DES Waste Management Division
29 Hazen Drive; PO Box 95
Concord, NH 03302-0095

On-Property Site Investigation Work Plan Addendum
Flatley Property Investigation
Merrimack, New Hampshire 03054
NHDES Site No.: 199712055
Project Number: 36430

Prepared For:
Saint-Gobain Performance Plastics Corp.
14 McCaffrey Street
Hoosick Falls, New York 12090
Phone Number (518) 686-6268
RP Contact Name: Chris Angier
RP Contact Email:
Christopher.Angier@saint-gobain.com

Prepared By:
Golder Associates Inc.
670 North Commercial Street
Manchester, New Hampshire 03101
Phone Number: (603) 688-0880
Contact Name: Ross Bennett
Contact Email: rbennett@golder.com

ross_bennett
@golder.com

Digitally signed by
ross_bennett@golder.com
DN:
cn=ross_bennett@golder.com
Date: 2018.07.27 16:18:46
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Date of Report: July 27, 2018

July 27, 2018 Project No. 166-8623

Ms. Lea Anne Atwell
New Hampshire Department of Environmental Services
Waste Management Division
29 Hazen Drive
PO Box 95
Concord, New Hampshire 03302-0095

RE: ON-PROPERTY SITE INVESTIGATION WORK PLAN ADDENDUM: FLATLEY PROPERTY INVESTIGATION

Dear Ms. Atwell:

Golder Associates Inc. (Golder) is submitting this addendum to the On-Property Site Investigation Work Plan (the On-Property SI Work Plan; Golder, 2018a) for the Merrimack, New Hampshire Saint-Gobain Performance Plastics (SGPP) facility (the facility, see Figure 1) on behalf of SGPP. This addendum outlines the objectives and proposed investigations on properties owned by John Flatley Company (Flatley) that abut the SGPP facility (Tax Lots 6E-3-1, 6E-3-3, 6E-3-4, 6E-3-5, and 6E-3-6, see Figure 2).

The New Hampshire Department of Environmental Services (NHDES) requested SGPP perform investigations on the Flatley properties in a letter dated November 3, 2017 (NHDES, 2017). Since November 2017:

- SGPP and Flatley negotiated access agreements to allow for sampling of surface water (Dumpling Brook) and groundwater on the Flatley property. SGPP submitted unvalidated analytical results for this sampling to NHDES on June 29, 2018 and July 13, 2018 (Golder, 2018b; Golder, 2018c; Golder, 2018d).
- Representatives of SGPP, Golder and NHDES met on February 22, 2018 to discuss the overall scope of proposed SI investigations, including investigations on the Flatley property.
- Golder submitted the On-Property SI Work Plan to NHDES on June 8, 2018 for activities on the SGPP-owned property.
- Representatives of SGPP, Golder, Flatley, and NHDES met on June 20, 2018 to discuss the scope of investigations on the Flatley properties. It was agreed SGPP would submit an addendum to the On-Property SI Work Plan so that the SI investigations on the Flatley property can be conducted at the same time as the SI investigations on the SGPP property.

This addendum presents the objectives and scope of work for the proposed SI investigations on the Flatley properties as discussed during the February 22, 2018 meeting and agreed upon by representatives of SGPP,

Golder Associates Inc.
670 North Commercial Street, Suite 103 Manchester, New Hampshire, USA 03101 T: +1 603 668-0880 +1 603 668-1199

Golder, Flatley and NHDES during the June 20, 2018 meeting.

1.0 INVESTIGATION OBJECTIVES

The following objectives have been developed for the Flatley properties investigation based on the preliminary conceptual site model (preliminary CSM) presented in Section 3.0 of the On-Property SI Work Plan.

- Objective 1: Refine the preliminary geologic and hydrogeologic CSM
  - Advance additional soil borings to confirm/refine the understanding of the overburden lithology
  - Advance additional soil borings to confirm/identify the depth to bedrock at multiple locations to define the overburden thickness and top of bedrock surface
  - Install overburden wells to further characterize the potentiometric conditions (i.e., groundwater flow directions)
  - Evaluate the potential for interaction between groundwater and Dumpling Brook, the facility sewer system, and the existing sub-surface stormwater conveyance system
  - Obtain additional hydraulic conductivity data for the overburden materials
- Objective 2: Investigate potential nature and extent of impacts to soil and groundwater on the Flatley properties from the following Potential Release Areas (PRAs) identified in Section 4.2.1 of the On-Property SI Work Plan:
  - PRA-1: Aerial Deposition Area
  - PRA-3: Former Railroad Tracks
  - PRA-12: Existing Sewer Lines
  - PRA-16: Existing Sub-surface Stormwater Conveyance System

2.0 SCOPE OF WORK

This section describes the scope of work to meet the investigation objectives outlined in Section 1.0.

The following investigation activities will be completed to meet Objective 1. See Figure 2 for soil boring and monitoring well locations.

- Perform site reconnaissance to identify potential boring locations, complete utility clearance, and map observable geologic features.
- Advance 12 soil borings (MW-101 through MW-112) to:
  - Log soil cores and construct lithologic profiles.
  - Identify the top of bedrock.
- Install and sample 12 groundwater monitoring wells to:

- Obtain depth to water (potentiometric) measurements from newly installed wells and existing surface water gauges to evaluate the potential for interaction between groundwater and Dumpling Brook, the facility sewer system, and the existing sub-surface stormwater conveyance system.
- Complete slug testing (as described in Section 5.10 of the On-Property SI Work Plan) to characterize the hydraulic conductivity of the overburden.

The following investigation activities will be completed to meet Objective 2.

- Collection of overburden soil samples during soil boring advancement and groundwater samples from the monitoring wells to assess potential impacts from each PRA, as shown on Table 1.
- Installation of wells located near conditions observed during camera surveys, as illustrated on Figure 3 to evaluate shallow groundwater quality in the assumed downgradient direction of the stormwater and sewer conveyance systems to assess whether potential leakage from the conveyance systems has impacted groundwater quality.

2.1 Soil Sampling and Analysis

Soil cores will be logged and soil samples will be collected according to the procedures described in Section 5.2 of the On-Property SI Work Plan. Soil samples will be collected for analysis at the approximate intervals listed on Tables 2 and 3 and submitted to Eurofins Lancaster Laboratory Environmental (ELLE) of Lancaster, Pennsylvania for analysis of:

- The PFAS analytes by Modified Method 537.1 (see Table 6).
- Total organic carbon by Method SW-846 9060.
- Moisture content by Method SM 2540 G-1997.

The following additional analytes will be analyzed in a subset of samples as identified on Tables 2 and 3:

- Expanded PFAS list (see Table 6) by Method EPA 537 Version 1.1 Modified.
- Perfluoro(2-methyl-3-oxahexanoic) acid (HFPODA, “GenX”) and dodecafluoro-3H-4,8-dioxanonanoic acid (ADONA) by Method SW-846 8321B.
- Principal ions (i.e., calcium, magnesium, potassium, sodium, chloride, sulfate, and carbonate/bicarbonate), pH and grain size analysis[1].
- Volatile organic compounds (VOCs) by Method 8260B.
- Semi-volatile organic compounds (SVOCs) by Method 8270C.
- Target Analyte List (TAL) Metals by methods 6010C and/or 6020A.

[1] Grain size analysis will be performed by GeoTesting Express of Acton, Massachusetts via method ASTM D422.

2.2 Monitoring Well Installation

Monitoring wells will be installed according to the procedures described in Section 5.3.1 of the On-Property SI Work Plan at the approximate locations presented on Figure 2. The wells will be installed as shallow overburden monitoring wells in boreholes advanced using direct push or roto-sonic drilling techniques with a screen interval intersecting the water table. In the event that the water table is near or below the top of bedrock, bedrock monitoring wells will be installed in boreholes advanced using roto-sonic drilling techniques. Following installation, the wells will be developed using the procedures described in Section 5.3.3 of the On-Property SI Work Plan.

Flush-mount surface completions will be utilized for wells installed under this work plan addendum. In the event that well decommissioning is required, wells will be decommissioned in accordance with the procedures included in Attachment A.

2.3 Groundwater Sampling and Analysis

Groundwater samples will be collected according to the procedures described in Section 5.4 of the On-Property SI Work Plan from the monitoring wells listed on Tables 4 and 5 and presented in Figure 2. The groundwater monitoring wells installed under this work plan addendum will be sampled twice, with one event coinciding with routine, on-property quarterly groundwater monitoring. Groundwater samples will be submitted to ELLE of Lancaster, Pennsylvania for analysis of:

- The PFAS analytes by Modified Method 537.1 (see Table 6)

The following additional analytes will be analyzed in a subset of samples as identified on Tables 4 and 5:

- Expanded PFAS list by Method EPA 537 Version 1.1 Modified (see Table 6)
- Perfluoro(2-methyl-3-oxahexanoic) acid (HFPODA, “GenX”) and dodecafluoro-3H-4,8-dioxanonanoic acid (ADONA) by Method SW-846 8321B
- VOCs by Method 8260B
- SVOCs by Method 8270C
- TAL Metals (aluminum, antimony, arsenic, barium, beryllium, cadmium, chromium, cobalt, copper, iron, lead, manganese, mercury, nickel, selenium, silver, thallium, vanadium, and zinc) by methods 6010C and/or 6020A
- Wet chemistry parameters including total suspended solids and principal ions (alkalinity as bicarbonate, ammonium, calcium, chloride, iron, magnesium, manganese, nitrate, nitrite, potassium, sodium, sulfate, and sulfite)

3.0 SCHEDULE AND PROJECT ORGANIZATION

The schedule and project organization for the Flatley property investigation will follow that outlined for the on-property site investigation in Section 6.0 of the On-Property SI Work Plan.

4.0 CLOSING

The undersigned are the principal authors of this work plan addendum. Should you have any questions regarding this document, please contact Mr. Ross Bennett at (603) 668-0880.

Golder Associates Inc.

Ross W. Bennett, PE
Senior Engineer

Alistair P.T. Macdonald, PG, LSP
Senior Program Leader and Principal

RWB/APTM/drb

CC: Kevin Walker, John Flatley Company

Attachments:

Figure 1	Site Location
Figure 2	Proposed Investigation Locations
Figure 3	Proposed Investigation Locations and Camera Survey Observations
Table 1	Proposed Investigation Locations and Associated PRAs
Table 2	Soil Investigation Locations – PFAS Analysis
Table 3	Soil Investigation Locations – Non-PFAS Analysis
Table 4	Groundwater Investigation Locations – First Sampling Event
Table 5	Groundwater Investigation Locations – Second Sampling Event
Table 6	PFAS Analyte List
Attachment A	Well Decommissioning Procedure

5.0 REFERENCES CITED

Golder, 2018a. On-Property Site Investigation On-Property SI Work Plan, Saint-Gobain Performance Plastics, 701 Daniel Webster Highway in Merrimack, New Hampshire. June 8, 2018.

Golder, 2018b. May 2018 Unvalidated Dry-Weather and Surface Water Data Submittal, Saint-Gobain Performance Plastics, 701 Daniel Webster Highway in Merrimack, New Hampshire. June 29, 2018.

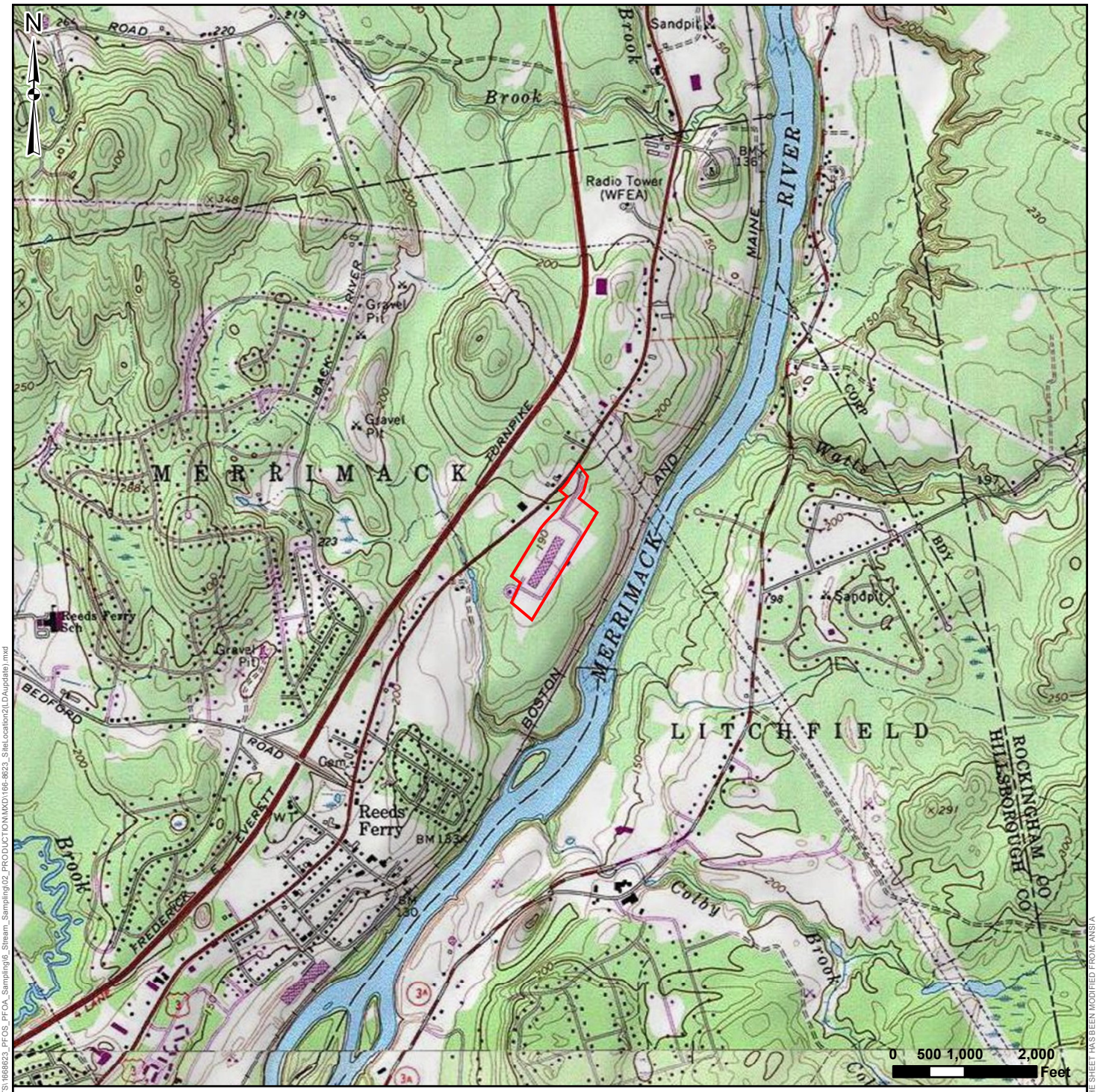
Golder, 2018c. May 2018 Unvalidated Groundwater Data Submittal, Saint-Gobain Performance Plastics, 701 Daniel Webster Highway in Merrimack, New Hampshire. July 13, 2018.

Golder, 2018d. June 2018 Unvalidated Wet-Weather Sampling Event Data Submittal, Saint-Gobain Performance Plastics, 701 Daniel Webster Highway in Merrimack, New Hampshire. July 13, 2018.

NHDES, 2017. Letter Re: October 30, 2017 Meeting. November 3, 2017.

x:\1668623 sgpp merrimack\700 reports-deliv\10 - flatley inv wp\on-property si addendum - flatley investigation work plan\si addendum - flatley 2018-07-27.docx

FIGURES



LEGEND

Approximate SGPP Facility Property Boundary

REFERENCE

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

CLIENT

SAINT-GOBAIN PERFORMANCE PLASTICS

PROJECT

SAINT-GOBAIN PERFORMANCE PLASTICS
701 DANIEL WEBSTER HIGHWAY
MERRIMACK, NH

TITLE

FACILITY LOCATION MAP

CONSULTANT

GOLDER

YYYY-MM-DD	2018-03-29
PREPARED	SHL
DESIGN	HDE
REVIEW	RWB
APPROVED	APTM

PROJECT No.	CONTROL	Rev.	FIGURE
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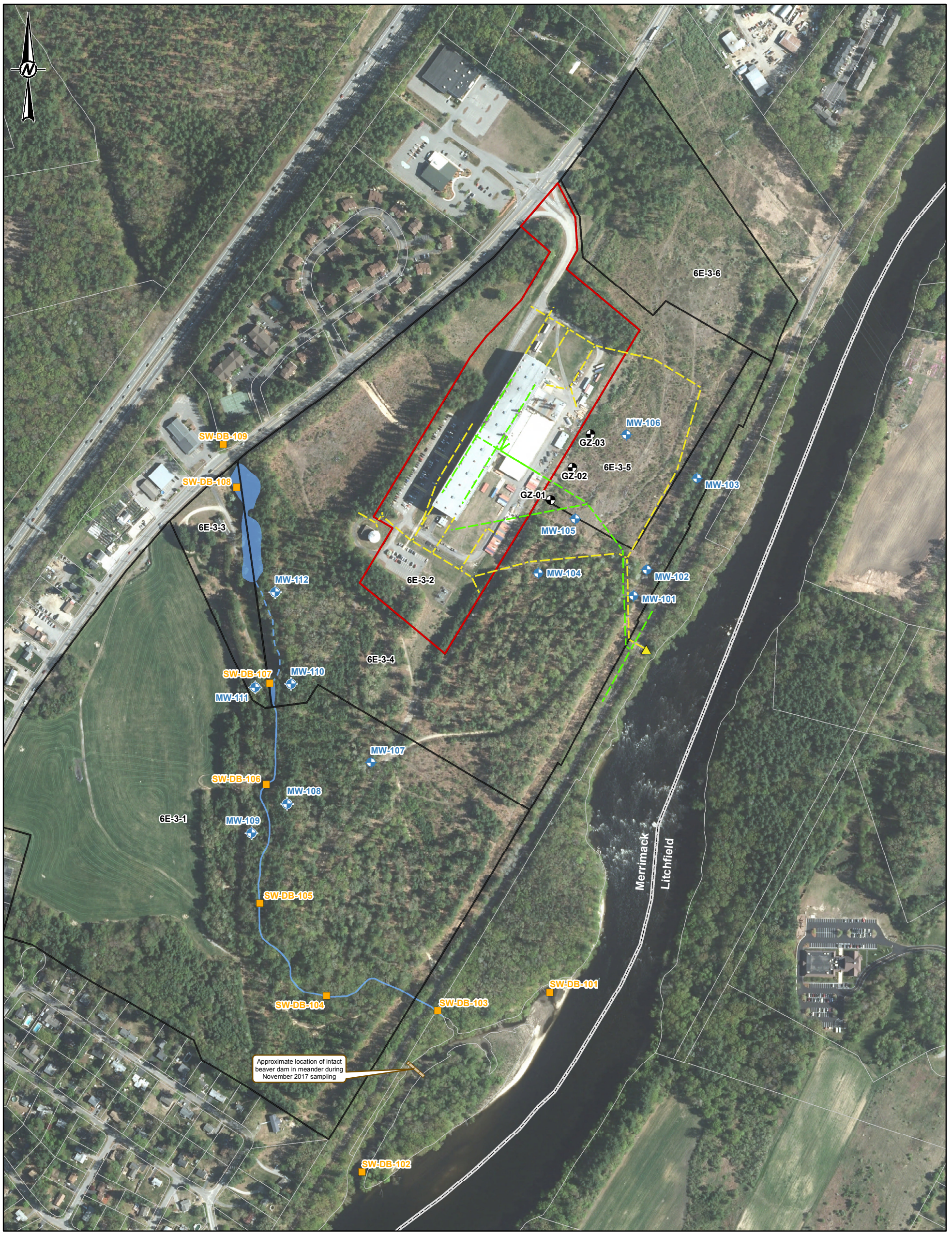

LEGEND

- Existing Monitoring Wells
- Proposed soil boring and temporary monitoring
- Sampling Location - Dumpling Brook
- Outfall Sampling Location
- Sanitary Sewer Line
- Stormwater Drain Line
- SGPP Property Boundary
- Former GE or Chemfab Properties
- Parcel Boundary
- Beaver Dam

0 400 800

1 inch = 400 feet Feet

NOTE(S)

1. PROPERTY BOUNDARIES ARE APPROXIMATE.

REFERENCE(S)

1. PARCEL MOSAIC DOWNLOADED FROM NH GRANIT
2. 2015 1-FT IMAGERY FROM NH GRANIT

CLIENT

SAINT-GOBAIN PERFORMANCE PLASTICS

PROJECT

SAINT-GOBAIN PERFORMANCE PLASTICS
701 DANIEL WEBSTER HIGHWAY
MERRIMACK, NH

TITLE

PROPOSED INVESTIGATION LOCATIONS

CONSULTANT

GOLDER

YYYY-MM-DD	7/26/2018
DESIGNED	RWB
PREPARED	SHL
REVIEWED	RWB
APPROVED	APTM

PROJECT NO.	CONTROL	REV.	FIGURE
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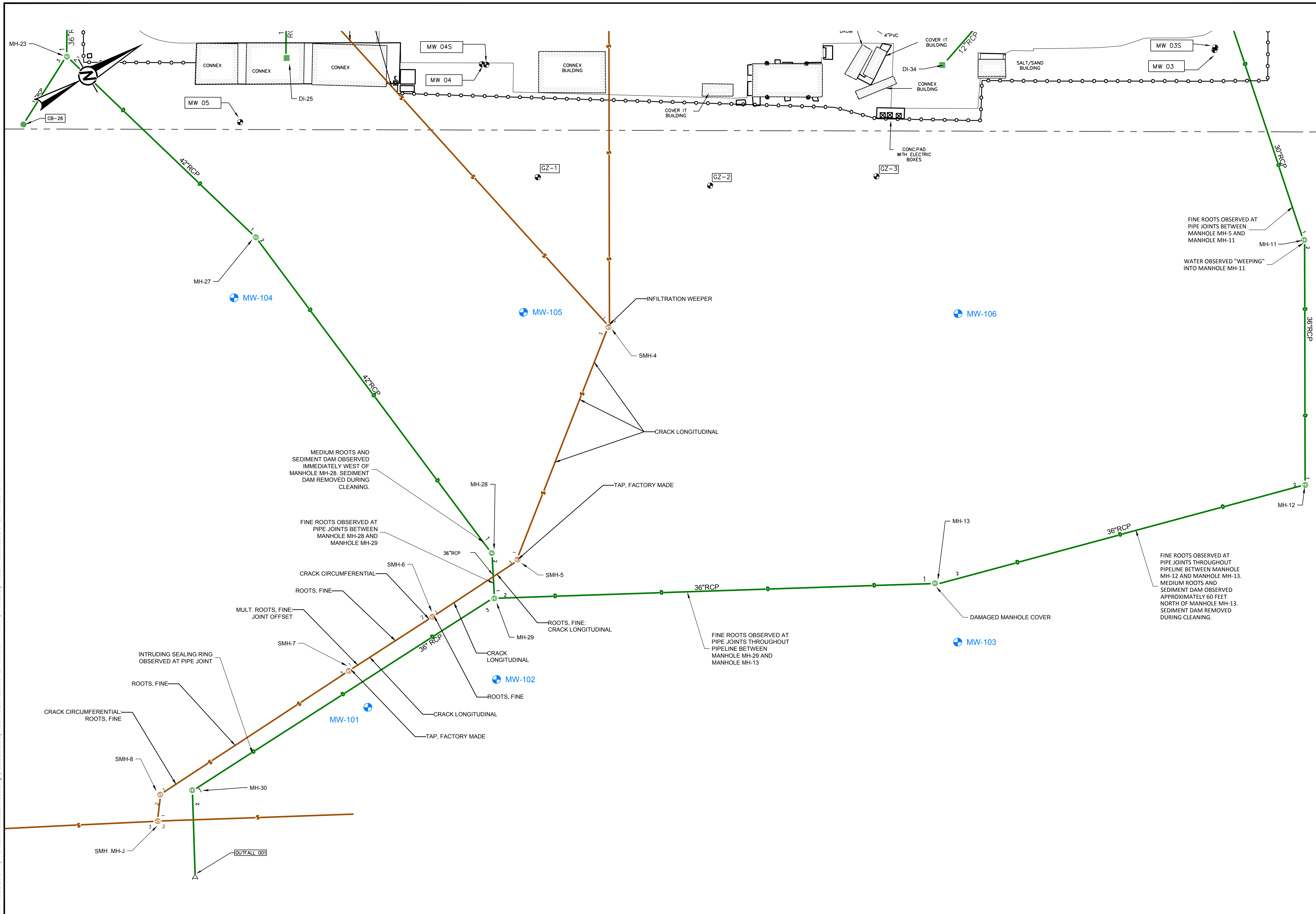

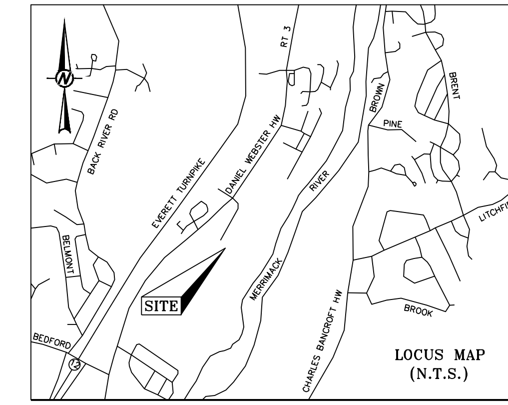

LEGEND

	CULVERT		ELECTRIC BOX
CMP	CORRUGATED METAL PIPE		CATCH BASIN
RCP	REINFORCED CONCRETE PIPE		ROUND CATCH BASIN
	EXISTING MONITORING WELL		DRAIN MANHOLE
	PROPOSED SOIL BORING AND MONITORING WELL		SEWER MANHOLE

- CHAIN LINK FENCE
- PROPERTY LINE
- RIGHT OF WAY
- STORMWATER DRAIN LINE
- SANITARY SEWER LINE

NOTES

1. THIS PLAN WAS PREPARED FROM FIELD SURVEY CONDUCTED BY WSP IN APRIL OF 2016, AUGUST OF 2017 AND OCTOBER OF 2017.
2. THE HORIZONTAL DATUM SHOWN HEREON REFERENCES THE NEW HAMPSHIRE STATE PLANE COORDINATE SYSTEM NAD83.
3. THE VERTICAL DATUM SHOWN HEREON REFERENCES NAVD88.
4. THIS PLAN ONLY REFERENCES THE BENCHMARK SET BY WSP AND IS LABELED AS 'TBM A'. ANY OTHER BENCHMARKS FOUND ON SITE WERE NOT SET OR VERIFIED BY WSP.
5. THE SURVEYED PROPERTY IS SUBJECT BUT NOT LIMITED TO THE INFORMATION SHOWN HEREON. ALL INFORMATION THAT MAY AFFECT THE QUALITY OF THE TITLE TO BOTH THE SUBJECT AND ADJOINING PARCELS SHOULD BE VERIFIED BY AN ACCURATE AND CURRENT TITLE REPORT. THIS SURVEY WAS PREPARED WITHOUT THE BENEFIT OF A CURRENT TITLE REPORT.

PLAN REFERENCES

1. PLAN ENTITLED "SUBDIVISION PLAN (MAP 6E, LOT 3-4), MERRIMACK COMMERCE PARK, DANIEL WEBSTER HIGHWAY, MERRIMACK, NEW HAMPSHIRE, PREPARED FOR JOHN J. FLATELY COMPANY." DATED NOVEMBER 3, 2012. PREPARED BY HAYNER/ SWANSON, INC. PLAN ON RECORD AT THE HILLSBOROUGH COUNTY REGISTRY OF DEEDS AS PLAN No. 37652.
2. PLAN ENTITLED "LOT LINE RELOCATION PLAN (LOTS 3-2 & 3-4, MAP 6E), BALLYGOWAN PARK, D.W. HIGHWAY, MERRIMACK, NEW HAMPSHIRE. PREPARED FOR THE FLATLEY COMPANY." DATED APRIL 6, 1990. PREPARED BY ALLAN H. SWANSON, INC. PLAN ON RECORD AT THE HILLSBOROUGH COUNTY REGISTRY OF DEEDS AS PLAN No. 24540.
3. PLAN ENTITLED "PLAN OF LOTS PREPARED FOR CHEMICAL FABRICS CORPORATION, DANIEL WEBSTER HIGHWAY, MERRIMACK, N.H." DATED MARCH 9, 1987. PREPARED BY T.F. MORAN, INC. PLAN ON RECORD AT THE HILLSBOROUGH COUNTY REGISTRY OF DEEDS AS PLAN No. 20689.
4. PLAN ENTITLED "SUBDIVISION PLAN PREPARED FOR CHEMICAL FABRICS CORPORATION, DANIEL WEBSTER HIGHWAY, MERRIMACK, N.H." DATED MARCH 9, 1987. PREPARED BY T.F. MORAN, INC. PLAN ON RECORD AT THE HILLSBOROUGH COUNTY REGISTRY OF DEEDS AS PLAN No. 20582.
5. PLAN ENTITLED "LOT LINE REVISION PLAN, LAND OF CHEMICAL FABRICS CORPORATION, DANIEL WEBSTER HIGHWAY, MERRIMACK, N.H." DATED AUGUST 7, 1986. PREPARED BY GEORGE F. KELLER, INC. PLAN ON RECORD AT THE HILLSBOROUGH COUNTY REGISTRY OF DEEDS AS PLAN No. 19804.

CLIENT
SAINT-GOBAIN PERFORMANCE PLASTICS

PROJECT
SAINT-GOBAIN PERFORMANCE PLASTICS
701 DANIEL WEBSTER HIGHWAY
MERRIMACK, NEW HAMPSHIRE

CONSULTANT
GOLDER

YYYY-MM-DD	2018-07-27
DESIGNED	STD
PREPARED	RWC
REVIEWED	RWB
APPROVED	APTM

TITLE
PROPOSED INVESTIGATION LOCATIONS AND CAMERA SURVEY OBSERVATIONS

PROJECT NO.	SUBTITLE	REV.	FIGURE
166-8623	A	0	3

TABLES

Table 1: Proposed Investigation Locations and Associated PRAs

Investigation Location	PRA-1 Aerial Deposition Area	PRA-3 Former Railroad Tracks	PRA-12 Sewer Lines	PRA-16 Existing Sub-surface Stormwater Conveyance System
MW-101	X		X	X
MW-102	X		X	X
MW-103	X			X
MW-104	X			X
MW-105	X		X	X
MW-106	X			
MW-107	X	X		
MW-108	X			
MW-109	X			
MW-110	X			
MW-111	X			
MW-112	X			

Notes:

PRA = Potential Release Area

Prepared by: STD
Checked by: RWB
Reviewed by: APTM

Table 2: Soil Investigation Locations - PFAS Analysis

Soil Boring	Anticipated Depth Intervals						PFAS - Short List[1]	PFAS - Expanded List[1]	HFPODA/ ADONA	Principal Ions, pH, Grain Size	TOC	Moisture Content
	0-2 Inches	2-12 Inches	3-4 feet	6-8 feet	10 feet below water table	Other						
MW-101	X	X	X	X			X	--	--	--	X	X
MW-102	X	X	X	X			X	--	--	--	X	X
MW-103	X	X	X	X			X	--	--	--	X	X
MW-104	X	X	X	X	X		X	X	X	X	X	X
MW-105	X	X	X	X			X	--	--	--	X	X
MW-106	X	X	X	X	X		X	X	X	X	X	X
MW-107	X	X	X	X			X	--	--	--	X	X
MW-108	X	X	X	X			X	--	--	--	X	X
MW-109	X	X	X	X			X	--	--	--	X	X
MW-110	X	X	X	X	X		X	X	X	X	X	X
MW-111	X	X	X	X	X		X	X	X	X	X	X
MW-112	X	X	X	X			X	--	--	--	X	X

Notes:

1: See Table 6 for PFAS short and expanded lists

PRA - potential release area

HFPODA - perfluoro(2-methyl-3-oxahexanoic) acid ("GenX")

ADONA - dodecafluoro-3H-4,8-dioxanonanoic acid

TOC - total organic carbon

Prepared by: STD

Checked by: RWB

Reviewed by: APTM

Table 3: Soil Investigation Locations - Non-PFAS Analysis

Soil Boring	Anticipated Depth Intervals					VOCs	SVOCs	TAL Metals
	0-2 feet	3-4 feet	6-8 feet	10 feet below water table	Other			
MW-106	X					X	X	X
MW-107	X					X	X	X

Notes:

VOCs - volatilte organic compounds

SVOCs - semi-volatile organic compounds

TAL Metals - target analyte list metals (aluminum, antimony, arsenic, barium, beryllium, cadmium, calcium, cobalt, chromium, copper, iron, lead, magnesium, manganese, nickel, potassium, selenium, sodium, silver, thallium, vanadium, and zinc)

Prepared by: STD

Checked by: RWB

Reviewed by: APTM

Table 4: Groundwater Investigation Locations - First Sampling Event

Well	PFAS - Short List[1]	PFAS - Expanded List[1]	HFPODA/ADONA	VOCs	SVOCs	TAL Metals	Wet Chemistry
MW-101	X	--	--	--	--	--	X
MW-102	X	--	--	--	--	--	X
MW-103	X	--	--	--	--	--	X
MW-104	X	X	X	X	X	X	X
MW-105	X	--	--	--	--	--	X
MW-106	X	X	X	--	--	--	X
MW-107	X	--	--	X	X	X	X
MW-108	X	--	--	--	--	--	X
MW-109	X	--	--	--	--	--	X
MW-110	X	X	X	--	--	--	X
MW-111	X	X	X	--	--	--	X
MW-112	X	--	--	--	--	--	X

Notes:

1: See Table 6 for PFAS short and expanded lists

HFPODA - perfluoro(2-methyl-3-oxahexanoic) acid ("GenX")

ADONA - dodecafluoro-3H-4,8-dioxanonanoic acid

VOCs - volatilte organic compounds

SVOCs - semi-volatile organic compounds

TAL Metals - target analyte list metals (aluminum, antimony, arsenic, barium, beryllium, cadmium, calcium, cobalt, chromium, copper, iron, lead, magnesium, manganese, nickel, potassium, selenium, sodium, silver, thallium, vanadium, and zinc)

Wet chemistry parameters - total suspended solids and principal ions (alkalinity as bicarbonate, ammonium, calcium, chloride, iron, magnesium, manganese, nitrate, nitrite, potassium, sodium, sulfate, and sulfite)

Prepared by: STD

Checked by: RWB

Reviewed by: APTM

Table 5: Groundwater Investigation Locations - Second Sampling Event

Well	PFAS - Short List[1]	PFAS - Expanded List[1]	HFPODA/ADONA
MW-101	X	--	--
MW-102	X	--	--
MW-103	X	--	--
MW-104	X	X	X
MW-105	X	--	--
MW-106	X	X	X
MW-107	X	--	--
MW-108	X	--	--
MW-109	X	--	--
MW-110	X	X	X
MW-111	X	X	X
MW-112	X	--	--

Notes:

1: See Table 6 for PFAS short and expanded lists

HFPODA - perfluoro(2-methyl-3-oxahexanoic) acid ("GenX")

ADONA - dodecafluoro-3H-4,8-dioxanonanoic acid

Prepared by: STD

Checked by: RWB

Reviewed by: APTM

Table 6: PFAS Analyte List

PFAS Analytes	Abbreviation	CAS Id.	Target List	Expanded List*
10:2 Fluorotelomer sulfonic acid	10:2 FTSA	120226-60-0		x
4:2 Fluorotelomer sulfonic acid	4:2 FTSA	757124-72-4		x
6:2 Fluorotelomer sulfonic acid	6:2 FTSA	27619-97-2		x
8:2 Fluorotelomer sulfonic acid	8:2 FTSA	39108-34-4		x
N-ethyl perfluorooctanesulfonamidoacetic acid	NEtFOSAA	2991-50-6	x	
N-ethyl perfluorooctylsulfonamide	NEtPFOSA	4151-50-2		x
N-ethyl perfluorooctanesulfonamideoethanol	NEtPFOSAE	1691-99-2		x
N-methyl perfluorooctanesulfonamidoacetic acid	NMeFOSAA	2355-31-9	x	
N-methyl perfluorooctanesulfonamide	NMePFOSA	31506-32-8		x
N-methyl perfluorooctanesulfonamidoethanol	NMePFOSAE	24448-09-7		x
Perfluorooctanesulfonic acid	PFOS	1763-23-1	x	
Perfluorobutanesulfonic acid	PFBS	375-73-5	x	
Perfluorobutanoic acid	PFBA	375-22-4	x	
Perfluorodecanesulfonic acid	PFDS	335-77-3		x
Perfluorodecanoic acid	PFDA	335-76-2	x	
Perfluorododecanesulfonic acid	PFDoS	79780-39-5		x
Perfluorododecanoic acid	PFDoA	307-55-1	x	
Perfluoroheptanesulfonic acid	PFHpS	375-92-8		x
Perfluoroheptanoic acid	PFHpA	375-85-9	x	
Perfluorohexadecanoic acid	PFHxdA	67905-19-5		x
Perfluorohexanesulfonic acid	PFHxS	355-46-4	x	
Perfluorohexanoic acid	PFHxA	307-24-4	x	
Perfluorononanesulfonic acid	PFNS	68259-12-1		x
Perfluorononanoic acid	PFNA	375-95-1	x	
Perfluorooctadecanoic acid	PFOdA	16517-11-6		x
Perfluorooctanesulfonamide	PFOSA	754-91-6		x
Perfluorooctanoic acid	PFOA	335-67-1	x	
Perfluoropentanesulfonic acid	PFPeS	2706-91-4		x
Perfluoropentanoic acid	PFPeA	2706-90-3	x	
Perfluorotetradecanoic acid	PFTA	376-06-7	x	
Perfluorotridecanoic acid	PFTrDA	72629-94-8	x	
Perfluoroundecanoic acid	PFUnA	2058-94-8	x	

*Analysis added at the request of NHDES.

Prepared by: STD
Checked by: RWB
Reviewed by: APTM

ATTACHMENT A
WELL DECOMISSIONING PROCEDURE

APPENDIX A

GENERAL FIELD METHODS FOR GROUNDWATER MONITORING WELL DECOMMISSIONING

1.0 GENERAL APPLICABILITY

This Standard Operating Procedure (SOP) describes the procedures for decommissioning groundwater monitoring wells installed on or near the Saint-Gobain Performance Plastics (SGPP) facility located in Merrimack, New Hampshire. The procedures described herein apply only to monitoring wells installed in unconsolidated overburden materials constructed with polyvinyl chloride (PVC) well screen and riser (casing) with steel protective surface casing. This well decommissioning SOP is not appropriate for decommissioning multi-cased monitoring wells and/or bedrock monitoring wells.

This SOP includes the following:

- Field team leader and field personnel responsibilities
- Pre-field work planning
- Field work procedures
- Decontamination procedures
- Field work documentation

2.0 RESPONSIBILITIES

The field team leader and field personnel have the shared responsibility to oversee and ensure that the monitoring well decommissioning program is performed in accordance with the program-specific protocols described in this SOP while adhering to the site-specific HASP. The field team leader shall ensure that on-site personnel, including subcontractors and third parties that may have direct access to the work area, understand and comply with this SOP.

3.0 PLANNING

Prior to decommissioning, monitoring wells shall be investigated to determine their condition, details of construction, and whether or not any obstructions exist that will interfere with the decommissioning process. A review of construction details should include construction materials, well depth and screen interval, subsurface information such as stratigraphy and water levels, legal location, date of installation and history of well maintenance and/or modifications.

Monitoring well decommissioning shall be completed by a competently trained licensed New Hampshire Water Well Contractor equipped with the appropriate tools and materials. Well decommissioning shall be observed and documented by a geological or engineering professional.

4.0 FIELD PROCEDURE

The field procedures for monitoring well decommissioning are as follows:

If the well is installed in a single hydrostratigraphic unit or in multiple hydrostratigraphic units that are in direct hydraulic communication (i.e., the well does not penetrate a low permeability aquitard or aquiclude) the well can be decommissioned by grouting the PVC well casing as follows:

- Measure and record the well information as indicated on the Well Decommissioning Form (Attachment A).

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- Remove the flush-mount surface casing using a jackhammer and/or hand tools using care not to damage the PVC well casing.
- Calculate and record the volume of grout required to completely fill the PVC well casing to ground surface based on the measured well depth and diameter.
- Seal the well from the bottom to the top by pressure grouting with a tremie line. The grout shall be Type 1 Portland cement with 2 to 10 percent bentonite clay or hydrated bentonite pellets. If hydrated bentonite pellets are used, the application rate will be at least three minutes per bag to reduce the risk of bridging. Monitor for grout loss during placement. If grout loss is significant, allow the grout to set for 12 to 24 hours before resuming grouting.
- If necessary, a tamping rod shall be used to tamp the sealing material into place.
- Cut PVC casing five feet below ground surface, as appropriate.
- Grout shall be installed to within approximately 2 feet of ground surface, and the remainder of the borehole filled to ground surface with clean granular material.

If the well is installed across multiple hydrostratigraphic units that are in not in direct hydraulic communication (i.e., the well penetrates one or more low permeability aquitards or aquicludes) or if the lithologic profile is unknown, the well must be decommissioned by overdrilling and grouting as follows:

- Measure and record the well information as indicated on the Well Decommissioning Form (Attachment A).
- Remove the flush-mount surface completion using a jackhammer and/or hand tools using care not to damage the PVC well casing.
- Overdrill the PVC monitoring well casing and filter pack using a hollow-stem auger drilling rig equipped with outward facing carbide cutting teeth with a diameter larger than the original borehole diameter.
- Place drill cuttings and any other materials generated during overdrilling in 55-gallon drums for offsite disposal.
- Measure depth of the overdrilled borehole to verify the total depth.
- Calculate and record the volume of grout required to fill the well to ground surface based on the measured borehole depth and diameter.
- Seal the overdrilled borehole from the bottom to the top by pressure grouting with a tremie line. The grout shall be Type 1 Portland cement with 2 to 10 percent bentonite clay. Monitor for grout loss during placement. If grout loss is significant, allow the grout to set for 12 to 24 hours before resuming grouting.
- If necessary, a tamping rod shall be used to tamp the sealing material into place.
- Grout shall be installed to within approximately 2 feet of ground surface, and the remainder of the borehole filled to ground surface with clean granular material.

5.0 DECONTAMINATION

All decommissioning tools that contact monitoring well/borehole soil and groundwater shall be decontaminated prior to use at the next monitoring well location. A hot water pressure washer or steam cleaner shall be used for decontamination. All water and other materials used for decontamination shall be containerized for offsite disposal.

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6.0 FIELD DOCUMENTATION

The site geological or engineering professional shall document the well decommissioning using the Well Decommissioning Form (Attachment A) and record volume of drill cuttings and other materials generated and containerized during overdrilling under “comments/observations” section of the field form. The site geological or engineering professional shall also provide photo documentation of all monitoring well decommissioning steps listed in Section 4.0 of this SOP.

Following completion of decommissioning activities, the licensed well driller shall provide a completed “Abandoned Well Registration Report” form to Golder.

Well Decommissioning Field Form

Well No._____

Well Information*

Well Installed By		**Date Installed**	
Design Well Depth		**Measured Depth**	
Depth to Water		**Well Casing Type**	
Inside Casing Dia.		**Inside Casing Depth**	
Screen Type		**Screen Length**	
Surface Casing Type		**Surface Casing Dia.**	
Borehole Dia.		**(Known or Assumed**	

Decommissioning Information

Decommissioning Observed By		**Date**	
Surface Casing Removed?			
Well Casing Removed?		**(Pulled Out- Drilled Out)**	
Overdrilling Method		**Drill Rig**	
Overdrill Depth		**Overdrill Dia.**	
Grout Type		**Grout Mix Ratio**	
Calculated Volume Required[1]			
Grout Volume Used			
Comments/Observations			

* If available, attach a copy of the original borehole and well construction log to this form

[1]Well volume (cubic feet) = ((3.1416*D^2)/4)*d, where D= diameter of well in feet, d= well depth in feet

1 cubic foot equals 7.48 gallons

Job Number		**Made By**	
Project		**Date**	

Well Number

_____

(FOR CONTRACTOR'S USE)

This report must be submitted to the N.H. Water Well Board no later than **90 days** after the well was decommissioned.

State of New Hampshire
Water Well Board
PO Box 95
Concord, NH 03302-0095

Abandoned Well Registration Report

Identification # _____

Latitude _____

Longitude _____

Please Report Coordinates in:
Map Datum: WGS 84
Position Format: hddd°mm.mmm

1. **Well Owner:** _____
Name Permanent Mailing Address

Building Contractor: _____
Name Permanent Mailing Address

2. **Location of Well:** Town _____ Address _____
Street No Road Name

Subdivision Name_____Subdivision Lot No._____

Town Tax Map and Lot No: Map No._____Lot No._____

3. **Type of Well:** ☐ Drilled in Bedrock ☐ Drilled in Gravel ☐ Dug ☐ Wash / Point

4. **Use Type:** ☐ Domestic ☐ Public ☐ Irrigation ☐ Commercial ☐ Monitoring

5. **Reason for Abandonment:** ☐ Insufficient Yield ☐ Poor Aesthetic Quality ☐ Contaminated ☐ Disrepair ☐ Failed Well ☐ Isolation Distances ☐ No Longer In Use ☐ Other _____

6. **Current Status:** ☐ Decommissioned ☐ Not Decommissioned ☐ Wellhead Left Above Grade and Covered

7. **Date Well was Decommissioned:** _____

8. **Depth of Well:** _____ ft., **Static Water Level:** _____ feet below land surface.

9. **Casing:** Length _____ft., Diameter _____in., Material _____

10. **Method Used for Sealing:** ☐ Filled with Grout ☐ Pressure Grout

11. **Quantity of Materials Used:** ☐ Neat Cement _____ (No. of Units) ☐ Cement / Bentonite Grout _____ (No. of Units)

☐ Premixed Bentonite Grout _____ (No. of Units) ☐ Bentonite Chips _____ (No. of Units) ☐ Other _____ (No. of Units)

12. **Additional Information:**

Doing Business as _____
Company or Business Name

Report Filed by _____
Licensee Signature

Date of Report _____ License No. _____

Use Back Side If Necessary