

STATE OF NEW HAMPSHIRE
Department of Environmental Services
Waste Management Division
Hazardous Waste Remediation Bureau

Technical Memorandum

DATE: November 6, 2020

FROM: Michael Summerlin, Project Manager

SUBJECT: Troy Mills Landfill Superfund Site

Evaluation of Remedy Protectiveness Relative to Presence of the Emerging Contaminant, PFAS

TO: Gerardo Millan-Ramos, Remedial Project Manager, USEPA

In the third Five Year Review performed by USEPA and dated September 23, 2020, the following Issue and Recommendation was identified:

OU(s): Entire Site	Issue Category: Remedy Performance			
	Issue: Need to assess whether the newly promulgated NH PFAS standards will require modification of the remedy.			
	Recommendation: Evaluate whether the remedy remains protective in light of the newly promulgated NH PFAS standards and whether additional action is needed.			
Affect Current Protectiveness	Affect Future Protectiveness	Party Responsible	Oversight Party	Milestone Date
No	Yes	State	EPA	9/30/2021

The NHDES herewith provides the requested evaluation. The following discussion of screening and regulatory values, as well as the existing groundwater data, is generally extracted from the *Spring 2020 Monitoring Report, Troy Mills Landfill Superfund Site, Troy, NH*, prepared by GZA GeoEnvironmental, Inc. and dated August 13, 2020.

PFAS Groundwater Screening and Regulatory Values

PFAS are emerging contaminants, known to be stable, persistent, and bioaccumulative in the environment. Various regulatory thresholds have been established including those used in evaluating the data collected at the Site in 2018 and 2020, as summarized below.

Screening levels (SLs) for the PFAS compounds perfluorooctanoic acid (PFOA), perfluorooctane sulfonic acid (PFOS), and perfluorobutane sulfonate (PFBS) in groundwater were developed by EPA using the Regional Screening Levels (RSL) calculator for a residential scenario and utilizing a Hazard Index (HI) equal to 0.1 to determine whether the contaminant levels present at a site may warrant further investigation. This is consistent with standard practices for screening to identify contaminants of potential concern during a Remedial Investigation. The SLs for PFOA and PFOS are each 40 nanograms per liter (ng/L) and the SL for PFBS is 40,000 ng/L. Concentrations of PFOA or PFOS in groundwater that exceed 400 ng/L exceed an HI of 1 in a risk-based scenario.

During May 2016, EPA issued a Lifetime Drinking Water Health Advisory (EPA Health Advisory) level of 70 ng/L for PFOA, PFOS, and for both PFOA and PFOS combined where these chemicals are present together. EPA recommends that the EPA Health Advisory level of 70 ng/L be used as the preliminary remediation goal (PRG) for contaminated groundwater that is a current or potential source of drinking water where no state Maximum Contaminant Level (MCL) or other ARARs are available or sufficiently protective (EPA, 2020).

In 2016, NHDES established an AGQS of 70 ng/L for PFOA, PFOS, and for both PFOA and PFOS combined where these chemicals are present together. The AGQS was based on the Reference Dose established in EPA's Health Advisory for PFOA and PFOS, as discussed above.

Effective July 23, 2020, New Hampshire established Maximum Contaminant Levels (MCLs) in drinking water for PFOA (12 ng/L), PFOS (15 ng/L), perfluorononanoic acid (PFNA, 11 ng/L), and perfluorohexane sulfonic acid (PFHxS, 18 ng/L)). New Hampshire also established AGQS for PFNA and PFHxS equivalent to the MCLs and lowered the AGQS established in 2016 for PFOA and PFOS to match the new MCLs.

Existing Groundwater PFAS Data

During 2018, NHDES initiated screening of Site groundwater for PFAS by sampling 11 of the 32 existing monitoring wells. PFOA was detected at concentrations exceeding the EPA SL, EPA Health Advisory, and AGQS in groundwater collected from 9 of the 11 sampled monitoring wells on the Site, with a maximum concentration of 790 ng/L PFOA (MW-804), and including down-gradient-most GMZ boundary well MW-105S (260 ng/L PFOA). Therefore, additional groundwater sampling for PFAS analyses was performed in 2020.

Of the 36 PFAS compounds analyzed for during 2020, 14 were detected within the groundwater samples collected from all of the groundwater wells on-Site. The following summarizes the 2020 groundwater analytical results for PFAS.

Comparison to EPA Screening and Regulatory Values

The detected concentration of PFOA exceeded the EPA SL of 40 ng/L during the spring 2020 sampling event in groundwater samples collected from overburden wells M-1, M-7, MW-C6D, MW-C6S, MW-101S, MW-102, MW-104S, MW-105S, MW-201SX, MW-202P, MW-204, MW-205, MW-301X, MW-501X, MW-601S, MW-801, MW-802, MW-803, MW-804, and MW-805 and bedrock wells MW-105D and MW-602B.

The detected concentration of PFOA and the total combined concentrations of PFOA/PFOS exceeded the EPA Health Advisory of 70 ng/L during the spring 2020 sampling event in groundwater samples collected from overburden wells M-1, M-7, MW-C6S, MW-101S, MW-102, MW-104S, MW-105S, MW-201SX, MW-202P, MW-204, MW-301X, MW-501X, MW-601S, MW-801, MW-802, MW-803, MW-804, and MW-805 and bedrock wells MW-105D and MW-602B. Exceedances of the EPA Health Advisory for PFOA are approximated as the red area (70 to 400 ng/L PFOA) on **Figure 6B**.

Concentrations of PFOA exceeding 400 ng/L (i.e., HI>1) were detected in groundwater samples collected from wells M-1, MW-C6S, MW-102, MW-204, MW-301X, MW-601S, MW-801, MW-802, MW-803, MW-804, and MW-805. The area of concentrations greater than an HI of 1 is approximated as the purple area (400 ng/L PFOA or greater) on **Figure 6B**.

The highest concentrations of PFOA were generally observed in the central portion of the defined former drum area and immediately north of the former drum area consistent with the historical extent of the VOC and SVOC plumes. The highest concentration of PFOA, 2,140 ng/L, was detected at well MW-102. Concentrations generally decrease toward the west and northwest closer to Rockwood Brook, although clear downgradient and crossgradient edges to the plume, with concentrations below regulatory values, were not delineated by the concentrations detected in groundwater collected from the existing Site well network.

PFOA was not detected above the laboratory reporting limit in groundwater samples collected from presumed upgradient bedrock wells MW-508X and MW-701, nor the MW-702 well couplet located on the western side of Rockwood Brook and the GMZ. Concentrations of PFOA detected within the groundwater samples collected from overburden/bedrock well couplet MW-105 located at the northern corner of the GMZ, and currently the downgradient-most location, exceeded the EPA screening level of 40 ng/L and the EPA Health Advisory of 70 ng/L (**Figure 6A** and **Figure 6B**).

The detected concentrations of PFOS and PFBS did not exceed the EPA SLs and concentrations of PFOS did not exceed the EPA Health Advisory.

Comparison to NH AGQS

The detected concentrations of PFOA exceeded the NH AGQS of 12 ng/L during the spring 2020 sampling event in the groundwater samples collected from overburden wells M-1, M-7, MW-A28, MW-C6D, MW-C6S, MW-101S, MW-102, MW-104S, MW-105S, MW-201SX, MW-202P, MW-204, MW-205, MW-301X, MW-501X, MW-601S, MW-801, MW-802, MW-803, MW-804, and MW-805 and bedrock wells MW-105D and MW-602B (**Figure 6A** and **Figure 6B**). Except for the addition of well MW-A28, the footprint of groundwater with exceedances of the

NH AGQS for PFOA matches the footprint for exceedances of the EPA SL for PFOA. This is approximated as the orange area (12 to 70 ng/L PFOA) on **Figure 6B**.

The detected concentrations of PFNA exceeded the NH AGQS of 11 ng/L in the groundwater samples collected during 2020 from overburden wells M-1, MW-C6S, MW-101S, MW-105S, MW-202P, MW-204, and MW-601S and bedrock well MW-105D. The detected concentration of PFHxS exceeded the NH AGQS of 18 ng/L in the groundwater sample collected from overburden well MW-102. With the exception of well couplet MW-105, each of the wells with exceedances of PFNA or PFHxS are located within the GMZ. Well couplet MW-105S/D is located at a downgradient boundary of the GMZ. EPA has not established a SL or Health Advisory for PFNA or PFHxS.

Detected concentrations of PFOS in overburden and bedrock groundwater samples did not exceed the NH AGQS of 15 ng/L.

Summary of Existing Groundwater PFAS Data

Based on the findings summarized above, PFAS data in groundwater samples indicate that concentrations of PFOA exceeding the EPA SL of 40 ng/L, EPA Health Advisory/AGQS of 70 ng/L, the EPA calculated HI=1 value of 400 ng/L, and NH AGQS of 12 ng/L are widespread on the Site. Due to the presumed discharge of groundwater to the wetland and Rockwood Brook, few monitoring wells have been installed near the GMZ boundaries and, therefore, the edges of the PFAS plume are not well delineated. Well couplet MW-105S/D, located at the northern, downgradient-most, point of the GMZ, has detected concentrations of PFOA that exceed each of the regulatory values, including AGQS, except the HI=1 value.

Evaluation of Protectiveness

In the September 2005 Record of Decision (ROD), the following Response Action Objective was “developed to aid in the development and screening of alternatives.” This, among two other RAOs, was “developed to mitigate, restore and/or prevent existing and potential future threats to human health and the environment.”

- “Limit migration of groundwater contaminants beyond a designated New Hampshire groundwater management zone (GMZ) to downgradient areas, and over time, restore all Site groundwater to safe drinking water levels...”

A Groundwater Management Zone, established in the November 3, 2009 Easement Deed and Restrictive Covenants instrument recorded in the Cheshire County Registry of Deeds on January 28, 2010 is the Institutional Control (IC) upon which management of the groundwater contaminant plume hinges. The PFAS plume extends to the GMZ and, more likely than not, beyond the GMZ, as indicated by the existing groundwater data. The nature and extent of the PFAS plume appears undefined at this time. Therefore, current management of the PFAS plume may not conform to the aforementioned RAO, and the Remedy may not currently be protective.

Next Steps

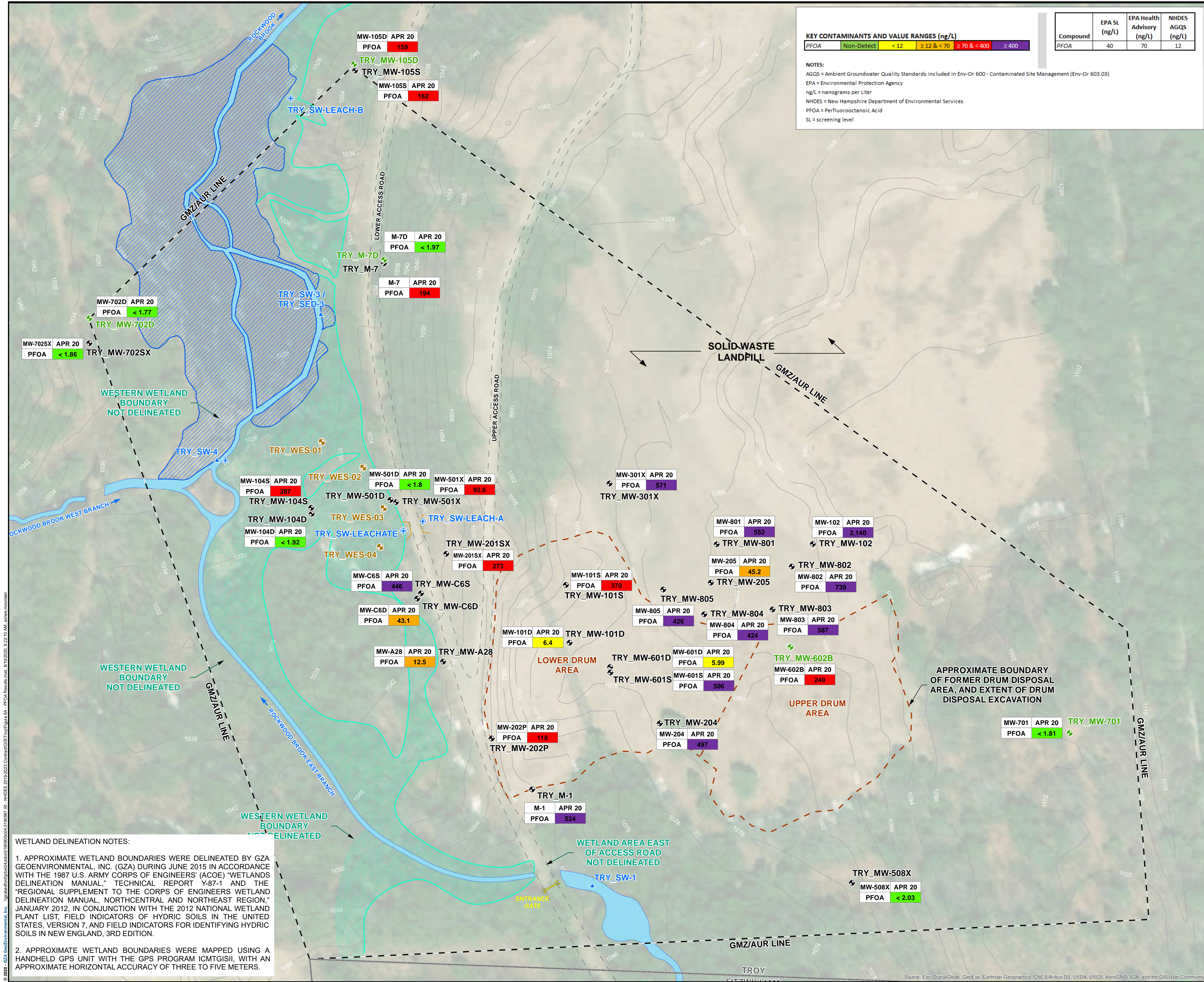
NHDES is planning to perform a groundwater monitoring round, to include the collection of samples for PFAS analysis, in the fall of 2022 from existing monitoring well locations. This will serve as a confirmatory round of data to evaluate the extent of the PFAS plume within, and at the edges of, the GMZ. Should the concentrations of PFAS at the GMZ boundary wells be confirmed to exceed the NH AGQS, then NHDES would recommend that the EPA perform supplemental Site Investigation activities to determine the nature and extent of the PFAS plume as well as a Focused Feasibility Study to evaluate appropriate revision to the existing Remedy, as necessary. As always, NHDES would be able to assist in the supplemental site investigation activities by applying for a Cooperative Agreement Grant and tasking our existing Site contractor with the needed investigations to delineate the nature and extent of the PFAS plume.

References

US EPA, 2020. EPA PFAS Action Plan: Program Update. February 2020.

Attachments

Figures 6A and 6B from *Spring 2020 Monitoring Report, Troy Mills Landfill Superfund Site, Troy, NH*, dated August 13, 2020, prepared by GZA GeoEnvironmental, Inc.



NOTES:

- BASE PLAN IS FROM NHDES GPS DATA POINTS TAKEN ON SEPTEMBER 29, 2011.
- THE GROUNDWATER MANAGEMENT ZONE (GMZ)/ACTIVITY AND USE RESTRICTION (AUR) LINE IS FROM "GROUNDWATER MANAGEMENT ZONE & ACTIVITY AND USE RESTRICTION PLAN, TROY MILLS LANDFILL, TROY, NEW HAMPSHIRE", PREPARED BY TF MORAN, INC., DATED DECEMBER 18, 2006, REVISED JANUARY 17, 2007 AND MARCH 19, 2007.
- A SURVEY OF THE SITE WELLS WAS CONDUCTED DURING FEBRUARY 2005 BY CONKLIN & SOROKA OF CHESHIRE, CONNECTICUT. THE BENCHMARK POINT USED FOR THIS SURVEY WAS MONITORING WELL TRY_M-3; ITS ELEVATION WAS ESTABLISHED AS 1037.65 (PVC) ACCORDING TO THE PLAN TITLED "TOPOGRAPHIC SURVEY DEPICTING MONITORING WELL LOCATIONS, LAND OF TROY MILLS LANDFILL." THE HORIZONTAL DATUM USED TO IDENTIFY SITE MONITORING WELLS IS NAD 83/96 PER NHDOT BASE STATION, FOLLOWING THE NEW HAMPSHIRE STATE PLANE PROJECTION, IN UNITS OF U.S. SURVEY FEET.
- GZA CHOSE TO DEPICT PFOA CONCENTRATIONS ON THIS FIGURE BECAUSE IT WAS THE ONLY PFAS CONTAMINANT THAT EXCEEDED BOTH ITS EPA SCREENING LEVEL AND EPA HEALTH ADVISORY.
- ANALYTICAL DATA DISPLAYED ON THIS FIGURE IS FROM THE APRIL 2020 SAMPLING EVENT.

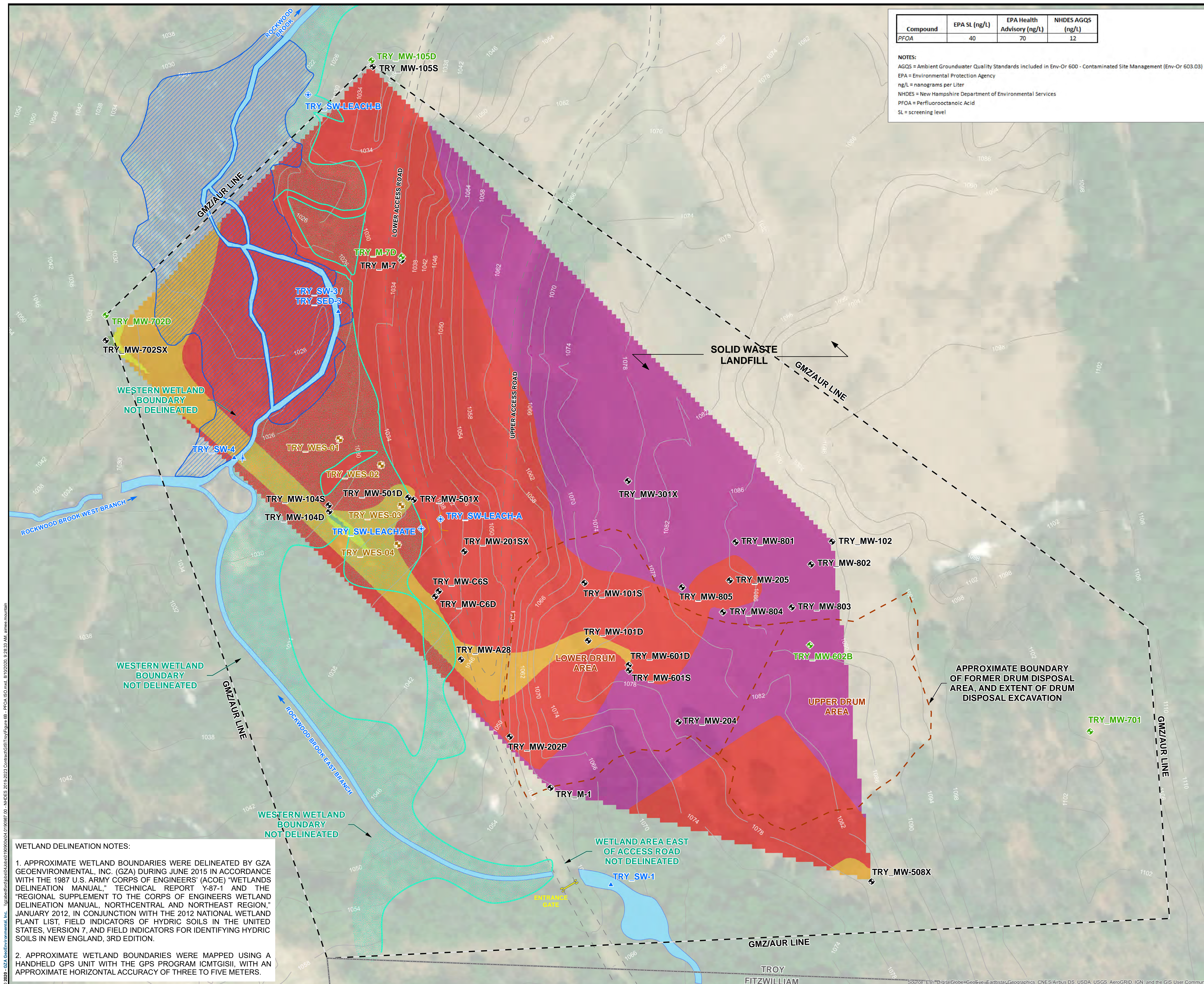
LEGEND:

- MW-701 BEDROCK MONITORING WELL
- MW-601 OVERBURDEN MONITORING WELL
- WES-01 WETLAND SOIL SAMPLE LOCATION
- SW-1 SURFACE WATER AND/OR SEDIMENT SAMPLE LOCATION
- SW-LEACH-A LEACHATE SAMPLE LOCATION
- PERMANENTLY INSTALLED STAFF GAUGE
- STREAM FLOW DIRECTION
- TOPOGRAPHIC CONTOURS (4 FEET)
- APPROXIMATE LOCATION OF FORMER DRUM DISPOSAL AREA
- APPROXIMATE WETLAND BOUNDARY
- CULVERT
- ENTRANCE GATE
- GMZ/AUR
- GRAVEL ACCESS ROAD
- TOWN LINE
- APPROXIMATE EXTENT OF FORMER PONDING
- APPROXIMATE WETLAND AREA
- SURFACE WATER

**TROY MILLS LANDFILL
SUPERFUND SITE
TROY, NEW HAMPSHIRE**

**GROUNDWATER PFOA
KEY CONTAMINANT RESULT SUMMARY (2020)**

PREPARED BY:		PREPARED FOR:	
GZA GeoEnvironmental, Inc. Engineers and Scientists www.gza.com		NHDES/EPA	
PROJ MGR: TPJ	REVIEWED BY: CGL	CHECKED BY: SRL	FIGURE 6A
DESIGNED BY: TPJ	DRAWN BY: BLW	SCALE: 1 in = 50 ft	
DATE: AUG 2020	PROJECT NO: 04.0190987.09	REVISION NO:	



NOTES:

WETLAND DELINEATION NOTES: