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Remedial Action Plan

Saint-Gobain Performance Plastics Facility
701 Daniel Webster Highway
Merrimack, New Hampshire 03054
NHDES Site No.: 199712055
Project Number: 36430

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REPORT

Remedial Action Plan

Saint-Gobain Performance Plastics
Merrimack, New Hampshire

Submitted to:

New Hampshire Dept. of Environmental Services

Hazardous Waste Remediation Bureau
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1.0 INTRODUCTION

In 2018, Saint-Gobain Performance Plastics Corporation (SGPP) and the New Hampshire Department of Environmental Services (NHDES) entered into a Consent Decree[1] to complete certain remedial measures to address per- and polyfluoroalkyl substances (PFAS) detected in environmental media at, in the vicinity of, the SGPP facility (Facility) located at 701 Daniel Webster Highway in Merrimack, New Hampshire (Figure 1-1). Pursuant to the terms of the Consent Decree, SGPP has undertaken a number of remedial measures to address PFAS in groundwater and drinking water supply wells in a broad area surrounding the Facility, including, but not limited to, providing alternative water to properties where PFAS was detected above the Ambient Groundwater Quality Standard (AGQS) in drinking water supply wells. In addition, WSP USA Inc. (WSP), on behalf of SGPP, performed a site investigation of the Facility and the properties immediately adjacent to the Facility, which are currently owned by the John Flatley Company (Flatley): Tax Lots 6E-3-1, 6E-3-3, 6E-3-4, 6E-3-5, and 6E-3-6 (the Adjacent Properties).

This Remedial Action Plan (RAP) addresses conditions at the Facility and Adjacent Properties, which historically were one contiguous property (Figure 1-2). While SGPP's on-going investigation of groundwater conditions in the broader area covered by the Consent Decree informs the analysis and recommendations set forth in this RAP, the RAP is limited to the Facility and the Adjacent Properties and is premised on the understanding that a broader Groundwater Management Zone (GMZ) will be established once SGPP's investigation of the surrounding area is completed.

This RAP provides the following:

- Background information (Section 2)
- The conceptual site model (CSM) and identification of remedial action areas (RAAs) at the Facility and Adjacent Properties (Section 3)
- Development of remedial action objectives ("RAOs" Section 4)
- Development and evaluation of remedial alternatives (Section 5), and
- Recommendations and next steps (Section 6)

2.0 BACKGROUND

Golder Associates Inc. (Golder) submitted a Supplemental Site Investigation (SSI) Report covering the Facility and Adjacent Properties to NHDES in October 2020 (Golder, 2020) and an SSI Errata in February 2021 (Golder, 2021a), collectively referred to herein as the SSI Report. The SSI Report presented stormwater, surface water, soil, and groundwater quality data collected during various phases of the SSI, and a comprehensive CSM for the Facility and Adjacent Properties. The SSI Report also identified a preliminary list of alternatives to be evaluated in this RAP.

During NHDES's review of the SSI, Golder submitted a Work Plan for Post-Regenerative Thermal Oxidizer (RTO) Stormwater and Surface Water Monitoring to NHDES in January 2021 (2021 Work Plan; Golder, 2021b). The 2021 Work Plan specified collection of wet-weather stormwater and surface water sampling after completion of post-RTO performance sampling and confirmation of RTO effectiveness. NHDES approved the 2021 Work Plan,

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[1] State of New Hampshire, Dept. of Environmental Services v. Saint-Gobain Performance Plastics Corporation, March 20, 2018.

with comments, on August 13, 2021 (NHDES, 2021). NHDES confirmed the effectiveness of the RTO on May 6, 2022 (NHDES, 2022a).

The wet-weather monitoring event specified in the 2021 Work Plan was completed on November 11, 2022, and the results were summarized in the 2022 Stormwater and Surface Water Monitoring Report submitted to NHDES on February 17, 2023 (WSP, 2023). NHDES provided comments on the Stormwater and Surface Water Monitoring report in a letter dated April 5, 2023 (NHDES 2023).

NHDES provided comments on the SSI Report in April 2022 (NHDES, 2022b) and requested that SGPP submit a RAP within 120 days of receipt of analytical results of the stormwater and surface water sampling specified in the 2021 Work Plan. WSP received the stormwater and surface water sampling analytical results on January 6, 2023.

2.1 Site History

Circa 1971, General Electric (GE) purchased approximately 170 acres of land (i.e., current Tax Lots 6E-3-1, 6E-3-2, 6E-3-3, 6E-3-4, 6E-3-5, and 6E-3-6, see Figure 1-2) between Daniel Webster Highway and the Merrimack River and began development of approximately 20 acres in the center of the parcel. GE manufactured turbine-based electrical generating components as part of their Large Steam Turbine Generator Division. GE's development included:

- A 90,000-square-foot manufacturing building (now referred to as the "Main Building")
- Several outbuildings, including the Water Tank and Pump House, the Hydro-Test Building, and what is currently referred to as the Hazardous Waste Storage Building (formerly referred to as the Oil Drum Storage Building [GE] or pressure-sensitive adhesive (PSA) Coater Building [Chemical Fabrics Corporation (ChemFab)/SGPP])
- The sanitary sewer system, which joins with the Town of Merrimack's sanitary sewer main southeast of the Facility where the Town's sanitary line runs parallel to the Merrimack River
- The stormwater conveyance system which collects runoff from the developed portion of the property and discharges to the Merrimack River southeast of the Facility

In 1984, ChemFab purchased the entire approximately 170-acre property from GE. ChemFab retrofitted the Main Building to accommodate corporate functions, weaving operations, and a research and development department during their initial occupation of the Facility. Additional operations were relocated from other facilities to the Merrimack facility over the next 15 years, including polytetrafluoroethylene (PTFE) film casting and fabric-coating operations.

In 1987, ChemFab sub-divided the property and sold approximately 150 acres of predominantly wooded/undeveloped land (current Tax Lots 6E-3-1, 6E-3-3, 6E-3-4, 6E-3-5, and 6E-3-6). ChemFab retained ownership of the developed portion of the property (approximately 21.2 acres, current Tax Lot 6E-3-2). As part of the subdivision, easements were established for the portions of the railway spur, sanitary sewer system, and stormwater conveyance system located between the eastern Facility boundary and the Merrimack River. In the mid- to late-1990s, ChemFab constructed a 55,000-square foot addition east of the Facility's Main Building (referred to as the "New Manufacturing Building") to house additional manufacturing, offices, and warehouse space.

ChemFab and its associated property were acquired by SGPP in 2000. Current operations consist of the manufacture of coated fabrics and cast extruded plastic films, and research and development related to these products.

2.2 Site Investigation History

Previous site investigations include the following:

- Initial site characterization conducted in 2016 and 2017
- Site investigation (SI) activities conducted in 2018
- Supplemental site investigation (SSI) activities conducted in 2019
- Stormwater and surface water sample collection and analysis as documented in a series of reports, including the most recent submitted by WSP in February 2023 (WSP, 2023).
- Ongoing semi-annual sampling and analysis of on-property groundwater and monthly dry-weather flow observations as documented in a series of annual reports, including the most recent submitted by Golder in April 2021 (Golder, 2021c)

A detailed description of these investigations is presented in Section 2.0 of the SI. Borehole and monitoring well locations are illustrated on Figures 2-1, and 2-2, respectively.

3.0 CONCEPTUAL SITE MODEL

The CSM is based on a series of investigations conducted by SGPP between 2016 and 2022. The results of these investigations, including a detailed presentation of CSM were provided in the SSI Report (Golder, 2020 and Golder, 2021b), and in the 2022 Stormwater and Surface Water Monitoring Report (WSP, 2023). The following sections present a summary of the CSM and include a description of the geologic and hydrogeologic conditions, a summary of the nature and extent of detections of PFAS and other constituents in soil, groundwater, stormwater, and surface water, a discussion of potential source areas, a description of potential transport pathways, and an evaluation of potential risk to receptors.

3.1 Geologic and Hydrogeologic Conditions

Sections 3.0 and 4.0 of the SSI Report presented a summary of the regional and site geologic and hydrogeologic, respectively. Key components of the geologic and hydrogeologic CSM include the following:

- Site overburden is composed primarily of a fine to medium sand ranging in thickness from approximately 11 to 43 feet overlying glacial till that ranges in thickness from 2 to 32.5 feet. Discontinuous lenses of clay are present in the fine to medium sand.
- The overburden is thinnest along the crest of the bedrock ridge (approximately 5 feet at historical geotechnical boring D-1) and thickest within the central portion of the bedrock trough (approximately 66 feet at boring MW-15B).
- The fine to medium sand becomes finer grained to the west of the facility.
- An approximately northeast-southwest linear bedrock trough is evident beneath the Facility buildings.

- An approximately northeast-southwest linear bedrock ridge is located between the Facility and the Merrimack River.
- The dominant direction of overburden groundwater flow is approximately north to south through the bedrock trough toward Dumpling Brook. East of the bedrock ridge, bedrock groundwater is interpreted to flow to the east and discharge to the Merrimack River. Overburden groundwater beneath the north-eastern portion of the Facility property flows approximately west to east toward the Merrimack River.
- The direction of vertical hydraulic gradients at the Site is variable, consistent with the observation that many of the vertical gradients are weak and are likely influenced by both short-term and longer-term precipitation trends.
- The geometric mean hydraulic conductivity of shallow overburden (1.19×10^{-2} cm/sec) is approximately two orders of magnitude greater than deep overburden (3.82×10^{-4} cm/sec). The geometric mean hydraulic conductivity of the bedrock is 5.25×10^{-5} cm/sec.
- Estimated groundwater flow velocities in the overburden ranged from approximately 0.043 ft/day to 40 feet/day in the fine and medium sand and from 0.0013 ft/day to 7.9 feet/day in the till. The lowest flow velocities were calculated for the immediate area of the Facility building where the horizontal hydraulic gradients are low. Higher flow velocities were calculated for the area between the property boundary and Dumpling Brook where horizontal hydraulic gradients steepen.
- The estimated groundwater flow velocity in bedrock ranges from approximately 0.0028 ft/day to 0.56 ft/day.

3.2 Nature and Extent of Contamination

The following sections present the potential release areas (PRA) and the nature and extent of contamination in the Site media.

3.2.1 Potential Release Mechanisms and Sources

Several potential release mechanisms, including possible air emissions and potential releases of liquid materials, have been evaluated as part of the modelling efforts and environmental investigations that have been completed. Possible air emission, deposition, and transport of perfluorooctanoic acid (PFOA) was evaluated in the Preliminary Air, Soil, and Water Modeling Technical Memorandum prepared by Barr Engineering Co. (Barr, 2018), which included modeling of:

- Air transport and deposition of PFOA on the ground surface,
- Dissolution of PFOA in water and infiltration, and
- Unsaturated zone and groundwater transport of dissolved phase PFOA.

As described in the Preliminary Air, Soil, and Water Modeling Technical Memorandum, potential air emissions of PFOA decreased substantially as SGPP's raw material suppliers reformulated the dispersions and other materials used by SGPP. NHDES estimates[2] that potential PFOA emissions in 2007 were nearly two orders of magnitude (or nearly 100 times) less than potential 2005 emissions. In addition, potential air emissions of PFAS were further

[2] Permit Application Review Summary: Application #18-0227. Issued by New Hampshire Department of Environmental Services. February 11, 2020.

reduced in 2021 with the installation of a Regenerative Thermal Oxidizer to control air emissions, as documented in the Results of the August 24-25, 2022 Regenerative Thermal Oxidizer Compliance Tests (Barr, 2022). The current potential PFAS air emissions are less than levels that would cause or contribute to a groundwater exceedance, as determined by the permit limits established by NHDES[3]

SI and SSI activities evaluated 21 PRAs. As discussed in the SSI Report, PFAS concentrations in soil and groundwater at and near the investigated PRAs were not elevated relative to conditions observed elsewhere in the vicinity of the Site. Therefore, the SSI Report concluded that the PRAs do not represent a source of PFAS to soil and/or groundwater that warrant further assessment. However, soil impacted by historical aerial deposition represents a potential secondary source of PFAS to groundwater.

In addition to PFAS, 26 groundwater samples were analyzed for volatile organic compounds (VOCs) and semi-volatile organic compounds (SVOCs). VOCs and SVOCs were not detected in samples collected from 23 of the 26 monitoring wells despite the property's almost 40-year industrial history. Low-level, sporadic concentrations of acetone, a phthalate, and/or naphthalene were detected in the remaining three wells. The absence of VOC or SVOC detections in groundwater is consistent with the conclusion that significant releases have not occurred at the PRAs.

3.2.2 Extent of Impacts in Soil

The distribution of PFOA and perfluorooctane sulfonic acid (PFOS) in Facility and Adjacent Property soils is illustrated on Figure 3-1 and 3-2, respectively. PFOA and PFOS were detected in most Facility and Adjacent Property soil samples, consistent with regional anthropogenic background (e.g., Zhu, W., et al., 2019) and/or the aerial deposition pathway (i.e., air transport and deposition of PFAS on the ground surface and into soils). To evaluate the relative distribution of PFAS in soils, analytical results were compared to NHDES S-1 and S-2 Direct Contact Risk-Based (DCRB) soil concentrations for PFAS (NHDES, 2019b). Residential (S-1) DCRB standards are considered protective of the most sensitive receptor (young children aged 2 to 6 years) in a residential scenario. Maintenance worker (S-2) DCRB standards are considered protective of potential exposure for a worker at a commercial/industrial property. Neither PFOA nor PFOS has been detected at a concentration above the maintenance worker (S-2) DCRB standards (1,300 micrograms per kilograms (ug/kg) for PFOA and 600 ug/kg for PFOS) in soil samples collected on the Facility and Adjacent Properties. PFOA and PFOS have been detected at a concentration above the residential (S-1) DCRB standards (200 ug/kg for PFOA and 100 ug/kg for PFOS) in a limited number of shallow soil (i.e., 1-foot or less) samples on the adjacent properties to the east of the Facility (i.e., Lots 6E-3-4 and 6E-3-5) as illustrated on Figure 3-1 and 3-2, respectively[4].

The SSI Report evaluated soil analytical results for non-PFAS constituents relative to NHDES Soil Remediation Standards[5] (SRSs) and identified that manganese and polynuclear aromatic hydrocarbons (PAHs) were detected at concentrations above their respective SRS values in a limited number of soil samples.

Manganese was detected at a concentration above the SRS (1,000 milligrams per kilograms (mg/kg)) in a single, isolated soil sample collected from MW-07 (location shown on Figure 2-1) at a depth of 39 to 39.5 ft-bgs (11,700 mg/kg). Manganese is naturally occurring in overburden materials in central New Hampshire. Given the depth of

[3] Permit No: TP-0256 Issued by New Hampshire Department of Environmental Service Air Resources Division.

[4] Flatley collected soil samples from soil borings in the vicinity of SGPP facility property (GZA, 2018 and GZA, 2021). Results from the Flatley soil sampling are presented on Figure 3-1 and Figure 3-2 to support delineation of PFAS impacts.

[5] New Hampshire Code of Administrative Rules, Chapter Env-Or 600 Table 600-2: Soil Remediation Standards

the MW-07 soil sample and its location below the water table, it is unlikely that direct contact with this soil will occur. The SSI Report concluded that manganese in site soils does not represent a potential unacceptable risk to human health.

PAHs were detected above NHDES SRSs in five soil samples (TMW-C-2-12IN, SG-SB-C-0-2FT, SG-SB-I-2-12IN, and SG-SB-I-0-2FT and MW-13S-0-2IN). As discussed in Section 7.2 of the SSI Report, the PAH detections are attributed to anthropogenic fill material and not to a release associated with the SGPP facility. The locations of samples with PAH detected above NHDES SRSs are illustrated on Figure 3-3.

3.2.3 Extent of Impacts in Groundwater

PFAS has been detected at concentrations above the AGQS in most overburden and shallow bedrock groundwater samples collected at the Facility and Adjacent Properties, consistent with the aerial deposition pathway from the SGPP facility (i.e., air transport and deposition of PFAS to soils and then migrating to groundwater) or other sources of PFAS (e.g., the Reed's Ferry Fire Station). The area of groundwater with PFAS concentrations above the AGQS associated with aerial deposition extends beyond the SGPP Facility and Adjacent Properties and will be the subject of a broader GMZ once SGPP has completed its ongoing investigation in the area covered by the Consent Decree.

The horizontal extent of PFOA, perfluorononanoic acid (PFNA), perfluorohexanesulfonic acid (PFHxS) and PFOS above their respective AGQS at the Facility and Adjacent Properties are presented on Figures 3-4A through 3-4D. PFOA, PFNA, PFHxS and PFOS were detected in Facility and Adjacent Property wells as follows:

- PFOA (Figure 3-4A) was detected at concentrations above the AGQS (12 ng/L) in all overburden monitoring wells on the Facility and Adjacent Properties. PFOA was detected above AGQS in most bedrock wells, however, concentrations of PFOA generally decrease with depth as discussed in SSI Section 5.2. In addition to monitoring wells on the Facility and Adjacent Properties, PFOA has been detected at concentrations above the AGQS in residential wells located upgradient of the facility along Daniel Webster Highway.

- PFNA (Figure 3-4B) was detected at a concentration above the AGQS (11 ng/L) in shallow overburden in several Facility property monitoring wells, in two overburden wells on the Adjacent Properties near the Facility property boundary (intermittently at MW-106-15 and GZ-1), and one deep overburden monitoring well (MW-06). PFNA was not detected at a concentration above the AGQS in deep overburden or bedrock monitoring wells.

- PFOS (Figure 3-4D) was detected at concentrations above the AGQS (15 ng/L) in multiple Facility shallow and intermediate overburden groundwater monitoring wells. Adjacent Property detections of PFOS at concentrations above the AGQS are limited to five overburden wells (GZ-1, MW-106-15, MW-108-40, MW-109-15, and MW-112-15). PFOS concentrations were below the AGQS in all deep overburden and bedrock wells, except for deep overburden wells MW-04, MW-06, MW-09-51, and bedrock well MW-02B-80.

The vertical extent of PFOA and PFOS above their respective AGQS is illustrated on Figures 3-4E and 3-4F, respectively. As illustrated:

- The highest PFOA concentrations in groundwater are observed in the overburden. PFOA concentrations generally decrease with depth.

- PFOS concentrations generally decrease with depth and are below the AGQS (15 ng/L) in the deep overburden (MW-06-59, MW-07-60) and bedrock monitoring well MW-15B-150.

The SSI Report identified Manganese as the only non-PFAS compound detected at a concentration above an NHDES AGQS (0.3 milligrams per liter (mg/L)). Samples collected from the following locations had concentrations of manganese above the AGQS: MW-01 (0.706 mg/L), MW-02 (0.351 mg/L), MW-02B-80 (0.349 mg/L), MW-03B-60 (0.371 mg/L), MW-05 (0.311 mg/L), MW-07-60 (1.36 mg/L), MW-09-51 (3.11 mg/L), and MW-112-15 (0.958 mg/L). In 2021 and 2022, samples collected from MW-07-60 and MW-09-51 were submitted for analysis of total and dissolved manganese. Results indicate total and dissolved manganese concentrations exceed the AGQS at MW-09-51 with a maximum detection of 0.44 mg/L. The maximum concentration of total and dissolved manganese detected at MW-07-60 in 2021 and 2022 is 0.057 mg/L, which is below the AGQS. These manganese detections are attributed to mobilized naturally occurring manganese in the formation materials. Manganese has been detected at concentrations above the AGQS in other regional wells (Ayotte and Toppin, 1995; Medalie and Moore, 1995).

3.2.4 Stormwater and Surface Water

Section 7.5 of the SSI Report summarized the preliminary CSM for stormwater and surface water. In 2022, after submittal of the SSI Report, SGPP conducted additional surface water and stormwater sampling following installation of the RTO. Results of post-RTO stormwater sampling in November 2022 (WSP, 2023) indicate that:

- PFAS concentrations in samples collected from the building roof drains and the outfall are lower after installation of the RTO and removal of the rooftop emissions points than in 2018 (i.e., pre-RTO installation).
- PFOA concentrations in 2022 first flush samples are 90% lower at the outfall and up to 93% lower in roof drain samples relative to comparable samples collected in 2018.
- Wet-weather flow that enters the Merrimack River at Outfall 001 does not result in a detectible change in PFAS concentrations in Merrimack River surface water downstream of the outfall as measured at downstream sample location SW-MERR-202 and SW-MERR-301.

NHDES suggested that exfiltration of stormwater from the stormwater conveyance system may occur during periods of lower groundwater table elevation when the stormwater system is above the water table. However, concentrations of PFAS in recent stormwater samples (WSP, 2023) are lower than concentrations in nearby shallow groundwater samples. Therefore, WSP does not consider exfiltration from the stormwater conveyance system to be a significant source of PFAS to groundwater.

Analytical results for PFOA, PFNA, PFHxS and PFOS from 2018 dry-weather sampling are illustrated on Figures 3-4A through 3-4D, respectively. There are no State surface water quality standards for comparison with the surface water analytical results. To provide context, the stormwater and surface water analytical results are compared to the USEPA April 2022 proposed Draft Freshwater Aquatic Live Water Quality Criteria[6] for PFOA (49,000,000 ng/L acute, 94,000 ng/L chronic) and PFOS (3,000,000 ng/L acute, 8,400 ng/L chronic). Concentrations of PFAS detected in surface water and stormwater near the facility are all orders of magnitude below these draft water quality criteria.

[6] https://www.epa.gov/system/files/documents/2022-04/pfoa-pfos-draft-factsheet-2022.pdf

Considering the significant decrease in stormwater concentrations between 2018 and 2022, and the sampling results demonstrating that PFAS concentrations in surface water and stormwater near the facility are orders of magnitude below USEPA proposed draft water quality criteria, no additional remedies are evaluated for stormwater or surface water in this RAP.

3.3 Remedial Action Areas (RAAs)

The following sections describe the extent of impacts in Facility and Adjacent Property media that are evaluated for remedial action based on comparison of analytical results to risk-based standards. These areas are identified as RAAs.

3.3.1 Soil

Soil represents a potential for direct contact risk to receptors and a potential secondary source of PFAS from soil to groundwater.

Direct Contact: PFAS

The Facility and Adjacent Properties are in the Town of Merrimack Industrial Zoning District. The Facility and Adjacent Properties are currently zoned for industrial/commercial use and the approved development plans for the Adjacent Properties do not include any proposed changes in zoning to allow for residential use. The Adjacent Property owner has proposed use of the Adjacent Properties (Lots 6E-3-1, 6E-3-3, 6E-3-4, 6E-3-5 and 6E-3-6) as commercial and industrial and has indicated that the Residential (S-1) DCRB standards do not apply (GZA, 2021 and GZA, 2022). Therefore, the potential receptors for soil at the Facility and Adjacent Properties include industrial/commercial workers and construction/excavation workers (i.e., maintenance workers) and only the Maintenance Worker (S-2) DCRB standards apply to the Facility and Adjacent Property soils under current and reasonably foreseeable property use.

PFAS have not been detected at concentrations above the Maintenance Worker (S-2) DCRB PFAS soil standards in Facility and Adjacent Property soils as described in Section 3.2.2. Therefore, Facility and Adjacent Property soils do not pose a direct contact risk to potential receptors under current and reasonably foreseeable property uses.

PFOA and PFOS have been detected at concentrations above their respective Residential DCRB S-1 soil standards in a limited number of shallow (generally 1-foot or less) soil samples on the Facility Property and Adjacent Property Lots 6E-3-4 and 6E-3-5 as illustrated on Figures 3-5A and 3-5B. The soils could represent a direct contact risk to residential receptors in the unlikely event that the approved uses for the properties changed and the properties were subsequently developed for residential use. Therefore, the estimated combined extent of shallow soils with PFOA and/or PFOS detections above Residential (S-1) DCRB soil standards, as illustrated on Figure 3-5C, is identified as a Residential Use Risk-Based Soil RAA for PFAS under the unlikely scenario where property use on the Adjacent Properties is changed to residential.

Direct Contact: Non-PFAS

PAHs were detected above NHDES SRSs in five soil samples as described in Section 3.2.2. The PAH detections are attributed to anthropogenic fill material and not to a release associated with the operation of the SGPP facility. However, the locations where PAH concentrations in soil have been detected at concentrations above NHDES SRSs are identified as an SRS-Based Soil RAA as shown on Figure 3-6.

Soil-to-Groundwater

The migration of PFAS (primarily PFOA) from Facility Property and Adjacent Property soils to groundwater has potential to result in, or continue to result in, the detection of PFAS at concentrations above AGQS in Facility Property and Adjacent Property groundwater. The effects of this past migration are evidenced by the detection of PFOA in all on-Site overburden (shallow) groundwater samples at a concentration above the AGQS. Therefore, all Facility and Adjacent Property soils are identified as a Soil to Groundwater RAA.

Summary of Soil RAAs

Based on the evaluation of the nature and extent of impacts and potential receptors, the following soil RAA's are evaluated for remedial action:

- Soil with PFAS concentrations above Residential (S-1) DCRB standards as identified in Figure 3-5C (Residential Use Risk-Based Soil RAA)
- Soil with PAH concentrations above SRS as identified on Figure 3-6 (SRS-Based Soil RAA)
- Soil that represents a potential source of PFAS to groundwater via migration of PFAS from soil to groundwater (i.e., all Facility and Adjacent Property soils, Soil to Groundwater RAA)

3.3.2 Groundwater

As described in Section 3.2.3, PFAS has been detected at concentrations above the AGQS in most overburden and shallow bedrock groundwater samples collected at the Facility and Adjacent Properties, consistent with the aerial deposition pathway from the SGPP facility or other sources of PFAS.

Potential receptors of Site groundwater include residential and/or commercial users of groundwater. The Facility and Adjacent Properties are currently served by public water. Therefore, Facility and Adjacent Properties groundwater does not pose a risk under current or reasonably foreseeable future uses. However, the theoretical potential future use of groundwater by on-Site residential and commercial receptors is evaluated. As such, all groundwater beneath the Facility and Adjacent Properties is identified as a Risked-Based Groundwater RAA.

Based on the evaluation of the nature and extent of impacts and potential receptors, the following RAA is evaluated for remedial actions:

- Groundwater beneath the Facility and Adjacent Properties (Groundwater RAA)

4.0 REMEDIAL ACTION OBJECTIVES (RAO)

This section establishes RAOs which are site-specific goals used in the development and evaluation of remedial action alternatives. Development of the RAOs considered the following, based on Env-Or 606.10(d)(3):

a) Remove or treat the source of contamination

b) Contain the contamination source to limit the impact to groundwater, surface water, and soil to the extent feasible

c) Protect human health from exposure through the indoor air exposure pathway

d) Protect human health from exposure through the direct contact exposure pathway

e) Contain contaminated groundwater within the limits of a proposed groundwater management zone, delineated in accordance with Env-Or 607.05

f) Restore groundwater quality to the groundwater quality criteria specified in Env-Or 603.01

g) Restore soil quality to the soil remediation criteria specified in Env-Or 606.19

Items a and b above relate to source removal, treatment, and/or containment. As described in Section 3.2.1, the primary source of impacts to soil and groundwater (i.e., potential aerial deposition of PFAS via stack emissions from the facility) was essentially eliminated when SGPP's raw material suppliers reformulated the dispersions and other materials used by SGPP. In addition, potential air emissions of PFAS were further reduced in 2021 with the installation of the RTO to control air emissions. Soil impacted by potential historical aerial deposition represents a potential secondary source of PFAS to groundwater. A soil RAO is established below for the potential secondary source of PFAS to groundwater. As described in Section 3.2.1, the SSI did not identify any other potential sources.

No human health risk has been identified for the indoor air exposure pathway (Item c). Therefore, an RAO is not established for this pathway.

Item d requires remedial action alternatives to protect human health from the direct exposure. Soil RAOs are also established below to address the potential, but unlikely, residential use direct contact exposure scenario with Facility and Adjacent Properties soils.

Items e and f relate to containing contaminated groundwater within the limits of a proposed GMZ and/or restoring groundwater quality. The Facility and Adjacent Properties are within the pre-GMZ established by NHDES and defined in the Consent Decree. SGPP currently monitors residential wells to confirm that PFAS concentrations in groundwater continue to meet AGQS within and near the perimeter of the pre-GMZ (Golder, 2019), and provides alternate water under the Consent Decree. Saint-Gobain is also discussing establishment of a final GMZ with NHDES, which is anticipated to include the area covered by the pre-GMZ plus a significant additional geographic area between the pre-GMZ and Outer Boundary lines, as established in the Consent Decree. Due to the size of the pre-GMZ and the anticipated final GMZ relative to the Facility Property and Adjacent Properties, and considering the likely more than four mile buffer area between any groundwater impacts detected at the SGPP Property and Adjacent Properties and the anticipated final GMZ, and anticipated monitoring plan to confirm that PFAS concentrations in groundwater continue to meet AGQS within and near the perimeter of the final GMZ, active remediation in groundwater at the SGPP Property and Adjacent Properties is not warranted or necessary to contain groundwater within the pre-GMZ. This is consistent with the Consent Decree which indicates that MNA is the anticipated remedy for PFAS within the pre-GMZ. Therefore, an RAO to contain groundwater within a proposed GMZ is not included in this RAP for the Facility and Adjacent Properties.

Consistent with the NHDES rules and this background, the following RAOs were considered in the evaluation of the remedial alternatives for the Facility and Adjacent Properties:

1) Soil
   a) Protect human health from potential direct contact exposure to Site soils
   b) Restore soil quality to the soil remediation criteria specified in Env-Or 606.19

   c) Remove, treat, and/or contain soil impacted by historical aerial deposition that represents a potential secondary source of PFAS to groundwater, to the extent feasible.

2) Groundwater
   a) Protect human health from potential exposure to Facility and Adjacent Property groundwater
   b) Restore groundwater quality to the groundwater quality criteria specified in Env-Or 603.01.

5.0 DEVELOPMENT AND EVALUATION OF REMEDIAL ALTERNATIVES

The following sections describe the remedial alternatives developed for each RAA. Each alternative is then evaluated to select a proposed alternative.

DES administrative rules (Env-Or 606.12(c)) require evaluation of alternatives relative to the following criteria:

- Effectiveness (Env-Or 606.12(c)(1)): Effectiveness is the ability of the alternative to achieve RAOs through eliminating or managing risk.
- Reliability (Env-Or 606.12(c)(1)): is the alternative's ability to maintain the required level of protection over the long-term after it has been implemented.
- Feasibility and ease of implementation (Env-Or 606.12(c)(2)): Feasibility and ease of implementation is evaluated as the technical and administrative feasibility of implementing an alternative and the availability of various services and materials required during its implementation.
- Risk reduction and associated benefits, Env-Or 606.12(c)(3): This is evaluated under two sub-categories:
  - Short-Term Risk: Risk to the community, workers, and the environment during implementation of the alternative.
  - Long-Term Risk: Potential risk posed by contamination remaining at the Site after implementation, including an evaluation of the adequacy of any engineering and institutional controls (ICs) necessary to manage the risk from treatment residuals and/or untreated materials remaining at the facility.
- A cost effectiveness comparison using the present worth of all future costs, Env-Or 606.12(c)(4): The cost effectiveness comparison includes a qualitative evaluation of the cost to design, construct, operate, and maintain the alternative including periodic review of the remedy.
- A clean-up time comparison, Env-Or 606.12(c)(5) will be evaluated as the timeframe to achieve RAOs (i.e., no further action)

5.1 Soil Remedial Alternatives and Evaluation

The following sections identify and evaluate the remedial alternatives developed for each soil RAA.

5.1.1 Development of Soil Remedial Alternatives

Remedial alternatives for the soil RAAs include:

- <u>Alt Soil-1: No Action</u> – the No Action alternative is evaluated for comparative purposes and assumes no active remediation of soil, no restrictions on future site use, and no maintenance or monitoring.

- Alt Soil-2: ICs - This alternative includes ICs to prohibit future residential use of the Facility and Adjacent Properties unless measures are implemented to eliminate the potential for direct contact with soils within the Residential Use Risk-Based and SRS-Based Soil RAAs. ICs are assumed to include Activity and Use Restrictions (AURs) to achieve or maintain a condition that is protective of human health and the environment. AURs are legally binding notices of land use restrictions recorded in the county registry of deeds that accompany the property deed and transfer to any subsequent property owner. AURs include a description of the Site and reasons for the limits on future activity.

  AURs would inform current and potential future Facility and Adjacent Properties owners that soils within the Residential Use Risk-Based or SRS-Based Soil RAAs exceed NHDES Residential (S-1) DCRB concentrations and/or SRSs and the properties cannot be used for residential purposes without removing, treating and/or restricting access to (isolating) the soils within the Residential Use Risk-Based Soil RAAs. The AURs would also require a management plan if soils within the Soil to Groundwater RAA are disturbed. Soil removal, treatment, and/or isolation would need to be conducted under an NHDES-approved soil management plan (SMP).

- Alt Soil-3: Low-permeability Capping of Soil to Groundwater RAA – This alternative includes installation of an engineered low permeability cap over all Facility and Adjacent Properties soils (i.e., Soil to Groundwater RAA). The objective of capping the Soil to Groundwater RAA would be to aide in the restoration of groundwater quality to AGQS by isolating soil that represents a potential secondary source of PFAS to groundwater via migration. This alternative also requires ICs to maintain the functionality of the soil cap.

  Installation of this soil cap would include the following:

  - Clearing and grubbing of existing vegetation
  - Installation of silt fencing and erosion controls
  - Re-grading and relocating soil to reduce the slope of the capping area
  - Installation of the following cap components (from bottom to top):
    - A minimum of 0.5-foot grading/shaping material to fill isolated low spots within the existing surface, bridge over hard spots, and shape the existing grade to accommodate overlying cap materials
    - A 40-mil textured high density polyethylene (HDPE) liner to serve as the primary low-permeability barrier
    - A double-sided geocomposite drainage layer to manage water that infiltrates through the vegetative layer
    - An 18-inch vegetive soil layer to support a vegetative cover.
  - Design and construction of a stormwater conveyance trench along the eastern edge and an infiltration basin for runoff from the capped area
  - Implementation of AURs to:
    - Establish cap maintenance and monitoring requirements
    - Require a SMP if the cap needs to be disturbed or removed for development activities.

- Alt Soil-4A: Excavation and Disposal of Residential Use Risk-Based Soil and the SRS-Based Soil RAAs: This alternative includes excavation and off-site disposal of soils within the Residential Use Risk-Based Soil and the SRS-Based Soil RAAs to eliminate the potential for direct contact. Excavated soils would be disposed at a permitted landfill.

  This alternative includes the following:

  - A pre-design investigation to refine the delineation of Residential Use Risk-Based Soil and the SRS-Based Soil RAAs
  - Clearing and grubbing of existing vegetation
  - Silt fencing and erosion controls
  - Excavation, transportation, and off-site disposal of Residential Use Risk-Based Soil and the SRS-Based Soil RAAs.
  - Importing fill and topsoil to re-establish site grades following excavation, as necessary

- Alt Soil 4B: Excavation and Disposal of the Soil to Groundwater RAA: This alternative would include the same elements as Alt Soil 4A; however, the extent of the soil excavation would include all Facility and Adjacent Properties soils (i.e., the Soil to Groundwater RAA). Excavation of the Residential Use Risk-Based Soil RAA and the SRS-Based Soil RAA is included in this alternative as it is within the Soil to Groundwater RAA.

5.1.2 Evaluation of Soil Alternatives

This section evaluates the soil alternatives relative to the RAOs presented in Section 4.0 using the criteria presented in Section 5.0.

5.1.2.1 Alt Soil-1: No Action

The No Action alternative is evaluated for comparative purposes and assumes no active remediation of soil, no restrictions on future site use, and no maintenance or monitoring.

- Effectiveness:
  - *Protect human health from potential direct contact exposure to Site soils*: The No Action alternative does not provide any active risk reduction related to soil. However, Facility and Adjacent Property soils do not pose a direct contact risk to potential receptors under current and reasonably foreseeable property uses.
  - *Restore soil quality to the soil remediation criteria specified in Env-Or 606.19*: This alternative would not improve the timeframe to restore soil quality to soil remediation criteria.
  - *Remove, treat, and/or contain soil impacted by historical aerial deposition that represents a potential secondary source of PFAS to groundwater, to the extent feasible*: No Action would not remove, treat, and/or contain the soil RAAs.
- Feasibility and Ease of Implementation: This alternative would be easily implemented because no services or materials are required.

- Reliability: Facility and Adjacent Property soils do not pose a direct contact risk to potential receptors under current and reasonably foreseeable property uses. However, the No Action Alternative does not restrict future property use, and therefore its reliability over the long-term is limited.
- Short-term Risk: Because this alternative does not involve any active remediation, the No Action alternative would not result in any short-term risk to human health (community or site workers) or environment during implementation.
- Long-Term Risk: Facility and Adjacent Property soils do not pose a direct contact risk to potential receptors under current and reasonably foreseeable property uses. However, the No Action Alternative does not restrict future property use, and therefore a long-term risk remains in the unlikely event that permitted land uses change and the Facility and/or Adjacent Properties are subsequently developed for residential use.
- Cost Effectiveness: The No Action alternative is the lowest-cost soil alternative.
- Clean-Up Time: The timeframe for restoration of soil under the no-action alternative would be long.

5.1.2.2 Alt Soil-2: ICs

This alternative includes ICs to prohibit future residential use of the Facility and Adjacent Properties.

- Effectiveness:
  - *Protect human health from potential direct contact exposure to Site soils*: ICs in the form of AURs will reduce the potential for exposure to impacted soils by prohibiting future residential use of the Facility and Adjacent Properties and requiring a soil management plan for activities that disturb soil.
  - *Restore soil quality to the soil remediation criteria specified in Env-Or 606.19*: This alternative would not improve the timeframe to restore soil quality to soil remediation criteria.
  - *Remove, treat, and/or contain soil impacted by historical aerial deposition that represents a potential secondary source of PFAS to groundwater, to the extent feasible*: This alternative would not remove, treat, and/or contain the Soil to Groundwater RAA.
- Feasibility and Ease of Implementation: This alternative relies on both on-property and off-property AURs which are readily implementable. The AURs are anticipated to be consistent with federal, state, and local requirements and authorization by agencies is expected to be timely. The anticipated AURs would be consistent with the Adjacent Property owners intended use for the Adjacent Properties.
- Reliability: AURs are considered a reliable form of IC to provide the required level of protection of the long-term.
- Short-term Risk: Because there is no active remediation, the ICs alternative would not result in potential risk to human health (community or site workers) or environment due to and during implementation
- Long-Term Risk: IC will manage long-term risk by restricting potential for residential direct contact with Residential Use Risk-Based RAA soils or industrial user contact with SRS-Based RAA soils. Some residual risk will remain; however, ICs are known to be effective in managing that risk.
- Cost Effectiveness: This alternative represents the lowest relative cost to implement and maintain, beyond the No Action Alternative

- Clean-Up Time: ICs could be rapidly implemented to restrict direct contact risk. The timeframe for restoration of soil to PAH SRS would be long.

5.1.2.3 Alt Soil-3: Low-permeability Capping of Soil to Groundwater RAA

This alternative includes installation of an engineered low permeability cap over all Facility and Adjacent Properties soils.

- Effectiveness:
  - *Protect human health from potential direct contact exposure to Site soils*: The cap would reduce the potential for exposure to impacted soils but would rely on ICs and long-term maintenance.
  - *Restore soil quality to the soil remediation criteria specified in Env-Or 606.19*: This alternative would not restore soil quality to soil remediation criteria.
  - *Remove, treat, and/or contain soil impacted by historical aerial deposition that represents a potential secondary source of PFAS to groundwater, to the extent feasible*: Effectiveness of this alternative is considered high with regard to containing the Soil to Groundwater RAA. However, PFAS from uncapped soils would not be addressed within wetlands buffers around Dumpling Brook or within developed portions of the Adjacent Properties. Containing the Soil to Groundwater RAA under a cap could prolong the restoration timeframe for soil or groundwater. Therefore, the effectiveness of this alternative is considered low.
- Feasibility and Ease of Implementation: Capping of the Soil to Groundwater RAA would require extensive remedial activity on property owned by others. Portions of that property are actively being developed (Lot 6E-3-4) for commercial use and future development of the remaining lots is expected. Design and construction of a low-permeability cap is inconsistent with the ongoing and expected development of the Adjacent Properties. Implementation of a soil remedy on the Adjacent Properties would require access agreements with property owners and represent a significant disruption to ongoing commercial development activities or a delay to planned commercial development activities on the undeveloped lots.

  The scale of this alternative introduces numerous implementability concerns. Capping of the soils would require clearing and regrading of approximately 100 of acres of land, construction of very large stormwater control systems, and significant ongoing maintenance of the cap.

  This alternative would pose significant permitting, design, and construction challenges including but not limited to:

  - installation of a cap and stormwater controls in the vicinity of Dumpling Brook,
  - extensive construction within the protected shoreland of the Merrimack River and
  - construction in close to an active rail line.

  Therefore, the implementability of this alternative is considered low or impracticable

- Reliability: There is high certainty that low-permeability capping of the Soil to Groundwater RAA would reliably meet risk reduction objectives for the Residential Use Risk-Based Soil RAA. For places where the capping can be implemented, there is high certainty that low-permeability capping of the Soil to Groundwater RAA would reliably achieve the RAO to contain soil impacted by historical aerial deposition. However, as discussed under implementability, there are significant portions of the Adjacent Properties where capping may not be implementable, and the reliability of this alternative would be low in those areas. Therefore, the overall reliability of this alternative would be moderate.

- Short-term Risk: Overall, Low-permeability Capping of the Soil to Groundwater RAA would pose a significant potential risk to human health (community or site workers) or environment during implementation. Earthworks during construction would increase potential for worker accidents as well as potential for impacts to the community and environment from dust, noise, and generation of greenhouse gases. Truck traffic associated with transport of materials to and from the Site increase the risk of fugitive dust, vehicle accidents, noise, and generation of greenhouse gasses thereby having significant impact to the community and environment during these activities

  This alternative would require excavation and capping activities near surface water bodies (i.e., Dumpling Brook and the Merrimack River) increasing risk of impacts to these surface water bodies during construction.

- Long-Term Risk: Low-permeability capping of the Soil to Groundwater RAA would provide an additional layer of protectiveness with regard to long-term risk, however, ICs would still be needed to maintain the cap and manage risk associated with these soils.

- Cost Effectiveness: The cost of Low-permeability Capping of the Soil to Groundwater RAA would be significantly higher than the cost of ICs (Alt Soil-2) and higher than the cost of Excavation and Disposal of the Residential Use Risk-Based and SRS-Based RAAs (Alt Soil-4A), but lower than the cost of Excavation and Disposal of the Soil to Groundwater RAA (Alt Soil-4B). Overall, this alternative would have a very high relative cost while not providing additional benefit with regard to improved effectiveness.

- Clean-Up Time: Capping of the Soil to Groundwater RAA theoretically would reduce the clean-up time. However, attainment of the RAO to restore groundwater to AGQS is expected to take many decades even if capping were implemented.

5.1.2.4 Alt Soil-4A: Excavation and Disposal of the Residential Use Risk-Based Soil and SRS-Based RAAs

This alternative includes excavation and off-site disposal of to eliminate the potential for direct contact risk.

- Effectiveness:
  - *Protect human health from potential direct contact exposure to Site soils*: Removal of the Residential Use Risk-Based Soil and SRS-Based RAAs would eliminate the potential for direct contact exposure to soils within these RAAs.
  - *Restore soil quality to the soil remediation criteria specified in Env-Or 606.19*: This alternative would remove the SRS-Based Soil RAA and thus meet the goal of restoring soil quality to the soil remediation criteria.
  - *Remove, treat, and/or contain soil impacted by historical aerial deposition that represents a potential secondary source of PFAS to groundwater, to the extent feasible*: Effectiveness of this alternative is considered low. This alternative involves removing a limited volume of soil (i.e., the Residential Use Risk-Based Soil and SRS-Based RAAs) relative to the total volume of soil within the Soil to Groundwater RAA. PFAS from the remaining soils is expected to continue to result in PFAS concentrations above AGQS in groundwater beneath Facility and Adjacent Properties.

- Feasibility and Ease of Implementation: Removal of the Residential Use Risk-Based Soil RAA would require extensive remedial activity on property owned by others. Implementation of a soil remedy on the adjacent properties would require access agreements with property owners and could represent a significant delay to planned commercial development activities on the undeveloped lots.

  The scale of this alternative introduces numerous implementability concerns. Excavation of the soil RAAs would involve removal of large quantities of soil and would require clearing and regrading of approximately ten of acres of land and construction of very large stormwater control systems. Disposal of such large quantities of PFAS-impacted soils may prove very difficult.

  Undertaking such large construction projects in the vicinity of the Merrimack River, the active rail line, and the above-ground electrical utilities would pose significant permitting, design, and construction challenges. Unknowns and data gaps indicate a high likelihood of implementation difficulties including potentially multiple phases of pre-design investigation to fully delineate the RAAs prior to implementing.

  Therefore, the implementability of this alternative is considered low.

- Reliability: There is high certainty that soil excavation and disposal would reliably meet treatment and/or risk reduction objectives for the Residential Use Risk-Based Soil and SRS-Based RAAs.

- Short-term Risk:

  Overall, Excavation and Disposal of the Residential Use Risk-Based and SRS-Based Soil RAAs would have a significant potential risk to human health (community or site workers) or environment due to and during implementation.

  Earthworks during construction would increase potential for worker accidents as well as potential for impacts to the community and environment from dust, noise, and generation of greenhouse gases. Truck traffic associated with transport of materials to and from the Site increase the risk of fugitive dust, vehicle accidents, noise, and generation of greenhouse gasses thereby having significant impact to the community and environment during these activities

- Long-Term Risk: Removal of the Residential Use Risk-Based Soil and SRS-Based Soil RAAs would eliminate long-term risk and ICs would not be needed to manage risk associated with these soils.

- Cost Effectiveness: The cost to excavate and dispose of the Residential Use Risk-Based Soil and SRS-Based Soil RAAs would be higher than the cost of ICs (Alt Soil-2), but lower than the cost of Low-permeability Capping of Soil to Groundwater RAA (Alt Soil-3) or Excavation and Disposal of the Soil to Groundwater RAA (Alt Soil-4B). Excavation would include the cost to remove the Residential Use Risk-Based Soil and SRS-Based Soil RAAs and imported fill would be needed to re-establish grades. In addition, the cost of off-site disposal would be included in this alternative, which would make it significantly more expensive than ICs.

- Clean-Up Time: Excavation and off-site disposal of the Residential Use Risk-Based Soil and SRS-Based Soil RAAs could be completed in a relative short time.

5.1.2.5 Alt Soil-4B: Excavation and Disposal of the Soil to Groundwater RAA

This alternative includes excavation and off-site disposal of all Facility and Adjacent Properties soils (i.e., the Soil to Groundwater RAA).

- Effectiveness:
  - *Protect human health from potential direct contact exposure to Site soils*: Removal of the Soil to Groundwater RAA would include removal of the Residential Use Risk-Based Soil RAA and thus would eliminate the potential for residential direct contact exposure to Site soils.
  - *Restore soil quality to the soil remediation criteria specified in Env-Or 606.19*: Removal of the Soil to Groundwater RAA would include removal of the SRS-Based Soil RAA and thus would restore soil to SRS criteria.
  - *Remove, treat, and/or contain soil impacted by historical aerial deposition that represents a potential secondary source of PFAS to groundwater, to the extent feasible*: Effectiveness of this alternative is considered high with regard to the Soil to Groundwater RAA; however, unexcavated soils within wetlands buffers around Dumpling Brook and underneath developed portions of the Adjacent Properties, or remaining soils on properties outside of the Facility and Adjacent Properties are expected to continue to result in PFAS concentrations above AGQS in groundwater beneath the Facility and Adjacent Properties. Therefore, the overall effectiveness of this alternative is considered low.
- Feasibility and Ease of Implementation: Excavation and Off-site Disposal of the Soil to Groundwater RAA would require extensive remedial activity on property owned by others. Portions of that property are actively being developed during 2023. Implementation of a soil remedy on the adjacent properties would require access agreements with property owners and represent a significant disruption to ongoing commercial development activities (Lot 6E-3-4) or a delay to planned commercial development activities on the undeveloped lots.

  The scale of this alternative introduces numerous implementability concerns. Excavation of the soils would require clearing and regrading of approximately 100 acres of land.

  This alternative would pose significant permitting, design, and construction challenges including but not limited to:

  - excavation activities in the vicinity of Dumpling Brook,
  - extensive construction within the protected shoreland of the Merrimack River and
  - construction near an active rail line.

  Therefore, the implementability of this alternative is considered low or impracticable.
- Reliability: There is high certainty that Excavation and off-Site Disposal of the Soil to Groundwater RAA would reliably meet risk reduction objectives for the Risk-Based Soil RAA which exists within the Soil to Groundwater RAA. For places where the excavation can be implemented, there is high certainty excavation and disposal of the Soil to Groundwater RAA would reliably achieve the RAO to remove or contain soil impacted by historical aerial deposition. However, as discussed under implementability, there are significant portions of the Adjacent Properties where excavation of soils may not be implementable, and the reliability of this alternative would be low in those areas. Therefore, the overall reliability of this alternative would be moderate.
- Short-term Risk: Overall, this alternative would have a significant potential risk to human health (community or site workers) or environment due to and during implementation.

Earthworks during construction would increase potential for worker accidents as well as potential for impacts to the community and environment from dust, noise, and generation of greenhouse gases. Truck traffic associated with transport of materials to and from the Site increase the risk of fugitive dust, vehicle accidents, noise, and generation of greenhouse gasses thereby having significant impact to the community and environment during these activities

This alternative would require excavation and capping activities in close proximity to surface water bodies (Dumpling Brook and the Merrimack River) increasing risk of impacts during construction.

- Long-Term Risk: Removal of the Soil to Groundwater RAA would eliminate long-term risk, however, ICs would still be needed to manage risk associated with soils that cannot be excavated within wetlands buffers around Dumpling Brook and within developed portions of the Adjacent Properties.
- Cost Effectiveness: The cost of Excavation and off-Site Disposal of the Soil to Groundwater RAA would be the highest cost soil alternative evaluated. Excavation would include the cost to remove the Soil to Groundwater RAA and substantial quantities of imported fill would be needed to re-establish grades. In addition, the cost of off-site disposal would be included in this alternative, which would make it significantly more expensive than ICs. The cost associated with this alternative would be many times higher than Soil Alt-3 or Soil Alt-4A, with no additional benefit associated with this alternative due to its limited effectiveness. Significant data gaps exist with regard to the extent and depth of excavation for this alternative, which make estimation of cost for this alternative impracticable.
- Clean-Up Time: Excavation and Disposal of the Soil to Groundwater RAA theoretically would reduce the clean-up time. However, attainment of the RAO to restore groundwater to AGQS is expected to take many decades even if this alternative were implemented.

5.1.3 Summary of Soil Alternatives Evaluation and Recommendation

The following soil alternatives were evaluated:

- Alt Soil-1: No Action
- Alt Soil-2: ICs
- Alt Soil-3: Low-permeability Capping of the Soil to Groundwater RAA
- Alt Soil-4A: Excavation and Disposal of Residential use Risk-Based Soil RAA
- Alt Soil 4B: Excavation and Disposal of the Soil to Groundwater RAA

Alt Soil-1 is eliminated from further consideration because it does not provide any risk-reduction or risk management.

Alt Soil-3 and Alt Soil-4B, which involve capping or removal of the Soil to Groundwater RAA, respectively, are both eliminated because the primary of objective of capping or removal of the Soil to Groundwater RAA is to reduce or eliminate the migration of PFAS from soil to groundwater that results in PFAS concentrations above AGQS. Alt Soil-3 and Alt Soil-4B are considered effective measures to reduce or eliminate the migration of PFAS from the Soil to Groundwater RAA. However, migration of PFAS from soil to groundwater on properties outside of the Facility and Adjacent Properties is expected to continue to result in PFAS concentrations above AGQS in groundwater beneath the Facility and Adjacent Properties. The implementability of Alt Soil-3 and Alt Soil-4B is considered low or impracticable primarily due to their scale. In addition, both alternatives are not cost effective because they would have a very high relative cost and do not provide additional benefit (i.e., effectiveness).

Alt Soil-2 and Alt Soil-4A both focus on managing (Alt Soil-2) or eliminating (Alt Soil-4A) the risk posed by Facility and Adjacent Property Soils based on an unlikely Residential Use development scenario. Alt Soil-2 is considered the preferred soil alternative relative to Alt Soil-4A for several reasons. Under current and reasonably foreseeable site use (i.e., non-residential), there is no risk to human health due to direct contact with soils. Soil Alt-2 ensures that future uses of the Facility and Adjacent Properties will not change (i.e., an activity use restriction (AUR) will be placed on the properties to restrict residential use) or require that soils that potentially represent a human health risk under a changed site use are appropriately managed under a soils management plan. While Soil Alt 4A addresses potential future site uses and risks through soil removal, it does so with several implementation challenges (i.e., property owner acceptance, permitting, and construction challenges), at a much a much higher cost, and with much higher short-term risk to site workers, the community, and the environment.

Alt Soil-2 is consistent with the ongoing development of the adjacent properties (i.e., commercial/industrial use) under a soil management plan. Alt Soil-2 provides the best combination of cost effectiveness and implementability while addressing identified risk under current and potential future use of the Facility and Adjacent Properties. Therefore, the recommended alternative for soil is Alt Soil-2: Institutional Controls.

5.2 Groundwater Remedial Alternatives

The following sections identify and evaluate the remedial alternatives developed for the Groundwater RAA.

5.2.1 Development of Groundwater Remedial Alternatives

Remedial alternatives for the Groundwater RAA include:

- Alt GW-1: No Action: – the No Action alternative is evaluated for comparative purposes and assumes no active remediation of groundwater, no restrictions on groundwater use, and no maintenance or monitoring.
- Alt GW-2: ICs and Monitored Natural Attenuation (MNA): Under this alternative, industrial or residential use of Facility and Adjacent Properties groundwater would be restricted to eliminate potential exposure to groundwater. Under New Hampshire Rules (Env-Or 607.01) control of groundwater use is managed through a Groundwater Management Permit (GMP), which establishes a GMZ. The Facility and Adjacent Properties are already within the pre-GMZ and will be within the final GMZ, when established (see Section 4.0). The Facility and developed Adjacent Properties are served by public water supply. Section 7.9 of the SSI Report included a potential receptor survey which concluded that residential properties within 1,000 feet of the SGPP property have been connected to a public water supply.

  This alternative includes Monitored Natural Attenuation (MNA) of groundwater to demonstrate that processes (e.g., dilution, sorption, biodegradation) are occurring and concentrations are trending towards achievement of remedial goals. As indicated in the Consent Decree, MNA and the provision of alternate water is anticipated to be the appropriate remedial action for all groundwater within the Consent Decree defined pre-GMZ. While the Consent Decree noted “areas of high concentration PFCs [PFAS] attributable to Respondent that require treatment to prevent the further spread of PFCs [PFAS]”, the SSI Report evaluated PRAs and no PRAs were identified as significant sources (see Section 3.2.1). In addition, available groundwater quality data from existing monitoring wells on the Facility and Adjacent Properties (Golder, 2021c) indicate that groundwater quality is stable (i.e., the extent of impacts is not increasing). MNA would be implemented for groundwater at the Facility and Adjacent Properties and would include development and implementation of a long-term groundwater quality monitoring program to evaluate the MNA remedy. The conceptual MNA monitoring program for the Facility and Adjacent Properties assumes annual monitoring or bi-annual monitoring (every other year) at many of the existing monitoring wells and annual reporting to evaluate monitoring data. An interim groundwater monitoring plan is presented in Appendix A.

- Alt GW-3: Groundwater Hydraulic Control and Treatment: This alternative includes groundwater extraction and treatment to achieve the RAO of restoring groundwater quality to AGQS by intercepting upgradient PFAS-impacted groundwater before it flows beneath the Facility and Adjacent Properties and providing mass removal from the interior of the Facility and Adjacent Properties. Extracted groundwater would be discharged to the publicly owned treatment works (POTW), to surface water under a National Pollutant Discharge Elimination System (NPDES) permit, or recharged to the subsurface. The need for, and type of treatment of extracted groundwater would depend on where the extracted water is discharged.

  The conceptual layout of a groundwater hydraulic control and treatment system is illustrated on Figure 5-3. The system would include paired overburden and bedrock groundwater extraction wells along an approximately 4,100-foot long upgradient hydraulic control system to intercept PFAS-impacted groundwater before it flows beneath the Facility and Adjacent Properties. Assuming an extraction well spacing of between 100 and 200 linear feet, the upgradient hydraulic control system would include between approximately 21 and 42 paired extraction wells. Given the degree of uncertainty in the thickness and hydraulic properties of geologic materials along the upgradient property boundary, there is significant uncertainty in the number of wells required to implement this alternative. An additional 4 to 10 extraction wells would be needed to capture groundwater with the areas of highest PFAS concentration (see Figure 5-1). 5,000 or more linear feet of conveyance piping would be required to route extracted groundwater to a treatment system.

  Treatment of groundwater would consist of greensand for manganese removal followed by ion exchange or granular activated carbon for PFAS removal. Additional treatment processes may be needed depending on discharge location and permit requirements.

- Alt GW-4: Passive In-situ Groundwater Treatment: This alternative includes in-situ passive treatment of upgradient groundwater (i.e., reactive flow-through wall) to achieve the RAO of restoring groundwater quality to AGQS by treating upgradient PFAS-impacted groundwater before it flows beneath the Facility and Adjacent Properties.

  The conceptual alignment of the upgradient reactive flow-through wall is the same as alignment of the groundwater hydraulic control system as illustrated on Figure 5-1 and would be approximately 4,100 feet long. Implementation of this alternative would be limited to overburden and would not address bedrock groundwater. Installation of a reactive flow-through wall is not considered feasible in areas of shallow bedrock. Restoration of interior groundwater using passive treatment technologies is not considered practical.

5.2.2 Evaluation of Groundwater Alternatives

This section evaluates the groundwater alternatives relative to the RAOs presented in Section 4.0 using the criteria presented in Section 5.0.

5.2.2.1 Alt GW-1: No Action

The No Action alternative includes no additional remedial action at the Site and Adjacent Properties.

- Effectiveness:
  - *Protect human health from potential exposure to Facility and Adjacent Property groundwater:* Facility and Adjacent Properties groundwater is currently not used for industrial or residential purposes because the developed properties are served by public water. Therefore, groundwater does not currently pose a risk to human health. The No Action alternative does not restrict future installation of groundwater extraction wells for drinking water use.
  - *Restore groundwater quality to AGQS:* The No Action alternative would not restore groundwater quality to AGQS.
- Feasibility and Ease of Implementation: No Action would be easily implemented because no additional services or materials are required beyond those already committed for implementation of Alternate Water.
- Reliability: The Facility and Adjacent Properties do not currently utilize groundwater as tap water. However, future of groundwater is not currently restricted.
- Short-Term Risk: Because this alternative does not involve any active remediation, the No Action alternative would not result in any short-term risk to human health (community or site workers) or environment during implementation.
- Long-Term Risk: Facility and Adjacent Properties groundwater is currently not used for industrial or residential purposes because the developed properties are served by public water. However, the No Action Alternative does not restrict future use of groundwater. Therefore, a long-term risk remains in the unlikely event that groundwater is developed for use at the Facility and/or Adjacent Properties.
- Cost effectiveness: The No Action alternative is the lowest-cost groundwater alternative.
- Clean-up time: No Action does not address the restoration of groundwater quality.

5.2.2.2 Alt GW-2: Institutional Controls and Monitored Natural Attenuation

Under this alternative, industrial or residential use of Facility and Adjacent Properties groundwater would be restricted to eliminate potential exposure to groundwater via a GMP.

- Effectiveness:
  - *Protect human health from potential exposure to Facility and Adjacent Property groundwater* - ICs will protect human health by restricting the future use of groundwater at the Facility and Adjacent Properties.
  - *Restore groundwater quality to AGQS* - Restoration of groundwater quality to AGQS using MNA is expected to take a long time
- Feasibility and Ease of Implementation: ICs in the form of groundwater use restrictions associated with a future GMP are anticipated to be consistent with the intended use of the Facility and Adjacent Properties. There are no known and/or anticipated challenges associated with implementation of MNA for groundwater and the required services, materials, equipment, and specialists are readily available.
- Reliability: Implementation and enforcement of ICs to prevent exposure to and use of groundwater is expected to be highly reliable. The long-term reliability of MNA for PFAS is uncertain and would take many decades to meet the RAO of restoring groundwater quality to AGQS.

- Short-Term Risk: Because this alternative does not involve any active remediation, ICs and MNA would not result in any short-term risk to human health (community or site workers) or environment during implementation.
- Long-Term Risk: ICs associated with a future GMP will rely on a town ordinance or deed notice to restrict the use of groundwater. There is minimal risk that a future property owner would extract groundwater for use as drinking water. The results of long-term monitoring of groundwater under MNA could be used to inform management of risk associated with impacted media at the Facility and Adjacent Properties. However, it does not provide additional benefit with regard to long-term risk management.
- Cost effectiveness: This alternative represents the lowest relative cost to implement and maintain, excluding the No Action alternative.
- Clean-up time: Implementation if ICs and MNA does not provide added benefit with regard to clean-up time.

5.2.2.3 Alt GW-3: Groundwater Hydraulic Control and Treatment

This alternative includes groundwater extraction and treatment to achieve the RAO of restoring groundwater quality to AGQS by intercepting upgradient PFAS-impacted groundwater

- Effectiveness:
  - *Protect human health from potential exposure to Facility and Adjacent Property groundwater:* This alternative would only provide additional protectiveness after groundwater quality has been restored to AGQS.
  - *Restore groundwater quality to AGQS:* Hydraulic interception of upgradient groundwater with PFAS concentrations above AGQS before it flows beneath the Facility and Adjacent Properties and providing mass removal at the Facility and Adjacent Properties is expected to be partially effective at reducing PFAS concentrations in groundwater beneath the Facility and Adjacent Properties. However, unless conducted in tandem with complete capping or removal of Soil to Groundwater RAA, PFAS concentrations in groundwater are expected to remain above AGQS due to migration from soils from the surrounding area as well as the Site and Adjacent Properties. As discussed in Section 5.1.2.3 and 5.1.2.5, there are substantial implementation challenges for capping or removal of the Soil to Groundwater RAA and the implementability of these soil alternatives is considered low or impracticable and these potential soil alternatives were eliminated based on overall infeasibility (Section 5.1.3). Therefore, the effectiveness of Groundwater Alternative 3 as a stand-alone technology is considered low.
- Feasibility and Ease of Implementation: The scale and complexity of hydraulicly capturing all groundwater that currently flows beneath the Facility and Adjacent Properties as presented in Figure 5-1 would present significant challenges. Complete hydraulic capture of upgradient groundwater may prove difficult in a fractured bedrock environment and/or in soils with variable hydraulic properties. Implementation of the remedy would require active construction on properties owned by others, portions of which are actively being developed in 2023. The remedy would require operation, maintenance, and monitoring over a very long time. Therefore, the feasibility and ease of implementation of Alt GW-3 is considered low.
- Reliability: Hydraulic control systems are generally considered reliable. However, attainment and continued maintenance of complete hydraulic control over such a large horizontal extent and across multiple hydrostratigraphic units (i.e., overburden and fractured bedrock) presents significant technical challenges.

Loss of hydraulic control, even over a short period, could result in recontamination of Facility and Adjacent Properties groundwater from upgradient areas. Therefore, the reliability of this alternative is considered moderate to low.

- Short-Term Risk: This alternative would pose a significant potential risk to human health (community or site workers) or environment during implementation. Drilling, well installation, installation of 5,000+ feet of conveyance piping, and construction of a groundwater treatment plant would increase the potential for worker accidents and potential for impacts to the community and environment from dust, noise, and generation of greenhouse gases. Therefore, the short-term risks are considered moderate to high.

- Long-Term Risk: Operation of the hydraulic control system would require long-term operation, maintenance, and monitoring of the extractions wells, conveyance piping, and water treatment facility, posing a long-term risk to workers. Greenhouse gasses associated with electrical use would be generated throughout the lifetime of the system. Large-scale extraction of groundwater would alter groundwater and surface water flow and potentially impacting surrounding streams, rivers, and ecology. Use of Facility and Adjacent Property groundwater as resource (the reason for the remedy) would be severely restricted because a) groundwater use would interfere with hydraulic control system and, b) the hydraulic control would significantly limit the volume of water available for commercial or residential use.

- Cost effectiveness: Implementation of this alternative is complex and would entail significant costs. This alternative also includes the cost of continued operation, maintenance, and monitoring of the hydraulic control. Cost is considered high.

- Clean-up time: Hydraulic control can typically be attained in a relatively short time if the system is design, operated and maintained effectively. Groundwater extraction from the interior of the site would also remove PFAS mass relatively quickly. However, clean-up would only be achieved if this alternative were combined with capping or removal of Facility and Adjacent Property soils that serve as a continuing source of PFAS to groundwater. As discussed in Section 5.1.2.3 and 5.1.2.5, there are substantial implementation challenges for capping or removal of the Soil to Groundwater RAA and the implementability of these soil alternatives is considered low or impracticable and these potential soil alternatives were eliminated based on overall infeasibility (Section 5.1.3). In addition, the upgradient hydraulic control would need to be maintained indefinitely until such time that upgradient groundwater quality meets AGQS.

5.2.2.4 Alt GW-4: Passive In-Situ Groundwater Treatment

This alternative includes in-situ passive treatment of upgradient groundwater (i.e., reactive flow-through wall).

- Effectiveness:
  - *Protect human health from potential exposure to Site and Adjacent Property groundwater.* This alternative would only provide additional protectiveness after groundwater quality has been restored to AGQS.
  - *Restore groundwater quality to AGQS:* In-situ passive treatment of upgradient groundwater with PFAS concentrations above AGQS before it flows beneath the Facility and Adjacent Properties is expected to be partially effective at reducing PFAS concentrations in groundwater beneath the Facility and Adjacent Properties. However, a passive treatment wall cannot be installed in bedrock. Therefore, the alternative would not be effective at treating bedrock groundwater quality. In addition, unless conducted in tandem with complete capping or removal of Soil to Groundwater RAA, PFAS concentrations in groundwater are

expected to remain above AGQS due to migration of PFAS from soils from the surrounding area as well as the Site and Adjacent Properties. As discussed in Section 5.1.2.3 and 5.1.2.5, there are substantial implementation challenges for capping or removal of the Soil to Groundwater RAA and the implementability of these soil alternatives is considered low or impracticable and these potential soil alternatives were eliminated based on overall infeasibility (Section 5.1.3). Therefore, the effectiveness of Groundwater Alternative 4 as a stand-alone technology, or in tandem with capping or removal of the Soil to Groundwater RAA, is considered very low.

- Feasibility and Ease of Implementation: The scale and complexity of implementing Passive In-Situ Groundwater Treatment on the scale presented in Figure 5-1 would present significant implementation challenges. Construction of a passive reactive treatment wall over such a long distance through variable geologic conditions would also present implementation challenges. A passive reactive treatment wall cannot be constructed in bedrock to treat bedrock groundwater. This alternative would require active construction on properties owned by others, portions of which are actively being developed in 2023. Therefore, the feasibility and ease of implementation of Alt GW-4 is considered low for overburden, and impracticable for bedrock.
- Reliability: Under ideal condition, passive treatment walls are generally considered reliable. However, common problems include groundwater bypass (either around or under the wall) and decreasing effectiveness of the treatment media over time. Given the complexity of the treatment wall as considered for this application, the reliability of Alt-4 is considered low.
- Short-Term Risk: This alternative would pose a significant potential risk to human health (community or site workers) or environment during construction. Construction of a 4,000+ foot-long treatment wall would increase potential for worker accidents and potential impacts to the community and environment from dust, noise, and generation of greenhouse gases. Therefore, the short-term risks are considered moderate to high.
- Long-Term Risk: Due the passive nature in in-situ passive treatment walls, the long-term risk of this alternative is considered low.
- Cost effectiveness: The cost to design and construction of a 4,000+ foot-long passive treatment wall would be costly. Given that the alternative would only be partially effective (i.e., would not treat bedrock groundwater), Alt GW-4 is not considered cost effective.
- Clean-up time: Passive treatment walls are typically immediately effective at treating groundwater that passes through the wall. However, decrease in contaminant concentrations downgradient of the of the treatment wall will take much longer to attenuate. However, given that bedrock groundwater will not be treated, restoration of groundwater beneath the Facility and Adjacent Properties is not expected until such time that upgradient bedrock groundwater quality meets AGQS. In addition, clean-up would only be achieved if this alternative were combined with capping or removal of Facility and Adjacent Property soils that serve as a continuing source of PFAS to groundwater. As discussed in Section 5.1.2.3 and 5.1.2.5, there are substantial implementation challenges for capping or removal of the Soil to Groundwater RAA and the implementability of these soil alternatives is considered low or impracticable.

5.2.3 Summary of Groundwater Alternatives

The following groundwater alternatives were evaluated:

- Alt GW-1: No Action

- Alt GW-2: ICs and MNA
- Alt GW-3: Groundwater Hydraulic Control and Treatment
- Alt GW-4: Passive In-situ Groundwater Treatment

Alt GW-1 is eliminated from further consideration because it does not provide any additional risk-reduction or risk management.

Alt GW-3 and Alt-GW-4 involve the hydraulic interception (Alt GW-3) or in-situ treatment (Alt GW-4) of upgradient groundwater with PFAS concentrations above AGQS that flows beneath the Facility and Adjacent Properties. In-situ treatment (Alt GW-4) would only be partially effective because it would not treat bedrock groundwater. Therefore, Alt GW-4 is eliminated form further considerations due to lack of effectiveness.

Hydraulic interception of upgradient groundwater with PFAS concentrations above AGQS before it flows beneath the Facility and Adjacent Properties and providing mass removal at the Facility and Adjacent Properties (i.e., Alt GW-4) is expected to be partially effective at reducing PFAS concentrations in groundwater beneath the Facility and Adjacent Properties. However, unless conducted in tandem with complete capping or removal of Soil to Groundwater RAA, PFAS concentrations in groundwater are expected to remain above AGQS due to migration from soils from the surrounding area as well as the Facility and Adjacent Properties. As concluded in Section 5.1.3, the two soil alternatives evaluated to cap (Alt Soil-3) or remove (Alt Soil-4B) the Soil to Groundwater RAA were both eliminated from further evaluation because both have low ratings for feasibility and ease of implementation (primarily due to the scale of the alternatives) and due to the overall lack of cost effectiveness (i.e., both alternatives are considered to have very high costs while not achieving benefit with regard to effectiveness). In addition, upgradient groundwater interception would be required until such time that upgradient groundwater quality is restored to AGQS, which is anticipated to take a very long time. In the interim, the hypothetical future use of Facility and Adjacent Property groundwater (the reason for the active remedy) would be severely restricted because a) groundwater use would interfere with hydraulic control system, and b) the hydraulic control would significantly limit the volume of water available for commercial or residential use. For these reasons and because public water is readily available to the Facility and Adjacent Properties, future use of groundwater at these properties is highly unlikely. Therefore, Alt GW-4 is eliminated from further consideration.

Under Alt GW-2, ICs and MNA, industrial or residential use of Facility and Adjacent Properties groundwater would be restricted to eliminate potential exposure to groundwater. Control of groundwater use can be effectively managed through a GMP and establishment of a GMZ. The Facility and Adjacent Properties are already within the pre-GMZ defined in the Consent Decree, and will be within the final GMZ, when established (see Section 4.0). The Facility and Adjacent Properties are served by public water supply, therefore future use of groundwater at the Facility and Adjacent Properties is considered highly unlikely. Alt GW-2 is considered to be readily implementable, reliable, has few if any short or long-term risks, and is cost effective. Therefore, Alt GW-2, ICs and MNA is the recommended alternative for groundwater.

6.0 RECOMMENDATIONS AND NEXT STEPS

The following sections describe the recommended remedial alternative and the proposed next steps for implementation.

6.1 Recommended Remedial Alternative

Based on the detailed evaluation of alternatives presented in Section 5.0, the recommended remedial alternative for the Facility and Surrounding Properties includes a combination of Alt Soil-2 (Institutional Controls) and Alt GW-2 (Institutional Controls and Monitored Natural Attenuation). This proposed remedial approach is consistent with the ongoing activities under the Consent Decree. Remedial cost estimates for the recommended remedial alternatives is included in Appendix B.

Under current and reasonably foreseeable site use (i.e., non-residential) there is no risk to human health due to direct contact with soils. Soil Alt-2 ensures that future uses of the Facility and Adjacent Properties will not change (i.e., an AUR will be placed on the properties to restrict residential use) or require that soils that potentially represent a human health risk under a changed site use are appropriately managed under a soils management plan. Alt Soil-2 is readily implementable, reliable, has few if any short or long-term risks, and is cost effective.

Similarly, under current and reasonably foreseeable site use there is no risk to human health related to groundwater beneath the Facility and Adjacent Properties. The Facility and developed Adjacent Properties are served by public water supply and future use of groundwater at the Facility and Adjacent Properties is considered highly unlikely. Under this alternative, industrial or residential use of Facility and Adjacent Properties groundwater would be restricted to eliminate potential future exposure to groundwater. Control of groundwater use can be effectively managed through a GMP and establishment of a GMZ. The Facility and Adjacent Properties are already within the Consent Decree pre-GMZ and will be within the final GMZ, when established (see Section 4.0). Alt GW-2 is readily implementable, reliable, has few if any short or long-term risks, and is cost effective.

6.2 Next Steps

The recommended remedial alternative does not include any active on-site treatment system containment system, or source removal project. Therefore, in accordance with Env-Or 606.15 – Remedial Action Implementation, SGPP will initiate implementation of the approved remedial action within 90 days following the department's approval of the Remedial Action Plan. Initial steps would include the following:

- Development of the AUR to restrict residential use of the Facility and Adjacent Properties or require development of a SMP to appropriately manage soils that potentially represent a human health risk under a changed site use.
- Ensure that the Facility and Adjacent Properties are appropriately incorporated into the final GMZ that will be developed under the Consent Decree
- Provide for financial assurance pursuant to Env-Or 606.20 and Env-Or 606.21, as applicable
- Development and implementation of a long-term groundwater quality monitoring program to evaluate the MNA remedy

7.0 CLOSING

The undersigned are the principal authors of this Report. Should NHDES have any questions regarding this document, please contact Ross Bennett at (603) 324-0894.

Signature Page

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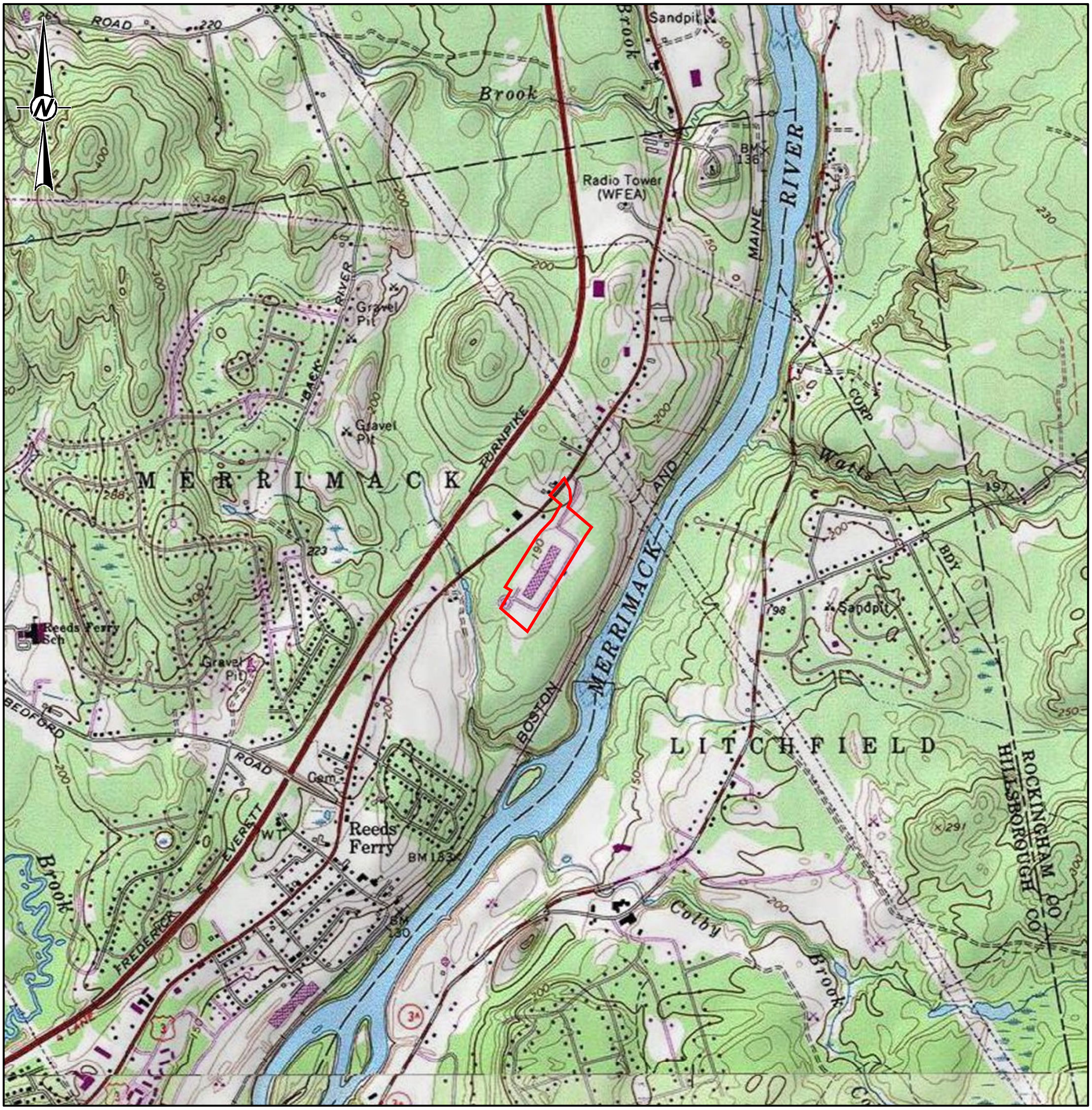
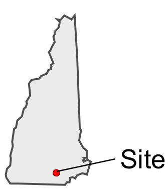
FIGURES



LEGEND

Approximate SGPP Facility Property Boundary



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Feet

NOTE(S)

REFERENCE(S)

1.PARCEL MOSAIC DOWNLOADED FROM NH GRANIT
2.SERVICE LAYER CREDITS: COPYRIGHT:© 2013 NATIONAL GEOGRAPHIC SOCIETY, I-CUBED

CLIENT
SAINT-GOBAIN PERFORMANCE PLASTICS

PROJECT
REMEDIAL ACTION PLAN
SAINT-GOBAIN PERFORMANCE PLASTICS FACILITY
MERRIMACK, NH

CONSULTANT

wsp

YYYY-MM-DD	4/19/2023
DESIGNED	RWB
PREPARED	SHL
REVIEWED	BDL
APPROVED	RWB

TITLE

FACILITY LOCATION MAP

PROJECT NO.	CONTROL	REV.	FIGURE
31406353	-	0	1-1

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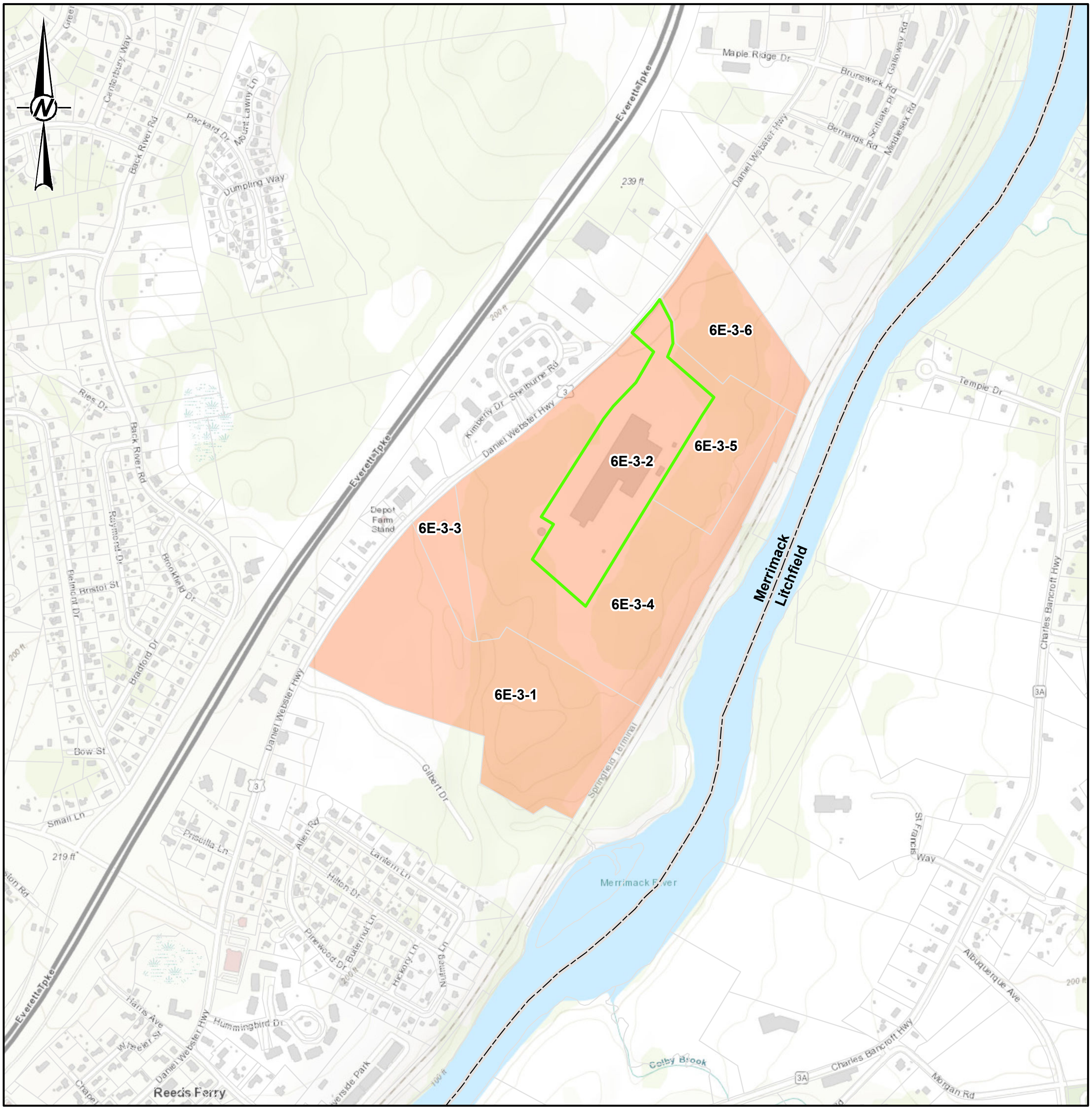

LEGEND

- SGPP Property Boundary
- Facility and Adjacent Properties
- Parcel Boundary

0 1,000 2,000
Feet

NOTE(S)
1. PROPERTY BOUNDARIES ARE APPROXIMATE.

REFERENCE(S)
1. 2019 PARCEL MOSAIC DOWNLOADED FROM NH GRANIT.
2. SERVICE LAYER CREDITS: SOURCES: ESRI, HERE, GARMIN, INTERMAP, INCREMENT P CORP., GEBCO, USGS, FAO, NPS, NRCAN, GEOBASE, IGN, KADASTER NL, ORDNANCE SURVEY, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), (C) OPENSTREETMAP CONTRIBUTORS, AND THE GIS USER COMMUNITY

CLIENT
SAINT-GOBAIN PERFORMANCE PLASTICS

PROJECT
REMEDIAL ACTION PLAN
SAINT-GOBAIN PERFORMANCE PLASTICS FACILITY
MERRIMACK, NH

CONSULTANT

YYYY-MM-DD	4/21/2023
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PREPARED	SHL
REVIEWED	BDL
APPROVED	RWB

TITLE
FACILITY AND ADJACENT PROPERTIES

PROJECT NO.	CONTROL	REV.	FIGURE
31406353	-	1	1-2

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LEGEND

- Shallow Overburden Soil Boring
- Shallow Overburden Soil Boring and Monitoring Well
- Deep Overburden Soil Boring and Monitoring Well
- Soil Boring and Bedrock Monitoring Well
- Deep Overburden/Bedrock Soil Boring and Monitoring Well
- Surface Water Sampling Location - Dumpling Brook
- Surface Water Sampling Location - Merrimack River
- Shallow Overburden Soil Boring and Temporary Monitoring Well
- Approximate SGPP Facility Boundary
- Tax Parcel Boundary
- Dumpling Brook
- Dumpling Brook - Underground
- Former Fish Hatchery Ponds
- Former Railroad Tracks

0 300 600
Feet

NOTE(S)

1. MONITORING LOCATIONS SURVEYED BY WSP IN NOVEMBER 2018 AND SEPTEMBER 2019.

REFERENCE(S)

1. 2015 IMAGERY DOWNLOADED FROM NH GRANIT WEBSITE

CLIENT

SAINT-GOBAIN PERFORMANCE PLASTICS

PROJECT

REMEDIAL ACTION PLAN
SAINT-GOBAIN PERFORMANCE PLASTICS FACILITY
MERRIMACK, NH

TITLE

INVESTIGATION LOCATIONS

CONSULTANT

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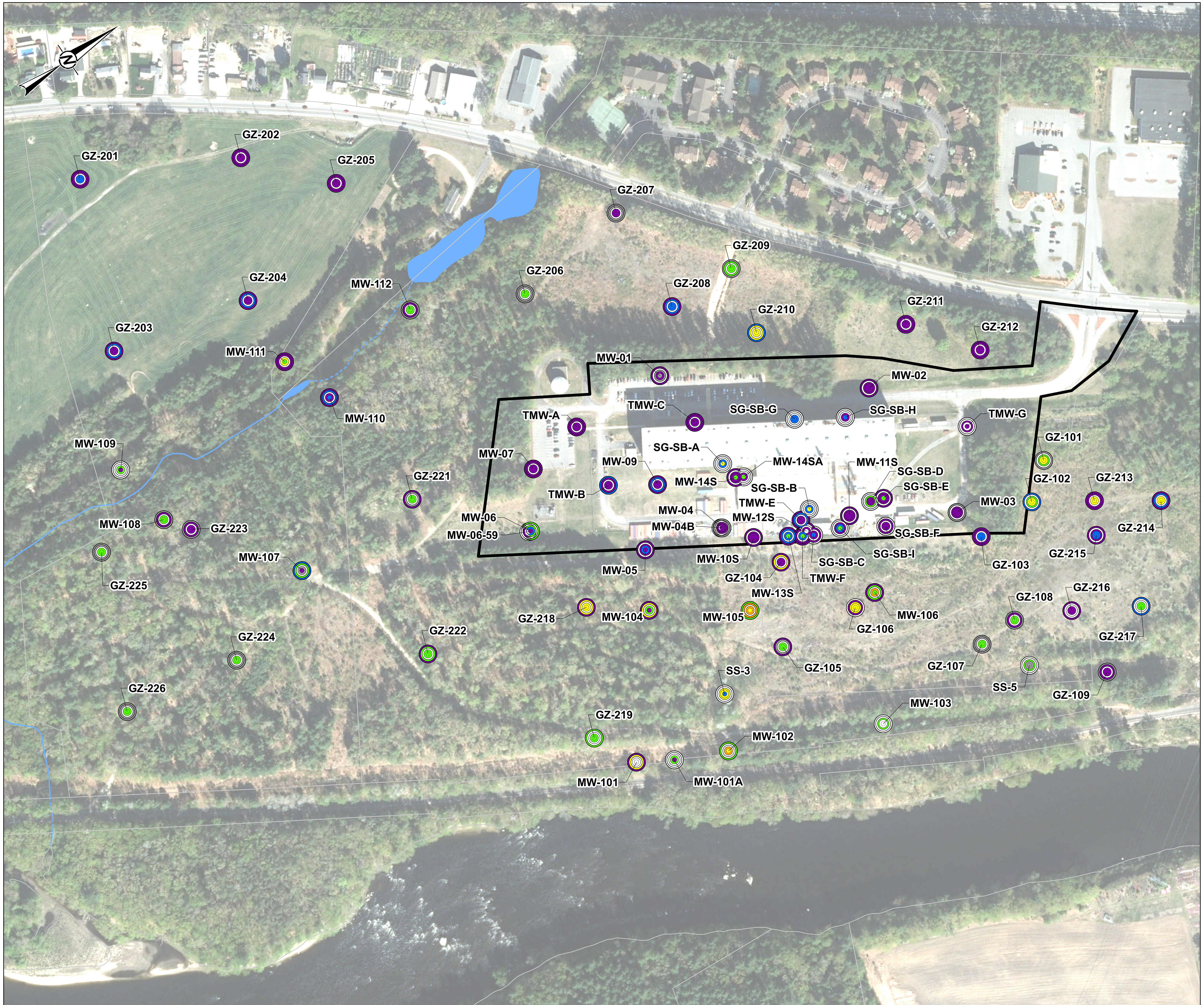

LEGEND

PFOA Results

- NA
- ND (< values)
- <5 ppb
- 5 - 10 ppb
- 10 - 50 ppb
- 50 - 200 ppb
- >200 ppb (Residential (S-1) DCRB standard)

Soil Sample Depth

- 0.0-0.5 ft
- 0.51-1.5 ft
- 1.51-3.0 ft
- 3.01-5.0 ft
- >5 ft

- Approximate SGPP Facility Boundary
- Tax Parcel Boundary
- Dumpling Brook
- Dumpling Brook - Underground
- Former Fish Hatchery Ponds

0 300 600
Feet

NOTE(S)

1. PFOA = PERFLUOROOCTANOIC ACID
2. DCRB STANDARD = DIRECT-CONTACT RISK BASED STANDARD

REFERENCE(S)

1. 2015 IMAGERY DOWNLOADED FROM NH GRANIT WEBSITE

CLIENT

SAINT-GOBAIN PERFORMANCE PLASTICS

PROJECT

REMEDIAL ACTION PLAN
SAINT-GOBAIN PERFORMANCE PLASTICS FACILITY
MERRIMACK, NH

TITLE

SOIL ANALYTICAL RESULTS - PFOA

CONSULTANT		
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	DESIGNED	RWB
	PREPARED	SHL
	REVIEWED	BDL
	APPROVED	RWB

PROJECT NO.	CONTROL	REV.	FIGURE
31406353		0	3-1

LEGEND

PFOS Results

- NA
- ND (< values)
- <5 ppb
- 5 - 10 ppb
- 10 - 50 ppb
- 50 - 100 ppb
- >100 ppb (Residential (S-1) DCRB standard)

Soil Sample Depth

- 0.0-0.5 ft
- 0.51-1.5 ft
- 1.51-3.0 ft
- 3.01-5.0 ft
- >5 ft

- Approximate SGPP Facility Boundary
- Tax Parcel Boundary
- Dumpling Brook
- Dumpling Brook - Underground
- Former Fish Hatchery Ponds

0 300 600
Feet

NOTE(S)

1. PFOS = PERFLUOROOCTANESULFONIC ACID
2. DCRB STANDARD = DIRECT-CONTACT RISK BASED STANDARD

REFERENCE(S)

1. 2015 IMAGERY DOWNLOADED FROM NH GRANIT WEBSITE

CLIENT

SAINT-GOBAIN PERFORMANCE PLASTICS

PROJECT

REMEDIAL ACTION PLAN
SAINT-GOBAIN PERFORMANCE PLASTICS FACILITY
MERRIMACK, NH

TITLE

SOIL ANALYTICAL RESULTS - PFOS

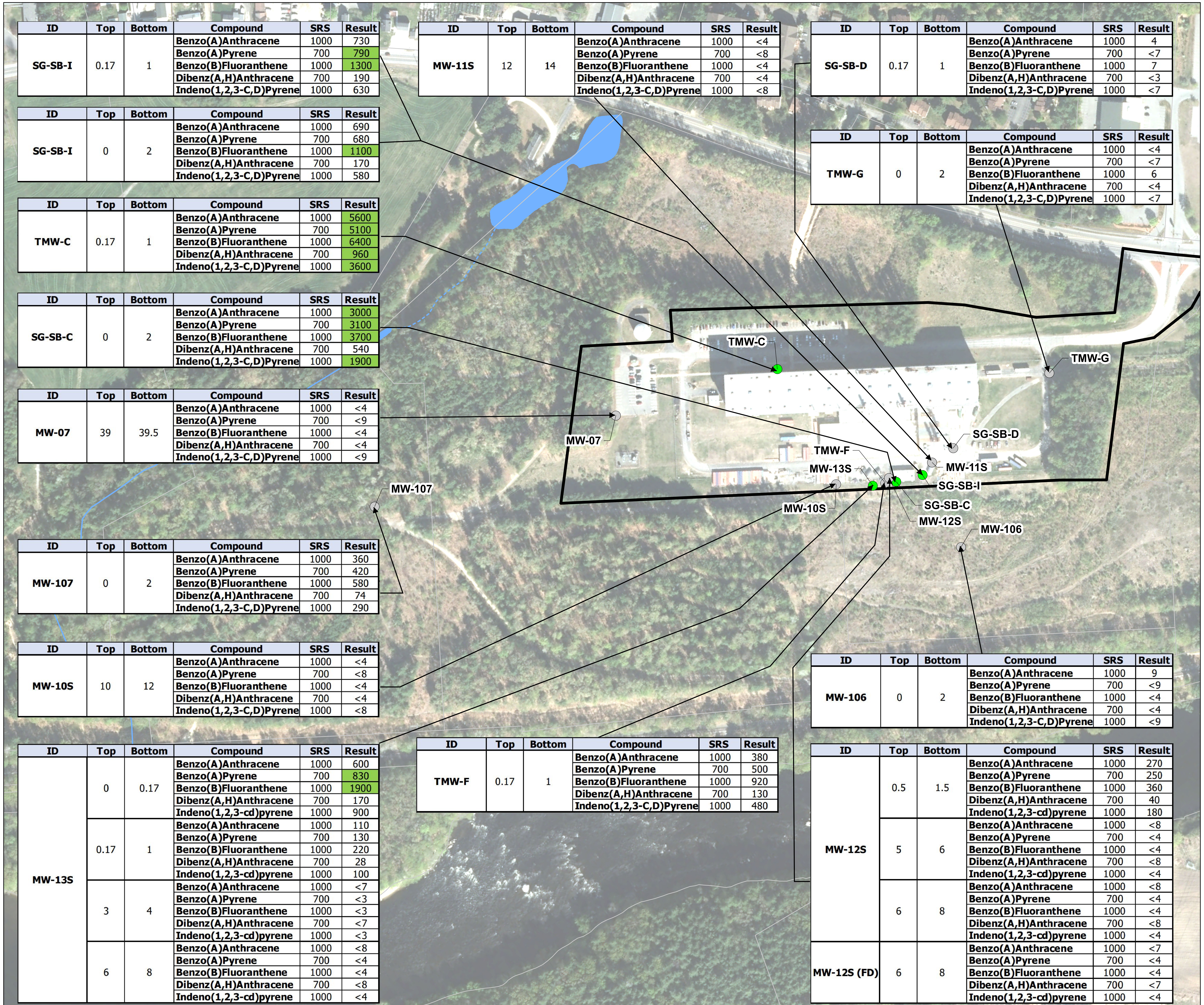
CONSULTANT

wsp

YYYY-MM-DD	4/28/2023
DESIGNED	RWB
PREPARED	SHL
REVIEWED	BDL
APPROVED	RWB

PROJECT NO.	CONTROL	REV.	FIGURE
31406353		0	3-2

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI D



ID	Top	Bottom	Compound	SRS	Result
SG-SB-I	0.17	1	Benzo(A)Anthracene	1000	730
			Benzo(A)Pyrene	700	790
			Benzo(B)Fluoranthene	1000	1300
			Dibenz(A,H)Anthracene	700	190
			Indeno(1,2,3-C,D)Pyrene	1000	630

ID	Top	Bottom	Compound	SRS	Result
SG-SB-I	0	2	Benzo(A)Anthracene	1000	690
			Benzo(A)Pyrene	700	680
			Benzo(B)Fluoranthene	1000	1100
			Dibenz(A,H)Anthracene	700	170
			Indeno(1,2,3-C,D)Pyrene	1000	580

ID	Top	Bottom	Compound	SRS	Result
TMW-C	0.17	1	Benzo(A)Anthracene	1000	5600
			Benzo(A)Pyrene	700	5100
			Benzo(B)Fluoranthene	1000	6400
			Dibenz(A,H)Anthracene	700	960
			Indeno(1,2,3-C,D)Pyrene	1000	3600

ID	Top	Bottom	Compound	SRS	Result
SG-SB-C	0	2	Benzo(A)Anthracene	1000	3000
			Benzo(A)Pyrene	700	3100
			Benzo(B)Fluoranthene	1000	3700
			Dibenz(A,H)Anthracene	700	540
			Indeno(1,2,3-C,D)Pyrene	1000	1900

ID	Top	Bottom	Compound	SRS	Result
MW-07	39	39.5	Benzo(A)Anthracene	1000	<4
			Benzo(A)Pyrene	700	<9
			Benzo(B)Fluoranthene	1000	<4
			Dibenz(A,H)Anthracene	700	<4
			Indeno(1,2,3-C,D)Pyrene	1000	<9

ID	Top	Bottom	Compound	SRS	Result
MW-107	0	2	Benzo(A)Anthracene	1000	360
			Benzo(A)Pyrene	700	420
			Benzo(B)Fluoranthene	1000	580
			Dibenz(A,H)Anthracene	700	74
			Indeno(1,2,3-C,D)Pyrene	1000	290

ID	Top	Bottom	Compound	SRS	Result
MW-10S	10	12	Benzo(A)Anthracene	1000	<4
			Benzo(A)Pyrene	700	<8
			Benzo(B)Fluoranthene	1000	<4
			Dibenz(A,H)Anthracene	700	<4
			Indeno(1,2,3-C,D)Pyrene	1000	<8

ID	Top	Bottom	Compound	SRS	Result
MW-13S	0	0.17	Benzo(A)Anthracene	1000	600
			Benzo(A)Pyrene	700	830
			Benzo(B)Fluoranthene	1000	1900
			Dibenz(A,H)Anthracene	700	170
			Indeno(1,2,3-cd)pyrene	1000	900
	0.17	1	Benzo(A)Anthracene	1000	110
			Benzo(A)Pyrene	700	130
			Benzo(B)Fluoranthene	1000	220
			Dibenz(A,H)Anthracene	700	28
			Indeno(1,2,3-cd)pyrene	1000	100
	3	4	Benzo(A)Anthracene	1000	<7
			Benzo(A)Pyrene	700	<3
			Benzo(B)Fluoranthene	1000	<3
			Dibenz(A,H)Anthracene	700	<7
			Indeno(1,2,3-cd)pyrene	1000	<3
	6	8	Benzo(A)Anthracene	1000	<8
			Benzo(A)Pyrene	700	<4
			Benzo(B)Fluoranthene	1000	<4
			Dibenz(A,H)Anthracene	700	<8
			Indeno(1,2,3-cd)pyrene	1000	<4

ID	Top	Bottom	Compound	SRS	Result
MW-11S	12	14	Benzo(A)Anthracene	1000	<4
			Benzo(A)Pyrene	700	<8
			Benzo(B)Fluoranthene	1000	<4
			Dibenz(A,H)Anthracene	700	<4
			Indeno(1,2,3-C,D)Pyrene	1000	<8

ID	Top	Bottom	Compound	SRS	Result
TMW-F	0.17	1	Benzo(A)Anthracene	1000	380
			Benzo(A)Pyrene	700	500
			Benzo(B)Fluoranthene	1000	920
			Dibenz(A,H)Anthracene	700	130
			Indeno(1,2,3-C,D)Pyrene	1000	480

ID	Top	Bottom	Compound	SRS	Result
SG-SB-D	0.17	1	Benzo(A)Anthracene	1000	4
			Benzo(A)Pyrene	700	<7
			Benzo(B)Fluoranthene	1000	7
			Dibenz(A,H)Anthracene	700	<3
			Indeno(1,2,3-C,D)Pyrene	1000	<7

ID	Top	Bottom	Compound	SRS	Result
TMW-G	0	2	Benzo(A)Anthracene	1000	<4
			Benzo(A)Pyrene	700	<7
			Benzo(B)Fluoranthene	1000	6
			Dibenz(A,H)Anthracene	700	<4
			Indeno(1,2,3-C,D)Pyrene	1000	<7

ID	Top	Bottom	Compound	SRS	Result
MW-106	0	2	Benzo(A)Anthracene	1000	9
			Benzo(A)Pyrene	700	<9
			Benzo(B)Fluoranthene	1000	<4
			Dibenz(A,H)Anthracene	700	<4
			Indeno(1,2,3-C,D)Pyrene	1000	<9

ID	Top	Bottom	Compound	SRS	Result
MW-12S	0.5	1.5	Benzo(A)Anthracene	1000	270
			Benzo(A)Pyrene	700	250
			Benzo(B)Fluoranthene	1000	360
			Dibenz(A,H)Anthracene	700	40
			Indeno(1,2,3-cd)pyrene	1000	180
	5	6	Benzo(A)Anthracene	1000	<8
			Benzo(A)Pyrene	700	<4
			Benzo(B)Fluoranthene	1000	<4
			Dibenz(A,H)Anthracene	700	<8
			Indeno(1,2,3-cd)pyrene	1000	<4
	6	8	Benzo(A)Anthracene	1000	<8
			Benzo(A)Pyrene	700	<4
			Benzo(B)Fluoranthene	1000	<4
			Dibenz(A,H)Anthracene	700	<8
			Indeno(1,2,3-cd)pyrene	1000	<4
MW-12S (FD)	6	8	Benzo(A)Anthracene	1000	<7
			Benzo(A)Pyrene	700	<4
			Benzo(B)Fluoranthene	1000	<4
			Dibenz(A,H)Anthracene	700	<7
			Indeno(1,2,3-cd)pyrene	1000	<4

LEGEND

- Soil Sample with PAH Results Below Soil Remediation Standards
- Soil Sample with PAH Results Above Soil Remediation Standards
- Approximate SGPP Facility Boundary
- Tax Parcel Boundary
- Dumpling Brook
- Dumpling Brook - Underground
- Former Fish Hatchery Ponds

0 150 300
Feet

NOTE(S)
1. PAH = POLYCYCLIC AROMATIC HYDROCARBON

REFERENCE(S)
1. 2015 IMAGERY DOWNLOADED FROM NH GRANIT WEBSITE

CLIENT
SAINT-GOBAIN PERFORMANCE PLASTICS

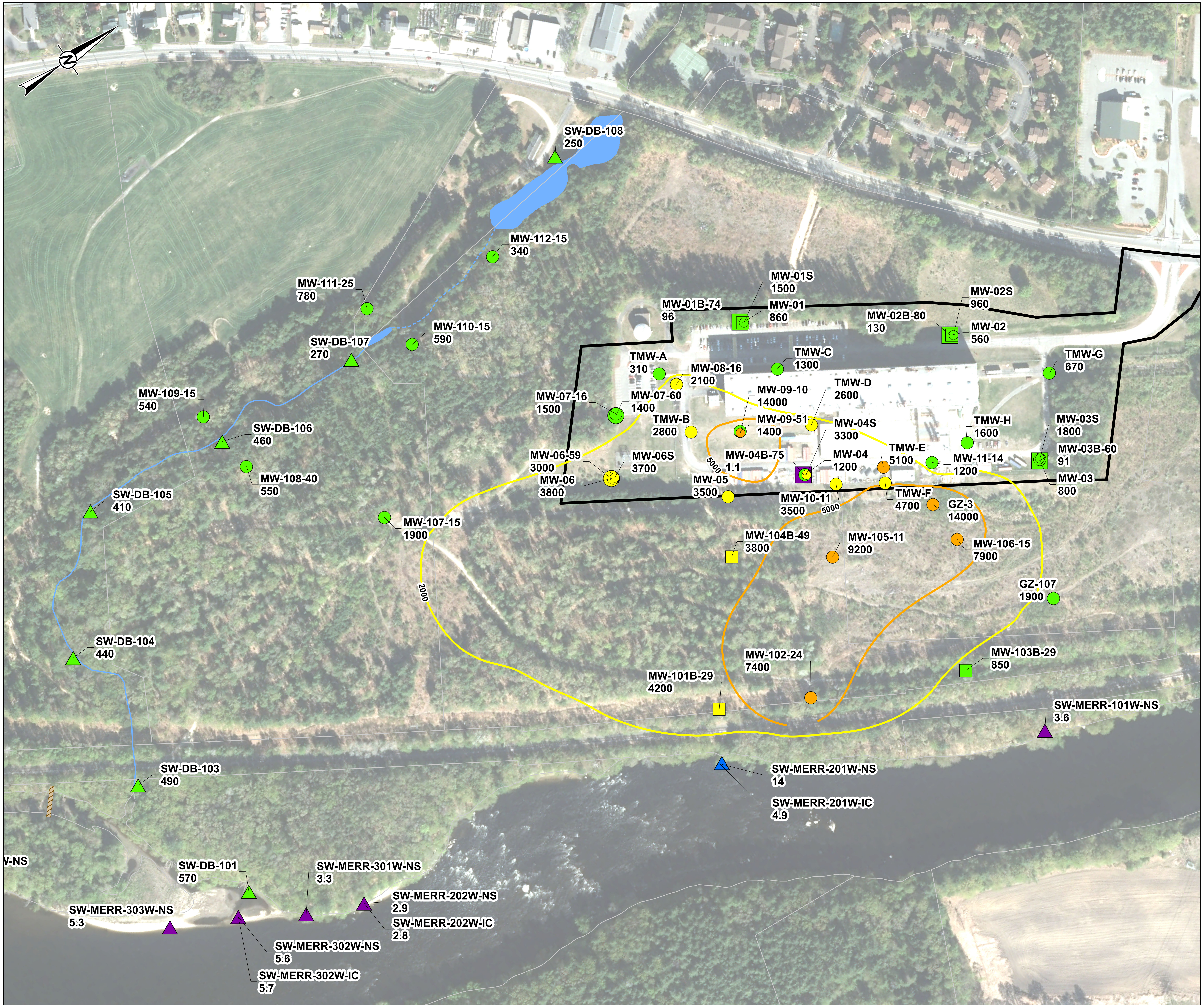
PROJECT
REMEDIAL ACTION PLAN
SAINT-GOBAIN PERFORMANCE PLASTICS FACILITY
MERRIMACK, NH

TITLE
PAH IN SOIL

CONSULTANT

YYYY-MM-DD	5/4/2023
DESIGNED	RWB
PREPARED	SHL
REVIEWED	BDL
APPROVED	RWB

PROJECT NO.	CONTROL	REV.	FIGURE
1668623		0	3-3



LEGEND

PFOA Results
- <12 ppt
- 12 - 70 ppt
- 70 - 2000 ppt
- 2000 - 5000 ppt
- >5000 ppt

Well Depth
- Shallow Overburden Well Location
- Intermediate Overburden Well Location
- Deep Overburden Well Location
- Surface Water Sampling Location
- Bedrock Sampling Location
- Approximate SGPP Facility Boundary
- Beaver Dam
- Tax Parcel Boundary
- Dumpling Brook
- Dumpling Brook - Underground
- Former Fish Hatchery Ponds

PFOA Concentration Contour
- 5000 ng/L
- 2000 ng/L

NOTE(S)
1. PFOA = PERFLUOROOCTANOIC ACID
2. THIS FIGURE PRESENTS THE MAXIMUM VALUE AT EACH LOCATION FROM GROUNDWATER SAMPLES COLLECTED IN THE FOURTH QUARTER OF 2018
3. SURFACE WATER RESULTS FROM AUGUST 2018 DRY-WEATHER SAMPLING EVENTS

REFERENCE(S)
1. 2015 IMAGERY DOWNLOADED FROM NH GRANIT WEBSITE

CLIENT
SAINT-GOBAIN PERFORMANCE PLASTICS

PROJECT
REMEDIAL ACTION PLAN
SAINT-GOBAIN PERFORMANCE PLASTICS FACILITY
MERRIMACK, NH

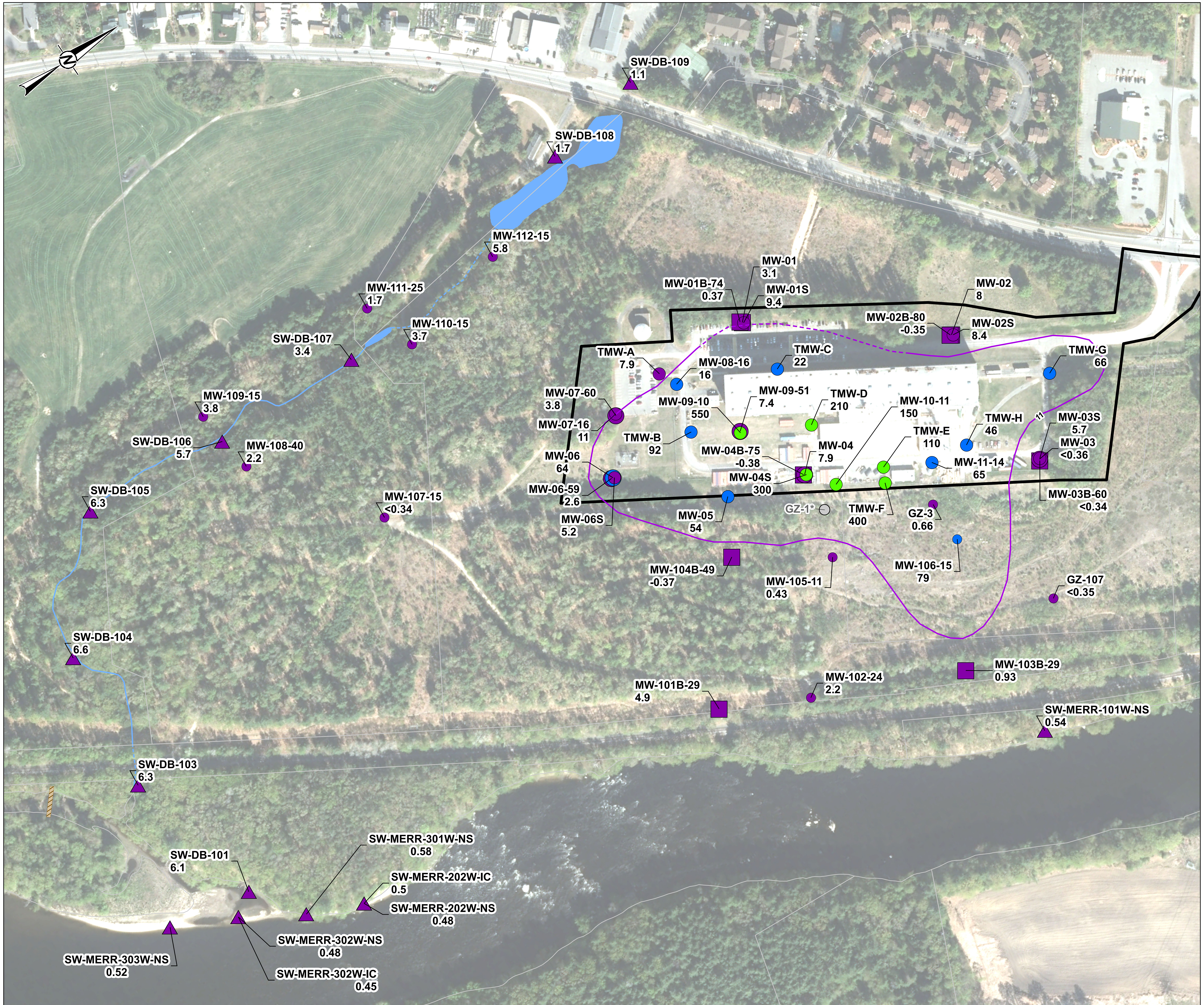
TITLE
HORIZONTAL EXTENT OF PFOA IN GROUNDWATER

CONSULTANT
wsp

YYYY-MM-DD	4/19/2023
DESIGNED	RWB
PREPARED	SHL
REVIEWED	BPC
APPROVED	RWB

PROJECT NO.	CONTROL	REV.	FIGURE
31406353		0	3-4A

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI D



LEGEND

PFNA Results

- <11 ppt
- 11 - 100 ppt
- 100 - 1000 ppt
- >1000 ppt

Well Depth

- Shallow Overburden Well Location
- Intermediate Overburden Well Location
- Deep Overburden Well Location
- Surface Water Sampling Location
- Bedrock Sampling Location
- Approximate SGPP Facility Boundary
- Beaver Dam
- Tax Parcel Boundary
- Dumpling Brook
- Dumpling Brook - Underground
- Former Fish Hatchery Ponds

PFNA Concentration Contour

- 11ng/L

0 300 600
Feet

NOTE(S)

1. PFNA = PERFLUORONONANOIC ACID
2. SURFACE WATER RESULTS FROM AUGUST 2018 DRY-WEATHER SAMPLING EVENTS
3. * INDICATES PFNA INTERMITTENTLY ABOVE AGQS BASED ON GROUNDWATER RESULTS COLLECTED SINCE 2018

REFERENCE(S)

1. 2015 IMAGERY DOWNLOADED FROM NH GRANIT WEBSITE

CLIENT

SAINT-GOBAIN PERFORMANCE PLASTICS

PROJECT

REMEDIAL ACTION PLAN
SAINT-GOBAIN PERFORMANCE PLASTICS FACILITY
MERRIMACK, NH

TITLE

HORIZONTAL EXTENT OF PFNA IN GROUNDWATER

CONSULTANT

YYYY-MM-DD	4/19/2023
DESIGNED	RWB
PREPARED	SHL
REVIEWED	BPC
APPROVED	RWB

PROJECT NO.	CONTROL	REV.	FIGURE
31406353		0	3-4B

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI D

LEGEND

PFHxS Results

- <18 ppt
- 18 - 100 ppt
- 100 - 1000 ppt
- >1000 ppt

Well Depth

- Shallow Overburden Well Location
- Intermediate Overburden Well Location
- Deep Overburden Well Location
- Surface Water Sampling Location
- Bedrock Sampling Location
- Approximate SGPP Facility Boundary
- Beaver Dam
- Tax Parcel Boundary
- Dumpling Brook
- Dumpling Brook - Underground
- Former Fish Hatchery Ponds

PFHxS Concentration Contour

- 18 ng/L

NOTE(S)

1. PFHXS = PERFLUOROHEXANESULPHONIC ACID
2. SURFACE WATER RESULTS FROM AUGUST 2018 DRY-WEATHER SAMPLING EVENTS

REFERENCE(S)

1. 2015 IMAGERY DOWNLOADED FROM NH GRANIT WEBSITE

CLIENT

SAINT-GOBAIN PERFORMANCE PLASTICS

PROJECT

REMEDIAL ACTION PLAN
SAINT-GOBAIN PERFORMANCE PLASTICS FACILITY
MERRIMACK, NH

TITLE

HORIZONTAL EXTENT OF PFHXS IN GROUNDWATER

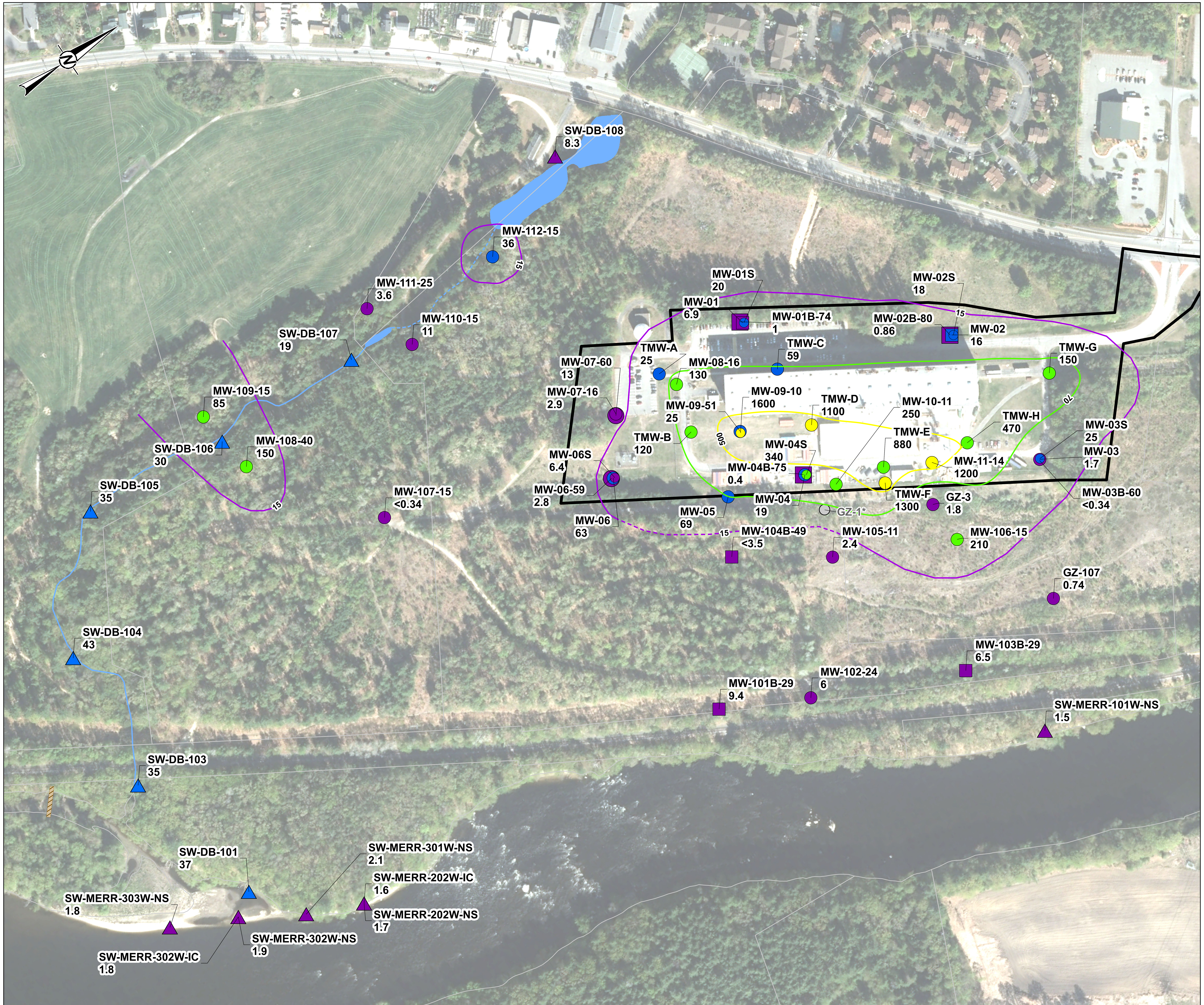
CONSULTANT

wsp

YYYY-MM-DD	4/19/2023
DESIGNED	RWB
PREPARED	SHL
REVIEWED	BPC
APPROVED	RWB

PROJECT NO.	CONTROL	REV.	FIGURE
31406353		0	3-4C

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI D



LEGEND

PFOS Results

- <15 ppt
- 15 - 70 ppt
- 70 - 1000 ppt
- > 1000 ppt

Well Depth

- Shallow Overburden Well Location
- Intermediate Overburden Well Location
- Deep Overburden Well Location
- Surface Water Sampling Location
- Bedrock Sampling Location
- Approximate SGPP Facility Boundary
- Beaver Dam
- Tax Parcel Boundary
- Dumpling Brook
- Dumpling Brook - Underground
- Former Fish Hatchery Ponds

PFOS Concentration Contour

- 500 ng/L
- 70 ng/L
- 15 ng/L

0 300 600

Feet

NOTE(S)

1. PFOS = PERFLUOROOCTANESULFONIC ACID
2. THIS FIGURE PRESENTS THE MAXIMUM VALUE AT EACH LOCATION FROM GROUNDWATER SAMPLES COLLECTED IN THE FOURTH QUARTER OF 2018
3. SURFACE WATER RESULTS FROM AUGUST 2018 DRY-WEATHER SAMPLING EVENTS
4. * INDICATES PFOS INTERMITTENTLY ABOVE AGQS BASED ON GROUNDWATER RESULTS

REFERENCE(S)

1. 2015 IMAGERY DOWNLOADED FROM NH GRANIT WEBSITE

CLIENT

SAINT-GOBAIN PERFORMANCE PLASTICS

PROJECT

REMEDIAL ACTION PLAN
SAINT-GOBAIN PERFORMANCE PLASTICS FACILITY
MERRIMACK, NH

TITLE

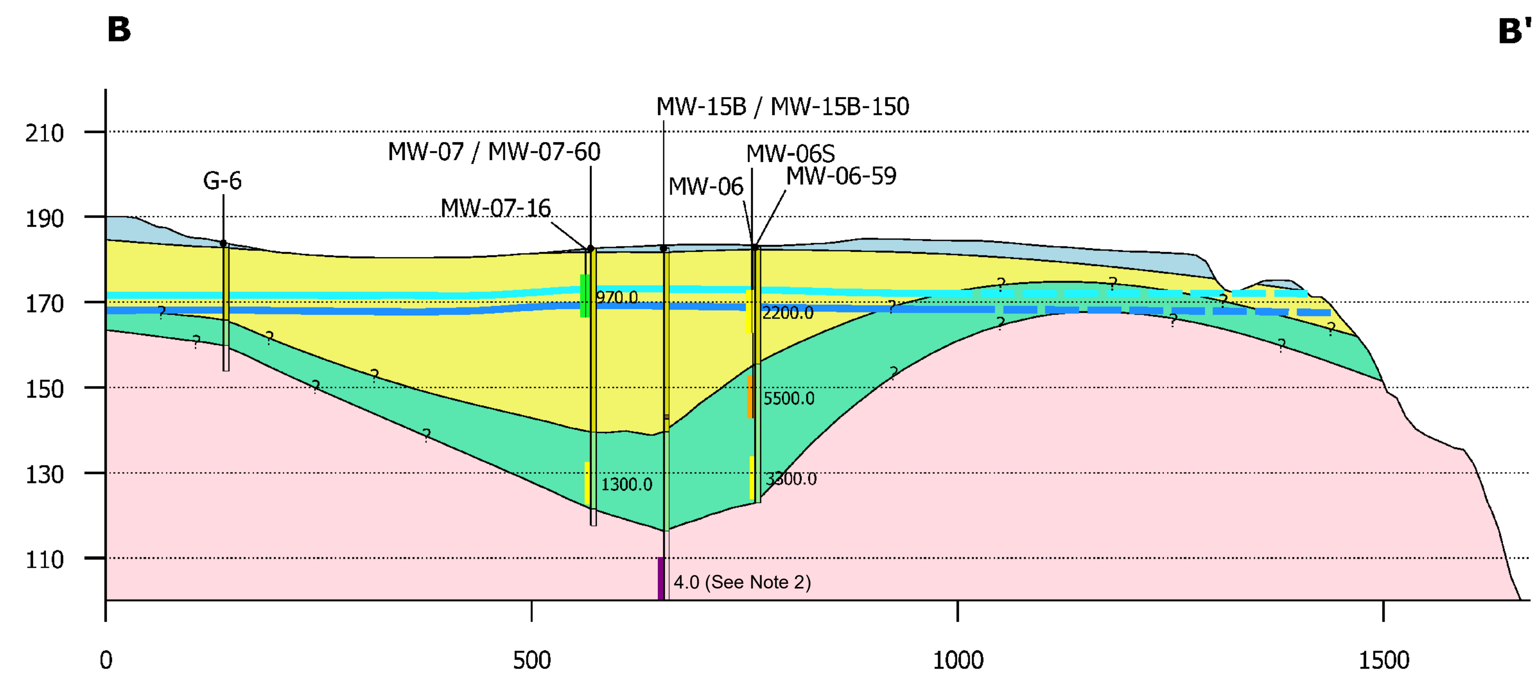
HORIZONTAL EXTENT OF PFOS IN GROUNDWATER

CONSULTANT

YYYY-MM-DD	4/19/2023
DESIGNED	RWB
PREPARED	SHL
REVIEWED	BPC
APPROVED	RWB

PROJECT NO.	CONTROL	REV.	FIGURE
31406353		0	3-4D

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI D



LEGEND

- December 2018 Phreatic Surface Elevation
- October 2019 Phreatic Surface Elevation

Lithology

- Topsoil
- Fine and Medium Sand
- Clay Lenses
- Glacial Till
- Bedrock

PFOA Results

- <=12 ppt
- <= 70 ppt
- <= 1000 ppt
- > 1000 ppt

Vertical Exaggeration: 5x

0 500

NOTE(S)

1.GROUNDWATER CONCENTRATIONS PROVIDED ON THIS FIGURE WERE COLLECTED DURING THE OCTOBER 2019 EVENT.

2. MW-15B-150 EXTENDS TO 150 FEET BELOW GROUND SURFACE, AND IS AN OPEN BOREHOLE FROM 90 TO 150 FEET BELOW GROUND SURFACE.

REFERENCE(S)

1. 2015 IMAGERY DOWNLOADED FROM NH GRANIT WEBSITE

CLIENT

SAINT-GOBAIN PERFORMANCE PLASTICS

PROJECT

REMEDIAL ACTION PLAN
SAINT-GOBAIN PERFORMANCE PLASTICS FACILITY
MERRIMACK, NH

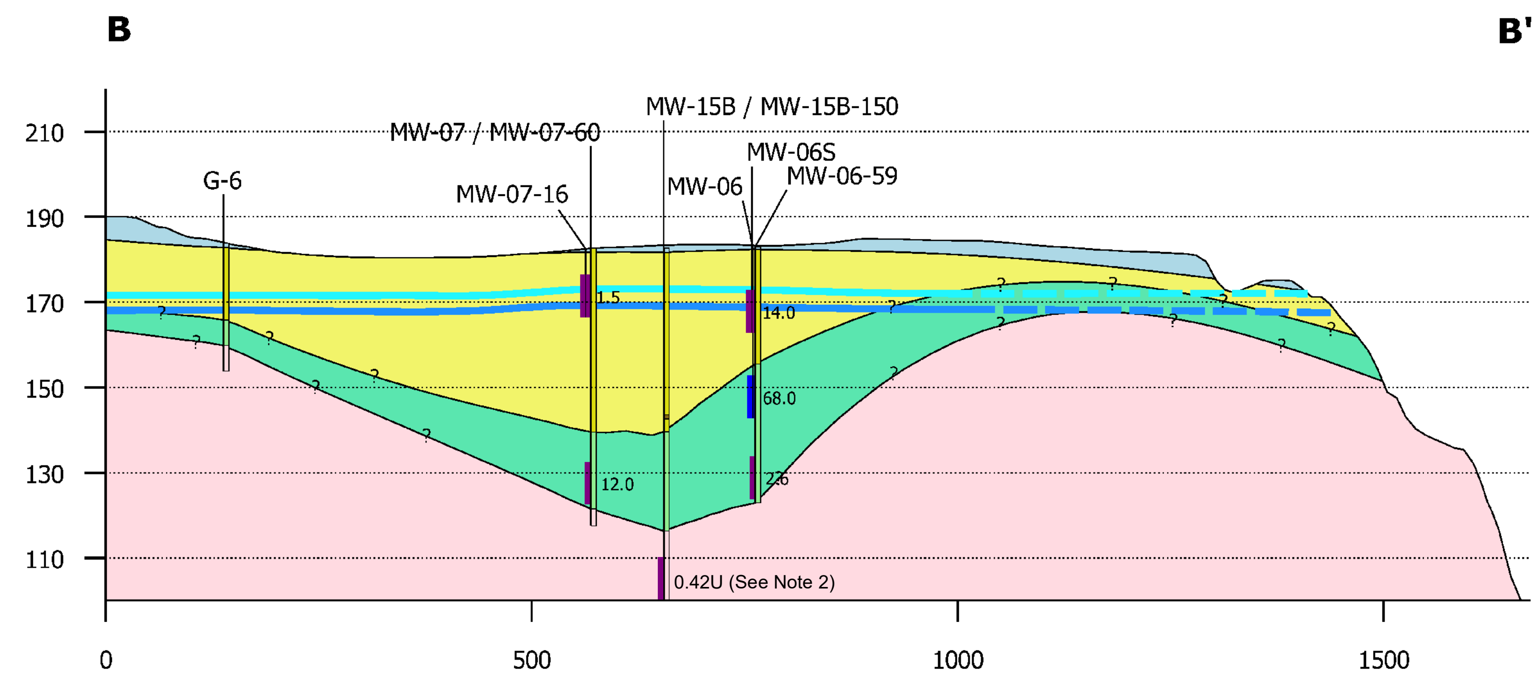
TITLE

VERTICAL EXTENT OF PFOA IN GROUNDWATER

CONSULTANT

YYYY-MM-DD	4/19/2023
DESIGNED	BDL
PREPARED	JMB
REVIEWED	LWL
APPROVED	RWB

PROJECT NO.	CONTROL	REV.	FIGURE
31406353	-	-	3-4E



LEGEND

- December 2018 Phreatic Surface Elevation
- October 2019 Phreatic Surface Elevation

Lithology

- Topsoil
- Fine and Medium Sand
- Clay Lenses
- Glacial Till
- Bedrock

PFOS Results

- <=15 ppt
- <= 70 ppt
- <= 1000 ppt
- > 1000 ppt

Vertical Exaggeration: 5x

0 500

NOTE(S)

1.GROUNDWATER CONCENTRATIONS PROVIDED ON THIS FIGURE WERE COLLECTED DURING THE OCTOBER 2019 EVENT.
2. MW-15B-150 EXTENDS TO 150 FEET BELOW GROUND SURFACE, AND IS AN OPEN BOREHOLE FROM 90 TO 150 FEET BELOW GROUND SURFACE.

REFERENCE(S)

1. 2015 IMAGERY DOWNLOADED FROM NH GRANIT WEBSITE

CLIENT

SAINT-GOBAIN PERFORMANCE PLASTICS

PROJECT

REMEDIAL ACTION PLAN
SAINT-GOBAIN PERFORMANCE PLASTICS FACILITY
MERRIMACK, NH

TITLE

VERTICAL EXTENT OF PFOS IN GROUNDWATER

CONSULTANT

YYYY-MM-DD	4/19/2023
DESIGNED	BDL
PREPARED	JMB
REVIEWED	LWL
APPROVED	RWB

PROJECT NO.	CONTROL	REV.	FIGURE
31406353	-	-	3-4F

LEGEND

PFOA Results

- NA
- ND (< values)
- <5 ppb
- 5 - 10 ppb
- 10 - 50 ppb
- 50 - 200 ppb
- >200 ppb
- Approximate SGPP Facility Boundary
- Tax Parcel Boundary
- Dumpling Brook
- Dumpling Brook - Underground
- Former Fish Hatchery Ponds
- Residential Use Risk-based Soil RAA - PFOA (See Note 2)

0 300 600
Feet

NOTE(S)

1. PFOA = PERFLUOROOCTANOIC ACID
2. RISK-BASED REMEDIAL ACTION AREA (RAA) INCLUDES LOCATIONS WHERE SOIL CONCENTRATIONS OF PFOA WERE DETECTED AT CONCENTRATIONS ABOVE THE RESIDENTIAL (S-1) DCRB SOIL STANDARD

REFERENCE(S)

1. SERVICE LAYER CREDITS: ESRI, USDA FARM SERVICE AGENCY

CLIENT

SAINT-GOBAIN PERFORMANCE PLASTICS

PROJECT

REMEDIAL ACTION PLAN
SAINT-GOBAIN PERFORMANCE PLASTICS FACILITY
MERRIMACK, NH

TITLE

RESIDENTIAL USE RISK-BASED SOIL RAA - PFOA

CONSULTANT

wsp

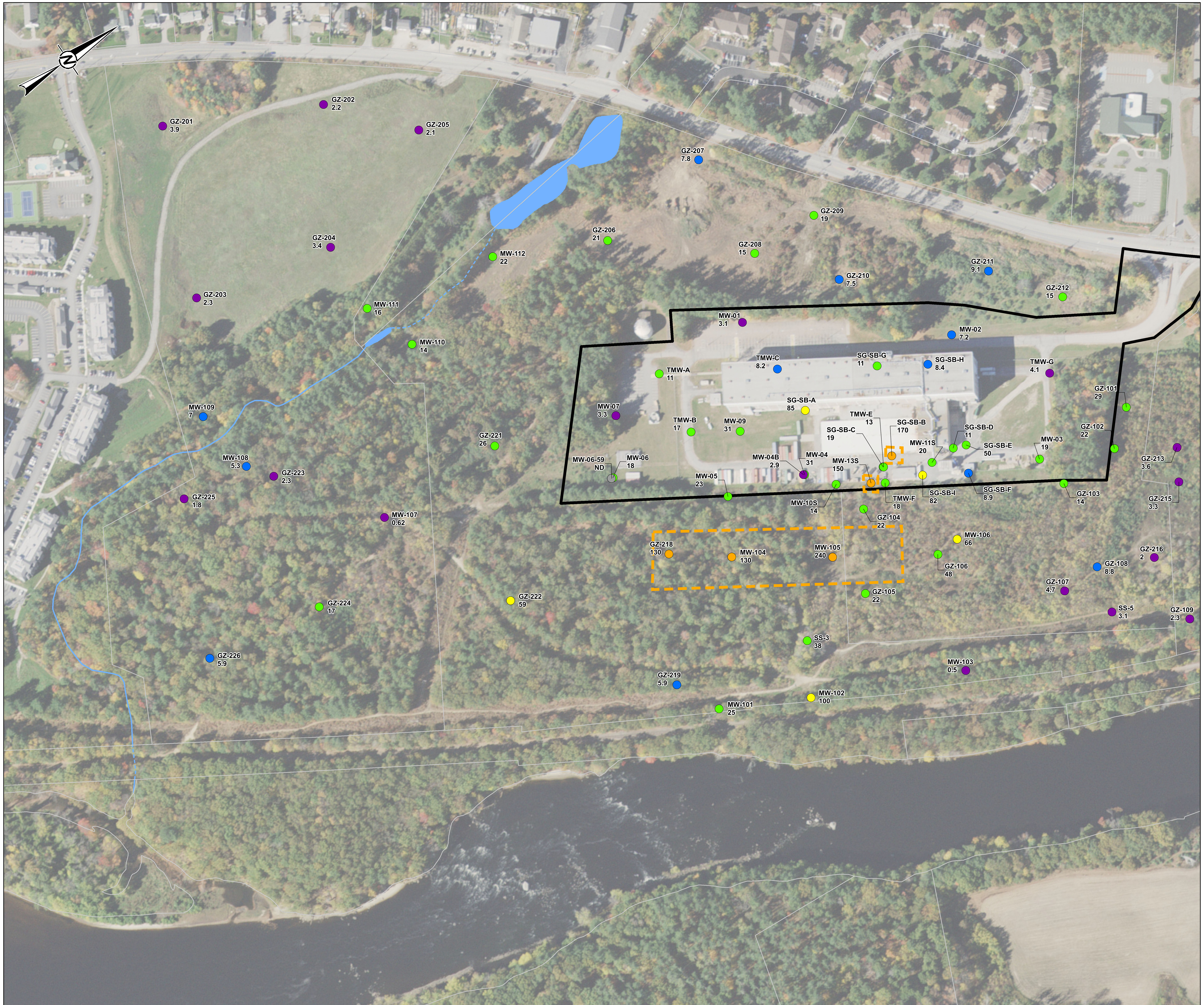
YYYY-MM-DD	5/5/2023
DESIGNED	RWB
PREPARED	EMM
REVIEWED	BDL
APPROVED	RWB

PROJECT NO.	CONTROL	REV.	FIGURE
31406353		0	3-5A

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI D

0 1 in

PATH: B:\Saint_Gobain\NH_Merrimack\99_PROJ\1668623_MerrimackFacility\0092_Remedial_Action_Plan\40_PROD\1668623181-0092-HS-0003_FIG3-5A.mxd PRINTED ON: 2023-05-05 AT: 1:15:06 PM



LEGEND

PFOS Results

- NA
- ND (< values)
- <5 ppb
- 5 - 10 ppb
- 10 - 50 ppb
- 50 - 100 ppb
- >100 ppb
- Approximate SGPP Facility Boundary
- Tax Parcel Boundary
- Dumpling Brook
- Dumpling Brook - Underground
- Former Fish Hatchery Ponds
- Residential Use Risk-based Soil RAA - PFOS (See Note 2)

0 300 600

Feet

NOTE(S)

1. PFOS = PERFLUOROOCTANESULFONIC ACID
2. RISK-BASED REMEDIAL ACTION AREA (RAA) INCLUDES LOCATIONS WHERE SOIL CONCENTRATIONS OF PFOS WERE DETECTED AT CONCENTRATIONS ABOVE THE RESIDENTIAL (S-1) DCRB SOIL STANDARD

REFERENCE(S)

1.SERVICE LAYER CREDITS: ESRI, USDA FARM SERVICE AGENCY

CLIENT

SAINT-GOBAIN PERFORMANCE PLASTICS

PROJECT

REMEDIAL ACTION PLAN
SAINT-GOBAIN PERFORMANCE PLASTICS FACILITY
MERRIMACK, NH

TITLE

RESIDENTIAL USE RISK-BASED SOIL RAA - PFOS

CONSULTANT

wsp

YYYY-MM-DD	5/5/2023
DESIGNED	RWB
PREPARED	EMM
REVIEWED	BDL
APPROVED	RWB

PROJECT NO.	CONTROL	REV.	FIGURE
31406353		0	3-5B

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI D

PATH: B:\Saint_Gobain\NH_Merrimack\99_PROJ\1668623_MerrimackFacility\0092_Remedial_Action_Plan\40_PROD\1668623181-0092-HS-0003_FIG3-5B.mxd PRINTED ON: 2023-05-05 AT: 1:21:55 PM

LEGEND

- Residential Use Risk-based Soil RAA - PFOA (See Note 3)
- Residential Use Risk-based Soil RAA - PFOS (See Note 3)
- Approximate SGPP Facility Boundary
- Tax Parcel Boundary
- Dumpling Brook
- Dumpling Brook - Underground
- Former Fish Hatchery Ponds

0 300 600

Feet

NOTE(S)

1. PFOS = PERFLUOROOCTANESULFONIC ACID
2. PFOA = PERFLUOROOCTANOIC ACID
3. RISK-BASED REMEDIAL ACTION AREA (RAA) INCLUDES LOCATIONS WHERE SOIL CONCENTRATIONS OF PFOS OR PFOA WERE DETECTED AT CONCENTRATIONS ABOVE THE RESIDENTIAL (S-1) DCRB SOIL STANDARD

REFERENCE(S)

1.SERVICE LAYER CREDITS: ESRI, USDA FARM SERVICE AGENCY

CLIENT

SAINT-GOBAIN PERFORMANCE PLASTICS

PROJECT

REMEDIAL ACTION PLAN
SAINT-GOBAIN PERFORMANCE PLASTICS FACILITY
MERRIMACK, NH

TITLE

RESIDENTIAL USE RISK-BASED SOIL RAA FOR PFAS

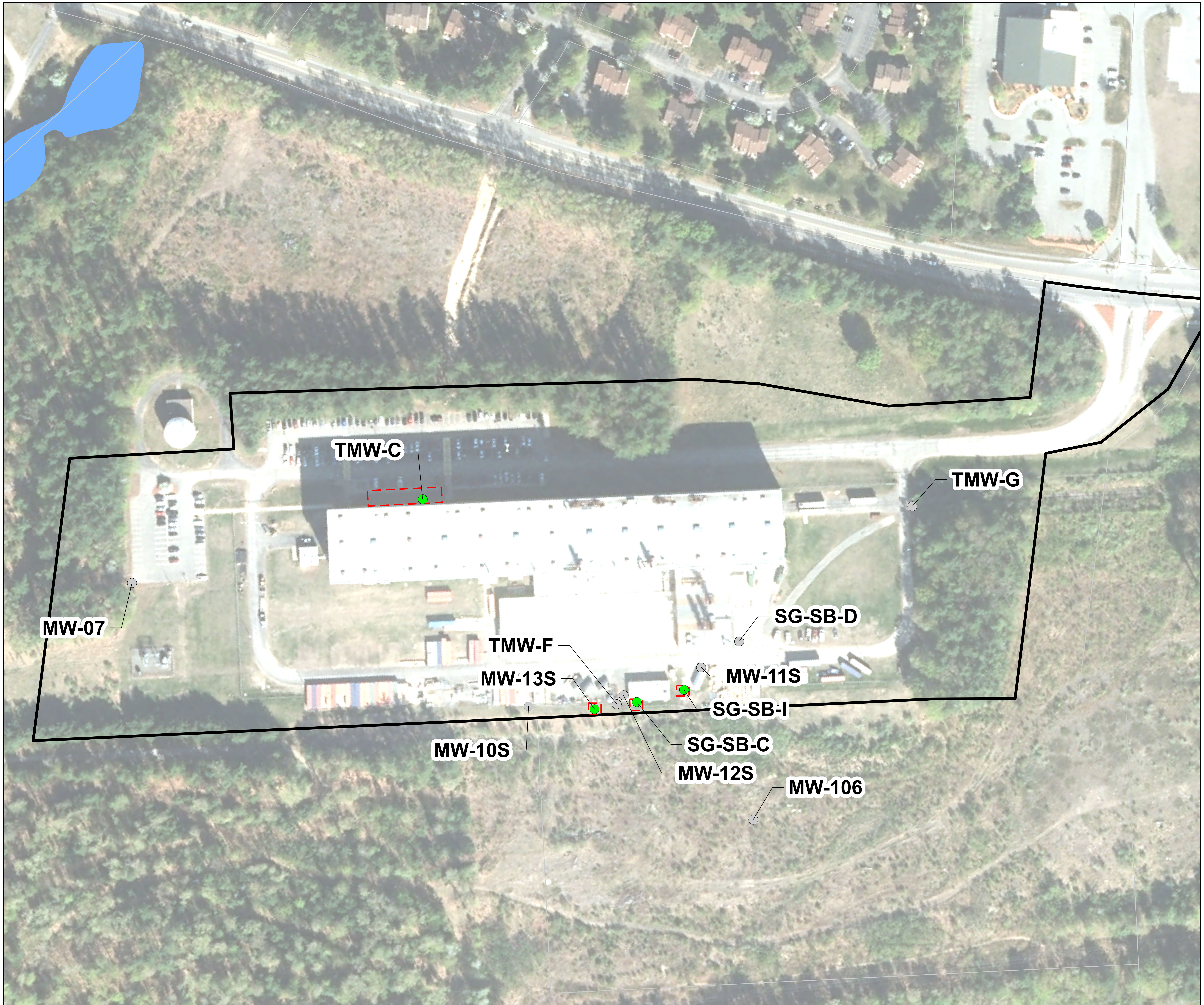
CONSULTANT

wsp

YYYY-MM-DD	5/5/2023
DESIGNED	RWB
PREPARED	EMM
REVIEWED	BDL
APPROVED	RWB

PROJECT NO.	CONTROL	REV.	FIGURE
31406353		0	3-5C

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI D



LEGEND

- Soil Sample with PAH Results Below Soil Remediation Standards
- Soil Sample with PAH Results Above Soil Remediation Standards
- PAH Soil Remedial Action Area
- Approximate SGPP Facility Boundary
- Tax Parcel Boundary
- Dumpling Brook
- Dumpling Brook - Underground
- Former Fish Hatchery Ponds

0 150 300
Feet

NOTE(S)

1. PAH = POLYCYCLIC AROMATIC HYDROCARBON

REFERENCE(S)

1. 2015 IMAGERY DOWNLOADED FROM NH GRANIT WEBSITE
2. SOURCE: GOLDER ASSOCIATES INC. SUPPLEMENTAL SITE INVESTIGATION REPORT, OCTOBER 14, 2020. FIGURE 7-1 PG 130

CLIENT

SAINT-GOBAIN PERFORMANCE PLASTICS

PROJECT

REMEDIAL ACTION PLAN
SAINT-GOBAIN PERFORMANCE PLASTICS FACILITY
MERRIMACK, NH

TITLE

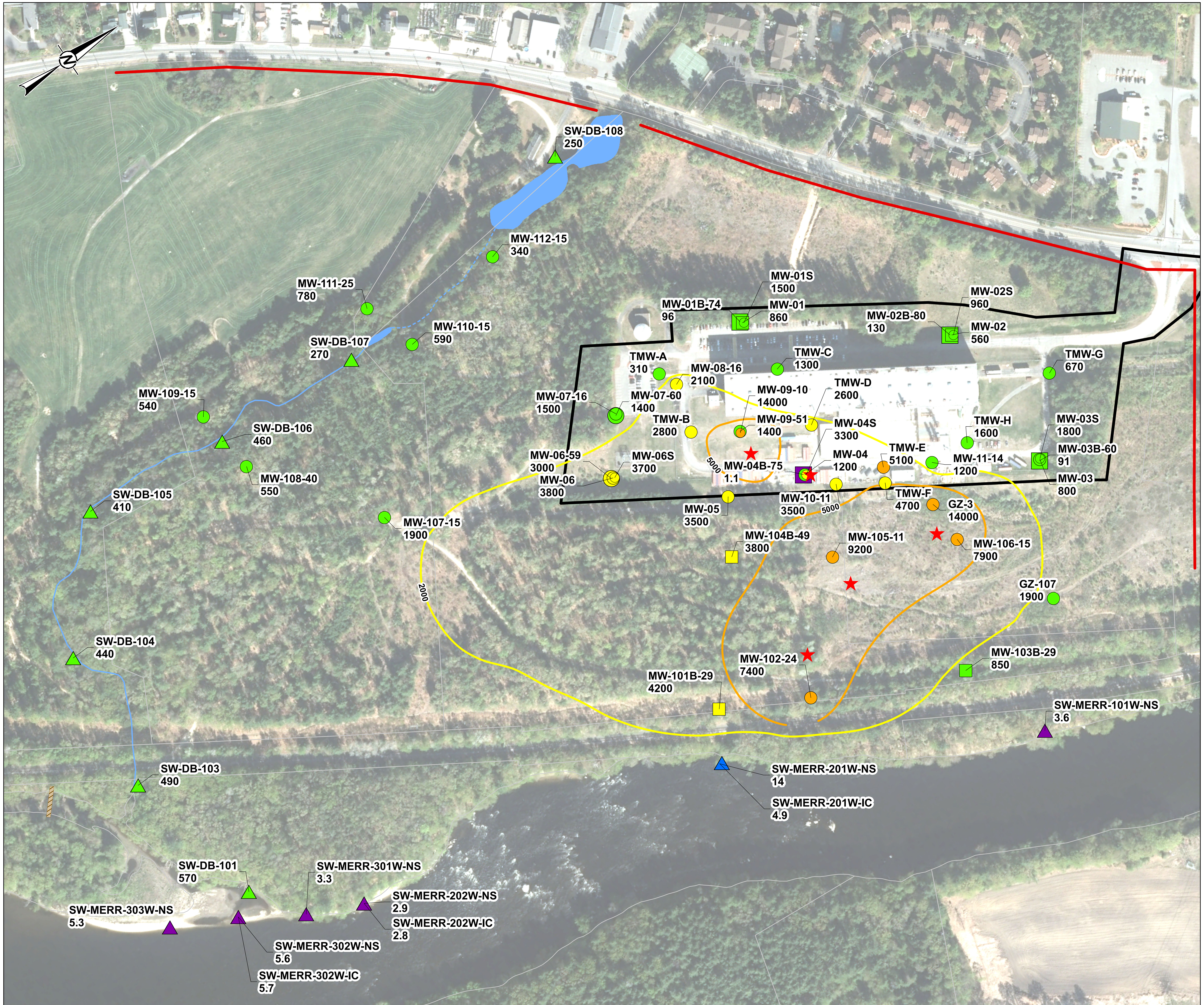
LOCATIONS WITH PAHS DETECTED ABOVE NHDES SOIL REMEDIATION STANDARDS

CONSULTANT

wsp

YYYY-MM-DD	5/5/2023
DESIGNED	RWB
PREPARED	EMM
REVIEWED	BDL
APPROVED	RWB

PROJECT NO.	CONTROL	REV.	FIGURE
31406353		0	3-6



LEGEND

PFOA Results

- <12 ppt
- 12 - 70 ppt
- 70 - 2000 ppt
- 2000 - 5000 ppt
- >5000 ppt

Well Depth

- Shallow Overburden Well Location
- Intermediate Overburden Well Location
- Deep Overburden Well Location
- Surface Water Sampling Location
- Bedrock Sampling Location
- Approximate SGPP Facility Boundary
- Beaver Dam
- Tax Parcel Boundary
- Dumpling Brook
- Dumpling Brook - Underground
- Former Fish Hatchery Ponds

PFOA Concentration Contour

- 5000 ng/L
- 2000 ng/L
- Conceptual Overburden and Bedrock Groundwater Extraction Well Pair
- Conceptual Alignment of Upgradient Hydraulic Control System or Upgradient Reactive Treatment Wall

0 300 600
Feet

NOTE(S)
1. PFOA = PERFLUOROOCTANOIC ACID
2. THIS FIGURE PRESENTS THE MAXIMUM VALUE AT EACH LOCATION FROM GROUNDWATER SAMPLES COLLECTED IN THE FOURTH QUARTER OF 2018
3. SURFACE WATER RESULTS FROM AUGUST 2018 DRY-WEATHER SAMPLING EVENTS

REFERENCE(S)
1. 2015 IMAGERY DOWNLOADED FROM NH GRANIT WEBSITE

CLIENT
SAINT-GOBAIN PERFORMANCE PLASTICS

PROJECT
REMEDIAL ACTION PLAN
SAINT-GOBAIN PERFORMANCE PLASTICS FACILITY
MERRIMACK, NH

TITLE
CONCEPTUAL GROUNDWATER REMEDIAL ACTION ALTERNATIVES

CONSULTANT

YYYY-MM-DD	5/5/2023
DESIGNED	RWB
PREPARED	SHL
REVIEWED	BDL
APPROVED	RWB

PROJECT NO.	CONTROL	REV.	FIGURE
31406353		0	5-1

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI D

APPENDIX A

2023 Interim Groundwater Monitoring Plan

APPENDIX A
2023 INTERIM GROUNDWATER MONITORING PLAN
May 5, 2023

On behalf of Saint-Gobain Performance Plastics (SGPP), WSP USA Inc. (WSP) prepared this revised interim groundwater monitoring plan for the SGPP facility (Facility) located at 701 Daniel Webster Highway in Merrimack, New and the properties immediately adjacent to the Facility, which are currently owned by the John Flatley Company (Flatley): Tax Lots 6E-3-1, 6E-3-3, 6E-3-4, 6E-3-5, and 6E-3-6 (the Adjacent Properties).

BACKGROUND

A groundwater management permit (GMP) has not been established for the Facility. Saint-Gobain has been completing interim groundwater monitoring since 2016 under several work plans. The most recent interim groundwater monitoring plan was proposed in Appendix D of the 2020 Annual Groundwater Monitoring Summary (2020 Annual GW Report; Golder, 2021), which NHDES approved in an April 27, 2021 email correspondence.

The following sections present a scope for interim groundwater monitoring following approval of the Remedial Action Plan for the Facility and Adjacent Properties and prior to finalization of the Groundwater Management Permit under the 2018 Consent Decree[i].

REVISED INTERIM GROUNDWATER MONITORING REQUIREMENTS

SGPP will monitor groundwater quality at Facility and Adjacent Properties monitoring wells at the frequencies specified on Table A-1. The goal of sampling is to determine when concentrations of per- and poly-fluoroalkyl substances (PFAS) in groundwater have decreased to below applicable Ambient Groundwater Quality Standards (AGQS). Wells with recent (2021/2022) PFOA concentrations closer to the AGQS will be sampled more frequently as they are expected to achieve AGQS sooner. Wells with higher recent PFOA concentrations will be sampled less frequently initially. Sampling frequency will be increased as PFOA concentrations decrease toward the AGQS. The sampling frequencies are based on the following criteria:

- Annual Sampling: Monitoring wells with PFOA concentrations less than 1,000 ng/L
- Bi-Annual Sampling (once every two years): Monitoring wells with PFOA concentrations greater than 1,000 ng/L and less than or equal to 3,000 ng/L
- Once every five years: Monitoring wells with PFOA concentrations greater than 3,000 ng/L

Samples will be collected using low-flow sampling procedures as specified in Section 5.4 of the Site Investigation Work Plan (Golder, 2018) and submitted for analysis of the PFAS target analyte list presented in Table A-2 which is with the same as the target analyte list used for 2021/2022 groundwater sampling. Samples from monitoring wells MW-07-60 and MW-09-51 will continue to be submitted for analysis of total and dissolved manganese.

Analytical data for the groundwater monitoring events will be submitted to NHDES as a data transmittal package within 45 days of completion of the monitoring event. Data transmittal packages will include tabular summaries of unvalidated analytical data and groundwater elevation data, copies of field documentation, and unvalidated analytical laboratory data reports.

An Annual Summary Report will be submitted in the first quarter of the following year and will include the elements of Env-Or-606.18, The Annual Summary Report will include validation reports for the past calendar year. Validated data will be uploaded to the NHDES Environmental Monitoring Database (EMD) within 45 days of submittal of the Annual Summary Report. The Annual Summary Report will also include recommendations for any changes to the monitoring program for the following year.

References

Golder, 2018. On-Property Site Investigation Work Plan: Saint-Gobain Performance Plastics, Merrimack, New Hampshire. June 8, 2018.

Golder, 2021. 2020 Annual Groundwater Monitoring Summary: Saint-Gobain Performance Plastics, Merrimack, New Hampshire. April 7, 2021.

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[i] State of New Hampshire, Dept. of Environmental Services v. Saint-Gobain Performance Plastics Corporation, March 20, 2018.

TABLE A-1: Sampling Frequency for Interim Groundwater Monitoring

Well ID	Maximum PFOA Concentration 2021-2022	PFAS Sampling Frequency: Annually* (Recent PFOA concentrations <= 1,000 ng/L)	PFAS Sampling Frequency: Bi-Annually** (Recent PFOA concentrations <1,000 ng/L and <= 3,000 ng/L)	PFAS Sampling Frequency: Every 5 Years (Recent PFOA concentrations > 3,000 ng/L)	Manganese Sampling Frequency: Bi-Annually (Every other year, starting 2024)
On-Property Overburden					
MW-01S	1,100		X		
MW-02S	1,000	X			
MW-03S	2,900		X		
MW-04S	3,800			X	
MW-05	3,300			X	
MW-06S	4,300			X	
MW-07-16	760	X			
MW-08-16	2,000		X		
MW-09-10	14,000			X	
MW-10-11	6,000			X	
MW-11-14	1,600		X		
MW-12-09	3,800			X	
MW-13-08	7,200			X	
MW-14-15	3,700			X	
On-Property Deep Overburden					
MW-04	1,700		X		
MW-06	4,800			X	
MW-06-59	3,700			X	
MW-07-60	1,500		X		X
MW-09-51	1,200		X		X
On-Property Deep Overburden/Bedrock					
MW-03	2,000		X		
On-Property Bedrock					
MW-01	950	X			
MW-02	870	X			
MW-01B-74	140	X			
MW-02B-80	140	X			
MW-03B-60	390	X			
MW-04B-75	10	X			
MW-15B-150	38	X			
Off-Property Overburden					
GZ-1	9,000			X	
GZ-3	14,000			X	
MW-102-24	7,800			X	
MW-105-11	11,000			X	
MW-106-15	5,600			X	
MW-107-15	2,000		X		
MW-108-40	1,000	X			
MW-109-15	640	X			
MW-110-15	1,600		X		
MW-111-25	550	X			
Off-Property Bedrock					
MW-101B-29	5,900			X	
MW-103B-29	960	X			
MW-104B-49	5,600			X	

Notes

* Annual wells will be sampled in the second quarter of even years (e.g. 2024) and fourth quarter of odd years (e.g. 2025)

** (Every other year, starting 2024)

Checked by: BDL
Reviewed by: RWB

TABLE A-2: PFAS Target Analyte List for Groundwater

	Abbreviation	CAS Id.	PFAS Target Analyte List - Groundwater
PFAS 24-Compound Target Analyte List			
Perfluorobutanoic acid	PFBA	375-22-4	X
Perfluoropentanoic acid	PFPeA	2706-90-3	X
Perfluorohexanoic acid	PFHxA	307-24-4	X
Perfluoroheptanoic acid	PFHpA	375-85-9	X
Perfluorooctanoic acid	PFOA	335-67-1	X
Perfluorononanoic acid	PFNA	375-95-1	X
Perfluorodecanoic acid	PFDA	335-76-2	X
Perfluoroundecanoic acid	PFUnA	2058-94-8	X
Perfluorododecanoic acid	PFDoA	307-55-1	X
Perfluorotridecanoic acid	PFTrDA	72629-94-8	X
Perfluorotetradecanoic acid	PFTeDA	376-06-7	X
6:2 fluorotelomersulfonate	6:2 FTSA	27619-97-2	X
8:2 fluorotelomersulfonate	8:2 FTSA	39108-34-4	X
Perfluorobutanesulfonic Acid	PFBS	375-73-5	X
Perfluoropentanesulfonate	PFPeS	2706-91-4	X
Perfluorohexanesulfonic Acid	PFHxS	355-46-4	X
Perfluoroheptanesulfonate	PFHpS	375-92-8	X
Perfluorooctanesulfonic Acid	PFOS	1763-23-1	X
Perfluorononanesulfonate	PFNS	68259-12-1	X
Perfluorooctanesulfonamide	PFOSA	754-91-6	X
N-ethyl perfluorooctanesulfonamidoacetic acid	NEtFOSAA	2991-50-6	X
N-methyl perfluorooctanesulfonamidoacetic acid	NMeFOSAA	2355-31-9	X
N-methyl perfluorooctanesulfonamide	NEtPFOSA	4151-50-2	X
Perfluoro(2-methyl-3-oxahexanoic) acid	HFPODA	13252-13-6	X
		Count:	24

Checked by: BDL
Reviewed by: RWB

APPENDIX B

Detailed Cost Sheets

Attachment B-1A: Soil Institutional Controls
Saint-Gobain Performance Plastics
Merrimack, New Hampshire

Item Description	Quantity	Unit	Unit Cost	Total Cost
CAPITAL COSTS				
Site Preparation and Institutional Controls				
Institutional Controls Plan	1	LS	$30,000	$ 30,000
Institutional Controls Implementation	1	LS	$50,000	$ 50,000
Institutional Controls Implementation Report	1	LS	$20,000	$ 20,000
			Subtotal	*$100,000*
SUBTOTAL				*$100,000*
Project Management	5%	of	$100,000	*$5,000*
SUBTOTAL				***$105,000***
Contingency	10%	of	$105,000	*$10,500*
TOTAL CONSTRUCTION COST				***$115,500***

Item Description	Quantity	Unit	Unit Cost	Total Cost
O&M / Periodic Costs				
Long-Term IC Monitoring				
Institutional controls monitoring	1	ea	$3,000	$ 3,000
			annual cost	*$3,000*
Project Management	5%	of	$3,000	$ 150
Engineering / Technical Support	5%	of	$3,000	$ 150
			Subtotal	*$300*
SUBTOTAL				$3,300
Contingency	10%	of	$3,300	$ 330
O&M SUBTOTAL				**$3,630**
Periodic Costs				
Five Year Review Report (every 5 years)	1	Each	$10,000	$ 10,000
Update Institutional Controls Plan (every 5 years)	1	Each	$5,000	$ 5,000
			Subtotal	*$15,000*
Project Management / Misc. Correspondence	5%	of	$15,000	$ 750
Contingency	10%	of	$15,000	$ 1,500
Periodic Costs SUBTOTAL				**$17,250**

SUMMARY		
Total Construction Cost		$115,500
Total Annual O&M Cost (30 year, undiscounted)		$108,900
Total Periodic Cost (30 year, undiscounted)		$103,500
Total Cost (30 year, undiscounted)		**$327,900**
PRESENT VALUE ANALYSIS **Discount Factor:**	**3.0%**	**7.0%**
Construction Cost	$115,500	$115,500
Present Worth of O&M and Periodic Costs	$135,249	$84,396
Estimated Net Present Value	**$250,749**	**$199,896**

Attachment B-1B: Soil Institutional Controls
Saint-Gobain Performance Plastics
Merrimack, New Hampshire

	Year	Capital Costs	Annual O&M Costs	Periodic Costs	Periodic Costs (with Project Management and Contingency)	P/F @3% (1+i)^-n	Total Present Worth Dollars @ 3%	P/F @7.0% (1+i)^-n	Total Present Worth Dollars @ 7.0%
2023	1	$115,500	$0		$0	1.0000	$115,500	1.0000	$115,500
2024	2	$0	$3,630		$0	0.9709	$3,524	0.9346	$3,393
2025	3	$0	$3,630		$0	0.9426	$3,422	0.8734	$3,171
2026	4	$0	$3,630		$0	0.9151	$3,322	0.8163	$2,963
2027	5	$0	$3,630	$15,000	$17,250	0.8885	$18,552	0.7629	$15,929
2028	6	$0	$3,630		$0	0.8626	$3,131	0.7130	$2,588
2029	7	$0	$3,630		$0	0.8375	$3,040	0.6663	$2,419
2030	8	$0	$3,630		$0	0.8131	$2,952	0.6227	$2,261
2031	9	$0	$3,630		$0	0.7894	$2,866	0.5820	$2,113
2032	10	$0	$3,630	$15,000	$17,250	0.7664	$16,003	0.5439	$11,357
2033	11	$0	$3,630		$0	0.7441	$2,701	0.5083	$1,845
2034	12	$0	$3,630		$0	0.7224	$2,622	0.4751	$1,725
2035	13	$0	$3,630		$0	0.7014	$2,546	0.4440	$1,612
2036	14	$0	$3,630		$0	0.6810	$2,472	0.4150	$1,506
2037	15	$0	$3,630	$15,000	$17,250	0.6611	$13,804	0.3878	$8,098
2038	16	$0	$3,630		$0	0.6419	$2,330	0.3624	$1,316
2039	17	$0	$3,630		$0	0.6232	$2,262	0.3387	$1,230
2040	18	$0	$3,630		$0	0.6050	$2,196	0.3166	$1,149
2041	19	$0	$3,630		$0	0.5874	$2,132	0.2959	$1,074
2042	20	$0	$3,630	$15,000	$17,250	0.5703	$11,908	0.2765	$5,773
2043	21	$0	$3,630		$0	0.5537	$2,010	0.2584	$938
2044	22	$0	$3,630		$0	0.5375	$1,951	0.2415	$877
2045	23	$0	$3,630		$0	0.5219	$1,894	0.2257	$819
2046	24	$0	$3,630		$0	0.5067	$1,839	0.2109	$766
2047	25	$0	$3,630	$15,000	$17,250	0.4919	$10,272	0.1971	$4,116
2048	26	$0	$3,630		$0	0.4776	$1,734	0.1842	$669
2049	27	$0	$3,630		$0	0.4637	$1,683	0.1722	$625
2050	28	$0	$3,630		$0	0.4502	$1,634	0.1609	$584
2051	29	$0	$3,630		$0	0.4371	$1,587	0.1504	$546
2052	30	$0	$3,630	$15,000	$17,250	0.4243	$8,860	0.1406	$2,935
	Total	**$115,500**					**$250,749**		**$199,896**

Attachment B-2A: Groundwater ICs and Monitored Natural Attenuation
Saint-Gobain Performance Plastics
Merrimack, New Hampshire

Item Description	Quantity	Unit	Unit Cost	Total Cost
CAPITAL COSTS				
MNA Implementation				
Initial Groundwater Management Permit Application	1	LS	$70,000	$ 70,000
			Subtotal	*$70,000*
SUBTOTAL				*$70,000*
Project Management	5%	of	$70,000	*$3,500*
SUBTOTAL				***$73,500***
Contingency	10%	of	$73,500	*$7,350*
TOTAL CONSTRUCTION COST				***$80,850***
O&M / Periodic Costs				
Annual O&M				
Sampling (13 well locations, annual sampling)	13	ea	$1,200	$ 15,600
Laboratory testing (13 well locations, annual sampling)	13	ea	$250	$ 3,250
Sampling (10 well locations, bi-annual sampling)	10	ea	$600	$ 6,000
Laboratory testing (10 well locations, bi-annual sampling)	10	ea	$125	$ 1,250
QA/QC (Duplicates, Blanks)	4	ea	$250	$ 1,000
Data Review/validation/reporting	1	LS	$9,000	$ 9,000
Well Maintenance - annual average cost	1	Each	$2,500	$ 2,500
			annual cost	*$38,600*
Project Management	5%	of	$38,600	$ 1,930
Engineering / Technical Support	5%	of	$38,600	$ 1,930
			Subtotal	*$3,860*
SUBTOTAL				$42,460
Contingency	10%	of	$42,460	$ 4,246
Annual O&M SUBTOTAL				**$46,706**
Periodic Costs				
Five Year Review Report (every 5 years)	1	Each	$15,000	$ 15,000
Sampling (17 well locations, every 5 year sampling)	17	ea	$1,200	$ 20,400
Laboratory testing (17 well locations, bi-annual sampling)	17	ea	$250	$ 4,250
QA/QC (Duplicates, Blanks)	2	ea	$250	$ 500
Groundwater Management Permit Application (every 5 years)	1	Each	$5,000	$ 5,000
			Subtotal	*$45,150*
Project Management / Misc. Correspondence	5%	of	$45,150	$ 2,258
Contingency	10%	of	$45,150	$ 4,515
Periodic Costs SUBTOTAL				**$51,923**
SUMMARY				
Total Construction Cost				$80,850
Total Annual O&M Cost (30 year, undiscounted)				$1,401,180
Total Periodic Cost (30 year, undiscounted)				$311,535
Total Cost (30 year, undiscounted)				**$1,793,565**
PRESENT VALUE ANALYSIS		**Discount Rate:**	**3.0%**	**7.0%**
Construction Cost			$80,850	$80,850
Present Worth of O&M and Periodic Costs			$1,140,362	$740,029
Estimated Net Present Value			**$1,221,212**	**$820,879**

Attachment B-2B: Groundwater ICs and Monitored Natural Attenuation
Saint-Gobain Performance Plastics
Merrimack, New Hampshire

	Year	Capital Costs	Annual O&M Costs	Periodic Costs	P/F @3% (1+i)^-n	Total Present Worth Dollars @ 3.0%	P/F @7.5% (1+i)^-n	Total Present Worth Dollars @ 7.0%
2023	1	$80,850	$46,706		1.0000	$127,556	1.0000	$127,556
2024	2	$0	$46,706		0.9709	$45,346	0.9346	$43,650
2025	3	$0	$46,706		0.9426	$44,025	0.8734	$40,795
2026	4	$0	$46,706		0.9151	$42,743	0.8163	$38,126
2027	5	$0	$46,706	$51,923	0.8885	$87,630	0.7629	$75,243
2028	6	$0	$46,706		0.8626	$40,289	0.7130	$33,301
2029	7	$0	$46,706		0.8375	$39,116	0.6663	$31,122
2030	8	$0	$46,706		0.8131	$37,976	0.6227	$29,086
2031	9	$0	$46,706		0.7894	$36,870	0.5820	$27,183
2032	10	$0	$46,706	$51,923	0.7664	$75,591	0.5439	$53,647
2033	11	$0	$46,706		0.7441	$34,754	0.5083	$23,743
2034	12	$0	$46,706		0.7224	$33,741	0.4751	$22,190
2035	13	$0	$46,706		0.7014	$32,759	0.4440	$20,738
2036	14	$0	$46,706		0.6810	$31,805	0.4150	$19,381
2037	15	$0	$46,706	$51,923	0.6611	$65,205	0.3878	$38,250
2038	16	$0	$46,706		0.6419	$29,979	0.3624	$16,928
2039	17	$0	$46,706		0.6232	$29,106	0.3387	$15,821
2040	18	$0	$46,706		0.6050	$28,258	0.3166	$14,786
2041	19	$0	$46,706		0.5874	$27,435	0.2959	$13,819
2042	20	$0	$46,706	$51,923	0.5703	$56,246	0.2765	$27,272
2043	21	$0	$46,706		0.5537	$25,860	0.2584	$12,070
2044	22	$0	$46,706		0.5375	$25,107	0.2415	$11,280
2045	23	$0	$46,706		0.5219	$24,376	0.2257	$10,542
2046	24	$0	$46,706		0.5067	$23,666	0.2109	$9,852
2047	25	$0	$46,706	$51,923	0.4919	$48,519	0.1971	$19,444
2048	26	$0	$46,706		0.4776	$22,307	0.1842	$8,606
2049	27	$0	$46,706		0.4637	$21,657	0.1722	$8,043
2050	28	$0	$46,706		0.4502	$21,027	0.1609	$7,516
2051	29	$0	$46,706		0.4371	$20,414	0.1504	$7,025
2052	30	$0	$46,706	$51,923	0.4243	$41,853	0.1406	$13,863
	Total	**$80,850**				**$1,221,212**		**$820,879**

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