The State of New Hampshire
DEPARTMENT OF ENVIRONMENTAL SERVICES

Robert R. Scott, Commissioner

EMAIL ONLY

June 16, 2020

Christopher S. Angier
Senior Environmental Project Manager
Saint-Gobain Performance Plastics
14 McCaffrey Street
Hoosick Falls, NY 12090

Subject: **Merrimack** – Saint-Gobain Performance Plastics, 701 Daniel Webster Highway
DES Site #**199712055**, Project #36430

Report on 2018 Stormwater and Surface Water Activities (SSWA), Volumes I & II, prepared by Golder Associates, Inc. (Golder), dated March 15, 2019

Site Investigation (SI) Report, Saint-Gobain Performance Plastics, prepared by Golder, dated April 19, 2019

Supplemental Site Investigation Data Transmittal, prepared by Golder, dated March 11, 2020

2019 Annual Groundwater Summary, prepared by Golder, dated March 18, 2020

Dear Mr. Angier:

The New Hampshire Department of Environmental Services (NHDES) has reviewed the above-referenced submittals prepared on behalf of Saint-Gobain Performance Plastics (SGPP) by Golder for SGPP's facility located at 701 Daniel Webster Highway in Merrimack (Facility). The submittals pertain to site characterization activities completed by SGPP to evaluate the extent of impacts to on-site groundwater and soil, surface water, and stormwater from the release of per- and polyfluoroalkyl substances (PFAS) from the Facility.

This comment letter is organized by topic and subject. Based on correspondence from Golder, NHDES understands that SGPP will be preparing a Supplemental Site Investigation (SSI) Summary Report. The SSI is warranted to further refine the understanding of site hydrogeology, source areas, impacted media, and the fate and transport of PFAS from the Facility, as well as to analyze data collected since completion of the Site Investigation Report, update the Conceptual Site Model (CSM), and document findings from any further investigation necessary to address the comments herein. This additional investigation work is needed to evaluate the potential remedial alternatives for the site.

Based on our review of the above-referenced reports, NHDES provides the following comments, questions, and requests for additional information (highlighted in ***bold/italic*** font):

A) Facility History

1. The Site Investigation (SI) report states that PFAS-containing dispersions were historically used at the Facility; it should be clarified that information provided to NHDES by SGPP indicates that PFAS-containing dispersions are still used at the Facility. The report further states that perfluorooctanoic acid (PFOA) may have been emitted through Facility stacks; it should be clarified that air emission tests completed by SGPP demonstrate that PFOA (and other PFAS) continue to be emitted through Facility stacks. ***Please update the introduction in the next report submittal.***

2. A review of the historical air photos provided in Appendix B of the SI report appears to show that the loading dock was reconfigured and that some or all of the former loading dock was covered by the "New Manufacturing Building" addition. ***Please confirm if some or all of the former loading dock was located where the New Manufacturing Building is presently located.***

3. The SI report provides select as-built interior drawings for the Facility. The report indicates that there are no subsurface conveyances; however, records in the NHDES files show a subsurface trench and sump in the dispersion mixing room. ***Please clarify whether there was any subsurface piping, trenches, sumps, etc. used to transfer manufacturing process liquids by current or historical Facility occupants, and show the location of all existing and former subsurface trenches and sumps on the SSI report figures.***

4. ***In the SSI, please identify whether fluorine-based chemicals were emitted from the PSA coater (silicone/PTFE mix) that formerly occupied the current Hazardous Waste Storage Building. If yes, please evaluate if the PFAS observed in soil and groundwater in PRA-6 is due to emissions from the PSA coater and/or other sources. Additionally, was the chrome dryer located in this area?***

5. The SI report (Appendix D) indicates that a work plan was submitted to NHDES to remove sand impacted by hydraulic oil released in March 2017. ***Please update the report with a summary of the response activities that were implemented (e.g., summarize findings of C.T. Male Associates report dated November 17, 2017).***

B) Stormwater

The stormwater assessment confirms that PFAS are being discharged to the Merrimack River through the stormwater management system. The system is discharging PFAS-impacted water during both wet weather (e.g., storm events) and dry weather events (e.g., non-stormwater, proposed by Golder to likely be groundwater infiltration). SGPP needs to take action to prevent, eliminate, or limit damage to the environment from both wet weather and dry weather discharges, thereby mitigating these ongoing releases of PFAS contamination from the stormwater system to the environment. ***Please address the stormwater comments in the SSI report and then prepare a Remedial Action Plan (RAP). The SSI should include an updated Conceptual Site Model (CSM) and address the requirements of Env-Or 606 as well as the following items:***

1. ***The source(s) of the PFAS impacts to stormwater should be confirmed:***

   i. The roof over the north end of the main building is identified by Golder as the source of the "higher PFAS detections" in stormwater; however, results from the SSWA study do not indicate the mechanism(s) by which PFAS contaminates stormwater. For example, it is not known if the PFAS in the roof runoff are due to accumulated dry deposition on the roof (including air fallout and char deposits), leaching of PFAS that absorbed onto building materials from air emissions, PFAS in the precipitation due to air emissions (i.e., wet deposition), and/or some other source.

   ii. Golder identifies a potential source of PFAS impacts to stormwater quality to be solid material accumulated in the roof drain system that was still present after the system was cleaned. As such, and consistent with recommendations made in our April 13, 2018 and August 28, 2018 letters, residual solid material should be analyzed to identify whether this is an ongoing source of PFAS release to the environment. At a minimum, sample analyses should include the 'Revised 2019 PFAS Target Analysis List' shown on Table Q-2 in the SI report and Total Oxidizer Precursor (TOP) Assay. If these materials are found to leach PFAS, SGPP should propose measures to prevent or eliminate stormwater quality impacts from these materials.

   iii. Golder indicates that runoff from the building roofs is not the only source of PFAS in stormwater. The SSI should discuss the other possible source(s).

2. ***Any completed or proposed remedial action requires documentation for the selection of the remedy and means to evaluate the effectiveness of the remedy, including collection and analysis of data. SGPP should address, at a minimum, the following:***

   i. SGPP should evaluate the degree by which, if any, proposed air emission controls will prevent and/or limit PFAS contamination of stormwater.

   ii. The RAP should address the proposed remedial measures that include: a) installation of a gutter and b) repair of compromised pavement on the eastern side of the building to address stormwater runoff from the roof that has the potential to infiltrate into the ground at the perimeter of the New Manufacturing Building.

   iii. Ongoing monthly dry weather flow monitoring should continue, and the data should be evaluated in the SSI report. The source of the dry weather flow to the stormwater discharge system should be eliminated.

   iv. SGPP should evaluate the effectiveness of efforts to eliminate groundwater infiltration (and potential for stormwater exfiltration) by lining compromised section of pipe and repairing stormwater infrastructure (e.g., manholes). This should include, at a minimum, stormwater flow rate monitoring, groundwater elevation monitoring at a minimum of wells MW-03 and MW-06, and dry weather flow observation as proposed in the SSWA report.

v. Additionally, SGPP should evaluate whether stormwater system repairs that eliminated localized infiltration of groundwater may also contribute to the increased water levels observed in the overburden aquifer, as Golder attributes the dry weather discharge observed in the stormwater system in December 2018 to groundwater infiltration resulting from a 2-foot increase in groundwater levels following above average November precipitation.

vi. The evaluation of the remedial action effectiveness should include ongoing assessments of surface water quality impacts, given that the data presented in the report does not support Golder's conclusion that flow from Outfall 001 and Dumpling Brook "*does not result in a detectible increase in PFAS concentrations in Merrimack River surface water downstream of the mixing zone[s]*." One of three wet weather and one of three dry weather samples from SW-MERR-403W, the furthest downstream surface water sampling site from the Facility, contained PFOA concentrations of 22 nanograms per liter (ng/L) and 14 ng/L, respectively, which were greater than PFOA concentrations measured upstream. By comparison, PFOA levels detected in samples from surface water site SW-MERR-101W-NS located upstream of the stormwater outfall (Outfall 001) for the Facility, were consistently below 10 ng/L (number of samples = 9) except for one field duplicate sample that was 22 ng/L (the corresponding sample was 7.2 ng/L). These results suggest that, on a transient basis, slightly elevated PFAS concentrations (relative to upstream samples) are observed as far as approximately 3,000 feet downstream from the Facility as SW-MERR-403W. Additionally, surface water site SW-MERR-101W is located downstream from Unnamed Brook A where several surface water samples contained PFOA concentrations greater than or equal to 1,000 ng/L. As such, ongoing water quality monitoring should continue, and should also include another station farther upriver of MERR-101W to more fully assess the scope of PFAS contribution to the Merrimack River due to release(s) from the Facility.

vii. SGPP should evaluate the existing stormwater flow and groundwater elevation datasets. At NHDES' request, Golder submitted on May 9, 2019 a set of supplemental figures showing the long-term stormwater flow measurements collected upstream from the Outfall Discharge. These figures have been uploaded to NHDES' OneStop Database by Golder. At NHDES' request, Golder submitted on March 26, 2019 Figure A-1A showing a plot of groundwater elevation versus time in Monitoring Well MW-3S based on measurements collected with a pressure transducer. This figure has been uploaded to NHDES' OneStop Database by Golder and was intended by Golder to be included in Appendix A of the SSWA report.

viii. SGPP should quantify the mass loading of PFAS to the Merrimack River from the stormwater system in both wet weather and dry weather events. Although stormwater samples were collected during early and later portions of rain events, the PFAS concentration during periods of peak stormwater discharge were not

evaluated[1] (i.e., samples were collected when stormwater flow from the Outfall was less than 500 gallons per minute (gpm)). Supplemental Figure S-2B shows that peak discharge from Outfall 001 exceeded 1,000 gpm more than twenty times in 2018, with an observed maximum discharge of nearly 10,000 gpm. Since PFAS concentrations during periods of peak stormwater discharge (e.g., flow rates over 1,000 gpm) have not been measured, the net mass flux of PFAS discharged to the Merrimack River from the Facility stormwater system during a storm event is not known.

C) Site Hydrogeology

1. Well triplets are used to evaluate groundwater quality and vertical flow directions at various depths in an aquifer. At the Facility, well triplets generally consist of three adjacent wells that are screened in shallow overburden, deep overburden, and in fractured rock. Analysis of water level measurements collected from several well triplets at the Facility suggest groundwater gradients from the deep overburden are simultaneously up into the shallow overburden and downward into the underlying bedrock. The SI report characterizes vertical gradients at the site as "*variable…and likely influenced by both short-term and longer-term precipitation trends.*" As such, further evaluation is necessary because the three groundwater depth gauging events reported in the SI report (Table 5.2) may not be sufficient to characterize the full range of vertical gradients at the site, as the magnitude and direction of vertical gradients may respond quickly and transiently to precipitation events. Besides influencing potential groundwater flow paths (e.g., into or out of bedrock), aquifer water levels can be a factor in contaminant fate and transport of PFAS, particularly in the phreatic water table if PFAS partitioning occurs at the air-water interface.

   In the comment letter dated June 6, 2019, NHDES recommended installation of pressure transducers/dataloggers in one or more well triplet(s) at the site to monitor water level changes in the bedrock, deep overburden (till), and overburden to evaluate hydraulic head response to recharge events and seasonal variation. NHDES understands that one transducer was installed in MW-15B after the October 2019 sampling event. ***Automatic and manually collected data should be used to evaluate temporal vertical gradient changes, considering implications for contaminant transport between the shallow/deep overburden and fractured bedrock aquifers. These data should be presented (e.g., graphs of water level elevations and a figure showing areas of the site where there is a downward gradient from the overburden to bedrock vs. an upward gradient for a given time period) and discussed in the SSI report. The SSI should evaluate if/how water level fluctuations influence groundwater contaminant trends. NHDES recommends installation of a datalogger in a well triplet where recharge to the bedrock aquifer, through the overburden, is identified (e.g., where a downward gradient into rock is observed). The report should also evaluate whether other datalogger installations may be needed to more fully understand transient vertical gradients across the site.***

[1] NHDES acknowledges that stormwater evaluations typically focus on 'first flush' conditions.

2. Golder estimated groundwater flow velocities in fractured bedrock using hydraulic conductivity values from the bedrock monitoring wells installed at the Facility and on adjoining lots. The bedrock monitoring wells were generally drilled until the borings encountered enough water from fractures to collect samples for laboratory analyses. As such, the estimated hydraulic conductivities of the bedrock monitoring wells may not be representative of the hydraulic conductivities (and groundwater flow velocities) of higher-yielding fractures or fracture zones that may be present in the vicinity of the site but not yet intersected by a bedrock monitoring well. According to data in the New Hampshire Geological Survey's Water Well Inventory, a bedrock well drilled on lot 6E-3-6 (located northeast of the Facility) had a reported yield of 50 gallons per minute (approximately an order of magnitude greater than the site bedrock monitoring wells), demonstrating higher yielding fractures are present in bedrock within 1,000 feet of the Facility. Monitoring Well MW-15B, the deepest bedrock monitoring well at the site was drilled to a depth of 190 feet below ground, which is shallower than the fracture zone encountered 275 feet below ground in the high-yield well drilled on lot 6E-3-6.

   Hydraulic conductivity estimates of the bedrock wells provided by Golder are positively correlated with PFOA, such that bedrock wells with greater hydraulic conductivity tend to have greater concentrations of PFOA. Depending on the results of the SSI hydraulic gradient analyses (using water level data collected by automated dataloggers) and/or the potential remedial alternatives considered for the site, additional characterization of groundwater quality in fractured rock may be necessary, particularly at depths greater than the site bedrock monitoring wells. ***The SSI report should evaluate whether additional bedrock investigations are necessary to meet remedial objectives.***

3. SGPP should further evaluate potential pathways (e.g. shallow overburden, deep overburden, and fractured rock) for groundwater flow to discharge PFAS along the reach of Dumpling Brook between Route 3 and the Merrimack River. At NHDES' request, Golder submitted on May 9, 2019 a supplemental figure (Figure S-1) showing the stage measurements collected at Surface Water Station SW-DB-104 in Dumpling Brook and Table S-1 showing discrete discharge measurements at several surface water stations. This figure and table have been uploaded to NHDES' OneStop Database. Gauging data collected between Dumpling Brook surface water stations SW-DB-106 (upstream) and SW-DB-104 (downstream) under non-storm conditions suggest increased flow in the brook is due to groundwater discharge to surface water.

   PFOA and perfluorooctane sulfonic acid (PFOS) concentrations increase along the reach of Dumpling Brook between Route 3 (SW-DB-109) and the Merrimack River (SW-DB-103) by approximately 200+ nanograms per liter[2] (ng/L) and 20+ ng/L, respectively. PFOA and PFOS increase in Dumpling Brook between sampling stations SW-DB-107 and SW-DB-106. Nearby Monitoring Well MW-108-40 has relatively elevated PFOS such that the PFOA to PFOS ratios in this well are similar to the PFOA to PFOS ratios of monitoring wells proximal to the Facility where the greatest concentrations of PFOS are observed in groundwater. Specific conductance and chloride are elevated in groundwater at this well, similar to wells that are located immediately south of the New Manufacturing Building.

[2] One nanograms per liter is equivalent to one part per trillion (ppt).

Golder attributes the elevated PFOS in MW-108 and MW-109 to 'another source' and not to a release from the Facility. ***The conceptual site model presented in the SSI should identify the source and account for the observed PFOS and chloride in these two wells.***

4. Updated cross sections, consistent with Env-Or 606.6, should be included in the SSI report that show the location of underground utilities such as stormwater structures and sanitary sewer lines. NHDES requests that the bedrock potentiometric surface be shown in addition to the phreatic water table. If the two lines overlap at the vertical scale the cross section is drawn, the water table should be symbolized to illustrate where one water level (phreatic vs. bedrock) elevation is greater than the other to aid in the visualization of the spatial distribution of vertical groundwater gradients. When revising the cross sections, consider the following observations:

    a. Figure 6A of the supplemental SSI data transmittal (Cross Section A-A') appears to illustrate Dumpling Brook as a losing stream in October 2019, with potential for groundwater flow in the direction of MW-111-25.
    b. The water table shown on Figure 6B of the supplemental SSI data transmittal (Cross Section B-B') intersects the land surface near B'; which suggests that springs or seeps occur in this vicinity. Additionally, bedrock is shown at the ground surface on the cross section near B'. Please confirm that these depictions on the cross sections are consistent with the CSM (e.g., there are springs/seeps and that bedrock outcrops nearby) as depicted on the figures.

5. ***NHDES requests that SSI Report figures depicting the phreatic water table should delineate areas where the overburden is unsaturated.***

6. The screen interval table in Section 2.4.2 of the Supplemental Data Transmittal appears to have incorrect screen intervals for wells MW-03S and MW-03. ***This table should be updated in the SSI Report.***

D) Site Contamination and Potential Release Areas

Various contaminants were present in soil and groundwater at levels greater than applicable regulatory standards and guidance values. As described below, the SSI should define the full extent of contamination and meet the objectives of Env-Or 606.01(b).

1. The SI report indicates PFAS concentrations in soil samples were less than soil remediation standards (SRS). NHDES notes that there are currently no SRS for PFAS in the Env-Or 600 Rules and that soil PFAS levels are evaluated in the context of a health-based direct contact screening value. NHDES has developed revised direct contact screening values for soil exposure[3], which are less than referenced screening values of 500 parts per billion for PFOA and PFOS. Although the SSI data transmittal identifies these screening levels, ***further evaluation of the SI data is needed, and further***

[3] See NHDES memo titled 'Direct Contact Risk-Based Soil Concentrations' dated December 11, 2019.

delineation of impacts in areas that exceed the screening values is necessary. Based on the results of the characterization, a preliminary screening of remedial alternatives will be necessary in the SSI report.

2. Golder attributes polynuclear aromatic hydrocarbons (PAHs) detected in soil at TMW-C to fill material containing 'vitreous-like material'. The 2019 SSI identified elevated concentrations of some PAHs in some samples proximate to the Hazardous Waste Storage Building, and concludes that the impacts are similar to urban fill soil. However, the SSI data transmittal does not provide a rationale for why elevated PAHs were only detected in some samples. ***The SSI should identify the source of PAHs in soil samples collected from borings proximal to the Hazardous Waste Storage Building and the Facility, as well as delineate the extent of the impacts for areas impacted at levels greater than the SRS for soils not impacted by anthropogenic fill material (e.g., coal, coal ash, asphalt).***

3. Manganese concentrations were greater than Ambient Groundwater Quality Standards (AGQS) in groundwater samples collected from several wells (e.g., MW-07-60). Further evaluation of the potential source of the manganese is necessary. Since the presence of suspended solids can influence analytical results for total metals, NHDES recommends field filtering groundwater samples from wells with manganese exceedances to determine if dissolved manganese is present above AGQS. ***If dissolved manganese is detected above AGQS in filtered samples from MW-07-60 and MW-09-51, the SSI report should consider whether this may suggest the presence of a reducing zone of groundwater downgradient from the Facility and the potential of such a zone to influence precursor transformation.***

4. ***The SSI report should reference the applicable AGQS. Please evaluate the nature and extent of other PFAS, not just PFOA and PFOS, associated with releases from this Facility. This evaluation should consider the potential presence of polyfluoroalkyl substances that might be precursors to these regulated compounds.***

5. ***Given the level of uncertainty associated with the PFOA and PFOS mass estimates provided on Table 7-1 of the SI report, NHDES believes that the report may underestimate the mass of PFOA and PFOS at the site. To evaluate the applicability of potential remedial alternatives, the SSI should consider a range of values (e.g., the potential for greater PFAS mass).*** The zones used to estimate the PFOA and PFOS mass are described on Table 7-1 but not shown on a figure. ***Please show the zones on a map included with the SSI report.*** The mass values presented on Table 7-1 may underestimate PFOA and PFOS mass for the following reasons:
    a. The "assumed porosity" value of 25% is on the low side of the range of porosity values for unconsolidated deposits[4].
    b. Data from the SI and SSI show the presence of precursors with the potential to transform to the regulated perfluoroalkyl acids (PFAAs) at the site in the soil and

[4] Freeze, R.A., and Cherry, J.A., Groundwater, Prentice-Hall, Inc. Englewood Cliffs, 1979.

groundwater. The mass estimate does not include the potential for precursors to transform to PFOA and PFOS.

c. The estimate does not include the PFOA detected at 52,000 and 69,500 ng/L in samples collected from monitoring well MW-4S in March 2019.
d. PFAS mass is only estimated for the first 15 feet of bedrock; bedrock below the first 15 feet is not included in the mass calculation for groundwater. Groundwater impacts in bedrock deeper than 190 feet have not been quantified or investigated at the site.
e. The upper eight feet of overburden was used for the soil estimate; soils below a depth of eight feet are not part of the mass calculation even though PFAS have been detected in soil samples collected at depths below eight feet.

6. Evaluation of Potential Release Areas and Transport Pathways. Comments are presented below for the individual potential release areas (PRA) where further assessment is warranted:

   a. PRA-1 Aerial Deposition Area – The SI report states longer-chain perfluoroalkyl carboxylic acids (PFCAs) (C-12 through C-16) were not detected in groundwater; however, that statement is incorrect, as perfluorododecanoic acid (PFDoDA, C-12) was detected in several wells, including monitoring well TMW-F where it was detected at a concentration of 31 ng/L. ***Please review and update in the SSI report.***

      The SI report states that PFOS was not used at the Facility; however, testing of stack emissions and residue conducted in 2016[5] detected perfluoroalkyl sulfonic acids (PFSAs) and perfluoroalkyl sulfonamido compounds in both media, suggesting an air release pathway exists for these compounds. Sulfonamido compounds have the potential degrade to PFSAs such as PFOS, and thus may contribute to the PFOS detections in soil and groundwater in the vicinity of SGPP.

      AGQS exceedances for PFOS in MW-108-40 and MW-109-15 "*are not attributed to aerial deposition from SGPP or advective flow of impacted groundwater from the SGPP Facility…,*" according to Golder. Since the aerial deposition pathway for PFOS was not evaluated by SGPP as part of the Draft Model Memo (Barr, 2018), further data would be needed to confirm these conclusions, as the data also suggests that elevated PFOS in these two monitoring wells could be associated with transport of PFOS from the immediate vicinity of the Facility (where PFOS levels are elevated) and/or leaching from soil due to aerial deposition (e.g., see soil PFOS concentrations at sampling locations in the vicinity of Dumpling Brook). ***Please further evaluate PFOS occurrence considering data collected for the SSI work. The SSI report should evaluate if soil PFOS and PFOS precursors may be a long-term source of PFOS in groundwater at the site. The occurrence, fate, and transport of regulated PFAS should be evaluated as***

[5] *Perfluorinated Sulfonic Acids and Perfluorinated Carboxylic Acids Testing Program Report, Saint-Gobain Performance Plastics, Merrimack, New Hampshire*, prepared by Weston Solutions, Inc., dated July 2016.

part of the SSI report, and NHDES encourages you to consider other non-regulated PFAS as part of the assessment. Consider whether observed/measured soil properties correlate to measured PFAS concentration in soil.

b. PRA-2 Current and Former Loading Dock Areas – Historical aerial photographs show impervious area/potential loading dock structures on the eastern side of the building running from the current location to about the location of the QX Tower. The SI report concludes there is no source of PFAS in this area that warrants additional investigation. However, the PFAS chemistry of monitoring well MW-11-14 is different compared to other onsite monitoring wells in that some short chain PFCAs, such as perfluoropentanoic acid (PFPeA), are present at similar or greater concentrations than PFOA (as well as PFOS) in groundwater samples, suggesting the possibility of a source in PRA-2. During sampling, an odor was observed from temporary monitoring well TMW-H, which is located adjacent to PRA-2. ***Please explain the source of the different PFAS chemistry at MW-11-14 and the odor observed in well TMW-H. Based on shallow overburden groundwater contours shown on Figure 5-8, MW-11-14 is not located downgradient of the former loading dock area, which is currently located below the new manufacturing building (e.g., more side gradient to MW-11-14). Please evaluate the efficacy of this well location to evaluate releases that may have occurred in the vicinity of the current and former loading dock in light of the groundwater elevation data collected for the SSI.***

   Groundwater quality immediately downgradient of the presumed location of the former loading dock suggests potential differences in water quality. Existing data do not confirm whether stormwater discharges may be the sole source of these water quality impacts. Further evaluation is necessary to identify whether there is a residual source mass in soil located below the footprint of the building, and if present, how that mass may influence contaminant fate and transport and potential remedial alternatives at the site. ***The SSI should address this data gap, which may require additional characterization in this area (e.g., beneath the New Manufacturing Building floor).***

c. PRA-4 June 2015 Formulation Spill Area – The SI report concludes there is no source of PFAS in this area that warrants additional investigation. This PRA is located within PRA-2, and MW-11-14 is located downgradient of the formulation spill area. As noted in the comment for PRA-2, the PFAS chemistry is different in MW-11-14 compared to other wells at the Facility. ***Please evaluate the source of the different PFAS chemistry at MW-11-14.***

d. PRA-6 Hazardous Waste Storage Building and Former PSA Coater Area – Although PFOA concentrations in soil appear to be similar to other areas onsite, soil samples from this PRA contained PAHs and several long-chain PFCAs at greater concentrations than PFOA. As such, NHDES concurred with the recommendation for additional investigation of the source of the sulfonamides (and other PFAS, including PFCAs) in the vicinity of this PRA. Elevated concentrations of long-chain PFCAs were also detected in the two borings (MW-12 and MW-13) installed during SSI. ***The SSI report should evaluate whether the area of***

impacts is adequately delineated, and complete additional delineation as warranted to address impacted areas (e.g., area of soil with PFOS greater than applicable direct contact screening values) in a remedial action plan.

The SI report concludes that downgradient wells have not been impacted by the release of sulfonamide substances in the vicinity of this PRA; however, several downgradient wells (MW-10-11 and TMW-F) have elevated concentrations of PFOS and PFOA in groundwater. Both PFOS and PFOA could be terminal breakdown products of sulfonamide substances including N-Ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA). Another notable difference in PFAS chemistry of the groundwater sample from TMW-F is the relatively elevated detection of longer chain PFCAs, including PFDoDA (31 ng/L). Monitoring wells GZ-2 and GZ-3 are located in an area where groundwater flow directions diverge based on the water level contours presented in the SI and SSI reports, even if only on a seasonal basis; as such, PFAS data at these locations should be evaluated in the assessment of a release at PRA-6. ***The SSI data should be assessed in consideration of the potential precursor transformation and impacts to downgradient water quality and discussed in the SSI report. The conceptual site model should include an evaluation of the source of contamination in this PRA (e.g., confirm if the release is related to the hazardous waste storage and/or the PFA coater, etc.).***

e. PRA-7 2011 Loom Spill Area and PRA-8A Roof Runoff Infiltration Areas – Eastern Edge of New Manufacturing Building – There are contradictory statements about the status of the pavement in these two overlapping PRAs. Golder describes the pavement in the area of the loom spill as “intact” but notes in the description of PRA-8A that there are cracks in the pavement. NHDES examined photos from the time of the loom spill (photo dated May 20, 2011) and a photo dated September 25, 2018. Both photos show cracks and/or grass growing through the pavement in this vicinity. One of the highest concentrations of perfluorobutanoic acid (PFBA) detected in groundwater at the site was from a sample collected from temporary monitoring well TMW-E.

   The SSI report should discuss the findings of the exploration associated with MW-14 and the soil boring conducted below the drip line of the New Manufacture Building, including the elevated detection of 6:2 fluorotelomer sulfonic acid in groundwater as well as potential PFAA precursors. ***NHDES expects that the effectiveness of the remedial action to repair the pavement and address this PRA will be addressed as discussed herein.***

f. PRA-9 Current and Former Interior Chemical Storage Areas, PRA-10 QX Settling Tank Area, and PRA-11 Formulation Area – The SI report indicates groundwater from five wells located downgradient from these three PRAs did not contain PFAS at concentrations that were “*elevated relative to conditions observed elsewhere in the vicinity of the Site*.” Groundwater from one of the five wells, MW-09-10, contained the fourth highest concentration of PFOA and the second highest concentration of perfluorohexanoic acid (PFHxA) observed at the site. Monitoring well MW-04S, which was not part of the five wells referenced in the above quote, has the highest detection of PFOA at the site and is listed in Site Investigation

Table 3-1 as a well to investigate PRA-10. Samples from two of the five wells (and MW-04S) downgradient of these three PRAs were analyzed for an expanded list of PFAS analytes. Some of the highest concentrations of 6:2 fluorotelomer sulfonic acid (FTSA) detected in groundwater at the site were in MW-04S (8,600 ng/L), MW-9-10 (3,000 ng/L) and TMW-D (130 ng/L). The sample from MW-09-10 contained the highest concentration of 8:2 FTSA (150 ng/L) in groundwater at the site. ***Please evaluate and explain the occurrence of other PFAS such as 6:2 and 8:2 FTSA in the SSI report and explain why MW-04S and MW-09-10 have such elevated levels of PFAS.***

In the SSI, please assess whether residual PFAS are present below the building due to releases from subsurface conveyances and or floor cracks. If releases occurred, there is the potential for significant mass to be present that could influence contaminant fate and transport and subsequent remedial alternatives at the site, given that the current dispersions and former wastewater discharges contain high concentrations of PFAS, and that the integrity of any subsurface conveyances that may have received these discharges is unknown.

g. PRA-13 Sewer Lines – Golder concludes that no further evaluation of the sewer lines is warranted because downgradient wells did not contain elevated PFAS relative to other portions of the site. However, groundwater quality data from samples collected in March 2019 show a significant increase in PFAS concentrations in MW-04S (PFOA was detected at 52,000 and 69,500 ng/L). Subsequent monitoring in 2019 showed a reduction in concentrations at this well. The SSI stated October 2019 sample results show PFOA concentrations exceeding 5,000 ng/L were limited to onsite overburden monitoring wells located on the east side of the Facility; however, PFOA was detected at 5,100 ng/L in off-property bedrock monitoring well MW-101B, located adjacent to the sewer line. ***Please explain the source of the elevated PFAS detected in MW-04S, located downgradient from the sewer line and at MW-101B located proximal to the sewer line. The location of both the sanitary and storm sewers should be shown on the site figures. A discussion of the sewer line repairs should be provided in the SSI, and a report documenting repairs to the sanitary sewer should be uploaded to OneStop.***

h. PRA-16 Sub-surface Stormwater Conveyance System – Golder states exfiltration is not likely to occur during first flush conditions because most of the stormwater system is below the water table, based on water level elevation contours shown on Figure 4 of the Stormwater and Surface Water report. NHDES disagrees, given that data used to generate the groundwater elevation contours shown on this figure were collected in December 2018 when groundwater levels were approximately 2 feet higher in monitoring well MW-03S compared to August 2018[6] and approximately 3.8 feet higher than February 1, 2017 (See Table 5-3). These data suggest some or all of the stormwater system was periodically above the water

[6] See Figure A-1A of the Stormwater and Surface Water Report for a plot of groundwater elevation versus time in MW-03S.

table since groundwater level data collection began at the site. Thus, when groundwater levels were seasonably lower, exfiltration was possible through compromised sections of the stormwater system. ***Please include a water table map for each monitoring event with the SSI data transmittal and evaluate which portions of the stormwater system were above the water table. The location of sewer lines should be shown on the cross-sections that illustrate contaminant concentration data provided in the SSI report.***

The PFAAs detected in the groundwater sample from MW-103B are more similar to those detected in stormwater samples (C4 to C8 PFCAs) than those PFAAs detected in nearby wells (e.g., MW-102-24 and GZ-107). This bedrock well is located downgradient from a section of the stormwater pipe where roots were observed growing into the pipe at the joints and where a sediment dam was observed in the pipe north of manhole MH-13[7]. These observations suggest a release of stormwater may have occurred in the vicinity of MW-103B. ***SGPP should address potential stormwater releases in other areas where compromised stormwater infrastructure have been identified.***

i. PRA-21 Stormwater Runoff and Snow Management Areas – The SI report concludes stormwater runoff and snow management areas do not warrant additional investigation because PFAS in soil and groundwater samples collected in these areas are not elevated compared to other portions of the site. As previously mentioned, samples collected from MW-04S in March 2019 contained the highest concentrations of PFOA detected in groundwater at the site to-date. Additionally, long-chain PFCAs are present in groundwater samples from wells that are located in this PRA. ***Evaluation of additional groundwater data collected in 2019, is necessary evaluate the source of elevated PFAS in this area.***

7. Results of Pre- and Post-TOP analyses conducted on two soil samples collected from MW-04B and MW-06-59 were similar. Based on these data, Golder concludes "*significant PFAS precursors are not present in soils impacted by aerial deposition*." NHDES disagrees with Golder's conclusion because 1) two samples are not sufficient to characterize a site of this size and diversity, and 2) samples should be collected from portions of the site where known precursors have been detected. Precursors such as NEtFOSAA that are detected in soil samples collected closer to the Facility (e.g. at SG-SB-I and TMW-F) were not detected in the soil samples from MW-04B and MW-06-59. ***Therefore, samples submitted for analysis by the TOP Assay should be collected from areas with known precursors since remedial measures for site soil and groundwater depends on an understanding of precursor mass in soil.***

8. Variable PFAS concentrations observed in shallow wells located proximal to the Facility suggest the full range of spatial and temporal conditions at the site have not yet been evaluated. ***The SSI should evaluate the groundwater quality data generated in 2019 and 2020 monitoring events to assess temporal variability of PFAS at the site. An***

[7] Figure 7 of *Stormwater and Surface Water Investigation Summary Report Volume I*, prepared by Golder Associates, January 30, 2018.

evaluation of the spatial distribution of expanded analytes should be included in the SSI report. Since PFAS concentrations vary with depth at the site, consider separate figures (or different iso-contour symbology) to illustrate contaminant distribution at different levels in the subsurface (e.g. shallow overburden, deep overburden, bedrock). Consider data visualization techniques, such as pie plots or bar charts, that illustrate the distribution of PFCA and PFSA homologues to better interpret the release mechanisms and fate and transport of these compounds at the site. Consider the presence of polyfluoroalkyl precursors in this analysis. The SSI should further develop the conceptual model pursuant to 606.07, including updates to the soil and groundwater concentration contour maps and cross-section contaminant distribution plans (Env-Or 606.06).

9. Site characterization activities have included collection of groundwater and soil data to evaluate for the presence of other site contaminants (e.g., volatile organic compounds [VOCs], metals) and site geochemical indicators (e.g., pH, chloride, alkalinity, total organic carbon [TOC]), but the reports do not offer a detailed discussion of the data or conclusions regarding releases and extent of contamination. ***The SSI report should evaluate the other geochemical data and contaminant concentrations (e.g., VOCs, metals, etc.) collected at the site, in consideration of the PRAs and the PFAS soil and groundwater quality data.***

E) Risk Assessment

As part of the SSI, a preliminary screening of remedial alternatives is required, pursuant to Env-Or 606.08. To support the preliminary screening, the SSI report should update the Risk Assessment based on the findings of any additional SSI characterization, and the following comments:

1. The preliminary risk evaluation did not assess the potential for PFAS to leach from soil and contaminate groundwater. Golder proposes to evaluate the leachability of PFAS from the soil by long-term groundwater quality monitoring, although the exact method by which this will be accomplished is not presented. ***Leachability of PFAS should be evaluated in the context of proposed remedial measures for this site, as the data presented in the SI report suggest significant impacts to groundwater quality (orders of magnitude above AGQS) occur as a result of leaching of PFAS from soils at the site, and without further evaluation, it is unclear how the site will achieve the requirements of Env-Or 600 to manage and remediate released contaminants. SGPP should identify the concentration of contaminants in soil which will not result in groundwater concentrations of the contaminant(s) greater than applicable groundwater standards (Env-Or 606.19 (d)(1)). NHDES will allow groundwater monitoring to demonstrate that soil contamination is not and will not result in AGQS exceedances, provided that SGPP submits a detailed proposal for this evaluation as part of a NHDES-approved RAP***.

2. While the SI report indicates potential receptors within 1,000 feet of the Facility are not currently using onsite water supply wells, a potential for future exposure to contaminated groundwater exists within 1,000 feet of the Facility until such time as formal controls (e.g., Groundwater Management Zone or other institutional control/notification procedure preventing installation and use of onsite water supply wells) are established and

maintained. As stated in the SI report, a receptor survey has not been completed to-date outside of the 1,000-foot buffer around the Facility that confirms there is no reliance on individual wells for potable water supplies.

Golder indicates pre-GMZ monitoring results show "stable or decreasing PFOA or PFOS concentrations". While this is generally true for the limited number of wells where multiple samples have been collected over time, some individual wells have exhibited increasing trends. NHDES notes that the vast majority of water supply wells in the pre-GMZ have only been sampled once or twice for PFAS. ***PFAS trends should be assessed for water supply wells within the Consent Decree that have been sampled more than once and the results should be included in the SSI report or the 2019 Annual Report for the Residential Sampling Program*.**

3. Golder used USEPA's risk-based screening levels for soil as part of their human risk assessment for PAHs and Manganese. ***These data need to be compared to NHDES' most recent RCMP Tables for risk-based evaluations in future submittals.***

Closing

NHDES appreciates your efforts to conduct site characterization and stormwater remedial work. In summary, NHDES expects that the SSI report that addresses the requirements for Env-Or 606.03 and the comments herein will be submitted within 120 days. The report should incorporate stormwater, surface water, soil, and groundwater quality data collected to-date into a comprehensive updated CSM. Should further site characterization or risk assessment be necessary, it should be identified in the SSI report.

The SSI report needs to address the requirements in Env-Or 606.08 to provide a preliminary screening of remedial alternatives to treat, remove, and/or provide for containment of the sources and impacted media. Based on the PFAS contamination levels detected in site soil and groundwater samples, passive remediation methods may be insufficient to restore groundwater quality or contain contamination in the vicinity of the site within a reasonable time frame. Active remediation needs to be considered for the site to meet the requirements of the New Hampshire Groundwater Protection Act, RSA 485-C and its implementing rules.

Following NHDES' review of the SSI report, NHDES expects submittal of a Remedial Action Plan to address 1) the discharge of regulated contaminants to soil, groundwater, and surface water from stormwater, including dry weather flow, generated at the Facility; and 2) contaminated soil and groundwater at the Facility. If proposed by SGPP, NHDES will consider whether a phased remedial approach would be appropriate to implement for portions of contaminated areas or media where no further investigation is deemed necessary while other supplemental investigations are continued (if needed), with a priority on significant impacts to human health and environment.

Should you have questions regarding this letter or wish to set up a meeting to discuss the contents, please contact me at NHDES' Waste Management Division.

Sincerely,

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