Natural Attenuation Monitoring to Active Remediation

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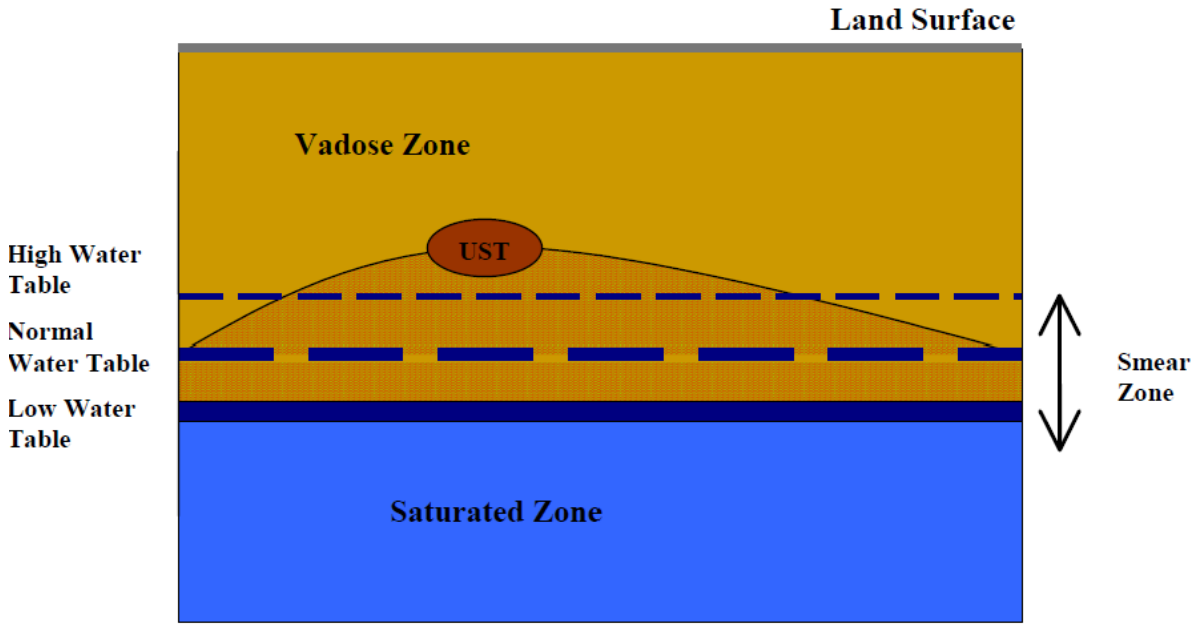
Wakeup Quiz



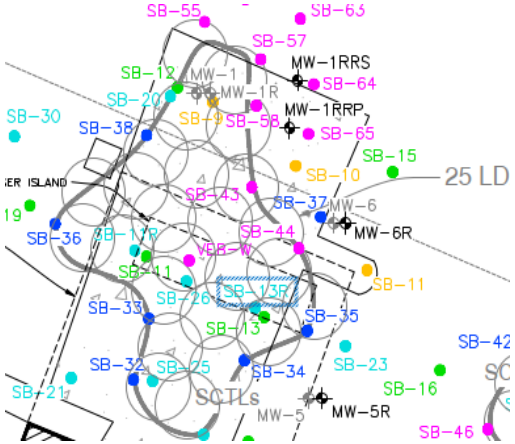
- True or False ?

To assess dissolved phase petroleum contamination, Organic Vapor Analyzer (OVA) soil sample screening of the water table fluctuation zone can be useful for determining where to install groundwater monitoring wells.

What Will Be Covered

Strategic remediation activities at sites transitioned from Natural Attenuation Monitoring (NAM)

- ❑ Review the existing data.
- ❑ Characterize the contamination plume.
- ❑ Select and implement appropriate remedial actions.



Review Existing Data

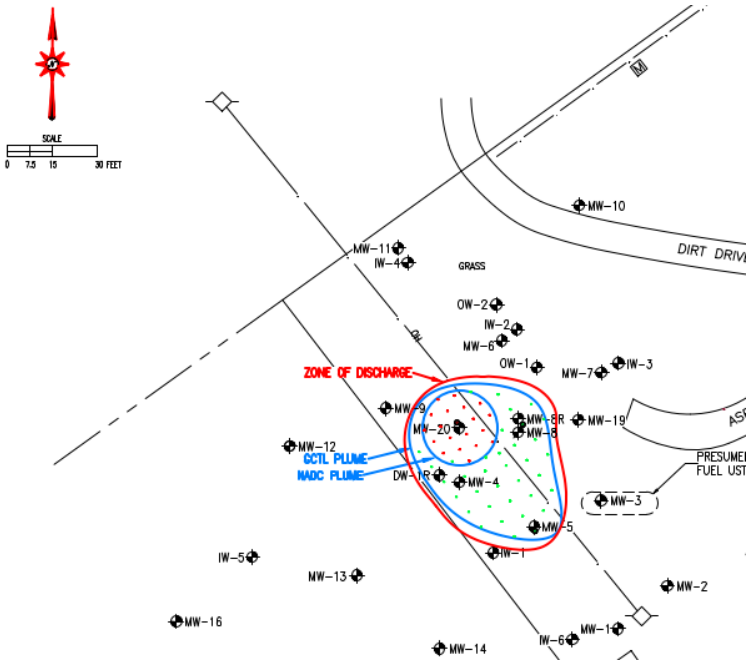
- ❑ Funding Caps and Site Closure Options.
- ❑ Soil/Groundwater Analytical Tables and Figures.
- ❑ Existing and Abandoned Monitoring Wells.
- ❑ Map Legends and Scales.

TABLE 4A: GROUNDWATER MONITORING WELL ANALYTICAL SUMMARY - VOCs and Metals

Facility ID#: 18/9300475 Facility Name: Circle K# 2721283

See notes at end of table.

GCTLs		1**	40**	30**	20**	NA	20	0.02**	3**	15**
NADCs		100	400	300	200	NA	200	2	300	150
Sample		Benzene	Toluene	Ethyl-benzene	Total Xylenes	Total VOAs	MTBE	EDB	1,2-Di-chloro-ethane	Total Lead
Location	Date	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)
MW-1	10/12/2012	0.21 U	0.20 U	0.29 U	0.50 U	0.37 I	1.7	0.0096 U	0.22 U	1.1 U
	9/11/2013	Abandoned								
MW-2	10/12/2012	0.21 U	0.20 U	0.29 U	0.50 U	0.37 I	0.21 U	--	--	--
	9/11/2013	Abandoned								
MW-3	10/12/2012	0.21 U	0.20 U	0.29 U	0.50 U	0.37 I	0.99	--	--	--
	9/11/2013	Abandoned								
MW-4	10/12/2012	0.21 U	0.20 U	0.29 U	0.50 U	0.37 I	0.91	--	--	--
	9/11/2013	Abandoned								
MW-5	10/12/2012	0.21 U	0.20 U	0.29 U	0.50 U	0.37 I	1.3	--	--	--
	9/11/2013	Abandoned								
MW-6	6/11/2013	0.21 U	0.20 U	0.29 U	0.50 U	0.37 I	10.5	--	--	--
	9/11/2013	Abandoned								
MW-7	10/29/2019	0.37 I	0.24 U	0.29 U	1.3 U	0.37 I	0.46 U	0.0040 U	0.40 U	4.3 I
	6/8/2020	0.26 U	0.24 U	0.51 I	1.3 U	0.51	0.46 U	--	--	--
	12/17/2020	**4.6**	1.4	**85**	**110**	201	2.8	--	--	--
	3/15/2021	**21**	1.4	4.2	**47**	73.6	4.6	--	--	--
	8/2/2021	0.38 I	0.28 U	0.39 I	8.6	9.37	0.34 U	--	--	--
	3/8/2022	1.0	0.18 U	0.77 I	1.3 I		0.13 U	--	--	--
	9/8/2022	**4.2**	1.9	1.0	1.8 I	8.9	0.13 U	--	--	--
	3/2/2023	**2.9**	0.21 U	0.28 U	1.1 U	2.9	0.21 U	--	--	--
MW-8	10/29/2019	0.26 U	0.24 U	0.29 U	1.3 U	1.3 U	0.46 U	--	--	--
	6/8/2020	0.26 U	0.45 I	0.29 U	1.3 U	0.45	0.46 U	--	--	--
	12/17/2020	0.27 U	0.28 U	0.32 U	1.3 U	1.3 U	0.34 U	--	--	--
	3/15/2021	0.27 U	0.28 U	0.32 U	1.3 U	1.3 U	0.34 U	--	--	--



Potential Follow-Up Activities

- ❑ Determine remaining cleanup funds and discuss site closure options.
- ❑ Check for contamination and remediation activities at adjacent sites.
- ❑ Conduct on-site OVA soil screening.
- ❑ Conduct confirmatory soil sampling.
- ❑ Abandon or repair damaged wells.
- ❑ Install new and replacement wells.
- ❑ Conduct groundwater sampling.

Characterize Soil and Groundwater Contamination

Ascertain the contaminant plume distribution in soil and groundwater, typically a residual contamination.

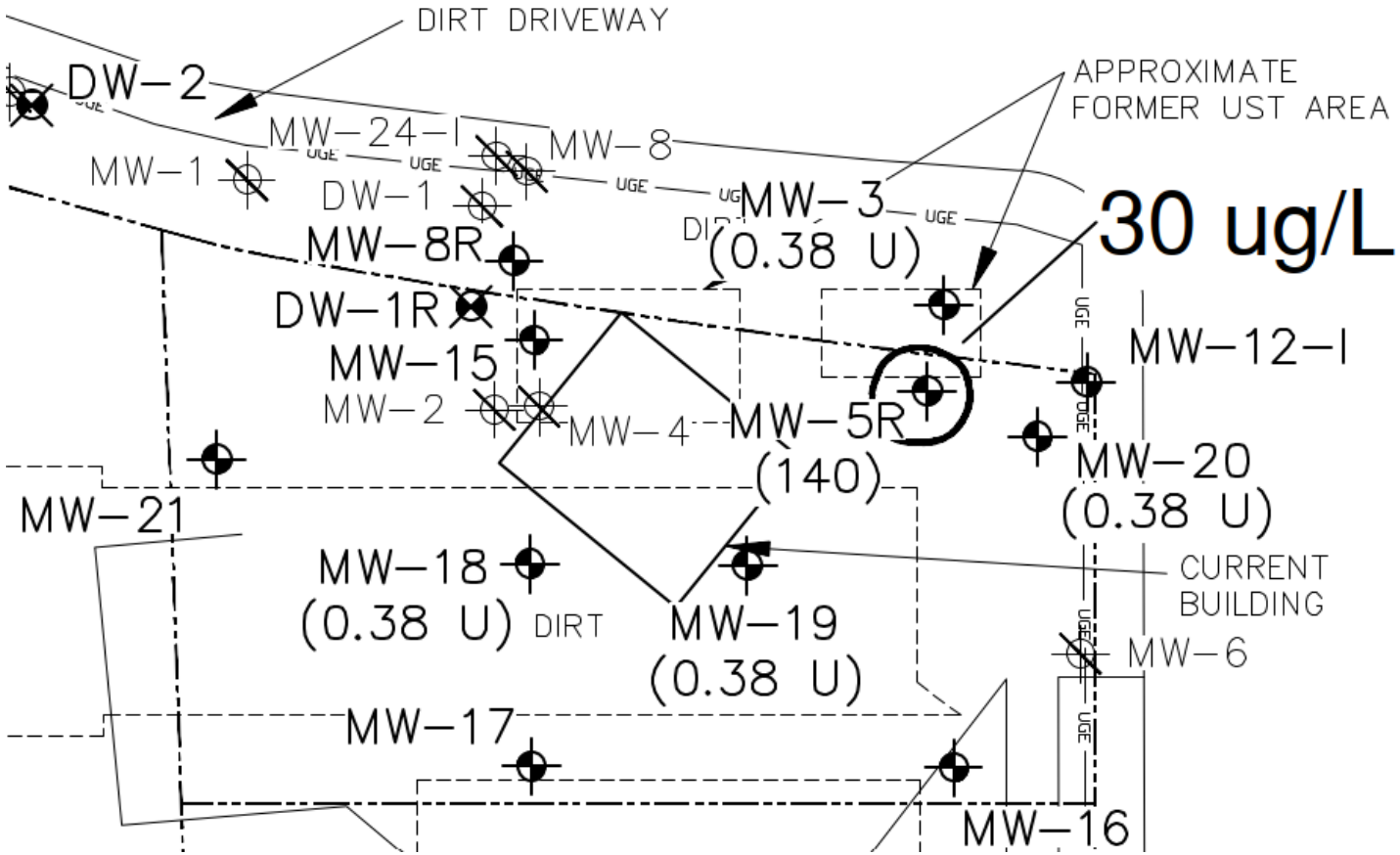
- ❑ Area-wide contamination, low-level concentrations.
- ❑ Localized contamination within a small area.
- ❑ Localized contamination around a well annulus.

Take note of the following:

- ❑ Depth to Water Table (DTW).
- ❑ Submerged well screens.
- ❑ Perched aquifers.

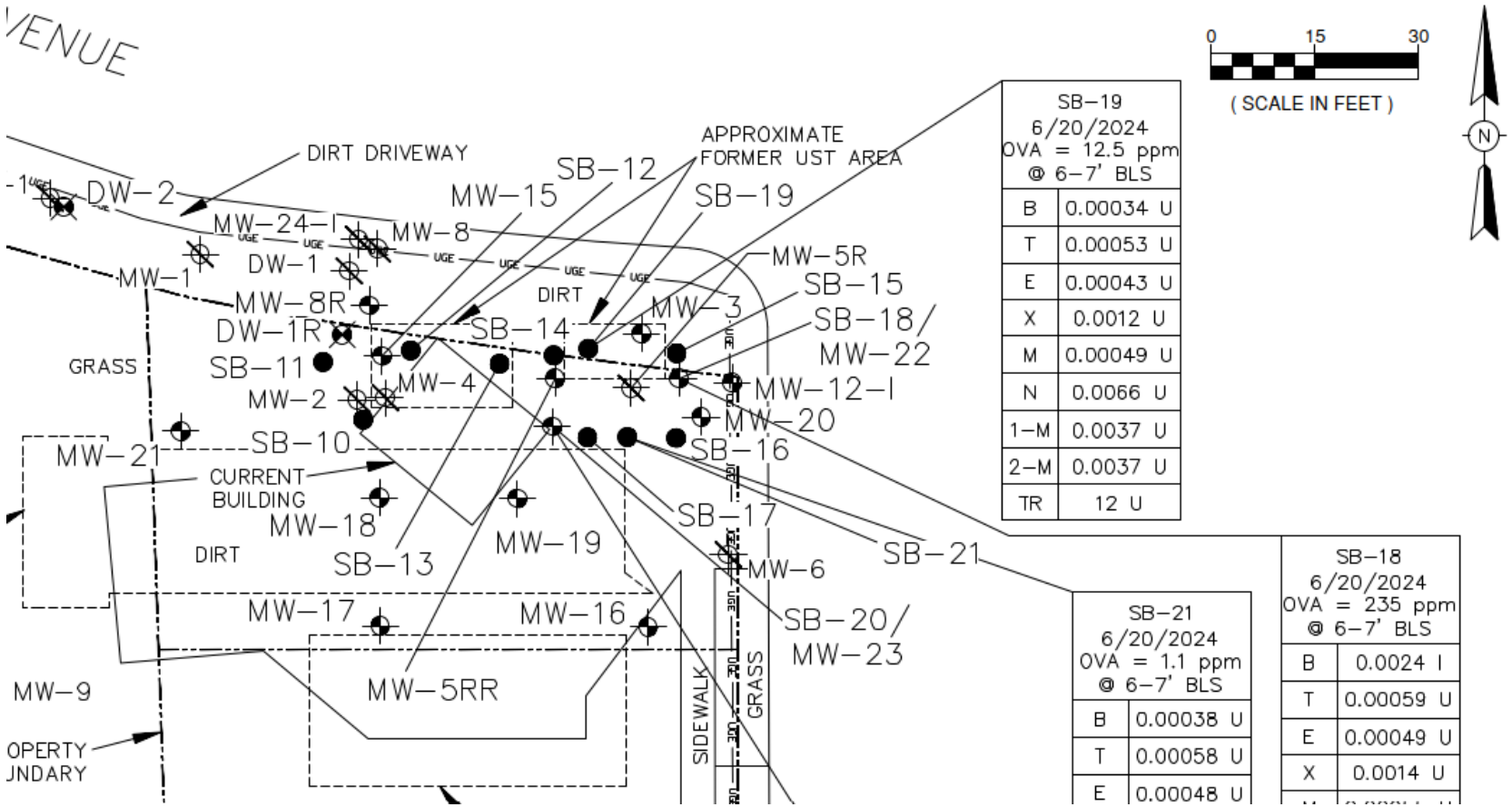
Determine Contamination Extent

Example 1 Plume
Prior to Switch from NAM



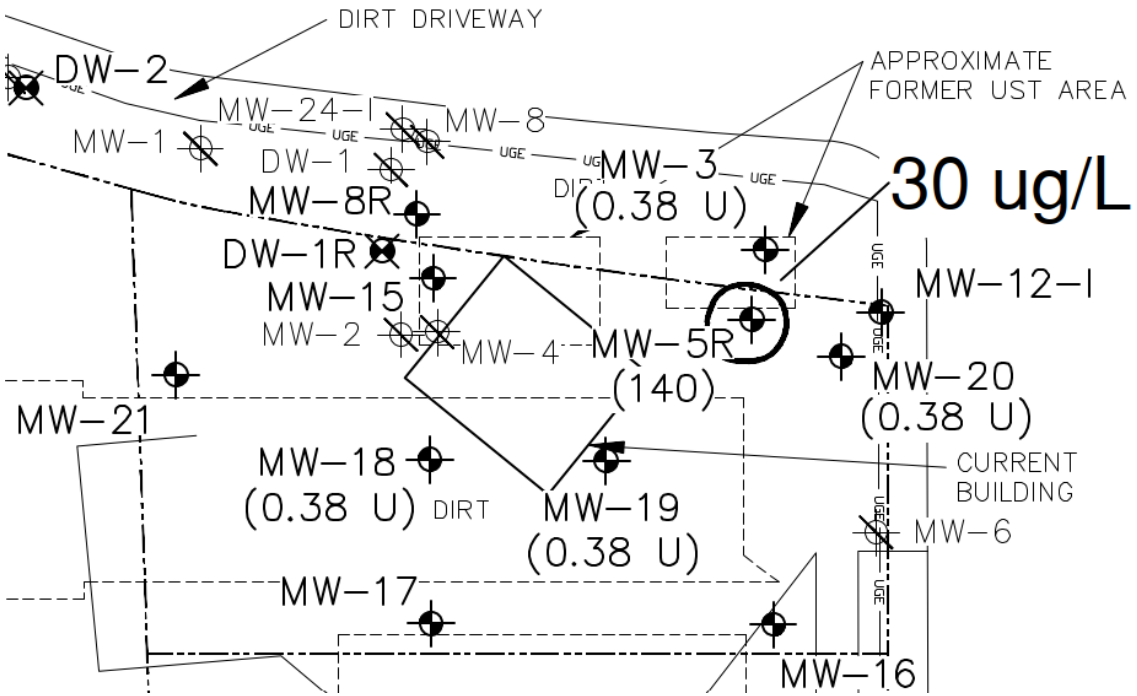
Determine Contamination Extent

Example 1 Plume
Follow-up Investigation

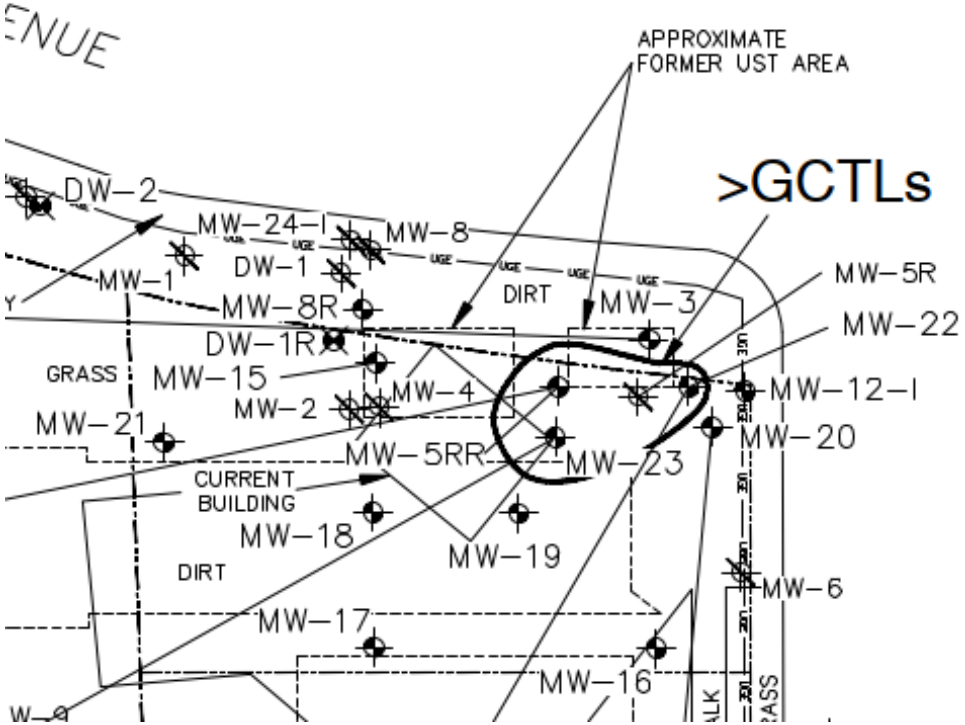


Determine Contamination Extent

Example 1 Plume Before Investigation



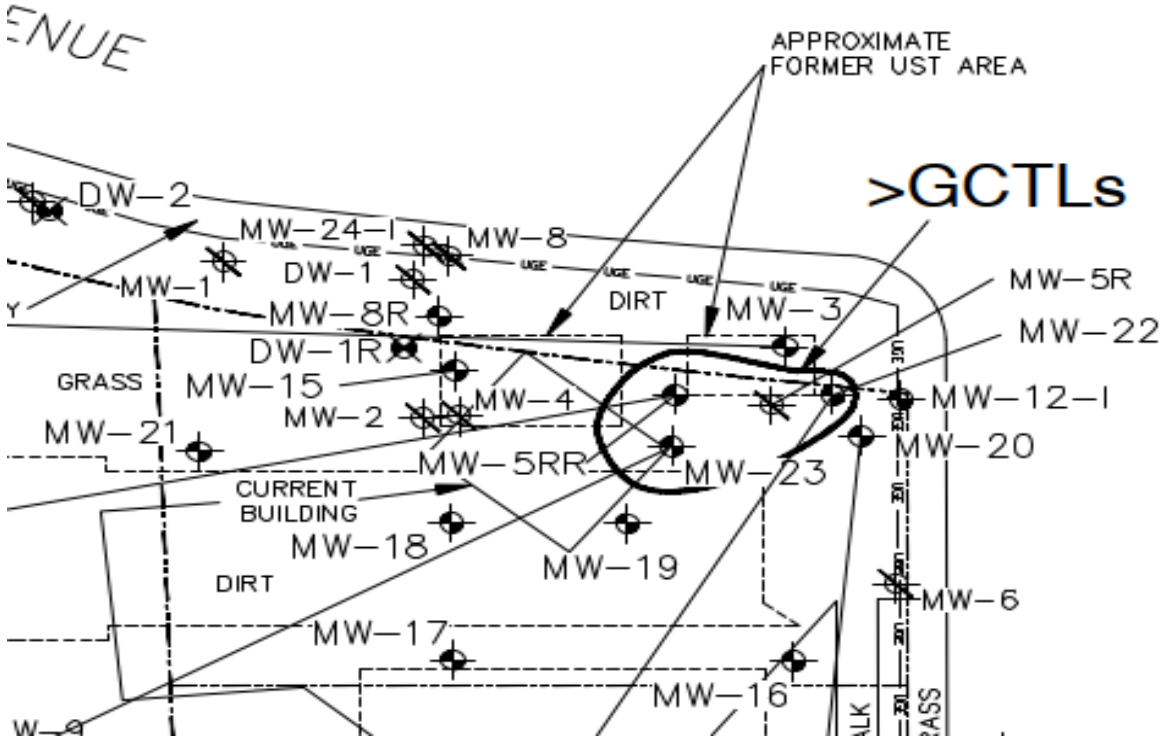
Example 1 Plume After Investigation



Cleanup Strategy

Air Sparge/Soil Vapor Extraction

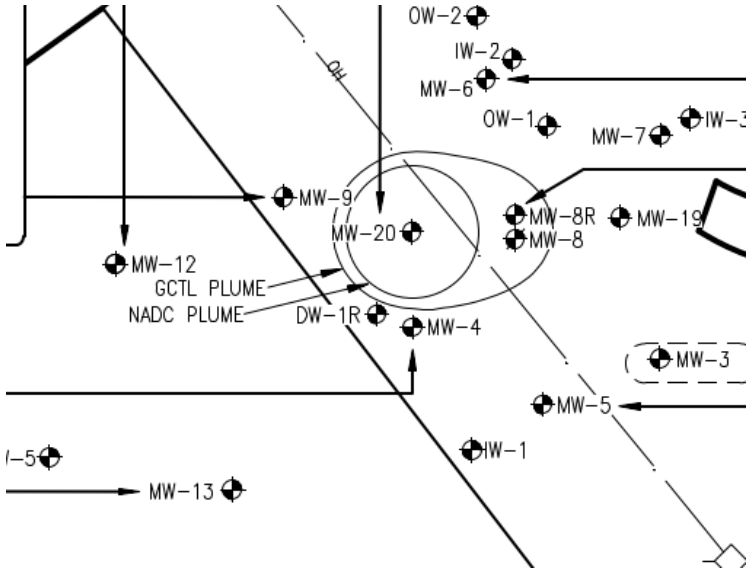
- ❑ Localized Groundwater Contamination
- ❑ Factors: Lithology and DTW



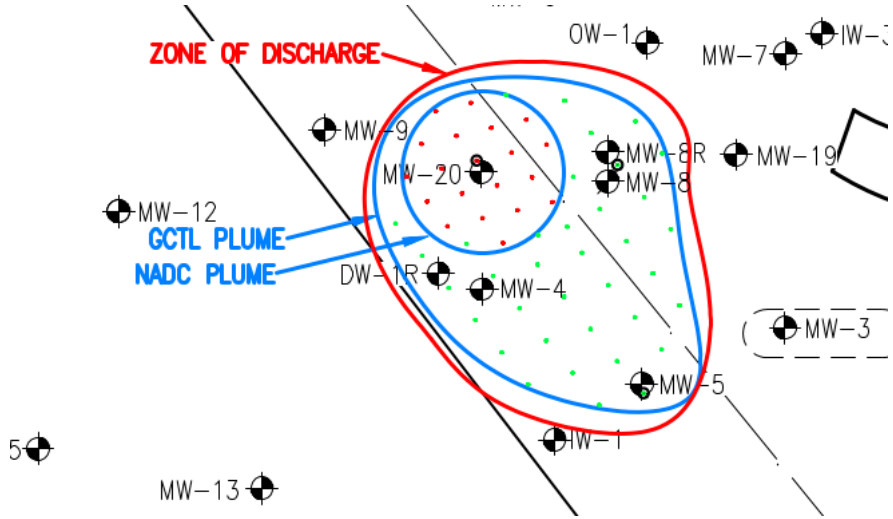
Cleanup Strategy

Petrofix Injection

- ❑ Localized Groundwater Contamination
- ❑ Factors: Lithology and Potential Offsite Contamination



Contaminant Plume

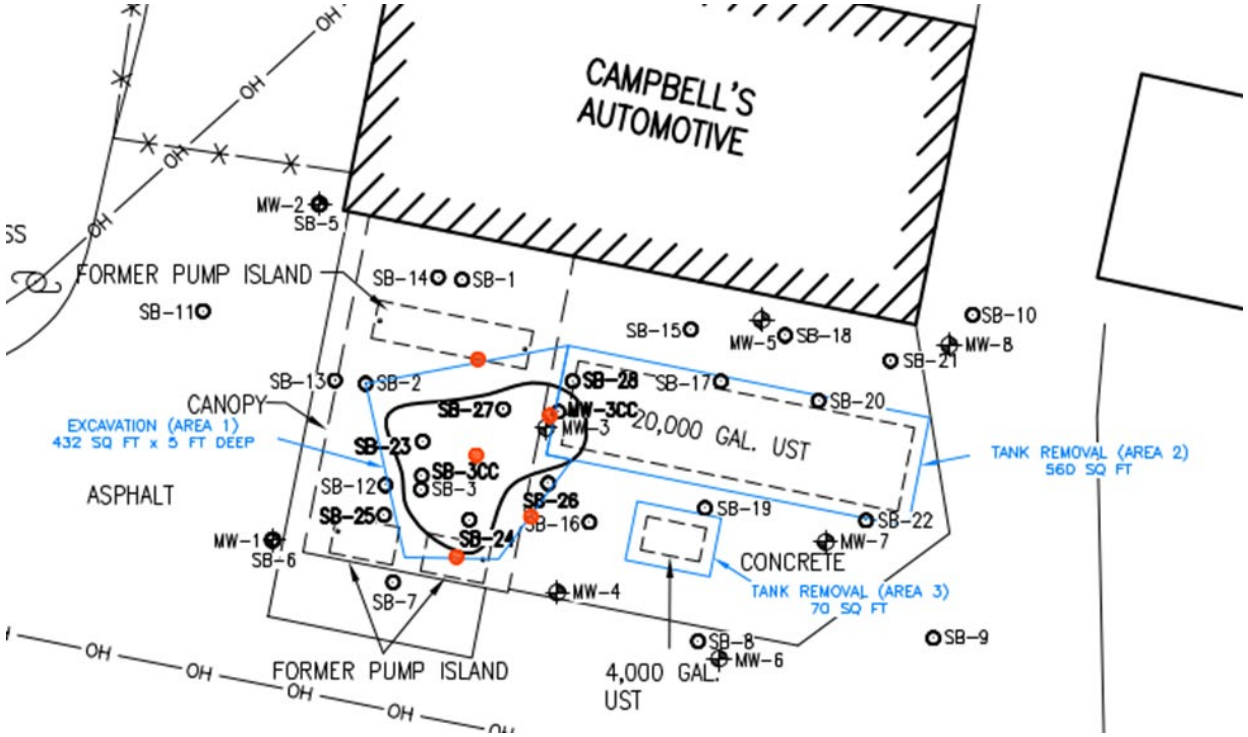


Injection Layout

Cleanup Strategy

Soil Excavation

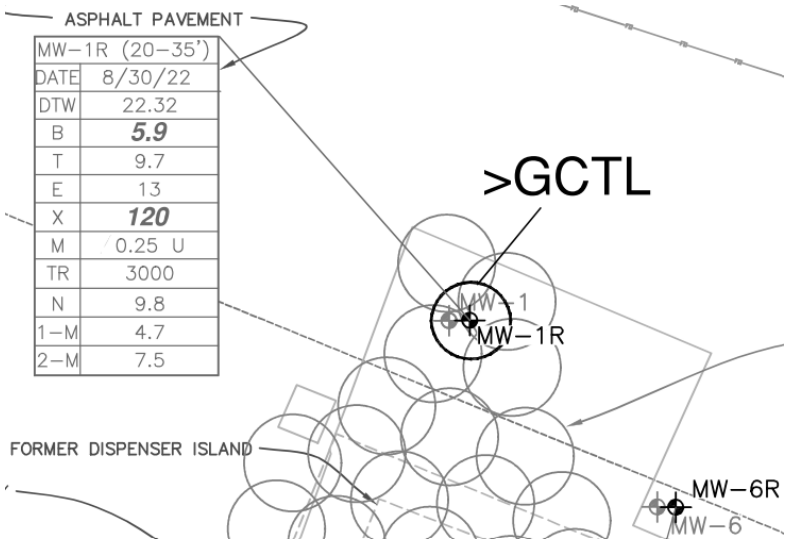
- ❑ Localized Soil Contamination
- ❑ Factors: Funding and Location of Contaminated Soil



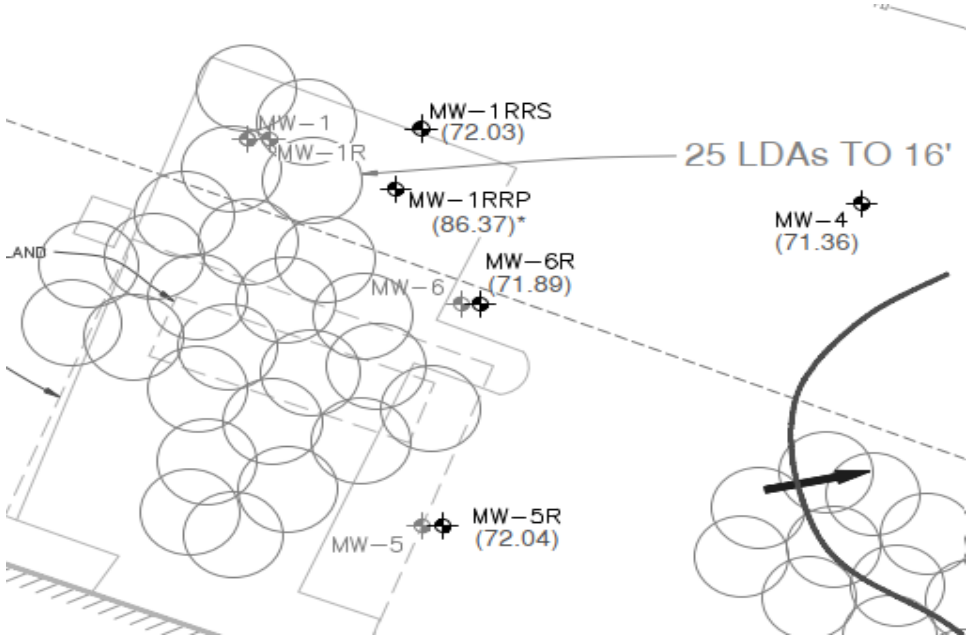
Cleanup Strategy

Monitoring Well Over-Drill / Replacement

- ❑ Localized Contamination around Well Annulus
- ❑ Factors: Perched Condition and Nature of Residual Contamination



Contaminant Plume



Well Replacement

Conclusion

Active remediation of sites transitioned from NAM can be effectively achieved with a strategic approach to the plume delineation and consideration of site conditions.

Contact Info

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Discussion / Questions?