SIXTH FIVE-YEAR REVIEW REPORT FOR
TINKHAM GARAGE SUPERFUND SITE
ROCKINGHAM COUNTY, NEW HAMPSHIRE

Prepared by

U.S. Environmental Protection Agency
Region 1
Boston, Massachusetts

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Bryan Olson, Division Director **Date**
Superfund and Emergency Management Division

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LIST OF ABBREVIATIONS & ACRONYMS

1,1-DCA	1,1-Dichloroethane
1,2-DCA	1,2-Dichloroethane
AGQS	Ambient Groundwater Quality Standard
ARAR	Applicable or Relevant and Appropriate Requirement
ATSDR	Agency for Toxic Substances and Disease Registry
bgs	Below Ground Surface
BLL	Blood Lead Level
CASRN	Chemical Abstracts Service Registry Number
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CIC	Community Involvement Coordinator
cis-1,2-DCE	cis-1,2-Dichloroethene
COC	Contaminant of Concern
CSC	Cannons Engineering Corporation
CSF	Cancer Slope Factor
CSG	Cannons Sites Group
CSM	Conceptual Site Model
EPA	United States Environmental Protection Agency
ESD	Explanation of Significant Differences
FS	Feasibility Study
FYR	Five-Year Review
GMP	Groundwater Management Permit
GMZ	Groundwater Management Zone
HFPO-DA	Hexafluoropropylene Oxide Dimer Acid (Gen-X)
HHRA	Human Health Risk Assessment
ICs	Institutional Controls
IRIS	Integrated Risk Information System
MCL	Maximum Contaminant Level
MDL	Minimum Detection Limit
mg/kg	Milligrams per Kilogram
mg/kg-day	Milligrams per Kilogram per Day
MNA	Monitored Natural Attenuation
MRL	Minimal Risk Level
MtBE	Methyl tert Butyl Ether
µg/L	Micrograms per Liter
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
ng/L	Nanograms per Liter
NHDES	New Hampshire Department of Environmental Services
NHWS&PCC	New Hampshire Water Supply and Pollution Control Commission
NPL	National Priorities List
O&M	Operation and Maintenance
OHHRRAF	OLEM's Human Health Regional Risk Assessment Forum
OLEM	Office of Land and Emergency Management
OU	Operable Unit

PCBs	Polychlorinated Biphenyls
PCE	Tetrachloroethene
PFAS	Per- and Polyfluoroalkyl Substances
PFBS	Perfluorobutane Sulfonic Acid
PFHxS	Perfluorohexane Sulfonate
PFNA	Perfluorononanoic Acid
PFOA	Perfluorooctanoic Acid
PFOS	Perfluorooctane Sulfonate
POE	Point of Entry
POTW	Publicly Owned Treatment Works
ppb	Parts per Billion
ppm	Parts per Million
PPRTV	Provisional Peer Reviewed Toxicity Value
ppt	Parts per Trillion
PRP	Potentially Responsible Party
RAO	Remedial Action Objective
RCRA	Resource Conservation and Recovery Act
RfC	Reference Concentration
RfD	Reference Dose
RI	Remedial Investigation
ROD	Record of Decision
RPM	Remedial Project Manager
RSL	Regional Screening Level
SAP	Sampling and Analysis Plan
TBC	To Be Considered
TCE	Trichloroethene
UU/UE	Unlimited Use and Unrestricted Exposure
VEE	Vacuum-Enhanced Extraction
VI	Vapor Intrusion
VISL	Vapor Intrusion Screening Level
VOC	Volatile Organic Compound

I. INTRODUCTION

The purpose of a five-year review (FYR) is to evaluate the implementation and performance of a remedy to determine if the remedy is and will continue to be protective of human health and the environment. The methods, findings and conclusions of reviews are documented in FYR reports such as this one. In addition, FYR reports identify issues found during the review, if any, and document recommendations to address them.

The U.S. Environmental Protection Agency (EPA) is preparing this FYR pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Section 121, consistent with the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) (40 Code of Federal Regulations (CFR) Section 300.430(f)(4)(ii)) and considering EPA policy.

This is the sixth FYR for the Tinkham Garage Superfund Site (Site). The triggering action for this policy review is the previous FYR, completed on September 30, 2019. The FYR has been prepared because hazardous substances, pollutants or contaminants remain at the Site above levels that allow for unlimited use and unrestricted exposure (UU/UE).

The Site consists of one sitewide operable unit (OU) that addresses both source control and management of migration response actions. This FYR addresses the sitewide OU.

EPA remedial project managers (RPMs) Joe Cunningham and Cheryl Sprague led the FYR. Participants from EPA included site attorney RuthAnn Sherman, human health risk assessor Paulina Do, ecological risk assessor TaChalla Gibeau and community involvement coordinator (CIC) Aaron Shaheen. Additional participants included Andrew Fuller and Rene Nahlik from the New Hampshire Department of Environmental Services (NHDES) and Kirby Webster and Jill Billus from EPA FYR contractor Skeo. The Cannons Sites Group (CSG), a settling party, was notified of the initiation of the FYR. The review began on January 29, 2024.

Appendix A includes a list of documents reviewed for this FYR. Appendix B provides a chronology of Site events.

Site Background

The Site is located about a mile southwest of the intersection of Interstate 93 and State Route 102 in the town of Londonderry in Rockingham County, New Hampshire (Figure 1). The Site was defined in the 1986 Record of Decision (ROD) as encompassing approximately 375 acres of residential, commercial, and undeveloped land and wetlands.[1] However, contaminant migration has resulted in impacts beyond the 1986 Site boundaries into nearby neighborhoods. There is currently one operational unit (OU) at the site.

The 1986 ROD identified impacted residential areas on-site including the Woodland Village condominium complex (formerly the Londonderry Green Apartments), which consists of 13 multi-unit buildings in the southwestern part of the Site as well as single-family homes along Mercury Drive and McAllister Drive. Subsequent investigations demonstrated that the Ross Drive and Tokanel Drive and

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[1] The 1986 Record of Decision (ROD) indicated the Site encompassed 375 acres; however, subsequent contaminant migration has resulted in an area impacted significantly larger than the area defined in the 1986 ROD.

Boston and Charleston neighborhoods were also impacted. In 2004 development of a residential retirement community began which ultimately resulted in the construction of more than 120 residences at the center of the site. Commercial areas of the site include the Tinkham Garage in the northwestern part of the Site and a large retail shopping center adjacent to the garage which makes up the northeast portion of the Site. Land was purchased in 2001 and a retail shopping center began construction in 2002 which currently includes a Home Depot, Staples and two restaurants. A portion of the shopping center was constructed in the area where remedial actions took place to address contaminated soils and shallow groundwater.

There are unnamed tributaries to Beaver Brook that flow from north to south through the Site, identified herein as streams 1A, 1B, 1C, and 1D. Stream 1D originates in the northern portion of the Site to the east of Tinkham garage flows in a southernly direction and contributes to the wetlands north of Ross Drive before flowing west through a culvert beneath the Nevins and joining Stream 1C where it ultimately discharges to wetlands adjacent to Beaver Brook. Originally a flowing wetland, portions of current Stream 1D were formed by excavating a shallow channel in the wetlands in the 1970s when it was determined to be the source of odor complaints leading to the discovery of the Site. Portions of this drainage stream continues to flow into historical channels within the wetlands and into and through the Ross and Tokanel neighborhood. While the shallow excavation redirected Stream 1D, it has been further channelized several times, during the development of the Nevins and current drains surface flows through the Nevins and discharges into Stream 1C. Streams 1A, 1B, and 1C carry flow from the northern portion of the Site west of Tinkham Garage, through the south-southwest portion of the Site and into a large wetland west/southwest of the Ross and Tokanel neighborhood. Groundwater-surface water interactions have been demonstrated in all streams, and the streams are gaining or losing depending on the season and groundwater elevation. There are numerous unnamed streams which flow throughout the Ross and Tokanel neighborhood, primarily originating from the wetland north of Ross Drive and fed primarily by Stream 1D. Saturated overburden thickness varies widely across the Site and is thin to non-existent in some areas due to the presence of shallow bedrock and multiple bedrock outcrops, while in other areas bedrock contains deep ravines and depressions resulting in a substantial saturated overburden approaching 100 ft thick in some locations.

Both the saturated overburden and fractured bedrock aquifers have historically been used as potable water sources via private residential and community groundwater extraction wells. Groundwater flow in the bedrock aquifer is complex, anisotropic, and there are large areas of the Site where groundwater hydrology has not been fully investigated, and therefore a complete discussion is beyond the scope of this Five-Year Review. However, groundwater flow is controlled by hydraulic gradient, fracture orientation, connectivity, and hydraulic stressors. Groundwater flow direction and magnitude in fractured bedrock vary significantly by location and depth at the Site. For an in-depth discussion of groundwater hydrology at this Site, please see the 2024 Remedial Investigation Summary Memorandum which is anticipated to be released in Early Spring 2025. Investigations are planned as part of the RI to better understand flow direction and potential migration pathways in both aquifers.

Site-related groundwater contamination, including VOCs, 1,4-dioxane and PFAS, has been found in both the overburden and bedrock aquifers within Site boundaries, while primarily 1,4-dioxane and PFAS have been found in groundwater and residential water supply wells beyond the Site boundary.

Site History

The Londonderry Health Department first investigated the Tinkham Garage Site in 1978 after receiving complaints of foam and odors in an unnamed brook crossing Ross Drive as well as in an adjacent water supply well. At that time, the Tinkham Garage stored, maintained, and cleaned tankers associated with Tinkham Enterprises. The health department's investigation concluded that liquids and sludge from tank truck washings had been dumped behind the garage directly on the ground and within trenches. The waste disposal practices reportedly took place in 1978 and 1979. The activities contaminated soil, surface water and shallow and bedrock groundwater, including residential wells and the water supply well at the Londonderry Green Apartments (now the Woodland Village condominiums) with volatile organic compounds (VOCs). Subsequent investigations determined that liquid waste was likely released at additional locations on the Site, including, but not limited to a purpose-built solvent swale and into the septic system and leach fields of the Londonderry Green Apartments. Several leach fields at the Londonderry Green Apartment complex failed, presumably due to its use to dispose of liquid hazardous waste. Also, during leach field replacement, at least one contaminated soil stockpile was created on-site and likely formed an additional source area as the contaminants in the soil leached into the soil and groundwater beneath the unlined soil stockpile. The source area investigations performed thus far focused on soil contamination in the area behind and east of the Tinkham Garage and where the initial 1978 complaint originated. However, due to the PRP's apparent proclivity to release liquid waste wherever convenient, the current understanding of the Site suggests that there are multiple potential additional source areas which have not been adequately addressed or investigated, and many data gaps remain.

Alternative Water

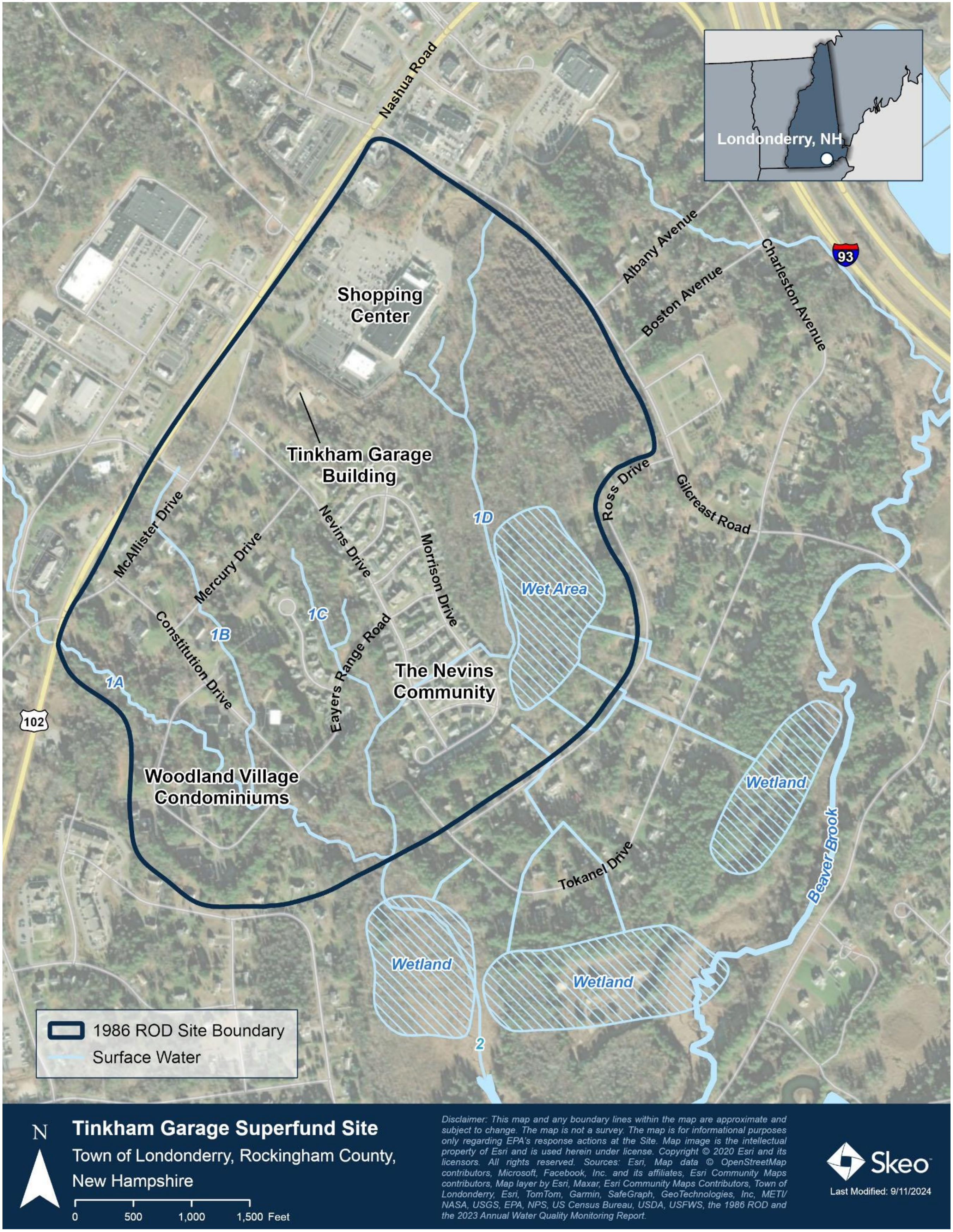
When the initial complaints for the Site began in 1978, residential and commercial properties at the Site obtained potable water via on-site groundwater supply wells. In the earliest phase of investigations these water supply wells were found to exceed State and Federal standards and an alternative water supply was deemed necessary. Residents and businesses on Mercury and McAllister roads, as well as the former Londonderry Green Apartment complex, were connected to a public water line in 1983 by a collaborative effort between the EPA and the State of New Hampshire. The Nevins community was built between 2004 – 2013 and was connected to the waterline as a condition of development, as was the retail shopping center. After monitoring detected contaminants in excess of Federal and State standards, five households along Boston and Charleston Avenue, located east of the Tinkham Garage, were connected to the waterline as required by an Explanation of Significant Differences (ESD) issued by EPA in 2016. Recent investigations, also required by the 2016 ESD, have demonstrated that contaminants released to the environment within the Site have migrated off-site and are found to have impacted nearby neighborhoods with their groundwater exceeding NH AGQS and/or EPA MCLs for Site contaminants. As of the date of publication, 59 residences in the Ross and Tokanel, Boston and Charleston neighborhoods have had at least one exceedance of either the NH AGQS for 1,4-dioxane and/or the EPA MCL for PFAS constituents in their residential wells and as a result have been offered bottled water as a temporary alternative water source. It should be noted that the bottled water offered to residents by the PRP group is intended for drinking and cooking purposes, and it should be assumed that all residents continue to use their groundwater wells for all other purposes, including bathing and washing, resulting in a continued draw on the aquifer. It is anticipated that residents in this area will be provided with a permanent alternative water supply source as the data suggests Site contaminants continue to migrate into these communities. Figure C-1 in Appendix C shows properties connected to the public water supply and properties with private wells. An extensive residential well monitoring program is in place at the Site under the State’s Groundwater Management Permit (GMP) program. The Data Review section of this FYR Report discusses recent sampling results. Bottled water is offered by the CSG where New Hampshire AGQS (drinking water) standards are exceeded in the residential wells as required by the GMP and where recent EPA PFAS MCLs have been exceeded based on a voluntary agreement by the CSG.

The Site’s 1986 Remedial Investigation (RI) Report as well as the 2024 Remedial Investigation Summary Memorandum provide more information on the history of contamination at the Site.

FIVE-YEAR REVIEW SUMMARY FORM

SITE IDENTIFICATION		
Site Name: Tinkham Garage		
EPA ID: NHD062004569		
Region: 1	**State:** NH	**City/County:** Londonderry/Rockingham
SITE STATUS		
NPL Status: Final		
Multiple OUs? No	**Has the site achieved construction completion?** Yes	
REVIEW STATUS		
Lead agency: EPA		
Author name: Joe Cunningham and Cheryl Sprague		
Author affiliation: EPA		
Review period: 1/29/2024 – 9/30/2024		
Date of site inspection: 4/18/2024		
Type of review: Policy		
Review number: 6		
Triggering action date: 9/30/2019		
Due date *(five years after triggering action date)*: 9/30/2024		

Figure 1: Site Vicinity Map



Disclaimer: This map and any boundary lines within the map are approximate and subject to change. The map is not a survey. The map is for informational purposes only regarding EPA's response actions at the Site. Map image is the intellectual property of Esri and is used herein under license. Copyright © 2020 Esri and its licensors. All rights reserved. Sources: Esri, Map data © OpenStreetMap contributors, Microsoft, Facebook, Inc. and its affiliates, Esri Community Maps contributors, Map layer by Esri, Maxar, Esri Community Maps Contributors, Town of Londonderry, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA, USFWS, the 1986 ROD and the 2023 Annual Water Quality Monitoring Report.

II. RESPONSE ACTION SUMMARY

Basis for Taking Action

EPA conducted an Endangerment Assessment for the Site in 1986, which included a human health risk assessment (HHRA) and ecological receptor assessment. Exposure routes evaluated quantitatively in the human health risk assessment included ingestion of contaminated groundwater and incidental ingestion of contaminated soil. Dermal contact and inhalation were also identified as possible exposure routes for both media, but the effects of these exposures were not quantified. The HHRA concluded that the bedrock aquifer was contaminated and posed an unacceptable risk if used for drinking water. The upper lifetime cancer risk was estimated at 2×10^{-2}. At the time of this assessment, it was believed that there were no residents on-site who were using the contaminated groundwater as potable water because affected homes had been connected to the public water line in 1983 (discussed more in the Response Actions section of this FYR Report). However, the potential for future risk remained because nearby private wells continued to draw water from the aquifer for a drinking water source.

The HHRA also concluded that contaminated soils in the source area behind the Tinkham Garage posed an unacceptable risk to sensitive populations, such as children, although access to the area was considered at the time to be limited. The greater risk posed by contaminants in soil was the potential for VOCs to leach into groundwater resulting in contamination of the aquifer above drinking water standards.

Contaminants detected in condominium area soils, on-site surface water and sediment (of an unnamed tributary, associated stream, and wetlands) were concluded not to pose a significant risk to human health and the environment through direct contact and incidental ingestion.

The 1986 ecological receptor assessment was limited to the sampling of surface waters in and migrating toward Beaver Brook, which is used for fishing and discharges into the Merrimack River. No ecological concerns were noted at that time.

Table 1 summarizes the Site’s groundwater and soil contaminants of concern (COCs) from the Site’s 1986 Record of Decision (ROD) as updated by a 2016 Explanation of Significant Differences (ESD).

Table 1: Site COCs

Groundwater COCs[a]	Soil COCs[b]
Benzene	Chlorobenzene
Ethylbenzene	1,2-Dichlorobenzene
Toluene	Ethylbenzene
Xylenes	Toluene
Chloroform	Xylenes
1,1-Dichloroethane (1,1-DCA)	1,1,1-Trichloroethane
1,2-Dichloroethane (1,2-DCA)	TCE
trans-1,2-Dichloroethene	PCE
Tetrachloroethene (PCE)	2-Butanone
1,1,1-Trichloroethane	Polychlorinated biphenyls (PCBs)[c]
Trichloroethene (TCE)	
Vinyl chloride	
Methylene chloride	
Acetone	
2-Butanone (methyl ethyl ketone)	
1,4-dioxane	

Notes:

a) Groundwater COCs are from Table 2 of the 1986 ROD and the 2016 ESD (1,4-dioxane only).
b) Soil COCs are from Table 4 of the 1986 ROD.
c) PCB concentrations were less than 1 part per million (ppm)

Response Actions

Early Actions (Pre-ROD)

After initial discovery of contamination in 1978, the New Hampshire Water Supply and Pollution Control Commission (NHWS&PCC) (now the NHDES) issued an order to Tinkham Garage to take action to prevent further contamination of surface water and groundwater. This resulted in the removal of surface contamination behind the garage and shallow excavation of a diversion trench to direct surface water runoff from behind the garage away from Ross Drive. Liquid waste discharges behind the Tinkham Garage reportedly ceased in 1979.

EPA completed a preliminary assessment at the Site in August 1981 that showed groundwater, soil and surface water were contaminated with VOCs. At that time, the Site and surrounding residential areas relied on bedrock water supply wells to provide potable water. In January 1983, the drinking water supply well (identified as LGSW) servicing the Londonderry Green Apartments (presently the Woodland Village condominiums) and several residential wells along Mercury Drive and McAllister Drive were taken out of service because of documented and potential contamination. These residents were temporarily supplied bottled water and point of entry (POE) treatment systems. In November 1983, NHWS&PCC installed a permanent water line for the affected residences under a cooperative agreement between EPA and the State.

EPA listed the Site on the National Priorities List (NPL) in September 1983. EPA conducted the Site's Remedial Investigation/Feasibility Study (RI/FS) from 1984 to 1986. Based on the RI, EPA concluded that the disposal area behind the Tinkham Garage was the primary source area at the Site which resulted in impacts to the nearby water supply wells, domestic waste leach fields, a soil pile, and a swale at the Londonderry Green Apartments were also identified as potential sources.[2] Figure C-2 in Appendix C shows the historical Site features.

Remedy Selection

EPA selected the Site's remedy in a 1986 ROD as modified by a 1989 Amended ROD and three ESDs, issued in 1992, 2003, and 2016.

The 1986 ROD defined remedial action objectives (RAOs) for the source control and management of migration response actions, which did not change with the 1989 Amended ROD and subsequent ESDs.

Source Control RAOs

- Prevent or mitigate further release of contaminants to surrounding environmental media.
- Eliminate or minimize the threat posed to the public health, welfare and the environment from the source area.

Management of Migration RAOs

- Prevent or mitigate further migration of contaminants beyond their current extent.
- Eliminate or minimize the threat posed to the public health, welfare and the environment from the current extent of contaminant migration.

1986 ROD and 1989 Amended ROD

The 1986 ROD originally selected soil excavation and on-site treatment using either thermal aeration, composting or soil washing for the source control remedy. It also selected removal of contaminated shallow and bedrock groundwater using two bedrock wells and a shallow trench near the garage and off-site treatment of the extracted groundwater (with the potential for on-site pretreatment) as the management of migration remedy. The 1986 ROD relied on the water line installed in 1983 as an early action to reduce the potential for exposure to contaminated groundwater. The 1989 Amended ROD modified the source control component of the remedy to dual vacuum extraction, which in turn, modified the planned shallow trench to a well system for extraction of shallow groundwater.

The remedy selected in the 1986 ROD, as modified by the 1989 Amended ROD, included the following major components:

- Soil remediation using dual vacuum extraction. Areas of the Site having soil with greater than 1 milligram per kilogram (mg/kg) volatile organics including the garage area, condominium leach fields I/J and K/L, and the soil pile located behind the condominium complex were to be remediated to 1 mg/kg or less total volatile organics. Remediation of the soils was to utilize vacuum extraction wells equipped to pump shallow groundwater and simultaneously extract vapors from the unsaturated soils.
- Extraction of contaminated groundwater through the use of two bedrock wells (LGSW and LGAW) at the condominium complex.
- Extraction of shallow groundwater behind the Tinkham Garage building via a dual vacuum extraction system.

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[2] The swale, which was reported as an open, water-filled trench, was backfilled by the owners of the Londonderry Green Apartments in November 1982, at EPA's request.

- On-site pre-treatment of shallow groundwater from the dual vacuum extraction system before mixing with the extracted bedrock groundwater.
- Transfer of the combined pre-treated shallow groundwater and bedrock groundwater to the town of Derry publicly owned treatment works (POTW) for off-site treatment.
- Groundwater monitoring on-site and off-site.

The 1986 ROD stated that groundwater extraction would proceed for two years from the date of implementation. At that time, EPA would assess progress toward meeting remedial objectives for the cleanup of groundwater at the Site. The ROD further stated that should steady-state conditions be reached, and the remedial objectives set for groundwater were not achievable, EPA would reevaluate the objectives and its remedial approach for groundwater at the Site. The 1986 ROD recommended that either the town of Londonderry or the State develop legislation, as an institutional control, to prevent the present and future use of groundwater until the aquifer on-site has been restored to levels protective of public health and welfare and the environment.

1992 and 2003 ESDs

An ESD issued in 1992 modified the approach for discharge of treated shallow groundwater at the Site. It was issued due to delays in the sewer line extension needed to send extracted groundwater to the POTW. The 2003 ESD retracted the 1992 ESD because construction of the sewer line began shortly after the first ESD was issued.

The 2003 ESD also made the following changes to the Site's remedy (all other components of the 1986 ROD remained):

- Modified the groundwater remedy from active extraction to monitored natural attenuation (MNA) (the rationale for this change is addressed in the Status of Implementation section of this FYR Report).
- Clarified and documented the application of institutional controls necessary for protection of public health until completion of the groundwater remedy. The institutional controls include a Groundwater Management Zone (GMZ) established by the State of New Hampshire, which is monitored through the State's GMP program.

2016 ESD

Site groundwater was sampled for 1,4-dioxane in 2008 for the first time and it was found to be present at elevated concentrations. In addition, during a 2014 State investigation unrelated to the Site, site-related constituents (TCE, vinyl chloride, 1,4-dioxane) were detected in residential wells above drinking water standards located more than 1,500 feet east of the Site's main source area that was not previously known to be contaminated. The affected residences were offered bottled water systems. These findings, in part, led EPA to issue the Site's third ESD in 2016.

The 2016 ESD made the following changes to the remedy:

- Added 1,4-dioxane as a Site COC and selected a cleanup level of 3 micrograms per liter (µg/L), based on the New Hampshire Ambient Groundwater Quality Standard (AGQS) at the time.
- Required a review and revision of the GMZ and deed restrictions.
- Required implementation of additional bedrock investigations to evaluate the contaminant extent, fate, transport, and time for attainment of the groundwater cleanup level due to the addition of 1,4-dioxane as a COC.

- Required connection of homes affected by Site-related contamination in groundwater above drinking water standards to a public water line (at the time of the ESD, this included homes along Charleston and Boston Avenues). After connections to the public water line, proper abandonment or decommissioning of potable supply wells unless the wells are needed for long-term monitoring, and removal of POE treatment systems.
- Required monitoring of nearby residential wells at homes not connected to the water line.
- Updated the approach to evaluating attainment of groundwater cleanup levels.

Cleanup Levels

Soil

The 1986 ROD, as modified by the 1989 Amended ROD, set a soil cleanup level of 1 mg/kg for total VOCs. The 1989 Amended ROD indicated that this cleanup level was selected because it resulted in significant reduction in the mass of contaminants in the source area behind the garage, was protective of public health for direct contact exposures, and would help accelerate cleanup of the contaminated bedrock aquifer. EPA determined that cleanup specifically for PCBs was not necessary since most PCB concentrations were less than 1 part per million (ppm) in most samples.

Groundwater

The 1986 ROD set groundwater cleanup levels for tetrachloroethene (PCE) and trichloroethene (TCE) and the 2016 ESD set a groundwater cleanup level for 1,4-dioxane (Table 2). Although the 1986 ROD identified multiple VOCs as groundwater COCs, it established cleanup levels only for PCE and TCE as indicator compounds for remediation. The ROD indicated that treatment to 5 parts per billion (ppb) for PCE and TCE was also expected to reduce other compounds identified in groundwater to non-detectable levels. The 2016 ESD noted that once groundwater cleanup levels have been met, EPA will perform a risk evaluation that considers additive risk from remaining COCs.

Table 2: Target Groundwater Cleanup Levels[a]

Groundwater COC	ROD Cleanup Level[a] (µg/L)	Basis
PCE	5	MCL[b]
TCE	5	MCL
1,4-dioxane	3	State AGQS[c,d]

Notes:

a) While cleanup levels for PCE, TCE, and 1,4-dioxane are included in the decision documents, the ROD also notes that all groundwater needs to attain respective MCLs.

b) PCE and TCE cleanup levels are from the 1986 ROD, page 38; the 1,4-dioxane cleanup level is from the 2016 ESD, page 5.

c) The 1986 ROD set a cleanup level for PCE of 5 ppb, which at that time was the proposed MCL for TCE, because an MCL had not yet been promulgated for PCE. In 1991, EPA promulgated the same cleanup level of 5 ppb for PCE.

d) The NH AGQS for 1,4-dioxane was subsequently lowered to 0.32 µg/L, however the ROD clean-up level currently remains 3 µg/L.

Status of Implementation

In September 1987, EPA and a group of potentially responsible parties (PRPs) entered into an Administrative Consent Order that required the PRPs to conduct pre-design evaluations and to define the full extent of soil contamination at the Site. These activities were completed in 1988 and subsequently led to the remedy modifications in the 1989 Amended ROD. EPA and the Cannons Engineering Corporation (CSC), a settling party, also entered a comprehensive Consent Decree, which became effective in August 1989. It required the CSC to implement the remedial action selected in the ROD and any subsequent amendments (at the Tinkham Garage Site and three other Superfund sites). Following entry of the Consent Decree, the CSC began the remedial design. The Cannons Sites Group, or CSG, is the group managing cleanup for the CSC.

Source Control (Soil) Remedy - Complete

The source control component of the remedial action began in March 1994. Initial work involved sampling and excavation of contaminated soils from three areas at the condominium complex. Post-excavation soil sampling confirmed total VOCs met the Site's cleanup goal in these areas. About 3,000 cubic yards of contaminated soil were transported to the main source near the Tinkham Garage for treatment. After the removals, the CSG restored all excavated areas at the condominium complex.

The CSG also constructed a vacuum-enhanced extraction (VEE) system behind the Tinkham Garage to treat the main source area soils in situ as well as the soils brought to the source area from the condominium complex. The VEE system operated from November 1994 to September 1995. Sampling conducted in October 1995 confirmed attainment of the soil cleanup level. With EPA approval, the CSG dismantled the VEE system in November 1995, but retained and modified components needed for continued extraction of shallow groundwater as part of the management of migration remedy.

Management of Migration (Groundwater) Remedy - Ongoing

The management of migration remedy initially included extraction of shallow and bedrock groundwater with treatment off-site at the Derry POTW (with on-site pre-treatment as necessary). Construction of a mile-long pipeline from the Site to the Derry POTW took place in 1993. Groundwater extraction began in May 1995. Bedrock groundwater was extracted from former condominium supply wells LGAW and LGSW and conveyed to the Tinkham Garage source area via a dedicated pipeline. At the Tinkham Garage source area, shallow groundwater was initially removed using the vacuum extraction wells and pretreated on-site before discharge to the town of Derry POTW. Pretreatment of the remedial effluent was required to meet the local industrial pretreatment standards established by the town of Derry for the Derry POTW to accept the site's remedial effluent.

After attaining soil cleanup levels in 1995, the VEE system was modified to include six independent shallow wells. Reduced contaminant levels allowed pretreatment of the extracted shallow groundwater to be discontinued. In July 1996, the CSG requested a temporary shutdown of the two bedrock extraction wells on the basis that VOC contamination had reached steady-state conditions. EPA granted a temporary shutdown of the two bedrock groundwater extraction wells and requested additional monitoring.

In May 1997, two years after extraction first began, the CSG requested that EPA approve the permanent shutdown of the groundwater extraction system as allowed by the ROD. The request was based on evidence of natural attenuation through active biodegradation in the shallow aquifer, attainment of steady-state conditions in the bedrock aquifer, and an estimate that drinking water standards would be achieved via natural attenuation within 15 years.

Based on those findings, EPA issued the 2003 ESD that changed the groundwater remedy from active extraction and treatment to MNA. It was determined that the use of a natural attenuation remedy would eliminate or minimize migration of contaminants and be protective of public health and the environment over the long term, and in the interim, it required monitoring and implementation of institutional controls via a GMZ, implemented as part of a NHDES GMP.

After the State established an AGQS for 1,4-dioxane in 2005, NHDES required that groundwater be tested for 1,4-dioxane. In a May 2008 sampling event, 1,4-dioxane was detected in Site groundwater above the AGQS. Based on a recommendation in the Site's 2009 FYR Report, the CSG began investigations to define the nature and extent of 1,4-dioxane in groundwater.

Bedrock investigations also began in 2014 to evaluate contaminant concentrations and characterize discrete fractures zones, water flow and water quality. Site data showed high concentrations of 1,4-dioxane in discrete fractures. Residential wells in the Boston/Charleston Avenue neighborhood, located nearly 1,500 feet northeast of the major contaminant source area at the Site, were also found to contain contaminants similar to those found in the Tinkham garage source area through separate investigations performed by the State of New Hampshire.

The discovery of site-related contamination outside of previously known areas above safe drinking water levels and the detection of widespread 1,4-dioxane in Site groundwater prompted EPA to issue the 2016 ESD. Water supply wells along Boston and Charleston Avenues, found to have concentrations above safe drinking water levels, were connected to a nearby waterline per the requirements of the 2016 ESD. The 2016 ESD also required a supplemental RI to evaluate the full extent of fate and transport of Site contaminants. Supplemental RI activities have been ongoing at the Site since that time.

Site data collected since the 2016 ESD show areas of high concentrations of 1,4-dioxane in the bedrock aquifer within the source area and widespread detection of 1,4-dioxane both above the MDL and above the AGQS in monitoring and residential wells northeast, east and south of the Site. In 2018, EPA requested sampling for the emerging contaminant group per-and polyfluoroalkyl substances (PFAS). The CSG performed the sampling and documented various PFAS compounds within the source area wells and in wells downgradient of source areas, including residential wells beyond the Site boundary. PFAS was also found in surface waters within the Site. The data suggest that due to the presence of 1,4-dioxane and PFAS and persistence of VOCs within the source areas, natural attenuation alone may not meet the Site's management of migration RAOs of preventing or mitigating further migration of contaminants and eliminating or minimizing the threat posed to human health and the environment. The CSG and EPA are implementing supplemental RI activities to obtain the data needed to develop a path forward for the Site that will improve the Conceptual Site Model (CSM), address all Site COCs and risks posed by the Site and ultimately, lead to an updated remedy that will meet all Site RAOs or provide new ones as necessary. Recent supplemental RI activities are described in the next section.

Under the GMP, long-term monitoring of groundwater, surface water and residential wells continues semi-annually to annually or at the frequency specified in the State-issued permit. The GMP, most recently updated in 2019 and revised in 2021, requires a contingency plan to provide drinking water should a drinking water supply well become impacted above AGQSs or if a new drinking water supply well is discovered within the GMZ. See "Institutional Controls" section below for more information about the GMP and GMZ.

Supplemental RI Activities

Additional Site investigations are being implemented under a January 2023 Bedrock Investigation Work Plan Addendum and a March 2023 Revised Bedrock Investigation Work Plan Addendum. Work completed by the CSG in 2023 included installation of three bedrock boreholes advanced to 400 feet bgs, installation of two boreholes to 200 feet bgs, installation of two overburden wells, geophysical logging, discrete fracture zone sampling and installation of permanent wells in the boreholes. In 2023, an assessment of former water supply wells near the Site was conducted in the Ross Drive and Tokanel Drive neighborhood, as well as the Reed Street and Button Drive neighborhood. Many of the identified wells were added to the monitoring program due to exceedances of the AGQS, MCL, or RSLs. The CSG has not performed any additional investigative Site work in 2024 because they have disputed performance of additional investigations under the existing Consent Decree. However, the CSG continued to perform monitoring of residential wells as part of the GMP during this FYR period.

Site Redevelopment

In January 2003, Gilcreast Realty Holdings II, LLC purchased 95 acres in the central portion of the Site to develop a planned retirement community consisting of over 120 residences called "The Nevins". As a condition of the prospective purchaser agreement, all units were required to be connected to municipal water and sewer and constructed with a passive vapor barrier or sub-slab depressurization system to prevent vapor intrusion of COCs. No information was found on actual compliance with this requirement, or documentation of maintenance of active sub-slab systems. Components consistent with a sub-slab depressurization system (i.e., exterior vacuum fan) were observed on several houses within the Nevins community, however absent on others. Prior Five-Year Reviews and a December 2019 assessment performed by CSG contractor Haley & Aldrich concluded that vapor intrusion was not a concern at the site due to VOC concentrations not exceeding the EPA VI threshold, the low VI potential of 1,4-dioxane, and presence of effective barriers at residences. However, as more data is collected at the site showing continued localized elevated VOC and 1,4-dioxane at concentrations which exceed State AGQS and ROD cleanup levels, at this time there is not enough information available to determine if the residences at the site, most notably homes in the Nevins community, are adequately protected from potential vapor intrusion risk. Additional information is required regarding the installation and maintenance of existing passive vapor barrier or sub-slab depressurization systems which were installed on these homes during construction.

Also in 2003, and consistent with the Site Re-use plan finalized in 2004, developers completed construction of the retail plaza containing a Home Depot, Staples, 99 Restaurant and Dunkin' Donuts in the northern part of the Site. As part of construction, a significant amount of fill was required to bring the land parcel to grade with Nashua Road. As a result, a portion of the original area of known releases, and a portion of the source area (the "1 ppm soil area") is buried and beneath the parking lot for the retail plaza. One of the monitoring wells with the highest COC concentrations, NAI-K2, is located within the retail plaza parking area, suggesting significant residual source material may remain beneath the footprint of the plaza. While these businesses are connected to public water and sewer, stormwater generated discharges to the rear of the plaza contribute to surface water flow throughout the Site.

Institutional Controls

The 1986 ROD, discussing institutional controls, stated:

> *"The U.S. EPA does recommend that either the Town of Londonderry, New Hampshire and/or the State of New Hampshire develop legislation capable of* ***preventing the present and future use*** *of the on-site aquifer. Existing groundwater protection and water supply rules at the State level may be employed to assist in attaining this objective. This restriction should be effective until the aquifer on-site has been restored to levels protective of public health and welfare and the environment."(*emphasis added)

The State of New Hampshire's Groundwater Management Permit Program (Env-Ws 410), developed in 1993, satisfies this institutional control objective by establishing a Groundwater Management Zone (GMZ). Property owners located within the GMZ are notified that the groundwater should not be used as a potable source until such time as ambient groundwater quality standards are attained. Notification of the groundwater management permit has been recorded on the deeds of the thirty-nine (39) properties located within the GMZ (See Appendix K-1). All property owners located within 1,000 feet of the GMZ have been sent notification of the permit. The GMP is reissued every five years by the NHDES.

NHDES issued the initial GMP in 2002 and renewed it in 2007, 2012 and 2019, and will reissue in 2024. (GWP-199004008-L-004). The 2019 permit expanded the GMZ to include areas of affected groundwater on Mercury Drive, McAllister Drive as well as households along Ross Drive and Tokanel Drive which were found to exceed the NH AGQS for 1,4-dioxane identified as a COC in the 2016 ESD. Figure 2 shows the GMZ as of 2024.

The 2019 permit was revised in December 2021 to incorporate sampling for VOCs, 1,4-dioxane and PFAS at 47 monitoring wells, four former water supply wells, five surface water locations and 77 residential wells at the frequency specified in the permit. While not currently included in the GMZ, monitoring is also required under the GMP at properties within the Boston and Charleston Avenues area to the northeast. The December 2021 revision to the permit also requires that the CSG continues to contact properties on Ross Drive and Tokanel Drive at least semiannually where access has not previously been granted.

Among other notification requirements, the permit requires immediate verbal notification to the State on receipt of analytical sampling results showing exceedances of the New Hampshire AGQSs in drinking water samples, so that appropriate corrective actions can be taken (i.e., supplying bottled water or POE treatment systems, etc.). As of 2024, 34 residential wells had at least one AGQS exceedance of 1,4-dioxane or PFAS (Figure 2), while an additional 27 exceed the EPA MCL for PFOA or PFOS. The CSG has offered residents at these properties bottled water for drinking and cooking. Several residences who were either not sampled or were below the applicable standards (e.g., AGQS or MCL) are known to use privately obtained bottled water for drinking water purposes due to either aesthetic reasons (e.g., silt, odor, discoloration), uncertainty over their water quality, and/or distrust in the residential groundwater sampling program While many residents in the Ross and Tokanel neighborhood are provided bottled water for drinking and cooking purposes, many continue to use their residential wells for other purposes, and it is expected that the residential groundwater wells continue to exert a hydraulic draw on the subsurface aquifer.

NHDES is expected to reissue the GMP in the Fall of 2024, however it is not yet clear what modifications will be included in the renewal.

Table 3 summarizes the Site's institutional controls. Additional land use restrictions or requirements for assessment of vapor intrusion if new buildings are constructed above the VOC plume should also be considered (see Section V, Technical Assessment of this FYR Report for more information).

Table 3: Summary of Implemented Institutional Controls (ICs)

Media, Engineered Controls, and Areas That Do Not Support UU/UE Based on Current Conditions	ICs Needed	ICs Called for in the Decision Documents	Impacted Parcel(s)	IC Objective	Title of IC Instrument Implemented and Date
Groundwater	Yes	Yes	See Appendix K-1 for complete list of impacted parcels	Restrict the use of contaminated groundwater as a potable source within the GMZ. Monitor the contaminated groundwater plume until cleanup levels are attained.	NHDES GMP GWP-199004008L-004 Issued May 17, 2019 Revised Permit expected to be released in Fall 2024.

Systems Operations/Operation & Maintenance (O&M)

There are no active remediation systems on-site. The dual vacuum extraction system was dismantled in 1995 and groundwater extraction ended in 1997. Since the remedy modification to MNA in the 2003 ESD, sampling of monitoring wells has been performed by the CSG under the GMP, while sampling of residential wells has been monitored by NHDES as well as the CSG under the GMP.

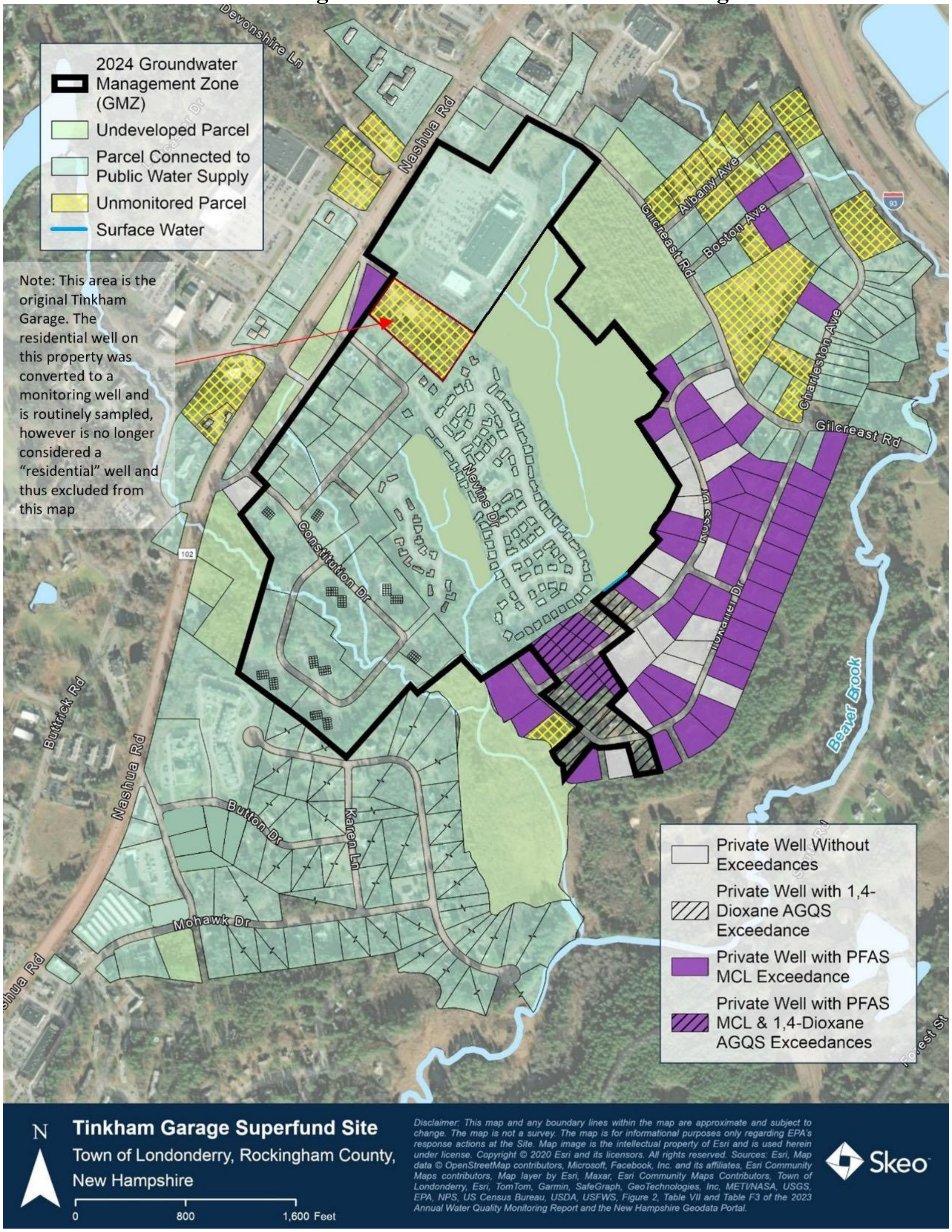
The CSG is responsible for conducting long-term monitoring activities at the Site required by the ROD, as amended. In addition to monitoring performed under the on-going remedial investigations, monitoring of contaminated groundwater and monitoring of nearby water supply wells continues to be performed under the Site's State issued GMP. The GMP was renewed in 2007, 2012 and 2019, revised in 2021, and is expected to be renewed again in 2024.

Sampling activities during this FYR period were conducted in accordance with a revised 2019 Sampling and Analysis Plan (SAP) and Quality Assurance Project Plan, and a 2023 SAP Addendum 2.

Long-term monitoring activities under the GMP include semi-annual and annual groundwater, surface water and residential well sampling for VOCs, 1,4-dioxane and PFAS. Frequency and analytes vary by location, with some locations only sampled once every five years while others are monitored twice annually.

The State has required bottled water to be offered to residents whose water supply well concentration exceed NH AGQS for 1,4-dioxane, and the CSG has offered to supply bottled to residents whose water supply well concentration exceeds the EPA MCLs issued in April 2024. This FYR has identified several households proximate to the Site which have not been sampled by CSG or EPA since prior to the 2016 ESD, and therefore the presence or concentration of PFAS in these residential wells is unknown. EPA requested that these households be sampled by the CSG, however the CSG declined. EPA and the State plan to address this data gap. As also noted in during the Site inspection, there are deficiencies in the O&M of the groundwater monitoring well network and several wells were found to be in poor condition. This is discussed in more detail below in Question A.

Figure 2: Current Groundwater Management Zone and Residential Drinking Water Status



Note: This area is the original Tinkham Garage. The residential well on this property was converted to a monitoring well and is routinely sampled, however is no longer considered a "residential" well and thus excluded from this map

Disclaimer: This map and any boundary lines within the map are approximate and subject to change. The map is not a survey. The map is for informational purposes only regarding EPA's response actions at the Site. Map image is the intellectual property of Esri and is used herein under license. Copyright © 2020 Esri and its licensors. All rights reserved. Sources: Esri, Map data © OpenStreetMap contributors, Microsoft, Facebook, Inc. and its affiliates, Esri Community Maps contributors, Map layer by Esri, Maxar, Esri Community Maps Contributors, Town of Londonderry, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA, USFWS, Figure 2, Table VII and Table F3 of the 2023 Annual Water Quality Monitoring Report and the New Hampshire Geodata Portal.

III. PROGRESS SINCE THE PREVIOUS REVIEW

Table 4 includes the protectiveness determinations and statements from the previous FYR. Table 5 includes the recommendations from the previous FYR and the current status of those recommendations.

Table 4: Protectiveness Determinations/Statements from the 2019 FYR Report

OU #	Protectiveness Determination	Protectiveness Statement
OU-1	Short-term Protective	The OU-1 remedy at the Site is currently protective of human health and the environment as envisioned in the 1986 ROD, as modified, because the remedy has met soil cleanup goals, and is complete and protective of human health and the environment; and connections to a waterline and the provision of bottled water have addressed residents whose water supply wells are found impacted above cleanup standards, MCLs or the State's AGQS, respectively. ICs are in place and currently effective at managing exposure to contaminated groundwater at the Site. However, in order for the remedy to be protective in the long-term the following actions are needed: (1) Further evaluation of the MNA groundwater remedy to determine whether it can address 1,4-dioxane and PFAS, reassess the time to meet cleanup levels, can minimize migration and protect nearby residences who utilize the groundwater as a drinking water source, and, if needed, evaluate alternative remedial options to address risk at the Site and attain cleanup standards. (2) Further evaluation for Site contaminants, including 1,4-dioxane and PFAS in groundwater, to determine whether they continue to migrate and impact water supply wells or pose an unacceptable risk for residences who continue to utilize groundwater as their drinking water source. (3) Installation of a comprehensive monitoring well network which allows for the vertical and horizontal delineation of the extent of contamination, the assessment of migration pathways, and the attainment of clean up levels within individual fractures. (4) Continued evaluation of the vapor intrusion pathway; and (5) Groundwater cleanup levels, selected in the 1986 ROD, as modified, need to be attained.
Sitewide	Short-term Protective	The remedy at the Site is currently protective of human health and the environment as envisioned in the 1986 ROD, as modified, all source control actions have been completed and the remedy has met soil cleanup goals, and connections to a waterline or the provision of bottled water (per the NH Env-Or 600 requirements) have addressed residents whose water supply wells have been found to be impacted above cleanup standards or NH AGQSs respectively, and ICs are in place and currently effective at managing exposure to contaminated groundwater at the Site. In order for the remedy to be protective in the long-term, groundwater cleanup levels, selected in the 1986 ROD, as modified, need to be attained; an evaluation of the MNA groundwater remedy and whether it can address 1,4-dioxane and PFAS, is capable of meeting cleanup levels in a reasonable amount of time, can minimize migration and protect nearby residences who utilize the groundwater as a drinking water source must be completed; a comprehensive monitoring well network needs to be installed to delineate and assess residual mass migration and attainment of cleanup levels within individual fractures; and the vapor intrusion exposure pathway should continue to be evaluated.

Table 5: Status of Recommendations from the 2019 FYR Report

OU #	Issue	Recommendation	Current Status	Current Implementation Status Description	Completion Date (if applicable)
OU-1	The current groundwater remedy (MNA) may not result in meeting cleanup goals in the expected time and may not be effective for newly identified contaminants.	A MNA remedy evaluation should be completed for residual contamination, including 1,4-dioxane and PFAS, and consistent with current EPA guidance to ascertain whether MNA will attain cleanup levels in a reasonable time, whether MNA will minimize the migration of contaminants in the bedrock aquifer and whether the current MNA remedy will be protective of human health and the environment or whether the groundwater remedy should be modified.	Ongoing	The CSG and EPA are conducting supplemental RI activities at the Site; the RI activities are expected to define the extent of 1,4-dioxane and PFAS contamination at the Site, and obtain data needed for an MNA remedy evaluation.	Not applicable
OU-1	1,4-dioxane has been detected in residential water supply wells above the State's current AGQS of 0.32 µg/L and PFAS have been detected in groundwater above EPA screening levels and in a residential water supply wells above 70 [nanograms per liter, ng/L], the State's AGQS at the time.	Further evaluation is needed to determine the full extent of 1,4-dioxane and PFAS in groundwater at the Site.	Ongoing	The supplemental RI is ongoing and is expected to determine the full extent of 1,4-dioxane and PFAS in groundwater at the Site. Because the RI is ongoing, this issue is carried forward in this FYR.	Not applicable

OU #	Issue	Recommendation	Current Status	Current Implementation Status Description	Completion Date (if applicable)
OU-1	The current monitoring well network is not adequate to delineate the extent of contamination nor assess migration of contaminants within bedrock fractures.	Install a more comprehensive monitoring well network which allows for the vertical and horizontal delineation of the extent of contamination so that migration pathways and attainment of cleanup levels within individual fractures can be adequately assessed.	Ongoing	The monitoring well network has been expanded since the 2019 FYR as knowledge of fate and transport of emerging contaminants 1,4-dioxane and PFAS has evolved, and additional monitoring points are required to adequately characterize the extent of the plume and contaminant pathways. However, the monitoring well network is not complete, and additional wells identified as necessary by the Agencies have yet to be installed. Further expansion of the monitoring well network may be required pending results of ongoing RI activities. This issue is carried forward in this FYR.	Not applicable

OU #	Issue	Recommendation	Current Status	Current Implementation Status Description	Completion Date (if applicable)
OU-1	Uncontrolled migration of Site contaminants, including 1,4-dioxane and PFAS, beyond the Site boundaries and impacts to residential drinking water supply wells has been documented.	As required by the 2016 ESD, remedial investigations, a feasibility study, and an amended remedy must be completed since the MNA remedy may not be able to reduce contaminant concentrations to cleanup levels in a reasonable time and meet the RAOs to minimize migration of contaminants and protect human health and the environment. 1,4-dioxane and PFAS have been identified in Site groundwater since the 2003 ESD, have impacted nearby residential drinking water supply wells and must be assessed as part of these studies and in any future remedy change.	Ongoing	Uncontrolled migration of Site contaminants continues. Affected residences are offered bottled water if their drinking water does not meet AGQSs for 1,4-dioxane or MCL for PFAS compounds. The CSG has agreed to offer bottled water to residents whose well water exceeds the recently issued MCLs for PFAS. The current GMZ does not include all households impacted by uncontrolled migration from the Site. The supplemental RI is on-going, and an FS will be conducted and a subsequent decision document will select a new or modified remedy, as needed to address risks posed by all Site contaminants. A revisited long-term monitoring program will be required. This issue is carried forward in this FYR.	Not applicable
OU-1	Changes in VOC concentrations in groundwater could present a potential vapor intrusion concern.	Perform additional groundwater sampling, and screen data against the updated vapor intrusion screening levels to identify any potential vapor intrusion concerns.	Ongoing	A limited vapor intrusion investigation performed at the Woodland Village Condos in 2018 and 2019 did not identify issues of concern. Additional investigation into the potential for vapor intrusion in The Nevins community and commercial buildings, specifically those that were built on or proximate to the former Tinkham Garage fields and source areas, should be conducted. See Question B of this FYR Report for more information on vapor intrusion investigations at the Site.	Not applicable

IV. FIVE-YEAR REVIEW PROCESS

Community Notification, Community Involvement and Site Interviews

EPA issued an online news release in February 2024 to announce that the FYR was underway. A copy of the news release is included in Appendix D. The results of the review and the completed FYR Report will be made available at EPA's Site profile page at www.epa.gov/superfund/tinkham.

The FYR Report will also be made available on NHDES's One Stop data and information provider at https://www4.des.state.nh.us/DESOnestop/BasicSearch.aspx (search by DES Interest ID: 199004008).

During the FYR process, interviews were conducted to document any perceived problems or successes with the remedy that has been implemented to date. The results of these interviews are summarized below. Appendix E includes the completed interview forms.

US EPA conducted interviews with a representative from CSG, the State of New Hampshire Department of Environmental Services, a representative from the Town of Londonderry, and a resident of Ross Drive. Copies of these interviews are available in Appendix E. As is Region 1 policy, the names of residents who participated in the interviews is redacted to protect their privacy. The names of public figures remain in their entirety.

Site Interviews

Cannon Site Group (CSG):
The Cannon Site Group, who are the potentially responsible parties for the Tinkham Garage Superfund Site, completed a questionnaire provided by USEPA focused on status of Site remediation and protectiveness of the remedy. The CSG states that "[t]he current MNA remedy is effective for VOCs...." The CSG, however, acknowledges that "[t]he effectiveness of MNA for 1,4-dioxane and PFAS cannot be answered at this time, because the supplemental RI is still in progress." The agencies would like to note that VOCs are still present above Site cleanup levels in some locations at the site more than 40 years after their discovery and the data suggests that MNA does not appear to be an effective remedy for VOCs.

When asked to discuss impacts of the "Site on the residents who live within the Site boundaries….and the surrounding communities," the CSG said that principal impacts have been the inconvenience of periodic sampling and infrequent monitoring well installation. The CSG does not directly discuss impacts due to Site contaminants on the community or impacts to residential wells other than to note "Homes that have had at least one sample that have exceeded AGQS or MCLs have been offered bottled water for drinking and cooking."

Risk communication by the CSG is a common complaint among residents and Town Officials who state that there has been a lack of adequate communication. USEPA directly asked the CSG to describe how they communicate risk when offering bottled water to residents whose groundwater exceeds either the NH AGQS or EPA MCL. The CSG responded that "CSG tells the homeowner that in an abundance of caution, we would like to provide them with bottled water for drinking and cooking……and (sit) with them to answer their questions and show them how their data compares to NHDES AGQS and EPA

MCLs." In addition, the CSG states that "CSG has had good communications and cooperation with the community."

In response to a permanent alternative water supply approach, the CSG states "[w]e expect that implementation of a public water supply in the Ross/Tokanel neighborhood will eliminate potential exposures to contaminated groundwater migration from the Site" and note their position that "[t]he current MNA remedy is effective for VOCs…….no remedy has been established for 1,4-dioxane or PFAS to date. Potential remedies will be evaluated for these compounds once the RI is complete."

State of New Hampshire Department of Environmental Services:
When asked about the overall state of the project, the NHDES representative stated:

"There have been significant changes to the understanding of the Site over the last 5 years. Remedial investigation activities and the NH Groundwater Management Permit have resulted in an expansive residential sampling program and increased monitoring wells across the Site. These have improved the understanding of contaminant fate and transport and refined the Conceptual Site Model. Multiple residential water supply wells have been sampled regularly, which has identified the presence of Site-related constituents of concern (COCs) in excess of the NH Ambient Groundwater Quality Standards (AGQS) and recently promulgated Federal MCLs for certain per- and polyfluoroalkyl substances (PFAS) in area drinking water. The presence of Site contaminants in area drinking water wells calls into question the protectiveness of the current monitored natural attenuation (MNA) remedy. Many homes have been offered bottled water for drinking and cooking as a result of this investigation, which NHDES considers a temporary solution. The provision of permanent alternate water to impacted residential properties has taken longer than anticipated and should be completed as soon as possible to ensure the Site is protective of human health and the environment."

The NHDES representative stated that "Additional investigation is required to determine if the current Site remedy (i.e., MNA) is appropriate. While the current remedy may be effective for chlorinated volatile organic compounds, further characterization of source areas, migration pathways, and expansion of the long-term monitoring well network is warranted to confirm the adequacy of the MNA remedy for these compounds. Furthermore, emerging Site contaminants, such as 1,4-dioxane and PFAS, behave differently in the environment and MNA does not appear to be adequately remediating their impacts, based on the migration of these compounds into nearby residential neighborhoods that rely on private water supply wells for potable use".

When asked about institutional controls, specifically the GMP, the representative stated "The Groundwater Management Zone (GMZ) was expanded in 2019 to include several properties along Ross and Tokanel Drives that exceed the State AGQS for 1,4-dioxane. Ongoing monitoring of residential properties throughout the neighborhoods to the east and southeast have identified PFAS above the AGQS in several private water supply wells located beyond the current GMZ. The GMZ is adequate in the short-term because all properties that exhibit an AGQS exceedance are provided with bottled water……The GMZ should be expanded following completion of the Remedial Investigation, which will refine our understanding of contaminant migration pathways – and ultimately, the nature and extent of contamination at the Site.

The NHDES representative noted that that risk communication at the Site is effective and NHDES and EPA are readily available to discuss the Site with residents, and "the agencies have the resources available to answer any questions residents might have. The agencies also try to maintain communication with town representatives as each phase of work at the Site proceeds so that they can relay information to residents with questions".

Residential Interviews:
EPA reached out to several residents on Ross Drive seeking to interview them for this Five-Year Review. Only one resident responded, and their comments are summarized below.

The resident is well versed in the history of the Site and its impacts on residences downgradient of the Site. He believes that the impacts to residents and overall water quality have worsened since the last Five-Year Review, and notes that the majority of the neighborhood now uses bottled water, either provided by the PRP for exceedances of the MCL/AGQS or purchased on their own due to uncertainty about the water quality. In discussions with the resident, it was revealed that the most recent groundwater results were below the AGQS and MCL for Site contaminants, but he installed a reverse-osmosis water treatment system because he does not trust the testing performed by H&A is representative or accurate. The resident is aware that a permanent alternative water supply is planned, however he is frustrated by the slow pace and notes that many residents have been on bottled water for more than 5 years while waiting for a permanent alternative water supply and is frustrated because newly constructed homes and developments are immediately connected.

The resident stated that communication from the CSG and their consultant H&A was poor, and that "practically zero communication" occurred while monitoring wells were being installed and sampled, and that the report he received on his groundwater results was difficult to understand. He notes that while he was provided a phone number to call with additional questions, H&A was often unable or unwilling to discuss the results or explain what they meant and would not discuss risk. The resident also noted that H&A showed disregard for his property during a monitoring well installation which occurred at the edge of his property and was not resolved until he called the Agencies who intervened on his behalf. As a result of these experiences, the resident stated he does not trust H&A and would not cooperate with future investigations if they are involved.

The resident stated that lack of clear communication is an ongoing issue with the Site, and he has felt misled several times by H&A, NHDES, and EPA. Most notably, he stated he was led to believe that H&A was an EPA contractor and not a contractor for the PRP group, and had he known this, he would not have allowed work on his property to be performed.

The resident stated that residents hadn't received a written update in over a year and often the only form of communication is by word of mouth amongst the community from those who had contacted H&A or the Agencies. The resident suggested more frequent written updates be provided and suggested either monthly or quarterly would be beneficial. He notes that even if there are no updates, it is important to communicate that as it allows residents to know work is still being performed. The resident also requested that communications from H&A regarding residential well test results be made more user-friendly and easier to understand.

Town/Municipal Government:
EPA provided select Town of Londonderry officials a copy of the Five-Year Review questions in advance and asked that they provide written answers. A Town official provided a written response to the answers, summarized below.

The Town stated that they feel well informed and are aware that some residences have been offered bottled water. They state the communication has been effective but suggest more united and routine communication between all parties can be improved. The Town suggested a webpage or site link be included on the Town of Londonderry website to provide easy access for residents.

The Town stated they are concerned about how long the ongoing investigations, remediation, and installation of a water line to residents is taking, and state they are concerned as residents do not appear to be well informed on the progress or timeline of providing an alternative water source.

The Town notes that two large residential developments were recently approved at land parcels which abut or are adjacent to the Site and numerous residents have expressed frustration and concerns that these new construction developments were being immediately connected to the water line to provide a clean source of water while those impacted by the Site are still waiting with an uncertain timeline.

Data Review

The CSG conducted monitoring under the Site RD/RA plan from 1994-2002 and has been monitoring groundwater at the Site in accordance with the Site's State of New Hampshire Department of Environmental Services (NHDES) issued Groundwater Management Permit (GMP) since 2002. The 2021 revision to the GMP 2019 permit specifies the sampling locations and frequency of monitoring. Some locations are sampled semi-annually or annually, and a few locations are sampled every five years. The GMP requires that detected concentrations be compared to the New Hampshire AGQSs, which are consistent with or more stringent than the ROD cleanup levels and MCLs[3]. In addition, this data review also compares the PFAS data to EPA's PFAS MCLs promulgated in April 2024.

This review focuses on the data presented in the 2023 Annual Water Quality Monitoring Report as it presents recent sampling data and a summary of historical data collected at each well. In addition, data from the ongoing RI was also used. The data from the 2023 Annual Water Quality Monitoring Report was collected in May and November 2023[4] from GMP-required locations (monitoring wells, residential wells, and surface water locations) in addition to new bedrock monitoring wells installed during the ongoing RI and other locations requested by EPA. Figure C-1 in Appendix C shows the sampling locations. Samples were analyzed for VOCs, 1,4-dioxane and/or PFAS. General findings from this review include:

- The remedy for VOCs in groundwater is MNA. After over 20 years monitoring, VOCs continue to exceed AGQSs and ROD cleanup levels in several monitoring wells within the GMZ boundary,

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[3] The 1986 ROD selected cleanup levels for PCE (5 µg/L) and TCE (5 µg/L), which are the same as the New Hampshire AGQSs for these COCs. The 2016 ESD selected a 1,4-dioxane cleanup level of 3 µg/L, which was based on the New Hampshire AGQS at that time. The AGQS for 1,4-dioxane has since been lowered to 0.32 µg/L.

[4] While monitoring wells were sampled in May 2024 as part of the NH GMP renewal process, this data was not included in this FYR due the long lead time for analysis and submittal to the Agencies.

with most exceedances occurring near the Tinkham Garage source area and Woodland Village condominiums. Increasing concentration trends were observed for benzene in monitoring well FW20 near the Tinkham Garage source area and for PCE and TCE in ERT04 near the condominiums. An increasing concentration trend was observed for vinyl chloride at former water supply well LGAW near the condominiums. Most other wells evaluated reported either stable or no trends, with only three wells reporting decreasing concentration trends for all VOCs evaluated.

- 1,4-dioxane was first identified as a Site COC in the 2016 ESD. 1,4-dioxane concentrations exceed the Site's cleanup level of 3 µg/L in several Site monitoring wells; however, there were no detections above EPA's cleanup level in the residential wells monitored. 1,4-dioxane concentrations above the current State AGQS of 0.32 µg/L are widespread across the Site, extending into residential areas to the northeast, east and southeast and outside the GMZ boundary. The extent of 1,4-dioxane contamination has not yet been fully defined but is being further assessed as part of the ongoing RI. While these exceedances have trigged distribution of bottled water under the State GMP, they do not currently exceed the cleanup level established for the Site.
- PFAS contamination is widespread across the Site. While the highest concentrations continue to be located in monitoring wells near source areas and water supply wells proximate to surface drainage, detections above the EPA MCL for PFOA have occurred in numerous residential wells downgradient of the Site and outside the current GMZ. Question B of this FYR Report provides further evaluation of the PFAS exceedances.

Additional information on the contaminant-specific data reviewed for this FYR is presented below.

VOCs

VOC samples were collected from 98 monitoring wells, five surface water locations, five irrigation wells, six former residential wells, three active residential wells and the Pump Station (Figure C-1) in 2023. PCE, TCE, cis-1,2-dichloroethene (cis-1,2-DCE), vinyl chloride, 1,2-dichloroethane and benzene were detected above the EPA MCL and/or NHDES AGQS in 15 monitoring wells but only exceeded the ROD cleanup levels in 6 monitoring wells. Upon achieving the ROD cleanup levels for TCE and PCE, the ROD required a decision to be made whether the groundwater quality and use adequately protects public health. This would include an assessment of other COCs identified for Site groundwater including cis-1,2-dichloroethene, vinyl chloride, 1,2-dichloroethane and benzene.

Figure F-1 in Appendix F shows locations where select chlorinated VOC concentrations exceeded the AGQSs in 2023.[5] Chlorinated VOC concentrations at most sampled locations, including residential wells, were below the AGQSs or were non-detect. Fifteen monitoring well locations had chlorinated VOC concentrations that exceeded AGQSs in 2023; the locations are near the Tinkham Garage source area and Woodland Village condominiums. Although not shown on Figure F-1, the benzene exceedances were located in the same areas.

As shown on Figure F-1, highest chlorinated VOC concentrations are near bedrock monitoring wells NAI-K2 and FW11D (at multiple depths) and overburden monitoring wells DVE-7 and OW2D near the Tinkham Garage source area.

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[5] The select CVOCs on Figure F-1 are compounds that have been consistently and historically associated with the Site and include PCE, TCE, cis-1,2-DCE, vinyl chloride and 1,2-dichloroethane.

Mann-Kendall trend analyses included in the 2023 Annual Water Quality Monitoring Report indicate stable or no trends for select VOCs at most of the 13 wells included in the evaluation (Table G-1, Appendix G). Only one well in the Tinkham Garage area (OW2D) and two wells in the Woodland Village condominiums area (FW21D-40 and LGSW) report decreasing trends for all VOCs evaluated at those locations. The analyses also identified a probably increasing trend in benzene concentrations at monitoring well FW20 in the Tinkham Garage area. Increasing trends in PCE and TCE concentrations at ERT04 and a probably increasing trend in vinyl chloride concentration at former supply well LGAW in the Woodland Village condominium source area were also reported.

1,4-dioxane

Groundwater and Residential Wells

During the 2023 sampling event 1,4-dioxane samples were collected from 156 monitoring wells, five surface water locations, five irrigation wells, six former residential wells, 41 active residential wells, the Tinkham Garage Well and the Pump Station.

Figure F-2 in Appendix F shows the locations where 1,4-dioxane concentrations exceeded the AGQS of 0.32 µg/L in 2023. 1,4-dioxane was detected at concentrations above the AGQS in monitoring wells within and downgradient of the Tinkham Garage source area and the Woodland Village condominiums, as well as at the interior Site wells between Tinkham Garage and the condominiums. 1,4-dioxane also exceeded the Site’s cleanup level of 3 µg/L established by the 2016 ESD in these areas. Highest 1,4-dioxane concentrations were detected at FW11D in the Tinkham Garage source area, where concentrations generally increase with depth (136 µg/L at 55 feet, 975 µg/L at 70 feet and 1,140 µg/L at 90 feet), and at FW11DX (up to 909 µg/L at 173 feet, however below the MDL at 300 feet).

As shown on Figure F-2, 10 residential wells within the southern segment of Ross Drive and Tokanel Drive had detections of 1,4-dioxane greater than the AGQS in 2023. Nine of these residential wells are located within the GMZ, while an additional residential well on Ross Drive had a first time AGQS exceedance of 1,4-dioxane just outside of the GMZ boundary in May 2023; however, it was not detected above laboratory reporting limits in November 2023. Bottled water has been offered to all residences with 1,4-dioxane concentrations above the AGQS. In 2023, 1,4-dioxane concentrations in all residential wells monitored were below the Site’s cleanup level of 3 µg/L.

Although the cleanup level for 1,4-dioxane in the 2016 ESD is 3 µg/L, the State of New Hampshire subsequently reduced the AGQS to 0.32 µg/L. Concentrations of 1,4-dioxane exceed the AGQS in both the overburden/shallow bedrock groundwater and the deeper bedrock. Figures F-3 and F-4 in Appendix F present isoconcentration contours from the spring 2023 sampling event. Highest concentrations of 1,4-dioxane are in the deeper bedrock near the Tinkham Garage source area and Woodland Village condominiums. The horizontal distribution of 1,4-dioxane above the AGQS extends over much of the Site within the GMZ boundary and extends further south near Reed Street and Tokanel Drive. The extent of 1,4-dioxane contamination, based on the current NH AGQS of 0.3 µg/L, has not yet been defined, but will be further assessed as part of the ongoing supplemental RI.

Mann-Kendall trend analyses included in the 2023 Annual Water Quality Monitoring Report indicate increasing, stable or no trends in 1,4-dioxane concentrations at 28 of 42 wells included in the evaluation (64% of the wells) (Table G-1, Appendix G). The following wells reported increasing 1,4-dioxane concentration trends:

- Monitoring well FW20 in the Tinkham Garage source area.
- Monitoring wells FW17, FW24 and LGSW in the Woodland Village condominiums area.
- Interior Site monitoring wells FW28D-104 and FW28D-174.

Surface Water

In the surface water samples, 1,4-dioxane was detected at sample locations Stream 1C (0.350 to 0.690 µg/L) and Stream 1D (0.254 to 1.29 µg/L) during both sampling events, and in SW-1 (0.233 µg/L) and SW-2 (0.149 µg/L) in the spring 2023 sampling event (not sampled in fall 2023). During May and November 2023, 1,4-dioxane was not detected at location Stream 1A/1B. While concentrations appear to be variable and none exceeded the 3 µg/L cleanup standard, numerous samples exceeded the NH AGQS standard of 0.32 ug/L. Additional work to assess the full extent of 1,4-dioxane contamination at the Site is ongoing.

PFAS

Sampling for PFAS constituents began in 2018 at the request of the EPA and has continued as a requirement of the Site's monitoring program for groundwater. During 2023, PFAS samples were collected from 99 monitoring wells, five surface water locations, five irrigation wells, six former residential wells, 68 active residential wells, the Tinkham Realty Supply Well and the Pump Station. Table G-2 in Appendix G presents the 2023 sampling results.

New Hampshire has established AGQSs for four individual PFAS: perfluorohexanesulfonic acid (PFHxS) at 18 parts per trillion (ppt) or nanograms per liter (ng/L), perfluorononanoic acid (PFNA) at 11 ng/L, PFOS at 15 ng/L and PFOA at 12 ng/L. As shown in Figures F-5 through F-12, there were AGQS exceedances for all four PFAS compounds for which AGQSs have been established upgradient, within and outside of the GMZ boundary. The PFOA and PFOS exceedances are more widespread than for PFHxS and PFNA. In April 2024 EPA promulgated MCLs for five PFAS compounds, PFOA, PFOS, PFNA, PFHxS, and PFBS as shown in Figure 6.

The first 1,4-dioxane AGQS exceedance resulting in the offer of bottled water occurred in 2018. Currently 11 residences have been offered bottled water within the GMZ and 48 residences have been offered bottled water outside the GMZ boundary. As of the publication of this FYR, 59 residences have been offered bottled water due their residential wells exceeding either an AGQS for 1,4-dioxane or MCL for PFOA or PFOS.

Delineation of PFAS compounds in groundwater is a key focus of the ongoing RI. EPA has established RSLs for several PFAS compounds known to be present at this sit (Table 6).

Table 6: Comparison of RSL, Federal Standards, and State Standards for Select PFAS Constituents

PFAS Compounds	**EPA Regional Screening Levels (May 2024)**		**Federal Standards**		**State Standards**
	Tap Water RSL (µg/L)	**Tap Water RSL (ng/L)**	**MCLG (ng/L)**	**MCL (ng/L)**	**AGQS (ng/L)**
Perfluorobutanesulfonic Acid (PFBS)	$6.01E^{-01}$ nc	601 nc	N/A	N/A	N/A
Perflurobutanoic acid (PFBA)	$1.85E^{+00}$ nc	1,850 nc	N/A	N/A	N/A
Perfluorodecanoic Acid (PFDA)	$4.01E^{-06}$ nc	$4.01E^{-03}$ nc	N/A	N/A	N/A
Perfluorohaxanoic Acid (PFHxA)	$9.92E^{-01}$ nc	992 nc	N/A	N/A	N/A
Perfluorohexanesulfonic Acid (PFHxS)	$3.94E^{-02}$ nc	39.4 nc	10	10	18
Perfluorononaonoic Acid (PFNA)	$5.89E^{-03}$ nc	5.89 nc	10	10	11
Perfluorooctanesulfonic Acid (PFOS)	$2.01E^{-04}$ nc	0.201 nc	Zero	4.0	15
Perfluorooctaonic Acid (PFOA)	$2.65E^{-06}$ ca	0.00265 ca	Zero	4.0	12
Hexafluoropropylene oxide dimer Acid (HFPO-DA)_	$1.50E^{-03}$ nc	1.5 nc	10	10	N/A

Notes:
nc = non-cancer
ca = cancer
N/A = no standard available
HFPO-DA = hexafluoropropylene oxide dimer acid (GenX Chemicals)
PFBS = Perfluorobutanesulfonic acid
RSL = EPA Regional Screening Levels
MCLG = Maximum Contaminant Level Goals
MCL = Maximum Contaminant Level
EPA RSLs can be found at: https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables

The majority of wells sampled either have a detection above the RSL or use a method in which the MDL is currently greater than the RSL. Therefore, detections of PFOA, the most commonly detected PFAS compound detected at the Site, may require additional investigation to better understand and improve the CSM.

Sampling for PFAS began in 2018, and while most residential wells have been tested biannually, some monitoring wells have only been sampled twice (once in 2019, and once in 2023 for the GMP renewal). Due to the unique QA/QC challenges associated with sampling and analysis of PFAS compounds, additional consideration should be given to increased scrutiny of sample collection, field and lab blanks and spikes, as well as completion of a sensitivity analysis to determine the minimum number of samples required in order to achieve an acceptable confidence interval of the reported value. Data included in the 2023 Annual Report were analyzed for PFAS using "SOP-454-PFAS", a proprietary Pace Analytical/Con-Test method, while samples analyzed for the Spring 2024 GMP permit renewal were analyzed using US EPA Methods 1633 and 537.1. US EPA Methods 1633, 533, and 537.1 should be considered as analytical methods for monitoring under the GMP and future RI activities.

Site Inspection

The Site inspection was conducted on 4/18/2024. In attendance were Cheryl Sprague, Joe Cunningham, Aaron Shaheen, and TaChalla Gibeau representing US EPA; Andrew Hoffman, Andrew

Fuller, and Rene Nahlik representing NH DES; Jim Soukup representing NH DES contractor Weston Solutions; Todd Majer of de maximis, Inc and Amy Dykstra of Haley and Aldrich representing the PRP group, John Trottier representing the Town of Londonderry, and Kirby Webster representing US EPA contractor SKEO. The purpose of the inspection was to assess the protectiveness of the remedy. Appendix H includes the completed Site inspection checklist. Appendix I includes photographs from the Site inspection.

The Site inspection began in the retail plaza at the northwest corner of the Site and included inspection of the source area behind Tinkham Garage, the Ross and Tokanel drive neighborhood, area surrounding the Woodland Village Condos, confluence point of Streams 1A and 1C adjacent to the municipal wastewater pump station, the Nevins community, the Mercury and McCallister drive neighborhood, and well clusters behind the Tinkham Garage source area and retail plaza. The primary goal of the inspection was to assess current use and changes to the neighborhoods since the 2019 FYR Site inspection, identify any additional potential exposure pathways, assess the condition and maintenance of monitoring wells, and identify overall compliance with institutional controls and other protective measures.

It was readily apparent that the many monitoring wells were in poor condition and there was no evidence that they were being maintained or efforts made to ensure they remained secure. Multiple wells casings were missing caps and/or locks or had caps that were easily removed even when locked due to a loose fit or damage to the well casing or cap (Photos 1-4, 7-10, Appendix I). Multiple wells were missing interior seals on the well body, potentially allowing communication from the surface to the water table (Photos 2 and 3, Appendix I). These deficiencies were also noted in the 2019 FYR Site Inspection, in many cases for the same wells. It appears that these deficiencies were not corrected by the consultants for the PRP group despite identifying them during the 2019 Site inspection.

The casings of three wells were severely damaged from corrosion with large holes present at ground level which would easily allow surface water infiltration and entrance of biota (Photos 5-7, Appendix I). Indeed, in one well casing a large animal nest was observed. At least one of these wells (FW-24), shown in Photo 5, was sampled as part of the November 2023 sampling event and nothing about the condition of the well or it being compromised was noted or communicated in the subsequent report.

Monitoring well ERT-08, located at the northern portion of the property and upgradient of the source area, is a ground-level well flush with the ground surface located in an ephemeral wetland area adjacent to the road (Photo 10, Appendix I). The casing cover was found to dislodged and partially open with trash and other debris visible inside of the casing. There was no lock on this well casing; instead, the well cap is designed to be held in place by 4 bolts. Two of the bolts were found to still be present on the casing cover, however not threaded into the casing collar and the remaining two were not present. Inspection of the bolts revealed no breaks or damaged threads, suggesting that accidental damage from a vehicle or snowplow was unlikely. The sealing gasket for the cover was found a few feet away. This well appeared to be an open-borehole, and as a result overland flow, organic and inorganic debris, and other material can directly enter the groundwater at the Site. ERT-04 was last sampled in November 2023.

It should be noted that all monitoring wells at the Site were not visited during the Site inspection, and therefore it is probable that additional compromised wells exist that were not encountered during the

Site visit. The PRP group was asked to conduct a complete inventory and assessment of all wells at the Site and develop a plan to repair and restore compromised wells.

At the request of the Agencies, in May 2024 a contractor for the CSG performed a survey of 119 monitoring wells at the Site and characterized 25 wells as in “poor” condition and identified 44 wells requiring maintenance or repair. 8 monitoring wells were found to have moderate to severely compromised casings, several of which (e.g., FW-21, FW-24) were sampled as recently as November 2023. The Agencies and the PRP group are currently in discussions on the best way to move forward to repair these monitoring wells and ensure their condition does not deteriorate further.

Despite being provided with a Site map with the locations of wells identified, the consultants for the CSG had difficulty navigating to, and identifying, key wells at the Site. The recurring serious issues observed with monitoring wells on Site calls into question the efficacy of Site oversight.

Children's toys were observed adjacent to and in streams throughout the property, suggesting children may be playing in or near the numerous surface water bodies throughout the Site and providing a potential route of exposure for surface water contaminants. Several wild animals were observed in and around surface water bodies throughout the Site, including squirrels, birds, turkeys, domestic cats, and footprints consistent with domestic dogs and deer were observed in several locations, most notably along walking paths through the wetlands area at the southern end of the Site where the streams converge and form a wetland area. Potential risk from child and ecological exposure to surface water contamination should be assessed.

Sump pump discharges were observed at several houses along Ross and Tokanel during the Site walk suggest that basement flooding is possible. Although there were intermittent light rain showers during the Site inspection, there had been no significant rainfall in the three days prior to the Site inspection suggesting that possible basement flooding was likely due to an elevated water table associated with springtime conditions. As residential groundwater sampling and monitoring well data has shown that much of the groundwater in this portion of the Site contains PFAS and 1,4-dioxane, in many cases above the AGQS or MCL, the presence of groundwater intrusion into basements raises concerns of additional potential residential exposure pathways that have not previously been considered and may impact assessment of the protectiveness of the remedy.

V. TECHNICAL ASSESSMENT

QUESTION A: Is the remedy functioning as intended by the decision documents?

Question A Summary:

No. Although the source control remedy (VEE) achieved its cleanup objectives, the management of migration (groundwater) remedy (MNA) may not be functioning as intended by the Site’s 1986 ROD as modified by the 1989 Amended ROD and subsequent ESDs. VOCs continue to exceed the ROD cleanup levels for PCE and TCE in several monitoring wells within the site boundary. In addition, contaminants attributable to the Site (1,4-dioxane and PFAS) have been detected in residential wells downgradient at concentrations above NHDES AGQSs and/or EPA MCLs beyond Site boundaries. Sampling during this FYR period has identified widespread 1,4-dioxane and PFAS contamination in groundwater, which has migrated into residential neighborhoods that rely on private water supply wells (Appendices C-2, C-3, C-4).

Remedial Action Performance

Remedy performance monitoring currently consists of groundwater and surface water monitoring to assess remedial progress with respect to achievement of the RAOs, protectiveness from migration and to assess natural attenuation and the attainment of cleanup levels in groundwater. Monitoring is currently conducted under the State's GMP, which includes monitoring requirements set forth in the ROD, as modified. It includes monitoring of on-site monitoring wells, nearby residential wells and surface water for VOCs, 1,4-dioxane and PFAS.

The 2003 ESD indicated that drinking water standards would be achieved in 15 years through natural attenuation. At that time, VOCs were the only known COCs in groundwater. After over 20 years of monitoring, VOCs continue to exceed the ROD cleanup levels for PCE and TCE in several monitoring wells within the GMZ boundary, with most exceedances occurring near the Tinkham Garage source area and Woodland Village condominiums. Several VOCs also exceed NHDES AGQSs in several monitoring wells, with some wells reporting increasing contaminant concentrations. Since the 2003 ESD, EPA has identified 1,4-dioxane as a Site COC with a cleanup level of 3 µg/L. The MNA remedy selected in the 2003 ESD was not intended to address 1,4-dioxane, as this contaminant was not monitored for at that time. It is unclear if groundwater can meet the 1,4-dioxane cleanup level through MNA alone, as the full extent of contamination is unknown, concentrations remain elevated within deep bedrock fractures, this compound is not favorable to degradation, and there is currently uncontrolled migration into nearby residential supply wells.

Since 2018, groundwater and residential supply wells have been monitored for PFAS. PFAS have not yet been identified as Site COCs in an EPA decision document. Several PFAS compounds, including but not limited to PFOA, PFOS, PFNA, PFHxS and PFBS, have been detected in groundwater monitoring wells at concentrations that exceed AGQSs and/or EPA MCLs (Table G-2, Appendix G). PFAS compounds have also been detected in residential supply wells outside the GMZ at concentrations that exceed AGQSs and/or EPA MCL. As the date of publication, 59 residences in the Ross and Tokanel Drive neighborhoods exceed either the AGQS for 1,4-dioxane or the MCL for PFOA or PFOS and are eligible to receive bottled water as an interim temporary alternative water supply. The total number of residential wells that exceed a State AGQS for 1,4-dioxane or Federal MCL for PFAS has steadily increased with time. This is likely due to, in part, continued uncontrolled migration from the source area, as well as highly variable PFAS concentrations. However, the full extent of PFAS contamination at the Site is not fully known but is a key focus of the ongoing supplemental RI.

The supplemental RI required by the 2016 ESD, when completed, will address residual source areas, migration pathways, estimated cleanup times, potential impacts to receptors and the evaluation of risk. Following completion of the RI, an FS will be conducted. EPA, in cooperation with NHDES, will determine the need for a modified or new remedy to address all Site contaminants.

System Operations/O&M

O&M at the Site consists primarily of maintenance of the existing monitoring well network. As noted above in the Site Inspection section, the Site inspection performed for this Five-Year Review revealed multiple serious issues with well casing integrity, unlocked and/or uncovered wells, and continued sampling from compromised wells with no discussion of issues in annual reports or in communications with the Agencies. Many of these issues were identified in the 2019 Five-Year Review inspection, however it appears little, if any, remedial action was taken to address the deficiencies. Overall, the O&M of the Site is poor and is not consistent with industry standards and State and/or Federal requirements for maintenance of monitoring wells.

Implementation of Institutional Controls and Other Measures

The 1986 ROD as modified by the 2003 ESD clarified the use of the State's GMP program to meet the institutional controls objective by establishing a GMZ. Monitoring required by the ROD, as amended, is currently being performed pursuant to the GMP and is documented in annual reports. Within the GMZ, the use of groundwater is restricted and contaminant concentrations and remedy progress will be monitored until cleanup standards are met. In accordance with the GMP, notification of the GMP is recorded on deeds for properties located within the GMZ to address use of contaminated groundwater until such time as the NHDES AGQSs are attained.[6] Based on recent detections of 1,4-dioxane and PFAS constituents in residential wells outside the GMZ, the GMZ may need to be expanded. NHDES will evaluate the GMZ boundary as part of the upcoming permit renewal process (the existing permit expires May 16, 2024).

In addition to the existing institutional controls, additional land use restrictions or requirements should be considered for assessment of vapor intrusion if new buildings are constructed above the VOC plume (see the vapor intrusion section in Question B for more information).

QUESTION B: Are the exposure assumptions, toxicity data, cleanup levels and RAOs used at the time of the remedy selection still valid?

Question B Summary:

No. There have been changes in toxicity values, most notably the promulgation of MCLs for PFOA, PFOS, PFHxS, PFNA, and HFPO-DA and development of RSLs for numerous PFAS compounds.

Since the last five-year review, groundwater data from both monitoring wells and residential wells has shown that 1,4-dioxane and PFAS are widespread across the Site and the on-going remedial investigations have resulted in a more refined CSM. Detections of 1,4-dioxane and PFAS compounds in residential groundwater wells above the AGQS and MCLs both on and off the Site at significant distances from the source area were found during this review period. The incorporation of 1,4-dioxane and PFAS in site monitoring has indicated a need for continued investigations to assess potential human health exposures related to site contamination in groundwater, surface water sediment, soils as well as via potential vapor intrusion risks.

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[6] Although EPA has required institutional controls for all areas that exceed cleanup levels established in EPA's decision documents, NHDES, in accordance with their GMP, required the CSG to increase the size of the GMZ to incorporate any exceedances of the state's AGQSs.

The MCLs for PFAS, as well as the NH AGQS for 1,4-dioxane, are not expected to alter the short-term protectiveness of the remedy because homes with water supply wells that exceed AGQSs and/or the Federal MCLs have either been connected to a public water supply or have been offered bottled water for drinking and cooking.

Residences in nearby neighborhoods still use groundwater as their primary potable water source. While the majority are routinely sampled under the GMP, several households were are not included in the GMP sampling and have not been sampled by CSG or EPA since the 2016 ESD sampling event and are suspected to be in the flowpath of groundwater contamination. These households will be sampled by the EPA in the fall of 2024 to address this data gap after the CSG declined to sample these residences.

EPA is summarizing remedial investigations conducted thus far and developing a focused feasibility study for alternative water for residents near the Site who rely on groundwater as their drinking water, as the continued use of these wells may be contributing to the migration of groundwater contaminants.

Due to concerns about recreational activity in surface water, this pathway will be further evaluated to determine potential exposure. As PFAS compounds were detected in the streams which pass through the neighborhoods, the surface water exposure pathway should be evaluated to determine if a potential risk exists, including a risk evaluation for recreational surface water exposure as part of the RI.

The following sections discuss the evaluation of the changes in standards and TBCs, exposure assumptions and toxicity data.

Changes in Standards and TBCs

New standards (Federal or State statutes and/or regulations), as well as new TBC guidances, should be considered during the FYR process as part of the protectiveness determination. Under the NCP, if a new Federal or State statute and/or regulation is promulgated or a new TBC guidance is issued after the ROD is signed, and, as part of the FYR process it is determined that the standard needs to be attained or new guidance procedures followed to ensure that the remedy is protective of human health and the environment, then the FYR should recommend that a future decision document be issued that adds the new standard as an ARAR or guidance as a TBC to the remedy.

EPA guidance states:

> “Subsequent to the initiation of the remedial action new standards based on new scientific information or awareness may be developed and these standards may differ from the cleanup standards on which the remedy was based. These new…[standards] should be considered as part of the review conducted at least every five years under CERCLA §121(c) for sites where hazardous substances remain on-site. The review requires EPA to assure that human health and the environment are being protected by the remedial action. Therefore, the remedy should be examined in light of any new standards that would be applicable or relevant and appropriate to the circumstances at the Site or pertinent new [standards], in order to ensure that the remedy is still protective. In certain situations, new standards or the information on which they are based may indicate that the Site presents a significant threat to health or environment. If such information

comes to light at times other than at the five-year reviews, the necessity of acting to modify the remedy should be considered at such times." (See CERCLA Compliance with Other Laws Manual: Interim Final (Part 1) EPA/540/G-89/006 August 1988, pp. 1-56.)

The 1986 ROD established cleanup levels for PCE and TCE in groundwater based on Federal MCLs (or proposed MCLs). The current MCLs for these COCs are the same as the cleanup levels established in the 1986 ROD. The 2016 ESD established a cleanup level for 1,4-dioxane based on the New Hampshire AGQS in effect at that time (3 µg/L). The AGQS has changed since the 2016 ESD and is addressed in the subsections below.

PFAS Activities at the Tinkham Garage Superfund Site

The purpose of this section is to present current information related to PFAS activities at the Site and to evaluate whether there are any potential impacts to remedy protectiveness from PFAS. In April, 2024, EPA published a final rulemaking in the Federal Register which established MCLs for six PFAS contaminants, including PFOA, PFOS, PFNA, HFPO-DA (Gen-X), PFHxS, and PFBS:

Table 7: Maximum Concentrations of PFAS in Groundwater vs MCL

Compound	**Final MCL**	**Maximum Concentration in Groundwater (Sample Location, Year)**[a]
PFOA	4 ppt	**831 ppt**[c] (Ross Drive Residence, 2020)
PFOS	4 ppt	**758 ppt** (NAI-K2, 2020)
PFHxS	10 ppt	**99.7 ppt** (DVE-7, 2019)
PFNA	10 ppt	**25 ppt** (DVE-7, 2023)
HFPO-DA (Gen-X)	10 ppt	Not sampled
Mixtures containing two or more of PFHxS, PFNA, HFPO-DA, and PFBS[b]	Hazard Index 1 (unitless)	13

Notes:
a) Detected concentrations are from the 2023 Annual Water Quality Monitoring Report, Appendix F, Historic Water Quality Parameters.
b) PFBS detected at 610 ppt at MP-L-2D (2022).
c) The highest monitoring well detection for PFOA was 323 ppt at NAI-K2 in 2020
Concentrations in **bold font** exceed the MCLs

Maximum concentrations of PFOA, PFOS, PFNA and PFHxS in groundwater samples were above the PFAS MCLs as listed above. PFOA and PFOS were detected in residential wells above the PFAS MCLs at multiple locations on Boston Avenue, Charleston Avenue, Gail Road, Gilcreast Road, Ross Drive and Tokanel Drive. PFOA concentrations were above the MCL (4 ppt) in 44 of 68 residential wells sampled in 2023 and ranged from 4.1 ppt at a Boston Avenue location to 130 ppt at a Ross Drive location. PFOS concentrations were above the MCL (4 ppt) in 24 of 68 residential wells sampled in 2023 and ranged from 4.1 ppt to 39 ppt, both at separate Tokanel Drive locations. During this Five-Year Review period, PFOS concentrations in residential wells ranged from non-detect to 44.2 ppt at a Charleston Avenue residence, and PFOA concentrations in residential wells ranged from non-detect to 831 ppt at a Ross Drive residence. The number of wells sampled increased over time as exceedances were discovered and as noted the final year of the FYR review period, 2023, 68 residential wells were sampled as part of the GMP. Figure 2 shows the private well locations with PFAS MCL exceedances. Homes with New Hampshire AGQS exceedances for 1,4-dioxane and/or EPA MCL exceedances for PFAS constituents in residential wells have been offered bottled water for drinking and cooking until a permanent remedy is selected. Residential wells within and select residential wells outside of the GMZ boundary continue to be monitored regularly as part of the Site's GMP.

The maximum detected concentration of PFBS in monitoring wells was 610 ppt at well MP-L-2D in 2022. PFBS detections ranged from <1.86 ppt (i.e., detection limit) to 32.4 ppt in residential wells sampled. Homes with New Hampshire AGQS exceedances for any contaminant in private wells have been offered bottled water for drinking and cooking until a more permanent remedy is selected. Residential wells within and outside of the boundary of the existing GMZ continue to be monitored regularly as part of the Site's GMP.

PFAS Toxicity Values

This section presents the toxicity values that EPA currently has available for PFAS compounds.

2024 Cancer and Non-cancer Toxicity Values for PFOA, PFOS and PFDA

On April 10, 2024, EPA issued new MCLs for PFOA and PFOS (4 ppt individually) which utilize updated toxicity values for cancer and non-cancer effects developed by EPA Office of Water. The new oral cancer slope factors are 2.93x10^{4} [mg/kg/day]$^{-1}$for PFOA and 3.95x10^{1} [mg/kg/day]$^{-1}$ for PFOS. For non-cancer, the new oral reference dose values are 3×10^{-8} (mg/kg/d) for PFOA and 1×10^{-7} (mg/kg/d) for PFOS. It is noted that toxicity values for PFHxS, PFNA, HFPO-DA (Gen-X), and PFBS are not changed with the new MCLs.

In July 2024, EPA released non-cancer organ specific reference dose value for PFDA of 2x10^{-9} mg/kg/day based on an IRIS value. Previously there was no toxicity value.

2023 Non-cancer Toxicity Values for PFODA, PfTetA, PFDoDA, PFUDA, PFHxA, PFPrA, HQ-115

In November 2023, EPA adopted new non-cancer oral reference dose (RfD) values for multiple PFAS compounds based on toxicity values developed by the State of Wisconsin Department of Health Services which include Perfluorooctadecanoic acid (PFODA) 4x10^{-2} mg/kg-day, Perfluorotetradecanoic acid (PFTetA) 1x10^{-3} mg/kg-day, Perfluorododecanoic acid (PFDoDA) 5x 10^{-5} mg/kg-day, and Perfluoroundecanoic acid (PFUDA) 3x 10^{-4} mg/kg-day.

Additionally, new oral RfD values were released for two PFAS compounds based on toxicity values published by the EPA Office of Research and Development (ORD) which include Perfluoropropanoic acid (PFPrA) 5x 10^{-4} mg/kg-day and Lithium bis[(trifluoromethyl)sulfonyl]azanide (HQ-115) 3x 10^{-4} mg/kg-day, also known as 1,1,1-Trifluoro-N-(trifluoromethanesulfonyl)methanesulfonamide (TFSI).

These values were determined to be based on similar methods and procedures as those used for other Tier 3 toxicity values. It is noted that currently there are no analytical methods available for PFODA and the two ORD compounds PFPrA and HQ-115/TFSI.

In April 2023, EPA released a new non-cancer oral reference dose (RfD) of $5x10^{-4}$ mg/kg-day for Perfluorohexanoic acid (PFHxA) based on an IRIS value.

Groundwater samples were not analyzed for PFODA, PFTetA, PFDoDA, PFUDA, PFPrA or HQ-115/TFSI. PFHxA was analyzed for and the maximum detected concentration of PFHxA was 190 ppt. Homes with New Hampshire AGQS and/or EPA MCL exceedances for site contaminants and emerging contaminants in private wells have been offered bottled water for drinking and cooking until a more permanent remedy is selected. Residential wells within and outside of the boundary of the existing GMZ continue to be monitored regularly as part of the Site's GMP permit. Additional sampling to assess all PFAS compounds listed above should be considered.

2022 Non-cancer Toxicity Value for PFBA

In December 2022, EPA released a new non-cancer oral reference dose (RfD) of $1x10^{-3}$ mg/kg-day for Perfluorobutanoic acid (PFBA) based on a new IRIS value.

PFBA is persistent at the Site and ranges in concentration from the detection limit to 153 ppt, with the majority of detections in the 1 – 20 ppt range. This is substantially below the RSL of 1,850 ppt. While concentrations are generally highest near the source area, detections are typically associated with the presence of other PFAS compounds.

PFAS State Standards

In July 2020, New Hampshire promulgated State MCLs for the following four specific PFAS into the State's Safe Drinking Water Act:

- PFOA: 12 ng/L
- PFOS: 15 ng/L
- PFHxS: 18 ng/L
- PFNA: 11 ng/L

NH RSA 485:16-e. (Current State law requires Ambient Groundwater Quality Standards [AGQS] be the same value as any MCL established by NHDES and that they be at least as stringent as health advisories set by EPA). These values are expected to be reduced to at least the EPA MCL in the future, and in the near term the Federal MCL is more stringent than the current PFAS State Standards.

Summary of Site PFAS Activities

Sampling for PFAS at the Site began in 2018 and continues regularly as required by the Site's GMP. As noted above and in the Data Review section of this FYR Report, PFAS compounds have been detected in monitoring wells and residential wells at concentrations that exceed the State AGQSs and EPA MCLs. PFOA and PFOS are the primary PFAS compounds detected above AGQSs and MCLs in the residential wells. PFAS continues to be detected at residential wells above the MCLs both inside and outside the GMZ, including many "first time" exceedances occurring with each sampling event suggesting uncontrolled migration may be continuing. Numerous surface water bodies used for recreation exceed the MCLs for PFAS. Protectiveness of the remedy cannot currently be adequately determined, and as a result protectiveness is deferred at this time. An FFS to select a remedy which provides an alternative drinking water source is ongoing, as is a supplemental RI to define the nature and extent of PFAS and

1,4-dioxane contamination. Once finalized, an FS will be conducted. EPA expects to select a new or modified remedy to address PFAS contamination at the Site.

1,4-dioxane at the Tinkham Garage Superfund Site

There is no current Federal MCL for 1,4-dioxane. Using 2013 updated IRIS toxicity information and the standard Superfund risk assessment approach, EPA's carcinogenic risk range of 10^{-6} to 10^{-4} for 1,4-dioxane equates to a concentration range of 0.46 to 46 µg/L (ppb).

State Standards for 1,4-Dioxane

In September 2018, NHDES modified its AGQS for 1,4-dioxane from 3.0 µg/L (ppb) to 0.32 µg/L (ppb).

The current Site groundwater cleanup level of 3.0 µg/L (ppb) for 1,4-dioxane equates to a carcinogenic risk of 6.5×10^{-6}, which is within EPA's acceptable 10^{-6} to 10^{-4} risk range. Thus, the existing cleanup goal likely remains protective.

1,4-dioxane has been detected above the Site's groundwater cleanup level in monitoring wells with a maximum concentration of 1,140 µg/L (FW11D-90) in spring 2023. Figure F-2 in Appendix F shows the site-wide detections of 1,4-dioxane in groundwater. None of the residential well locations sampled during this FYR period reported 1,4-dioxane above the cleanup level selected in the Site's 2016 ESD. As noted in the Data Review section of this FYR Report, 1,4-dioxane concentrations above the State's AGQS are widespread across the Site and extend into residential areas.

The remedy is currently protective with respect to 1,4-dioxane because homes with New Hampshire AGQS exceedances for any contaminant in residential wells have been offered bottled water for drinking and cooking until a more permanent remedy is selected. Residential wells within and outside of the boundary of the existing GMZ continue to be monitored regularly as part of the Site's GMP.

Changes in Toxicity and Other Contaminant Characteristics

2022 cis-1,2-DCE Non-cancer Toxicity Value

In October 2022, EPA released a non-cancer reference concentration (RfC) of 4×10^{-2} milligrams per cubic meter (mg/m³) for cis-1,2-DCE, based on a provisional peer reviewed toxicity value (PPRTV) screening value. Previously, no RfC was available for cis-1,2-DCE.

Regular monitoring required by the Site's GMP includes analysis for cis-1,2-DCE. Cis-1,2-DCE is detected in Site monitoring wells, primarily located near former source areas. The maximum detected concentration in 2023 was 170 µg/L in monitoring well NAI-K2 compared to its MCL of 70 µg/L. Cis-1,2-DCE was not detected above laboratory reporting limits in any residential well monitored. The change in toxicity data for cis-1,2-DCE does not affect protectiveness of the remedy because the compound is regularly monitored for in residential wells, and if there were to be an exceedance of the State's AGQS, an alternative source of water would be provided.

2021 tert-Butyl Alcohol Cancer and Non-cancer Toxicity Values

In August 2021, EPA finalized a non-cancer oral RfD and a non-cancer inhalation RfC for tert-butyl alcohol (tBA) based on new IRIS toxicity values. Additionally, EPA finalized an oral slope factor for tBA based on a new IRIS cancer value. Previously, no toxicity values were available for tBA.

Regular monitoring required by the Site's GMP includes analysis for tBA. The maximum tBA concentration detected was 11 µg/L in monitoring well FW-11D in 2023 and is below the State's AQGS of 40 µg/L and EPA's RSLs of 150 µg/L based on a cancer risk of 1 x 10^{-6} and 450 µg/L based on a HQ of 0.1. tBA has not been detected in residential wells and therefore these changes to the toxicity data for tBA do not affect protectiveness of the remedy.

2021 Updated Recommendations on the Use of Chronic or Subchronic Non-cancer Values

In 2021, a memorandum was released from the Office of Land and Emergency Management (OLEM) regarding the use of subchronic toxicity values rather than the chronic non-cancer value for 19 chemicals. This recommendation is based on OLEM's Human Health Regional Risk Assessment Forum's (OHHRRAF) Toxicity Workgroup evaluation of the toxicity of 32 chemicals. The OHHRRAF Toxicity Workgroup identified 21 oral and 11 inhalation non-cancer toxicity values where a subchronic toxicity value was lower than its corresponding chronic toxicity value. After review of relevant information, the OHHRRAF recommended use of the subchronic toxicity value rather than the chronic value for 19 of the 32 chemicals, as follows below.

> *Subchronic inhalation RfC selected for the following chemicals (Chemical Abstracts Service Registry Number [CASRN]):*
>
> - *Acrylic acid (79-10-7)*
> - *2-Ethoxyethanol (110-80-5)*
> - *Ethyl-chloride (75-00-3)*
> - *2-Methoxyethanol (109-86-4)*
>
> *Subchronic oral RfD selected for the following chemicals (CASRN):*
>
> - *Allyl alcohol (107-18-6)*
> - *Atrazine (1912-24-9)*
> - *Bromodichloromethane (75-27-4)*
> - *Cadmium (7440-43-9)*
> - *p-Chloroaniline (106-47-8)*
> - *p-Cresol (106-44-5)*
> - *Ethyl acetate (141-78-6)*
> - *Ethylbenzene (100-41-4)*
> - *Ethylene glycol (107-21-1)*
> - *Heptachlor (76-44-8)*
> - *Hexachlorobenzene (118-74-1)*
> - *Hexachlorocyclohexane, gamma (58-89-9)*
> - *1,2,4,5-Tetrachlorobenzene (95-94-3)*

OHHRRAF recommended the chronic inhalation non-cancer value for the following chemicals: ammonia, chlordane, 1,1-dichloroethene, MtBE, nitromethane and vinyl acetate.

OHHRRAF recommended the chronic oral non-cancer value for the following chemicals: acrylamide, acrylic acid, 1,1-biphenyl, cyclohexanone, endosulfan, ethylene glycol monobutyl ether and pentachlorophenol.

Of the compounds listed above, ethylbenzene, 1,1-dichloroethene and MtBE are regularly monitored for in Site groundwater. They were not detected in most wells in 2023; there were a few sporadic detections of ethylbenzene and 1,1-dichloroethylene in some wells but at low concentrations (<2 µg/L). MtBE was detected at a maximum concentration of 11 µg/L in ERT08 in 2023. These detections do not affect protectiveness of the remedy because they were not detected in residential wells, and regular monitoring is performed as part of the Site's GMP.

2020 Trans-1,2-Dichloroethylene (Trans-1,2-Dichloroethene) Non-cancer Toxicity Value
In November 2020, EPA finalized a new RfC for trans-1,2-dichloroethylene (trans-1,2-DCE) based on a new PPRTV. There previously was no RfC for trans-1,2-DCE.

Trans-1,2-DCE is monitored under the Site's GMP. The maximum concentration detected in 2023 was 3.5 µg/L in FW11D-70. The concentration is below the Federal and State MCL of 100 µg/L. Therefore, the change in toxicity data for trans-1,2-DCE does not affect protectiveness of the remedy.

Lead in Soil Cleanups
On January 17, 2024, EPA OLEM released the "Updated Residential Soil Lead Guidance for CERCLA sites and RCRA Corrective Action Facilities" (OLEM Memo), which updates the residential soil lead screening level (RSL) for the CERCLA and Resource Conservation and Recovery Act (RCRA) programs. A review of available site information determined that this update may not be applicable because lead is not a soil COC for the Site. However, this may be confirmed during the on-going remedial investigations. Because lead is not a Site COC, this update does not affect the protectiveness of the remedy.

Changes in Risk Assessment Methods

There have been no notable changes in risk methodologies since the previous FYR.

Changes in Exposure Pathways

The 1986 HHRA identified groundwater ingestion, dermal contact, and inhalation of volatile compounds as the pathways of exposure posing the greatest risk to human health. Since the remedy decision, vapor intrusion has been identified as a potential exposure pathway requiring investigation; however, no unacceptable risks from vapor intrusion have been identified to date.

Since the previous FYR, several residential supply wells in the neighborhood's northeast, east and southeast of the Site were found to be impacted by concentrations of 1,4-dioxane and PFAS above the NHDES AGQSs, and for PFAS above the MCLs. Under the GMP, monitoring of the residential wells is ongoing; if exceedances are identified, the CSG is required to supply alternative drinking water to the residence. In addition, the institutional controls in the form of the GMP and associated GMZ require continued monitoring until the AGQSs are met, and notification of the GMP is recorded on deeds for property located within the GMZ to address use of contaminated groundwater.

Additional exposure pathway considerations are addressed below.

Ecological Risk Considerations

2021 Development of the Ecological Screening Values (ESVs) for PFAS

The ecological screening values (ESVs) have been developed to support screening-level ecological risk assessments sites where PFAS have been detected in soils, sediment, and surface waters. The ESVs, developed for eight PFAS, represent PFAS concentrations in soil, sediment, and surface water at or below which chronically exposed biota are not expected to be adversely affected and ecological risks or other impacts are unlikely.

The ESVs support the screening level steps (Steps 1 and 2 of eight steps) of EPA's Ecological Risk Assessment Guidance for Superfund and may be applied at sites undergoing investigation for the historic release or disposal of PFAS, to identify whether PFAS levels pose potential unacceptable ecological risks. Sites that have concentrations of PFAS that exceed ESVs may require further investigation in a baseline ecological risk assessment, which in turn may support risk-management decisions and actions to reduce risks. These ESVs are solely for use in conducting screening-level ecological risk assessments and are not recommended or intended for use as default cleanup values.

The ESVs were developed for the following media and receptors:

- Soils for invertebrates.
- Soils for plants.
- Soils for avian and mammalian wildlife.
- Surface water for freshwater and marine aquatic biota.
- Surface water for aquatic-dependent avian and mammalian wildlife.

ESVs can be found in: Derivation of PFAS Ecological Screening Values, M. Grippo, J. Hayse, I. Hlohowskyj, and K. Picel, Environmental Science Division, Argonne National Laboratory, September 2021.

The table below compares the maximum detected concentrations in surface water samples collected at the Site between 2018 and 2023 to the freshwater ESVs. Maximum detected concentrations were below the ESVs. Therefore, ecological risk or other impacts are unlikely.

Table 8: Maximum Concentration of PFAS in surface water vs Freshwater ESV

PFAS Compound	Freshwater ESV (ng/L)[a]			Maximum Concentration in Surface Water (ng/L) (Sample Location, Year)
	Aquatic	Mammal	Bird	
PFBA	64,600	8,370,000	No ESV	18 (Stream 1D, 2023)
PFBS	400,000	5,710,000	88,600,000	7.97 (Stream 1A/1B, 2021)
PFDA	2,940	660	No ESV	Not sampled
PFHxA	28,800	2,210,000	No ESV	14.8 (SW-2, 2020)
PFHxS	65,300	5,500	No ESV	4.6 (Stream 1D, 2023)
PFNA	16,400	2,080	No ESV	3.17 (Stream 1A/1B, 2020)
PFOA	307,000	1,580,000	No ESV	26.6 (Stream 1D, 2021)
PFOS	22,600	117	2,570	31.2 (Stream 1D, 2020)

Notes:

a. ESVs obtained from Table 3-6 of Derivation of PFAS Ecological Screening Values, M. Grippo, J. Hayse, I. Hlohowskyj, and K. Picel, Environmental Science Division, Argonne National Laboratory, September 2021.

While the area known to be impacted by Site contaminants has greatly increased since the last five-year review, the ecological risk is not expected to be a driver as the RSLs are substantially lower than the ESVs and thus far no surface water body sampled has approached the ESV values.

EPA Regional Screening Levels

EPA Regional Screening Levels (RSLs) are risk-based concentrations derived by combining exposure information assumptions with EPA toxicity data. EPA RSLs are updated twice a year. The most up-to-date tables as available at https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables.

Methods for Evaluating Vapor Intrusion

EPA Guidance on Vapor Intrusion

The most current guidance available to evaluate risk from vapor intrusion is the EPA 2015 Vapor Intrusion Technical Guide. The guidance emphasizes the use of multiple lines of evidence to evaluate the potential for vapor intrusion. This guidance was considered when assessing the potential for vapor intrusion during the FYR process. This resource can be found at: https://www.epa.gov/sites/default/files/2015-09/documents/oswer-vapor-intrusion-technical-guide-final.pdf

EPA VISL Calculator

The EPA online Vapor Intrusion Screening Level (VISL) calculator is a web-based tool which can be used to obtain risk-based screening level concentrations for groundwater, sub-slab soil gas, and indoor air. The VISL calculator uses the same database as the RSLs for toxicity values and physiochemical parameters and is automatically updated during the semi-annual RSL updates. Please see the User's

Guide for further details on how to use the VISL calculator. https://www.epa.gov/vaporintrusion/vapor-intrusion-screening-level-calculator.

Vapor Intrusion Investigations for the Tinkham Garage Superfund Site

Exposure to VOCs through vapor intrusion was not evaluated in the original risk assessment. The potential for vapor intrusion was evaluated during the 2004 and 2009 FYRs and determined not to be a concern at the Site at that time. Passive vapor mitigation systems were installed during construction of The Nevins community in 2003 to minimize possible future indoor air exposures.

In 2015, EPA requested that investigations for a vapor intrusion exposure pathway be undertaken at a house on Boston Avenue following the finding of TCE and other VOCs at elevated levels in their residential drinking water supply well. The CSG performed a one-time sampling round of the property for indoor air in the basement and first floor levels and for ambient air in the vicinity in December 2015. Sub-slab soil gas samples were not collected in this investigation. Both indoor air and ambient air results showed no exceedance of indoor air standards when compared to EPA's generic VISLs and NHDES's screening levels for any of the analytes detected, and no significant human health risks were found related to exposure under a residential exposure scenario. This house was connected to a public waterline, as required in the 2016 ESD, to address their contaminated drinking water supply. Since 2019, TCE concentrations in the well at this location, which was retained for monitoring only, were below 1 µg/L and other VOCs were not detected.

Following the detection of TCE at concentrations exceeding its NHDES screening level at monitoring well ERT-04 in 2016, ambient air and sub-slab vapor samples were collected in late 2017 and early 2018 from Building N of the Woodland Village condominiums. Low levels of chloroform and benzene were detected in the indoor air samples collected, but those concentrations were attributed to environmental factors not related to groundwater. Some site-related VOCs were detected in the sub-slab vapor samples, but at concentrations below screening levels. The only exception was one sample in which TCE was detected at a concentration above the EPA sub-slab soil gas screening level, but below the NHDES screening level. Although TCE was detected in sub-slab vapor, it was not detected at levels of concern in indoor air at that time. Further investigation of the vapor intrusion pathway in this area may be warranted to provide current data, due to the initial detections of TCE in sub-slab vapor and continued detections of VOCs in monitoring ERT-04 during this FYR period.

Since 2019, VOCs continue to persist primarily near the source areas at the Site. Detected concentrations of TCE in source area overburden well DVE-7 were evaluated further using EPA's VISL calculator, using a residential use exposure scenario (Appendix J). The 2023 VOC concentrations in this well result in an estimated noncancer HQ above 1, primarily due to TCE. No buildings are within 100 feet of this location; however, if changes in land use occur and buildings are constructed, additional vapor intrusion evaluations should be considered using a multiple lines of evidence approach to determine if vapor intrusion is a concern in this area. The closest residences to this location are The Nevins community homes, which have passive vapor mitigation systems. However, there are no recent data from The Nevins homes evaluating the effectiveness of the systems.

Expected Progress Towards Meeting RAOs

The RAOs for the source control remedy have been met with respect to the Site's COCs identified in the 1986 ROD, as amended. However, since that time, 1,4-dioxane and PFAS have been identified in groundwater and residential wells at levels that exceed State AGQSs and EPA MCLs. With the discovery of these contaminants, the RAOs for the management of migration component of the remedy are not currently being met and are not progressing toward being met. The remedy in place for groundwater (MNA) is not preventing or mitigating further migration of contaminants. Following completion of the supplemental RI, an FS will be completed to assess the efficacy of the current MNA remedy, evaluate the need to modify the RAOs and cleanup standards, and compare the current MNA remedy against other remedial alternatives to address risks posed by the Site and to attain cleanup levels in a reasonable time.

QUESTION C: Has any other information come to light that could call into question the protectiveness of the remedy?

The expected impacts of climate change in New England pose increasing risks to contaminated sites. Increases in air and water temperature, precipitation, flooding, and periods of drought may result in altered fate and transport pathways and exposure assumptions, impaired aquatic habitats, dispersal of contaminants, damage to remediation related structures and ultimately, ineffective remedies. At coastal sites, saltwater impacts made more likely by sea-level rise may cause corrosion of remediation equipment and impair restoration efforts. Increased frequency of extreme weather events may cause damage or releases at sites, impairing remedial efforts where remedies have not been adequately designed to protect against these risks.

The majority of Tinkham Garage site is located outside of a Zone A 100-year flood zone. A small, undeveloped portion of the site that is comprised of wetlands is classified as Zone AE, however, given the selected remedy, MNA, the risk of long-term damage from flooding to remedial equipment (e.g., monitoring wells) is minimal. There are no capped areas or RCRA Subtitle C landfills on the site.

The risks posed by climate change in New England are not expected to significantly impact the short-term protectiveness of the remedy at the Tinkham Garage Superfund Site. However, in the long-term, the impacts of increasing extreme weather events resulting in increased surface soil flushing, changes to stream pathways, wetlands, erosion, and increased variability in groundwater elevation, flow, and direction may result in increased mobility or remobilization of contaminants, changes to the CSM, and efficacy of the remedy and ultimately protectiveness.

VI. ISSUES/RECOMMENDATIONS

Issues/Recommendations
OU(s) without Issues and Recommendations Identified in the FYR:
None

Issues and Recommendations Identified in the FYR:

<table>
<tr><td rowspan="3">OU(s): OU-1 (Sitewide)</td><td colspan="4">Issue Category: Remedy Performance</td></tr>
<tr><td colspan="4">Issue: The current groundwater remedy (MNA) has not met cleanup goals in the expected timeframe and may not be effective for newly identified contaminants.</td></tr>
<tr><td colspan="4">Recommendation: Assess the effectiveness of MNA as a remedy for all contaminants (i.e., cVOCs, 1,4-dioxane, PFAS), and if necessary, propose a new remedy which addresses all contaminants and potential risks at the Site, modified performance standards, and remedial action objectives set for the Site.</td></tr>
<tr><th>Affect Current Protectiveness</th><th>Affect Future Protectiveness</th><th>Party Responsible</th><th>Oversight Party</th><th>Milestone Date</th></tr>
<tr><td>No</td><td>Yes</td><td>PRP</td><td>EPA/State</td><td>9/30/2028</td></tr>
</table>

<table>
<tr><td rowspan="3">OU(s): OU-1 (Sitewide)</td><td colspan="4">Issue Category: Institutional Controls</td></tr>
<tr><td colspan="4">Issue: Numerous residential wells outside the boundaries of the GMZ were found to contain site contaminants and emerging contaminants. While many of the residences with contaminated groundwater outside the GMZ are receiving bottled water, the GMP and associated GMZ do not include a number of impacted residences, and several residences have not been assessed for impacts from emerging contaminants.</td></tr>
<tr><td colspan="4">Recommendation: Assess residential groundwater wells in the Boston/Charleston neighborhood for presence of contaminants.</td></tr>
<tr><th>Affect Current Protectiveness</th><th>Affect Future Protectiveness</th><th>Party Responsible</th><th>Oversight Party</th><th>Milestone Date</th></tr>
<tr><td>No</td><td>Yes</td><td>PRP</td><td>EPA/State</td><td>9/30/2028</td></tr>
</table>

<table>
<tr><td rowspan="3">OU(s): OU-1 (Sitewide)</td><td colspan="4">Issue Category: Monitoring</td></tr>
<tr><td colspan="4">Issue: The current monitoring well network does not fully delineate the extent of contamination or assess migration of contaminants within bedrock fractures.</td></tr>
<tr><td colspan="4">Recommendation: Install a comprehensive monitoring well network as part of the RI that allows for delineation of the extent of contamination so that migration pathways within individual fractures can be adequately assessed.</td></tr>
<tr><th>Affect Current Protectiveness</th><th>Affect Future Protectiveness</th><th>Party Responsible</th><th>Oversight Party</th><th>Milestone Date</th></tr>
<tr><td>No</td><td>Yes</td><td>PRP</td><td>EPA/State</td><td>9/30/2028</td></tr>
</table>

<table>
<tr><td rowspan="3">OU(s): OU-1 (Sitewide)</td><td colspan="4">Issue Category: Changed Site Conditions</td></tr>
<tr><td colspan="4">Issue: Uncontrolled migration of Site contaminants, including 1,4-dioxane and PFAS, beyond the Site boundaries are impacting residential drinking water supply wells. Residences with exceedances of a AGQSs and/or MCLs in their private supply wells have been offered bottled water as a temporary measure, however, residential groundwater wells are likely still in use for non-potable water uses which may result in additional exposure pathways and may be contributing to plume migration.</td></tr>
<tr><td colspan="4">Recommendation: A permanent alternative water remedy is needed to address potential exposure pathways and eliminate residential well pumping as a potential contributer to the uncontrolled migration of contaminants.</td></tr>
<tr><th>Affect Current Protectiveness</th><th>Affect Future Protectiveness</th><th>Party Responsible</th><th>Oversight Party</th><th>Milestone Date</th></tr>
<tr><td>No</td><td>Yes</td><td>PRP</td><td>EPA/State</td><td>9/30/2028</td></tr>
</table>

<table>
<tr><td rowspan="3">OU(s): OU-1 (Sitewide)</td><td colspan="4">Issue Category: Monitoring</td></tr>
<tr><td colspan="4">Issue: VOC concentrations remain elevated in groundwater and the potential for vapor intrusion remains in certain areas of the Site that warrant further investigation.</td></tr>
<tr><td colspan="4">Recommendation: Additional investigations for vapor intrusion potential and mitigation measures should be considered for areas where VOC concentrations remain elevated in groundwater.</td></tr>
<tr><th>Affect Current Protectiveness</th><th>Affect Future Protectiveness</th><th>Party Responsible</th><th>Oversight Party</th><th>Milestone Date</th></tr>
<tr><td>No</td><td>Yes</td><td>PRP</td><td>EPA/State</td><td>9/30/2028</td></tr>
</table>

<table>
<tr><td rowspan="3">OU(s): OU-1 (Sitewide)</td><td colspan="4">Issue Category: Changed Site Conditions</td></tr>
<tr><td colspan="4">Issue: Children’s toys were observed in and around streams which pass through the Ross/Tokanel neighborhood.</td></tr>
<tr><td colspan="4">Recommendation: Assess recreational exposure to children and young adults to COCs and emerging contaminants at site and areas where evidence of recreational activities adjacent to streams was observed during the five-year review site inspection.</td></tr>
<tr><th>Affect Current Protectiveness</th><th>Affect Future Protectiveness</th><th>Party Responsible</th><th>Oversight Party</th><th>Milestone Date</th></tr>
<tr><td>No</td><td>Yes</td><td>PRP</td><td>EPA/State</td><td>9/30/2025</td></tr>
</table>

<table>
<tr><td rowspan="3">OU(s): OU-1 (Sitewide)</td><td colspan="4">Issue Category: Institutional Controls</td></tr>
<tr><td colspan="4">Issue: Numerous residential wells outside the boundaries of the current GMZ were found to contain 1,4-dioxane and PFAS and have been offered bottled water. These households currently do not have ICs associated with their property under the GMP.</td></tr>
<tr><td colspan="4">Recommendation: Assess residential groundwater wells outside the boundaries of the GMZ for presence of contaminants and consider expanding the GMZ boundary to include all residences to ensure that ICs are in place if PFAS compounds are added as a COC.</td></tr>
<tr><th>Affect Current Protectiveness</th><th>Affect Future Protectiveness</th><th>Party Responsible</th><th>Oversight Party</th><th>Milestone Date</th></tr>
<tr><td>No</td><td>Yes</td><td>PRP</td><td>State</td><td>9/30/2028</td></tr>
</table>

Other Findings

In addition, the following are recommendations that were identified during the FYR and may improve management of O&M and long-term monitoring activities, but do not affect current or future protectiveness:

- The initial proprietary PFAS method used, SOP 454 PFAS by Con Test/Pace Analytical, has limited detection limits and is limited to 9 analytes. This method was replaced by EPA Methods 1633 and 537.1 in the Spring 2024 monitoring event, however no discussion has occurred about future use. These methods, as well as EPA Method 533 and other relevant and appropriate approved methods, should continue to be used for all PFAS analyses across the site to ensure consistent analysis and decreased detection limits.
- The GMP and associated GMZ were intended as a provision of institutional controls and not as the means for long-term monitoring or evaluation of remedy effectiveness at this site. A long-term monitoring program should be developed to assess remedy performance and attainment of site cleanup objectives.

VII. PROTECTIVENESS STATEMENT

Sitewide Protectiveness Statement

Protectiveness Determination	*Planned Addendum Completion Date*
Protectiveness Deferred	**9/30/2028**

Protectiveness Statement:

A Sitewide protectiveness determination of the remedy cannot be made at this time until further information is obtained. Further information will be obtained by taking the following actions:

- Assess residential groundwater wells outside the boundaries of the GMZ for presence of contaminants and consider expanding the GMZ boundary to include all residences to ensure that ICs are in place if PFAS is added as a COC.
- Assess recreational exposure to children and young adults to site contaminants and emerging contaminants at the site and areas where evidence of recreational activities adjacent to streams was observed during the five-year review site inspection.
- Additional investigations for vapor intrusion potential and mitigation measures should be considered for areas where VOC concentrations remain elevated in groundwater.
- A permanent alternative water remedy is needed to address potential exposure pathways and eliminate residential well pumping as a potential contributer to the uncontrolled migration of contaminants.
- Install a comprehensive monitoring well network as part of the RI that allows for delineation of the extent of contamination so that migration pathways within individual fractures can be adequately assessed.

It is expected that these actions will be performed via completion of the proposed RI and installation of a permanent alternative water remedy and allow a sitewide protectiveness determination.

VIII. NEXT REVIEW

The next FYR for the Tinkham Garage Superfund Site is required five years from the completion date of this review.

APPENDIX A – REFERENCE LIST

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EPA. 2021c. Human Health Toxicity Values for Hexafluoropropylene Oxide (HFPO) Dimer Acid and Its Ammonium Salt (CASRN 13252-13-6 and CASRN 62037-80-3) Also Known as "Gen-X Chemicals." Office of Water, Health and Ecological Criteria Division, Washington, DC, October 2021.

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EPA. Integrated Risk Information System (IRIS). Available at https://www.epa.gov/iris

EPA. Provisional Peer-Reviewed Toxicity Values. Available at https://www.epa.gov/pprtv

EPA. The Use of Monitored Natural Attenuation at Superfund, RCRA Corrective Action, and Underground Storage Tank Sites. OSWER Directive 9200.4-17P. Available at: https://www.epa.gov/sites/default/files/2014-02/documents/d9200.4-17.pdf

EPA. Regional Screening Level Tables. Available at https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables

Haley & Aldrich, Inc. 2020. Revised Bedrock Investigation Letter Work Plan, Tinkham Garage Site, Londonderry, New Hampshire. September 4, 2020.

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NHDES, 2021. Groundwater Management Permit No. GWP-199004008-L-004 Revised. Date of Issuance: May 17, 2019. Date of Revision: December 21, 2021. Date of Expiration: May 16, 2024.

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APPENDIX B – SITE CHRONOLOGY

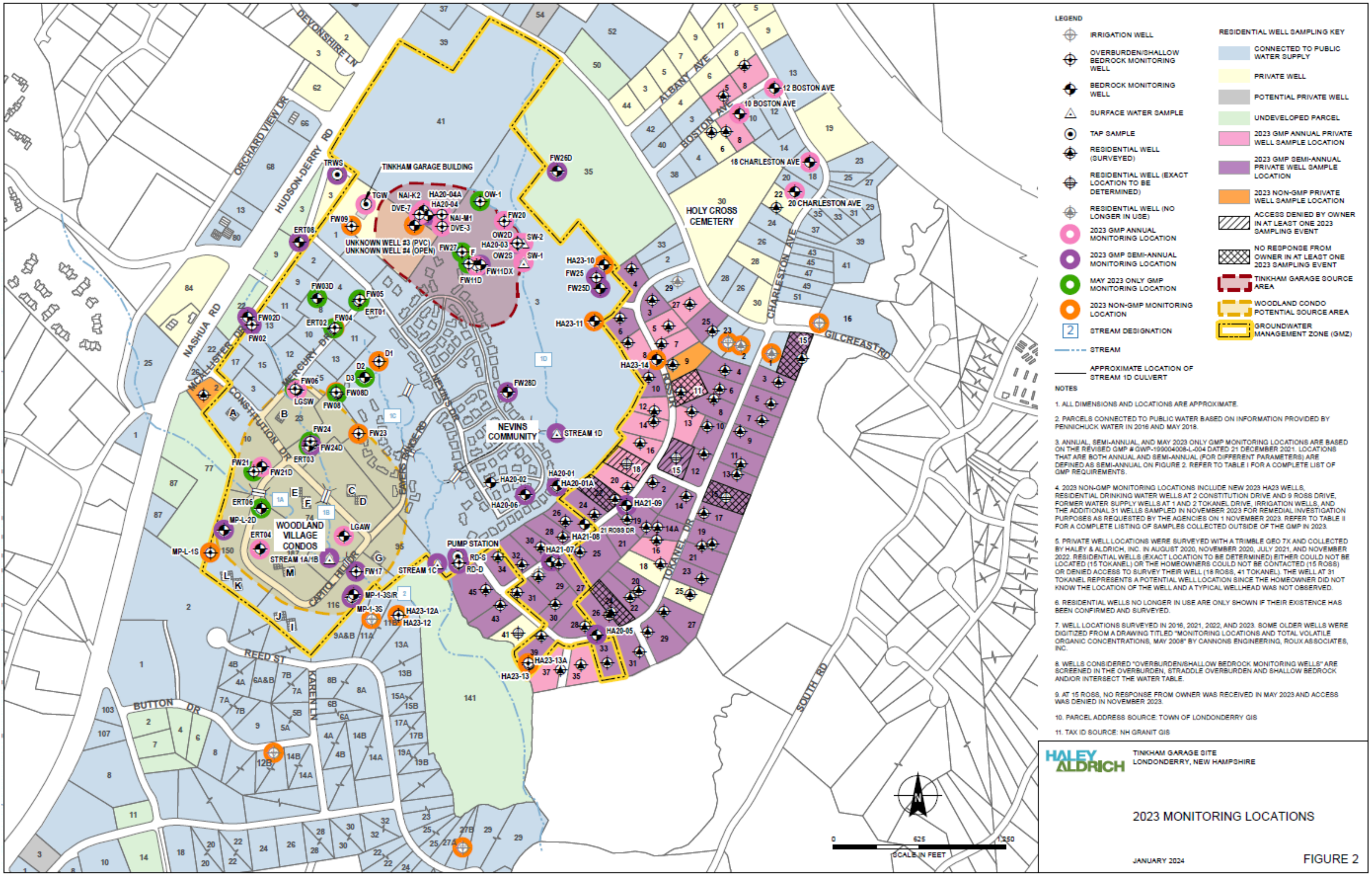
Table B-1: Chronology of Site Events

Event	Date
Initial discovery of contamination	April 1978
Condominium and individual residential wells were shut down	January 1983
EPA listed the Site on the NPL	September 1983
NHWS&PCC connected affected homes to the public water supply	November 1983
EPA began the Site's RI/FS	1984
EPA completed the Site's RI/FS and issued a ROD	September 1986
EPA issued an AOC requiring PRPs to perform pre-design studies to assess source control remedial technologies	September 1987
The PRPs completed the pre-design studies	July 1988
EPA issued an Amended ROD to change the source control remedy	March 1989
EPA and PRPs signed a Consent Decree that requires the PRPs to implement the amended remedy	August 1989
EPA issued an ESD	January 1992
Construction of the sewer line to the POTW began	March 1993
Construction for the remedial action began	April 1994
The source control and groundwater treatment plant began operating	November 1994
Remedial construction was completed; EPA issued a Preliminary Close Out Report	April 1995
The vacuum extraction system was dismantled	November 1995
The PRPs shut down the bedrock extraction wells	July 1996
EPA issued the Site's first FYR Report	March 1999
NHDES issued the Site's GMP	October 2002
All extraction wells were shut down	November 2002
EPA issued an ESD documenting a groundwater remedy change to MNA	March 2003
EPA issued the Site's second FYR Report	March 2004
NHDES renewed the GMP	November 2007
1,4-dioxane was first sampled for in Site groundwater	May 2008
EPA issued the Site's third FYR Report	March 2009
NHDES renewed the GMP	August 2012
PRPs began additional investigation of 1,4-dioxane contamination in bedrock	April 2014
EPA issued the Site's fourth FYR Report	September 2014
NHDES found site-related contamination in residential wells northeast of the Site in an area not previously known to be contaminated; POE treatment systems are provided to affected residences	November 2014
EPA issued a third ESD identifying 1,4-dioxane as a COC, requiring installation of a water line and requiring a supplemental RI	March 2016
EPA issued a Scope of Work for a supplemental RI/FS	June 2016
PRPs prepared a supplemental RI /FS Work Plan	December 2016
EPA requested PFAS sampling	May 2018

Event	Date
PRPs prepared work plans for a groundwater/surface water interaction study, a surface geophysical survey and a supplemental release area investigation	June 2018
NHDES renewed the GMP	May 2019
EPA issued the Site's fifth FYR Report	September 2019
NHDES revised the 2019 GMP	December 2021

APPENDIX C – SITE MAPS

Figure C-1: Sampling Locations, 2023



NOTES

1. ALL DIMENSIONS AND LOCATIONS ARE APPROXIMATE.

2. PARCELS CONNECTED TO PUBLIC WATER BASED ON INFORMATION PROVIDED BY PENNICHUCK WATER IN 2016 AND MAY 2018.

3. ANNUAL, SEMI-ANNUAL, AND MAY 2023 ONLY GMP MONITORING LOCATIONS ARE BASED ON THE REVISED GMP # GWP-199004008-L-004 DATED 21 DECEMBER 2021. LOCATIONS THAT ARE BOTH ANNUAL AND SEMI-ANNUAL (FOR DIFFERENT PARAMETERS) ARE DEFINED AS SEMI-ANNUAL ON FIGURE 2. REFER TO TABLE I FOR A COMPLETE LIST OF GMP REQUIREMENTS.

4. 2023 NON-GMP MONITORING LOCATIONS INCLUDE NEW 2023 HA23 WELLS, RESIDENTIAL DRINKING WATER WELLS AT 2 CONSTITUTION DRIVE AND 9 ROSS DRIVE, FORMER WATER SUPPLY WELLS AT 1 AND 2 TOKANEL DRIVE, IRRIGATION WELLS, AND THE ADDITIONAL 31 WELLS SAMPLED IN NOVEMBER 2023 FOR REMEDIAL INVESTIGATION PURPOSES AS REQUESTED BY THE AGENCIES ON 1 NOVEMBER 2023. REFER TO TABLE II FOR A COMPLETE LISTING OF SAMPLES COLLECTED OUTSIDE OF THE GMP IN 2023.

5. PRIVATE WELL LOCATIONS WERE SURVEYED WITH A TRIMBLE GEO 7X AND COLLECTED BY HALEY & ALDRICH, INC. IN AUGUST 2020, NOVEMBER 2020, JULY 2021, AND NOVEMBER 2022. RESIDENTIAL WELLS (EXACT LOCATION TO BE DETERMINED) EITHER COULD NOT BE LOCATED (15 TOKANEL) OR THE HOMEOWNERS COULD NOT BE CONTACTED (15 ROSS) OR DENIED ACCESS TO SURVEY THEIR WELL (18 ROSS, 41 TOKANEL). THE WELL AT 31 TOKANEL REPRESENTS A POTENTIAL WELL LOCATION SINCE THE HOMEOWNER DID NOT KNOW THE LOCATION OF THE WELL AND A TYPICAL WELLHEAD WAS NOT OBSERVED.

6. RESIDENTIAL WELLS NO LONGER IN USE ARE ONLY SHOWN IF THEIR EXISTENCE HAS BEEN CONFIRMED AND SURVEYED.

7. WELL LOCATIONS SURVEYED IN 2016, 2021, 2022, AND 2023. SOME OLDER WELLS WERE DIGITIZED FROM A DRAWING TITLED "MONITORING LOCATIONS AND TOTAL VOLATILE ORGANIC CONCENTRATIONS, MAY 2008" BY CANNONS ENGINEERING, ROUX ASSOCIATES, INC.

8. WELLS CONSIDERED "OVERBURDEN/SHALLOW BEDROCK MONITORING WELLS" ARE SCREENED IN THE OVERBURDEN, STRADDLE OVERBURDEN AND SHALLOW BEDROCK AND/OR INTERSECT THE WATER TABLE.

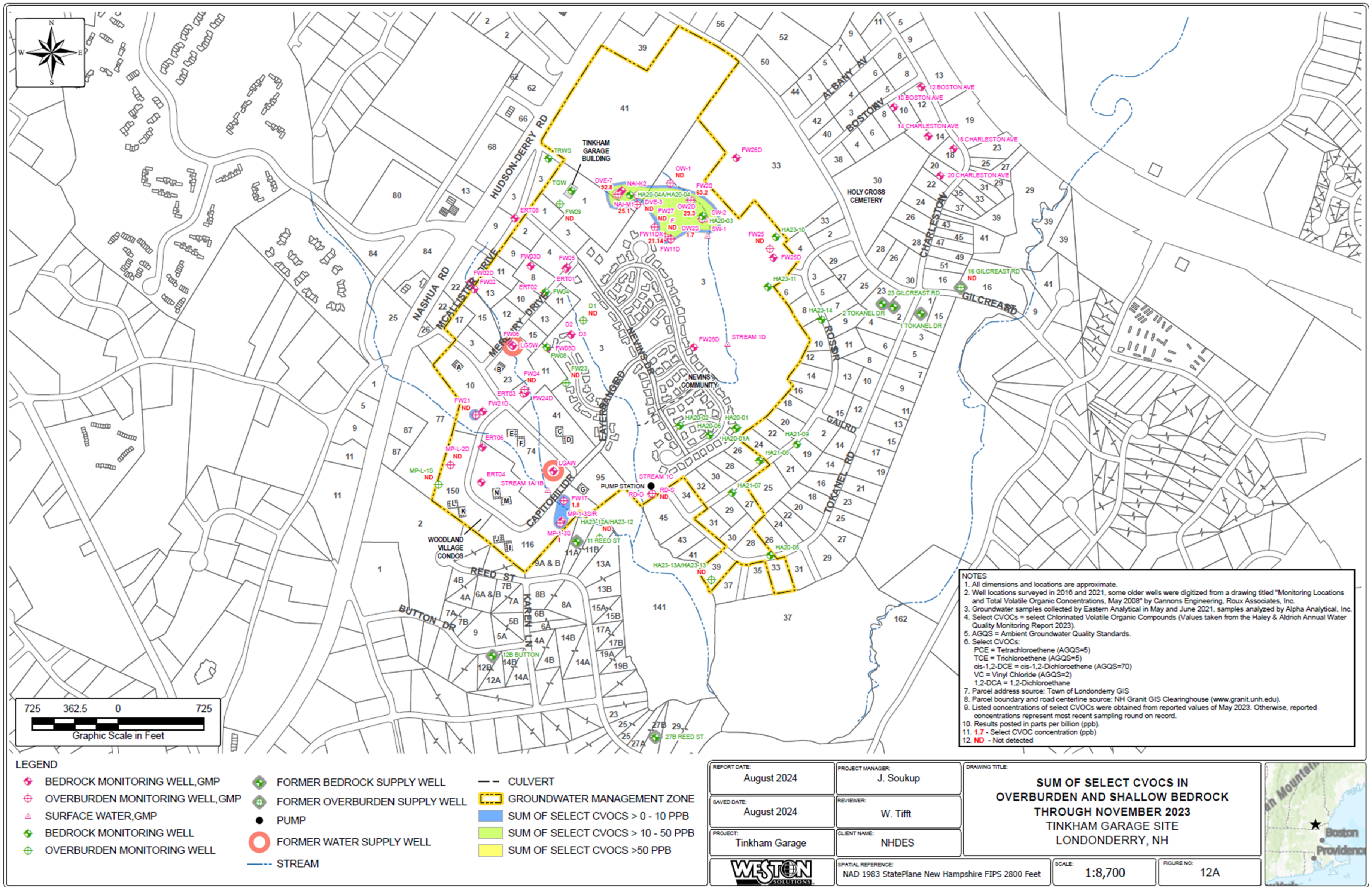
9. AT 15 ROSS, NO RESPONSE FROM OWNER WAS RECEIVED IN MAY 2023 AND ACCESS WAS DENIED IN NOVEMBER 2023.

10. PARCEL ADDRESS SOURCE: TOWN OF LONDONDERRY GIS

11. TAX ID SOURCE: NH GRANIT GIS

Source: Annual Water Quality Monitoring Report 2023, Tinkham Garage Site. Prepared by Haley & Aldrich, Inc.

Figure C-2 – cVOC Concentrations though November 2023



NOTES
1. All dimensions and locations are approximate.
2. Well locations surveyed in 2016 and 2021, some older wells were digitized from a drawing titled "Monitoring Locations and Total Volatile Organic Concentrations, May 2008" by Cannons Engineering, Roux Associates, Inc.
3. Groundwater samples collected by Eastern Analytical in May and June 2021, samples analyzed by Alpha Analytical, Inc.
4. Select CVOCs = select Chlorinated Volatile Organic Compounds (Values taken from the Haley & Aldrich Annual Water Quality Monitoring Report 2023).
5. AGQS = Ambient Groundwater Quality Standards.
6. Select CVOCs:
    - PCE = Tetrachloroethene (AGQS=5)
    - TCE = Trichloroethene (AGQS=5)
    - cis-1,2-DCE = cis-1,2-Dichloroethene (AGQS=70)
    - VC = Vinyl Chloride (AGQS=2)
    - 1,2-DCA = 1,2-Dichloroethane
7. Parcel address source: Town of Londonderry GIS
8. Parcel boundary and road centerline source: NH Granit GIS Clearinghouse (www.granit.unh.edu).
9. Listed concentrations of select CVOCs were obtained from reported values of May 2023. Otherwise, reported concentrations represent most recent sampling round on record.
10. Results posted in parts per billion (ppb).
11. 1.7 - Select CVOC concentration (ppb)
12. ND - Not detected

REPORT DATE: August 2024
SAVED DATE: August 2024
PROJECT: Tinkham Garage
PROJECT MANAGER: J. Soukup
REVIEWER: W. Tifft
CLIENT NAME: NHDES
DRAWING TITLE:

SUM OF SELECT CVOCS IN
OVERBURDEN AND SHALLOW BEDROCK
THROUGH NOVEMBER 2023
TINKHAM GARAGE SITE
LONDONDERRY, NH

SPATIAL REFERENCE: NAD 1983 StatePlane New Hampshire FIPS 2800 Feet
SCALE: 1:8,700
FIGURE NO: 12A

Figure C-3: 1,4-dioxane Plume though November 2023

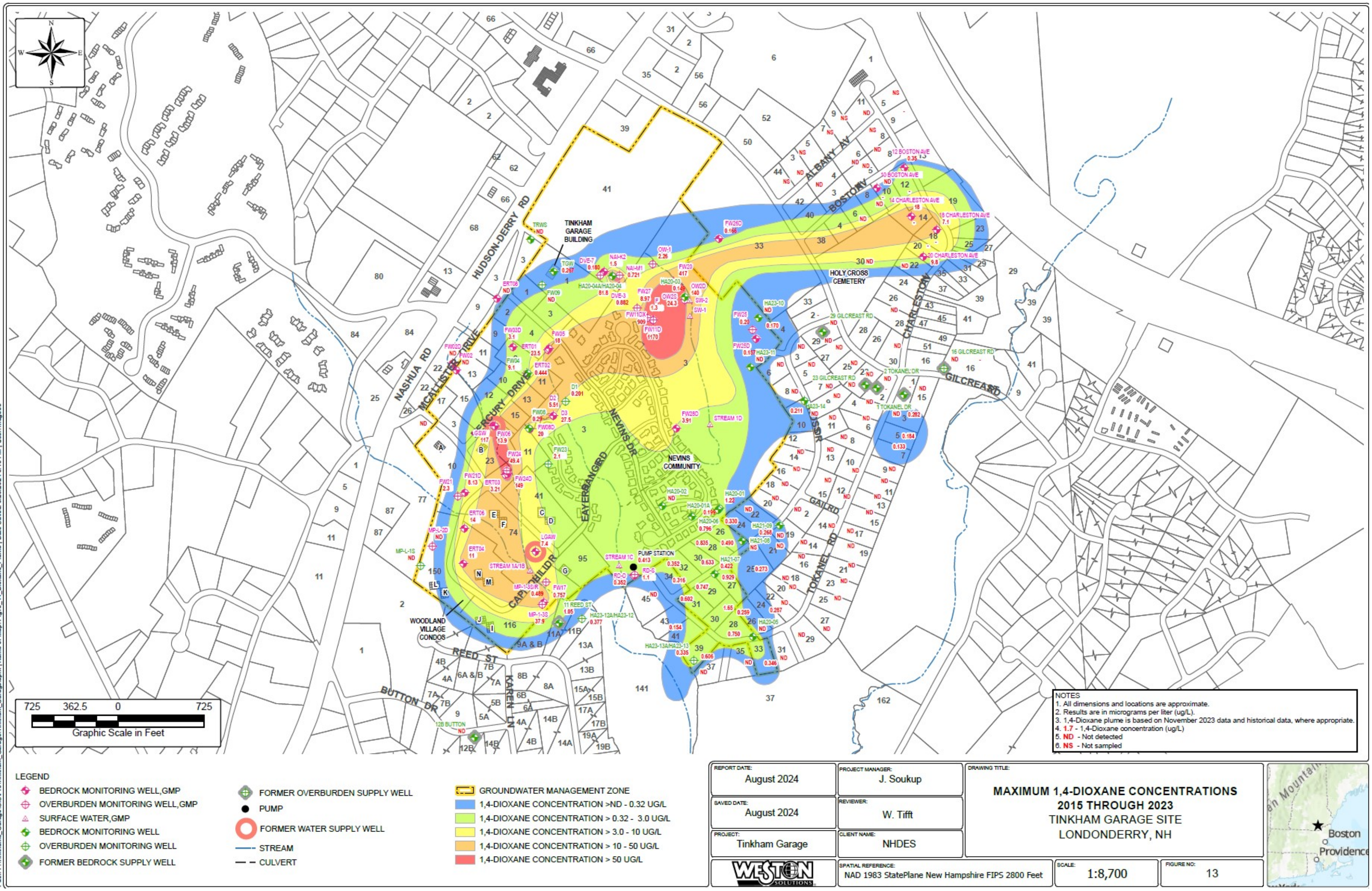


Figure C-4: PFOA Plume through November 2023

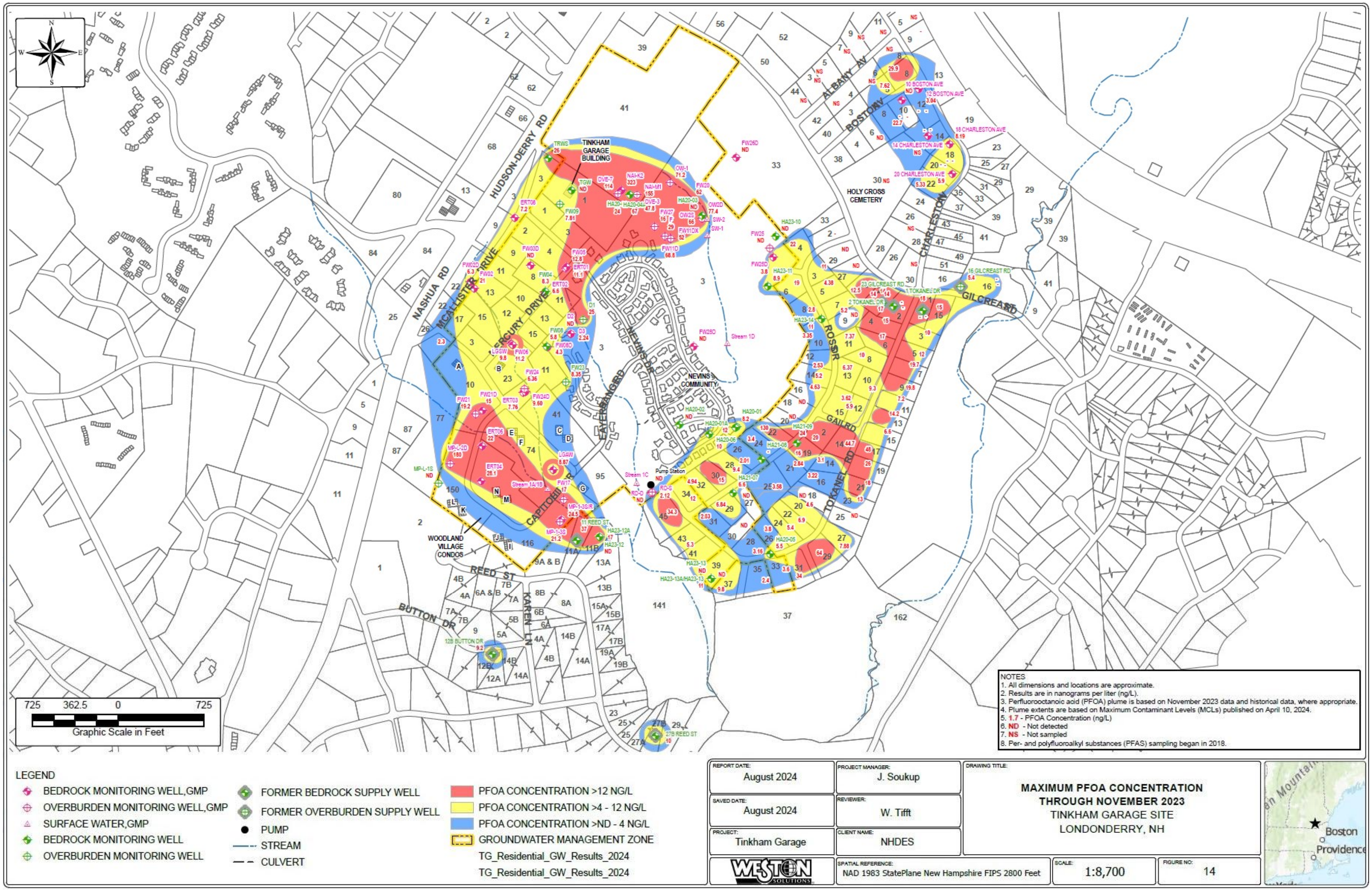
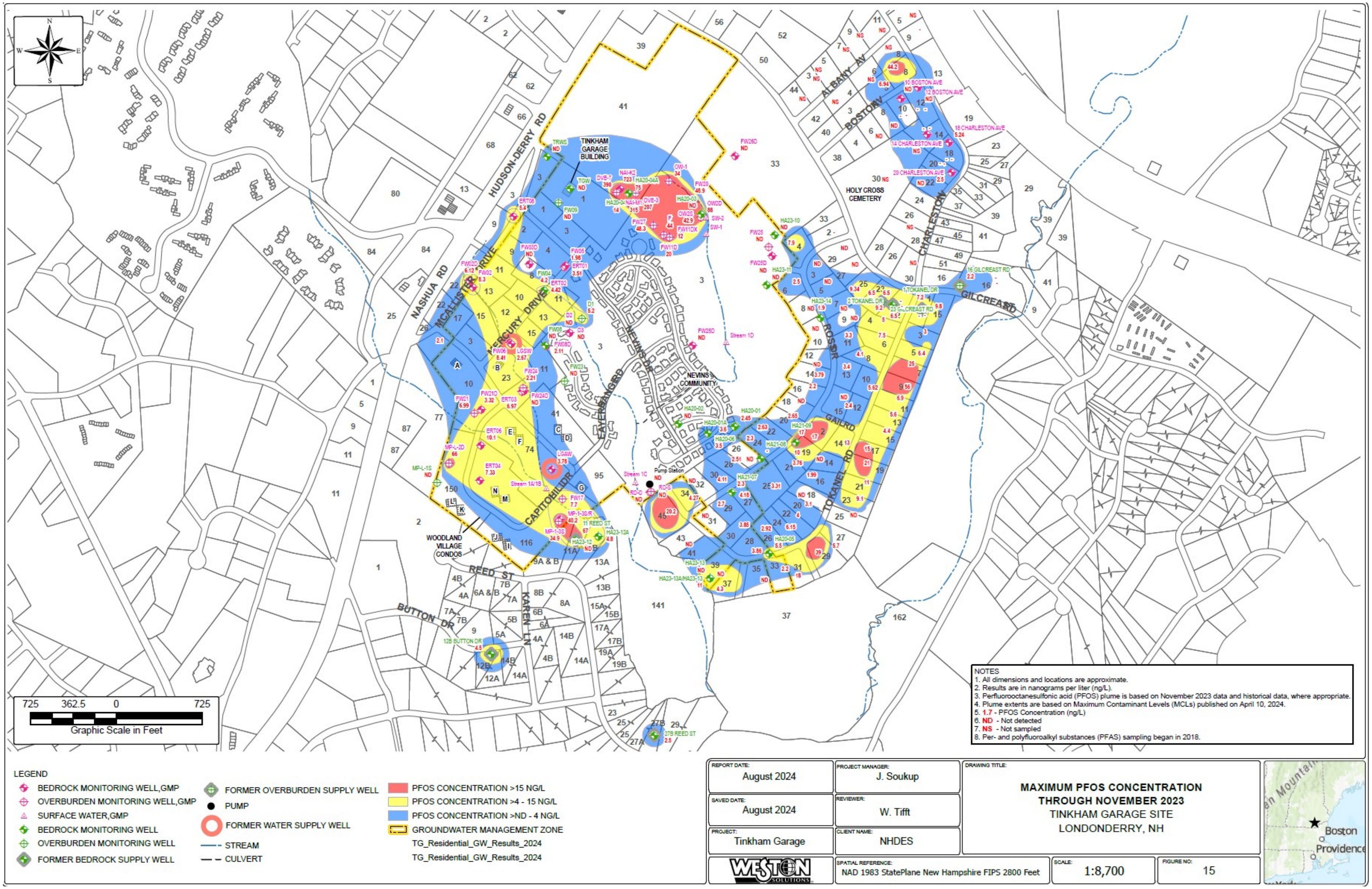


Figure C-5: PFOS Plume through November 2023

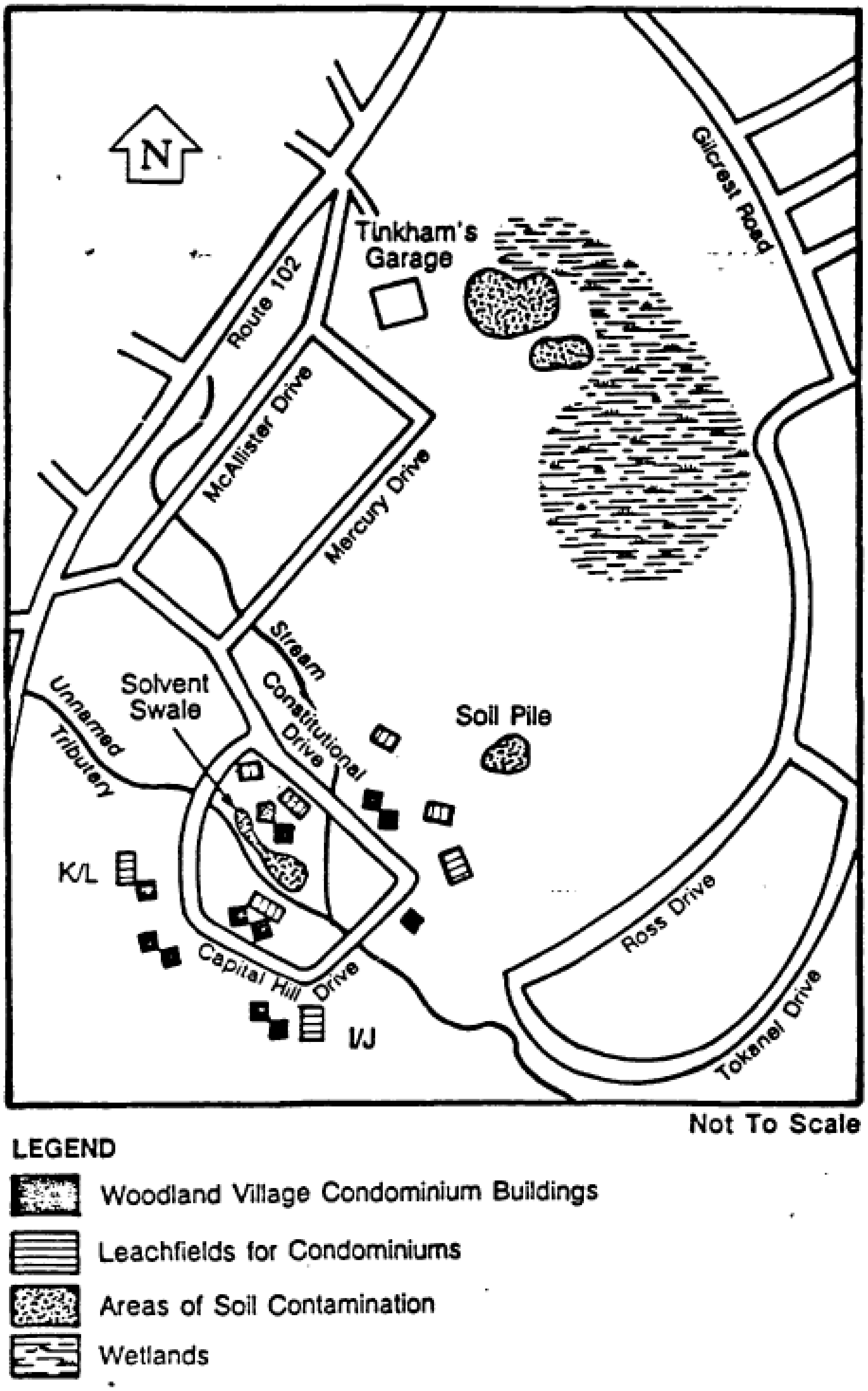


NOTES
1. All dimensions and locations are approximate.
2. Results are in nanograms per liter (ng/L).
3. Perfluorooctanesulfonic acid (PFOS) plume is based on November 2023 data and historical data, where appropriate.
4. Plume extents are based on Maximum Contaminant Levels (MCLs) published on April 10, 2024.
5. 1.7 - PFOS Concentration (ng/L)
6. ND - Not detected
7. NS - Not sampled
8. Per- and polyfluoroalkyl substances (PFAS) sampling began in 2018.

REPORT DATE: August 2024
SAVED DATE: August 2024
PROJECT: Tinkham Garage
PROJECT MANAGER: J. Soukup
REVIEWER: W. Tifft
CLIENT NAME: NHDES
DRAWING TITLE: MAXIMUM PFOS CONCENTRATION THROUGH NOVEMBER 2023
TINKHAM GARAGE SITE
LONDONDERRY, NH
SPATIAL REFERENCE: NAD 1983 StatePlane New Hampshire FIPS 2800 Feet
SCALE: 1:8,700
FIGURE NO: 15

Figure C-6: Historical Site Map

Figure 1: Map of Study Area, Tinkham's Garage Site, Londonderry, NH



Source: 1989 Amended ROD.

APPENDIX D – EPA NEWS RELEASE

An official website of the United States government

MENU

News Releases: Region 01 <https://epa.gov/newsreleases/search/press_office/region-01-226161>

CONTACT US <https://epa.gov/newsreleases/forms/contact-us>

EPA to Review Cleanups at Five New Hampshire Superfund Sites this Year

February 1, 2024

Contact Information
James Anderson (anderson.james.r@epa.gov)
(617) 918-1401

BOSTON (Feb. 1, 2024) – The U.S. Environmental Protection Agency (EPA) will conduct comprehensive reviews of completed cleanup work at five National Priorities List (NPL) Superfund sites in New Hampshire this year.

Each individual site will undergo a legally required Five-Year Review to ensure that previous remediation efforts at the sites continue to protect public health and the environment. Once the Five-Year Review is complete, its findings will be posted to EPA's website in a final report.

"Every step of the process at a Superfund site is critical and reflects a commitment we make with local communities to be as thorough as possible. Cleaning up hazardous waste sites takes extensive time and effort, and these Five-Year Reviews allow EPA to ensure our cleanup efforts continue to protect public health and the environment, while keeping everyone informed and accountable, especially in those communities that have been overburdened by industrial pollution." **said EPA New England Regional Administrator David W. Cash**. "EPA continues to evaluate these cleanups, with the overarching mission to protect public health and the environment and ensuring that New Hampshire communities will continue to be protected."

In 2024 EPA will conduct Five-Year Reviews at the below listed sites. The included web links provide detailed information on site status as well as past assessment and cleanup activity.

Five-Year Reviews of Superfund sites in New Hampshire to be completed in 2024:

Sylvester, Nashua

https://www.epa.gov/newsreleases/epa-review-cleanups-five-new-hampshire-superfund-sites-year

Ottati & Goss/Kingston Steel Drum, Kingston

Tinkham Garage, Londonderry

Pease Air Force Base, Portsmouth & Newington

Five-Year Reviews of Superfund sites in New Hampshire to begin in 2024, to be completed in Fiscal Year 2025:
New Hampshire Plating Co., Merrimack

More information:

The Superfund program, a federal program established by Congress in 1980, investigates and cleans up the most complex, uncontrolled, or abandoned hazardous waste sites in the country and EPA endeavors to facilitate activities to return them to productive use. In total, there are 123 Superfund sites across New England.

📄 Superfund and other cleanup sites in New England (pdf) <https://www.epa.gov/system/files/documents/2024-02/urls-ssp-chart-508.pdf> (91.4 KB)

EPA's Superfund program <https://epa.gov/superfund>

Contact Us <https://epa.gov/newsreleases/forms/contact-us> to ask a question, provide feedback, or report a problem.

LAST UPDATED ON FEBRUARY 1, 2024

APPENDIX E – INTERVIEW FORMS

United States
Environmental Protection
Agency

Five Year Review Interview Form – PRP

SUPERFUND SITE **FIVE-YEAR REVIEW INTERVIEW FORM**	
Site Name: Tinkham Garage	
EPA ID:	
Interviewer name: Joe Cunningham Aaron Shaheen	**Interviewer affiliation:** US EPA
Subject name: Michael Skinner	**Subject affiliation:** CSG Representative
Subject contact information: mjs@superfundmanagement.com	
Interview date: 6/18/24	**Interview time:**
Interview location:	
Interview format (circle one): In Person Phone Mail [✓ Email] Other:	
Interview category: Representative for the Potentially Responsible Party (PRP)	

1. The CSG has implemented numerous actions at the Site over nearly 40 years including investigations, RD and RA and long-term monitoring, however, the Site has yet to meet remedial action objectives and evidence suggests some Site contaminants have spread beyond Site boundaries. Discuss the efficacy of the actions taken by the CSG thus far, and what future actions must be taken to ensure RAOs are attained and off-site migration is controlled.

2. The remedy was changed from pump and treat to monitored natural attenuation in 2003. Do you believe that MNA has been effective at meeting remedy objectives for groundwater?

3. What have been the impacts of the Site on the residents who live within the Site boundaries (e.g., the Nevins community, the condo development, and residences on Mercury, McCallister, and Constitution Drives), well as the surrounding communities (Ross and Tokanel Drives, Boston, Albany and Charleston Drives), if any? How have these impacts been addressed?

   Impacts to the Nevins Community, Woodland Condos and residences on Mercury and McAllister Drives has been limited to providing periodic access to drill and test new monitoring wells and sample groundwater from existing monitoring wells. These residents are now connected to public water and not impacted by the exposure to contaminants of concerns at or from the Site.

   Impacts to the residences on Constitution, Ross, Tokanel, Boston and Charleston Drives has ranged from drilling and testing of new monitoring wells on or in ROWs near their properties to periodically accessing existing monitoring wells for routine sampling and accessing their private water supply wells for periodic sampling of drinking water. Homes that have had at least one sample that have exceeded AGQS or MCLs have been offered bottled water for drinking and cooking.

   The CSG does not believe that the evidence supports a conclusion that contamination from the Site has migrated or is migrating to residences on Boston and Charleston Drive.

Scheduling for access for all activities is coordinated in advance through each homeowner and property management company.

4. 1,4-dioxane and PFAS compounds have been found in groundwater and surface water both on-site and downgradient beyond Site boundaries.\ How do you believe that detections of these emerging contaminants impact the efficacy and protectiveness of the current remedy to residents impacted by these compounds?

   No remedy has been established for 1,4-dioxane or PFAS to date. Potential remedies will be evaluated for these compounds once the RI is complete. As noted above, residents are offered bottled water for drinking and cooking if private water supply wells have only one exceedance of NHDES AGQS or EPA MCLs. We also understand the EPA is preparing to release an interim ROD to provide public water to certain residences. The CSG agrees that installation of public water supplies would address current potential exposures. The CSG does not believe that exceedances of 1,4-dioxane and PFAS in the Boston/Charleston neighborhood are caused by migration of groundwater from the Site.

5. The CSG has been providing bottled water to 31 residents for exceedances of the NHDES AGQS for several years, and recently agreed to provide bottled water to an additional 23 residences which exceed the PFAS MCL. When offering bottled water to residents, how does the CSG explain this offer to residents? How does the CSG respond to questions regarding risk and concerns about the quality of their groundwater?

   CSG tells the homeowner that in an abundance of caution, we would like to provide them with bottled water for drinking and cooking. We have visited almost every resident once and sat with them to answer their questions and show them how their data compare to NHDES AGQS and EPA MCLs. Residents whom we have been unable to contact directly were mailed offers to supply bottled water via certified letters.

6. The Site is very large and complex which includes retail shopping centers, condominiums, and residences as well as wetland areas make up the Site. Do you believe that institutional controls are adequate at the Site? Are there additional institutional controls which may be considered to limit potential exposure to contaminants as the Site itself and nearby lands continue to be developed and new information about Site contaminants is discovered?

   Current institutional controls are adequate at the Site. The Groundwater Management Permit minimizes the potential for human consumption of groundwater impacted by the Site and routine groundwater monitoring ensures that the GMZ is protective. In consultation with NHDES, the GMZ has been expanded to include 11 homes on Ross and Tokanel Drives. As stated previously, bottled water is provided to numerous homes that have had at least one exceedance of AGQS and/or MCLs and the installation of a public water supply will eliminate potential exposure to contaminated groundwater migrating from the Site.

7. Are you aware of any complaints or inquiries regarding concerns about the Site cleanup, areas of the Site, drinking water quality or the status of the on-going investigations from residents since the last five-year review in 2019? If so, can you provide examples of these concerns and any responses which have been provided or otherwise communicated.

   In general, CSG has had good communications and cooperation with the community. We are aware of periodic calls to EPA and NHDES. To the best of our knowledge, there are no unresolved inquiries or complaints.

8. Describe the site operation and maintenance plan, including well maintenance, inspection, and repairs. Include the frequency of inspections, as well as any management plans that are in place to communicate deficiencies and track repairs.

A well integrity survey was completed during the comprehensive water level round in May 2024. Wells were inspected, and maintenance and repair needs were noted. Plans to repair wells, as needed, are currently underway. Repairs will be tracked with photos and a memo to the Agencies when complete. Well integrity will be inspected during comprehensive water level rounds each May and November moving forward and deficiencies and repairs will be tracked and recorded as necessary each year.

9. Do you have any comments, suggestions or recommendations regarding Site management, maintenance or any concerns of the Site's current MNA groundwater remedy?

   The current MNA remedy is effective for VOCs. As noted above, no remedy has been established for 1,4-dioxane or PFAS to date. Potential remedies will be evaluated for these compounds once the RI is complete. We expect that implementation of a public water supply in the Ross/Tokanel neighborhood will eliminate potential exposures to contaminated groundwater migration from the Site.

United States
Environmental Protection
Agency

Five Year Review Interview Form – Resident

SUPERFUND SITE
FIVE-YEAR REVIEW INTERVIEW FORM

Site Name: Tinkham Garage – Londonderry, New Hampshire

EPA ID:

Interviewer name: Joe Cunningham
Aaron Shaheen

Interviewer affiliation: U.S. EPA

Subject name: REDACTED

Subject affiliation: REDACTED

Subject contact information:

Interview date: 4/18/2024

Interview time: 1:30pm

Interview location: REDACTED

Interview format [✓ In Person] Phone Mail Email

Interview category: Resident

1. Are you aware of the environmental impacts historic dumping and the release of liquid wastes had on the community that led to the Tinkham Garage Site being added to the National Priorities List and becoming a Superfund Site in 1983? If so, please list which impacts you are aware of.

   I am aware of the dumping that occurred at the Site. My well has been tested multiple times. It was routinely monitored but has stopped more recently.

2. Are you aware of the current and ongoing impacts from the Tinkham Garage Superfund Site, including, but not limited to, contamination of groundwater and surface water streams, exceedances of drinking water standards in some residential wells requiring bottled water, and evidence that the groundwater contaminant plume is expanding and increasing the number of impacted wells?

   I am aware that other people in the neighborhood have been impacted from the Site. I have concerns with new development nearby and how it will affect the groundwater. I have asked Haley and Aldrich for my most recent well sample results, but have not received them. I have installed two water filtration systems using personal funds. The operations & maintenance of the system costs about $600 annually.

3. In your opinion, have the impacts from the Site improved, stayed the same, or worsened in the past 5 years? What are your biggest concerns related to the Site?

   The impacts from the Site have worsened over the past 5 years. The water is my biggest concern. Also, would like more understandable and accessible information regarding sample results and other technical information.

4. What is your overall impression of the investigations, cleanup, and response to discovery of contaminated groundwater in areas downgradient of the Site?

The cleanup process is taking too long, and I am frustrated that other new developments have town water, but I am still waiting. I have concerns that the contamination will affect my ability to move if I choose to do so.

5. What have been the effects of this Site on the surrounding community, if any?

   I know other neighbors are upset about the effects the Site has on their water and we need more education about the water at the Site.

6. Have you observed children or domestic animals (e.g., dogs, cats) playing in, or drinking, surface water in streams, ponds, or wetlands in the area?

   Parents do not let children or pets play in the surface water in the neighborhood due to contamination. Also, there is a stream that runs along Ross Drive during heavy rain events that people avoid pets from walking in or drinking from during walks.

7. How can EPA best provide the community with site-related information in the future?

   More meetings and/or mailings with information related to the Site. Possibly monthly or quarterly updates. Overall, be more proactive about communication about the Site.

8. How would you describe the outreach efforts performed during the Site investigation by Haley and Aldrich, the consultant for the potentially responsible party?

   Practically zero communication from Haley and Aldrich besides sending a data packet that is difficult to understand. H&A is open to calls, but not clear about what the results mean.

9. If you are currently using a groundwater well for your drinking water source, what is your impression of the water quality? Do you have any concerns continuing to use water from your well?

   I still use groundwater for drinking water but have a filtration system. I am in favor of a waterline depending on who is funding it.

10. Check any of the following which are true: (Yellow highlight means true).

    - I receive bottled water from Haley and Aldrich or the State of New Hampshire at no cost.
    - X I use water from my residential well for cooking and drinking.

    ☐ I am connected to a municipal water line.
    X I purchase bottled water for drinking and/or cooking.

11. If you purchase bottled water, what is your reason for doing so?

    .I have concerns with the water quality and do not trust documentation from H&A.

12. Do you have any comments, suggestions or recommendations regarding any aspects of the Tinkham Garage Superfund Site investigation and remediation?

    - *I feel mislead by EPA regarding who hired Haley and Aldrich to perform the work. I thought EPA hired them as consultants and am upset to find out they were hired by the Cannon Site Group.*
    - *What is the timeframe for the waterline, filtration systems, and/or additional action by EPA to remediate the situation?*
    - *We need more quarterly/monthly updates about work occuring at the Site or other Site activities even if there are no substantial updates.*
    - *I have talked to Jessica Way, Amy Dykstra, and Ian Phillips from H&A about the Site work. From EPA, I have talked to Cheryl Sprague, Kelsey Dumville, and Aaron Shaheen.*

United States
Environmental Protection
Agency

Five Year Review Interview Form – State

SUPERFUND SITE **FIVE-YEAR REVIEW INTERVIEW FORM**	
Site Name: Tinkham Garage Superfund Site	
EPA ID:	
Interviewer name: Joe Cunningham Aaron Shaheen	**Interviewer affiliation:** US EPA
Subject name: Andrew Fuller Rene Nahlik	**Subject affiliation:** NHDES
Subject contact information:	
Interview date: 5/15/2024	**Interview time:**
Interview location:	
Interview format (circle one): In Person Phone Mail [✓ Email] Other:	
Interview category: State Agency	

1. What is your overall impression of the project, including the ongoing investigation, current remedial remedy (i.e., MNA), progress toward providing impacted residents bottled water and a permanent alternative water supply, and overall protection of human health and the environment?

   There have been significant changes to the understanding of the Site over the last 5 years. Remedial investigation activities and the NH Groundwater Management Permit have resulted in an expansive residential sampling program and increased monitoring wells across the Site. These have improved the understanding of contaminant fate and transport and refined the Conceptual Site Model. Multiple residential water supply wells have been sampled regularly, which has identified the presence of site-related constituents of concern (COCs) in excess of the NH Ambient Groundwater Quality Standards (AGQS) and recently promulgated Federal MCLs for certain per- and polyfluoroalkyl substances (PFAS) in area drinking water. The presence of Site contaminants in area drinking water wells calls into question the protectiveness of the current monitored natural attenuation (MNA) remedy. Many homes have been provided bottled water for drinking and cooking as a result of this investigation, which NHDES considers a temporary solution. The provision of permanent alternate water to impacted residential properties has taken longer than anticipated and should be completed as soon as possible to ensure the Site is protective of human health and the environment.

2. What is your assessment of the current efficacy of the groundwater remedy in place at the Site?

   Additional investigation is required to determine if the current Site remedy (i.e., MNA) is appropriate. While the current remedy may be effective for chlorinated volatile organic compounds, further characterization of source areas, migration pathways, and expansion of the long-term monitoring well network is warranted to confirm the adequacy of the MNA remedy for these compounds. Furthermore, emerging Site contaminants, such as 1,4-dioxane and PFAS, behave differently in the environment and MNA does not appear to be adequately remediating their impacts, based on the migration of these compounds into nearby residential neighborhoods that rely on private water supply wells for potable use.

3. Are the institutional controls that are currently in place (i.e., GMZ) adequate for short and long-term protection to residents?

The Groundwater Management Zone (GMZ) was expanded in 2019 to include several properties along Ross and Tokanel Drives that exceed the State AGQS for 1,4-dioxane. Ongoing monitoring of residential properties throughout the neighborhoods to the east and southeast have identified PFAS above the AGQS in several private water supply wells located beyond the current GMZ. The GMZ is adequate in the short-term because all properties that exhibit an AGQS exceedance are provided with bottled water. It is likely that the current GMZ will need to be expanded; however, further evaluation of source areas and migration pathways are needed to confirm the extent of Site impacts, and the associated GMZ, in the long-term.

4. What, if any, additional institutional controls should be considered to protect human health and the environment?

   The GMZ should be expanded following completion of the Remedial Investigation, which will refine our understanding of contaminant migration pathways – and ultimately, the nature and extent of contamination at the Site.

5. Are you aware of any changes to State laws that might affect the protectiveness of the Site's remedy?

   The EPA recently finalized MCLs for 6 PFAS, which are lower than the current AGQS promulgated by NH. New Hampshire will be required to adopt the lower MCLs into law. NHDES will be working with EPA to determine if the lower MCLs for PFAS affect the long-term protectiveness of the remedy; however, the PRP is working to provide bottled water to residents impacted with PFAS above the new MCLs to remain protective in the short-term.

6. Describe your opinion of communication of risk and Site status to Site residents and municipal government by EPA, NHDES, and the CSG since the last Five-year review in 2019. What actions can be taken to improve communication?

   As a representative of NHDES, it is my opinion that risk communication at the Site is effective. NHDES and EPA are readily available to discuss the Site with residents during field work or following sampling events if there are questions regarding drinking water results. The agencies have the resources available to answer any questions residents might have. The agencies also try to maintain communication with town representatives as each phase of work at the Site proceeds so that they can relay information to residents with questions.

7. How can communication between EPA and NHDES be improved?

   Communication between EPA and NHDES is strong. We maintain weekly check-in meetings for the Site and collaborate closely with each other, and our contracted subject matter experts, to progress the Site forward.

8. Do you have any comments, suggestions or recommendations regarding the management or operation of the Site's remedy?

   NHDES believes that the current remedy needs to be reevaluated, based on findings from the ongoing Remedial Investigation of Site COCs and emerging contaminants (1,4-dioxane and PFAS), to determine if MNA will remain protective of human health and the environment. In addition, permanent alternate water should be provided to areas near that Site that are impacted with site-related contaminants above drinking water standards.

United States
Environmental Protection
Agency

Five Year Review Interview Form – Town/Municipality

SUPERFUND SITE FIVE-YEAR REVIEW INTERVIEW FORM	
Site Name:	
EPA ID:	
Interviewer name: Joe Cunningham Aaron Shaheen	**Interviewer affiliation:** US EPA
Subject name: John Trottier	**Subject affiliation:** Town of Londonderry
Subject contact information:	
Interview date: 6/26/2024	**Interview time:**
Interview location:	
Interview format (circle one): In Person Phone Mail [✓ Email] Other:	
Interview category: Local Government	

1. Briefly describe your knowledge of the historic and ongoing environmental issues at the Tinkham Garage Superfund Site and the surrounding area.

   IT IS OUR UNDERSTANDING THAT THE SITE HAD BEEN OK'D FOR THE CONSTRUCTION OF RESIDENTIAL HOMES (NEVINS). SUBSEQUENT DRINKING WATER SAMPLING AND ANALYSIS, ASSOCIATED WITH HISTORIC UPGRADIENT MTBE ISSUES, IDENTIFIED TINKHAM SITE CONTAMINATES IN THE GROUND WATER RESULTING IN REOPENING INVESTIGATIONS ASSOCIATED WITH THE TINKHAM SITE. LEVELS DETECTED RESULTED IN CONNNECTING A NUMBER OF RESIDENCES, IMMEDIATELY, INTO THE MUNICIPAL WATER SYSTEM.

2. Are you aware that residences which exceed the State and/or Federal standard for contaminant levels have been offered bottled water as a temporary measure until a permanent alternative water supply connection is made? If so, who communicated it to you? (e.g., NHDES, US EPA, Haley and Aldrich, Cannon Site Group).

   WE ARE AWARE THAT RESIDENCES HAVE BEEN OFFERED BOTTLED WATER AND THIS HAS BEEN COMMUNICATED BY ALL THOSE NOTED ABOVE.

3. Do you feel well informed regarding the environmental and potential health issues related to the Site, as well as the ongoing investigation, plans to remediate groundwater and provide a permanent alternative water supply to affected residents?

   WE FEEL INFORMED.

4. Do you feel that communication between the Town of Londonderry and EPA, the State, and the Potentially responsible party has been effective? Describe ways in which communication to the Town can be improved.

   COMMUNICATION HAS BEEN EFFECTIVE. MORE UNITED AND ROUTINE COMMUNICATIONS BETWEEN ALL PARTIES CAN BE IMPROVED.

5. Can you recommend ways in which EPA, the State, and the Potentially Responsible Party (i.e., Cannon Site Group) may better distribute site-related information and communicate with **town residents** in the future?

   SUGGEST A WEB PAGE / LINK ASSOCIATED WITH THE TINKHAM SITE BE PREPARED AND MADE AVAILABLE TO RESIDENTS THROUGH THE TOWN OF LONDONDERRY'S WEB SITE.

6. This is a large Site consisting of commercial and residential developments, wetlands, multiple surface streams, and conservation land. Have you observed children or animals (e.g., dogs, cats, deer, turkey, etc.) playing in, drinking from, or routinely coming into contact with surface water at the Site?

   NO

7. Some of the contaminants identified in 1983 remain at the Site despite remediation efforts, and emerging contaminants – such as 1,4-dioxane and PFAS, have recently been discovered at the Site and areas downgradient of the Site in residential areas. Residents who rely on groundwater as their drinking water source and have had their drinking water impacted by the groundwater contamination have been offered bottled water as a temporary measure to mitigate exposure. What are your top concerns regarding the ongoing investigation and remediation of the Site. What are your concerns for residents living within or proximate to the Site?

   CONCERNS REGARDING ONGOING INVESTGATIONS AND REMEDIATION OF THE SITE AND THE LENGTH OF TIME IT HAS TAKEN. CONCERN FOR RESIDENTS IS THEY DO NOT APPEAR TO BE INFORMED OF PROPOSED / POSSIBLE REMEDIATION (EXTENSION OF MUNICIPAL WATER).

8. Have there been any changes to local regulations or zoning restrictions that might impact the protectiveness of the Site's remedy?

   NO

9. Are you aware of any changes in projected land use(s) at the Site or near the Site which EPA and the State should be aware of?

   PLANS FOR A 96-UNIT MULTI-FAMILY REDIENTIAL DEVELOPMENT AT 35 GILCREAST ROAD WHICH DIRECTLY ABUTS THE SITE WERE CONDITIONALLY APPROVED ON JUNE 12, 2024.

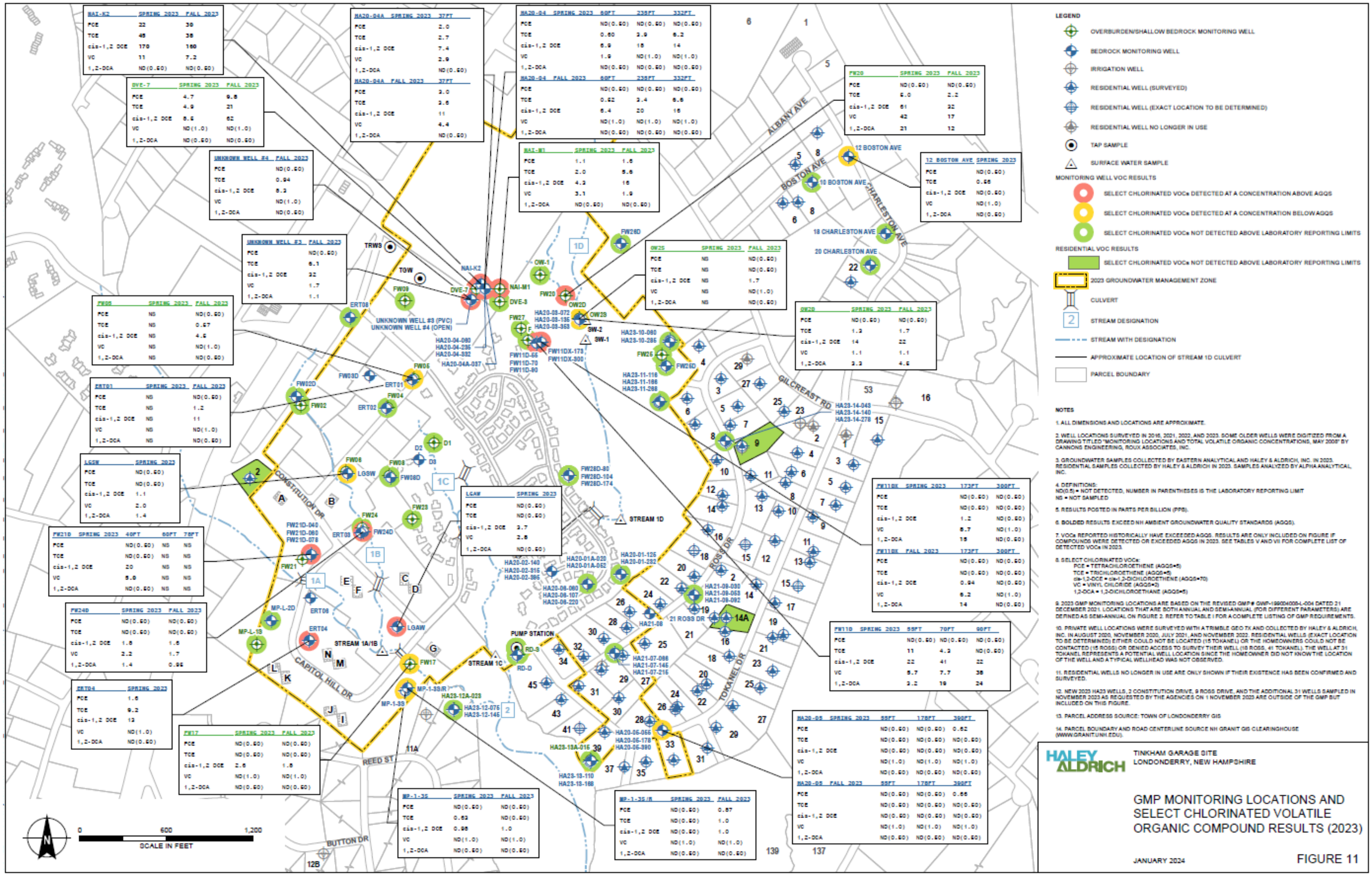
   PLANS FOR A 67-UNIT MULTI-FAMILY REDIENTIAL DEVELOPMENT AT 50-52 GILCREAST ROAD WERE CONDITIONALLY APPROVED ON JUNE 12, 2024.

10. Do you have any comments, suggestions or recommendations regarding the project?

    DURING PUBLIC MEETINGS ASSOCIATED WITH THE ABOVE REFERENCED MULTI-FAMILY DEVELOPMENTS, NUMEROUS RESIDENTS HAD CONCERNS REGARDING THEIR DRINKING WATER AND IT APPEARED THEY WERE NOT AWARE OF RECENT HAPPENINGS AT THE SITE AND REMEDIAL OPTIONS. SUGGEST INFORMING RESIDENTS AND POSSIBLY HOLDING A PUBLIC MEETING TO INFORM, THOSE PRESENT, OF RECENT AND FUTURE ACTIVITIES AT THE SITE.

APPENDIX F – DATA REVIEW FIGURES

Figure F-1: Select VOC Results, 2023



NAI-K2	SPRING 2023	FALL 2023
PCE	22	30
TCE	45	36
cis-1,2 DCE	170	160
VC	11	7.2
1,2-DCA	ND(0.50)	ND(0.50)

DVE-7	SPRING 2023	FALL 2023
PCE	4.7	9.8
TCE	4.9	21
cis-1,2 DCE	8.6	62
VC	ND(1.0)	ND(1.0)
1,2-DCA	ND(0.50)	ND(0.50)

UNKNOWN WELL #4	FALL 2023
PCE	ND(0.50)
TCE	0.94
cis-1,2 DCE	8.3
VC	ND(1.0)
1,2-DCA	ND(0.50)

UNKNOWN WELL #3	FALL 2023
PCE	ND(0.50)
TCE	6.1
cis-1,2 DCE	32
VC	1.7
1,2-DCA	1.1

HA20-04A SPRING 2023	37FT
PCE	2.0
TCE	2.7
cis-1,2 DCE	7.4
VC	2.9
1,2-DCA	ND(0.50)
HA20-04A FALL 2023	37FT
PCE	3.0
TCE	3.6
cis-1,2 DCE	11
VC	4.4
1,2-DCA	ND(0.50)

HA20-04 SPRING 2023	60FT	235FT	332FT
PCE	ND(0.50)	ND(0.50)	ND(0.50)
TCE	0.60	3.9	6.2
cis-1,2 DCE	6.9	18	14
VC	1.9	ND(1.0)	ND(1.0)
1,2-DCA	ND(0.50)	ND(0.50)	ND(0.50)
HA20-04 FALL 2023	60FT	235FT	332FT
PCE	ND(0.50)	ND(0.50)	ND(0.50)
TCE	0.52	3.4	6.6
cis-1,2 DCE	6.4	20	16
VC	ND(1.0)	ND(1.0)	ND(1.0)
1,2-DCA	ND(0.50)	ND(0.50)	ND(0.50)

NAI-M1	SPRING 2023	FALL 2023
PCE	1.1	1.6
TCE	2.0	5.6
cis-1,2 DCE	4.3	16
VC	3.1	1.9
1,2-DCA	ND(0.50)	ND(0.50)

FW20	SPRING 2023	FALL 2023
PCE	ND(0.50)	ND(0.50)
TCE	5.0	2.2
cis-1,2 DCE	61	32
VC	42	17
1,2-DCA	21	12

12 BOSTON AVE	SPRING 2023
PCE	ND(0.50)
TCE	0.56
cis-1,2 DCE	ND(0.50)
VC	ND(1.0)
1,2-DCA	ND(0.50)

OW2S	SPRING 2023	FALL 2023
PCE	NS	ND(0.50)
TCE	NS	ND(0.50)
cis-1,2 DCE	NS	1.7
VC	NS	ND(1.0)
1,2-DCA	NS	ND(0.50)

OW2D	SPRING 2023	FALL 2023
PCE	ND(0.50)	ND(0.50)
TCE	1.3	1.7
cis-1,2 DCE	14	22
VC	1.1	1.1
1,2-DCA	3.3	4.5

FW05	SPRING 2023	FALL 2023
PCE	NS	ND(0.50)
TCE	NS	0.57
cis-1,2 DCE	NS	4.5
VC	NS	ND(1.0)
1,2-DCA	NS	ND(0.50)

ERT01	SPRING 2023	FALL 2023
PCE	NS	ND(0.50)
TCE	NS	1.2
cis-1,2 DCE	NS	11
VC	NS	ND(1.0)
1,2-DCA	NS	ND(0.50)

LGSW	SPRING 2023
PCE	ND(0.50)
TCE	ND(0.50)
cis-1,2 DCE	1.1
VC	2.0
1,2-DCA	1.4

LGAW	SPRING 2023
PCE	ND(0.50)
TCE	ND(0.50)
cis-1,2 DCE	3.7
VC	2.8
1,2-DCA	ND(0.50)

FW21D SPRING 2023	40FT	60FT	78FT
PCE	ND(0.50)	NS	NS
TCE	ND(0.50)	NS	NS
cis-1,2 DCE	20	NS	NS
VC	5.0	NS	NS
1,2-DCA	ND(0.50)	NS	NS

FW24D	SPRING 2023	FALL 2023
PCE	ND(0.50)	ND(0.50)
TCE	ND(0.50)	ND(0.50)
cis-1,2 DCE	1.8	1.6
VC	2.2	1.7
1,2-DCA	1.4	0.95

ERT04	SPRING 2023
PCE	1.6
TCE	9.2
cis-1,2 DCE	13
VC	ND(1.0)
1,2-DCA	ND(0.50)

FW17	SPRING 2023	FALL 2023
PCE	ND(0.50)	ND(0.50)
TCE	ND(0.50)	ND(0.50)
cis-1,2 DCE	2.6	1.8
VC	ND(1.0)	ND(1.0)
1,2-DCA	ND(0.50)	ND(0.50)

MP-1-3S	SPRING 2023	FALL 2023
PCE	ND(0.50)	ND(0.50)
TCE	0.63	ND(0.50)
cis-1,2 DCE	0.98	1.0
VC	ND(1.0)	ND(1.0)
1,2-DCA	ND(0.50)	ND(0.50)

MP-1-3S/R	SPRING 2023	FALL 2023
PCE	ND(0.50)	0.87
TCE	ND(0.50)	1.0
cis-1,2 DCE	ND(0.50)	1.0
VC	ND(1.0)	ND(1.0)
1,2-DCA	ND(0.50)	ND(0.50)

FW11DX SPRING 2023	173FT	300FT
PCE	ND(0.50)	ND(0.50)
TCE	ND(0.50)	ND(0.50)
cis-1,2 DCE	1.2	ND(0.50)
VC	8.7	ND(1.0)
1,2-DCA	15	ND(0.50)
FW11DX FALL 2023	173FT	300FT
PCE	ND(0.50)	ND(0.50)
TCE	ND(0.50)	ND(0.50)
cis-1,2 DCE	0.94	ND(0.50)
VC	6.2	ND(1.0)
1,2-DCA	14	ND(0.50)

FW11D SPRING 2023	55FT	70FT	90FT
PCE	ND(0.50)	ND(0.50)	ND(0.50)
TCE	11	4.3	ND(0.50)
cis-1,2 DCE	22	41	22
VC	5.7	7.7	38
1,2-DCA	3.2	19	24

HA20-05 SPRING 2023	55FT	178FT	390FT
PCE	ND(0.50)	ND(0.50)	0.62
TCE	ND(0.50)	ND(0.50)	ND(0.50)
cis-1,2 DCE	ND(0.50)	ND(0.50)	ND(0.50)
VC	ND(1.0)	ND(1.0)	ND(1.0)
1,2-DCA	ND(0.50)	ND(0.50)	ND(0.50)
HA20-05 FALL 2023	55FT	178FT	390FT
PCE	ND(0.50)	ND(0.50)	0.66
TCE	ND(0.50)	ND(0.50)	ND(0.50)
cis-1,2 DCE	ND(0.50)	ND(0.50)	ND(0.50)
VC	ND(1.0)	ND(1.0)	ND(1.0)
1,2-DCA	ND(0.50)	ND(0.50)	ND(0.50)

LEGEND

- OVERBURDEN/SHALLOW BEDROCK MONITORING WELL
- BEDROCK MONITORING WELL
- IRRIGATION WELL
- RESIDENTIAL WELL (SURVEYED)
- RESIDENTIAL WELL (EXACT LOCATION TO BE DETERMINED)
- RESIDENTIAL WELL NO LONGER IN USE
- ◉ TAP SAMPLE
- △ SURFACE WATER SAMPLE

MONITORING WELL VOC RESULTS

- 🔴 SELECT CHLORINATED VOCs DETECTED AT A CONCENTRATION ABOVE AGQS
- 🟡 SELECT CHLORINATED VOCs DETECTED AT A CONCENTRATION BELOW AGQS
- 🟢 SELECT CHLORINATED VOCs NOT DETECTED ABOVE LABORATORY REPORTING LIMITS

RESIDENTIAL VOC RESULTS

- 🟩 SELECT CHLORINATED VOCs NOT DETECTED ABOVE LABORATORY REPORTING LIMITS
- 2023 GROUNDWATER MANAGEMENT ZONE
- CULVERT
- 2 STREAM DESIGNATION
- STREAM WITH DESIGNATION
- APPROXIMATE LOCATION OF STREAM 1D CULVERT
- PARCEL BOUNDARY

NOTES

1. ALL DIMENSIONS AND LOCATIONS ARE APPROXIMATE.
2. WELL LOCATIONS SURVEYED IN 2016, 2021, 2022, AND 2023. SOME OLDER WELLS WERE DIGITIZED FROM A DRAWING TITLED "MONITORING LOCATIONS AND TOTAL VOLATILE ORGANIC CONCENTRATIONS, MAY 2008" BY CANNONS ENGINEERING, ROUX ASSOCIATES, INC.
3. GROUNDWATER SAMPLES COLLECTED BY EASTERN ANALYTICAL AND HALEY & ALDRICH, INC. IN 2023. RESIDENTIAL SAMPLES COLLECTED BY HALEY & ALDRICH IN 2023. SAMPLES ANALYZED BY ALPHA ANALYTICAL, INC.
4. DEFINITIONS:
ND(0.5) = NOT DETECTED, NUMBER IN PARENTHESES IS THE LABORATORY REPORTING LIMIT
NS = NOT SAMPLED
5. RESULTS POSTED IN PARTS PER BILLION (PPB).
6. BOLDED RESULTS EXCEED NH AMBIENT GROUNDWATER QUALITY STANDARDS (AGQS).
7. VOCs REPORTED HISTORICALLY HAVE EXCEEDED AGQS. RESULTS ARE ONLY INCLUDED ON FIGURE IF COMPOUNDS WERE DETECTED OR EXCEEDED AGQS IN 2023. SEE TABLES V AND VII FOR COMPLETE LIST OF DETECTED VOCs IN 2023.
8. SELECT CHLORINATED VOCs:
PCE = TETRACHLOROETHENE (AGQS=5)
TCE = TRICHLOROETHENE (AGQS=5)
cis-1,2-DCE = cis-1,2-DICHLOROETHENE (AGQS=70)
VC = VINYL CHLORIDE (AGQS=2)
1,2-DCA = 1,2-DICHLOROETHANE (AGQS=5)
9. 2023 GMP MONITORING LOCATIONS ARE BASED ON THE REVISED GMP# GWP-199004008-L-004 DATED 21 DECEMBER 2021. LOCATIONS THAT ARE BOTH ANNUAL AND SEMI-ANNUAL (FOR DIFFERENT PARAMETERS) ARE DEFINED AS SEMI-ANNUAL ON FIGURE 2. REFER TO TABLE I FOR A COMPLETE LISTING OF GMP REQUIREMENTS.
10. PRIVATE WELL LOCATIONS WERE SURVEYED WITH A TRIMBLE GEO 7X AND COLLECTED BY HALEY & ALDRICH, INC. IN AUGUST 2020, NOVEMBER 2020, JULY 2021, AND NOVEMBER 2022. RESIDENTIAL WELLS (EXACT LOCATION TO BE DETERMINED) EITHER COULD NOT BE LOCATED (15 TOKANEL) OR THE HOMEOWNERS COULD NOT BE CONTACTED (15 ROSS) OR DENIED ACCESS TO SURVEY THEIR WELL (18 ROSS, 41 TOKANEL). THE WELL AT 31 TOKANEL REPRESENTS A POTENTIAL WELL LOCATION SINCE THE HOMEOWNER DID NOT KNOW THE LOCATION OF THE WELL AND A TYPICAL WELLHEAD WAS NOT OBSERVED.
11. RESIDENTIAL WELLS NO LONGER IN USE ARE ONLY SHOWN IF THEIR EXISTENCE HAS BEEN CONFIRMED AND SURVEYED.
12. NEW 2023 HA23 WELLS, 2 CONSTITUTION DRIVE, 9 ROSS DRIVE, AND THE ADDITIONAL 31 WELLS SAMPLED IN NOVEMBER 2023 AS REQUESTED BY THE AGENCIES ON 1 NOVEMBER 2023 ARE OUTSIDE OF THE GMP BUT INCLUDED ON THIS FIGURE.
13. PARCEL ADDRESS SOURCE: TOWN OF LONDONDERRY GIS
14. PARCEL BOUNDARY AND ROAD CENTERLINE SOURCE NH GRANIT GIS CLEARINGHOUSE (WWW.GRANIT.UNH.EDU).

HALEY ALDRICH

TINKHAM GARAGE SITE
LONDONDERRY, NEW HAMPSHIRE

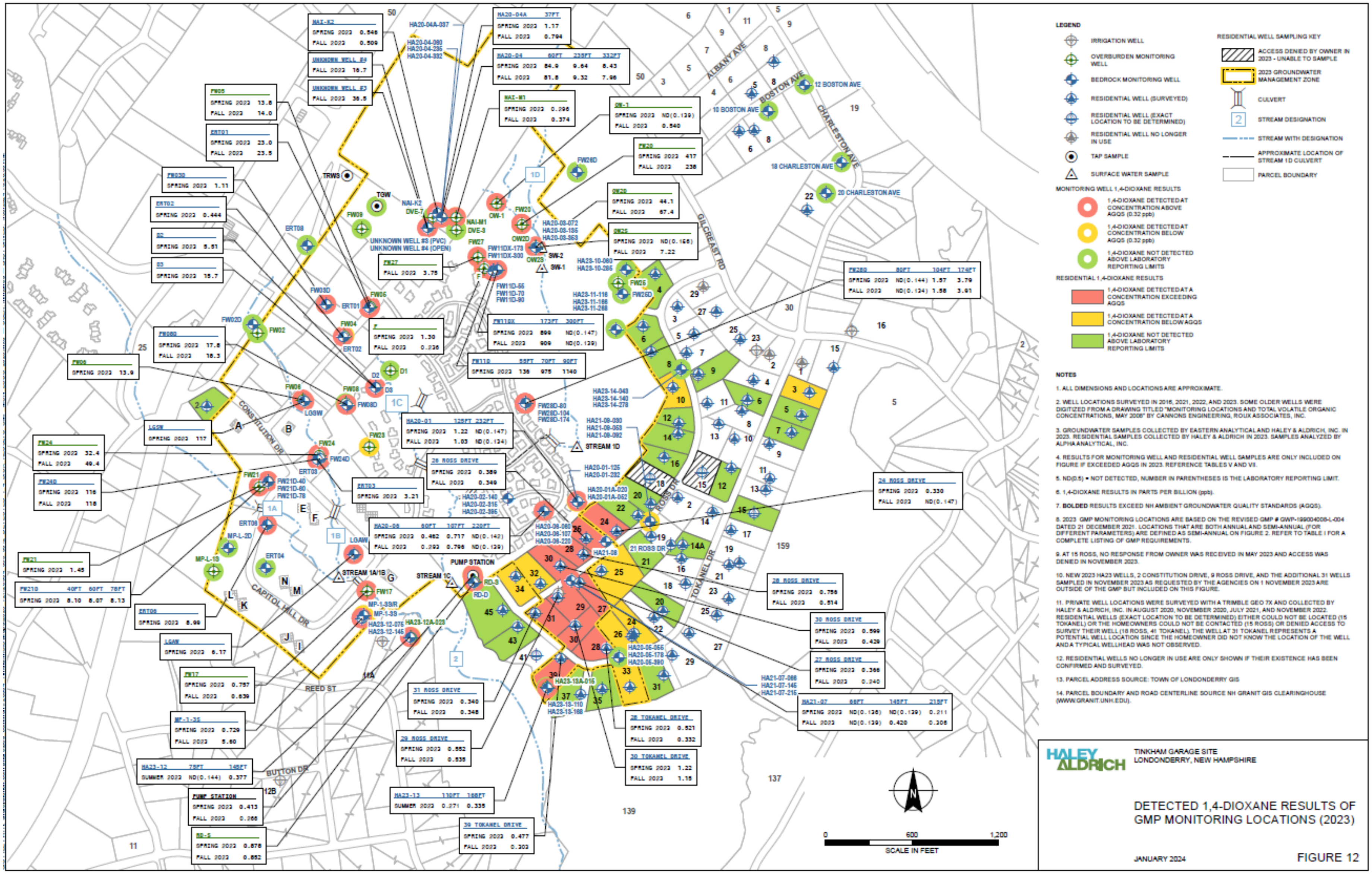
GMP MONITORING LOCATIONS AND SELECT CHLORINATED VOLATILE ORGANIC COMPOUND RESULTS (2023)

JANUARY 2024

FIGURE 11

Source: Annual Water Quality Monitoring Report 2023, Tinkham Garage Site. Prepared by Haley & Aldrich, Inc.

Figure F-2: 1,4-dioxane Results, 2023



NAI-K2	
SPRING 2023	0.546
FALL 2023	0.509

UNKNOWN WELL #4	
FALL 2023	16.7

UNKNOWN WELL #3	
FALL 2023	36.5

FW05	
SPRING 2023	13.8
FALL 2023	14.0

ERT01	
SPRING 2023	23.0
FALL 2023	23.5

FW03D	
SPRING 2023	1.11

ERT02	
SPRING 2023	0.444

D2	
SPRING 2023	5.51

D3	
SPRING 2023	15.7

FW08D	
SPRING 2023	17.8
FALL 2023	18.3

FW06	
SPRING 2023	13.9

LGSW	
SPRING 2023	117

FW24	
SPRING 2023	32.4
FALL 2023	49.4

FW24D	
SPRING 2023	116
FALL 2023	116

FW21	
SPRING 2023	1.45

FW21D	40FT	60FT	78FT
SPRING 2023	8.10	8.07	8.13

ERT06	
SPRING 2023	8.99

LGAW	
SPRING 2023	6.17

FW17	
SPRING 2023	0.757
FALL 2023	0.639

MP-1-3S	
SPRING 2023	0.729
FALL 2023	5.60

HA23-12	75FT	145FT
SUMMER 2023	ND(0.144)	0.377

PUMP STATION	
SPRING 2023	0.413
FALL 2023	0.266

RD-S	
SPRING 2023	0.876
FALL 2023	0.852

HA20-04A	37FT
SPRING 2023	1.17
FALL 2023	0.794

HA20-04	60FT	235FT	332FT
SPRING 2023	84.9	9.64	8.43
FALL 2023	81.8	9.32	7.96

NAI-M1	
SPRING 2023	0.296
FALL 2023	0.374

OW-1	
SPRING 2023	ND(0.139)
FALL 2023	0.540

FW20	
SPRING 2023	417
FALL 2023	238

OW2D	
SPRING 2023	44.1
FALL 2023	67.4

OW2S	
SPRING 2023	ND(0.166)
FALL 2023	7.22

FW27	
FALL 2023	3.75

F	
SPRING 2023	1.30
FALL 2023	0.236

FW11DX	173FT	300FT
SPRING 2023	899	ND(0.147)
FALL 2023	909	ND(0.139)

FW11D	55FT	70FT	90FT
SPRING 2023	136	975	1140

FW28D	80FT	104FT	174FT
SPRING 2023	ND(0.144)	1.57	3.79
FALL 2023	ND(0.134)	1.56	3.91

HA20-01	125FT	232FT
SPRING 2023	1.22	ND(0.147)
FALL 2023	1.03	ND(0.134)

26 ROSS DRIVE	
SPRING 2023	0.389
FALL 2023	0.349

ERT03	
SPRING 2023	3.21

HA20-06	60FT	107FT	220FT
SPRING 2023	0.462	0.717	ND(0.142)
FALL 2023	0.293	0.796	ND(0.139)

24 ROSS DRIVE	
SPRING 2023	0.330
FALL 2023	ND(0.147)

28 ROSS DRIVE	
SPRING 2023	0.756
FALL 2023	0.514

30 ROSS DRIVE	
SPRING 2023	0.599
FALL 2023	0.429

27 ROSS DRIVE	
SPRING 2023	0.366
FALL 2023	0.240

HA21-07	66FT	145FT	215FT
SPRING 2023	ND(0.136)	ND(0.139)	0.211
FALL 2023	ND(0.139)	0.420	0.306

31 ROSS DRIVE	
SPRING 2023	0.340
FALL 2023	0.348

29 ROSS DRIVE	
SPRING 2023	0.552
FALL 2023	0.535

28 TOKANEL DRIVE	
SPRING 2023	0.521
FALL 2023	0.332

30 TOKANEL DRIVE	
SPRING 2023	1.22
FALL 2023	1.15

HA23-13	110FT	168FT
SUMMER 2023	0.271	0.335

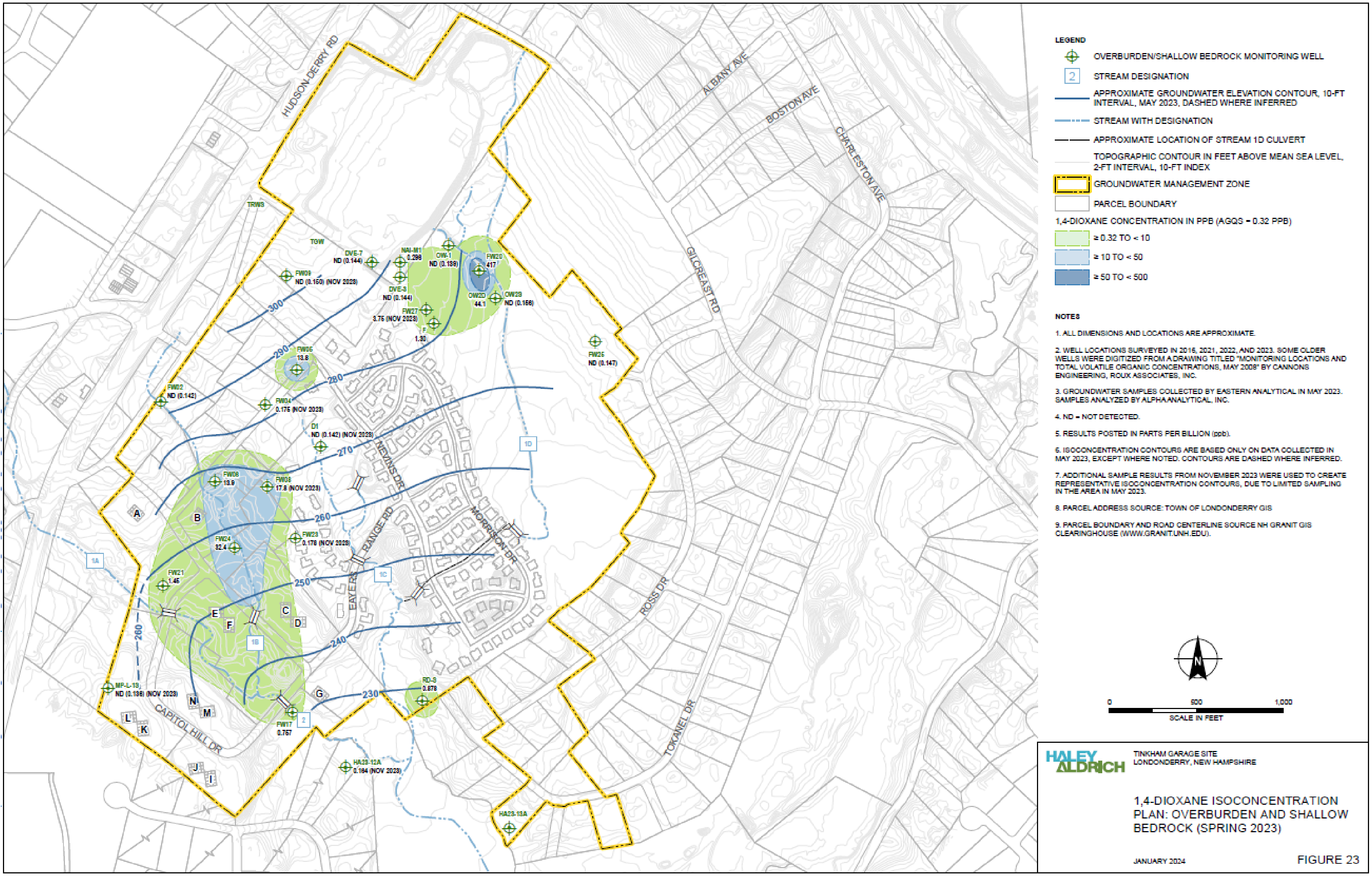
39 TOKANEL DRIVE	
SPRING 2023	0.477
FALL 2023	0.303

NOTES

1. ALL DIMENSIONS AND LOCATIONS ARE APPROXIMATE.
2. WELL LOCATIONS SURVEYED IN 2016, 2021, 2022, AND 2023. SOME OLDER WELLS WERE DIGITIZED FROM A DRAWING TITLED "MONITORING LOCATIONS AND TOTAL VOLATILE ORGANIC CONCENTRATIONS, MAY 2006" BY CANNONS ENGINEERING, ROUX ASSOCIATES, INC.
3. GROUNDWATER SAMPLES COLLECTED BY EASTERN ANALYTICAL AND HALEY & ALDRICH, INC. IN 2023. RESIDENTIAL SAMPLES COLLECTED BY HALEY & ALDRICH IN 2023. SAMPLES ANALYZED BY ALPHA ANALYTICAL, INC.
4. RESULTS FOR MONITORING WELL AND RESIDENTIAL WELL SAMPLES ARE ONLY INCLUDED ON FIGURE IF EXCEEDED AGQS IN 2023. REFERENCE TABLES V AND VII.
5. ND(0.5) = NOT DETECTED, NUMBER IN PARENTHESES IS THE LABORATORY REPORTING LIMIT.
6. 1,4-DIOXANE RESULTS IN PARTS PER BILLION (ppb).
7. **BOLDED** RESULTS EXCEED NH AMBIENT GROUNDWATER QUALITY STANDARDS (AGQS).
8. 2023 GMP MONITORING LOCATIONS ARE BASED ON THE REVISED GMP # GWP-199004008-L-004 DATED 21 DECEMBER 2021. LOCATIONS THAT ARE BOTH ANNUAL AND SEMI-ANNUAL (FOR DIFFERENT PARAMETERS) ARE DEFINED AS SEMI-ANNUAL ON FIGURE 2. REFER TO TABLE I FOR A COMPLETE LISTING OF GMP REQUIREMENTS.
9. AT 15 ROSS, NO RESPONSE FROM OWNER WAS RECEIVED IN MAY 2023 AND ACCESS WAS DENIED IN NOVEMBER 2023.
10. NEW 2023 HA23 WELLS, 2 CONSTITUTION DRIVE, 9 ROSS DRIVE, AND THE ADDITIONAL 31 WELLS SAMPLED IN NOVEMBER 2023 AS REQUESTED BY THE AGENCIES ON 1 NOVEMBER 2023 ARE OUTSIDE OF THE GMP BUT INCLUDED ON THIS FIGURE.
11. PRIVATE WELL LOCATIONS WERE SURVEYED WITH A TRIMBLE GEO 7X AND COLLECTED BY HALEY & ALDRICH, INC. IN AUGUST 2020, NOVEMBER 2020, JULY 2021, AND NOVEMBER 2022. RESIDENTIAL WELLS (EXACT LOCATION TO BE DETERMINED) EITHER COULD NOT BE LOCATED (15 TOKANEL) OR THE HOMEOWNERS COULD NOT BE CONTACTED (15 ROSS) OR DENIED ACCESS TO SURVEY THEIR WELL (18 ROSS, 41 TOKANEL). THE WELL AT 31 TOKANEL REPRESENTS A POTENTIAL WELL LOCATION SINCE THE HOMEOWNER DID NOT KNOW THE LOCATION OF THE WELL AND A TYPICAL WELLHEAD WAS NOT OBSERVED.
12. RESIDENTIAL WELLS NO LONGER IN USE ARE ONLY SHOWN IF THEIR EXISTENCE HAS BEEN CONFIRMED AND SURVEYED.
13. PARCEL ADDRESS SOURCE: TOWN OF LONDONDERRY GIS
14. PARCEL BOUNDARY AND ROAD CENTERLINE SOURCE NH GRANIT GIS CLEARINGHOUSE (WWW.GRANIT.UNH.EDU).

Source: Annual Water Quality Monitoring Report 2023, Tinkham Garage Site. Prepared by Haley & Aldrich, Inc.

Figure F-3: 1,4-dioxane Isoconcentration Contours, Overburden and Shallow Bedrock, Spring 2023

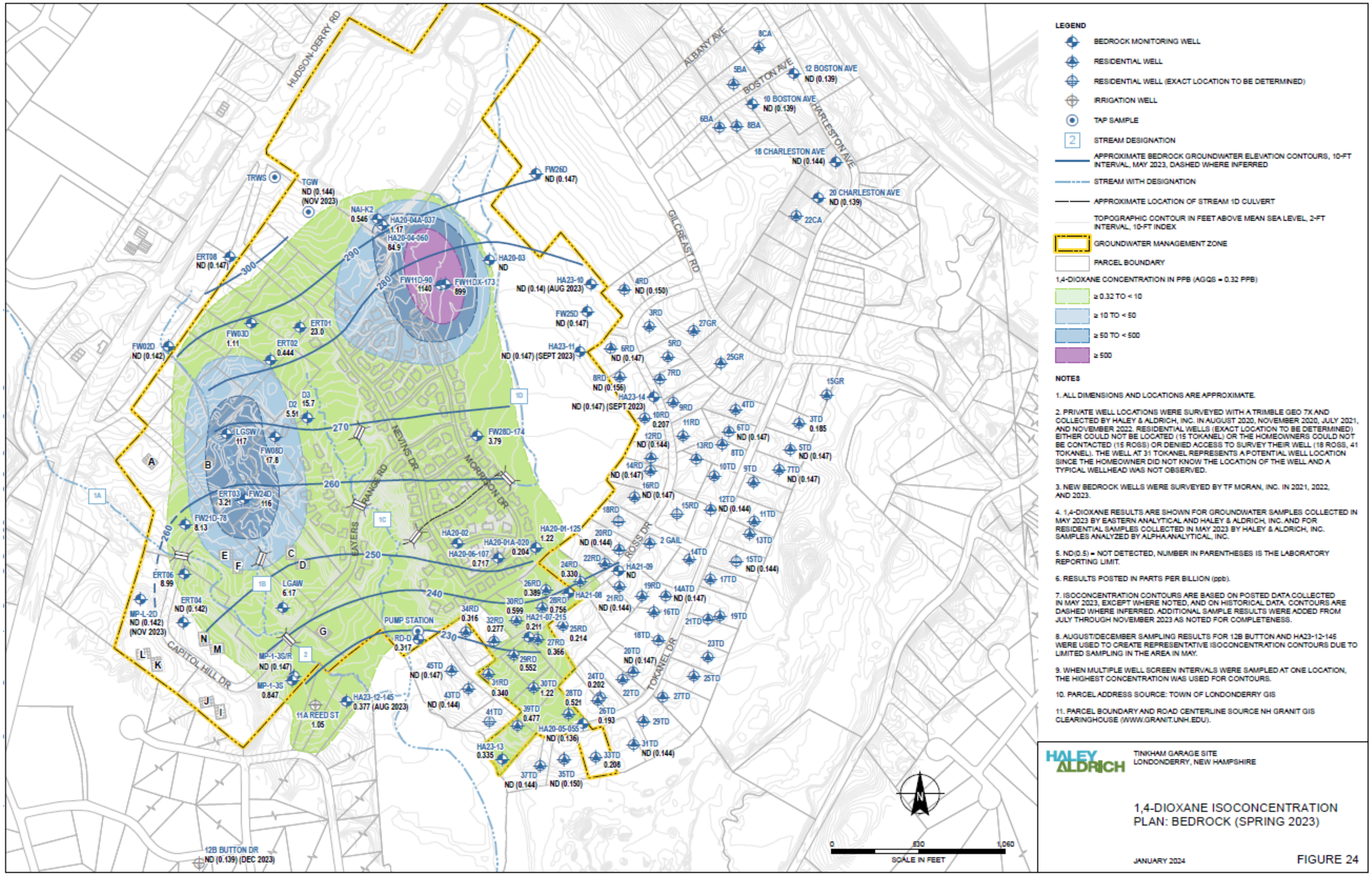


NOTES

1. ALL DIMENSIONS AND LOCATIONS ARE APPROXIMATE.
2. WELL LOCATIONS SURVEYED IN 2016, 2021, 2022, AND 2023. SOME OLDER WELLS WERE DIGITIZED FROM A DRAWING TITLED "MONITORING LOCATIONS AND TOTAL VOLATILE ORGANIC CONCENTRATIONS, MAY 2008" BY CANNONS ENGINEERING, ROUX ASSOCIATES, INC.
3. GROUNDWATER SAMPLES COLLECTED BY EASTERN ANALYTICAL IN MAY 2023. SAMPLES ANALYZED BY ALPHA ANALYTICAL, INC.
4. ND = NOT DETECTED.
5. RESULTS POSTED IN PARTS PER BILLION (ppb).
6. ISOCONCENTRATION CONTOURS ARE BASED ONLY ON DATA COLLECTED IN MAY 2023, EXCEPT WHERE NOTED. CONTOURS ARE DASHED WHERE INFERRED.
7. ADDITIONAL SAMPLE RESULTS FROM NOVEMBER 2023 WERE USED TO CREATE REPRESENTATIVE ISOCONCENTRATION CONTOURS, DUE TO LIMITED SAMPLING IN THE AREA IN MAY 2023.
8. PARCEL ADDRESS SOURCE: TOWN OF LONDONDERRY GIS
9. PARCEL BOUNDARY AND ROAD CENTERLINE SOURCE NH GRANIT GIS CLEARINGHOUSE (WWW.GRANIT.UNH.EDU).

Source: Annual Water Quality Monitoring Report 2023, Tinkham Garage Site. Prepared by Haley & Aldrich, Inc.

Figure F-4: 1,4-dioxane Isoconcentration Contours, Bedrock, Spring 2023



NOTES

1. ALL DIMENSIONS AND LOCATIONS ARE APPROXIMATE.

2. PRIVATE WELL LOCATIONS WERE SURVEYED WITH A TRIMBLE GEO 7X AND COLLECTED BY HALEY & ALDRICH, INC. IN AUGUST 2020, NOVEMBER 2020, JULY 2021, AND NOVEMBER 2022. RESIDENTIAL WELLS (EXACT LOCATION TO BE DETERMINED) EITHER COULD NOT BE LOCATED (15 TOKANEL) OR THE HOMEOWNERS COULD NOT BE CONTACTED (15 ROSS) OR DENIED ACCESS TO SURVEY THEIR WELL (18 ROSS, 41 TOKANEL). THE WELL AT 31 TOKANEL REPRESENTS A POTENTIAL WELL LOCATION SINCE THE HOMEOWNER DID NOT KNOW THE LOCATION OF THE WELL AND A TYPICAL WELLHEAD WAS NOT OBSERVED.

3. NEW BEDROCK WELLS WERE SURVEYED BY TF MORAN, INC. IN 2021, 2022, AND 2023.

4. 1,4-DIOXANE RESULTS ARE SHOWN FOR GROUNDWATER SAMPLES COLLECTED IN MAY 2023 BY EASTERN ANALYTICAL AND HALEY & ALDRICH, INC. AND FOR RESIDENTIAL SAMPLES COLLECTED IN MAY 2023 BY HALEY & ALDRICH, INC. SAMPLES ANALYZED BY ALPHA ANALYTICAL, INC.

5. ND(0.5) = NOT DETECTED, NUMBER IN PARENTHESES IS THE LABORATORY REPORTING LIMIT.

6. RESULTS POSTED IN PARTS PER BILLION (ppb).

7. ISOCONCENTRATION CONTOURS ARE BASED ON POSTED DATA COLLECTED IN MAY 2023, EXCEPT WHERE NOTED, AND ON HISTORICAL DATA. CONTOURS ARE DASHED WHERE INFERRED. ADDITIONAL SAMPLE RESULTS WERE ADDED FROM JULY THROUGH NOVEMBER 2023 AS NOTED FOR COMPLETENESS.

8. AUGUST/DECEMBER SAMPLING RESULTS FOR 12B BUTTON AND HA23-12-145 WERE USED TO CREATE REPRESENTATIVE ISOCONCENTRATION CONTOURS DUE TO LIMITED SAMPLING IN THE AREA IN MAY.

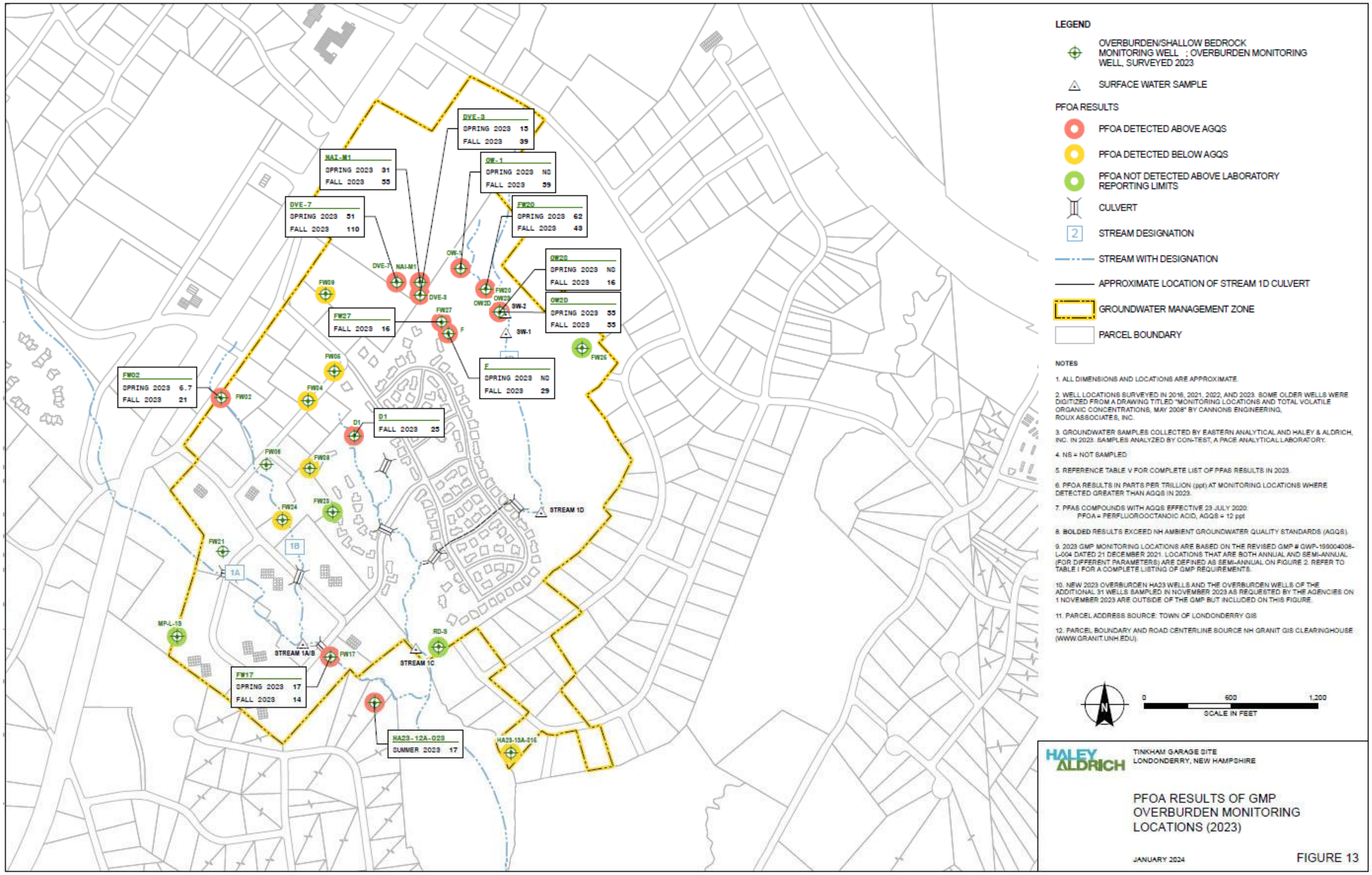
9. WHEN MULTIPLE WELL SCREEN INTERVALS WERE SAMPLED AT ONE LOCATION, THE HIGHEST CONCENTRATION WAS USED FOR CONTOURS.

10. PARCEL ADDRESS SOURCE: TOWN OF LONDONDERRY GIS

11. PARCEL BOUNDARY AND ROAD CENTERLINE SOURCE NH GRANIT GIS CLEARINGHOUSE (WWW.GRANIT.UNH.EDU).

Source: Annual Water Quality Monitoring Report 2023, Tinkham Garage Site. Prepared by Haley & Aldrich, Inc.

Figure F-5: PFOA Results of GMP Overburden Monitoring Locations, 2023

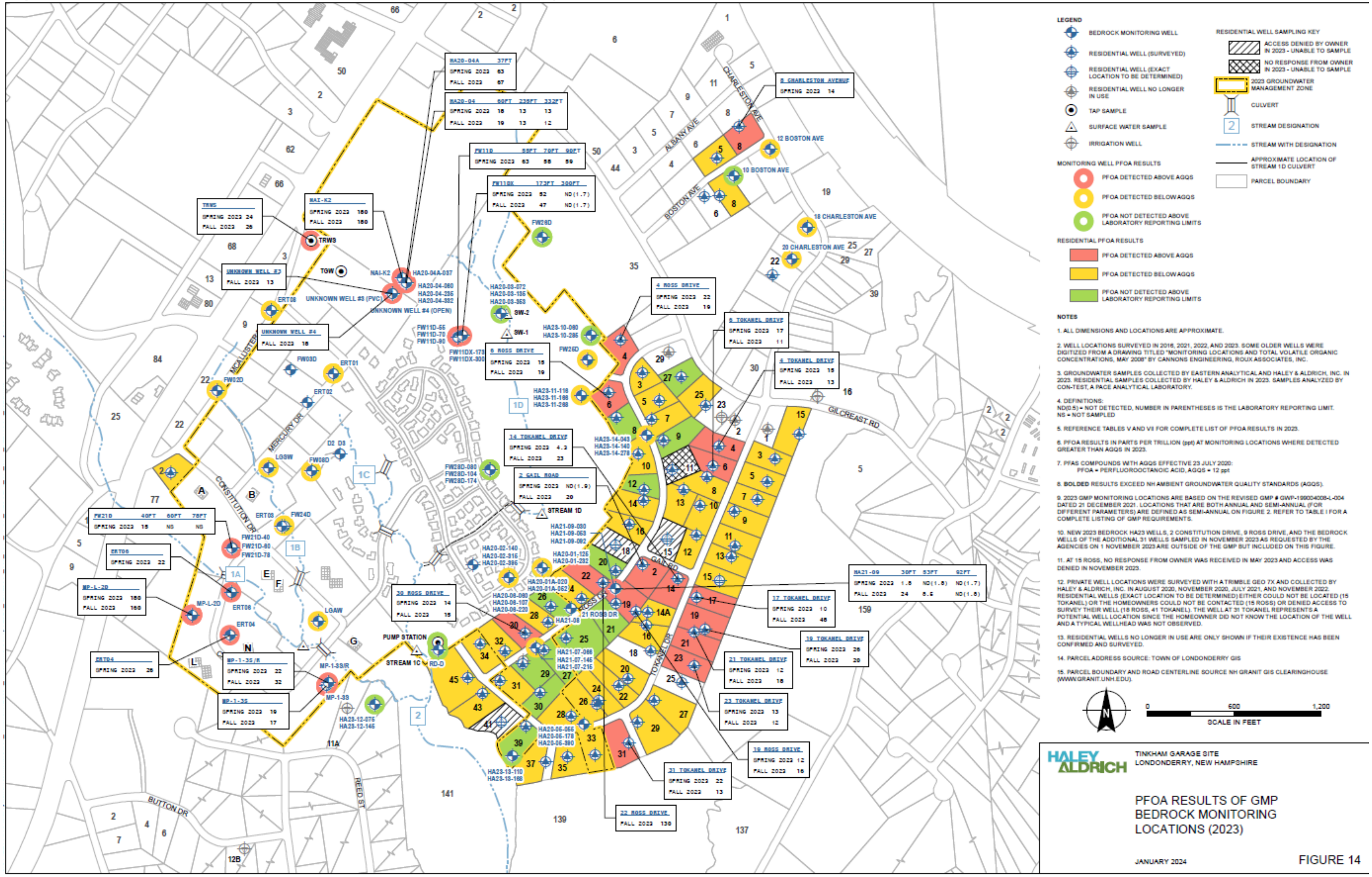


NOTES

1. ALL DIMENSIONS AND LOCATIONS ARE APPROXIMATE.
2. WELL LOCATIONS SURVEYED IN 2016, 2021, 2022, AND 2023. SOME OLDER WELLS WERE DIGITIZED FROM A DRAWING TITLED "MONITORING LOCATIONS AND TOTAL VOLATILE ORGANIC CONCENTRATIONS, MAY 2008" BY CANNONS ENGINEERING, ROUX ASSOCIATES, INC.
3. GROUNDWATER SAMPLES COLLECTED BY EASTERN ANALYTICAL AND HALEY & ALDRICH, INC. IN 2023. SAMPLES ANALYZED BY CON-TEST, A PACE ANALYTICAL LABORATORY.
4. NS = NOT SAMPLED
5. REFERENCE TABLE V FOR COMPLETE LIST OF PFAS RESULTS IN 2023.
6. PFOA RESULTS IN PARTS PER TRILLION (ppt) AT MONITORING LOCATIONS WHERE DETECTED GREATER THAN AGQS IN 2023.
7. PFAS COMPOUNDS WITH AGQS EFFECTIVE 23 JULY 2020:
   PFOA = PERFLUOROOCTANOIC ACID, AGQS = 12 ppt
8. BOLDED RESULTS EXCEED NH AMBIENT GROUNDWATER QUALITY STANDARDS (AGQS).
9. 2023 GMP MONITORING LOCATIONS ARE BASED ON THE REVISED GMP # GWP-199004008-L-004 DATED 21 DECEMBER 2021. LOCATIONS THAT ARE BOTH ANNUAL AND SEMI-ANNUAL (FOR DIFFERENT PARAMETERS) ARE DEFINED AS SEMI-ANNUAL ON FIGURE 2. REFER TO TABLE I FOR A COMPLETE LISTING OF GMP REQUIREMENTS.
10. NEW 2023 OVERBURDEN HA23 WELLS AND THE OVERBURDEN WELLS OF THE ADDITIONAL 31 WELLS SAMPLED IN NOVEMBER 2023 AS REQUESTED BY THE AGENCIES ON 1 NOVEMBER 2023 ARE OUTSIDE OF THE GMP BUT INCLUDED ON THIS FIGURE.
11. PARCEL ADDRESS SOURCE: TOWN OF LONDONDERRY GIS
12. PARCEL BOUNDARY AND ROAD CENTERLINE SOURCE NH GRANIT GIS CLEARINGHOUSE (WWW.GRANIT.UNH.EDU).

Source: Annual Water Quality Monitoring Report 2023, Tinkham Garage Site. Prepared by Haley & Aldrich, Inc.

Figure F-6: PFOA Results of GMP Bedrock Monitoring Locations, 2023



NOTES

1. ALL DIMENSIONS AND LOCATIONS ARE APPROXIMATE.

2. WELL LOCATIONS SURVEYED IN 2016, 2021, 2022, AND 2023. SOME OLDER WELLS WERE DIGITIZED FROM A DRAWING TITLED "MONITORING LOCATIONS AND TOTAL VOLATILE ORGANIC CONCENTRATIONS, MAY 2008" BY CANNONS ENGINEERING, ROUX ASSOCIATES, INC.

3. GROUNDWATER SAMPLES COLLECTED BY EASTERN ANALYTICAL AND HALEY & ALDRICH, INC. IN 2023. RESIDENTIAL SAMPLES COLLECTED BY HALEY & ALDRICH IN 2023. SAMPLES ANALYZED BY CON-TEST, A PACE ANALYTICAL LABORATORY.

4. DEFINITIONS:
ND(0.5) = NOT DETECTED, NUMBER IN PARENTHESES IS THE LABORATORY REPORTING LIMIT.
NS = NOT SAMPLED

5. REFERENCE TABLES V AND VII FOR COMPLETE LIST OF PFOA RESULTS IN 2023.

6. PFOA RESULTS IN PARTS PER TRILLION (ppt) AT MONITORING LOCATIONS WHERE DETECTED GREATER THAN AGQS IN 2023.

7. PFAS COMPOUNDS WITH AGQS EFFECTIVE 23 JULY 2020:
PFOA = PERFLUOROOCTANOIC ACID, AGQS = 12 ppt

8. **BOLDED** RESULTS EXCEED NH AMBIENT GROUNDWATER QUALITY STANDARDS (AGQS).

9. 2023 GMP MONITORING LOCATIONS ARE BASED ON THE REVISED GMP # GWP-199004008-L-004 DATED 21 DECEMBER 2021. LOCATIONS THAT ARE BOTH ANNUAL AND SEMI-ANNUAL (FOR DIFFERENT PARAMETERS) ARE DEFINED AS SEMI-ANNUAL ON FIGURE 2. REFER TO TABLE I FOR A COMPLETE LISTING OF GMP REQUIREMENTS.

10. NEW 2023 BEDROCK HA23 WELLS, 2 CONSTITUTION DRIVE, 9 ROSS DRIVE, AND THE BEDROCK WELLS OF THE ADDITIONAL 31 WELLS SAMPLED IN NOVEMBER 2023 AS REQUESTED BY THE AGENCIES ON 1 NOVEMBER 2023 ARE OUTSIDE OF THE GMP BUT INCLUDED ON THIS FIGURE.

11. AT 15 ROSS, NO RESPONSE FROM OWNER WAS RECEIVED IN MAY 2023 AND ACCESS WAS DENIED IN NOVEMBER 2023.

12. PRIVATE WELL LOCATIONS WERE SURVEYED WITH A TRIMBLE GEO 7X AND COLLECTED BY HALEY & ALDRICH, INC. IN AUGUST 2020, NOVEMBER 2020, JULY 2021, AND NOVEMBER 2022. RESIDENTIAL WELLS (EXACT LOCATION TO BE DETERMINED) EITHER COULD NOT BE LOCATED (15 TOKANEL) OR THE HOMEOWNERS COULD NOT BE CONTACTED (15 ROSS) OR DENIED ACCESS TO SURVEY THEIR WELL (18 ROSS, 41 TOKANEL). THE WELL AT 31 TOKANEL REPRESENTS A POTENTIAL WELL LOCATION SINCE THE HOMEOWNER DID NOT KNOW THE LOCATION OF THE WELL AND A TYPICAL WELLHEAD WAS NOT OBSERVED.

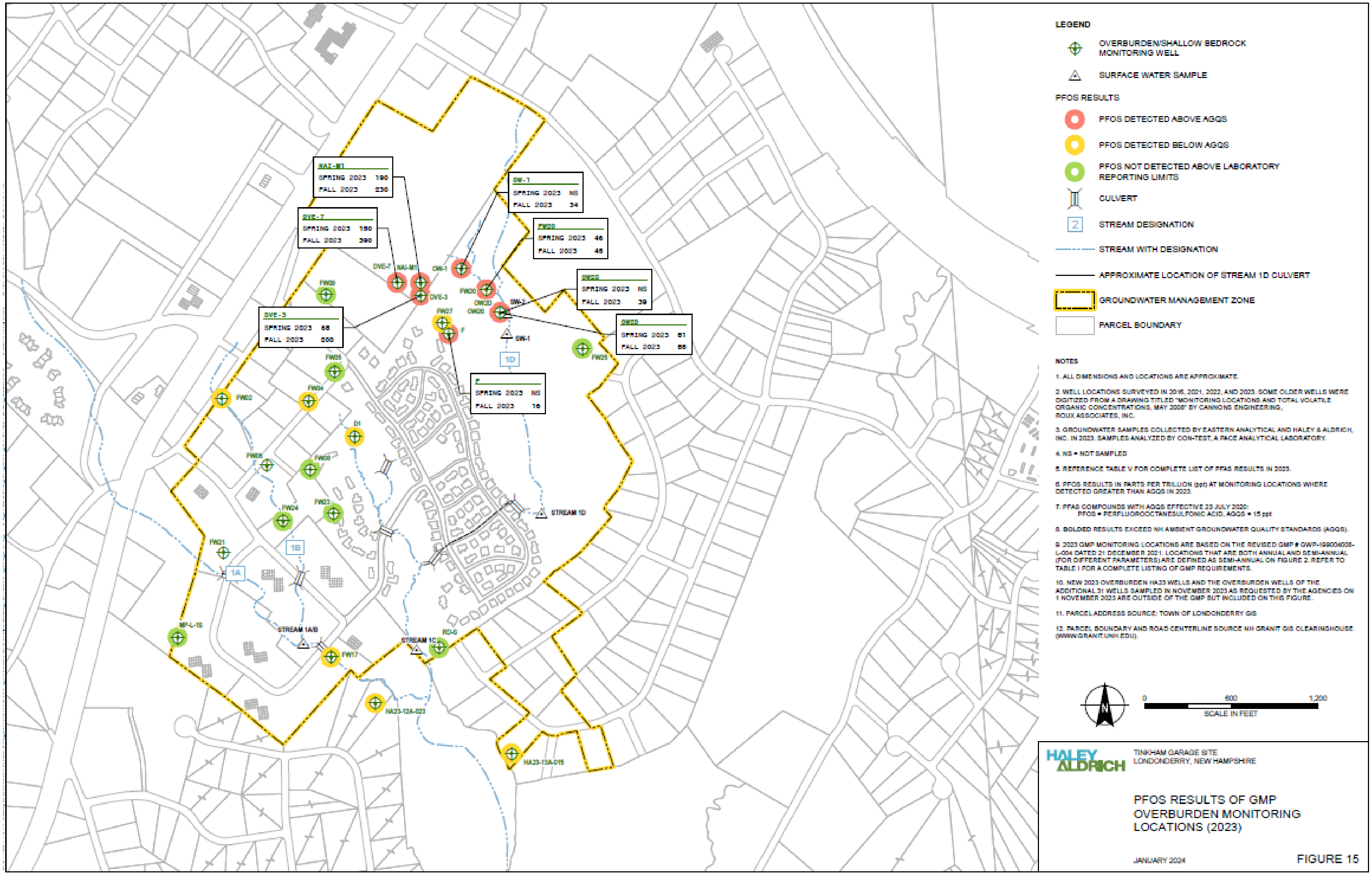
13. RESIDENTIAL WELLS NO LONGER IN USE ARE ONLY SHOWN IF THEIR EXISTENCE HAS BEEN CONFIRMED AND SURVEYED.

14. PARCEL ADDRESS SOURCE: TOWN OF LONDONDERRY GIS

15. PARCEL BOUNDARY AND ROAD CENTERLINE SOURCE NH GRANIT GIS CLEARINGHOUSE (WWW.GRANIT.UNH.EDU).

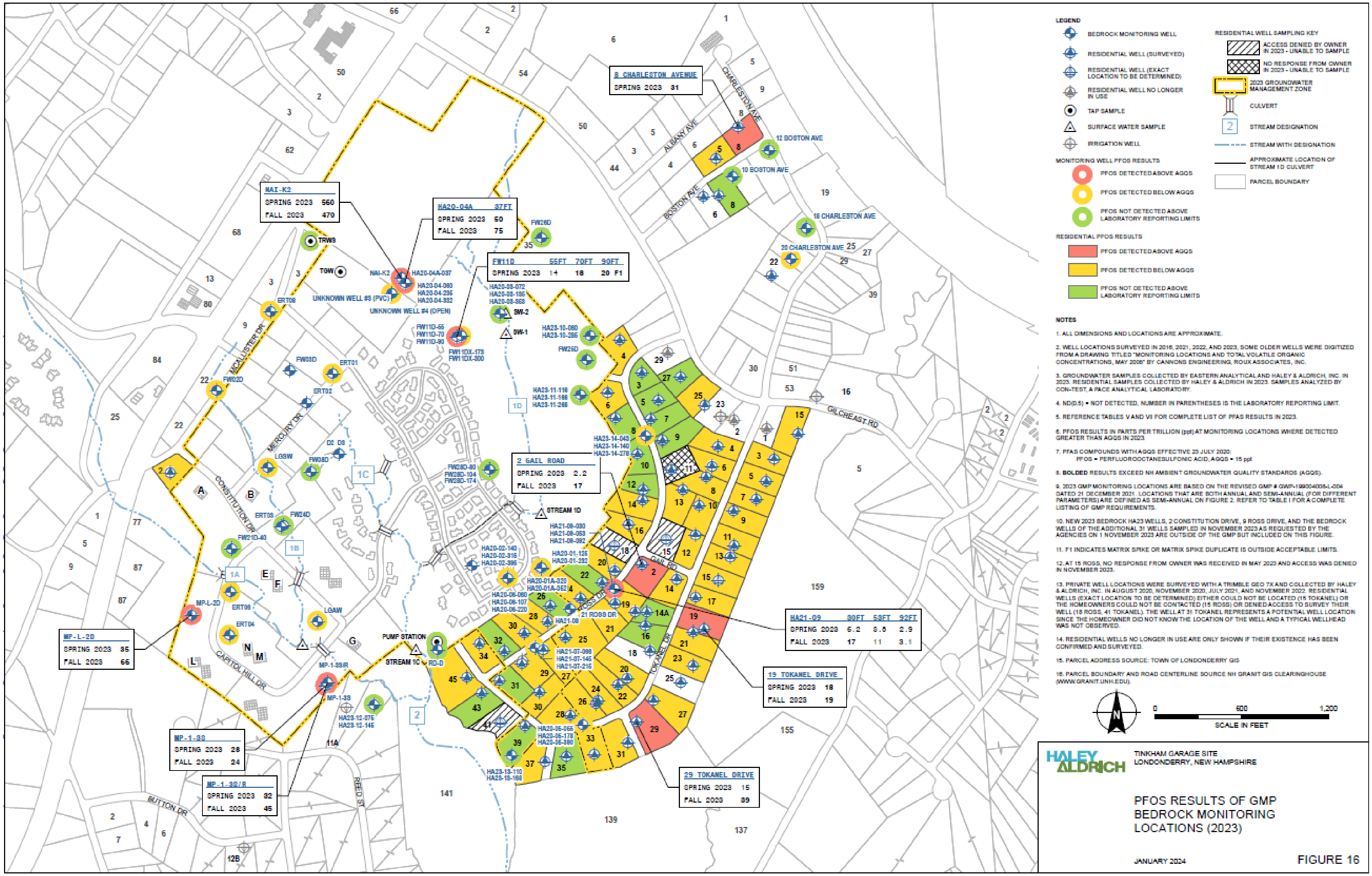
Source: Annual Water Quality Monitoring Report 2023, Tinkham Garage Site. Prepared by Haley & Aldrich, Inc.

Figure F-7: PFOS Results of GMP Overburden Monitoring Locations, 2023



Source: Annual Water Quality Monitoring Report 2023, Tinkham Garage Site. Prepared by Haley & Aldrich, Inc.

Figure F-8: PFOS Results of GMP Bedrock Monitoring Locations, 2023



NOTES

1. ALL DIMENSIONS AND LOCATIONS ARE APPROXIMATE.

2. WELL LOCATIONS SURVEYED IN 2016, 2021, 2022, AND 2023, SOME OLDER WELLS WERE DIGITIZED FROM A DRAWING TITLED "MONITORING LOCATIONS AND TOTAL VOLATILE ORGANIC CONCENTRATIONS, MAY 2008" BY CANNONS ENGINEERING, ROUX ASSOCIATES, INC.

3. GROUNDWATER SAMPLES COLLECTED BY EASTERN ANALYTICAL AND HALEY & ALDRICH, INC. IN 2023. RESIDENTIAL SAMPLES COLLECTED BY HALEY & ALDRICH IN 2023. SAMPLES ANALYZED BY CON-TEST, A PACE ANALYTICAL LABORATORY.

4. ND(0.5) = NOT DETECTED, NUMBER IN PARENTHESES IS THE LABORATORY REPORTING LIMIT.

5. REFERENCE TABLES V AND VI FOR COMPLETE LIST OF PFAS RESULTS IN 2023.

6. PFOS RESULTS IN PARTS PER TRILLION (ppt) AT MONITORING LOCATIONS WHERE DETECTED GREATER THAN AGQS IN 2023.

7. PFAS COMPOUNDS WITH AGQS EFFECTIVE 23 JULY 2020:
PFOS = PERFLUOROOCTANESULFONIC ACID, AGQS = 15 ppt

8. **BOLDED** RESULTS EXCEED NH AMBIENT GROUNDWATER QUALITY STANDARDS (AGQS).

9. 2023 GMP MONITORING LOCATIONS ARE BASED ON THE REVISED GMP # GWP-199004008-L-004 DATED 21 DECEMBER 2021. LOCATIONS THAT ARE BOTH ANNUAL AND SEMI-ANNUAL (FOR DIFFERENT PARAMETERS) ARE DEFINED AS SEMI-ANNUAL ON FIGURE 2. REFER TO TABLE I FOR A COMPLETE LISTING OF GMP REQUIREMENTS.

10. NEW 2023 BEDROCK HA23 WELLS, 2 CONSTITUTION DRIVE, 9 ROSS DRIVE, AND THE BEDROCK WELLS OF THE ADDITIONAL 31 WELLS SAMPLED IN NOVEMBER 2023 AS REQUESTED BY THE AGENCIES ON 1 NOVEMBER 2023 ARE OUTSIDE OF THE GMP BUT INCLUDED ON THIS FIGURE.

11. F1 INDICATES MATRIX SPIKE OR MATRIX SPIKE DUPLICATE IS OUTSIDE ACCEPTABLE LIMITS.

12. AT 15 ROSS, NO RESPONSE FROM OWNER WAS RECEIVED IN MAY 2023 AND ACCESS WAS DENIED IN NOVEMBER 2023.

13. PRIVATE WELL LOCATIONS WERE SURVEYED WITH A TRIMBLE GEO 7X AND COLLECTED BY HALEY & ALDRICH, INC. IN AUGUST 2020, NOVEMBER 2020, JULY 2021, AND NOVEMBER 2022. RESIDENTIAL WELLS (EXACT LOCATION TO BE DETERMINED) EITHER COULD NOT BE LOCATED (15 TOKANEL) OR THE HOMEOWNERS COULD NOT BE CONTACTED (15 ROSS) OR DENIED ACCESS TO SURVEY THEIR WELL (18 ROSS, 41 TOKANEL). THE WELL AT 31 TOKANEL REPRESENTS A POTENTIAL WELL LOCATION SINCE THE HOMEOWNER DID NOT KNOW THE LOCATION OF THE WELL AND A TYPICAL WELLHEAD WAS NOT OBSERVED.

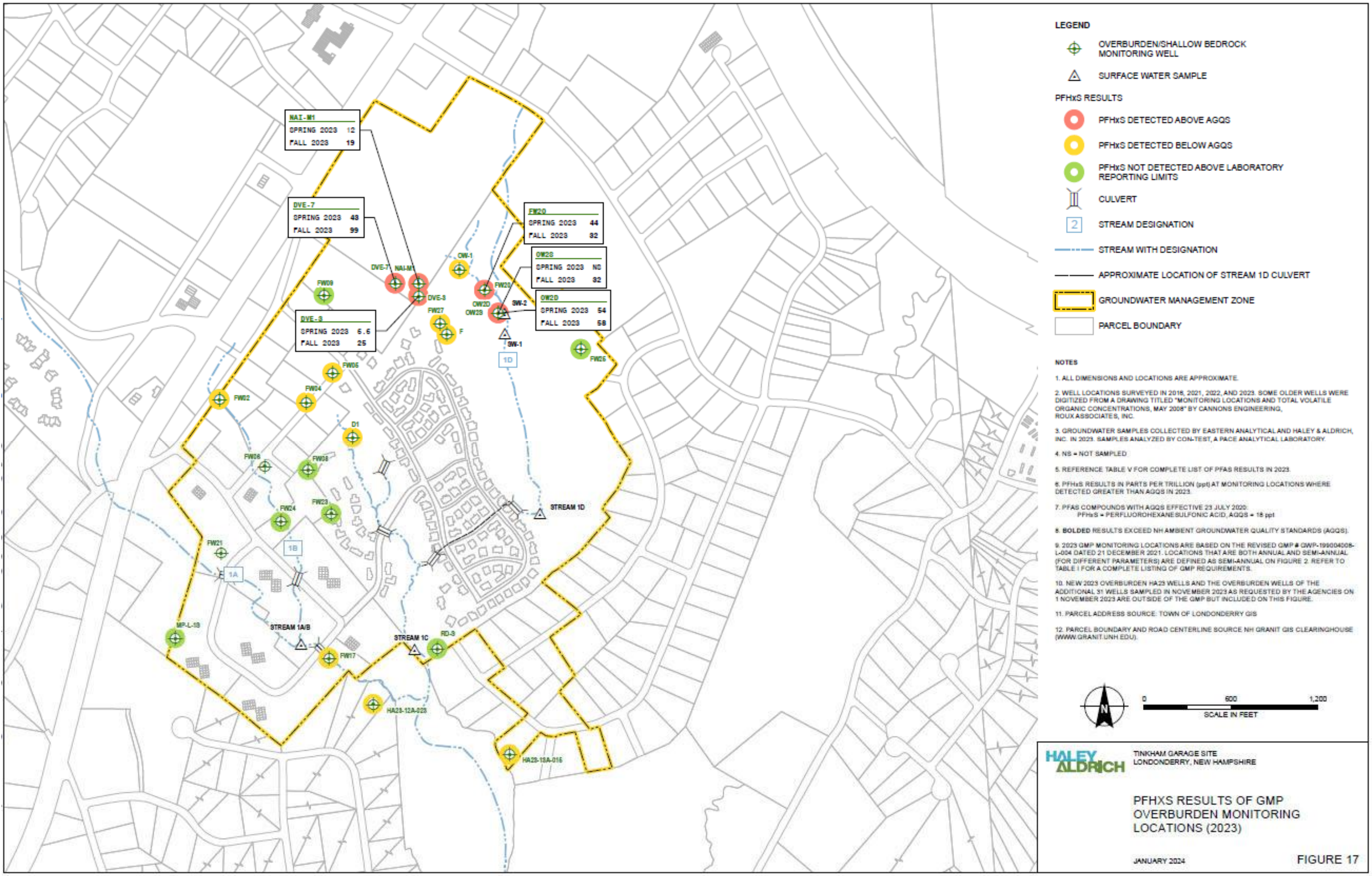
14. RESIDENTIAL WELLS NO LONGER IN USE ARE ONLY SHOWN IF THEIR EXISTENCE HAS BEEN CONFIRMED AND SURVEYED.

15. PARCEL ADDRESS SOURCE: TOWN OF LONDONDERRY GIS

16. PARCEL BOUNDARY AND ROAD CENTERLINE SOURCE NH GRANIT GIS CLEARINGHOUSE (WWW.GRANIT.UNH.EDU).

Source: Annual Water Quality Monitoring Report 2023, Tinkham Garage Site. Prepared by Haley & Aldrich, Inc.

Figure F-9: PFHxS Results of GMP Overburden Monitoring Locations, 2023



NOTES

1. ALL DIMENSIONS AND LOCATIONS ARE APPROXIMATE.

2. WELL LOCATIONS SURVEYED IN 2018, 2021, 2022, AND 2023. SOME OLDER WELLS WERE DIGITIZED FROM A DRAWING TITLED "MONITORING LOCATIONS AND TOTAL VOLATILE ORGANIC CONCENTRATIONS, MAY 2008" BY CANNONS ENGINEERING, ROUX ASSOCIATES, INC.

3. GROUNDWATER SAMPLES COLLECTED BY EASTERN ANALYTICAL AND HALEY & ALDRICH, INC. IN 2023. SAMPLES ANALYZED BY CON-TEST, A PACE ANALYTICAL LABORATORY.

4. NS = NOT SAMPLED.

5. REFERENCE TABLE V FOR COMPLETE LIST OF PFAS RESULTS IN 2023.

6. PFHxS RESULTS IN PARTS PER TRILLION (ppt) AT MONITORING LOCATIONS WHERE DETECTED GREATER THAN AGQS IN 2023.

7. PFAS COMPOUNDS WITH AGQS EFFECTIVE 23 JULY 2020:
PFHxS = PERFLUOROHEXANESULFONIC ACID, AGQS = 18 ppt

8. **BOLDED** RESULTS EXCEED NH AMBIENT GROUNDWATER QUALITY STANDARDS (AGQS).

9. 2023 GMP MONITORING LOCATIONS ARE BASED ON THE REVISED GMP # GWP-199004008-L-004 DATED 21 DECEMBER 2021. LOCATIONS THAT ARE BOTH ANNUAL AND SEMI-ANNUAL (FOR DIFFERENT PARAMETERS) ARE DEFINED AS SEMI-ANNUAL ON FIGURE 2. REFER TO TABLE I FOR A COMPLETE LISTING OF GMP REQUIREMENTS.

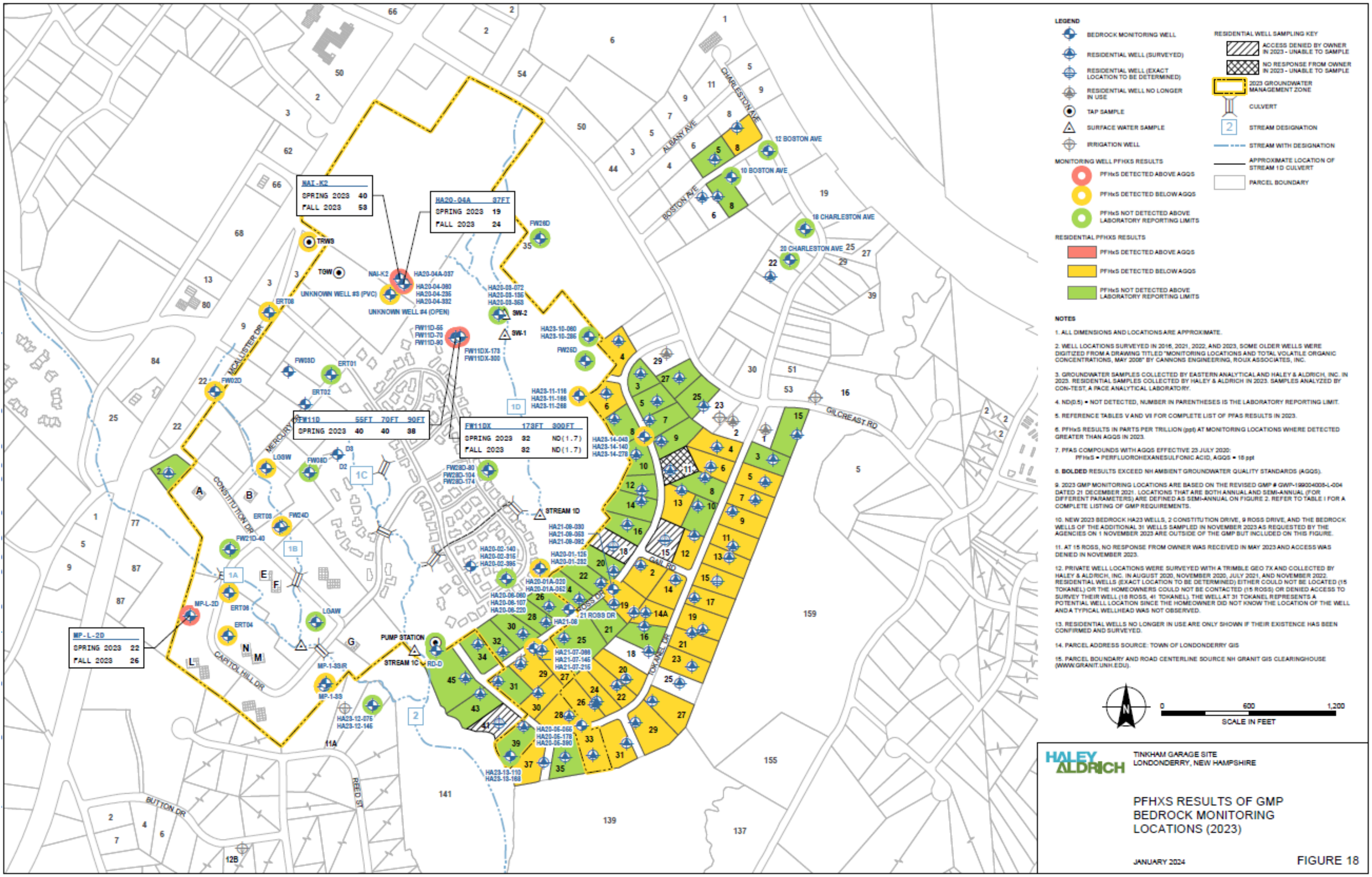
10. NEW 2023 OVERBURDEN HA23 WELLS AND THE OVERBURDEN WELLS OF THE ADDITIONAL 31 WELLS SAMPLED IN NOVEMBER 2023 AS REQUESTED BY THE AGENCIES ON 1 NOVEMBER 2023 ARE OUTSIDE OF THE GMP BUT INCLUDED ON THIS FIGURE.

11. PARCEL ADDRESS SOURCE: TOWN OF LONDONDERRY GIS

12. PARCEL BOUNDARY AND ROAD CENTERLINE SOURCE NH GRANIT GIS CLEARINGHOUSE (WWW.GRANIT.UNH.EDU).

Source: Annual Water Quality Monitoring Report 2023, Tinkham Garage Site. Prepared by Haley & Aldrich, Inc.

Figure F-10: PFHxS Results of GMP Bedrock Monitoring Locations, 2023



NOTES

1. ALL DIMENSIONS AND LOCATIONS ARE APPROXIMATE.

2. WELL LOCATIONS SURVEYED IN 2016, 2021, 2022, AND 2023, SOME OLDER WELLS WERE DIGITIZED FROM A DRAWING TITLED "MONITORING LOCATIONS AND TOTAL VOLATILE ORGANIC CONCENTRATIONS, MAY 2006" BY CANNONS ENGINEERING, ROUX ASSOCIATES, INC.

3. GROUNDWATER SAMPLES COLLECTED BY EASTERN ANALYTICAL AND HALEY & ALDRICH, INC. IN 2023. RESIDENTIAL SAMPLES COLLECTED BY HALEY & ALDRICH IN 2023. SAMPLES ANALYZED BY CON-TEST, A PACE ANALYTICAL LABORATORY.

4. ND(0.5) = NOT DETECTED, NUMBER IN PARENTHESES IS THE LABORATORY REPORTING LIMIT.

5. REFERENCE TABLES V AND VII FOR COMPLETE LIST OF PFAS RESULTS IN 2023.

6. PFHxS RESULTS IN PARTS PER TRILLION (ppt) AT MONITORING LOCATIONS WHERE DETECTED GREATER THAN AGQS IN 2023.

7. PFAS COMPOUNDS WITH AGQS EFFECTIVE 23 JULY 2020:
PFHxS = PERFLUOROHEXANESULFONIC ACID, AGQS = 18 ppt

8. **BOLDED** RESULTS EXCEED NH AMBIENT GROUNDWATER QUALITY STANDARDS (AGQS).

9. 2023 GMP MONITORING LOCATIONS ARE BASED ON THE REVISED GMP # GWP-199004008-L-004 DATED 21 DECEMBER 2021. LOCATIONS THAT ARE BOTH ANNUAL AND SEMI-ANNUAL (FOR DIFFERENT PARAMETERS) ARE DEFINED AS SEMI-ANNUAL ON FIGURE 2. REFER TO TABLE I FOR A COMPLETE LISTING OF GMP REQUIREMENTS.

10. NEW 2023 BEDROCK HA23 WELLS, 2 CONSTITUTION DRIVE, 9 ROSS DRIVE, AND THE BEDROCK WELLS OF THE ADDITIONAL 31 WELLS SAMPLED IN NOVEMBER 2023 AS REQUESTED BY THE AGENCIES ON 1 NOVEMBER 2023 ARE OUTSIDE OF THE GMP BUT INCLUDED ON THIS FIGURE.

11. AT 15 ROSS, NO RESPONSE FROM OWNER WAS RECEIVED IN MAY 2023 AND ACCESS WAS DENIED IN NOVEMBER 2023.

12. PRIVATE WELL LOCATIONS WERE SURVEYED WITH A TRIMBLE GEO 7X AND COLLECTED BY HALEY & ALDRICH, INC. IN AUGUST 2020, NOVEMBER 2020, JULY 2021, AND NOVEMBER 2022. RESIDENTIAL WELLS (EXACT LOCATION TO BE DETERMINED) EITHER COULD NOT BE LOCATED (15 TOKANEL) OR THE HOMEOWNERS COULD NOT BE CONTACTED (15 ROSS) OR DENIED ACCESS TO SURVEY THEIR WELL (18 ROSS, 41 TOKANEL). THE WELL AT 31 TOKANEL REPRESENTS A POTENTIAL WELL LOCATION SINCE THE HOMEOWNER DID NOT KNOW THE LOCATION OF THE WELL AND A TYPICAL WELLHEAD WAS NOT OBSERVED.

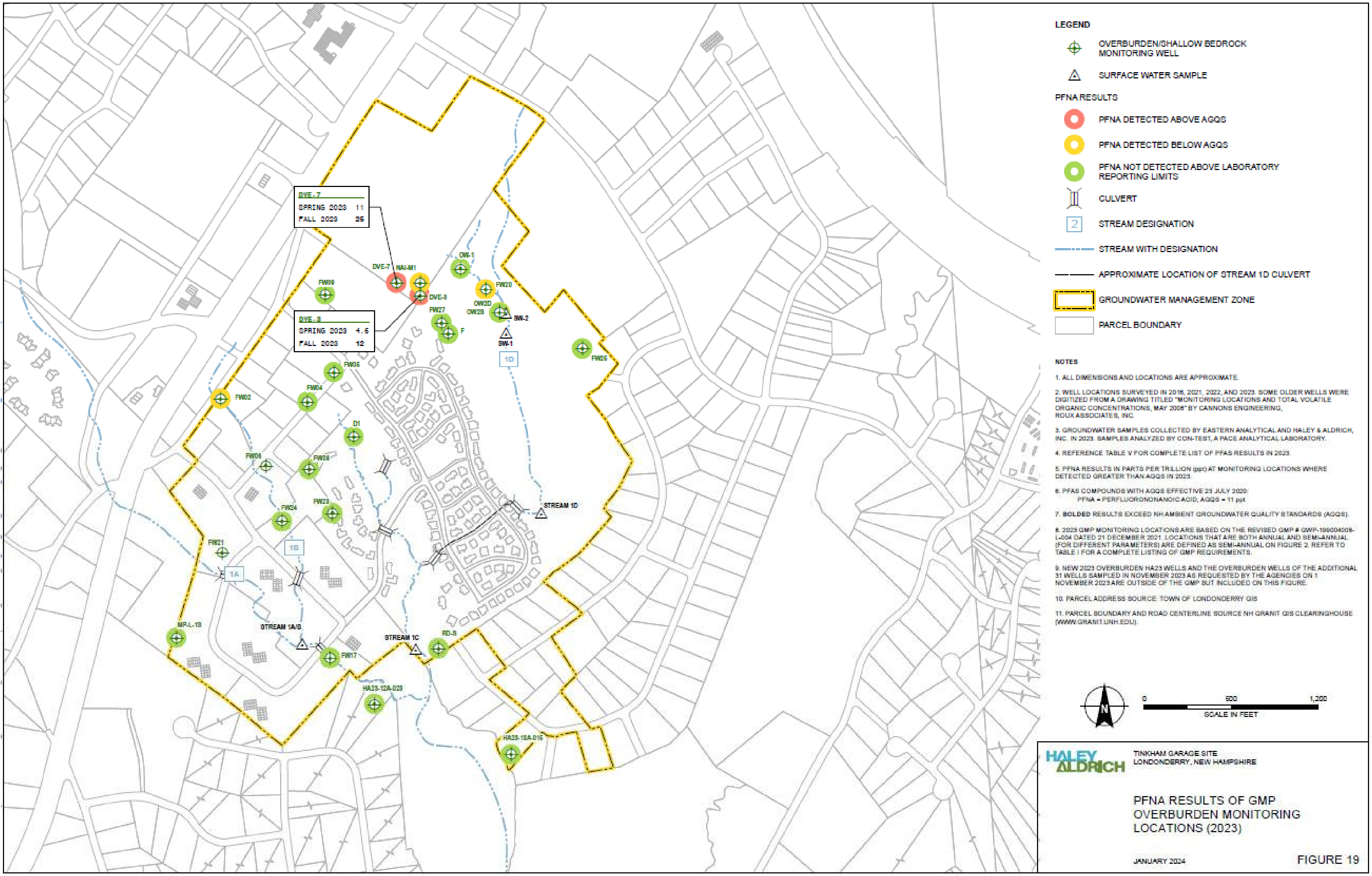
13. RESIDENTIAL WELLS NO LONGER IN USE ARE ONLY SHOWN IF THEIR EXISTENCE HAS BEEN CONFIRMED AND SURVEYED.

14. PARCEL ADDRESS SOURCE: TOWN OF LONDONDERRY GIS

15. PARCEL BOUNDARY AND ROAD CENTERLINE SOURCE NH GRANIT GIS CLEARINGHOUSE (WWW.GRANIT.UNH.EDU).

Source: Annual Water Quality Monitoring Report 2023, Tinkham Garage Site. Prepared by Haley & Aldrich, Inc.

Figure F-11: PFNA Results of GMP Overburden Monitoring Locations, 2023



NOTES

1. ALL DIMENSIONS AND LOCATIONS ARE APPROXIMATE.

2. WELL LOCATIONS SURVEYED IN 2018, 2021, 2022, AND 2023. SOME OLDER WELLS WERE DIGITIZED FROM A DRAWING TITLED "MONITORING LOCATIONS AND TOTAL VOLATILE ORGANIC CONCENTRATIONS, MAY 2008" BY CANNONS ENGINEERING, ROUX ASSOCIATES, INC.

3. GROUNDWATER SAMPLES COLLECTED BY EASTERN ANALYTICAL AND HALEY & ALDRICH, INC. IN 2023. SAMPLES ANALYZED BY CON-TEST, A PACE ANALYTICAL LABORATORY.

4. REFERENCE TABLE V FOR COMPLETE LIST OF PFAS RESULTS IN 2023.

5. PFNA RESULTS IN PARTS PER TRILLION (ppt) AT MONITORING LOCATIONS WHERE DETECTED GREATER THAN AGQS IN 2023.

6. PFAS COMPOUNDS WITH AGQS EFFECTIVE 23 JULY 2020:
PFNA = PERFLUORONONANOIC ACID, AGQS = 11 ppt

7. **BOLDED** RESULTS EXCEED NH AMBIENT GROUNDWATER QUALITY STANDARDS (AGQS).

8. 2023 GMP MONITORING LOCATIONS ARE BASED ON THE REVISED GMP # GWP-198904008-L-004 DATED 21 DECEMBER 2021. LOCATIONS THAT ARE BOTH ANNUAL AND SEMI-ANNUAL (FOR DIFFERENT PARAMETERS) ARE DEFINED AS SEMI-ANNUAL ON FIGURE 2. REFER TO TABLE I FOR A COMPLETE LISTING OF GMP REQUIREMENTS.

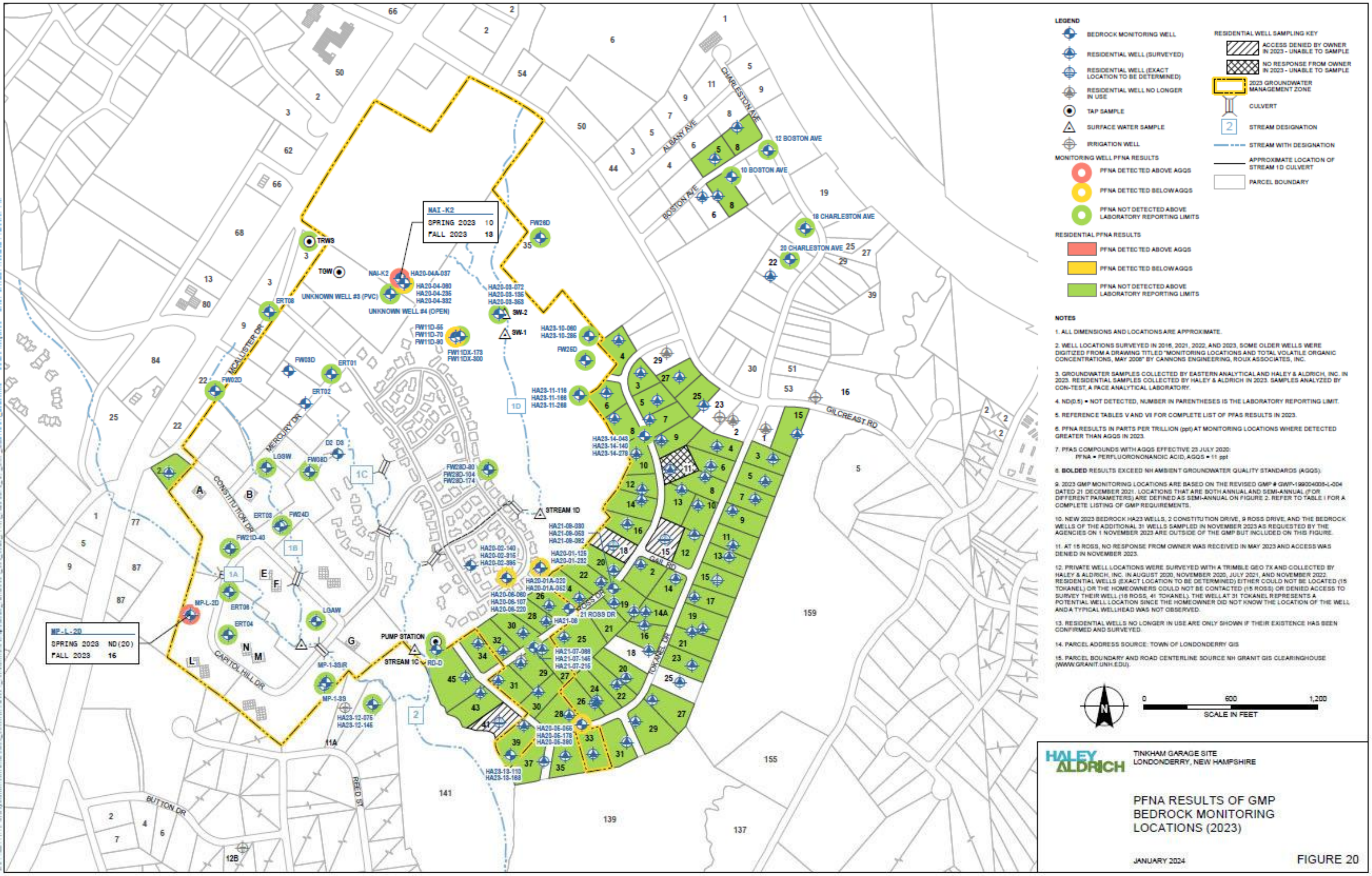
9. NEW 2023 OVERBURDEN HA23 WELLS AND THE OVERBURDEN WELLS OF THE ADDITIONAL 31 WELLS SAMPLED IN NOVEMBER 2023 AS REQUESTED BY THE AGENCIES ON 1 NOVEMBER 2023 ARE OUTSIDE OF THE GMP BUT INCLUDED ON THIS FIGURE.

10. PARCEL ADDRESS SOURCE: TOWN OF LONDONDERRY GIS

11. PARCEL BOUNDARY AND ROAD CENTERLINE SOURCE NH GRANIT GIS CLEARINGHOUSE (WWW.GRANIT.UNH.EDU).

Source: Annual Water Quality Monitoring Report 2023, Tinkham Garage Site. Prepared by Haley & Aldrich, Inc.

Figure F-12: PFNA Results of GMP Bedrock Monitoring Locations, 2023



NAI-K2

SPRING 2023 10

FALL 2023 **18**

MP-L-2D

SPRING 2023 ND(20)

FALL 2023 **16**

NOTES

1. ALL DIMENSIONS AND LOCATIONS ARE APPROXIMATE.
2. WELL LOCATIONS SURVEYED IN 2016, 2021, 2022, AND 2023, SOME OLDER WELLS WERE DIGITIZED FROM A DRAWING TITLED "MONITORING LOCATIONS AND TOTAL VOLATILE ORGANIC CONCENTRATIONS, MAY 2008" BY CANNONS ENGINEERING, ROUX ASSOCIATES, INC.
3. GROUNDWATER SAMPLES COLLECTED BY EASTERN ANALYTICAL AND HALEY & ALDRICH, INC. IN 2023. RESIDENTIAL SAMPLES COLLECTED BY HALEY & ALDRICH IN 2023. SAMPLES ANALYZED BY CON-TEST, A PACE ANALYTICAL LABORATORY.
4. ND(0.5) = NOT DETECTED, NUMBER IN PARENTHESES IS THE LABORATORY REPORTING LIMIT.
5. REFERENCE TABLES V AND VII FOR COMPLETE LIST OF PFAS RESULTS IN 2023.
6. PFNA RESULTS IN PARTS PER TRILLION (ppt) AT MONITORING LOCATIONS WHERE DETECTED GREATER THAN AGQS IN 2023.
7. PFAS COMPOUNDS WITH AGQS EFFECTIVE 23 JULY 2020:
   PFNA = PERFLUORONONANOIC ACID, AGQS = 11 ppt
8. **BOLDED** RESULTS EXCEED NH AMBIENT GROUNDWATER QUALITY STANDARDS (AGQS).
9. 2023 GMP MONITORING LOCATIONS ARE BASED ON THE REVISED GMP # GWP-198904008-L-004 DATED 21 DECEMBER 2021. LOCATIONS THAT ARE BOTH ANNUAL AND SEMI-ANNUAL (FOR DIFFERENT PARAMETERS) ARE DEFINED AS SEMI-ANNUAL ON FIGURE 2. REFER TO TABLE I FOR A COMPLETE LISTING OF GMP REQUIREMENTS.
10. NEW 2023 BEDROCK HA23 WELLS, 2 CONSTITUTION DRIVE, 9 ROSS DRIVE, AND THE BEDROCK WELLS OF THE ADDITIONAL 31 WELLS SAMPLED IN NOVEMBER 2023 AS REQUESTED BY THE AGENCIES ON 1 NOVEMBER 2023 ARE OUTSIDE OF THE GMP BUT INCLUDED ON THIS FIGURE.
11. AT 15 ROSS, NO RESPONSE FROM OWNER WAS RECEIVED IN MAY 2023 AND ACCESS WAS DENIED IN NOVEMBER 2023.
12. PRIVATE WELL LOCATIONS WERE SURVEYED WITH A TRIMBLE GEO 7X AND COLLECTED BY HALEY & ALDRICH, INC. IN AUGUST 2020, NOVEMBER 2020, JULY 2021, AND NOVEMBER 2022. RESIDENTIAL WELLS (EXACT LOCATION TO BE DETERMINED) EITHER COULD NOT BE LOCATED (15 TOKANEL) OR THE HOMEOWNERS COULD NOT BE CONTACTED (15 ROSS) OR DENIED ACCESS TO SURVEY THEIR WELL (18 ROSS, 41 TOKANEL). THE WELL AT 31 TOKANEL REPRESENTS A POTENTIAL WELL LOCATION SINCE THE HOMEOWNER DID NOT KNOW THE LOCATION OF THE WELL AND A TYPICAL WELLHEAD WAS NOT OBSERVED.
13. RESIDENTIAL WELLS NO LONGER IN USE ARE ONLY SHOWN IF THEIR EXISTENCE HAS BEEN CONFIRMED AND SURVEYED.
14. PARCEL ADDRESS SOURCE: TOWN OF LONDONDERRY GIS
15. PARCEL BOUNDARY AND ROAD CENTERLINE SOURCE NH GRANIT GIS CLEARINGHOUSE (WWW.GRANIT.UNH.EDU).

TINKHAM GARAGE SITE
LONDONDERRY, NEW HAMPSHIRE

PFNA RESULTS OF GMP
BEDROCK MONITORING
LOCATIONS (2023)

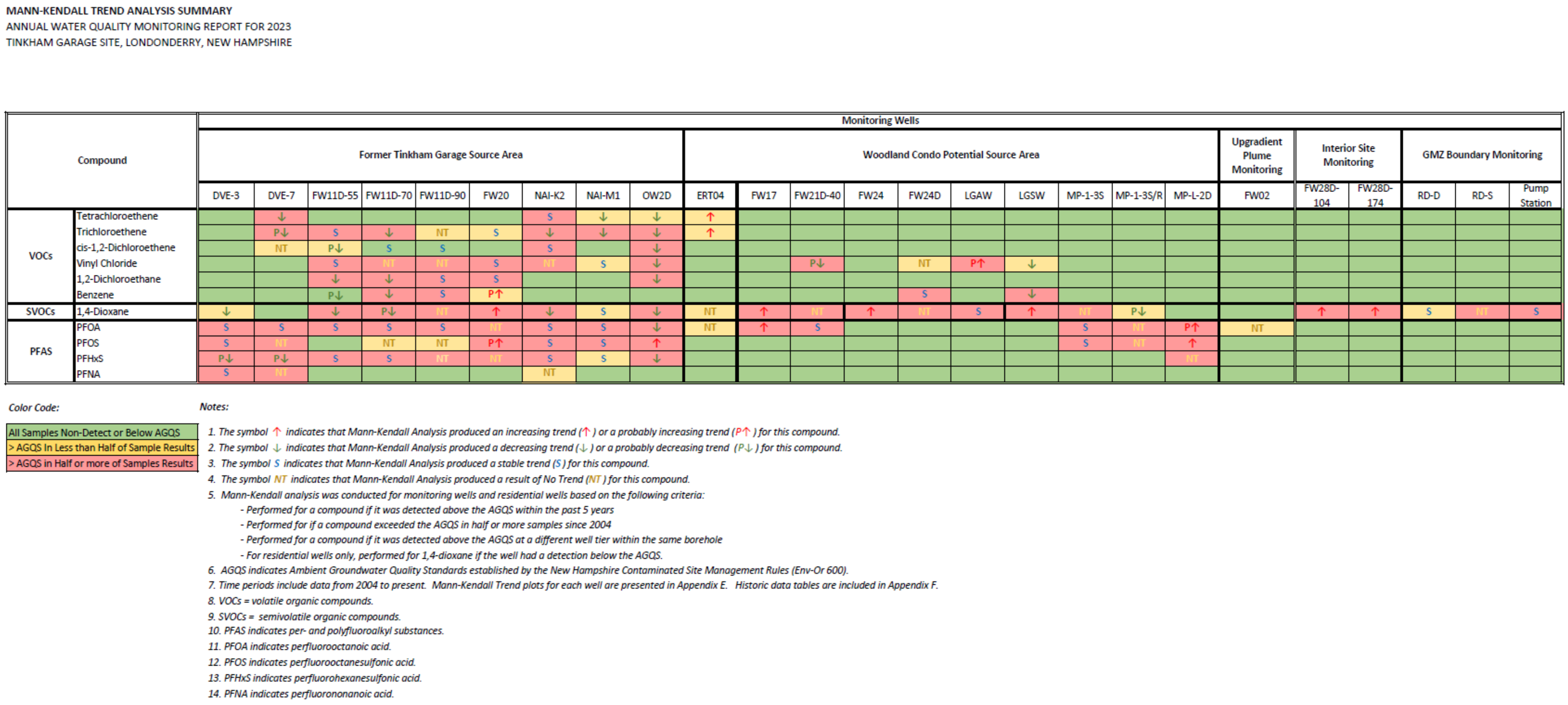
JANUARY 2024

FIGURE 20

Source: Annual Water Quality Monitoring Report 2023, Tinkham Garage Site. Prepared by Haley & Aldrich, Inc.

APPENDIX G – DATA REVIEW TABLES

Table G-1: Mann-Kendall Trend Analysis Summary



MANN-KENDALL TREND ANALYSIS SUMMARY
ANNUAL WATER QUALITY MONITORING REPORT FOR 2023
TINKHAM GARAGE SITE, LONDONDERRY, NEW HAMPSHIRE

Compound		Monitoring Wells																								
		Former Tinkham Garage Source Area									Woodland Condo Potential Source Area										Upgradient Plume Monitoring	Interior Site Monitoring		GMZ Boundary Monitoring		
		DVE-3	DVE-7	FW11D-55	FW11D-70	FW11D-90	FW20	NAI-K2	NAI-M1	OW2D	ERT04	FW17	FW21D-40	FW24	FW24D	LGAW	LGSW	MP-1-3S	MP-1-3S/R	MP-L-2D	FW02	FW28D-104	FW28D-174	RD-D	RD-S	Pump Station
VOCs	Tetrachloroethene	🟩	🟥 ↓	🟩	🟩	🟩	🟩	🟥 S	🟨 ↓	🟨 ↓	🟨 ↑	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩
	Trichloroethene	🟩	🟥 P↓	🟥 S	🟥 ↓	🟨 NT	🟨 S	🟥 ↓	🟥 ↓	🟥 ↓	🟨 ↑	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩
	cis-1,2-Dichloroethene	🟩	🟨 NT	🟨 P↓	🟩 S	🟩 S	🟩	🟥 S	🟩	🟥 ↓	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩
	Vinyl Chloride	🟩	🟩	🟥 S	🟥 NT	🟥 NT	🟥 S	🟥 NT	🟨 S	🟥 ↓	🟩	🟩	🟥 P↓	🟩	🟨 NT	🟥 P↑	🟨 ↓	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩
	1,2-Dichloroethane	🟩	🟩	🟥 ↓	🟥 ↓	🟥 S	🟥 S	🟩	🟩	🟥 ↓	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩
	Benzene	🟩	🟩	🟩 P↓	🟥 ↓	🟥 S	🟨 P↑	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟥 S	🟩	🟥 ↓	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩
SVOCs	1,4-Dioxane	🟨 ↓	🟩	🟥 ↓	🟥 P↓	🟥 NT	🟥 ↑	🟥 ↓	🟨 S	🟥 ↓	🟨 NT	🟥 ↑	🟥 NT	🟥 ↑	🟥 NT	🟥 S	🟥 ↑	🟥 NT	🟨 P↓	🟩	🟩	🟥 ↑	🟥 ↑	🟨 S	🟥 NT	🟥 S
PFAS	PFOA	🟥 S	🟥 S	🟥 S	🟥 S	🟥 S	🟥 NT	🟥 S	🟥 S	🟥 ↓	🟨 NT	🟥 ↑	🟥 S	🟩	🟩	🟩	🟩	🟥 S	🟥 NT	🟥 P↑	🟨 NT	🟩	🟩	🟩	🟩	🟩
	PFOS	🟥 S	🟥 NT	🟩	🟨 NT	🟨 NT	🟥 P↑	🟥 S	🟥 S	🟥 ↑	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟥 S	🟥 NT	🟥 ↑	🟩	🟩	🟩	🟩	🟩	🟩
	PFHxS	🟥 P↓	🟥 P↓	🟥 S	🟥 S	🟥 NT	🟥 NT	🟥 S	🟨 S	🟥 ↓	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟥 NT	🟩	🟩	🟩	🟩	🟩	🟩
	PFNA	🟥 S	🟥 NT	🟩	🟩	🟩	🟩	🟨 NT	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩

Color Code:

- 🟩 All Samples Non-Detect or Below AGQS
- 🟨 > AGQS In Less than Half of Sample Results
- 🟥 > AGQS in Half or more of Samples Results

Notes:

1. The symbol ↑ indicates that Mann-Kendall Analysis produced an increasing trend (↑) or a probably increasing trend (P↑) for this compound.

2. The symbol ↓ indicates that Mann-Kendall Analysis produced a decreasing trend (↓) or a probably decreasing trend (P↓) for this compound.

3. The symbol S indicates that Mann-Kendall Analysis produced a stable trend (S) for this compound.

4. The symbol NT indicates that Mann-Kendall Analysis produced a result of No Trend (NT) for this compound.

5. Mann-Kendall analysis was conducted for monitoring wells and residential wells based on the following criteria:
- *Performed for a compound if it was detected above the AGQS within the past 5 years*
- *Performed for if a compound exceeded the AGQS in half or more samples since 2004*
- *Performed for a compound if it was detected above the AGQS at a different well tier within the same borehole*
- *For residential wells only, performed for 1,4-dioxane if the well had a detection below the AGQS.*

6. AGQS indicates Ambient Groundwater Quality Standards established by the New Hampshire Contaminated Site Management Rules (Env-Or 600).

7. Time periods include data from 2004 to present. Mann-Kendall Trend plots for each well are presented in Appendix E. Historic data tables are included in Appendix F.

8. VOCs = volatile organic compounds.

9. SVOCs = semivolatile organic compounds.

10. PFAS indicates per- and polyfluoroalkyl substances.

11. PFOA indicates perfluorooctanoic acid.

12. PFOS indicates perfluorooctanesulfonic acid.

13. PFHxS indicates perfluorohexanesulfonic acid.

14. PFNA indicates perfluorononanoic acid.

MANN-KENDALL TREND ANALYSIS SUMMARY
ANNUAL WATER QUALITY MONITORING REPORT FOR 2023
TINKHAM GARAGE SITE, LONDONDERRY, NEW HAMPSHIRE

Compound		Residential Wells																				
		Boston and Charleston Neighborhoods		Tinkham Realty	Gilcreast Road		Ross Drive Northern Segment								Ross Drive Southern Segment							
		8 Boston	8 Charleston	TRWS	15 Gilcreast	25 Gilcreast	2 Gail	4 Ross	6 Ross	10 Ross	19 Ross	22 Ross	24 Ross	25 Ross	26 Ross	27 Ross	28 Ross	29 Ross	30 Ross	31 Ross	32 Ross	34 Ross
VOCs	Tetrachloroethene	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩
	Trichloroethene	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩
	cis-1,2-Dichloroethene	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩
	Vinyl Chloride	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩
	1,2-Dichloroethane	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩
	Benzene	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩
SVOCs	1,4-Dioxane	🟩	🟩	🟩	🟩	🟩	🟩	🟩 S	🟩	🟩 ↓	🟩	🟩	🟨 NT	🟩 P↓	🟥 S	🟨 ↓	🟥 P↓	🟥 NT	🟥 S	🟥 P↓	🟨 S	🟩 NT
PFAS	PFOA	🟨 S	🟥 P↓	🟥 P↑	🟨 NT	🟨 S	🟨 NT	🟥 ↑	🟥 ↑	🟩	🟨 NT	🟥 ↓	🟩	🟩	🟩	🟩	🟩	🟩	🟥 NT	🟩	🟩	🟩
	PFOS	🟩	🟥 S	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩
	PFHxS	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩
	PFNA	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩

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MANN-KENDALL TREND ANALYSIS SUMMARY
ANNUAL WATER QUALITY MONITORING REPORT FOR 2023
TINKHAM GARAGE SITE, LONDONDERRY, NEW HAMPSHIRE

Compound		Residential Wells																			
		Tokanel Drive Northern Segment										Tokanel Drive Southern Segment									
		3 Tokanel	4 Tokanel	6 Tokanel	7 Tokanel	9 Tokanel	13 Tokanel	14 Tokanel	17 Tokanel	19 Tokanel	23 Tokanel	24 Tokanel	26 Tokanel	28 Tokanel	29 Tokanel	30 Tokanel	31 Tokanel	33 Tokanel	39 Tokanel	43 Tokanel	45 Tokanel
VOCs	Tetrachloroethene	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩
	Trichloroethene	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩
	cis-1,2-Dichloroethene	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩
	Vinyl Chloride	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩
	1,2-Dichloroethane	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩
	Benzene	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩
SVOCs	1,4-Dioxane	🟩 P↓	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩 S	🟩 S	🟥 S	🟩	🟥 S	🟩	🟨 ↓	🟥 ↓	🟩 NT	🟩
PFAS	PFOA	🟩	🟨 NT	🟨 NT	🟨 NT	🟨 S	🟨 P↓	🟥 S	🟨 NT	🟨 ↑	🟨 NT	🟩	🟩	🟩	🟨 NT	🟩	🟨 NT	🟩	🟩	🟩	🟨 S
	PFOS	🟩	🟩	🟩	🟨 NT	🟨 NT	🟩	🟩	🟩	🟨 ↑	🟩	🟩	🟩	🟩	🟥 NT	🟩	🟨 S	🟩	🟩	🟩	🟨 NT
	PFHxS	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩
	PFNA	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩

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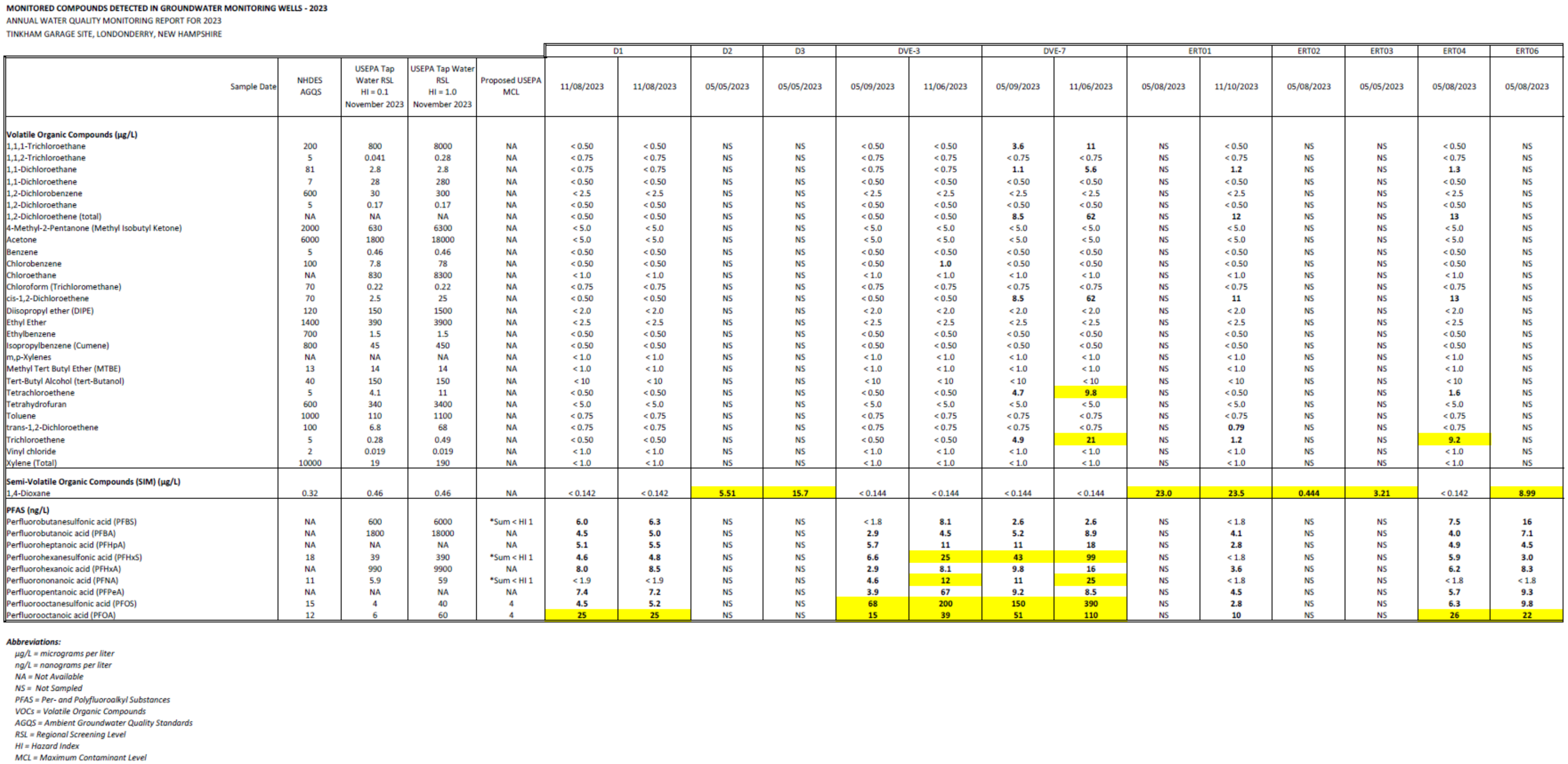
14. PFNA indicates perfluorononanoic acid.

Source: Annual Water Quality Monitoring Report 2023, Tinkham Garage Site. Prepared by Haley & Aldrich, Inc.

Table G-2: Monitored Compounds Detected in Groundwater Monitoring Wells, 2023



MONITORED COMPOUNDS DETECTED IN GROUNDWATER MONITORING WELLS - 2023
ANNUAL WATER QUALITY MONITORING REPORT FOR 2023
TINKHAM GARAGE SITE, LONDONDERRY, NEW HAMPSHIRE

					D1		D2	D3	DVE-3		DVE-7		ERT01		ERT02	ERT03	ERT04	ERT06
Sample Date	NHDES AGQS	USEPA Tap Water RSL HI = 0.1 November 2023	USEPA Tap Water RSL HI = 1.0 November 2023	Proposed USEPA MCL	11/08/2023	11/08/2023	05/05/2023	05/05/2023	05/09/2023	11/06/2023	05/09/2023	11/06/2023	05/08/2023	11/10/2023	05/08/2023	05/05/2023	05/08/2023	05/08/2023
Volatile Organic Compounds (µg/L)																		
1,1,1-Trichloroethane	200	800	8000	NA	< 0.50	< 0.50	NS	NS	< 0.50	< 0.50	3.6	11	NS	< 0.50	NS	NS	< 0.50	NS
1,1,2-Trichloroethane	5	0.041	0.28	NA	< 0.75	< 0.75	NS	NS	< 0.75	< 0.75	< 0.75	< 0.75	NS	< 0.75	NS	NS	< 0.75	NS
1,1-Dichloroethane	81	2.8	2.8	NA	< 0.75	< 0.75	NS	NS	< 0.75	< 0.75	1.1	5.6	NS	1.2	NS	NS	1.3	NS
1,1-Dichloroethene	7	28	280	NA	< 0.50	< 0.50	NS	NS	< 0.50	< 0.50	< 0.50	< 0.50	NS	< 0.50	NS	NS	< 0.50	NS
1,2-Dichlorobenzene	600	30	300	NA	< 2.5	< 2.5	NS	NS	< 2.5	< 2.5	< 2.5	< 2.5	NS	< 2.5	NS	NS	< 2.5	NS
1,2-Dichloroethane	5	0.17	0.17	NA	< 0.50	< 0.50	NS	NS	< 0.50	< 0.50	< 0.50	< 0.50	NS	< 0.50	NS	NS	< 0.50	NS
1,2-Dichloroethene (total)	NA	NA	NA	NA	< 0.50	< 0.50	NS	NS	< 0.50	< 0.50	8.5	62	NS	12	NS	NS	13	NS
4-Methyl-2-Pentanone (Methyl Isobutyl Ketone)	2000	630	6300	NA	< 5.0	< 5.0	NS	NS	< 5.0	< 5.0	< 5.0	< 5.0	NS	< 5.0	NS	NS	< 5.0	NS
Acetone	6000	1800	18000	NA	< 5.0	< 5.0	NS	NS	< 5.0	< 5.0	< 5.0	< 5.0	NS	< 5.0	NS	NS	< 5.0	NS
Benzene	5	0.46	0.46	NA	< 0.50	< 0.50	NS	NS	< 0.50	< 0.50	< 0.50	< 0.50	NS	< 0.50	NS	NS	< 0.50	NS
Chlorobenzene	100	7.8	78	NA	< 0.50	< 0.50	NS	NS	< 0.50	1.0	< 0.50	< 0.50	NS	< 0.50	NS	NS	< 0.50	NS
Chloroethane	NA	830	8300	NA	< 1.0	< 1.0	NS	NS	< 1.0	< 1.0	< 1.0	< 1.0	NS	< 1.0	NS	NS	< 1.0	NS
Chloroform (Trichloromethane)	70	0.22	0.22	NA	< 0.75	< 0.75	NS	NS	< 0.75	< 0.75	< 0.75	< 0.75	NS	< 0.75	NS	NS	< 0.75	NS
cis-1,2-Dichloroethene	70	2.5	25	NA	< 0.50	< 0.50	NS	NS	< 0.50	< 0.50	8.5	62	NS	11	NS	NS	13	NS
Diisopropyl ether (DIPE)	120	150	1500	NA	< 2.0	< 2.0	NS	NS	< 2.0	< 2.0	< 2.0	< 2.0	NS	< 2.0	NS	NS	< 2.0	NS
Ethyl Ether	1400	390	3900	NA	< 2.5	< 2.5	NS	NS	< 2.5	< 2.5	< 2.5	< 2.5	NS	< 2.5	NS	NS	< 2.5	NS
Ethylbenzene	700	1.5	1.5	NA	< 0.50	< 0.50	NS	NS	< 0.50	< 0.50	< 0.50	< 0.50	NS	< 0.50	NS	NS	< 0.50	NS
Isopropylbenzene (Cumene)	800	45	450	NA	< 0.50	< 0.50	NS	NS	< 0.50	< 0.50	< 0.50	< 0.50	NS	< 0.50	NS	NS	< 0.50	NS
m,p-Xylenes	NA	NA	NA	NA	< 1.0	< 1.0	NS	NS	< 1.0	< 1.0	< 1.0	< 1.0	NS	< 1.0	NS	NS	< 1.0	NS
Methyl Tert Butyl Ether (MTBE)	13	14	14	NA	< 1.0	< 1.0	NS	NS	< 1.0	< 1.0	< 1.0	< 1.0	NS	< 1.0	NS	NS	< 1.0	NS
Tert-Butyl Alcohol (tert-Butanol)	40	150	150	NA	< 10	< 10	NS	NS	< 10	< 10	< 10	< 10	NS	< 10	NS	NS	< 10	NS
Tetrachloroethene	5	4.1	11	NA	< 0.50	< 0.50	NS	NS	< 0.50	< 0.50	4.7	9.8	NS	< 0.50	NS	NS	1.6	NS
Tetrahydrofuran	600	340	3400	NA	< 5.0	< 5.0	NS	NS	< 5.0	< 5.0	< 5.0	< 5.0	NS	< 5.0	NS	NS	< 5.0	NS
Toluene	1000	110	1100	NA	< 0.75	< 0.75	NS	NS	< 0.75	< 0.75	< 0.75	< 0.75	NS	< 0.75	NS	NS	< 0.75	NS
trans-1,2-Dichloroethene	100	6.8	68	NA	< 0.75	< 0.75	NS	NS	< 0.75	< 0.75	< 0.75	< 0.75	NS	0.79	NS	NS	< 0.75	NS
Trichloroethene	5	0.28	0.49	NA	< 0.50	< 0.50	NS	NS	< 0.50	< 0.50	4.9	21	NS	1.2	NS	NS	9.2	NS
Vinyl chloride	2	0.019	0.019	NA	< 1.0	< 1.0	NS	NS	< 1.0	< 1.0	< 1.0	< 1.0	NS	< 1.0	NS	NS	< 1.0	NS
Xylene (Total)	10000	19	190	NA	< 1.0	< 1.0	NS	NS	< 1.0	< 1.0	< 1.0	< 1.0	NS	< 1.0	NS	NS	< 1.0	NS
Semi-Volatile Organic Compounds (SIM) (µg/L)																		
1,4-Dioxane	0.32	0.46	0.46	NA	< 0.142	< 0.142	5.51	15.7	< 0.144	< 0.144	< 0.144	< 0.144	23.0	23.5	0.444	3.21	< 0.142	8.99
PFAS (ng/L)																		
Perfluorobutanesulfonic acid (PFBS)	NA	600	6000	*Sum < HI 1	6.0	6.3	NS	NS	< 1.8	8.1	2.6	2.6	NS	< 1.8	NS	NS	7.5	16
Perfluorobutanoic acid (PFBA)	NA	1800	18000	NA	4.5	5.0	NS	NS	2.9	4.5	5.2	8.9	NS	4.1	NS	NS	4.0	7.1
Perfluoroheptanoic acid (PFHpA)	NA	NA	NA	NA	5.1	5.5	NS	NS	5.7	11	11	18	NS	2.8	NS	NS	4.9	4.5
Perfluorohexanesulfonic acid (PFHxS)	18	39	390	*Sum < HI 1	4.6	4.8	NS	NS	6.6	25	43	99	NS	< 1.8	NS	NS	5.9	3.0
Perfluorohexanoic acid (PFHxA)	NA	990	9900	NA	8.0	8.5	NS	NS	2.9	8.1	9.8	16	NS	3.6	NS	NS	6.2	8.3
Perfluorononanoic acid (PFNA)	11	5.9	59	*Sum < HI 1	< 1.9	< 1.9	NS	NS	4.6	12	11	25	NS	< 1.8	NS	NS	< 1.8	< 1.8
Perfluoropentanoic acid (PFPeA)	NA	NA	NA	NA	7.4	7.2	NS	NS	3.9	67	9.2	8.5	NS	4.5	NS	NS	5.7	9.3
Perfluorooctanesulfonic acid (PFOS)	15	4	40	4	4.5	5.2	NS	NS	68	200	150	390	NS	2.8	NS	NS	6.3	9.8
Perfluorooctanoic acid (PFOA)	12	6	60	4	25	25	NS	NS	15	39	51	110	NS	10	NS	NS	26	22

Abbreviations:
µg/L = micrograms per liter
ng/L = nanograms per liter
NA = Not Available
NS = Not Sampled
PFAS = Per- and Polyfluoroalkyl Substances
VOCs = Volatile Organic Compounds
AGQS = Ambient Groundwater Quality Standards
RSL = Regional Screening Level
HI = Hazard Index
MCL = Maximum Contaminant Level

Source: Annual Water Quality Monitoring Report 2023, Tinkham Garage Site. Prepared by Haley & Aldrich, Inc.

MONITORED COMPOUNDS DETECTED IN GROUNDWATER MONITORING WELLS - 2023

ANNUAL WATER QUALITY MONITORING REPORT FOR 2023

TINKHAM GARAGE SITE, LONDONDERRY, NEW HAMPSHIRE

					ERT08		F		FW02		FW02D		FW03D	FW04		FW05		FW06
Sample Date	NHDES AGQS	USEPA Tap Water RSL HI = 0.1 November 2023	USEPA Tap Water RSL HI = 1.0 November 2023	Proposed USEPA MCL	05/01/2023	11/01/2023	05/08/2023	11/10/2023	05/04/2023	11/01/2023	05/04/2023	11/01/2023	05/08/2023	11/10/2023	11/10/2023	05/08/2023	11/10/2023	05/08/2023
Volatile Organic Compounds (µg/L)																		
1,1,1-Trichloroethane	200	800	8000	NA	< 0.50	< 0.50	NS	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	NS	< 0.50	< 0.50	NS	< 0.50	NS
1,1,2-Trichloroethane	5	0.041	0.28	NA	< 0.75	< 0.75	NS	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	NS	< 0.75	< 0.75	NS	< 0.75	NS
1,1-Dichloroethane	81	2.8	2.8	NA	< 0.75	< 0.75	NS	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	NS	< 0.75	< 0.75	NS	< 0.75	NS
1,1-Dichloroethene	7	28	280	NA	< 0.50	< 0.50	NS	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	NS	< 0.50	< 0.50	NS	< 0.50	NS
1,2-Dichlorobenzene	600	30	300	NA	< 2.5	< 2.5	NS	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	NS	< 2.5	< 2.5	NS	< 2.5	NS
1,2-Dichloroethane	5	0.17	0.17	NA	< 0.50	< 0.50	NS	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	NS	< 0.50	< 0.50	NS	< 0.50	NS
1,2-Dichloroethene (total)	NA	NA	NA	NA	< 0.50	< 0.50	NS	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	NS	< 0.50	< 0.50	NS	**4.5**	NS
4-Methyl-2-Pentanone (Methyl Isobutyl Ketone)	2000	630	6300	NA	< 5.0	< 5.0	NS	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	NS	< 5.0	< 5.0	NS	< 5.0	NS
Acetone	6000	1800	18000	NA	< 5.0	< 5.0	NS	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	NS	< 5.0	< 5.0	NS	< 5.0	NS
Benzene	5	0.46	0.46	NA	< 0.50	< 0.50	NS	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	NS	< 0.50	< 0.50	NS	< 0.50	NS
Chlorobenzene	100	7.8	78	NA	< 0.50	< 0.50	NS	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	NS	< 0.50	< 0.50	NS	< 0.50	NS
Chloroethane	NA	830	8300	NA	< 1.0	< 1.0	NS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	NS	< 1.0	< 1.0	NS	< 1.0	NS
Chloroform (Trichloromethane)	70	0.22	0.22	NA	< 0.75	< 0.75	NS	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	NS	< 0.75	< 0.75	NS	< 0.75	NS
cis-1,2-Dichloroethene	70	2.5	25	NA	< 0.50	< 0.50	NS	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	NS	< 0.50	< 0.50	NS	**4.5**	NS
Diisopropyl ether (DIPE)	120	150	1500	NA	< 2.0	< 2.0	NS	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	NS	< 2.0	< 2.0	NS	< 2.0	NS
Ethyl Ether	1400	390	3900	NA	< 2.5	< 2.5	NS	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	NS	< 2.5	< 2.5	NS	< 2.5	NS
Ethylbenzene	700	1.5	1.5	NA	< 0.50	< 0.50	NS	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	NS	< 0.50	< 0.50	NS	< 0.50	NS
Isopropylbenzene (Cumene)	800	45	450	NA	< 0.50	< 0.50	NS	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	NS	< 0.50	< 0.50	NS	< 0.50	NS
m,p-Xylenes	NA	NA	NA	NA	< 1.0	< 1.0	NS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	NS	< 1.0	< 1.0	NS	< 1.0	NS
Methyl Tert Butyl Ether (MTBE)	13	14	14	NA	**11**	**9.4**	NS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	NS	< 1.0	< 1.0	NS	< 1.0	NS
Tert-Butyl Alcohol (tert-Butanol)	40	150	150	NA	< 10	< 10	NS	< 10	< 10	< 10	< 10	< 10	NS	< 10	< 10	NS	< 10	NS
Tetrachloroethene	5	4.1	11	NA	< 0.50	< 0.50	NS	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	NS	< 0.50	< 0.50	NS	< 0.50	NS
Tetrahydrofuran	600	340	3400	NA	< 5.0	< 5.0	NS	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	NS	< 5.0	< 5.0	NS	< 5.0	NS
Toluene	1000	110	1100	NA	< 0.75	< 0.75	NS	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	NS	< 0.75	< 0.75	NS	< 0.75	NS
trans-1,2-Dichloroethene	100	6.8	68	NA	< 0.75	< 0.75	NS	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	NS	< 0.75	< 0.75	NS	< 0.75	NS
Trichloroethene	5	0.28	0.49	NA	< 0.50	< 0.50	NS	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	NS	< 0.50	< 0.50	NS	**0.57**	NS
Vinyl chloride	2	0.019	0.019	NA	< 1.0	< 1.0	NS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	NS	< 1.0	< 1.0	NS	< 1.0	NS
Xylene (Total)	10000	19	190	NA	< 1.0	< 1.0	NS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	NS	< 1.0	< 1.0	NS	< 1.0	NS
Semi-Volatile Organic Compounds (SIM) (µg/L)																		
1,4-Dioxane	0.32	0.46	0.46	NA	< 0.147	< 0.147	**1.30**	**0.236**	< 0.142	< 0.142	< 0.142	< 0.136	**1.11**	**0.175**	**0.171**	**13.8**	**14.0**	**13.9**
PFAS (ng/L)																		
Perfluorobutanesulfonic acid (PFBS)	NA	600	6000	*Sum < HI 1	**8.3**	**8.4**	NS	**4.7**	**7.4**	**15**	**7.0**	**10**	NS	**5.3**	**5.1**	NS	< 1.8	NS
Perfluorobutanoic acid (PFBA)	NA	1800	18000	NA	**6.4**	**6.7**	NS	**11**	**5.5**	**15**	**5.7**	**8.2**	NS	**2.1**	**2.1**	NS	**4.2**	NS
Perfluoroheptanoic acid (PFHpA)	NA	NA	NA	NA	< 1.7	< 1.8	NS	**9.9**	< 1.8	**5.7**	< 1.8	< 1.8	NS	< 1.9	< 1.9	NS	**3.2**	NS
Perfluorohexanesulfonic acid (PFHxS)	18	39	390	*Sum < HI 1	< 1.7	**1.9**	NS	**15**	< 1.8	**2.2**	**1.9**	**2.5**	NS	**3.2**	**3.3**	NS	**2.0**	NS
Perfluorohexanoic acid (PFHxA)	NA	990	9900	NA	< 1.7	< 1.8	NS	**7.5**	< 1.8	**6.9**	< 1.8	< 1.8	NS	**3.2**	**3.2**	NS	**3.4**	NS
Perfluorononanoic acid (PFNA)	11	5.9	59	*Sum < HI 1	< 1.7	< 1.8	NS	< 1.9	< 1.8	**2.0**	< 1.8	< 1.8	NS	< 1.9	< 1.9	NS	< 1.8	NS
Perfluoropentanoic acid (PFPeA)	NA	NA	NA	NA	**2.0**	**3.4**	NS	**8.2**	< 1.8	**9.3**	< 1.8	**3.7**	NS	**3.0**	**2.8**	NS	**4.4**	NS
Perfluorooctanesulfonic acid (PFOS)	15	4	40	4	**5.0**	**5.2**	NS	**16**	**3.5**	**8.3**	**4.0**	**5.4**	NS	**4.1**	**4.2**	NS	< 1.8	NS
Perfluorooctanoic acid (PFOA)	12	6	60	4	**6.7**	**5.9**	NS	**29**	**6.7**	**21**	**4.4**	**6.3**	NS	**8.3**	**8.3**	NS	**12**	NS

Abbreviations:

µg/L = micrograms per liter
ng/L = nanograms per liter
NA = Not Available
NS = Not Sampled
PFAS = Per- and Polyfluoroalkyl Substances
VOCs = Volatile Organic Compounds
AGQS = Ambient Groundwater Quality Standards
RSL = Regional Screening Level
HI = Hazard Index
MCL = Maximum Contaminant Level

MONITORED COMPOUNDS DETECTED IN GROUNDWATER MONITORING WELLS - 2023

ANNUAL WATER QUALITY MONITORING REPORT FOR 2023

TINKHAM GARAGE SITE, LONDONDERRY, NEW HAMPSHIRE

					FW08	FW08D		FW09	FW11D-55	FW11D-70	FW11D-90	FW11DX-173			FW11DX-300		FW17	
Sample Date	NHDES AGQS	USEPA Tap Water RSL HI = 0.1 November 2023	USEPA Tap Water RSL HI = 1.0 November 2023	Proposed USEPA MCL	11/09/2023	05/05/2023	11/09/2023	11/10/2023	05/09/2023	05/09/2023	05/09/2023	05/02/2023	05/02/2023	11/07/2023	05/02/2023	11/07/2023	05/02/2023	11/02/2023
Volatile Organic Compounds (µg/L)																		
1,1,1-Trichloroethane	200	800	8000	NA	< 0.50	NS	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1,2-Trichloroethane	5	0.041	0.28	NA	< 0.75	NS	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75
1,1-Dichloroethane	81	2.8	2.8	NA	< 0.75	NS	< 0.75	< 0.75	**7.1**	**38**	**44**	**27**	**30**	**24**	< 0.75	< 0.75	< 0.75	< 0.75
1,1-Dichloroethene	7	28	280	NA	< 0.50	NS	< 0.50	< 0.50	**0.52**	**0.57**	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dichlorobenzene	600	30	300	NA	< 2.5	NS	< 2.5	< 2.5	**5.0**	**19**	**17**	**8.3**	**9.4**	**7.6**	< 2.5	< 2.5	< 2.5	< 2.5
1,2-Dichloroethane	5	0.17	0.17	NA	< 0.50	NS	< 0.50	< 0.50	**3.2**	**19**	**24**	**15**	**16**	**14**	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dichloroethene (total)	NA	NA	NA	NA	< 0.50	NS	< 0.50	< 0.50	**23**	**45**	**24**	**2.5**	**2.7**	**2.1**	< 0.50	< 0.50	**2.6**	**1.8**
4-Methyl-2-Pentanone (Methyl Isobutyl Ketone)	2000	630	6300	NA	< 5.0	NS	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Acetone	6000	1800	18000	NA	< 5.0	NS	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Benzene	5	0.46	0.46	NA	< 0.50	NS	**0.74**	< 0.50	< 0.50	**5.8**	**7.3**	**13**	**14**	**14**	< 0.50	< 0.50	< 0.50	< 0.50
Chlorobenzene	100	7.8	78	NA	< 0.50	NS	< 0.50	< 0.50	< 0.50	**2.0**	**2.2**	**1.3**	**1.5**	**1.5**	< 0.50	< 0.50	< 0.50	< 0.50
Chloroethane	NA	830	8300	NA	< 1.0	NS	< 1.0	< 1.0	< 1.0	< 1.0	**1.2**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloroform (Trichloromethane)	70	0.22	0.22	NA	**0.83**	NS	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75
cis-1,2-Dichloroethene	70	2.5	25	NA	< 0.50	NS	< 0.50	< 0.50	**22**	**41**	**22**	**1.2**	**1.3**	**0.94**	< 0.50	< 0.50	**2.6**	**1.8**
Diisopropyl ether (DIPE)	120	150	1500	NA	< 2.0	NS	< 2.0	< 2.0	< 2.0	**6.8**	**9.2**	**5.7**	**6.4**	**7.0**	< 2.0	< 2.0	< 2.0	< 2.0
Ethyl Ether	1400	390	3900	NA	< 2.5	NS	< 2.5	< 2.5	< 2.5	**5.9**	**7.7**	**7.0**	**7.4**	**8.2**	< 2.5	< 2.5	< 2.5	< 2.5
Ethylbenzene	700	1.5	1.5	NA	< 0.50	NS	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Isopropylbenzene (Cumene)	800	45	450	NA	< 0.50	NS	< 0.50	< 0.50	< 0.50	**0.52**	**0.74**	**0.53**	**0.62**	**0.76**	< 0.50	< 0.50	< 0.50	< 0.50
m,p-Xylenes	NA	NA	NA	NA	< 1.0	NS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Methyl Tert Butyl Ether (MTBE)	13	14	14	NA	< 1.0	NS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tert-Butyl Alcohol (tert-Butanol)	40	150	150	NA	< 10	NS	< 10	< 10	< 10	< 10	**11**	< 10	< 10	**11**	< 10	< 10	< 10	< 10
Tetrachloroethene	5	4.1	11	NA	< 0.50	NS	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Tetrahydrofuran	600	340	3400	NA	< 5.0	NS	< 5.0	< 5.0	< 5.0	**7.4**	**14**	**7.7**	**7.5**	**9.5**	< 5.0	< 5.0	< 5.0	< 5.0
Toluene	1000	110	1100	NA	< 0.75	NS	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75
trans-1,2-Dichloroethene	100	6.8	68	NA	< 0.75	NS	< 0.75	< 0.75	**0.86**	**3.5**	**1.9**	**1.3**	**1.4**	**1.2**	< 0.75	< 0.75	< 0.75	< 0.75
Trichloroethene	5	0.28	0.49	NA	< 0.50	NS	< 0.50	< 0.50	**11**	**4.3**	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Vinyl chloride	2	0.019	0.019	NA	< 1.0	NS	< 1.0	< 1.0	**5.7**	**7.7**	**38**	**8.7**	**10**	**6.2**	< 1.0	< 1.0	< 1.0	< 1.0
Xylene (Total)	10000	19	190	NA	< 1.0	NS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Semi-Volatile Organic Compounds (SIM) (µg/L)																		
1,4-Dioxane	0.32	0.46	0.46	NA	< 0.142	**17.8**	**18.3**	< 0.150	**136**	**975**	**1140**	**899**	**874**	**909**	< 0.147	< 0.139	**0.757**	**0.639**
PFAS (ng/L)																		
Perfluorobutanesulfonic acid (PFBS)	NA	600	6000	*Sum < HI 1	**2.8**	NS	< 2.1	< 2.1	**5.7**	**2.0**	**3.4**	**3.2**	**3.9**	**4.4**	< 1.7	< 1.7	**5.5**	**4.2**
Perfluorobutanoic acid (PFBA)	NA	1800	18000	NA	**2.4**	NS	**2.7**	< 2.1	**27**	**18**	**22**	**34**	**35**	< 1.7	**2.5**	< 1.7	**6.1**	**4.5**
Perfluoroheptanoic acid (PFHpA)	NA	NA	NA	NA	< 1.8	NS	< 2.1	< 2.1	**9.9**	**10**	**9.4**	**7.3**	**7.2**	**7.5**	< 1.7	< 1.7	**6.1**	**4.8**
Perfluorohexanesulfonic acid (PFHxS)	18	39	390	*Sum < HI 1	< 1.8	NS	< 2.1	< 2.1	**40**	**40**	**38**	**32**	**27**	**32**	< 1.7	< 1.7	**4.7**	**4.1**
Perfluorohexanoic acid (PFHxA)	NA	990	9900	NA	< 1.8	NS	**3.2**	< 2.1	**12**	**10**	**8.6 F1**	**8.1**	**8.1**	**9.0**	< 1.7	< 1.7	**6.8**	**5.5**
Perfluorononanoic acid (PFNA)	11	5.9	59	*Sum < HI 1	< 1.8	NS	< 2.1	< 2.1	**1.9**	**2.1**	**2.2**	< 1.8	< 1.9	< 1.7	< 1.7	< 1.7	< 1.8	< 1.9
Perfluoropentanoic acid (PFPeA)	NA	NA	NA	NA	< 1.8	NS	**2.9**	< 2.1	**110**	**120**	**100 F1**	**86**	**87**	**98**	< 1.7	< 1.7	**6.2**	**6.3**
Perfluorooctanesulfonic acid (PFOS)	15	4	40	4	< 1.8	NS	< 2.1	< 2.1	**14**	**18**	**20 F1**	**11**	**11**	**12**	< 1.7	< 1.7	**6.6**	**7.7**
Perfluorooctanoic acid (PFOA)	12	6	60	4	**5.8**	NS	**4.3**	**7.7**	**63**	**58**	**59**	**52**	**47**	**47**	< 1.7	< 1.7	**17**	**14**

Abbreviations:

µg/L = micrograms per liter
ng/L = nanograms per liter
NA = Not Available
NS = Not Sampled
PFAS = Per- and Polyfluoroalkyl Substances
VOCs = Volatile Organic Compounds
AGQS = Ambient Groundwater Quality Standards
RSL = Regional Screening Level
HI = Hazard Index
MCL = Maximum Contaminant Level

MONITORED COMPOUNDS DETECTED IN GROUNDWATER MONITORING WELLS - 2023

ANNUAL WATER QUALITY MONITORING REPORT FOR 2023

TINKHAM GARAGE SITE, LONDONDERRY, NEW HAMPSHIRE

					FW20		FW21	FW21D-40	FW21D-60	FW21D-78	FW23	FW24		FW24D		FW25		FW25D		FW26D	
Sample Date	NHDES AGQS	USEPA Tap Water RSL HI = 0.1 November 2023	USEPA Tap Water RSL HI = 1.0 November 2023	Proposed USEPA MCL	05/08/2023	11/08/2023	05/04/2023	05/04/2023	05/04/2023	05/04/2023	11/09/2023	05/05/2023	11/10/2023	05/05/2023	11/02/2023	05/03/2023	11/01/2023	05/03/2023	11/01/2023	05/01/2023	11/02/2023
Volatile Organic Compounds (µg/L)																					
1,1,1-Trichloroethane	200	800	8000	NA	< 0.50	< 0.50	NS	< 0.50	NS	NS	< 0.50	NS	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1,2-Trichloroethane	5	0.041	0.28	NA	< 0.75	< 0.75	NS	< 0.75	NS	NS	< 0.75	NS	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75
1,1-Dichloroethane	81	2.8	2.8	NA	**30**	**16**	NS	**15**	NS	NS	< 0.75	NS	**0.82**	**4.2**	**3.1**	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75
1,1-Dichloroethene	7	28	280	NA	**0.69**	< 0.50	NS	< 0.50	NS	NS	< 0.50	NS	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dichlorobenzene	600	30	300	NA	**12**	**9.4**	NS	**8.9**	NS	NS	< 2.5	NS	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5
1,2-Dichloroethane	5	0.17	0.17	NA	**21**	**12**	NS	< 0.50	NS	NS	< 0.50	NS	< 0.50	**1.4**	**0.95**	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dichloroethene (total)	NA	NA	NA	NA	**61**	**32**	NS	**20**	NS	NS	< 0.50	NS	< 0.50	**1.8**	**1.6**	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
4-Methyl-2-Pentanone (Methyl Isobutyl Ketone)	2000	630	6300	NA	< 5.0	< 5.0	NS	< 5.0	NS	NS	< 5.0	NS	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Acetone	6000	1800	18000	NA	< 5.0	< 5.0	NS	< 5.0	NS	NS	< 5.0	NS	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Benzene	5	0.46	0.46	NA	**4.3**	**3.4**	NS	**2.8**	NS	NS	< 0.50	NS	**1.8**	**12**	**9.4**	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Chlorobenzene	100	7.8	78	NA	**2.4**	**1.6**	NS	< 0.50	NS	NS	< 0.50	NS	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Chloroethane	NA	830	8300	NA	**4.4**	**1.3**	NS	< 1.0	NS	NS	< 1.0	NS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloroform (Trichloromethane)	70	0.22	0.22	NA	< 0.75	< 0.75	NS	< 0.75	NS	NS	< 0.75	NS	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75
cis-1,2-Dichloroethene	70	2.5	25	NA	**61**	**32**	NS	**20**	NS	NS	< 0.50	NS	< 0.50	**1.8**	**1.6**	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Diisopropyl ether (DIPE)	120	150	1500	NA	**8.3**	**4.4**	NS	< 2.0	NS	NS	< 2.0	NS	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Ethyl Ether	1400	390	3900	NA	**10**	**4.7**	NS	< 2.5	NS	NS	< 2.5	NS	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5
Ethylbenzene	700	1.5	1.5	NA	< 0.50	< 0.50	NS	**0.52**	NS	NS	< 0.50	NS	< 0.50	**1.5**	**1.2**	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Isopropylbenzene (Cumene)	800	45	450	NA	< 0.50	< 0.50	NS	< 0.50	NS	NS	< 0.50	NS	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
m,p-Xylenes	NA	NA	NA	NA	< 1.0	< 1.0	NS	< 1.0	NS	NS	< 1.0	NS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Methyl Tert Butyl Ether (MTBE)	13	14	14	NA	< 1.0	< 1.0	NS	< 1.0	NS	NS	< 1.0	NS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tert-Butyl Alcohol (tert-Butanol)	40	150	150	NA	NS	< 10	NS	< 10	NS	NS	< 10	NS	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Tetrachloroethene	5	4.1	11	NA	< 0.50	< 0.50	NS	< 0.50	NS	NS	< 0.50	NS	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Tetrahydrofuran	600	340	3400	NA	< 5.0	< 5.0	NS	**24**	NS	NS	< 5.0	NS	< 5.0	**8.0**	**7.9**	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Toluene	1000	110	1100	NA	< 0.75	< 0.75	NS	< 0.75	NS	NS	< 0.75	NS	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75
trans-1,2-Dichloroethene	100	6.8	68	NA	< 0.75	< 0.75	NS	< 0.75	NS	NS	< 0.75	NS	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75
Trichloroethene	5	0.28	0.49	NA	**5.0**	**2.2**	NS	< 0.50	NS	NS	< 0.50	NS	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Vinyl chloride	2	0.019	0.019	NA	**42**	**17**	NS	**5.0**	NS	NS	< 1.0	NS	< 1.0	**2.2**	**1.7**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Xylene (Total)	10000	19	190	NA	< 1.0	< 1.0	NS	< 1.0	NS	NS	< 1.0	NS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Semi-Volatile Organic Compounds (SIM) (µg/L)																					
1,4-Dioxane	0.32	0.46	0.46	NA	**417**	**238**	**1.45**	**8.10**	**8.07**	**8.13**	**0.178**	**32.4**	**49.4**	**116**	**118**	< 0.147	< 0.136	< 0.147	< 0.144	< 0.147	< 0.150
PFAS (ng/L)																					
Perfluorobutanesulfonic acid (PFBS)	NA	600	6000	*Sum < HI 1	**2.6**	**3.4**	NS	< 1.8	NS	NS	< 1.8	NS	< 1.8	< 1.9	< 1.9	< 1.9	< 1.8	**2.2**	**3.5**	< 1.8	< 1.8
Perfluorobutanoic acid (PFBA)	NA	1800	18000	NA	**12**	**8.1**	NS	**1.8**	NS	NS	< 1.8	NS	**2.3**	**4.0**	**5.6**	< 1.9	< 1.8	< 1.8	**2.0**	< 1.8	< 1.8
Perfluoroheptanoic acid (PFHpA)	NA	NA	NA	NA	**10**	**7.4**	NS	< 1.8	NS	NS	< 1.8	NS	< 1.8	< 1.9	< 1.9	< 1.9	< 1.8	< 1.8	< 1.9	< 1.8	< 1.8
Perfluorohexanesulfonic acid (PFHxS)	18	39	390	*Sum < HI 1	**44**	**32**	NS	< 1.8	NS	NS	< 1.8	NS	< 1.8	**2.4**	**2.5**	< 1.9	< 1.8	< 1.8	< 1.9	< 1.8	< 1.8
Perfluorohexanoic acid (PFHxA)	NA	990	9900	NA	**8.6**	**6.4**	NS	< 1.8	NS	NS	< 1.8	NS	**2.2**	**3.0**	**2.8**	< 1.9	< 1.8	**2.1**	**3.1**	< 1.8	< 1.8
Perfluorononanoic acid (PFNA)	11	5.9	59	*Sum < HI 1	**3.4**	**2.8**	NS	< 1.8	NS	NS	< 1.8	NS	< 1.8	< 1.9	< 1.9	< 1.9	< 1.8	< 1.8	< 1.9	< 1.8	< 1.8
Perfluoropentanoic acid (PFPeA)	NA	NA	NA	NA	**130**	**120**	NS	< 1.8	NS	NS	< 1.8	NS	< 1.8	**2.0**	< 1.9	< 1.9	< 1.8	**2.0**	**2.8**	< 1.8	< 1.8
Perfluorooctanesulfonic acid (PFOS)	15	4	40	4	**46**	**45**	NS	< 1.8	NS	NS	< 1.8	NS	< 1.8	< 1.9	< 1.9	< 1.9	< 1.8	< 1.8	< 1.9	< 1.8	< 1.8
Perfluorooctanoic acid (PFOA)	12	6	60	4	**62**	**43**	NS	**15**	NS	NS	< 1.8	NS	**4.3**	**7.7**	**7.3**	< 1.9	< 1.8	**3.0**	**3.8**	< 1.8	< 1.8

Abbreviations:

µg/L = micrograms per liter
ng/L = nanograms per liter
NA = Not Available
NS = Not Sampled
PFAS = Per- and Polyfluoroalkyl Substances
VOCs = Volatile Organic Compounds
AGQS = Ambient Groundwater Quality Standards
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MONITORED COMPOUNDS DETECTED IN GROUNDWATER MONITORING WELLS - 2023

ANNUAL WATER QUALITY MONITORING REPORT FOR 2023
TINKHAM GARAGE SITE, LONDONDERRY, NEW HAMPSHIRE

					FW27	FW28D-80		FW28D-104		FW28D-174		HA20-01A-020			HA20-01A-052		HA20-01-125		HA20-01-232	
Sample Date	NHDES AGQS	USEPA Tap Water RSL HI = 0.1 November 2023	USEPA Tap Water RSL HI = 1.0 November 2023	Proposed USEPA MCL	11/10/2023	05/04/2023	11/02/2023	05/04/2023	11/02/2023	05/04/2023	11/02/2023	05/03/2023	11/02/2023	11/02/2023	05/03/2023	11/02/2023	05/02/2023	11/02/2023	05/02/2023	11/02/2023
Volatile Organic Compounds (µg/L)																				
1,1,1-Trichloroethane	200	800	8000	NA	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1,2-Trichloroethane	5	0.041	0.28	NA	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75
1,1-Dichloroethane	81	2.8	2.8	NA	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75
1,1-Dichloroethene	7	28	280	NA	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dichlorobenzene	600	30	300	NA	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5
1,2-Dichloroethane	5	0.17	0.17	NA	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dichloroethene (total)	NA	NA	NA	NA	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
4-Methyl-2-Pentanone (Methyl Isobutyl Ketone)	2000	630	6300	NA	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Acetone	6000	1800	18000	NA	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Benzene	5	0.46	0.46	NA	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Chlorobenzene	100	7.8	78	NA	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Chloroethane	NA	830	8300	NA	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloroform (Trichloromethane)	70	0.22	0.22	NA	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75
cis-1,2-Dichloroethene	70	2.5	25	NA	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Diisopropyl ether (DIPE)	120	150	1500	NA	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Ethyl Ether	1400	390	3900	NA	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5
Ethylbenzene	700	1.5	1.5	NA	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Isopropylbenzene (Cumene)	800	45	450	NA	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
m,p-Xylenes	NA	NA	NA	NA	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Methyl Tert Butyl Ether (MTBE)	13	14	14	NA	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tert-Butyl Alcohol (tert-Butanol)	40	150	150	NA	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Tetrachloroethene	5	4.1	11	NA	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Tetrahydrofuran	600	340	3400	NA	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Toluene	1000	110	1100	NA	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75
trans-1,2-Dichloroethene	100	6.8	68	NA	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75
Trichloroethene	5	0.28	0.49	NA	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Vinyl chloride	2	0.019	0.019	NA	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Xylene (Total)	10000	19	190	NA	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Semi-Volatile Organic Compounds (SIM) (µg/L)																				
1,4-Dioxane	0.32	0.46	0.46	NA	**3.75**	< 0.144	< 0.134	**1.57**	**1.58**	**3.79**	**3.91**	**0.204**	< 0.134	< 0.134	**0.160**	< 0.144	**1.22**	**1.03**	< 0.147	< 0.134
PFAS (ng/L)																				
Perfluorobutanesulfonic acid (PFBS)	NA	600	6000	*Sum < HI 1	< 1.9	< 1.8	< 1.9	< 1.8	< 1.8	< 1.8	< 1.8	< 1.8	**2.3**	**2.1**	**1.9**	**2.8**	< 1.7	< 1.8	< 1.8	< 1.8
Perfluorobutanoic acid (PFBA)	NA	1800	18000	NA	**1.9**	< 1.8	< 1.9	< 1.8	< 1.8	< 1.8	< 1.8	< 1.8	**3.1**	**3.7**	< 1.8	**2.1**	**31**	< 1.8	**12**	**12**
Perfluoroheptanoic acid (PFHpA)	NA	NA	NA	NA	**4.3**	< 1.8	< 1.9	< 1.8	< 1.8	< 1.8	< 1.8	< 1.8	**3.6**	**3.6**	< 1.8	< 1.8	< 1.7	< 1.8	< 1.8	< 1.8
Perfluorohexanesulfonic acid (PFHxS)	18	39	390	*Sum < HI 1	**4.8**	< 1.8	< 1.9	< 1.8	< 1.8	< 1.8	< 1.8	**2.4**	**3.3**	**2.9**	**2.3**	**3.2**	< 1.7	< 1.8	< 1.8	< 1.8
Perfluorohexanoic acid (PFHxA)	NA	990	9900	NA	**3.7**	< 1.8	< 1.9	< 1.8	< 1.8	< 1.8	< 1.8	< 1.8	**5.7**	**5.7**	< 1.8	< 1.8	< 1.7	< 1.8	< 1.8	< 1.8
Perfluorononanoic acid (PFNA)	11	5.9	59	*Sum < HI 1	< 1.9	< 1.8	< 1.9	< 1.8	< 1.8	< 1.8	< 1.8	< 1.8	< 1.7	< 1.8	< 1.8	< 1.8	**2.8**	< 1.8	< 1.8	< 1.8
Perfluoropentanoic acid (PFPeA)	NA	NA	NA	NA	**2.2**	< 1.8	< 1.9	< 1.8	< 1.8	< 1.8	< 1.8	< 1.8	**4.4**	**3.9**	< 1.8	< 1.8	< 1.7	< 1.8	**5.7**	**17**
Perfluorooctanesulfonic acid (PFOS)	15	4	40	4	**11**	< 1.8	< 1.9	< 1.8	< 1.8	< 1.8	< 1.8	< 1.8	**3.6**	**2.6**	< 1.8	< 1.8	< 1.7	< 1.8	< 1.8	< 1.8
Perfluorooctanoic acid (PFOA)	12	6	60	4	**16**	< 1.8	< 1.9	< 1.8	< 1.8	< 1.8	< 1.8	**2.3**	**12**	**12**	< 1.8	< 1.8	**8.2**	< 1.8	< 1.8	< 1.8

Abbreviations:

µg/L = micrograms per liter
ng/L = nanograms per liter
NA = Not Available
NS = Not Sampled
PFAS = Per- and Polyfluoroalkyl Substances
VOCs = Volatile Organic Compounds
AGQS = Ambient Groundwater Quality Standards
RSL = Regional Screening Level
HI = Hazard Index
MCL = Maximum Contaminant Level

Notes:

1. *Tabulated results are compared to NHDES AGQS. RSLs and MCLs are provided for reference only.*
2. *See Page 12 of 12 for full list of Notes for Table V.*

MONITORED COMPOUNDS DETECTED IN GROUNDWATER MONITORING WELLS - 2023
ANNUAL WATER QUALITY MONITORING REPORT FOR 2023
TINKHAM GARAGE SITE, LONDONDERRY, NEW HAMPSHIRE

					HA20-03-072	HA20-03-135	HA20-03-353	HA20-04A-037			HA20-04-060		HA20-04-235		HA20-04-332		HA20-05-055		HA20-05-178		HA20-05-390	
Sample Date	NHDES AGQS	USEPA Tap Water RSL HI = 0.1 November 2023	USEPA Tap Water RSL HI = 1.0 November 2023	Proposed USEPA MCL	05/01/2023	05/01/2023	05/01/2023	05/01/2023	05/01/2023	11/06/2023	05/01/2023	11/08/2023	05/01/2023	11/07/2023	05/01/2023	11/07/2023	05/03/2023	11/02/2023	05/08/2023	11/09/2023	05/03/2023	11/08/2023
Volatile Organic Compounds (µg/L)																						
1,1,1-Trichloroethane	200	800	8000	NA	< 0.50	< 0.50	< 0.50	0.50	0.51	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1,2-Trichloroethane	5	0.041	0.28	NA	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75
1,1-Dichloroethane	81	2.8	2.8	NA	< 0.75	< 0.75	< 0.75	0.91	1.2	1.6	1.7	1.8	2.3	2.3	2.0	1.8	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75
1,1-Dichloroethene	7	28	280	NA	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	0.52	< 0.50	0.54	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dichlorobenzene	600	30	300	NA	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5
1,2-Dichloroethane	5	0.17	0.17	NA	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dichloroethene (total)	NA	NA	NA	NA	< 0.50	< 0.50	< 0.50	7.4	8.1	11	6.9	6.4	18	20	14	16	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
4-Methyl-2-Pentanone (Methyl Isobutyl Ketone)	2000	630	6300	NA	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Acetone	6000	1800	18000	NA	< 5.0	< 5.0	8.1	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	11	5.3	15	11
Benzene	5	0.46	0.46	NA	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	2.1	2.0	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Chlorobenzene	100	7.8	78	NA	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Chloroethane	NA	830	8300	NA	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloroform (Trichloromethane)	70	0.22	0.22	NA	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75
cis-1,2-Dichloroethene	70	2.5	25	NA	< 0.50	< 0.50	< 0.50	7.4	8.1	11	6.9	6.4	18	20	14	16	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Diisopropyl ether (DIPE)	120	150	1500	NA	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Ethyl Ether	1400	390	3900	NA	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5
Ethylbenzene	700	1.5	1.5	NA	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Isopropylbenzene (Cumene)	800	45	450	NA	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
m,p-Xylenes	NA	NA	NA	NA	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Methyl Tert Butyl Ether (MTBE)	13	14	14	NA	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tert-Butyl Alcohol (tert-Butanol)	40	150	150	NA	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Tetrachloroethene	5	4.1	11	NA	< 0.50	< 0.50	< 0.50	2.0	2.2	3.0	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	0.62	0.66
Tetrahydrofuran	600	340	3400	NA	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	25	26	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Toluene	1000	110	1100	NA	< 0.75	< 0.75	0.88	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75
trans-1,2-Dichloroethene	100	6.8	68	NA	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75
Trichloroethene	5	0.28	0.49	NA	< 0.50	< 0.50	< 0.50	2.7	3.1	3.6	0.60	0.52	3.9	3.4	6.2	6.6	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Vinyl chloride	2	0.019	0.019	NA	< 1.0	< 1.0	< 1.0	2.9	2.5	4.4	1.9	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Xylene (Total)	10000	19	190	NA	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Semi-Volatile Organic Compounds (SIM) (µg/L)																						
1,4-Dioxane	0.32	0.46	0.46	NA	< 0.142	< 0.142	< 0.147	1.17	1.05	0.794	84.9	81.8	9.64	9.32	8.43	7.96	< 0.136	< 0.134	< 0.142	< 0.136	< 0.142	< 0.142
PFAS (ng/L)																						
Perfluorobutanesulfonic acid (PFBS)	NA	600	6000	*Sum < HI 1	< 1.8	< 1.8	< 1.8	2.3	2.4	3.3	< 1.9	< 1.8	1.9	2.9	2.2	1.9	2.1	2.4	< 1.8	R	< 4.1	3.2
Perfluorobutanoic acid (PFBA)	NA	1800	18000	NA	4.5	8.8	64	5.0	5.3	6.7	14	6.3	13	< 1.8	12	< 1.8	< 1.8	< 1.8	50	R	96	48
Perfluoroheptanoic acid (PFHpA)	NA	NA	NA	NA	< 1.8	< 1.8	< 1.8	8.5	8.0	9.5	4.0	4.6	2.7	2.8	2.7	2.7	< 1.8	< 1.8	< 1.8	R	< 4.1	1.7
Perfluorohexanesulfonic acid (PFHxS)	18	39	390	*Sum < HI 1	< 1.8	< 1.8	< 1.8	19	18	24	4.3	4.1	1.9	2.2	2.1	2.0	3.3	3.2	< 1.8	R	< 4.1	< 1.7
Perfluorohexanoic acid (PFHxA)	NA	990	9900	NA	< 1.8	< 1.8	< 1.8	6.5	5.8	7.2	6.3	6.6	5.2	4.9	5.5	4.8	< 1.8	< 1.8	< 1.8	R	10	< 1.7
Perfluorononanoic acid (PFNA)	11	5.9	59	*Sum < HI 1	< 1.8	< 1.8	< 1.8	2.5	2.5	3.5	< 1.9	< 1.8	< 1.8	< 1.8	< 1.7	< 1.8	< 1.8	< 1.8	< 1.8	R	< 4.1	< 1.7
Perfluoropentanoic acid (PFPeA)	NA	NA	NA	NA	< 1.8	< 1.8	8.9	7.1	6.7	8.8	6.0	14	5.9	11	6.5	9.8	1.9	3.8	22	R	43	< 1.7
Perfluorooctanesulfonic acid (PFOS)	15	4	40	4	< 1.8	< 1.8	< 1.8	50	45	75	11	14	3.8	3.4	3.9	3.7	4.9	5.0	2.3	R	< 4.1	2.7
Perfluorooctanoic acid (PFOA)	12	6	60	4	< 1.8	< 1.8	< 1.8	63	55	67	18	19	13	13	13	12	< 1.8	< 1.8	2.9	R	< 4.1	2.1

Abbreviations:
µg/L = micrograms per liter
ng/L = nanograms per liter
NA = Not Available
NS = Not Sampled
PFAS = Per- and Polyfluoroalkyl Substances
VOCs = Volatile Organic Compounds
AGQS = Ambient Groundwater Quality Standards
RSL = Regional Screening Level
HI = Hazard Index
MCL = Maximum Contaminant Level

MONITORED COMPOUNDS DETECTED IN GROUNDWATER MONITORING WELLS - 2023

ANNUAL WATER QUALITY MONITORING REPORT FOR 2023
TINKHAM GARAGE SITE, LONDONDERRY, NEW HAMPSHIRE

					HA20-06-060		HA20-06-107		HA20-06-220		HA21-07-066		HA21-07-145		HA21-07-215		HA21-09-030		HA21-09-053		HA21-09-092	
Sample Date	NHDES AGQS	USEPA Tap Water RSL HI = 0.1 November 2023	USEPA Tap Water RSL HI = 1.0 November 2023	Proposed USEPA MCL	05/03/2023	11/09/2023	05/02/2023	11/03/2023	05/02/2023	11/03/2023	05/05/2023	11/07/2023	05/04/2023	11/03/2023	05/04/2023	11/10/2023	05/03/2023	11/01/2023	05/04/2023	11/01/2023	05/03/2023	11/02/2023
Volatile Organic Compounds (µg/L)																						
1,1,1-Trichloroethane	200	800	8000	NA	< 0.50	< 1.0	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1,2-Trichloroethane	5	0.041	0.28	NA	< 0.75	< 1.5	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75
1,1-Dichloroethane	81	2.8	2.8	NA	< 0.75	< 1.5	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75
1,1-Dichloroethene	7	28	280	NA	< 0.50	< 1.0	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dichlorobenzene	600	30	300	NA	< 2.5	< 5.0	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5
1,2-Dichloroethane	5	0.17	0.17	NA	< 0.50	< 1.0	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dichloroethene (total)	NA	NA	NA	NA	< 0.50	< 1.0	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
4-Methyl-2-Pentanone (Methyl Isobutyl Ketone)	2000	630	6300	NA	< 5.0	< 10	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Acetone	6000	1800	18000	NA	< 5.0	< 10	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Benzene	5	0.46	0.46	NA	< 0.50	< 1.0	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Chlorobenzene	100	7.8	78	NA	< 0.50	< 1.0	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Chloroethane	NA	830	8300	NA	< 1.0	< 2.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloroform (Trichloromethane)	70	0.22	0.22	NA	< 0.75	< 1.5	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75
cis-1,2-Dichloroethene	70	2.5	25	NA	< 0.50	< 1.0	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Diisopropyl ether (DIPE)	120	150	1500	NA	< 2.0	< 4.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Ethyl Ether	1400	390	3900	NA	< 2.5	< 5.0	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5
Ethylbenzene	700	1.5	1.5	NA	< 0.50	< 1.0	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Isopropylbenzene (Cumene)	800	45	450	NA	< 0.50	< 1.0	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
m,p-Xylenes	NA	NA	NA	NA	< 1.0	< 2.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Methyl Tert Butyl Ether (MTBE)	13	14	14	NA	< 1.0	< 2.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tert-Butyl Alcohol (tert-Butanol)	40	150	150	NA	< 10	< 20	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Tetrachloroethene	5	4.1	11	NA	< 0.50	< 1.0	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Tetrahydrofuran	600	340	3400	NA	< 5.0	< 10	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Toluene	1000	110	1100	NA	< 0.75	< 1.5	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75
trans-1,2-Dichloroethene	100	6.8	68	NA	< 0.75	< 1.5	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75
Trichloroethene	5	0.28	0.49	NA	< 0.50	< 1.0	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Vinyl chloride	2	0.019	0.019	NA	< 1.0	< 2.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Xylene (Total)	10000	19	190	NA	< 1.0	< 2.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Semi-Volatile Organic Compounds (SIM) (µg/L)																						
1,4-Dioxane	0.32	0.46	0.46	NA	**0.462**	**0.293**	**0.717**	**0.796**	< 0.142	< 0.139	< 0.136	< 0.139	< 0.139	**0.420**	**0.211**	**0.306**	< 0.136	< 0.153	< 0.142	**0.227**	< 0.142	< 0.144
PFAS (ng/L)																						
Perfluorobutanesulfonic acid (PFBS)	NA	600	6000	*Sum < HI 1	< 1.7	< 1.8	< 1.7	< 1.8	< 1.7	< 1.8	< 4.1	< 1.7	**2.0**	**2.5**	< 1.7	< 1.7	**1.9**	**7.5**	**2.8**	**5.5**	< 1.7	< 1.8
Perfluorobutanoic acid (PFBA)	NA	1800	18000	NA	**3.3**	< 1.8	**8.4**	**8.2**	**31**	< 1.8	**41**	**18**	**31**	**3.6**	**8.9**	**2.4**	**15**	**12**	< 1.8	**8.4**	< 1.7	< 1.8
Perfluoroheptanoic acid (PFHpA)	NA	NA	NA	NA	< 1.7	< 1.8	< 1.7	< 1.8	< 1.7	< 1.8	< 4.1	< 1.7	< 1.8	< 1.8	< 1.7	< 1.7	< 1.8	**5.8**	< 1.8	**2.8**	< 1.7	< 1.8
Perfluorohexanesulfonic acid (PFHxS)	18	39	390	*Sum < HI 1	< 1.7	< 1.8	< 1.7	< 1.8	< 1.7	< 1.8	< 4.1	< 1.7	< 1.8	**2.0**	< 1.7	< 1.7	< 1.8	**4.1**	**1.8**	**3.2**	< 1.7	< 1.8
Perfluorohexanoic acid (PFHxA)	NA	990	9900	NA	< 1.7	< 1.8	< 1.7	< 1.8	< 1.7	< 1.8	< 4.1	< 1.7	< 1.8	< 1.8	< 1.7	< 1.7	< 1.8	**9.8**	< 1.8	**3.7**	< 1.7	< 1.8
Perfluorononanoic acid (PFNA)	11	5.9	59	*Sum < HI 1	< 1.7	< 1.8	< 1.7	< 1.8	**7.2**	< 1.8	< 4.1	< 1.7	< 1.8	< 1.8	< 1.7	< 1.7	< 1.8	< 1.8	< 1.8	< 1.8	< 1.7	< 1.8
Perfluoropentanoic acid (PFPeA)	NA	NA	NA	NA	**20**	**34**	**7.1**	**12**	< 1.7	< 1.8	< 4.1	< 1.7	< 1.8	**3.2**	**2.4**	< 1.7	< 1.8	**19**	< 1.8	**6.6**	< 1.7	< 1.8
Perfluorooctanesulfonic acid (PFOS)	15	4	40	4	< 1.7	< 1.8	< 1.7	< 1.8	**3.5**	< 1.8	< 4.1	**1.9**	< 1.8	< 1.8	< 1.7	< 1.7	**6.2**	**17**	**3.8**	**11**	**2.9**	**3.1**
Perfluorooctanoic acid (PFOA)	12	6	60	4	< 1.7	< 1.8	**2.1**	< 1.8	**10**	< 1.8	< 4.1	**2.7**	**3.0**	**2.8**	**2.2**	< 1.7	**1.8**	**24**	< 1.8	**8.5**	< 1.7	< 1.8

Abbreviations:

µg/L = micrograms per liter
ng/L = nanograms per liter
NA = Not Available
NS = Not Sampled
PFAS = Per- and Polyfluoroalkyl Substances
VOCs = Volatile Organic Compounds
AGQS = Ambient Groundwater Quality Standards
RSL = Regional Screening Level
HI = Hazard Index
MCL = Maximum Contaminant Level

MONITORED COMPOUNDS DETECTED IN GROUNDWATER MONITORING WELLS - 2023
ANNUAL WATER QUALITY MONITORING REPORT FOR 2023
TINKHAM GARAGE SITE, LONDONDERRY, NEW HAMPSHIRE

					HA23-10-060	HA23-10-285	HA23-11-116	HA23-11-166	HA23-11-268	HA23-12A-023	HA23-12-075	HA23-12-145		HA23-13A-015	HA23-13-110	HA23-13-168
Sample Date	NHDES AGQS	USEPA Tap Water RSL HI = 0.1 November 2023	USEPA Tap Water RSL HI = 1.0 November 2023	Proposed USEPA MCL	08/31/2023	08/31/2023	09/14/2023	09/14/2023	09/14/2023	08/09/2023	08/09/2023	08/10/2023	08/10/2023	07/28/2023	07/28/2023	07/28/2023
Volatile Organic Compounds (µg/L)																
1,1,1-Trichloroethane	200	800	8000	NA	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1,2-Trichloroethane	5	0.041	0.28	NA	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75
1,1-Dichloroethane	81	2.8	2.8	NA	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75
1,1-Dichloroethene	7	28	280	NA	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dichlorobenzene	600	30	300	NA	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5
1,2-Dichloroethane	5	0.17	0.17	NA	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dichloroethene (total)	NA	NA	NA	NA	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
4-Methyl-2-Pentanone (Methyl Isobutyl Ketone)	2000	630	6300	NA	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Acetone	6000	1800	18000	NA	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Benzene	5	0.46	0.46	NA	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Chlorobenzene	100	7.8	78	NA	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Chloroethane	NA	830	8300	NA	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloroform (Trichloromethane)	70	0.22	0.22	NA	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75
cis-1,2-Dichloroethene	70	2.5	25	NA	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Diisopropyl ether (DIPE)	120	150	1500	NA	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Ethyl Ether	1400	390	3900	NA	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5
Ethylbenzene	700	1.5	1.5	NA	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Isopropylbenzene (Cumene)	800	45	450	NA	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
m,p-Xylenes	NA	NA	NA	NA	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Methyl Tert Butyl Ether (MTBE)	13	14	14	NA	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tert-Butyl Alcohol (tert-Butanol)	40	150	150	NA	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Tetrachloroethene	5	4.1	11	NA	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Tetrahydrofuran	600	340	3400	NA	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Toluene	1000	110	1100	NA	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75
trans-1,2-Dichloroethene	100	6.8	68	NA	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75
Trichloroethene	5	0.28	0.49	NA	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Vinyl chloride	2	0.019	0.019	NA	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Xylene (Total)	10000	19	190	NA	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Semi-Volatile Organic Compounds (SIM) (µg/L)																
1,4-Dioxane	0.32	0.46	0.46	NA	< 0.142	< 0.147	< 0.147	< 0.147	< 0.142	**0.164**	< 0.144	**0.377**	**0.345**	< 0.147	**0.271**	**0.335**
PFAS (ng/L)																
Perfluorobutanesulfonic acid (PFBS)	NA	600	6000	*Sum < HI 1	< 1.8	< 1.9	**5.2**	< 1.8	**2.0**	**4.8**	< 1.8	< 1.8	< 1.8	**2.9**	< 1.8	< 1.8
Perfluorobutanoic acid (PFBA)	NA	1800	18000	NA	< 1.8	**9.8**	**5.0**	< 1.8	**4.3**	**3.5**	**2.3**	**2.9**	**3.3**	**2.4**	< 1.8	< 1.8
Perfluoroheptanoic acid (PFHpA)	NA	NA	NA	NA	< 1.8	< 1.9	**2.5**	< 1.8	< 1.8	**3.4**	< 1.8	< 1.8	< 1.8	**2.3**	< 1.8	< 1.8
Perfluorohexanesulfonic acid (PFHxS)	18	39	390	*Sum < HI 1	< 1.8	< 1.9	**2.0**	< 1.8	< 1.8	**3.7**	< 1.8	< 1.8	< 1.8	**1.9**	< 1.8	< 1.8
Perfluorohexanoic acid (PFHxA)	NA	990	9900	NA	< 1.8	< 1.9	**7.3**	< 1.8	**2.7**	**3.6**	< 1.8	< 1.8	< 1.8	**4.3**	< 1.8	< 1.8
Perfluorononanoic acid (PFNA)	11	5.9	59	*Sum < HI 1	< 1.8	< 1.9	< 1.8	< 1.8	< 1.8	< 1.8	< 1.8	< 1.8	< 1.8	< 1.9	< 1.8	< 1.8
Perfluoropentanoic acid (PFPeA)	NA	NA	NA	NA	< 1.8	**12**	**6.4**	< 1.8	**3.2**	**4.2**	< 1.8	< 1.8	< 1.8	**8.7**	< 1.8	< 1.8
Perfluorooctanesulfonic acid (PFOS)	15	4	40	4	< 1.8	< 1.9	< 1.8	< 1.8	< 1.8	**4.8**	< 1.8	< 1.8	< 1.8	**11**	< 1.8	< 1.8
Perfluorooctanoic acid (PFOA)	12	6	60	4	< 1.8	< 1.9	**8.9**	< 1.8	**3.0**	**17**	< 1.8	< 1.8	< 1.8	**11**	< 1.8	< 1.8

Abbreviations:

µg/L = micrograms per liter
ng/L = nanograms per liter
NA = Not Available
NS = Not Sampled
PFAS = Per- and Polyfluoroalkyl Substances
VOCs = Volatile Organic Compounds
AGQS = Ambient Groundwater Quality Standards
RSL = Regional Screening Level
HI = Hazard Index
MCL = Maximum Contaminant Level

APPENDIX H – SITE INSPECTION CHECKLIST

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

I. SITE INFORMATION

Site Name: Tinkham Garage	**Date of Inspection:** 04/18/2024
Location and Region: Londonderry, NH, Region 1	**EPA ID:** NHD062004569
Agency, Office or Company Leading the Five-Year Review: EPA	**Weather/Temperature:** Drizzling/45 degrees Fahrenheit

Remedy Includes: (Check all that apply)

- ☐ Landfill cover/containment
- ☐ Access controls
- ☒ Institutional controls
- ☐ Groundwater pump and treatment
- ☐ Surface water collection and treatment
- ☐ Other: _____
- ☒ Monitored natural attenuation
- ☐ Groundwater containment
- ☐ Vertical barrier walls

Attachments: ☐ Inspection team roster attached ☐ Site map attached

II. INTERVIEWS (check all that apply)

1. **O&M Site Manager** _____ Name _____ Title _____ Date
   Interviewed ☐ at site ☐ at office ☐ by phone Phone: _____
   Problems, suggestions ☐ Report attached: _____

2. **O&M Staff** _____ Name _____ Title _____ Date
   Interviewed ☐ at site ☐ at office ☐ by phone Phone: _____
   Problems/suggestions ☐ Report attached: _____

3. **Local Regulatory Authorities and Response Agencies** (i.e., State and tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices). Fill in all that apply.

Agency _____
Contact _____ Name _____ Title _____ Date _____ Phone No.
Problems/suggestions ☐ Report attached: _____

Agency _____
Contact _____Name _____ Title _____ Date _____ Phone No.
Problems/suggestions ☐ Report attached:______

Agency _____
Contact _____ Name _____ Title _____ Date _____ Phone No.
Problems/suggestions ☐ Report attached:______

Agency _____
Contact _____ Name _____ Title _____ Date _____ Phone No.
Problems/suggestions ☐ Report attached: _____

Agency _____

Contact _____ _____ _____ _____
Name Title Date Phone No.
Problems/suggestions ☐ Report attached:_____

4. **Other Interviews** (optional) ☐ Report attached: _____

III. ON-SITE DOCUMENTS AND RECORDS VERIFIED (check all that apply)

1. **O&M Documents**

☐ O&M manual	☐ Readily available	☐ Up to date	☐ N/A
☐ As-built drawings	☐ Readily available	☐ Up to date	☐ N/A
☐ Maintenance logs	☐ Readily available	☐ Up to date	☐ N/A

Remarks: Sampling and Analysis Plans, Work Plans and Quality Assurance Project Plans are maintained off-site by the contractor for the PRP and are available for review upon request.

2. **Site-Specific Health and Safety Plan** ☒ Readily available ☒ Up to date ☐ N/A
☒ Contingency plan/emergency response plan ☒ Readily available ☒ Up to date ☐ N/A

Remarks: The Site-Specific Health and Safety Plan is maintained off-site by the contractor for the PRP and is available for review upon request.

3. **O&M and OSHA Training Records** ☒ Readily available ☒ Up to date ☐ N/A

Remarks: OSHA training records for personnel conducting field work at the Site are maintained by the contractor for the PRP and are available upon request.

4. **Permits and Service Agreements**

☐ Air discharge permit	☐ Readily available	☐ Up to date	☒ N/A
☐ Effluent discharge	☐ Readily available	☐ Up to date	☒ N/A
☐ Waste disposal, POTW	☐ Readily available	☐ Up to date	☒ N/A
☒ Other permits: GMP	☒ Readily available	☐ Up to date	☐ N/A

Remarks: The Groundwater Management Permit is being renewed in May 2024.

5. **Gas Generation Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks: _____

6. **Settlement Monument Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks: _____

7. **Groundwater Monitoring Records** ☒ Readily available ☒ Up to date ☐ N/A

Remarks: A database of groundwater monitoring data is maintained off-site by the contractor for the PRP and is available upon request. All results and site-related reports are also available for review through the NHDES OneStop website.

8. **Leachate Extraction Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks: _____

9. **Discharge Compliance Records**

☐ Air ☐ Readily available ☐ Up to date ☒ N/A

☐ Water (effluent) ☐ Readily available ☐ Up to date ☒ N/A

Remarks: _____

10. **Daily Access/Security Logs** ☐ Readily available ☐ Up to date ☒ N/A

Remarks: _____

IV. O&M COSTS

1. **O&M Organization**

☐ State in-house ☐ Contractor for State

☐ PRP in-house ☒ Contractor for PRP

☐ Federal facility in-house ☐ Contractor for Federal facility

☐ _____

2. **O&M Cost Records**

☒ Readily available ☐ Up to date

☒ Funding mechanism/agreement in place ☐ Unavailable

Original O&M cost estimate: $15,000 to $25,000 (for MNA monitoring) ☐ Breakdown attached

Total annual cost during FYR period has been approximately $500,000 per year.

3. **Unanticipated or Unusually High O&M Costs during Review Period**

Describe costs and reasons: Contaminants have migrated beyond the GMZ and site-related compounds have been identified in residential drinking water wells.

V. ACCESS AND INSTITUTIONAL CONTROLS ☒ Applicable ☐ N/A

A. Fencing

1. **Fencing Damaged** ☐ Location shown on site map ☐ Gates secured ☒ N/A

Remarks: _____

B. Other Access Restrictions

1. **Signs and Other Security Measures** ☐ Location shown on site map ☒ N/A

Remarks: _____

C. Institutional Controls (ICs)

1. **Implementation and Enforcement**

Site conditions imply ICs not properly implemented ☐ Yes ☒ No ☐ N/A

Site conditions imply ICs not being fully enforced ☐ Yes ☒ No ☐ N/A

Type of monitoring (e.g., self-reporting, drive by): On-line database review to confirm no new drinking water wells within the Groundwater Management Zone, with windshield survey confirmation.

Frequency: Annual

Responsible party/agency: PRP

Contact				
	Ian Phillips	Project Manager	_____	616-886-7483
	Name	Title	Date	Phone no.

Reporting is up to date ☒ Yes ☐ No ☐ N/A

Reports are verified by the lead agency ☒ Yes ☐ No ☐ N/A

Specific requirements in deed or decision documents have been met ☐ Yes ☐ No ☒ N/A

Violations have been reported ☐ Yes ☐ No ☒ N/A

Other problems or suggestions: ☐ Report attached

2. **Adequacy** ☐ ICs are adequate ☒ ICs are inadequate ☐ N/A

Remarks: The Groundwater Management Zone does not include all impacted residences; it is expected that the Groundwater Management Zone will be updated after the current investigations are complete.

D. General

1. **Vandalism/Trespassing** ☐ Location shown on site map ☒ No vandalism evident

Remarks: Illegal dumping has been observed at the rear of the Staples and Home Depot parking lots near the Tinkham Garage source area monitoring wells which are included in the MNA long-term monitoring program.

2. **Land Use Changes On Site** ☒ N/A

Remarks: No land use changes were noted on-site during the site inspection.

3. **Land Use Changes Off Site** ☒ N/A

Remarks: No land use changes were noted on adjacent off-site properties.

VI. GENERAL SITE CONDITIONS

A. Roads ☒ Applicable ☐ N/A

1. **Roads Damaged** ☐ Location shown on site map ☒ Roads adequate ☐ N/A

Remarks: _____

B. Other Site Conditions

Remarks: The Site includes a wide range of conditions, ranging from undeveloped forested areas to active large retail commercial facilities (Home Depot and Staples stores). A portion of the Site includes a senior residential community and downgradient areas include a suburban residential neighborhood. Most areas are well-maintained.

VII. LANDFILL COVERS ☐ Applicable ☒ N/A

A. Landfill Surface

1. **Settlement** (low spots) ☐ Location shown on site map ☐ Settlement not evident

Area extent: _____ Depth: _____

Remarks: _____

2. **Cracks** ☐ Location shown on site map ☐ Cracking not evident

Lengths: _____ Widths: _____ Depths: _____

Remarks: _____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident

Area extent: _____ Depth: _____

Remarks: _____

4. **Holes** ☐ Location shown on site map ☐ Holes not evident

Area extent: _____ Depth: _____

Remarks: _____

5. **Vegetative Cover** ☐ Grass ☐ Cover properly established

☐ No signs of stress ☐ Trees/shrubs (indicate size and locations on a diagram)

Remarks: _____

6. **Alternative Cover** (e.g., armored rock, concrete) ☐ N/A

Remarks: _____

7. **Bulges** ☐ Location shown on site map ☐ Bulges not evident

Area extent: _____ Height: _____

Remarks: _____

8. **Wet Areas/Water Damage** ☐ Wet areas/water damage not evident

☐ Wet areas ☐ Location shown on site map Area extent: _____
☐ Ponding ☐ Location shown on site map Area extent: _____
☐ Seeps ☐ Location shown on site map Area extent: _____
☐ Soft subgrade ☐ Location shown on site map Area extent: _____

Remarks: _____

9. **Slope Instability** ☐ Slides ☐ Location shown on site map

☐ No evidence of slope instability

Area extent: _____

Remarks: _____

B. Benches ☐ Applicable ☐ N/A

(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)

1. **Flows Bypass Bench** ☐ Location shown on site map ☐ N/A or okay

Remarks: _____

2. **Bench Breached** ☐ Location shown on site map ☐ N/A or okay

Remarks: _____

3. **Bench Overtopped** ☐ Location shown on site map ☐ N/A or okay

Remarks: _____

C. Letdown Channels ☐ Applicable ☐ N/A

(Channel lined with erosion control mats, riprap, grout bags or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)

1. **Settlement** (Low spots) ☐ Location shown on site map ☐ No evidence of settlement

Area extent: _____ Depth: _____

Remarks: _____

2. **Material Degradation** ☐ Location shown on site map ☐ No evidence of degradation

Material type:_____ Area extent: _____

Remarks: _____

3. **Erosion** ☐ Location shown on site map ☐ No evidence of erosion

Area extent: _____ Depth: _____

Remarks: _____

4. **Undercutting** ☐ Location shown on site map ☐ No evidence of undercutting

Area extent: _____ Depth: _____

Remarks: _____

5. **Obstructions** Type: _____ ☐ No obstructions

☐ Location shown on site map Area extent: _____

Size: _____

Remarks: _____

6. **Excessive Vegetative Growth** Type: _____

☐ No evidence of excessive growth

☐ Vegetation in channels does not obstruct flow

☐ Location shown on site map Area extent: _____

Remarks: _____

D. Cover Penetrations ☐ Applicable ☐ N/A

1. **Gas Vents** ☐ Active ☐ Passive

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs maintenance ☐ N/A

Remarks: _____

2. **Gas Monitoring Probes**

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs maintenance ☐ N/A

Remarks: _____

3. **Monitoring Wells** (within surface area of landfill)

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs maintenance ☐ N/A
Remarks: _____

4. **Extraction Wells Leachate**
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs maintenance ☐ N/A
Remarks: _____

5. **Settlement Monuments** ☐ Located ☐ Routinely surveyed ☐ N/A
Remarks: _____

E. Gas Collection and Treatment ☐ Applicable ☐ N/A

1. **Gas Treatment Facilities**
☐ Flaring ☐ Thermal destruction ☐ Collection for reuse
☐ Good condition ☐ Needs maintenance
Remarks: _____

2. **Gas Collection Wells, Manifolds and Piping**
☐ Good condition ☐ Needs maintenance
Remarks: _____

3. **Gas Monitoring Facilities** (e.g., gas monitoring of adjacent homes or buildings)
☐ Good condition ☐ Needs maintenance ☐ N/A
Remarks: _____

F. Cover Drainage Layer ☐ Applicable ☐ N/A

1. **Outlet Pipes Inspected** ☐ Functioning ☐ N/A
Remarks: _____

2. **Outlet Rock Inspected** ☐ Functioning ☐ N/A
Remarks: _____

G. Detention/Sedimentation Ponds ☐ Applicable ☐ N/A

1. **Siltation** Area extent: _____ Depth: _____ ☐ N/A
☐ Siltation not evident
Remarks: _____

2. **Erosion** Area extent: _____ Depth: _____
☐ Erosion not evident
Remarks: _____

3. **Outlet Works** ☐ Functioning ☐ N/A
Remarks: _____

4. **Dam** ☐ Functioning ☐ N/A
Remarks: _____

H. Retaining Walls ☐ Applicable ☐ N/A

1. **Deformations** ☐ Location shown on site map ☐ Deformation not evident

Horizontal displacement: _____ Vertical displacement: _____

Rotational displacement: _____

Remarks: _____

2. **Degradation** ☐ Location shown on site map ☐ Degradation not evident

Remarks: _____

I. Perimeter Ditches/Off-Site Discharge ☐ Applicable ☐ N/A

1. **Siltation** ☐ Location shown on site map ☐ Siltation not evident

Area extent: _____ Depth: _____

Remarks: _____

2. **Vegetative Growth** ☐ Location shown on site map ☐ N/A

☐ Vegetation does not impede flow

Area extent: _____ Type: _____

Remarks: _____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident

Area extent: _____ Depth: _____

Remarks: _____

4. **Discharge Structure** ☐ Functioning ☐ N/A

Remarks: _____

VIII. VERTICAL BARRIER WALLS ☐ Applicable ☒ N/A

1. **Settlement** ☐ Location shown on site map ☐ Settlement not evident

Area extent: _____ Depth: _____

Remarks: _____

2. **Performance Monitoring** Type of monitoring: _____

☐ Performance not monitored

Frequency: _____ ☐ Evidence of breaching

Head differential: _____

Remarks: _____

IX. GROUNDWATER/SURFACE WATER REMEDIES ☒ Applicable ☐ N/A

A. Groundwater Extraction Wells, Pumps and Pipelines ☐ Applicable ☒ N/A

1. **Pumps, Wellhead Plumbing and Electrical**

☐ Good condition ☐ All required wells properly operating ☐ Needs maintenance ☐ N/A

Remarks: _____

2. **Extraction System Pipelines, Valves, Valve Boxes and Other Appurtenances**

☐ Good condition ☐ Needs maintenance

Remarks: _____

3. **Spare Parts and Equipment**

☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided

Remarks: _____

B. Surface Water Collection Structures, Pumps and Pipelines ☐ Applicable ☒ N/A

1. **Collection Structures, Pumps and Electrical**

☐ Good condition ☐ Needs maintenance

Remarks: _____

2. **Surface Water Collection System Pipelines, Valves, Valve Boxes and Other Appurtenances**

☐ Good condition ☐ Needs maintenance

Remarks: _____

3. **Spare Parts and Equipment**

☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided

Remarks: _____

C. Treatment System ☐ Applicable ☒ N/A

1. **Treatment Train** (check components that apply)

☐ Metals removal ☐ Oil/water separation ☐ Bioremediation

☐ Air stripping ☐ Carbon adsorbers

☐ Filters: _____

☐ Additive (e.g., chelation agent, flocculent): _____

☐ Others: _____

☐ Good condition ☐ Needs maintenance

☐ Sampling ports properly marked and functional

☐ Sampling/maintenance log displayed and up to date

☐ Equipment properly identified

☐ Quantity of groundwater treated annually: _____

☐ Quantity of surface water treated annually: _____

Remarks: _____

2. **Electrical Enclosures and Panels** (properly rated and functional)

☐ N/A ☐ Good condition ☐ Needs maintenance

Remarks: _____

3. **Tanks, Vaults, Storage Vessels**

☐ N/A ☐ Good condition ☐ Proper secondary containment ☐ Needs maintenance

Remarks: _____

4. **Discharge Structure and Appurtenances**

☐ N/A ☐ Good condition ☐ Needs maintenance

Remarks: _____

5. **Treatment Building(s)**

☐ N/A ☐ Good condition (esp. roof and doorways) ☐ Needs repair

☐ Chemicals and equipment properly stored

Remarks: _____

6. **Monitoring Wells** (pump and treatment remedy)

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ All required wells located ☐ Needs maintenance ☐ N/A

Remarks: _____

D. Monitoring Data

1. **Monitoring Data**

☒ Is routinely submitted on time ☒ Is of acceptable quality

2. **Monitoring Data Suggests:**

☐ Groundwater plume is effectively contained ☐ Contaminant concentrations are declining

E. Monitored Natural Attenuation

1. **Monitoring Wells** (natural attenuation remedy)

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ All required wells located ☒ Needs maintenance ☐ N/A

Remarks: *Numerous monitoring wells were unsecured/unlocked or in poor condition.*

X. OTHER REMEDIES

If there are remedies applied at the site and not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief Statement of what the remedy is designed to accomplish (e.g., to contain contaminant plume, minimize infiltration and gas emissions).

The selected groundwater remedy for this Site is MNA with a goal of restoring the overburden and bedrock aquifers to drinking water standards. VOC and 1,4-dioxane concentrations in some wells suggest a residual source is likely present and that MNA alone may not be sufficient to achieve the cleanup goals in a reasonable timeframe, and prevent the migration of contaminants in groundwater toward downgradient residential water supply wells.

B. Adequacy of O&M

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.

Currently, additional data is being collected at the Site through a supplemental bedrock Remedial Investigation required by the 2016 ESD to assess MNA and provide additional remedial cleanup options to address contamination in groundwater. The impact of site-related contaminants in nearby residential water supply wells has required the installaition of bottled water and waterline connections. Monitoring continues.

C. Early Indicators of Potential Remedy Problems

Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs that suggest that the protectiveness of the remedy may be compromised in the future.

Detections of 1,4-dioxane and PFAS compounds in downgradient residential wells, combined with the steady and/or upward trend of VOC and 1,4-dioxane concentrations in select source-area monitoring wells suggest that a residual source may be present, that the migration of the plume has extended into nearby residential neighborhoods which rely on groundwater for their drinking water has occurred, and that the effectiveness of MNA to reduce concentrations and minimize migration requires further evaluation.

D.	**Opportunities for Optimization**
	Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy. No opportunities for optimization of the MNA remedy were identified during this review.

APPENDIX I – SITE PHOTOGRAPHS

Photo 1: Unsecured well

Photo 2: Unsecured well with unsealed well cap

Photo 3: Unsecured well with unsealed well cap

Photo 4: Unsecured well

Photo 5: Damaged/corroded casing at base of FW-24

Photo 6: Damaged/corroded casing at base

Photo 7: Severely corroded casing

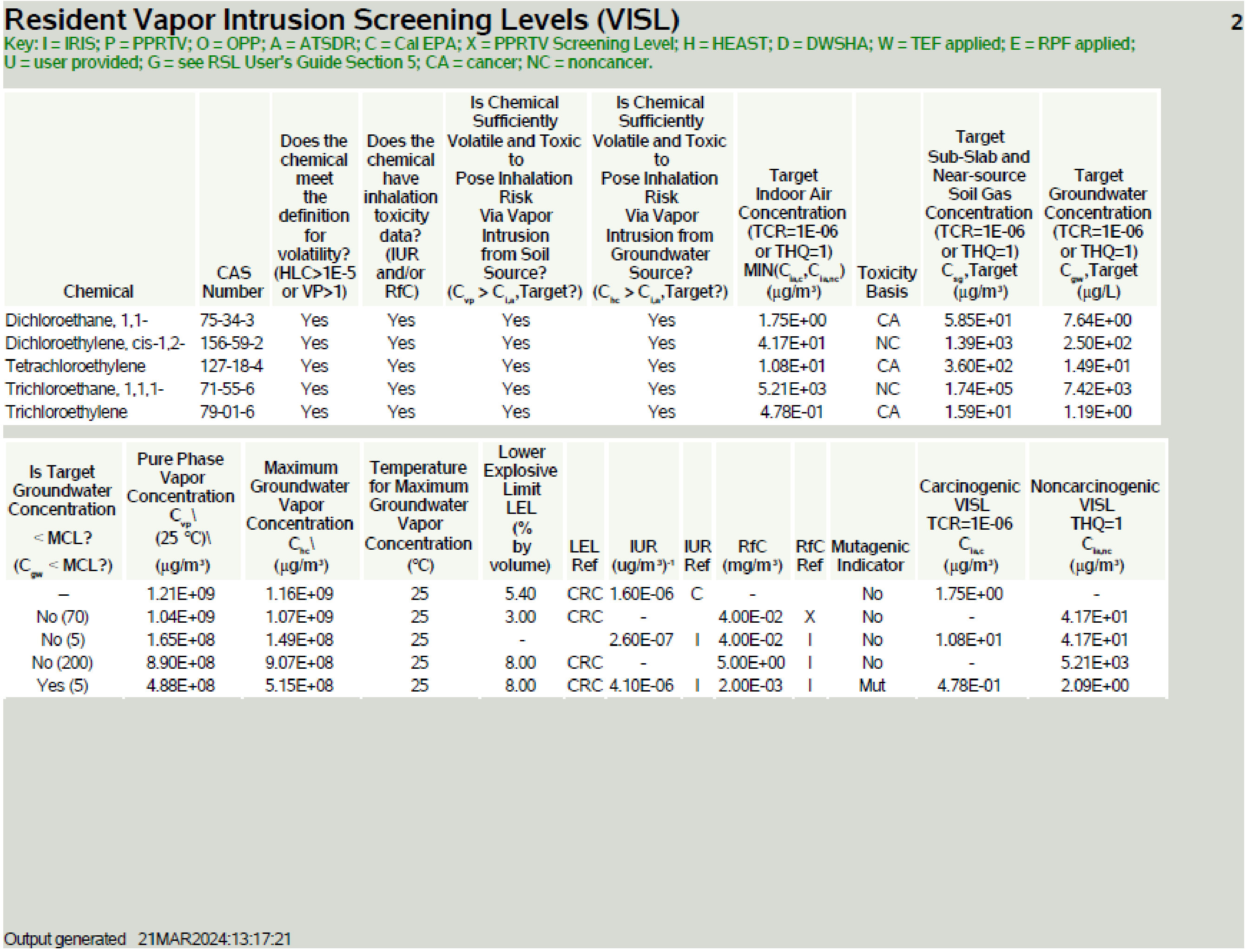
Photo 8: Unsecured well

Photo 9: Unlocked well

Photo 10: Unsecured well ERT-08

APPENDIX J – VISL OUTPUT

Data from monitoring well DVE-7, November 2023



Resident Vapor Intrusion Screening Levels (VISL)

Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = PPRTV Screening Level; H = HEAST; D = DWSHA; W = TEF applied; E = RPF applied; U = user provided; G = see RSL User's Guide Section 5; CA = cancer; NC = noncancer.

Chemical	CAS Number	Does the chemical meet the definition for volatility? (HLC>1E-5 or VP>1)	Does the chemical have inhalation toxicity data? (IUR and/or RfC)	Is Chemical Sufficiently Volatile and Toxic to Pose Inhalation Risk Via Vapor Intrusion from Soil Source? (C_{vp} > C_{ia},Target?)	Is Chemical Sufficiently Volatile and Toxic to Pose Inhalation Risk Via Vapor Intrusion from Groundwater Source? (C_{hc} > C_{ia},Target?)	Target Indoor Air Concentration (TCR=1E-06 or THQ=1) MIN($C_{ia,c}$,$C_{ia,nc}$) (µg/m³)	Toxicity Basis	Target Sub-Slab and Near-source Soil Gas Concentration (TCR=1E-06 or THQ=1) C_{sg},Target (µg/m³)	Target Groundwater Concentration (TCR=1E-06 or THQ=1) C_{gw},Target (µg/L)
Dichloroethane, 1,1-	75-34-3	Yes	Yes	Yes	Yes	1.75E+00	CA	5.85E+01	7.64E+00
Dichloroethylene, cis-1,2-	156-59-2	Yes	Yes	Yes	Yes	4.17E+01	NC	1.39E+03	2.50E+02
Tetrachloroethylene	127-18-4	Yes	Yes	Yes	Yes	1.08E+01	CA	3.60E+02	1.49E+01
Trichloroethane, 1,1,1-	71-55-6	Yes	Yes	Yes	Yes	5.21E+03	NC	1.74E+05	7.42E+03
Trichloroethylene	79-01-6	Yes	Yes	Yes	Yes	4.78E-01	CA	1.59E+01	1.19E+00

Is Target Groundwater Concentration < MCL? (C_{gw} < MCL?)	Pure Phase Vapor Concentration C_{vp}\ (25 °C)\ (µg/m³)	Maximum Groundwater Vapor Concentration C_{hc}\ (µg/m³)	Temperature for Maximum Groundwater Vapor Concentration (°C)	Lower Explosive Limit LEL (% by volume)	LEL Ref	IUR (ug/m³)⁻¹	IUR Ref	RfC (mg/m³)	RfC Ref	Mutagenic Indicator	Carcinogenic VISL TCR=1E-06 $C_{ia,c}$ (µg/m³)	Noncarcinogenic VISL THQ=1 $C_{ia,nc}$ (µg/m³)
–	1.21E+09	1.16E+09	25	5.40	CRC	1.60E-06	C	-		No	1.75E+00	-
No (70)	1.04E+09	1.07E+09	25	3.00	CRC	-		4.00E-02	X	No	-	4.17E+01
No (5)	1.65E+08	1.49E+08	25	-		2.60E-07	I	4.00E-02	I	No	1.08E+01	4.17E+01
No (200)	8.90E+08	9.07E+08	25	8.00	CRC	-		5.00E+00	I	No	-	5.21E+03
Yes (5)	4.88E+08	5.15E+08	25	8.00	CRC	4.10E-06	I	2.00E-03	I	Mut	4.78E-01	2.09E+00

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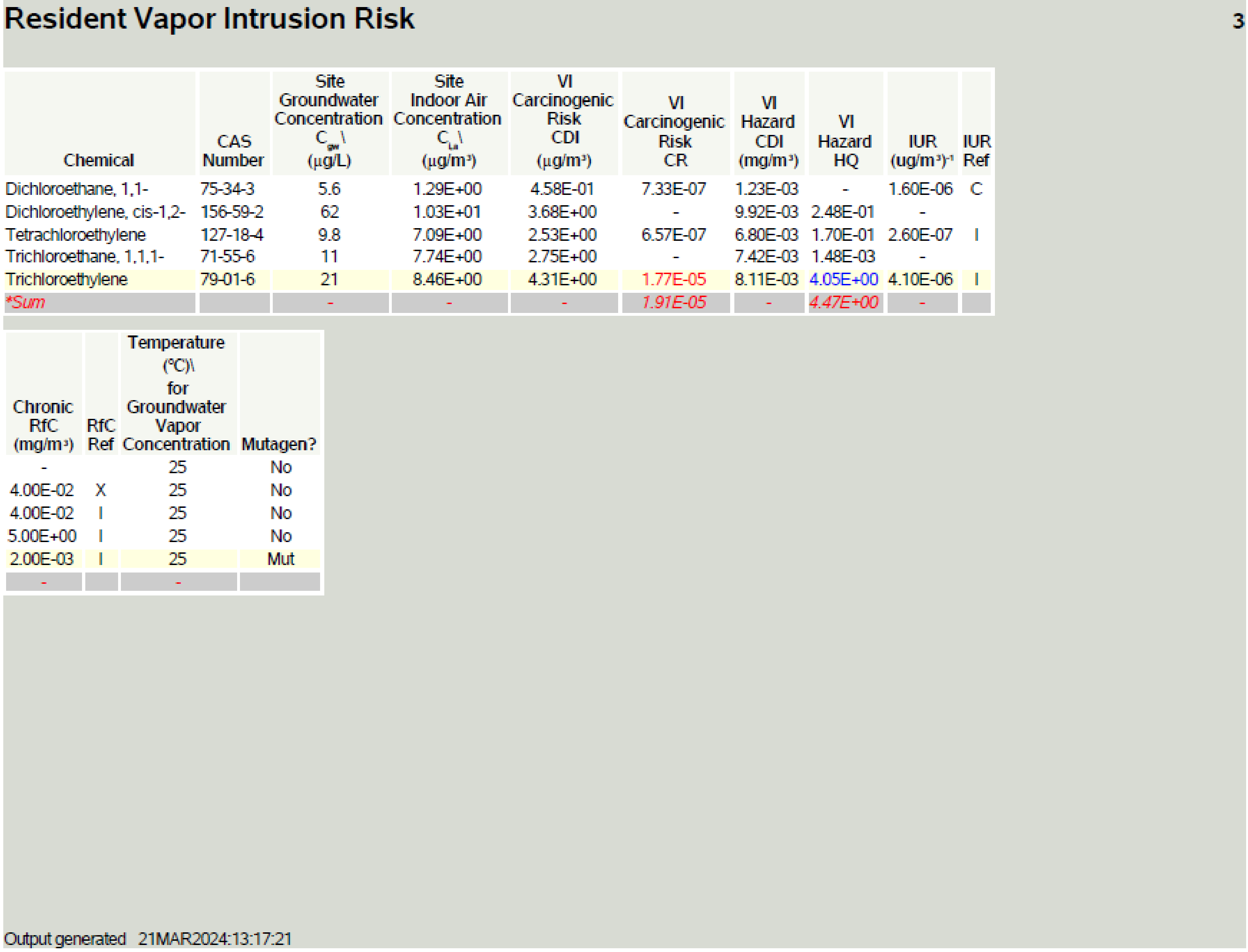

Resident Vapor Intrusion Risk

3

Chemical	CAS Number	Site Groundwater Concentration C_{gw}\ (μg/L)	Site Indoor Air Concentration C_{ia}\ (μg/m³)	VI Carcinogenic Risk CDI (μg/m³)	VI Carcinogenic Risk CR	VI Hazard CDI (mg/m³)	VI Hazard HQ	IUR (ug/m³)⁻¹	IUR Ref
Dichloroethane, 1,1-	75-34-3	5.6	1.29E+00	4.58E-01	7.33E-07	1.23E-03	-	1.60E-06	C
Dichloroethylene, cis-1,2-	156-59-2	62	1.03E+01	3.68E+00	-	9.92E-03	2.48E-01	-	
Tetrachloroethylene	127-18-4	9.8	7.09E+00	2.53E+00	6.57E-07	6.80E-03	1.70E-01	2.60E-07	I
Trichloroethane, 1,1,1-	71-55-6	11	7.74E+00	2.75E+00	-	7.42E-03	1.48E-03	-	
Trichloroethylene	79-01-6	21	8.46E+00	4.31E+00	1.77E-05	8.11E-03	4.05E+00	4.10E-06	I
**Sum*		-	-	-	*1.91E-05*	-	*4.47E+00*	-	

Chronic RfC (mg/m³)	RfC Ref	Temperature (°C)\ for Groundwater Vapor Concentration	Mutagen?
-		25	No
4.00E-02	X	25	No
4.00E-02	I	25	No
5.00E+00	I	25	No
2.00E-03	I	25	Mut
-		-	

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Appendix K – Properties Included in the GMZ under the Groundwater Management Permit

Lot Number	Property Address
007/119/0	41 Nashua Road
007/122/1	3 Rear McAllister Drive
007/122/0	2 Wesley Drive
007/124/7 007/124/9 007/124/10 007/124/13 007/124/15 007/124/19 007/124/29 007/124/33	Constitution and Capitol Hill Drive
007/124/1	1 Mercury Drive
007/124/42	2 Mercury Drive
007/124/2	3 Mercury Drive
007/124/43	4 Mercury Drive
007/124/44	8 Mercury Drive
007/124/45	10 Mercury Drive
007/124/46	12 Mercury Drive
007/127/1	3 Constitution Drive
007/124/4	11 Mercury Drive
007/124/5	13 Mercury Drive
007/124/6	15 Mercury Drive
007/124/41	9 McAllister Drive
007/124/40	11 McAllister Drive
007/124/39	13 McAllister Drive
007/127/2	15 McAllister Drive
007/127/0	17 McAllister Drive
007/117/42	26 Ross Drive
007/117/45	27 Ross Drive
007/117/44	28 Ross Drive
007/117/47	29 Ross Drive
007/117/46	30 Ross Drive
007/117/49	31 Ross Drive
007/117/48	32 Ross Drive
007/117/54	28 Tokanel Drive
007/117/56	30 Tokanel Drive
007/117/59	33 Tokanel Drive
007/117/55	39 Tokanel Drive