



transform your environment

McNeil Dump: Initial Landfill Assessment and Duxbury Municipal Landfill Initial PFAS Sampling

Sean Healey, LSP
Team Leader
Weston & Sampson Engineers, Inc.

Notes:

1. Elevation Contours created using the February 2015 New England CMGP Sandy LiDAR by Woolpert for United States Geological Survey (USGS).
2. Limit of waste is defined as subsurface waste. Scattered debris is located on ground surface beyond limits indicated.
3. Duxbury Municipal Landfill limit of waste was referenced from the MassGIS MassDEP Solid Waste Diversion and Disposal layer. The limit of waste is approximate and based on a site visit conducted by MassDEP on July 1, 1993.



Acronyms

- PFAS: Per- and Polyfluoroalkyl Substances
- VOCs: Volatile Organic Compounds
- PWS: Public Water Supply Well
- MW: Monitoring Well
- GW: Groundwater
- BOH: Board of Health
- LF: Landfill
- ACM: Asbestos Containing Material
- LBP: Lead Based Paint
- Nanograms per liter (ng/L) = Parts per trillion (ppt)

What is PFAS - USEPA

- PFAS are **widely used, long lasting chemicals**, components of which break down very slowly over time.
- Because of their **widespread use and their persistence in the environment**, many PFAS are found in the blood of people and animals all over the world and are present at low levels in a variety of food products and in the environment.
- PFAS are **found in water, air, fish, and soil** at locations across the nation and the globe.
- Scientific studies have shown that exposure to some PFAS in the environment **may be linked to harmful health effects in humans and animals**.
- There are **thousands of PFAS chemicals**, and they are **found in many different consumer, commercial, and industrial products**. This makes it challenging to study and assess the potential human health and environmental risks.

PFAS: Where is it? - USEPA

- **Drinking water** – in public drinking water systems and private drinking water wells.
- **Soil and water at or near waste sites** - at **landfills**, disposal sites, and hazardous waste sites such as those that fall under the federal Superfund and Resource Conservation and Recovery Act programs.
- **Fire extinguishing foam** - in aqueous film-forming foams (or AFFFs) used to extinguish flammable liquid-based fires. Such foams are used in training and emergency response events at airports, shipyards, military bases, firefighting training facilities, chemical plants, and refineries.
- **Manufacturing or chemical production facilities that produce or use PFAS** – for example at chrome plating, electronics, and certain textile and paper manufacturers.
- **Food** – for example in **fish** caught from water contaminated by PFAS and **dairy products** from livestock exposed to PFAS.
- **Food packaging** – for example in grease-resistant paper, fast food containers/wrappers, microwave popcorn bags, pizza boxes, and candy wrappers.
- **Household products and dust** – for example in stain and water-repellent used on carpets, upholstery, **clothing, and other fabrics; cleaning products; non-stick cookware**; paints, varnishes, and sealants.
- **Personal care products** – for **example in certain shampoo, dental floss, and cosmetics**.
- **Biosolids** – for example fertilizer from wastewater treatment plants that is used on agricultural lands can affect ground and surface water and animals that graze on the land.

What is 1,4 Dioxane - USEPA

- 1,4-Dioxane is a **synthetic industrial chemical**
- Used as a **stabilizer for industrial solvents**
- Also found in **paint strippers**, dyes, greases, **antifreeze** and aircraft deicing fluids, and in some consumer products (**deodorants, shampoos and cosmetics**)
- Found in some **pharmaceuticals and plastics**
- Also in some **food supplements, food packaging adhesives** or on food crops treated with pesticides
- Often found in groundwater around Landfills

McNeil Dump Initial Assessment

Scope of Work - LIMITED

- W&S engaged in November 2021
- **Review of town records**, previous reports
- Obtain DEP Permitting (5-month approval process)
- **Test pits, soil gas and MW Installation**
- **Soil gas and groundwater sampling**
 - GW Analysis (4 wells): VOCs, Metals, PFAS and 1,4 dioxane
- **Landfill Assessment Report**
- Work performed between May and October 2022

Duxbury Municipal Landfill PFAS Sampling – ADD ON

- **PFAS in PWS wells in 2021** (Depot- 10 ppt - max) and Partridge (105 - ppt max)
- DEP requests PFAS sampling at Duxbury Municipal Landfill
- W&S sampled Duxbury LF well network in May and July of 2022
- July 2022 sampling performed in conjunction with McNeil Dump Scope of Work – ADD ON

Landfill Assessment Report

DEP Review

- Work performed between May and October 2022
- Report issued to DEP Solid Waste on October 5, 2022
- DEP provided verbal comments
- **DEP understands findings and agree no immediate risk to human health (no PWS wells in use, no private water wells downgradient)**
- Waiting on DEP final review and written comments/recommendations before moving to next phase of evaluation

Town Review

- Town provided comments including in depth review by James Begley (resident)
- W&S agrees with comments. Major comments:
 - Additional delineation (horizontal and vertical extent) of PFAS plume needed
 - GW flow and fate and transport evaluation needed
 - Additional evaluation of potential risk to PWS wells

**Additional work scope needed to address comments.
And to evaluate potential remedial alternatives such
as potential source area treatment at landfill and
PWS PFAS treatment at Depot Street**

McNeil Dump Assessment: Historic Info

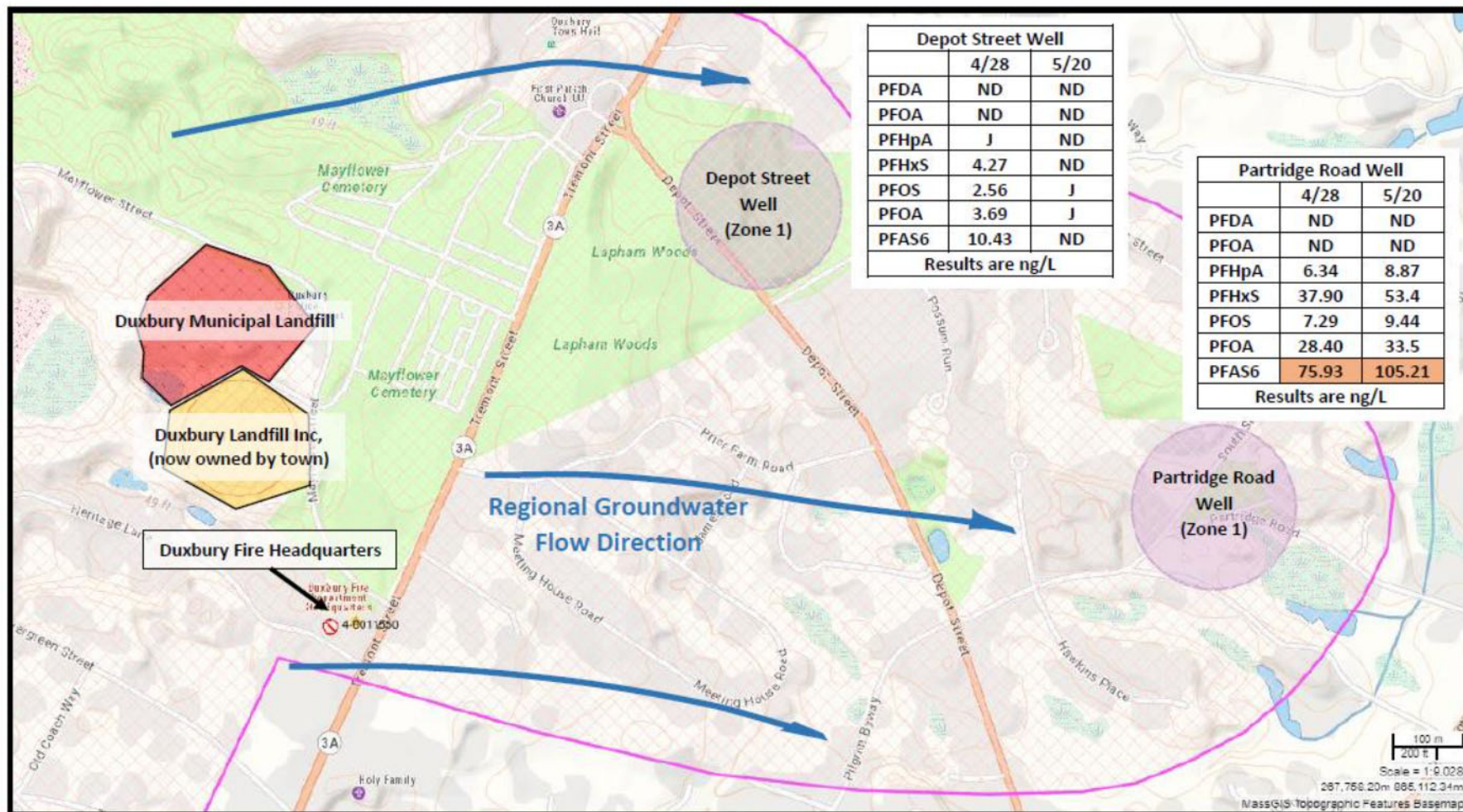
- Historic sand and gravel pit. Open dump from 1946 to 1979.
- 1988 study by IEP confirmed leachate plume (sodium, manganese, chloride, etc.) from LF extending to Depot Street PWS
- 1994 CES report hazardous building debris materials, including ACM, materials with PCBs), materials coated with LBP, were disposed of at McNeil Dump

Historic Info McNeil Dump (cont.)

- Duxbury BOH, reported numerous fires During LF operations
- Duxbury Fire Department used “wet water”, a fire-retardant foam potentially containing PFAS, as a firefighting measure
- Construction debris from hotel fire Boston
- The McNeil Dump property was acquired by the Town under tax title in 1997

Nearest Water Supply Wells

- BOH database: **no private drinking wells within 500 feet of landfills or plume**
- Town's Depot Street PWS well located over 2,000 feet northeast.
- Partridge Street PWS Well located over 4,000 feet southeast
- Both wells off-line
- Depot Street (Manganese) Partridge (PFAS)



McNeil Dump Initial Recon

- **Scattered Surface Debris:** metal, car parts, empty steel tanks, unlabeled empty drums, wood and concrete waste
- Nine historic monitoring wells found
- Four viable for sampling











McNeil Dump Waste

- **18 Test Pits** advanced **5 to 20 feet** deep
- **Waste observed:** brick, metal, crushed drums, plastic, textiles, foam, glass, bottles, wood debris, melted asphalt material, and roof shingles
- **Some of the debris** (crushed drums, plastic, textiles, melted asphalt material) **potential PFAS source debris**
- **Suspect ACM:** fire brick, tiles, and insulation
- **Petroleum odors** were observed in multiple test pits

McNeil Dump Limits of Waste

- **Maximum vertical limit of waste: 19 feet** below grade surface in central portion of dump
- Test pits and boring logs **defined** horizontal limits of **waste to north, northeast, south and west**
- **Additional delineation of waste is required** along the **western and northwestern** property line







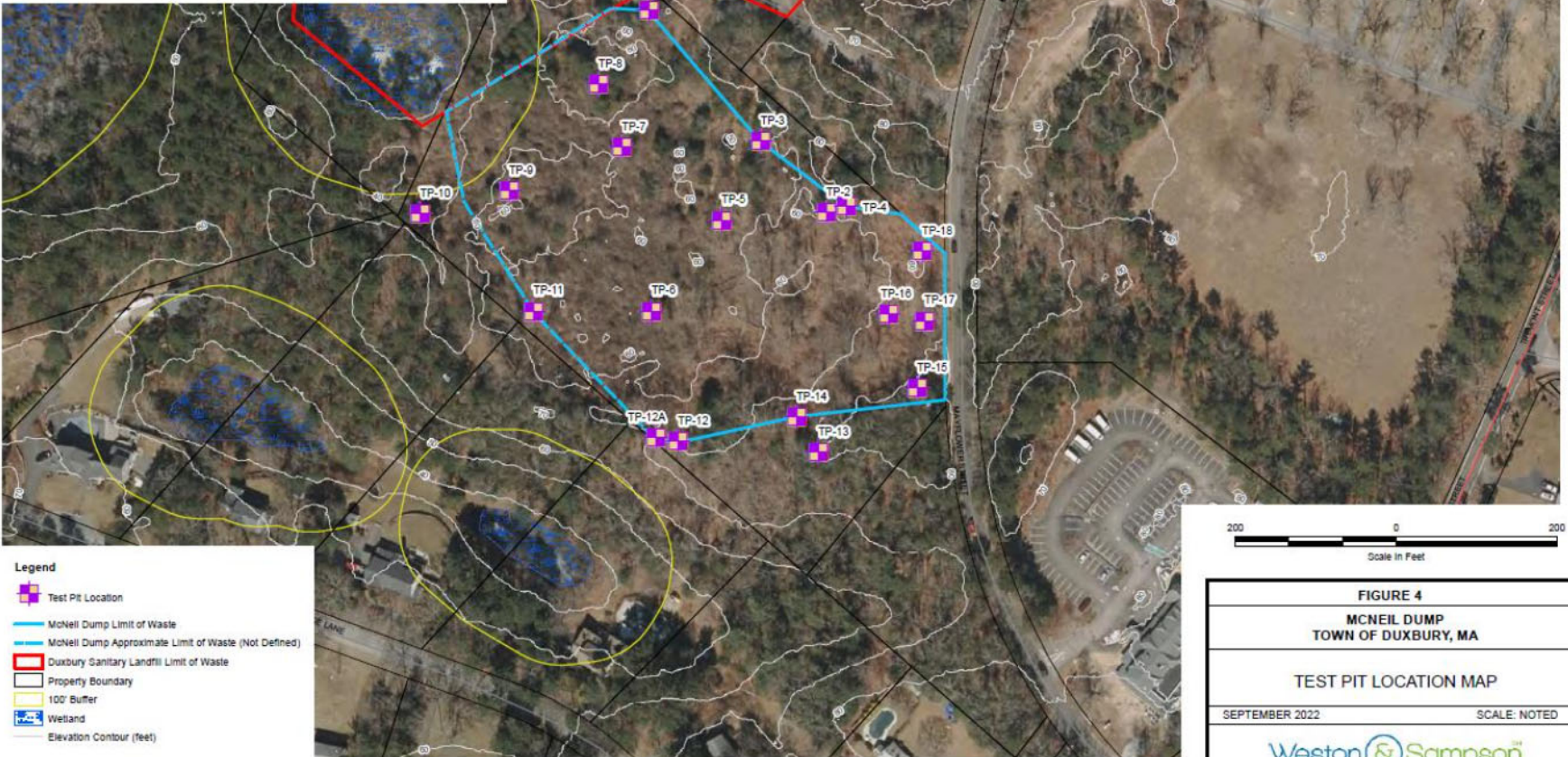






Notes:

1. Elevation Contours created using the February 2015 New England CMGP Sandy LiDAR by Woolpert for United States Geological Survey (USGS).
2. Limit of waste is defined as subsurface waste. Scattered debris is located on ground surface beyond limits indicated.
3. Duxbury Municipal Landfill limit of waste was referenced from the MassGIS MassDEP Solid Waste Diversion and Disposal layer. The limit of waste is approximate and based on a site visit conducted by MassDEP on July 1, 1993.

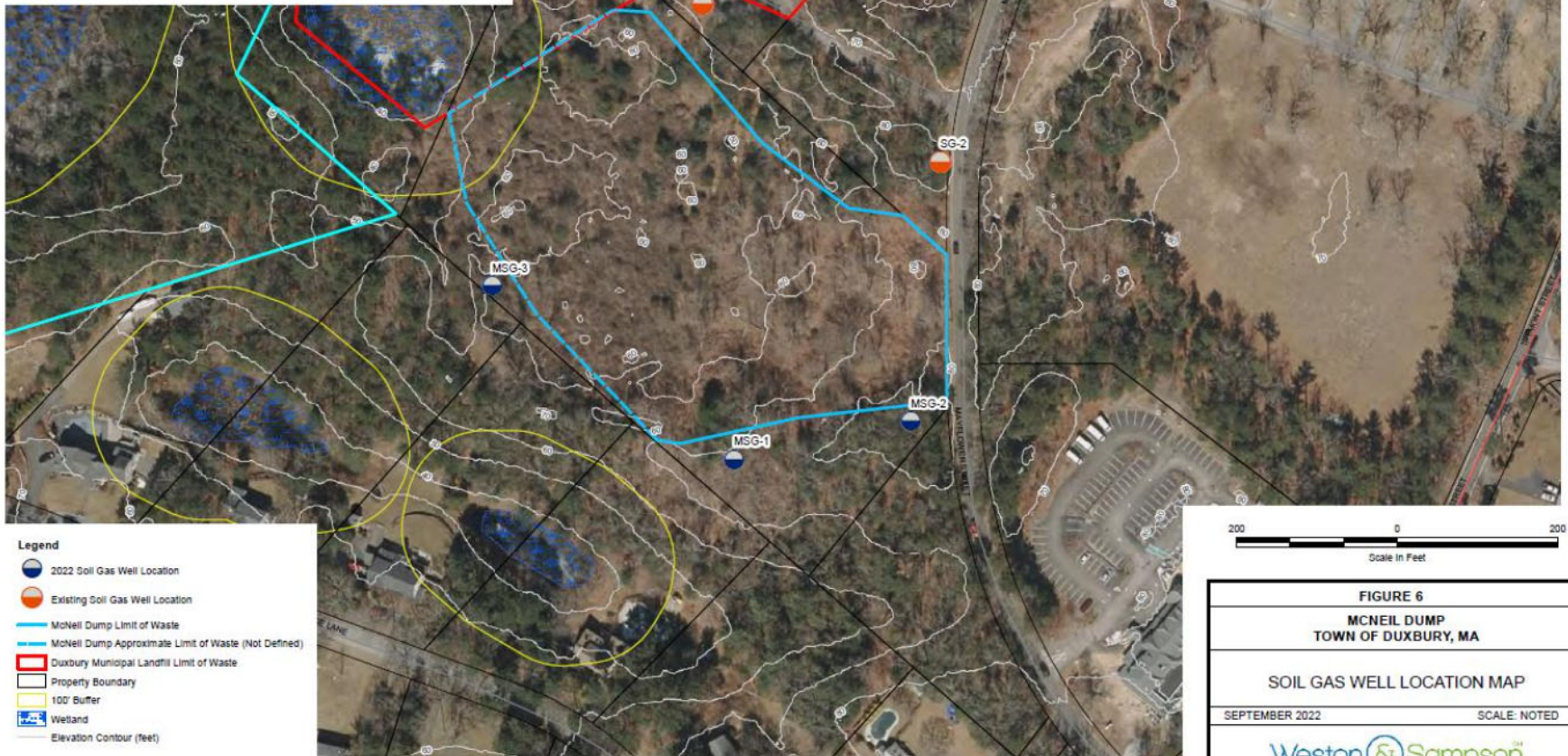


McNeil Soil Gas Monitoring Results

- **3 new soil gas** wells installed and sampled.
Two existing wells sampled.
- Sampled for methane, carbon dioxide, oxygen, hydrogen sulfide volatile organic compounds
- Detections are very low or just above instrument detection limits and are likely close to background
- Landfill gas concentrations are not considered a concern

Notes:

1. Elevation Contours created using the February 2015 New England CMGP Sandy LIDAR by Woolpert for United States Geological Survey (USGS).
2. Limit of waste is defined as subsurface waste. Scattered debris is located on ground surface beyond limits indicated.
3. Duxbury Municipal Landfill limit of waste was referenced from the MassGIS MassDEP Solid Waste Diversion and Disposal layer. The limit of waste is approximate and based on a site visit conducted by MassDEP on July 1, 1993.

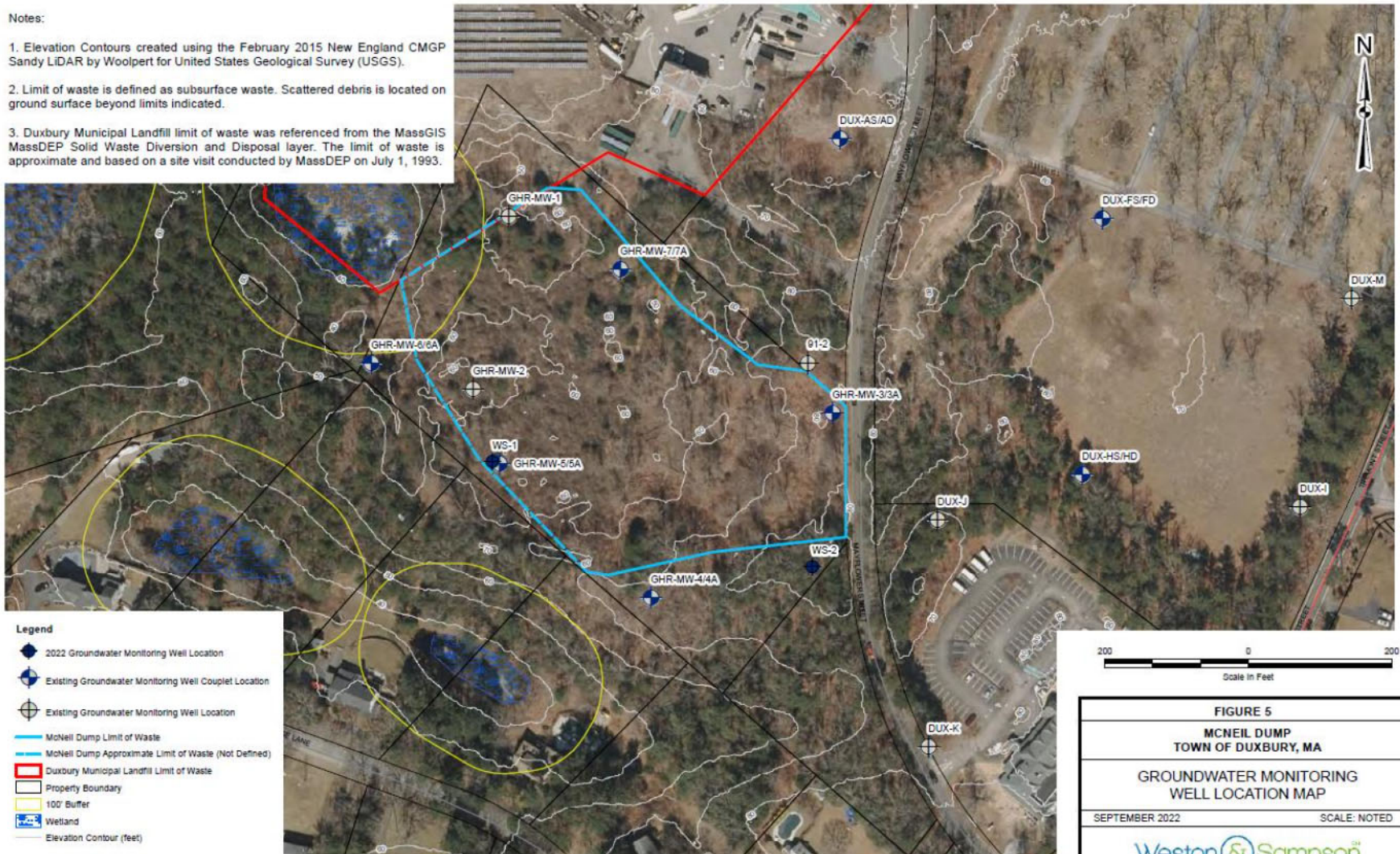


McNeil Dump GW Sampling

- **Two additional perimeter wells** installed WS-1 (30 feet) and WS-2 (50 feet below grade)
- WS-1 screened immediately below LF waste
- Two existing perimeter wells also sampled (GHR-MW-7 and MW-91-2)
- Samples (4 total) analyzed for PFAS, 1,4 dioxane, VOCs, metals (total)

Notes:

1. Elevation Contours created using the February 2015 New England CMGP Sandy LiDAR by Woolpert for United States Geological Survey (USGS).
2. Limit of waste is defined as subsurface waste. Scattered debris is located on ground surface beyond limits indicated.
3. Duxbury Municipal Landfill limit of waste was referenced from the MassGIS MassDEP Solid Waste Diversion and Disposal layer. The limit of waste is approximate and based on a site visit conducted by MassDEP on July 1, 1993.

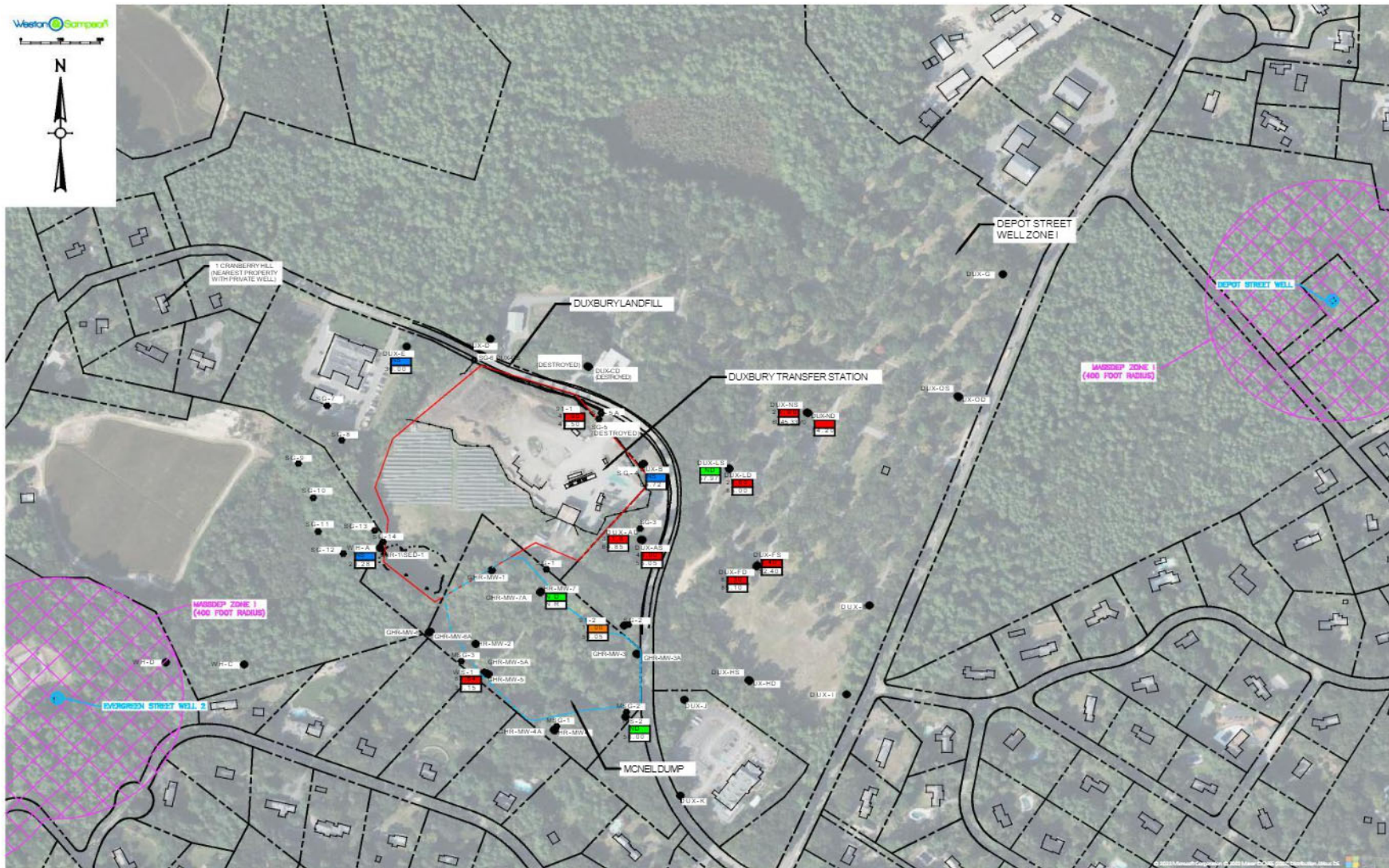


McNeil Dump GW Sampling Results (continued)

- **Metals and VOCs** results **below drinking water** (GW-1) and GW-3 **standards** (protective of surface water)
- **1,4 Dioxane not detected.** VOCs not detected
- **PFAS not detected in 2 of 4 wells**
- **MW- 91-2- PFAS detected well below drinking water standard**
- **WS-1-PFAS above drinking water standard but well below GW-3 standard** (protective above surface waters).
- WS-1 installed immediately below waste.

Duxbury Landfill GW Sampling Results

- Sampled **8 existing wells for PFAS** and **2 for 1,4 dioxane** - July 2022
- **1,4 dioxane** in two wells (**DUX-NS** and **DUX-ND**) **above drinking water standards** consistent with previous results (May 2022)
- **PFAS detected above drinking water standards in all 8 wells.** Highest levels adjacent to **Duxbury Municipal LF**
- May and July results similar concentrations.
- **MWs FS and FD** additional wells sampled in July



Groundwater Gauging and Flow Survey

- MW network at both McNeil and Dux LF gauged and located, July and Aug 2022
- **GW depths** range from **10 to 52 feet below well casings.**
- **GW flow to the east**, consistent with previous GW flow surveys and 1988 IES evaluation
- **Additional survey required** to incorporate additional wells in network and surface elevations



Overall Findings – McNeil Landfill

- Landfill waste (primarily construction and demolition waste) to depths of 19 feet below.
- Limit of waste established northeastern, eastern, and southern property boundaries
- Additional assessment is required to define limits of landfill waste, western and northwestern property boundary.
- Results of perimeter soil gas monitoring did not identify levels of concern.

Overall Finding McNeil Dump (continued)

- Downgradient perimeter groundwater monitoring wells did not identify concentrations above drinking water standards.
- PFAS concentrations above drinking water standard at WS-1, upgradient well. Well screened directly below waste mass.
- Additional assessment is required to define the extent of groundwater impacts within this area.

Overall Findings Duxbury LF GW Sampling

- 1,4 dioxane detected at two locations above drinking water standards.
- PFAS detected above drinking water standards at all well locations sampled in May and July.
- PFAS plume extends to the east of the landfill to cemetery property.
- Duxbury LF appears to be main source of PFAS at Depot Street PWS. Partridge Street may be impacted from another source.

EVERGREEN STREET
WELLFIELD ZONE I

DUXBURY LANDFILL

DUXBURY TRANSFER STATION

MCNEILDUMP

APPROXIMATE PFAS PLUME

DEPOT STREET
WELL ZONE I

PARTRIDGE
STREET WELL
ZONE I

Regulatory Status

- DEP Solid Waste: PFAS and 1,4 dioxane impacts will likely remain in Solid Waste program as adequately regulated
- DEP agrees no immediate threat to human health. No ingestion of water occurring, no private wells in area and PWS wells shut down
- Final DEP review of report is pending
- W&S has discussed general scope of work for additional evaluation with DEP

Next Steps – Dux LF PFAS

- Additional PFAS evaluation to confirm nature and extent of impacts
- Delineation, horizontal and vertical extent of PFAS
- Remaining wells in network to be sampled
- Additional field survey
- Evaluate potential impacts to nearby irrigation wells (sampling)
- Evaluate potential for additional sources to PWS (such as fire station property)
- Evaluation of potential remedial options including PFAS treatment at Depot Street PWS and possible source area treatment at Duxbury Municipal landfill

Next Steps – McNeil Dump Landfill Closure

- Additional test pits horizontal extent of waste
- PFAS groundwater delineation to the west
- Seasonal perimeter groundwater sampling to support closure (4 rounds)
- Complete Phase II Comprehensive Site Assessment Report, Corrective Action Alternatives Analysis, Corrective Action Design, Bidding. 2022 to 2025

Rough Costs Estimates

- Duxbury Landfill additional PFAS monitoring and evaluation 2022 to 2024 : \$200K
- McNeil Landfill Closure 2022 to 2025: \$440 to \$480K
 - Engineering costs for Phase II Comprehensive Site Assessment Report, Corrective Action Alternatives Analysis, Corrective Action Design, Bidding

Potential Funding

- ARPA Funding: MA State RLF
- Massworks: Community One Stop
- MassDEP PFAS grants
- America Build Back Program?

Questions / Comments

Sean Healey, LSP

Team Leader

Weston & Sampson Engineers, Inc.

100 Foxborough Blvd.

Foxborough, MA 02035

healeys@wseinc.com

508-698-3034

thank you
westonandsampson.com



transform your environment