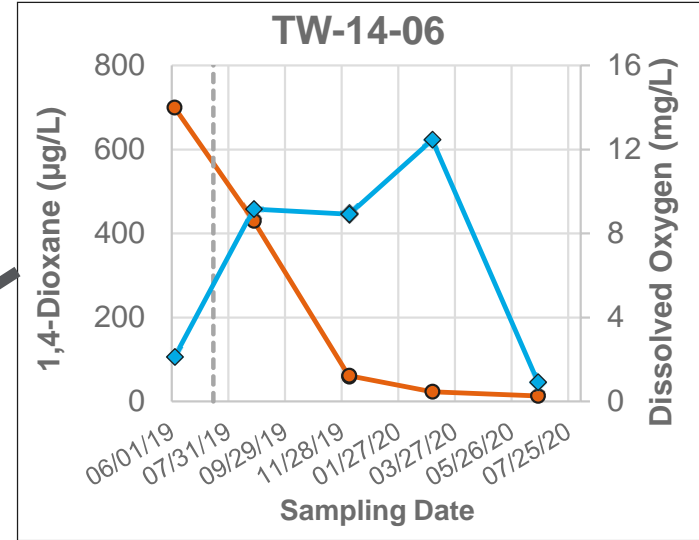
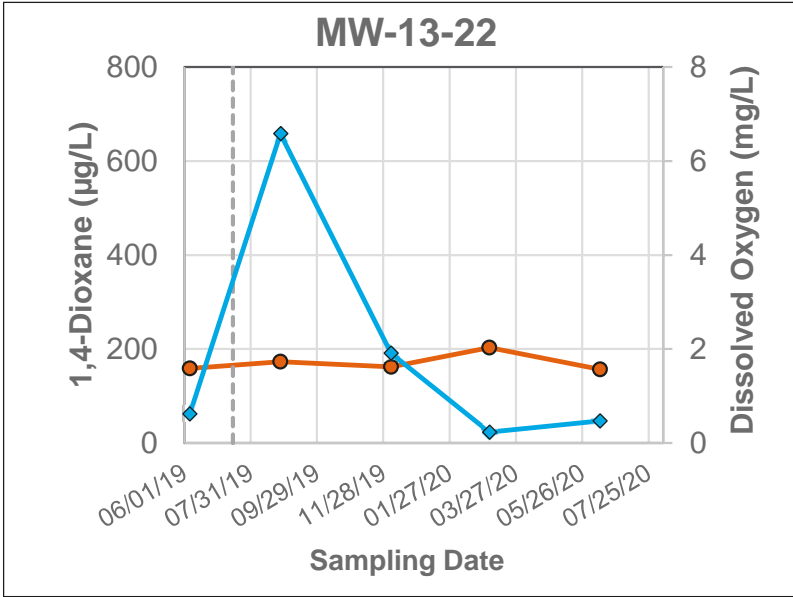
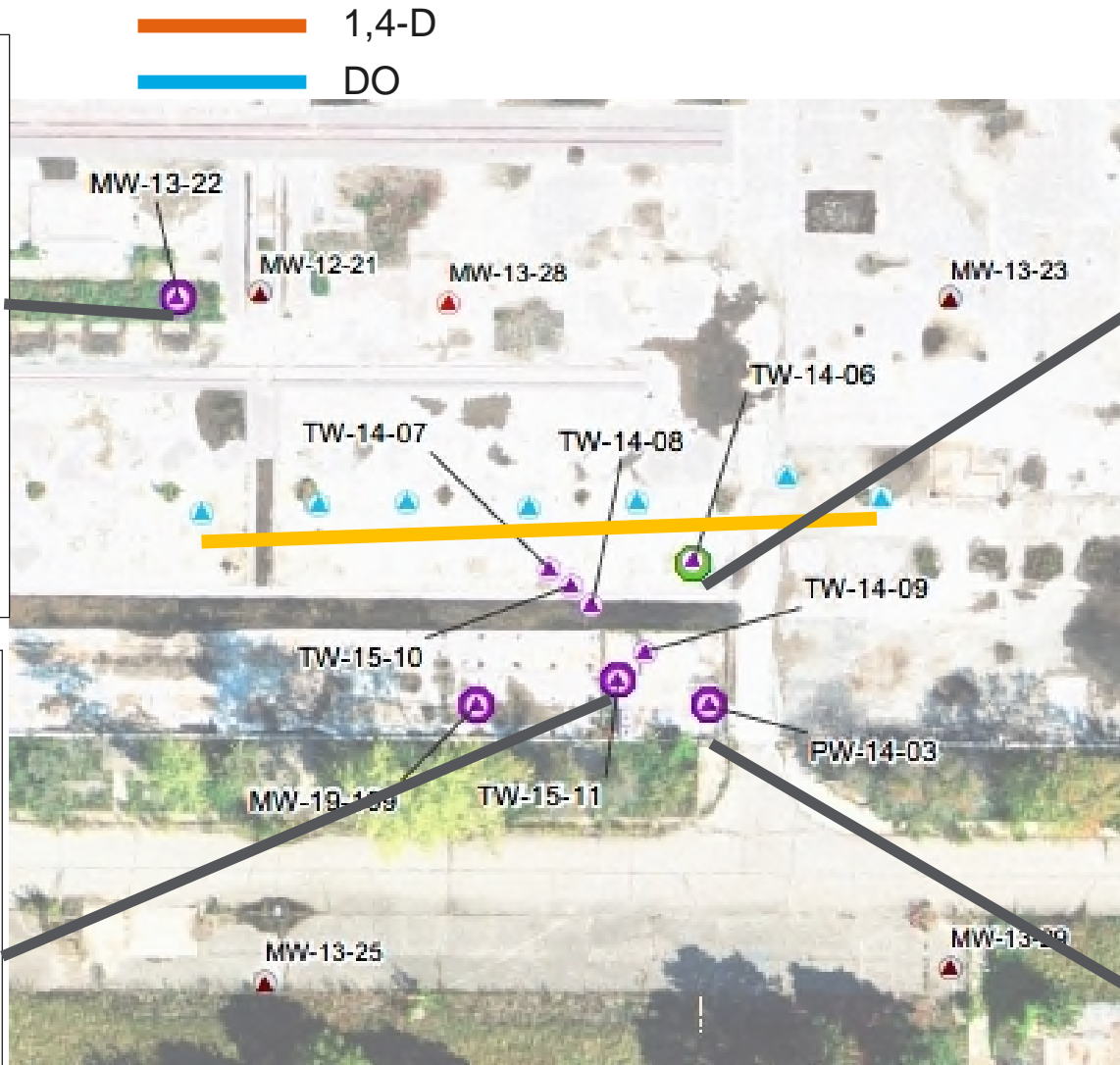
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14 October 2020

Remediation of 1,4-Dioxane in the Weathered Bedrock

Plant 3 Performance Results



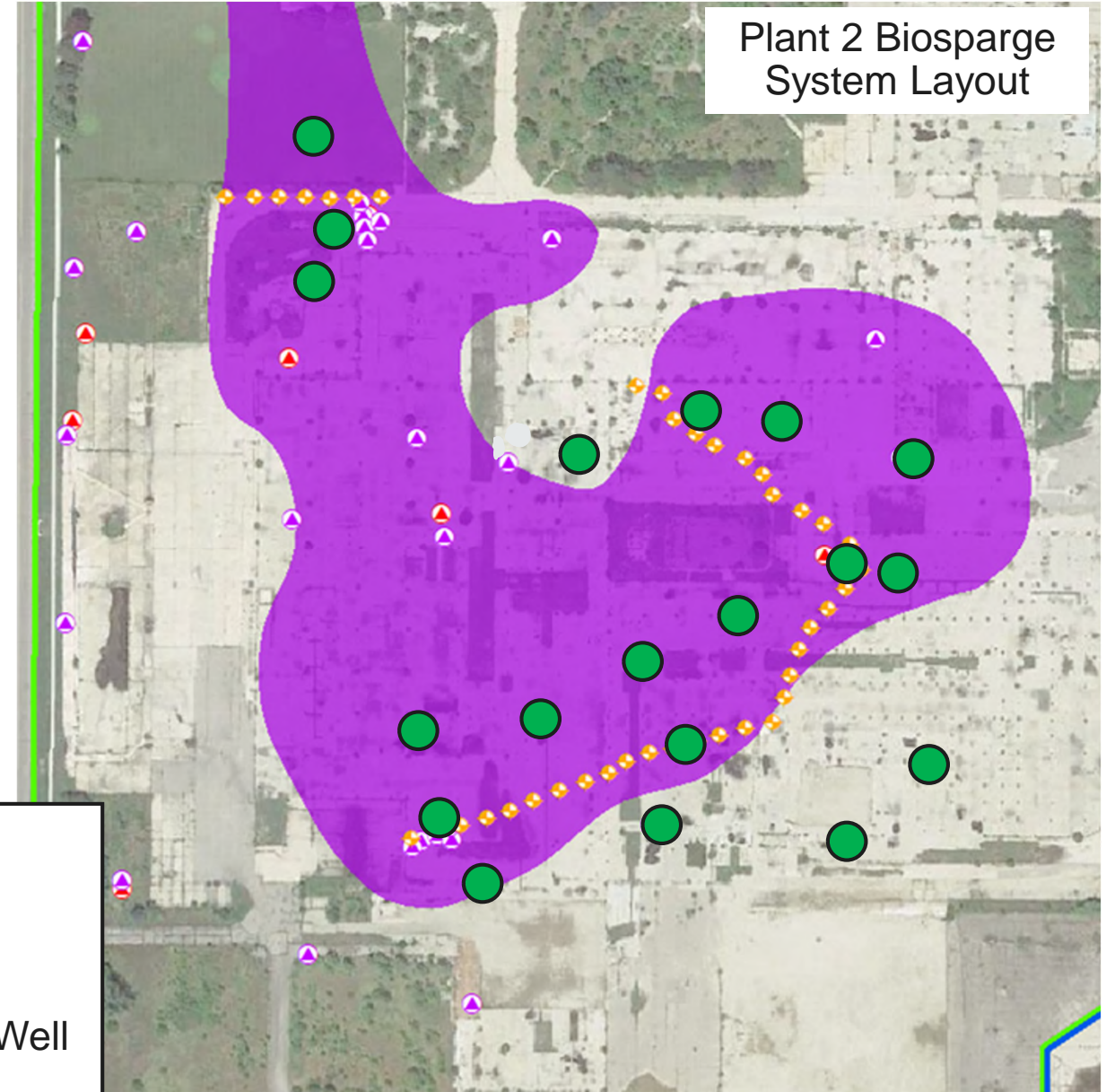
Note

- Graphs generally show an increase in DO and a decrease in 1,4-dioxane which demonstrates the biosparge system is working to remediate the 1,4-dioxane.
- Last sample was collected in July while system down for 2 months due to a broken compressor

Remediation of 1,4-Dioxane in the Weathered Bedrock

Plants 2 & 3 Biosparge System Next Steps

- Third quarter performance monitoring at Plant 3 completed in September and we are waiting for results
- Baseline monitoring at Plant 2 was completed in September and we are waiting on results
- Routine nutrient injection event was completed in mid-September to help stimulate degradation of 1,4-dioxane
- Next performance monitoring sampling event for Plants 2 & 3 is scheduled for December



- 1,4-Dioxane Plume
- Performance Monitoring Well
- ⊕ Biosparge Well
- ▲ Other Weathered Bedrock Monitoring Well
- ▲ Bedrock Monitoring Well

Remediation of PFAS Impacts

Plant 2 PFOS Storm Sewer Results (July)

- Filled 2 additional manholes with concrete in May 2020 to isolate areas with concentrations of PFAS above criteria in sewers
- Sampling completed in July and was preceded by a particularly dry period with no rainfall
- Northwest Outfall manhole P2-MH-2 results

Date	PFOS (ng/L)
Jan 2019	161
Feb 2020	31.3
July 2020	45

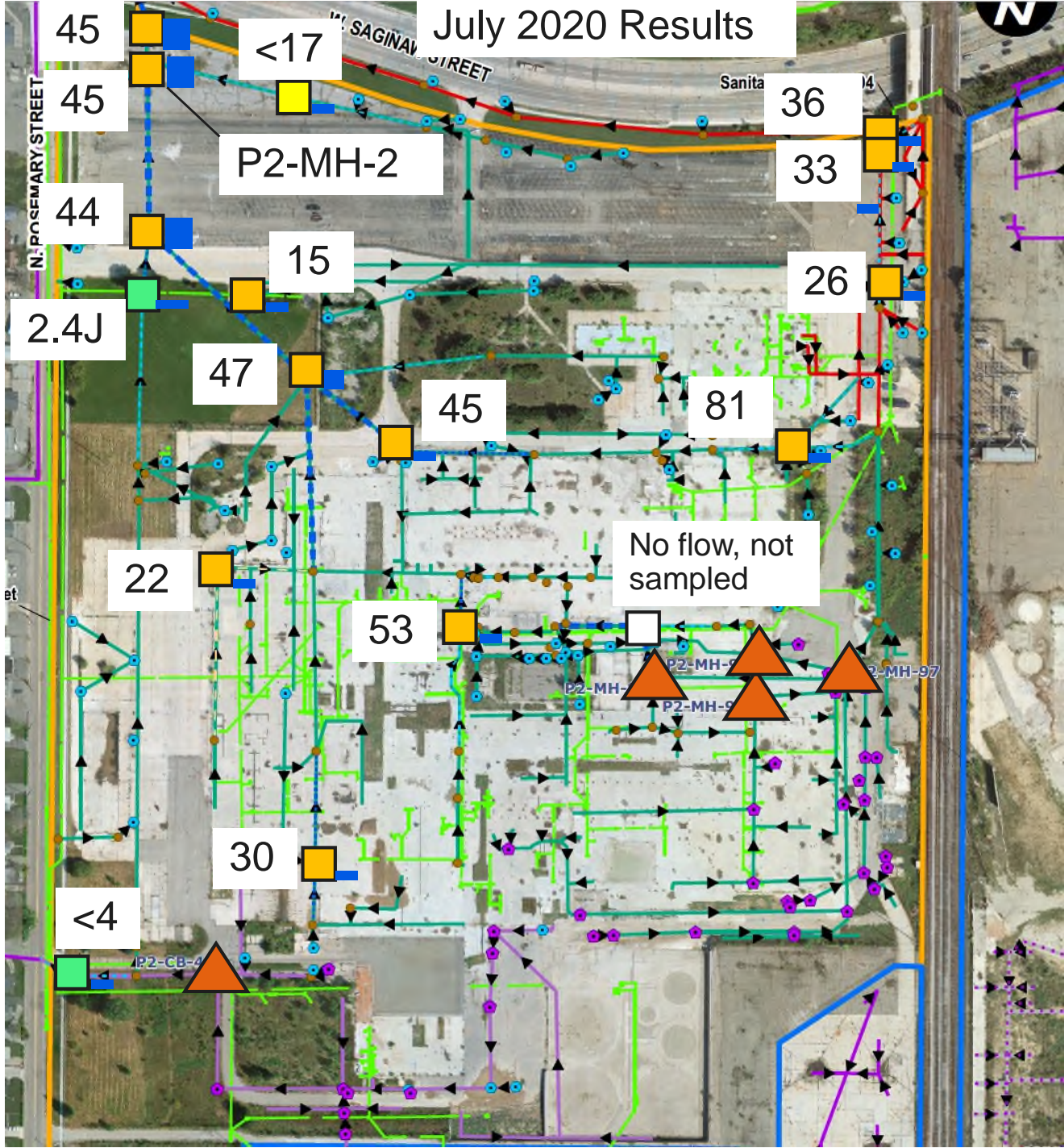
Concentrations decreasing (improving) over time

PFOS Results are in ng/L

- Does not exceed criteria
- Exceeds PFOS Surface Water Criteria (12 ng/L)
- Laboratory detection limit Exceeds PFOS Surface Water Criteria (12 ng/L)
- Manhole filled

Flow Under Dry Conditions

- Moderate Flow
- Little Flow
- Trickle

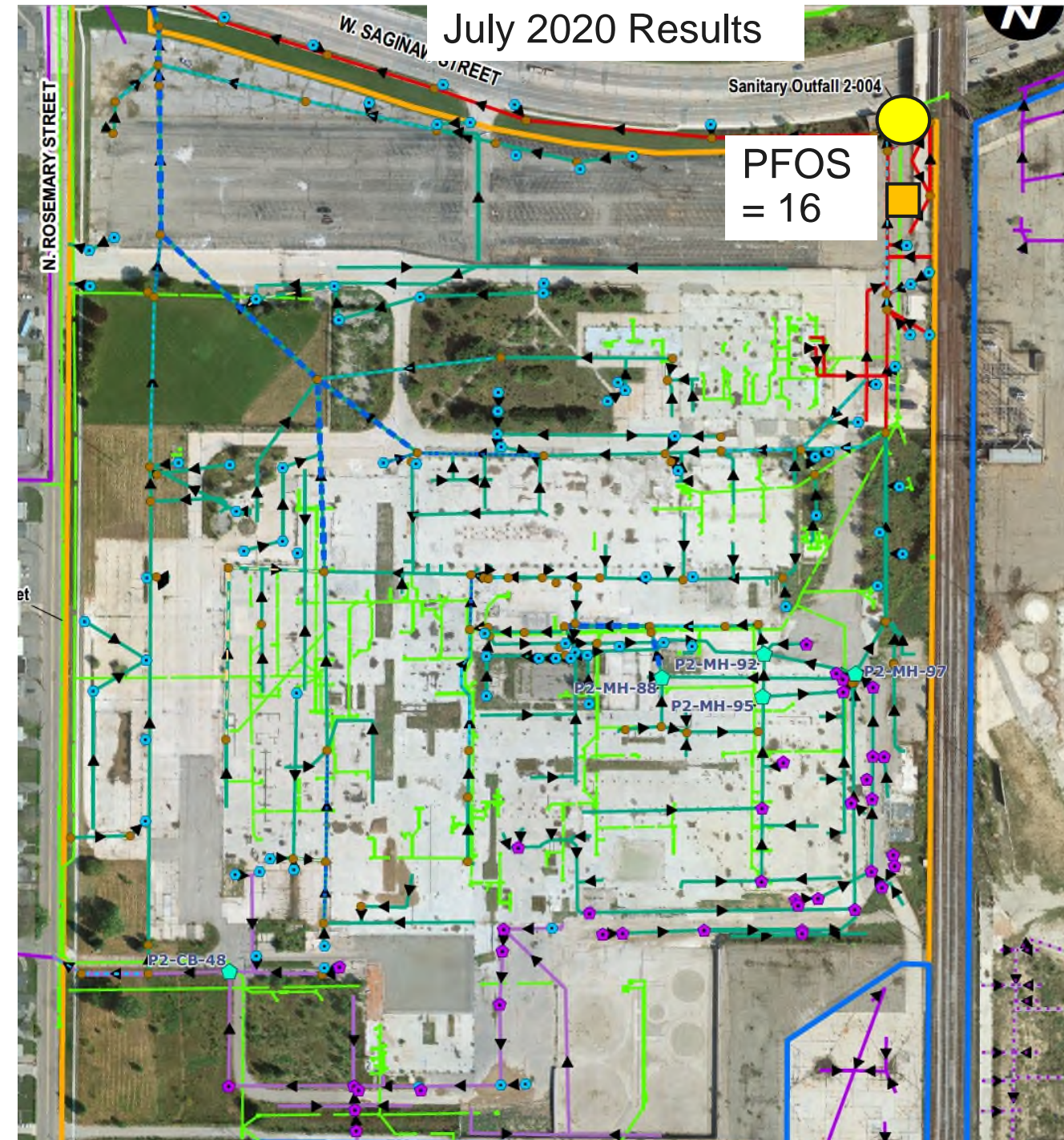


Remediation of PFAS Impacts

Plant 2 Sanitary Sewer Sampling Results (July)

- A trickle of water was observed in sanitary sewer line near northeast outfall
 - Flow within inactive sanitary sewer indicates potential GW infiltration
 - Sample collected from sanitary outfall above GSI for PFOS
- No outfall could be identified along western property boundary – RACER sanitary line appears separate from Rosemary Street sanitary line
- Recommend filling northeast sanitary manhole with concrete

● Sanitary Sewer Outfall
— Sanitary Sewer Line



Remediation of PFAS Impacts

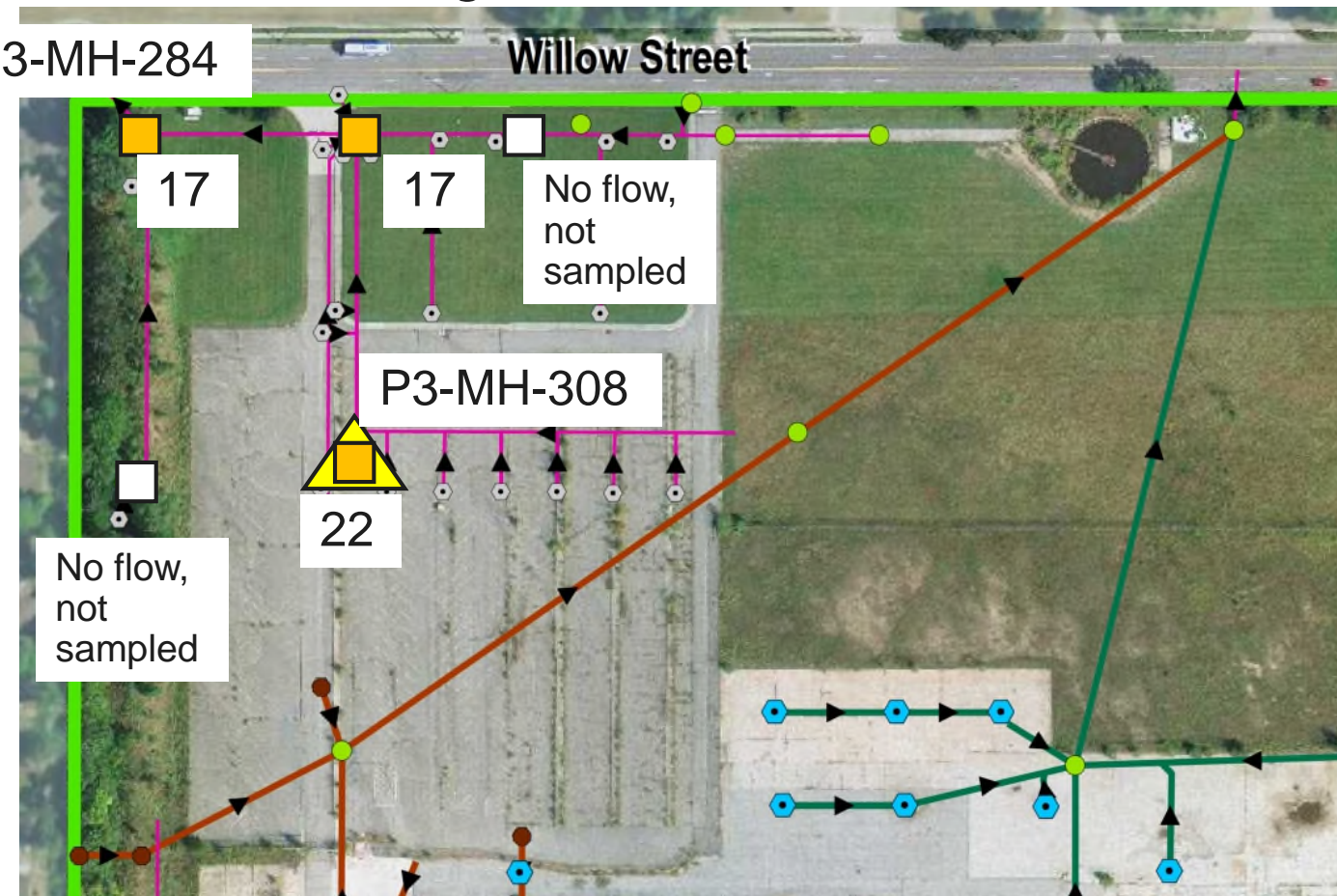
Plant 3 Storm Sewer Northwest Parking Lot

- Plant 3 Northwest Outfall P3-MH-284.

Date1	PFOS (ng/L)
February 2020	5.1
July 2020	33
August 2020	17

- Also conducted expanded sampling in August to identify locations of PFAS impacts in sewer
- Recommend filling P3-MH-308
- Recommend continued monitoring of Outfall

August 2020 Results

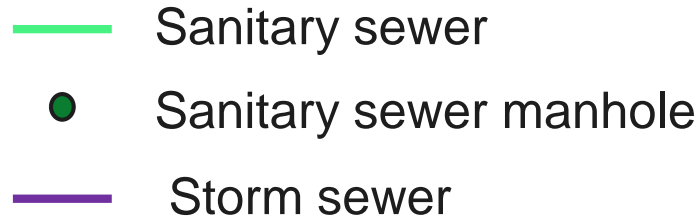
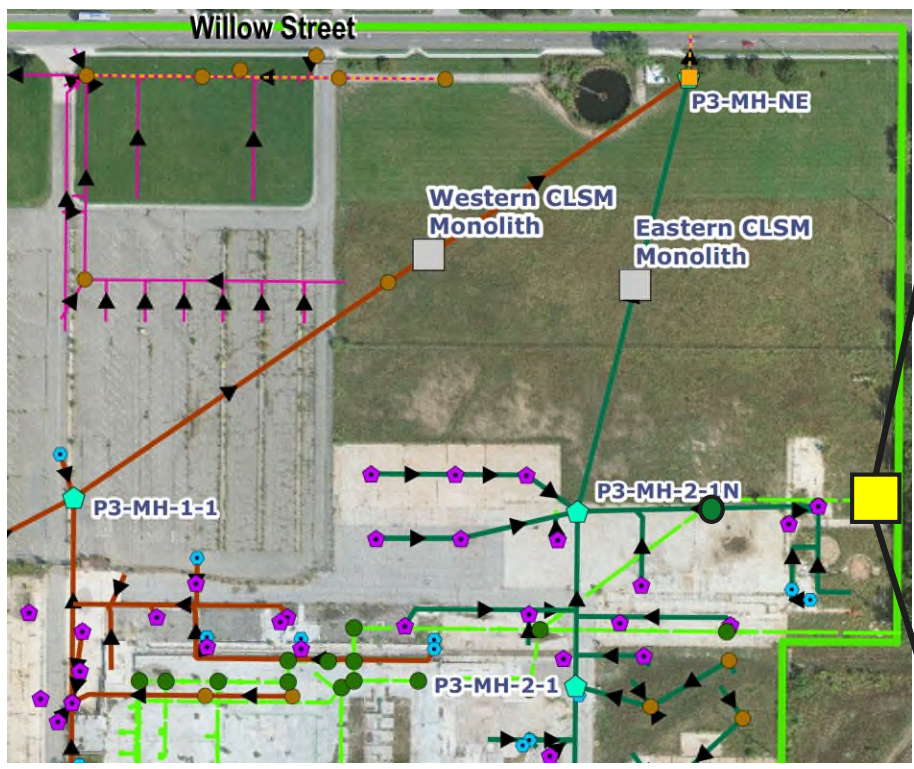


 Manhole to fill

Remediation of PFAS Impacts

Plant 3 Northeast Sanitary Outfall

- Sanitary sewer vault and flume structure located at NE property outfall
- Trickle flow observed discharging after rain events, no discharge in dry weather
- Flow may be groundwater infiltration based on upstream observations
- Recommend bulkheading pipe entering sanitary vault to mitigate potential for discharge



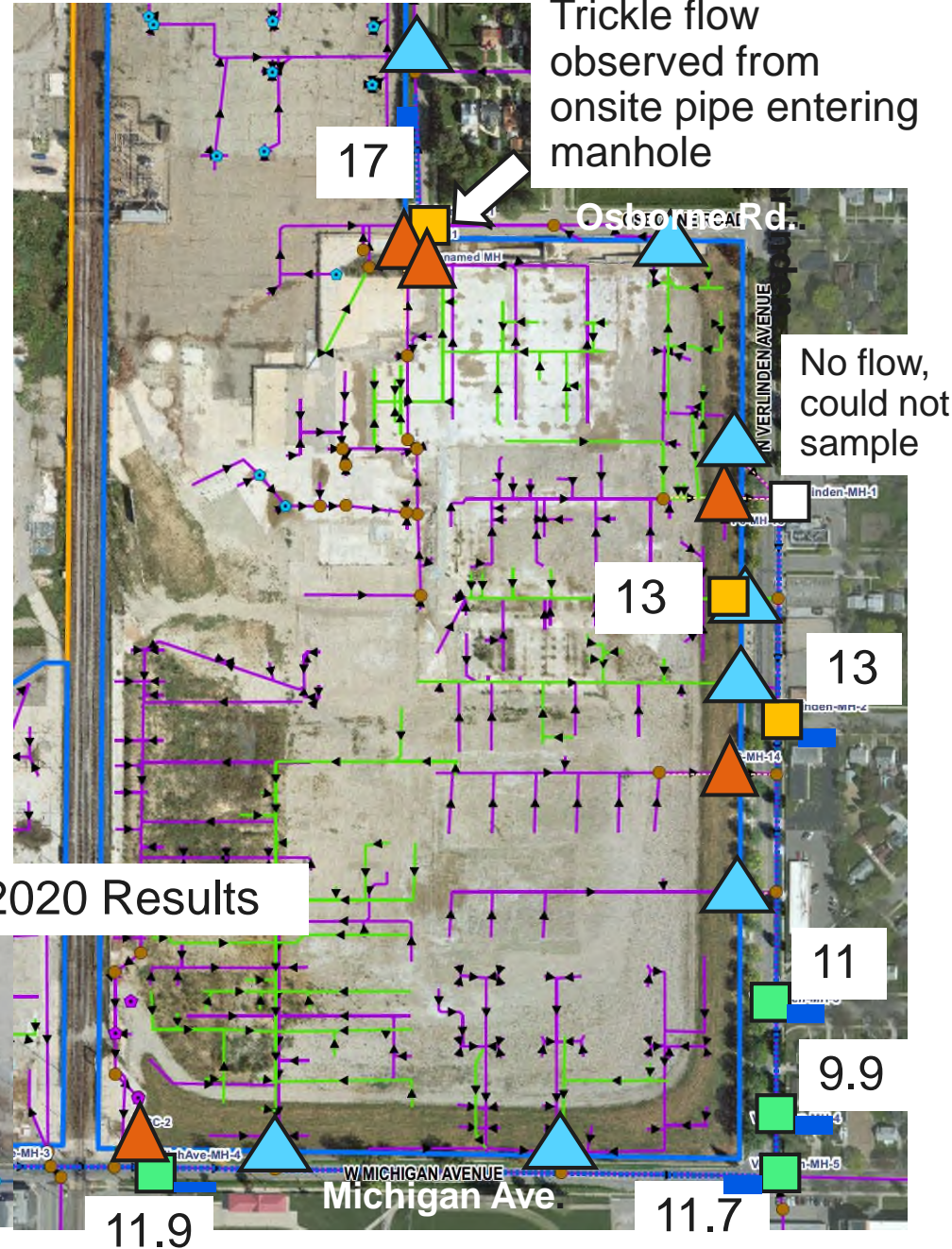
Trickle flow observed in sanitary sewer outfall

Remediation of PFAS Impacts

Plant 6 Storm Sewer PFOS Results Summary

- Majority of outfalls have now been plugged or cut and capped at the curb
- Trickle flow observed from 3" pipe coming from the direction of the Site and entering Osborne Street manhole
- Recommend plugging 3" pipe
- Recommend performing video inspection of offsite sewers to look for groundwater infiltration

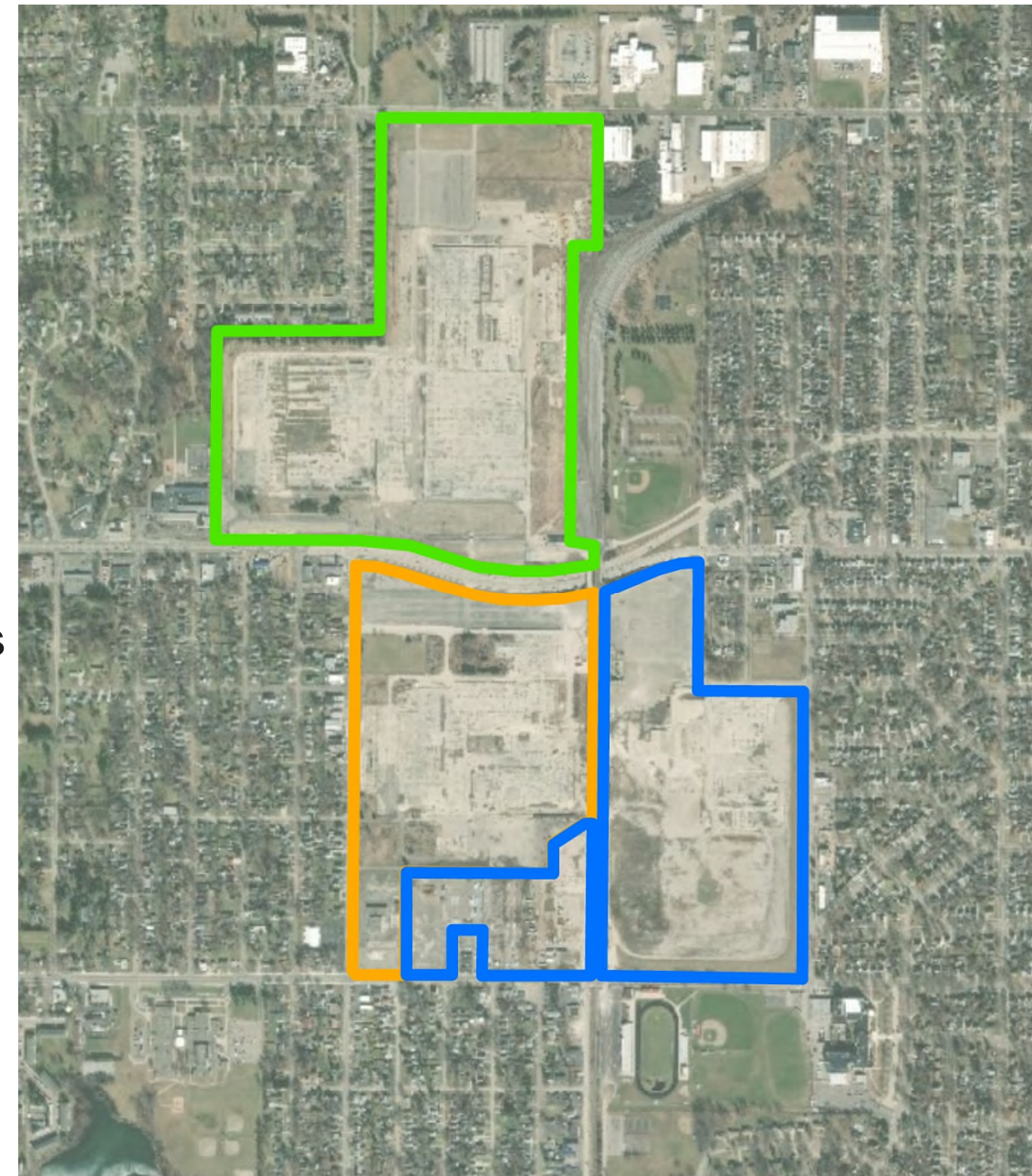
PFOS Results are in ng/L		Flow Under Dry Conditions	
	Does not exceed criteria		Moderate Flow
	Exceeds PFOS Surface Water criteria (12 ng/L)		Little Flow
	Manhole filled		Trickle
	Sewer line cut and capped at curb in 2014		



Remediation of PFAS Impacts

Next Steps

- Submit Work Plan to implement recommendations to EGLE, City and County
- Complete Plant 2 and 3 sewer modifications in 2020, upon approval:
 - ❑ Plant 2 – fill 5 manholes and cap associated catch basins
 - ❑ Plant 3 – fill 1 manhole and cap associated catch basins
 - ❑ Plant 6 – Plug lateral entering Osborne St. manhole, perform video inspection of offsite sewers to identify groundwater infiltration
- Resample following modifications in Q4
- Identify next steps, if necessary

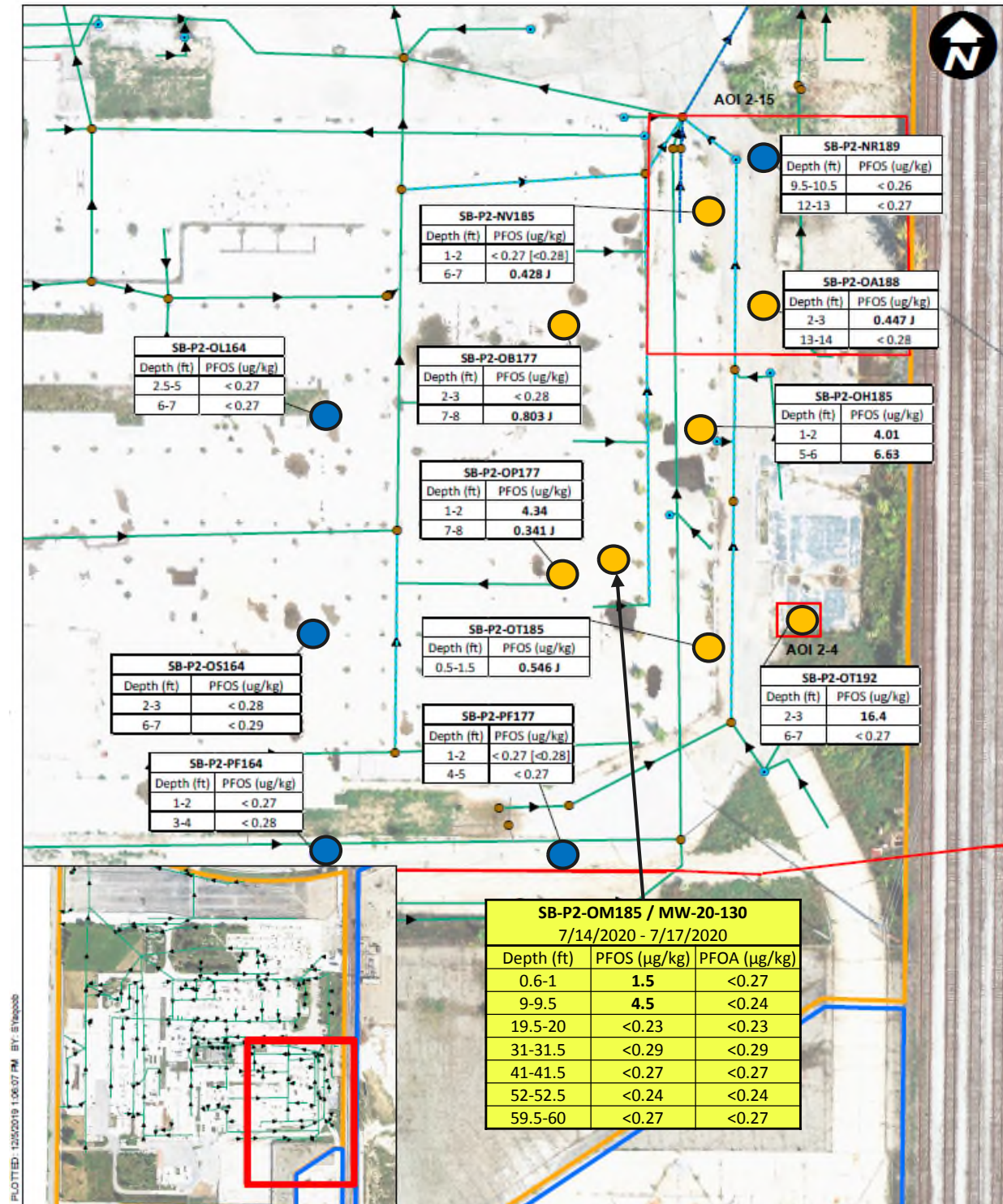


Investigation of PFAS Impacts

Plant 2 PFAS Investigation – Soil Analytical Results

- Investigation completed in July
- Soil samples collected at about 10' intervals down to weathered bedrock at SB-P2-OM-185
 - Soils < 10' below ground surface (bgs) exceed groundwater surface water interface protection (GSIP) criteria for PFOS
 - Soils > 19.5' bgs are non-detect
- SB-P2-OM-185 was converted to a weathered bedrock monitoring well to monitor for vertical migration
- Double cased (outer casing cemented into the till underlying the perched zone) down to 36' bgs

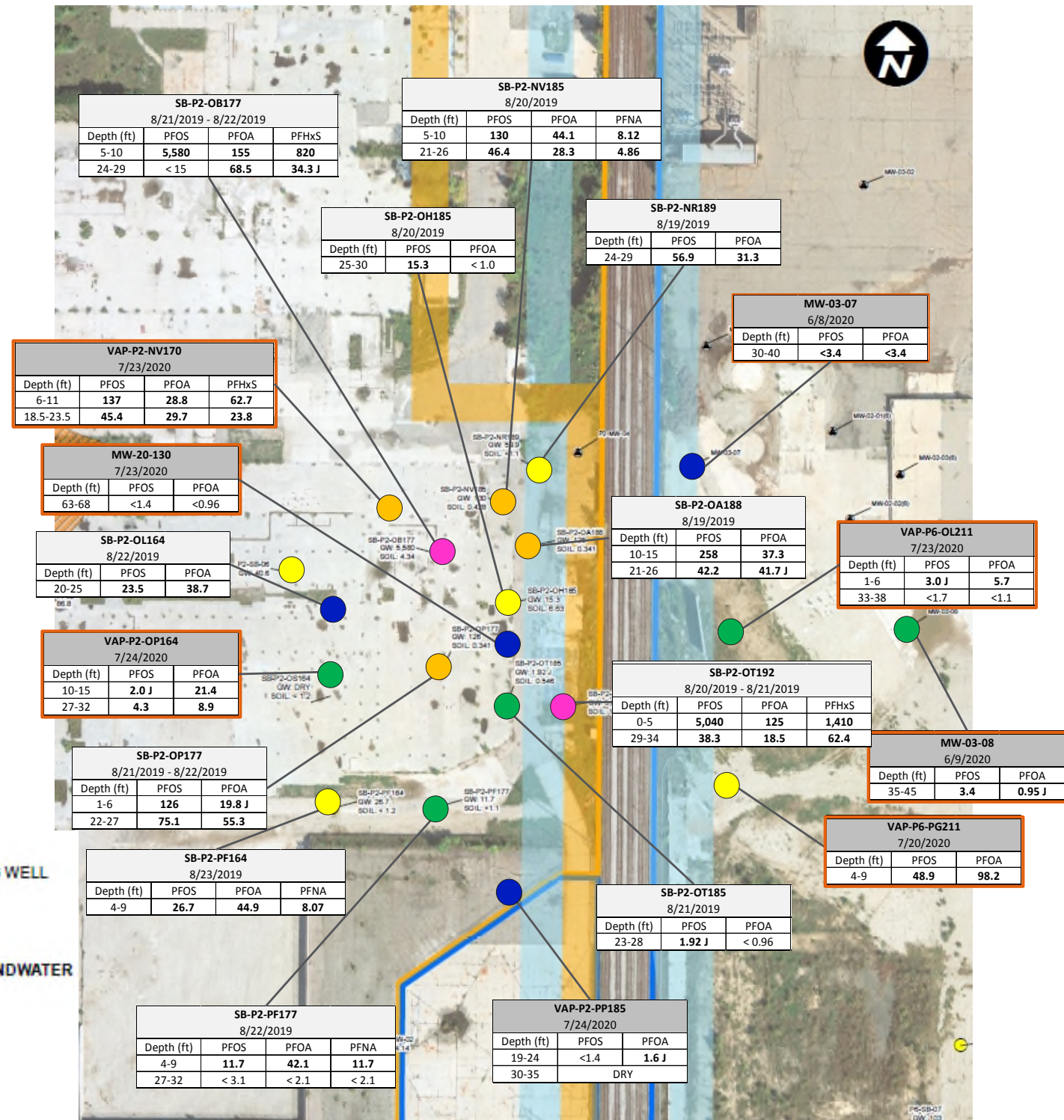
- VAP SOIL BORINGS
- PFOS < GSIP CRITERIA (0.24 ug/Kg)
- PFOS > GSIP CRITERIA (0.24 ug/Kg)
- CATCH BASIN TO REMAIN OPEN
- ▭ AREA OF INTREST
- MANHOLE



Investigation of PFAS Impacts

Plant 2 PFAS Investigation – GW Analytical Results

- Results of July 2020 PFAS investigation highlighted
 - 5 vertical aquifer profile (VAP) borings completed to ~40' bgs
 - 2 samples collected where multiple permeable zones were encountered
 - 2 existing monitoring wells sampled
 - New weathered bedrock monitoring well MW-20-130 sampled
- Non-detects in MW-20-130 indicate no vertical migration



Investigation of PFAS Impacts

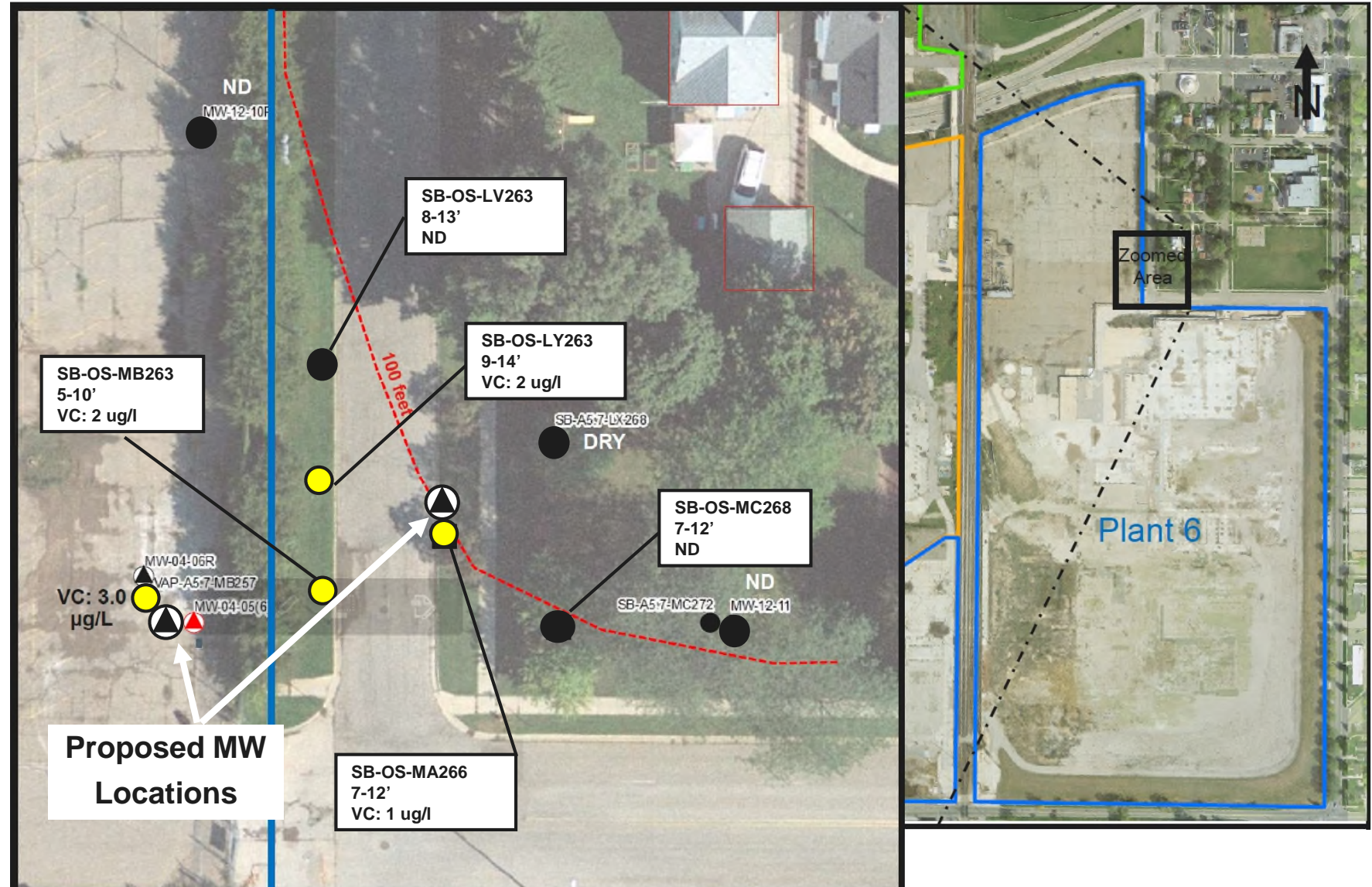
Plant 2 PFAS Summary

- The result of the soil sampling and weathered bedrock monitoring well sampling suggest PFAS does not migrate vertically
- PFAS in shallow soil near AOCs is in the central portion of site and does not pose a risk of direct contact. Associated shallow impact to groundwater is being managed via storm sewer bulkheading to prevent off-site migration.
- PFAS in shallow GW is partially delineated to GSI criteria but likely comingled (or the source of) concentrations associated with adjacent areas at Plant 2, and comingled to the east /southeast on Plant 6 with concentrations associated with the former rinse water cistern
- No additional investigation recommended at this time

Investigation of Soil Vapor

Plant 6 Additional VI Investigation

- Completed 5 VAP borings in July to delineate vinyl chloride detected in shallow GW at VAP-A5.7-MB257
- Detections of vinyl chloride in 3 of the 5 borings at 1-2 µg/L
- The results of the sampling suggest no vapor intrusion to indoor air to off-site residences
- Recommend installation of two monitoring wells to monitor vinyl chloride in the shallow zone



- <SSVIAC for vinyl Chloride (0.96 µg/L)
- >SSVIAC for vinyl Chloride (0.96 µg/L)

Quarterly Groundwater Monitoring – 3Q 2020

- Completed 3Q groundwater monitoring in accordance with the October 2019 revised Interim Groundwater Monitoring Program (IGMP) approved by EGLE
- 3Q event was completed between August 31st and September 4th, 2020.
- Sampled 49 wells for one or more of the following constituents of concern (COCs): PFAS, semi volatile organic compounds (SVOCs), volatile organic compounds (VOCs) and 1,4-dioxane. This included;
 - 16 wells sampled and analyzed for PFAS;
 - 26 wells sampled and analyzed for 1,4-dioxane.
 - 5 wells sampled to help gauge the performance of the 1,4-dioxane biosparge system(s);
 - 2 wells sampled and analyzed for SVOCs;
 - Groundwater elevations were collected from a total of 87 wells.
- Results are expected in 4Q 2020 and will be included in the comprehensive 2020 Annual Groundwater Monitoring Report, which is expected to be submitted in 2Q 2021.

Work in Progress and Near-Term Milestones Anticipated During the 4Q 2020

Activity	Schedule
Remediation of 1,4-Dioxane in the Weathered Bedrock	
Lower 1,4-Dioxane Updated Conceptual Site Model	November 2020
Plants 2 and 3 Biosparge System Operation	Ongoing
Plants 2 and 3 performance monitoring	November/December 2020
Biosparge Construction Completion Report	November/December 2020
Remediation and Investigation of PFAS	
Plants 2, 3 & 6 Additional Storm Sewer Modifications Work Plan	October 2020
Implement Plants 2, 3 & 6 Additional Storm Sewer Modifications Work Plan	November/December 2020
Installation of Plant 6 Perimeter Wells to evaluate PFOS exceedances	November/December 2020
Storm sewer modifications, site wide (Plants 2, 3 and 6) inspections and monitoring	November/December 2020
Other investigations and Sampling	
Shallow soil sampling at Plant 2 and 3 to support delineation of needed soil/concrete covers over soil that exceed criteria and to support a plan to address PCB-impacted soil	October 2020
4Q 2020 IGMP Sampling Event	November/December 2020
Installation and sampling of Plant 6 VI Monitoring wells;	November/December 2020
Abandonment of select groundwater monitoring wells	November 2020

Appendix

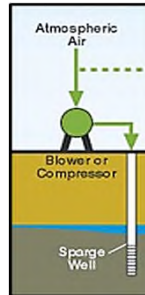
BIOSPARGING TREATMENT OF 1,4-DIOXANE



Lansing Industrial Land, Lansing and Lansing Township, Michigan,

WHAT IS BIOSPARGING?

- Air and small amounts of propane are injected into the ground through wells
- Promotes biodegradation of chemicals in groundwater, much faster than it would occur naturally
- 1,4-dioxane is treated in the ground, so minimal waste is generated
- Nearby wells are sampled to make sure treatment is occurring

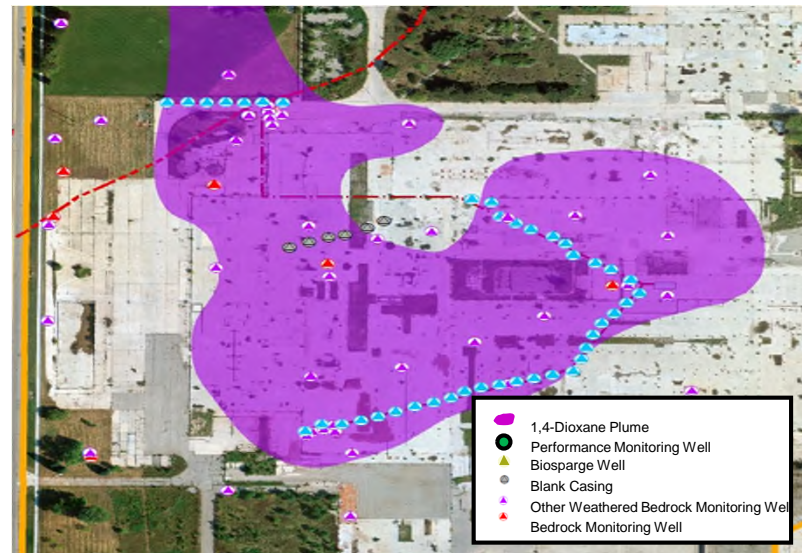


Propane

SYSTEM SETUP

- 2016 Pilot Test Biosparge Points
- 2018 Pre-Design Study Biosparge Points With Sand Enhancements
- Weathered Bedrock Monitoring Well

Plant 2 Biosparge Transect Layout



CONCLUSIONS

- Biosparging is a low cost, effective, safe and sustainable method for treating 1,4-dioxane
- Installation of sand enhancements improves treatment
- Continual monitoring of the treatment system improves results
- Technology can be scaled up to treat the rest of the site

FULL-SCALE DESIGN

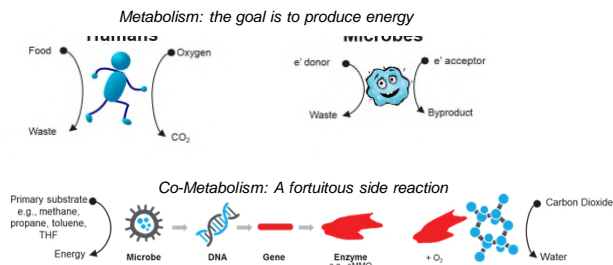
- 5 transects with 48 air sparge wells across Plants 2 and 4
- Nearly 5 miles of air hose and an air/propane injection network
- Groundwater flows from northwest to southeast and is cleaned by each transect
- Tubing installed above grade to save on costs and to accommodate future development
- Network of monitoring wells to track treatment progress
- Initial results showing up to a 97% reduction in 1,4-dioxane in just one year



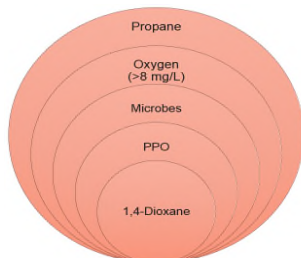
TREATMENT OBJECTIVES

- Reduce onsite concentrations of 1,4-dioxane in the top/weathered zone of the bedrock aquifer
- Prevent off-site migration of 1,4-dioxane

CO-METABOLIC BIODEGRADATION OF 1,4-DIOXANE:



Propane + Oxygen + Microbes = 1,4-Dioxane Treatment



Plant 2 Biosparge Unit and Nutrient Injection Tanks