Go Further

PROJECT UPDATE

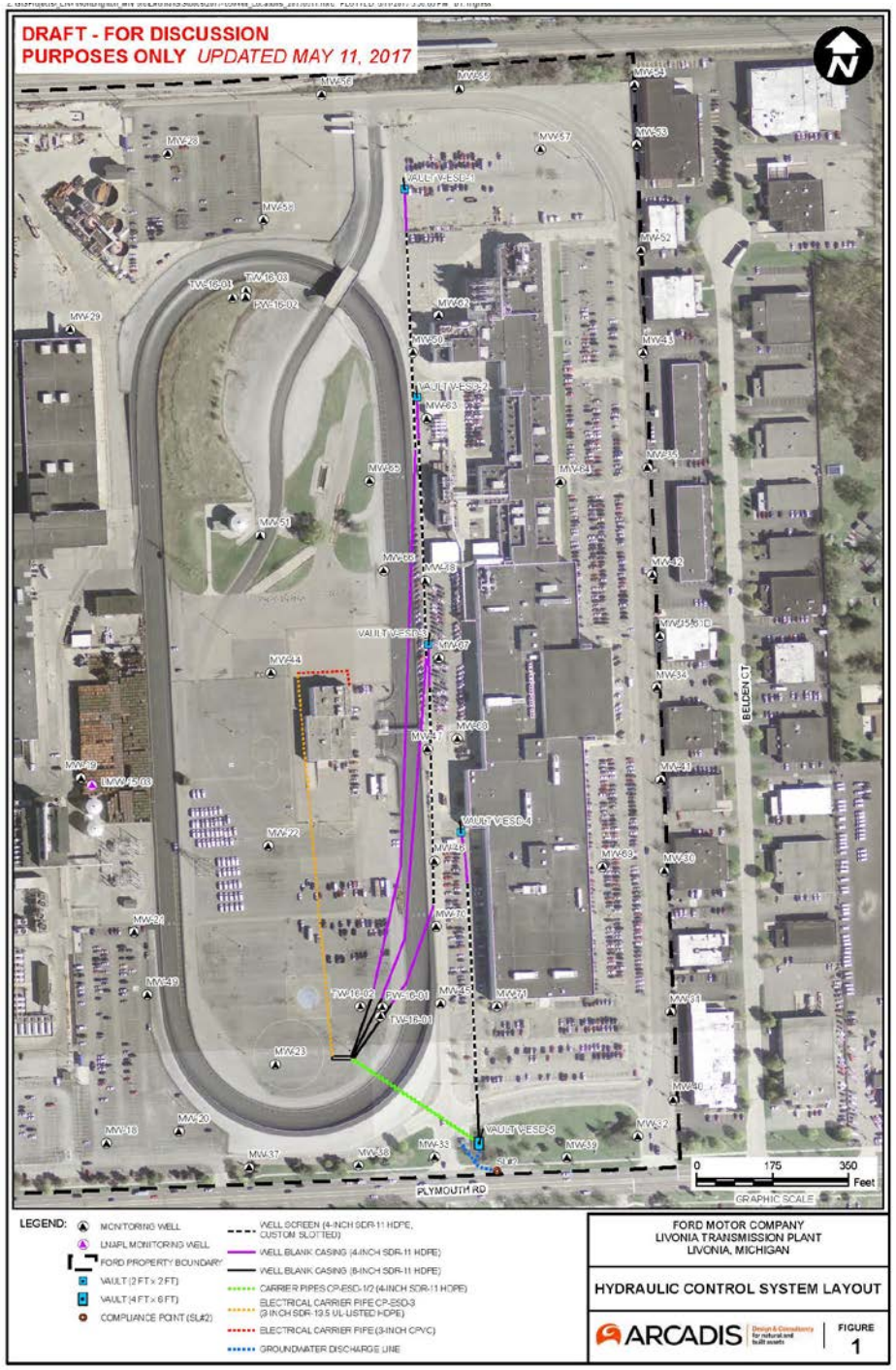
Ford Livonia Transmission Plant

August 3, 2017

Agenda

- Hydraulic Control System
- Off-site Conceptual Site Model
- Building Survey Results
- Off-Site Groundwater Results
- Off-Site Soil Vapor Results
- Path Forward

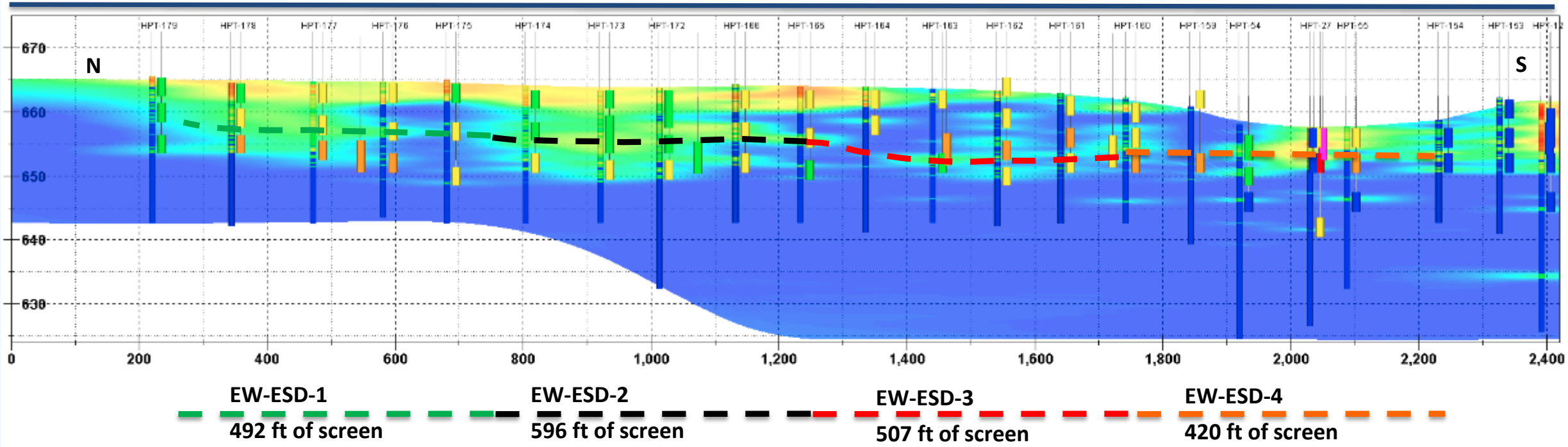
HYDRAULIC CONTROL SYSTEM

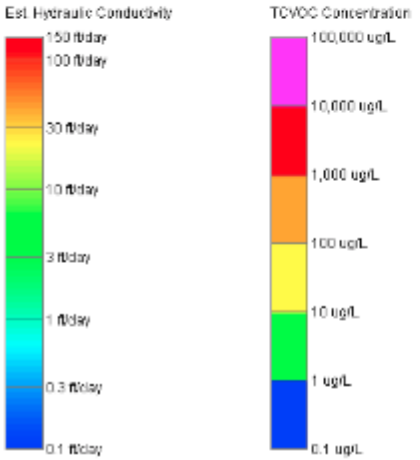


System Overview

- Four horizontal wells installed November 2016 – February 2017
- Hydraulic control system operating since March 2017
  - ~ 5.6M gallons treated as of (July 28, 2017)
  - ~30-40 gpm daily average flowrate
- Extraction wells configured to intercept groundwater migrating west to east via natural gradients
- Extraction wells designed to provide a hydraulic barrier to migration of VOCs

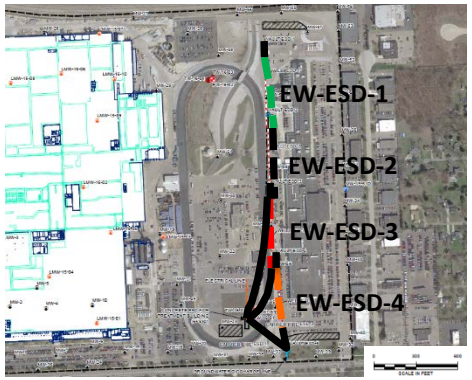
Hydraulic Barrier: Extraction Wells





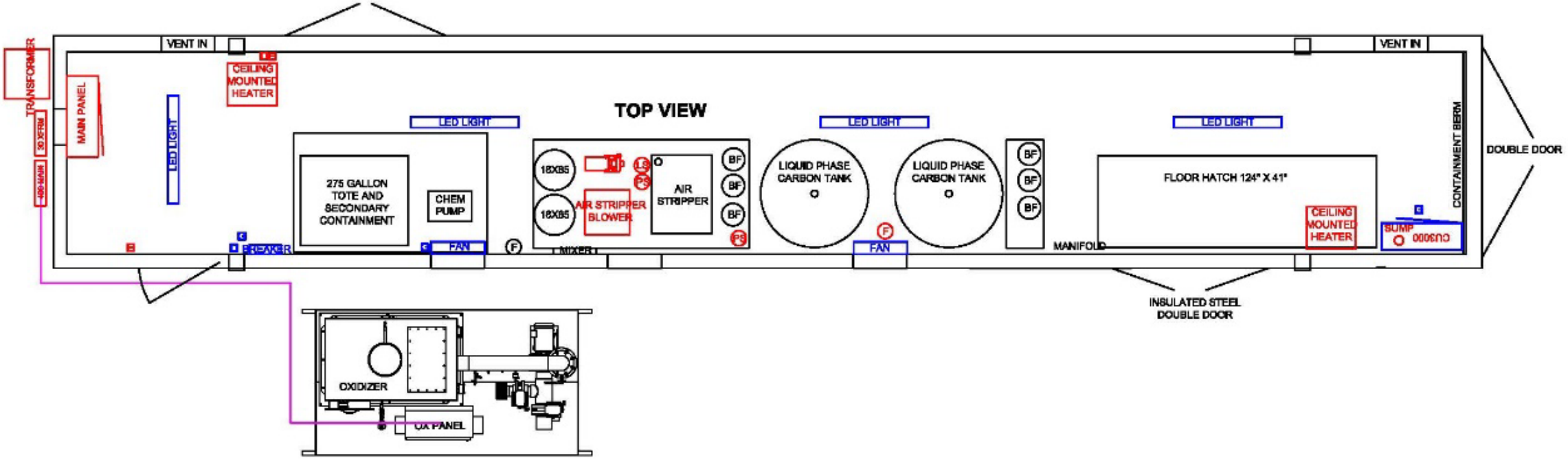
Hydraulic Conductivity

- 2,000 ft long hydraulic barrier
- Four screens 16.5 – 22.5 feet below grade surface (bgs)
- Screens placed in high permeability zones for optimal capture of VOCs
- 4-inch-diameter HDPE well materials with 6-inch risers at southern ends
- Solid riser sections not shown



Groundwater Treatment System: Overview

- Influent Groundwater flows through Bag Filters to remove solids
- Sequestrant added to prevent precipitation of naturally occurring metals (iron, manganese)
- Air Stripper removes VOCs from Groundwater
- Effluent Bag Filters remove remaining solids
- Carbon filter provides final polishing step prior to permitted discharge to sanitary sewer
- Catalytic Oxidizer polishes Air Stripper vapor, as needed prior to discharge to atmosphere



Groundwater Treatment System: OMM

- OMM Visits Conducted Weekly
  - Data collection
  - Bag filter replacement
  - Air stripper inspection/cleaning
- OMM Data Collection
  - Pressure
  - Flow
  - Power usage
  - Maintenance record and observations
  - Samples collected (VOCs, compliance)
- System Performance
  - Start-up phase complete
  - Optimization on-going
  - System preventing off-Site migration via hydraulic capture

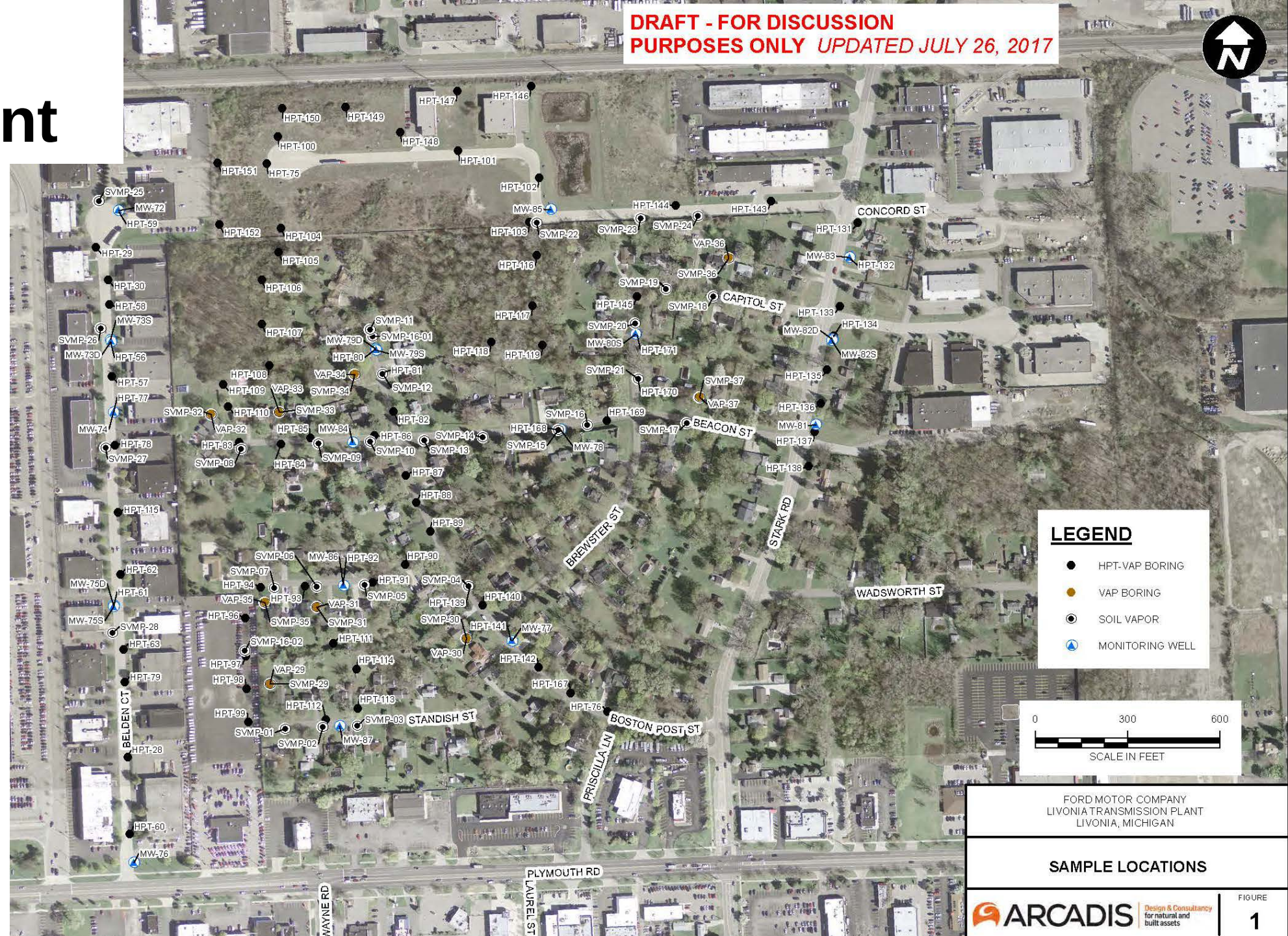
OFF-SITE CONCEPTUAL SITE MODEL

Vapor Intrusion Executive Summary

- Proactive approach to sampling in off-site area
- Multiple rounds of sampling completed
  - Groundwater 2015-2016 & 2017 → 287 samples
  - Soil vapor 2015, 2016 & 2017 → 45 samples
- Multiple meetings with MDEQ and City officials
- Conceptual site model well understood
- Multiple lines of evidence suggest vapor intrusion not occurring

Offsite Assessment

- 287 Groundwater samples
- 45 Soil gas samples

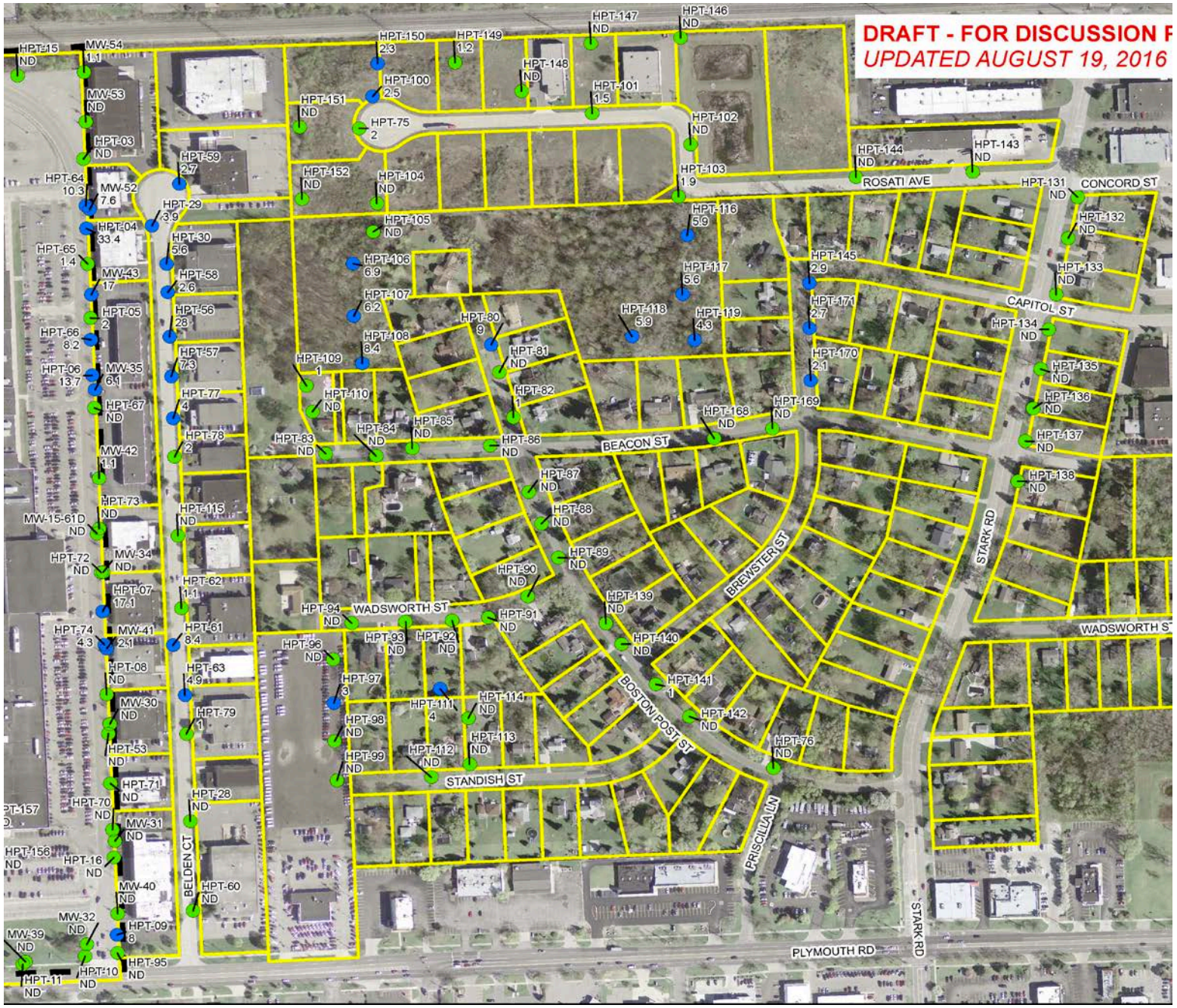


Regulatory Considerations

- Initial evaluation using MDEQ 2013 VI Guidance and Part 201 groundwater criteria (2013)
  - 2013 VI Screening values rescinded June 20, 2017
  - Part 201 groundwater criteria subject to revision in 2017
- MDEQ/MDHHS Action & Trigger Levels considered
- Consent Decree Screening Levels filed July 28, 2017
  - Residential property with a basement (most conservative scenario)
- Soil vapor and indoor air screening values from each are slightly different, but generally consistent
- Consent Decree recommended interim action screening levels for groundwater in contact with basement (GWIC) are less than MDLs for VC, TCE

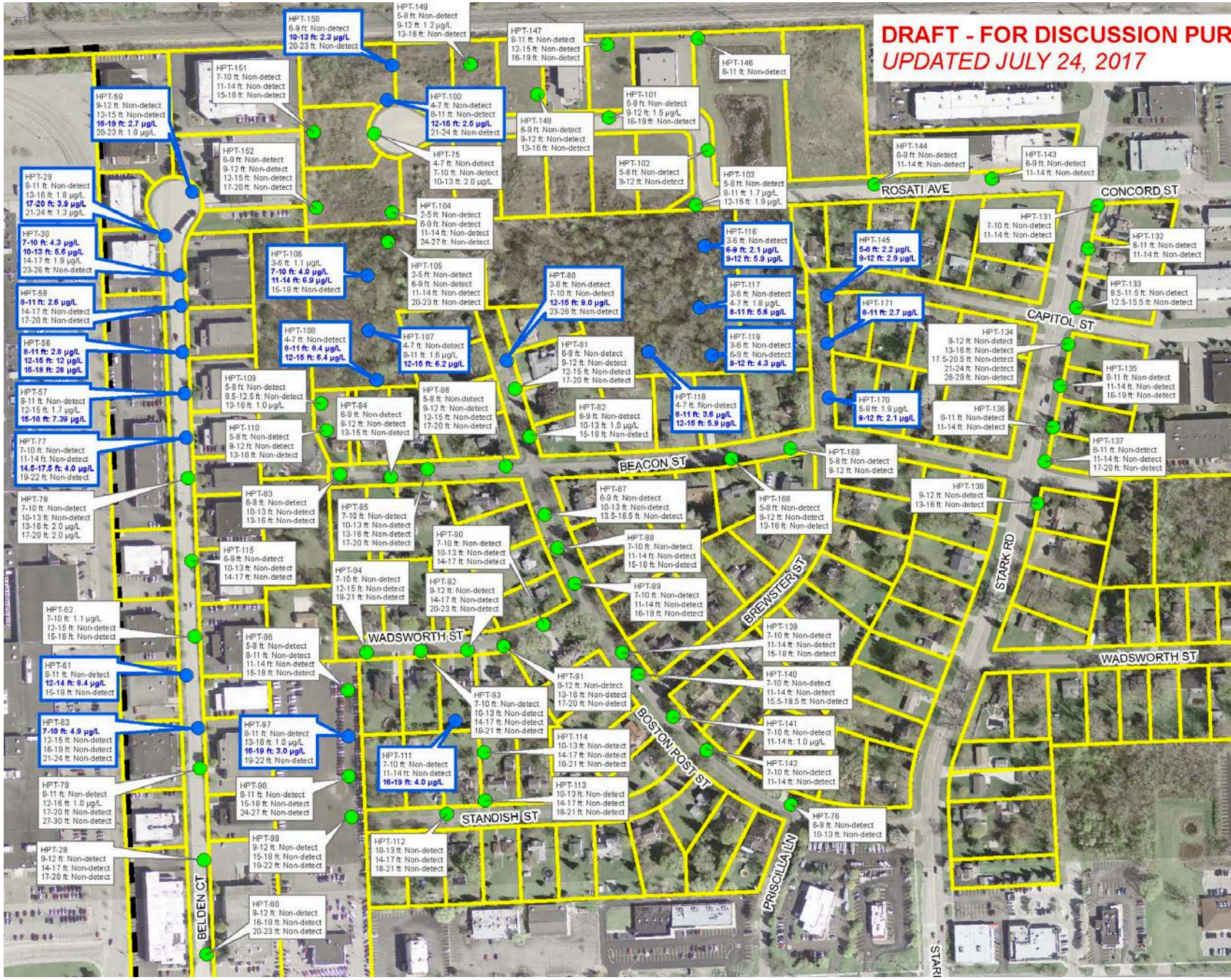
Initial Off-Site Groundwater Sampling

- Nov 2015 – Sept 2016
- Geoprobe HPT, VAP sampling
- 250 samples from 90 borings
- Exceedances of 2013 VI screening number for vinyl chloride (2 ug/L) noted at some locations (blue dot)



Initial Off-Site Vinyl Chloride Groundwater Sampling

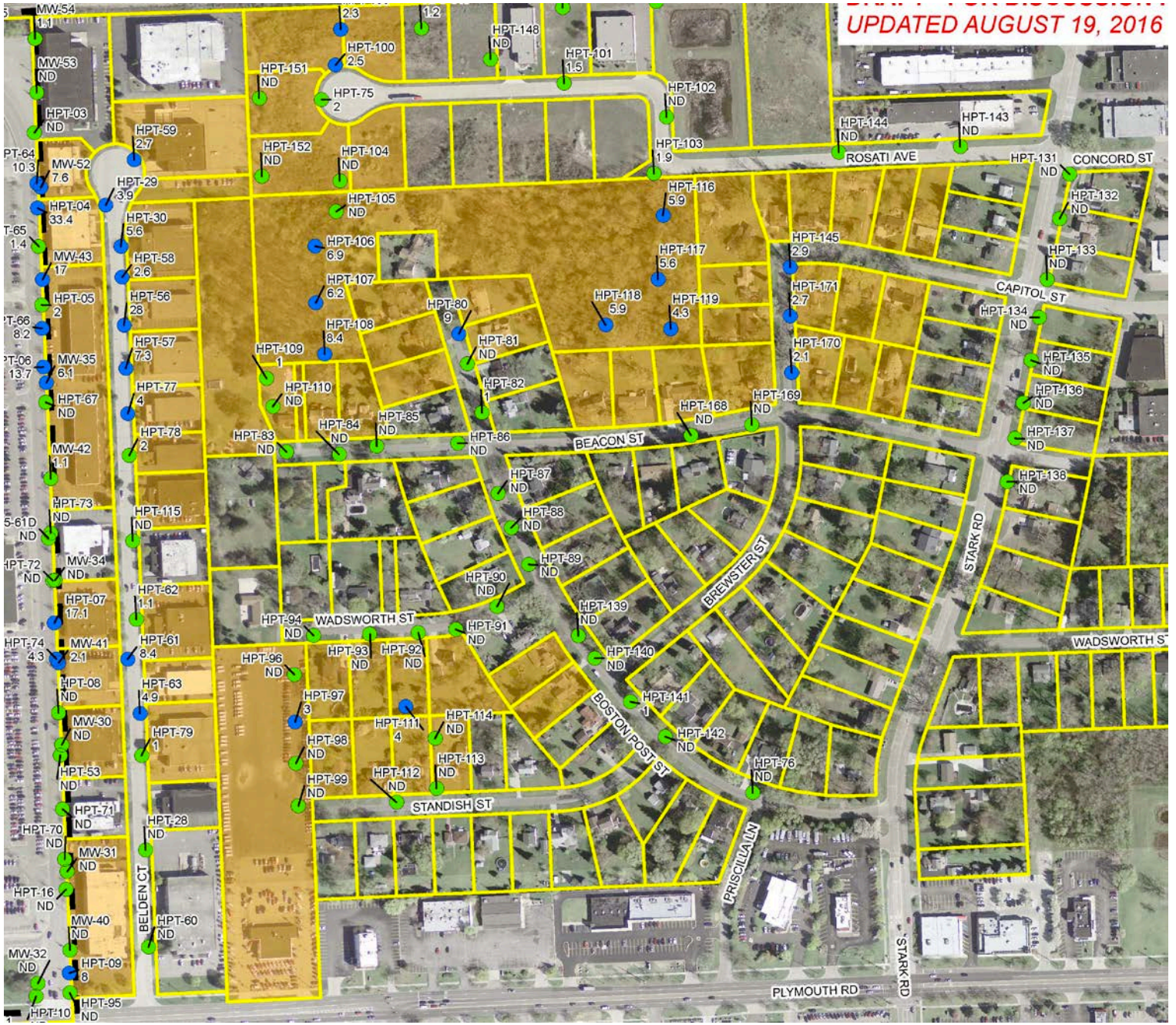
- Clean water layer present in most, but not all locations
- VC non-detect or below 2013 VI screening level of 2 ug/L at 18 of 24 locations where an exceedance noted



Parcels Potentially Affected (≥2 µg/L)

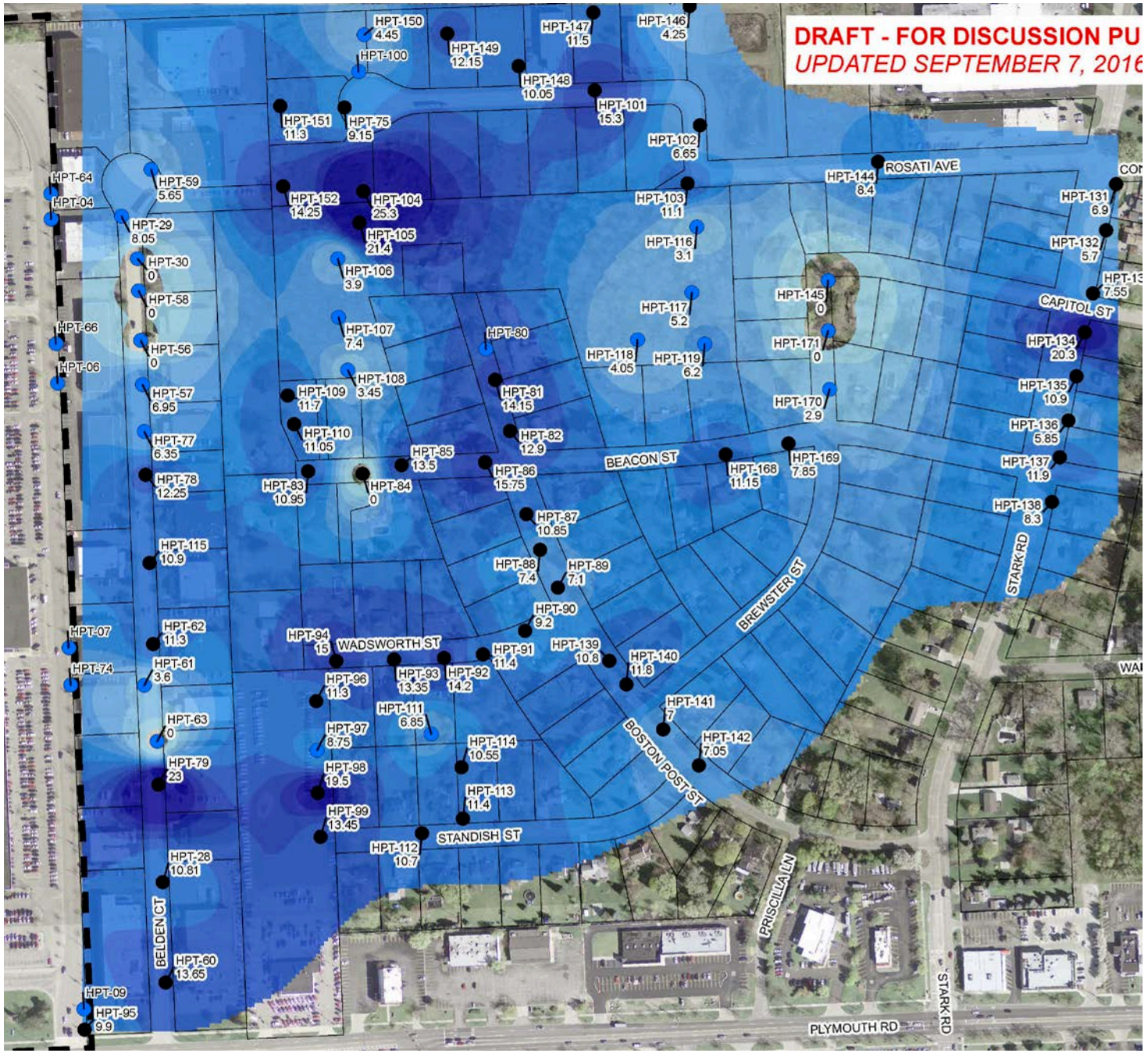
2013 VI Guidance:

- VI evaluation included all parcels within 100 feet of detections of vinyl chloride > 2 µg/L
- 19 Commercial properties
- 37 Residential buildings



Clean Water Lens Present

- Impacted zones are overlain by a lens of clean water with the exception of a few areas
- 4-12’ of clean water present in most areas



Vadose Zone Thickness

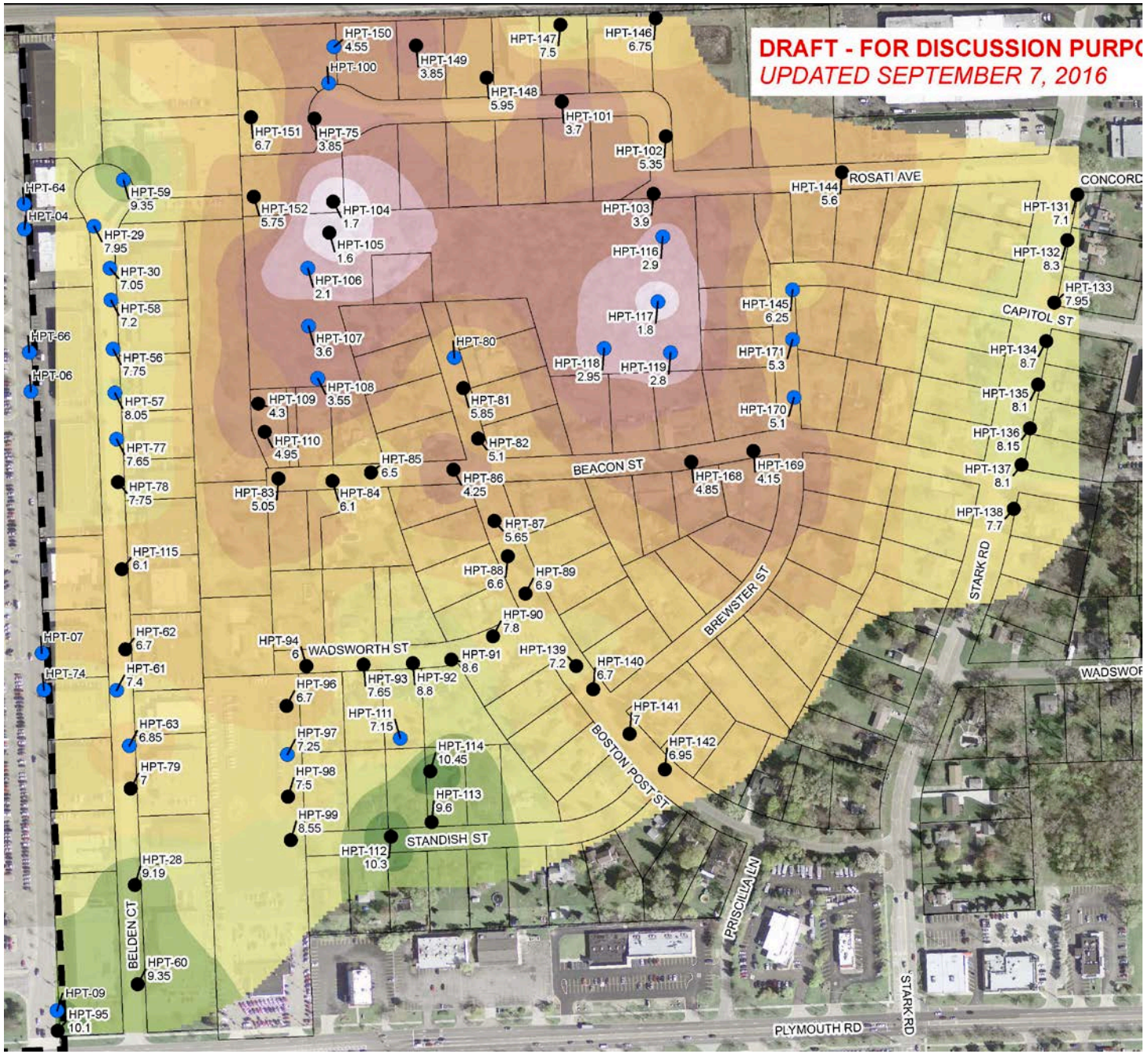
- Vadose zone thickness drives investigation options
- Depth to water 1-10’ bgs

LEGEND

- HPT LOCATION
- VINYL CHLORIDE > 2 µg/L

VADOSE ZONE THICKNESS

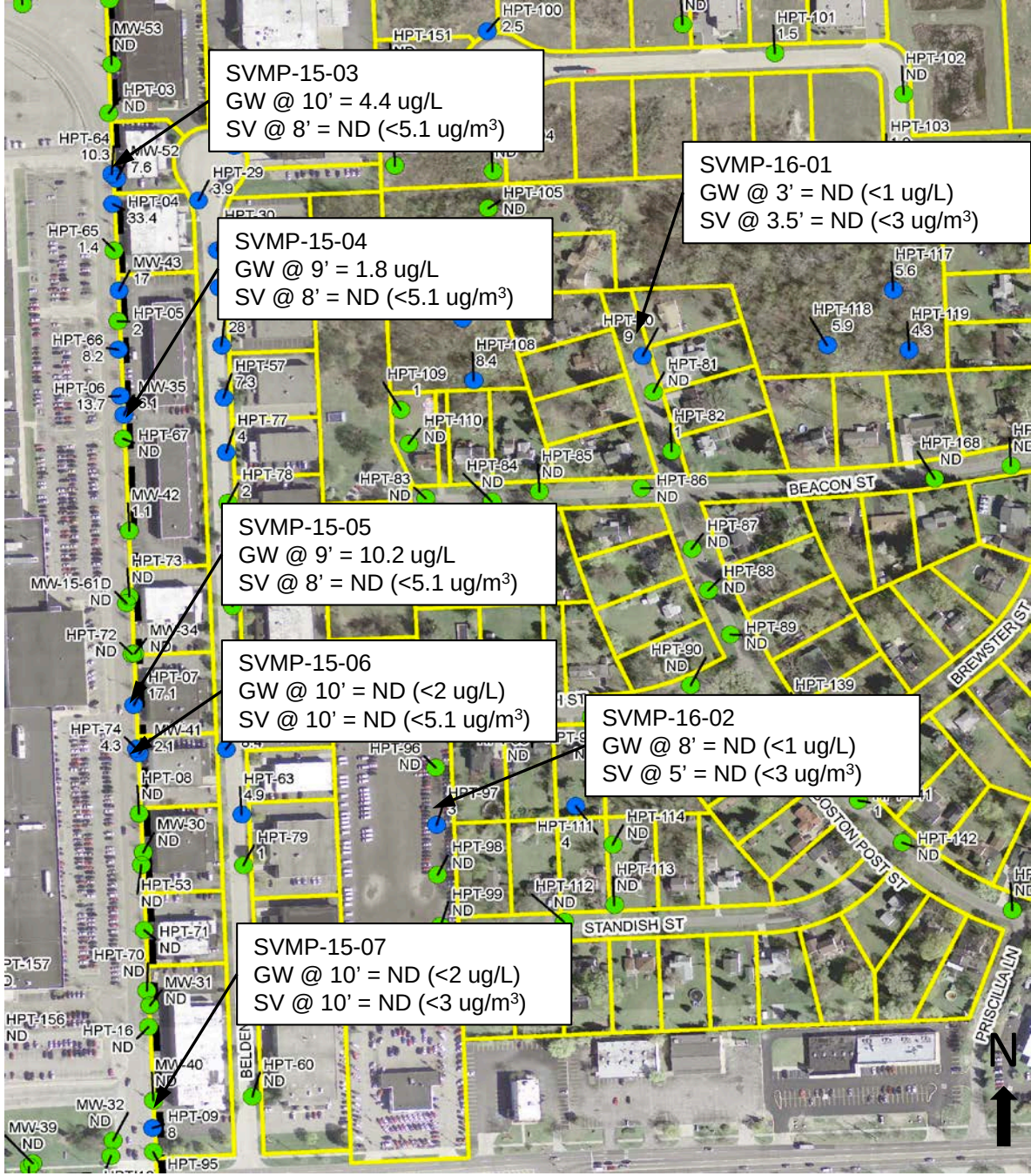
- > 10.0
- 9.1 - 10.0
- 8.1 - 9.0
- 7.1 - 8.0
- 6.1 - 7.0
- 5.1 - 6.0
- 4.1 - 5.0
- 3.1 - 4.0
- 2.1 - 3.0
- < 2.0
- PROPERTY BOUNDARIES
- FORD PROPERTY BOUNDARY



Initial Soil Vapor Sampling

Soil vapor co-located with groundwater at seven locations biased toward VC

- Nov 2015 (boundary) and March 2016 (neighborhood)
- Soil vapor collected above water table
- Data supports CSM
  - Henrys law predicts ~1,100 µg/m³ soil vapor from 1 µg/L water
  - Site soil vapor is non-detect, although VC in groundwater detected from 4-10 µg/L



LEGEND

VINYL CHLORIDE - GROUNDWATER

- ND - 2 µg/L
- 2 - 100 µg/L

Consent Decree Vinyl Chloride Soil Vapor Screening Level 54 µg/m³

Off-site VI Investigation Considerations

- Building distance from groundwater with >2 µg/L vinyl chloride
- Building construction (e.g., slab on grade, crawl space, basement)
- Depth to groundwater beneath the lowest floor of building
- Presence of sumps

Off-site Investigation Steps Completed

- High-resolution groundwater characterization
- Initial soil vapor
- Desktop analysis of property construction
  - Assessment records
  - Building specific information (construction, presence of sump, pumping status), from survey conducted by Ford
- Permanent groundwater monitoring wells
- Targeted soil vapor sampling
- Groundwater sampling beneath soil vapor points

Off-Site Vapor Intrusion Summary

Multiple lines of evidence suggest vapor intrusion not occurring

- Robust groundwater and soil vapor data sets collected
- Groundwater results show presence of clean water lens
- Vinyl chloride not present in soil vapor
- Clean water lens effective

Off-Site Groundwater and Survey Status

N

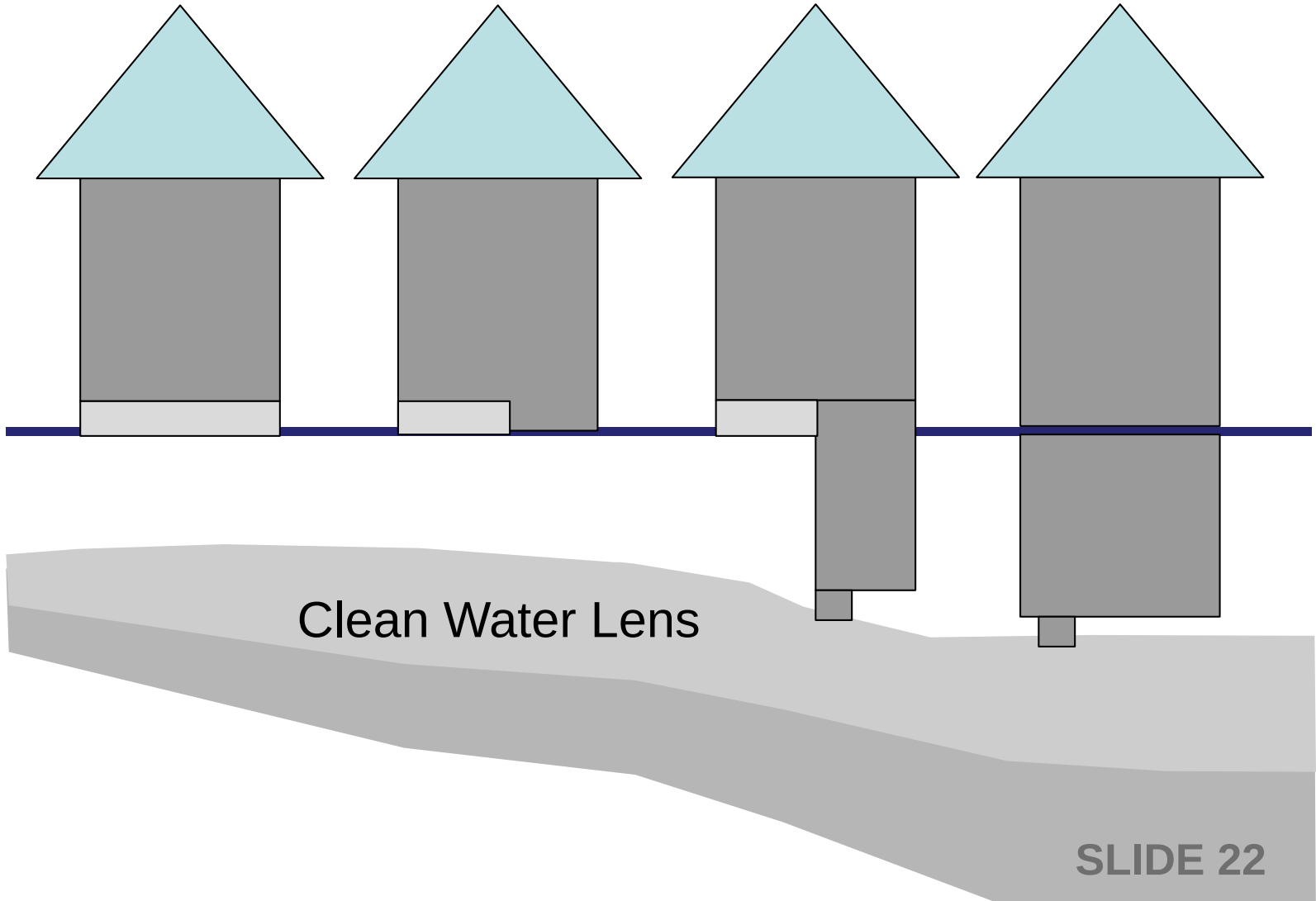
- Property Boundary
- Survey Sent and Not Received
- Survey Sent and Received
- Basement and/or Crawl Space
- Ford Property Boundary
- Off-Site Soil Boring with Vinyl Chloride ≤2.0 µg/L
- Off-Site Soil Boring with Vinyl Chloride ≥2.0 µg/L

Residential Drinking Water Criteria is 2.0 µg/L
Results shown in µg/L

Surveys distributed 2016/2017 – 33 out of 64 received

Building Construction Overview

- 17 Full crawl space
- 10 Partial crawl/partial slab-on-grade
- 8 Partial crawl/partial basement
- 3 Full basement
- 0 slab-on-grade (residential)



Groundwater Sampling – New Wells

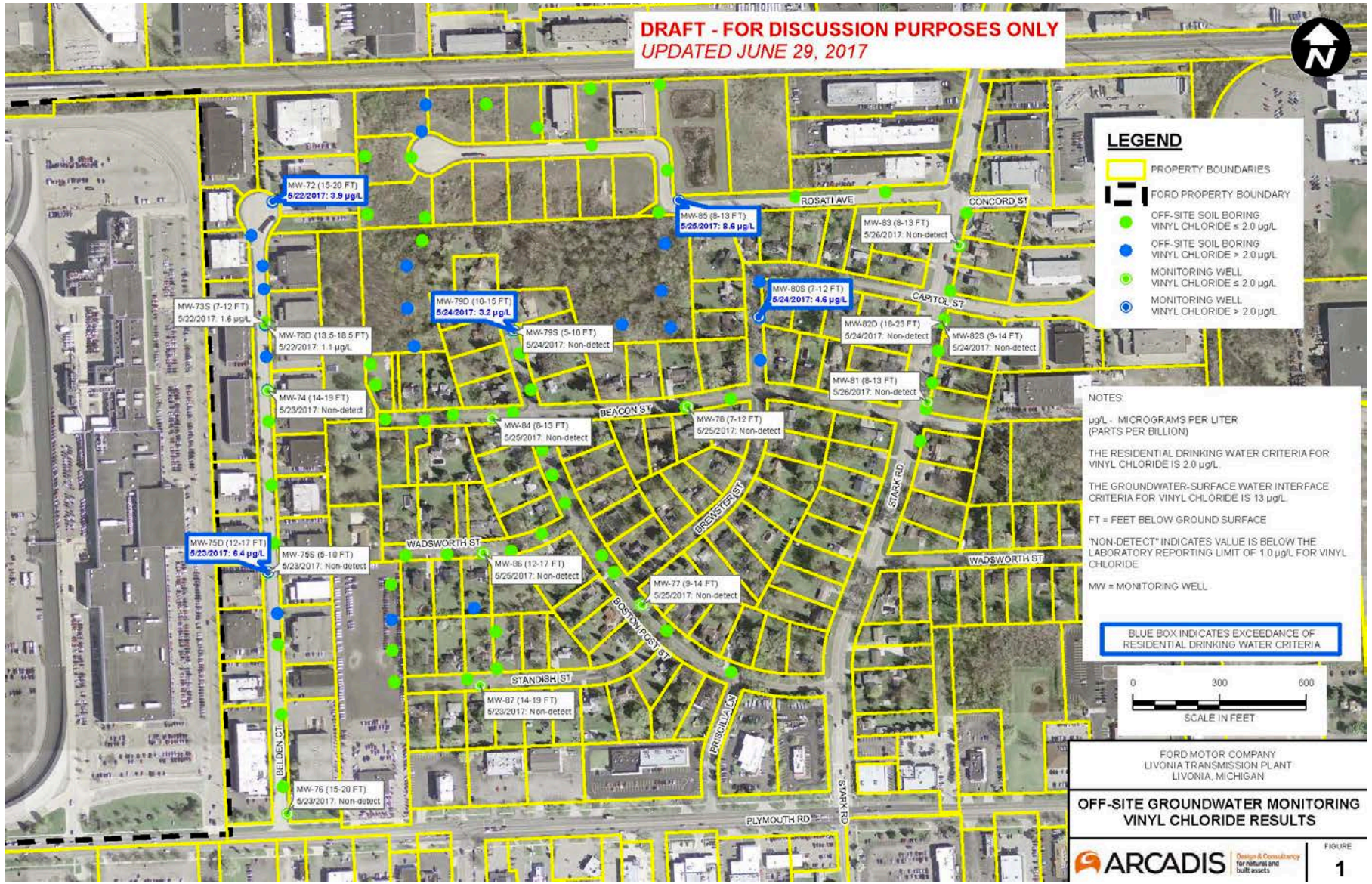
Objectives

- Monitoring to evaluate trends
- Compare to past VAP data
- Confirm clean water lens

Methods

- 20 permanent wells installed and sampled
- Locations selected strategically to monitor attenuation and delineate shallow and deeper impacts
- 3 Nested locations to confirm clean water lens

Permanent Groundwater Well Vinyl Chloride Results



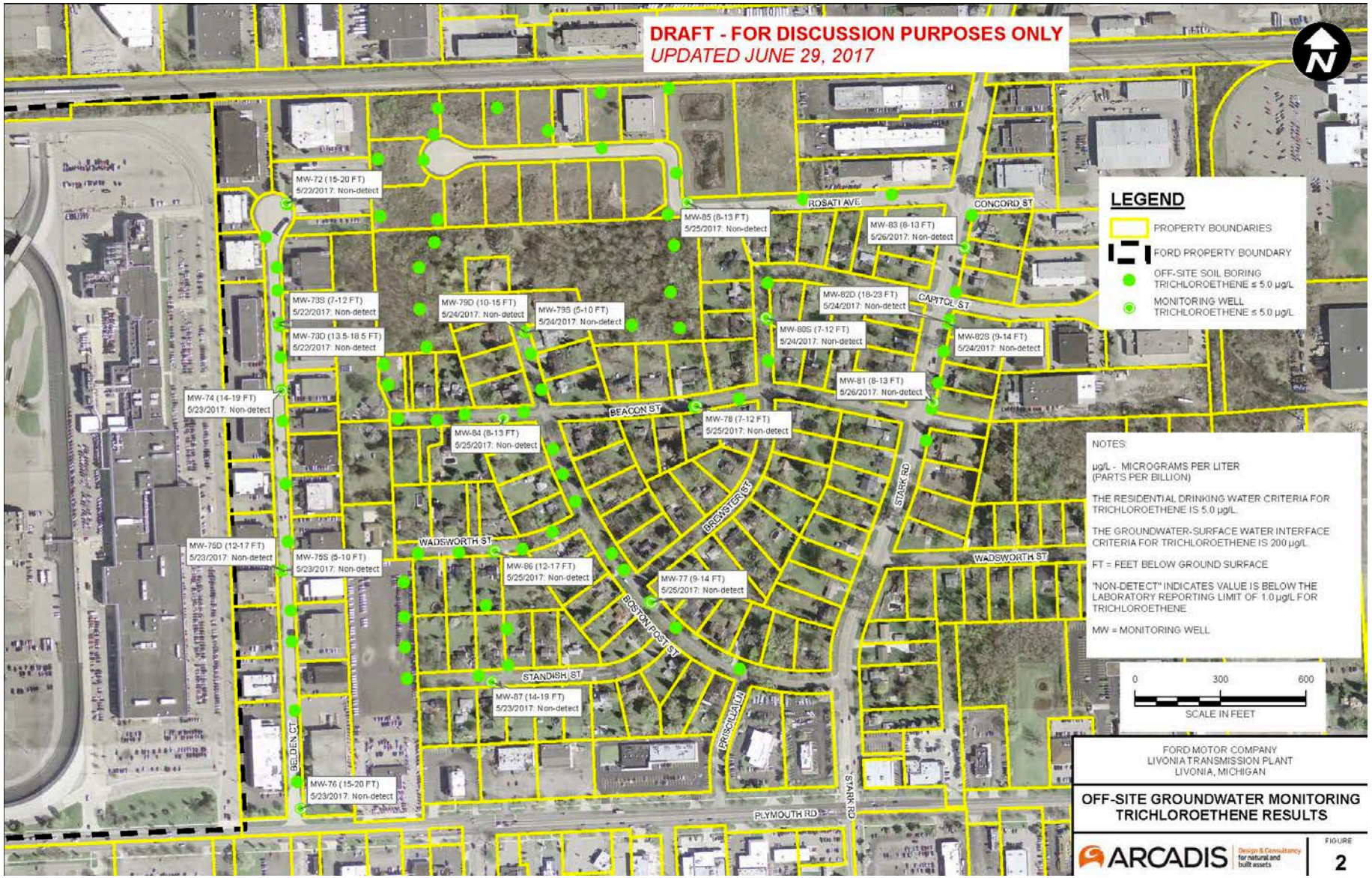
May 2017

5 of 20 Samples collected exceeded vinyl chloride Drinking Water Criteria of 2.0 µg/L

Exceedances ranged from 3.2 µg/L to 8.6 µg/L

Results consistent with past groundwater sampling

Permanent Groundwater Well Trichloroethene Results

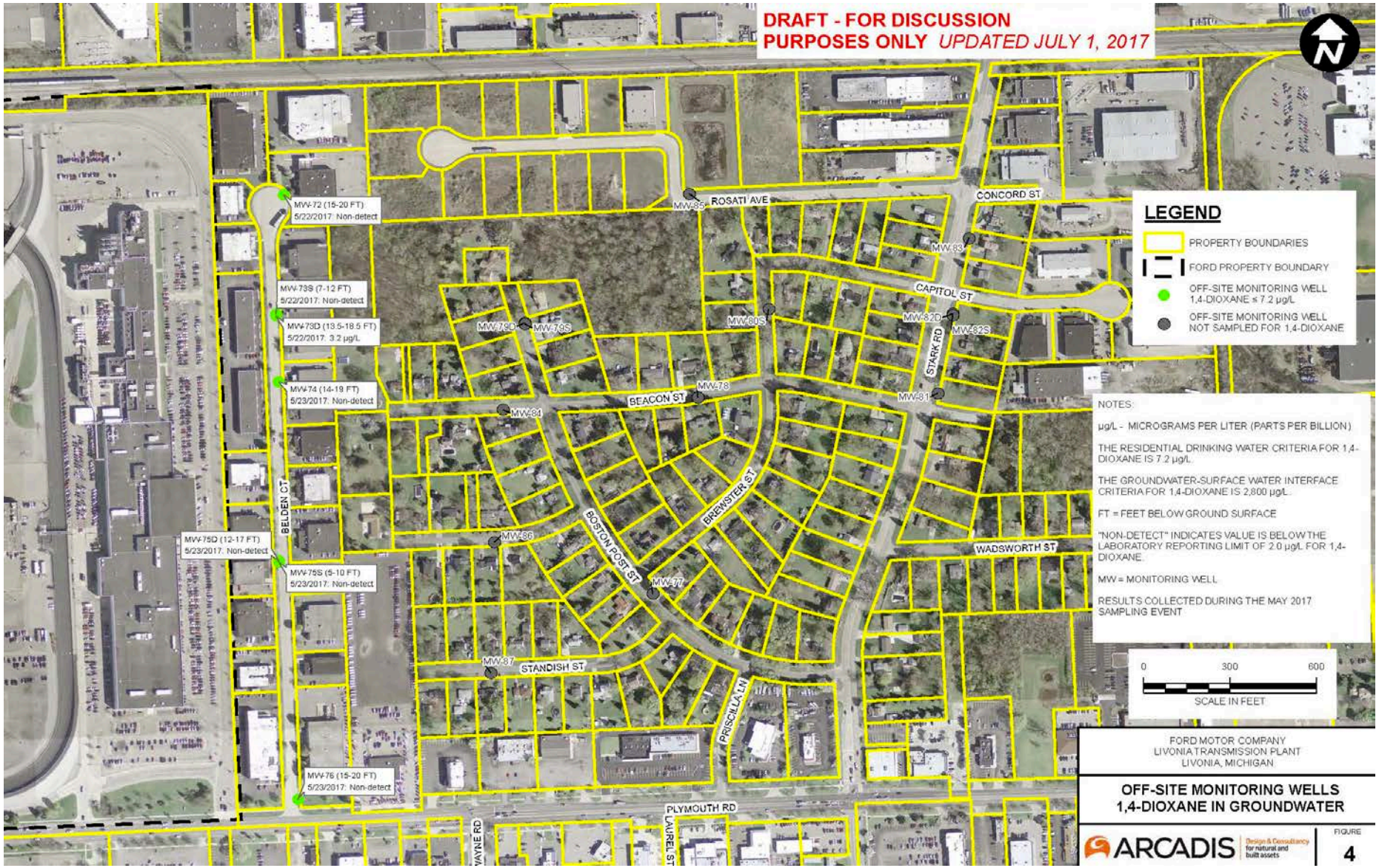


May 2017

0 of 20 Samples collected exceeded Trichloroethene Drinking Water Criteria of 5.0 µg/L

TCE not detected in any sample off-site

Permanent Groundwater Well 1,4-Dioxane Results



May 2017

0 of 7 Samples collected exceeded 1,4-Dioxane Drinking Water Criteria of 7.2 µg/L

Targeted Soil Vapor & Groundwater Sampling

Objectives

- Evaluate potential for vapor intrusion
- Understand attenuation in vadose zone via nested ports
- Sample water near basements

Methods

- 43 permanent vapor probes installed and sampled at 37 locations via summa cans
  - Samples from right-of-ways and private property
- GW sampled beneath vapor points at 9 locations with basements

Off-Site Soil Vapor Vinyl Chloride Results

June 2017

0 of 43 Samples collected exceeded the Consent Decree Soil Gas Criteria of 54 µg/m³ for Vinyl Chloride

Vinyl Chloride not-detected in any sample (DL ~3 µg/m³)

Off-Site Soil Vapor Trichloroethene Results

June 2017

0 of 43 samples collected exceeded the Trichloroethene Consent Decree Soil Gas Criteria of 67 µg/m³

TCE detected in 3 of 43 samples

Groundwater Beneath Soil Vapor Vinyl Chloride Results

June 2017

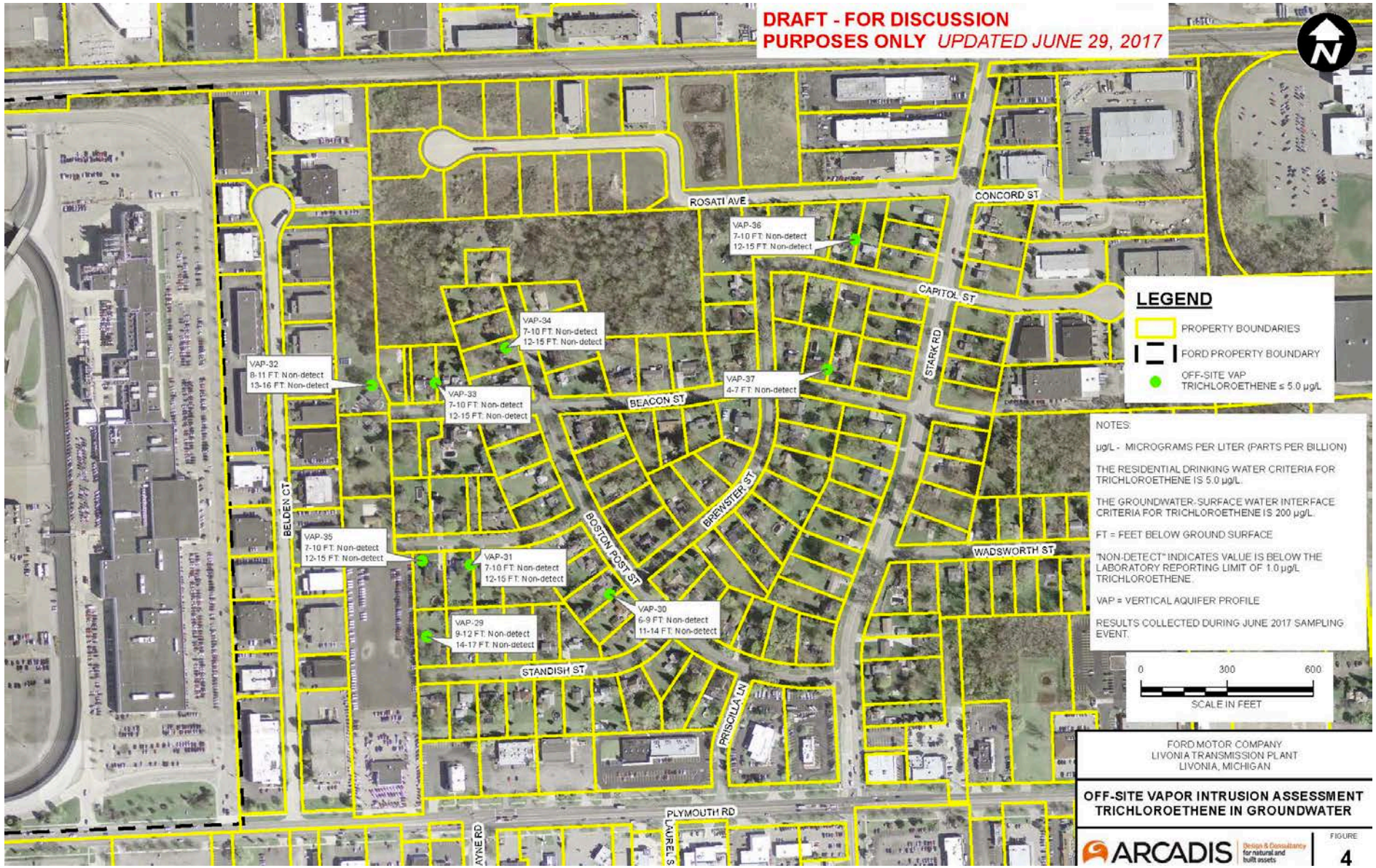
1 of 17 Samples Exceeded the Vinyl Chloride Drinking Water Criteria of 2.0 µg/L

VAP-34 deep = 2.2 µg/L

VAP-34 shallow = ND

Vinyl chloride non-detect in soil vapor at this location → Clean water lens present and effective

Groundwater Beneath Soil Vapor Trichloroethene Results



June 2017

0 of 17 Samples Collected Exceeded the Trichloroethene Drinking Water Criteria of 5.0 µg/L

Path Forward

Off-Site Groundwater

- Quarterly groundwater monitoring
  - Q3 2017 – Week of July 24th
  - Q4 2017 – October 2017
  - Q1 2018 – January 2018

Off-Site Vapor

- Resample soil vapor Q3 2017

Comply with Consent Decree

- HASP, QAPP, CSM – August 25, 2017
- Other documents to follow