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

**SSI Surface Water PFAS Sampling Data Transmittal**
**North Country Environmental Services, Inc. Landfill**
**581 Trudeau Road**
**Bethlehem, New Hampshire 03574**

**NHDES Site #: 198704033**
**Project Type: Water Quality Monitoring**
**Project Number: 1737**

Prepared For:
North Country Environmental Services, Inc. (NCES)
581 Trudeau Road, P.O. Box 9
Bethlehem, New Hampshire 03574-0009
Phone Number (603) 869-3366
RP Contact Name: Mr. John Gay
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Sanborn, Head and Associates, Inc.

Digitally signed by: Sanborn, Head and Associates, Inc.
DN: CN = Sanborn, Head and Associates, Inc. email = lalic@sanbornhead.com C = US O = Sanborn, Head and Associates, Inc.
Date: 2023.10.06 13:36:23 -04'00'

Prepared By:
Sanborn, Head & Associates, Inc.
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Bedford, New Hampshire 03110
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Contact Name: Timothy M. White, P.G.
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**Date of Report: October 6, 2023**

SANBORN HEAD

*6 Bedford Farms Drive, Suite 201*
*Bedford, NH 03110*

Mr. James W. O'Rourke, P.G.
New Hampshire Department of Environmental Services
Waste Management Division
29 Hazen Drive, P.O. Box 95
Concord, New Hampshire 03302-0095

October 6, 2023
File No. 1003.23

Re: Supplemental Site Investigation (SSI)
Surface Water PFAS Sampling Data Transmittal
Groundwater Management and Release Detection Permit GWP-198704033-B-008
North Country Environmental Services, Inc. (NCES) Landfill
Bethlehem, New Hampshire

Dear Mr. O'Rourke:

On behalf of NCES, Sanborn, Head & Associates, Inc. (Sanborn Head) has prepared this transmittal of surface water quality results related to the on-going SSI. NHDES' June 30, 2023 letter[1] required supplemental surface water sampling to "define the downgradient extent of PFAS impacts and confirm the validity of the Groundwater Management Zone (GMZ) associated with the former unlined landfill which was removed in the 1990s."

**Summary of Sampling**
Surface water locations S-108, S-109, S-1, S-101, and SF-1 were sampled in July pursuant to NHDES' June 30, 2023 letter. Field parameters pH, specific conductance, temperature, and turbidity were measured at the time of sample collection. Surface water samples were placed into laboratory containers and transported to Eastern Analytical, Inc. (EAI) of Concord, New Hampshire in coolers with ice under standard chain-of-custody procedures. Samples were submitted for analysis of the following parameters in July:

- Chemical oxygen demand (COD), chloride, nitrate, total Kjeldahl-nitrogen (TKN), iron, manganese.
- NHDES Waste Management Division Full List of Analytes for Volatile Organics (Full List VOCs), and 1,4-dioxane.

The results of the July surface water sampling were reported to NHDES in the July/Annual Report[2].

On August 22, 2023, surface water locations S-108, S-109, S-1, S-101, and SF-1 were sampled for the following analytes pursuant to NHDES' June 30 letter:

[1] https://www4.des.state.nh.us/DocViewer/?ContentId=5099069
[2] https://www4.des.state.nh.us/DocViewer/?ContentId=5114194

- Bromide; and
- Per- and polyfluoroalkyl substances (PFAS).

The surface water samples were analyzed by USEPA Method 1633 for the four PFAS analytes with New Hampshire groundwater standards (PFOA, PFOS, PFNA, and PFHxS).

For comparison to the SSI-required surface water results, samples from the three Ammonoosuc River locations (AR-1, AR-2, and AR-3) were also collected on August 22, 2023 for analysis for the same PFAS analytes.

The surface water sampling locations are shown on Figure 1. Tabulated surface water data are included in Appendices A and B. The field sampling form is included in Appendix C, and the laboratory reports are included in Appendix D.

**Summary of Surface Water Results**
Surface water results from July 2023 sampling, which included all analytes from NHDES' June 20, 2023 letter except PFAS and bromide, were reported in the July /2023 Annual Report. In July 2023, VOCs were not detected in surface water samples, and the results for other analytes in surface water were generally consistent with previous sampling events (refer to Table B.3 and Appendix C.2 of the July 2023/Annual report).

A summary of the PFAS and bromide results from the surface water locations in August 2023 is provided below:

***PFAS***
Of the eight surface water locations sampled for target four PFAS analytes, only two detections were recorded, both for PFOA:

- SF-1: PFOA = 3.70 ng/l
- S-101: PFOA = 3.05 ng/l

Although there is no surface water standard established in New Hampshire, for reference, we note that the two PFOA concentrations were less than the Ambient Groundwater Quality Standard (AGQS; 12 nanograms per liter [ng/l]).

The low level PFOA detections at SF-1 and S-101 are consistent with residual impacts from the former unlined landfill which have historically been documented in this area.

***Bromide***
Bromide was not detected in surface water samples collected from S-108, S-109, S-1, S-101, and SF-1 on August 22, 2023.

**Closing**

Together, the surface water results summarized in this letter report and the surface water results included in the July/Annual Report fulfill the requirements in NHDES' June 30, 2023 letter.

The results of the supplemental surface water monitoring indicated low-level PFOA detections at two locations (SF-1 and S-101), which are consistent with residual impacts from the former unlined landfill which have historically been well-documented in this area. PFAS target analytes were not detected in the Ammonoosuc River.

Based on the results of this supplemental surface water sampling, the limits of the GMZ are considered to be adequately monitored by the existing surface water monitoring network. We do not recommend additional surface water sampling as part of the SSI.

Please contact Tim White at Sanborn Head, or Joe Gay at NCES if you have any questions.

Very truly yours,
SANBORN, HEAD & ASSOCIATES, INC.

Timothy M. White, P.G.
*Vice President*

Matthew E. Estabrooks, P.E.
*Senior Project Manager*

TMW/MEE: tmw

**FIGURE**

Figure 1 Exploration Location Plan

**APPENDICES**

Appendix A – Surface Water Analytical Results
Appendix B – PFAS Surface Water Analytical Results
Appendix C – Field Sampling Summary Form
Appendix D – Analytical Laboratory Reports

cc: w/Appendices: Mr. Joe Gay, NCES
Mr. Kevin Roy, NCES
Town of Bethlehem

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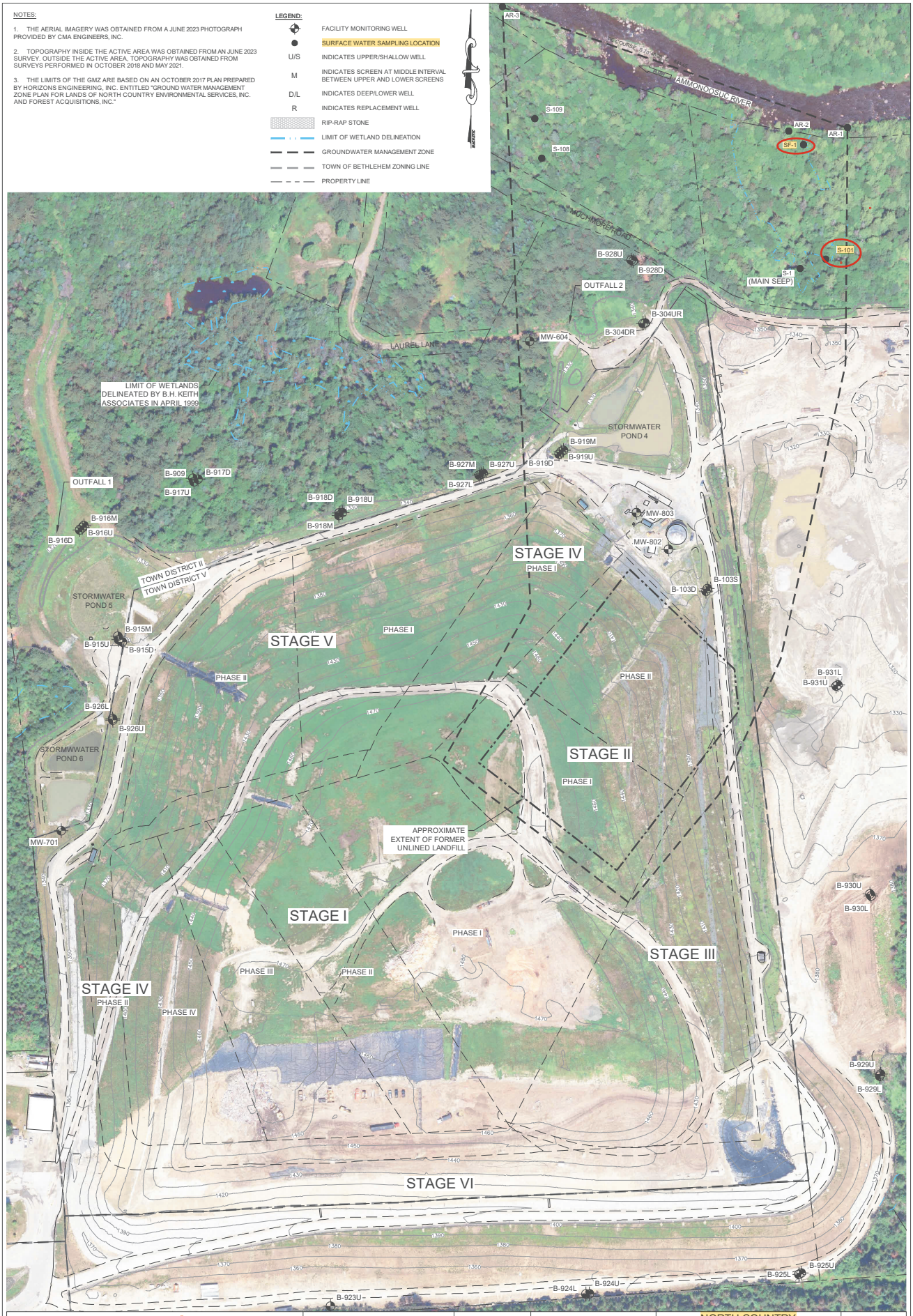
NOTES:

1. THE AERIAL IMAGERY WAS OBTAINED FROM A JUNE 2023 PHOTOGRAPH PROVIDED BY CMA ENGINEERS, INC.
2. TOPOGRAPHY INSIDE THE ACTIVE AREA WAS OBTAINED FROM AN JUNE 2023 SURVEY. OUTSIDE THE ACTIVE AREA, TOPOGRAPHY WAS OBTAINED FROM SURVEYS PERFORMED IN OCTOBER 2018 AND MAY 2021.
3. THE LIMITS OF THE GMZ ARE BASED ON AN OCTOBER 2017 PLAN PREPARED BY HORIZONS ENGINEERING, INC. ENTITLED "GROUND WATER MANAGEMENT ZONE PLAN FOR LANDS OF NORTH COUNTRY ENVIRONMENTAL SERVICES, INC. AND FOREST ACQUISITIONS, INC."

LEGEND:

- FACILITY MONITORING WELL
- SURFACE WATER SAMPLING LOCATION
- U/S — INDICATES UPPER/SHALLOW WELL
- M — INDICATES SCREEN AT MIDDLE INTERVAL BETWEEN UPPER AND LOWER SCREENS
- D/L — INDICATES DEEP/LOWER WELL
- R — INDICATES REPLACEMENT WELL
- RIP-RAP STONE
- LIMIT OF WETLAND DELINEATION
- GROUNDWATER MANAGEMENT ZONE
- TOWN OF BETHLEHEM ZONING LINE
- PROPERTY LINE




SANBORN HEAD

GRAPHICAL SCALE
100' 50' 0 100' 200'

| | |
|---|---|
| DRAWN BY: | E. WRIGHT |
| DESIGNED BY: | G. PANIK |
| REVIEWED BY: | T. WHITE |
| PROJECT MGR: | M. ESTABROOKS |
| PIC: | T. WHITE |
| DATE: | OCTOBER 2023 |

NORTH COUNTRY ENVIRONMENTAL SERVICES, INC.
BETHLEHEM, NEW HAMPSHIRE

EXPLORATION LOCATION PLAN

PROJECT NUMBER: 1003.23

FIGURE NUMBER: 1

**TABLE B.1**
**Summary of PFAS Surface Water Analytical Results**
**North Country Environmental Services, Inc.**
**Bethlehem, New Hampshire**
**Permit No. GWP-198704033-B-008**

| Sample Location | Sample Date | Sample Type | Concentrations in ng/L | | | | |
|---|---|---|---|---|---|---|---|
| | | | Perfluoroalkyl Carboxylic Acids | | Perfluoroalkyl Sulfonic Acids | | |
| | | | Perfluorooctanoic Acid (PFOA) [7] | Perfluorononanoic Acid (PFNA) [8] | Perfluorohexanesulfonic Acid (PFHxS) [6S] | Perfluorooctanesulfonic Acid (PFOS) [8S] | Total of Regulated PFAS |
| | | CAS Number | 335-67-1 | 375-95-1 | 355-46-4 | 1763-23-1 | – |
| | | GW-1 (AGQS) | 12 | 11 | 18 | 15 | |
| Seep S-1 | 08-22-2023 | N | <1.92 | <1.54 | <1.4 | <1.43 | ND |
| SF-1 | 08-22-2023 | N | 3.70 | <1.52 | <1.39 | <1.42 | 3.70 |
| AR-1 | 08-22-2023 | N | <1.92 | <1.54 | <1.4 | <1.43 | ND |
| AR-2 | 08-22-2023 | N | <1.93 | <1.54 | <1.41 | <1.44 | ND |
| AR-3 | 08-22-2023 | N | <1.96 | <1.57 | <1.43 | <1.46 | ND |
| S-101 | 08-22-2023 | N | 3.05 | <1.52 | <1.39 | <1.42 | 3.05 |
| S-108 | 08-22-2023 | N | <1.93 | <1.54 | <1.41 | <1.44 | ND |
| S-109 | 08-22-2023 | N | <1.99 | <1.59 | <1.45 | <1.48 | ND |
| QC_FB | 08-22-2023 | FB | <3.76 | <3.01 | <2.74 | <2.8 | ND |

ENTHALPY ANALYTICAL

**Sample ID: SF-1_20230822** **EPA Method 1633**

| Client Data | | | | Laboratory Data | | | |
|---|---|---|---|---|---|---|---|
| Name: | Eastern Analytical, Inc. | Matrix: | Aqueous | Lab Sample: | 2308236-02 | Column: | BEH C18 |
| Project: | 265509 NH 2089 | Date Collected: | 22-Aug-23 09:51 | Date Received: | 24-Aug-23 10:50 | | |
| Location: | 265509 | | | | | | |

| Analyte | Conc. (ug/L) | | RL | Qualifiers | Batch | Extracted | Samp Size | Analyzed | Dilution |
|---|---|---|---|---|---|---|---|---|---|
| PFOA | 0.00370 | 3.70 ng/L | 0.00190 | | B23I081 | 13-Sep-23 | 0.525 L | 14-Sep-23 14:17 | 1 |
| PFHxS | ND | | 0.00139 | | B23I081 | 13-Sep-23 | 0.525 L | 14-Sep-23 14:17 | 1 |
| PFNA | ND | | 0.00152 | | B23I081 | 13-Sep-23 | 0.525 L | 14-Sep-23 14:17 | 1 |
| PFOS | ND | | 0.00142 | | B23I081 | 13-Sep-23 | 0.525 L | 14-Sep-23 14:17 | 1 |

| Labeled Standards | Type | % Recovery | Limits | Qualifiers | Batch | Extracted | Samp Size | Analyzed | Dilution |
|---|---|---|---|---|---|---|---|---|---|
| 13C8-PFOA | IS | 111 | 20 - 150 | | B23I081 | 13-Sep-23 | 0.525 L | 14-Sep-23 14:17 | 1 |
| 13C3-PFHxS | IS | 93.1 | 20 - 150 | | B23I081 | 13-Sep-23 | 0.525 L | 14-Sep-23 14:17 | 1 |
| 13C9-PFNA | IS | 92.5 | 20 - 150 | | B23I081 | 13-Sep-23 | 0.525 L | 14-Sep-23 14:17 | 1 |
| 13C8-PFOS | IS | 93.7 | 20 - 150 | | B23I081 | 13-Sep-23 | 0.525 L | 14-Sep-23 14:17 | 1 |

RL - Reporting limit Results reported to RL.

ENTHALPY ANALYTICAL

**Sample ID: S-101_20230822** **EPA Method 1633**

| Client Data | | | | Laboratory Data | | | |
|---|---|---|---|---|---|---|---|
| Name: | Eastern Analytical, Inc. | Matrix: | Aqueous | Lab Sample: | 2308236-03 | Column: | BEH C18 |
| Project: | 265509 NH 2089 | Date Collected: | 22-Aug-23 10:04 | Date Received: | 24-Aug-23 10:50 | | |
| Location: | 265509 | | | | | | |

| Analyte | Conc. (ug/L) | | RL | Qualifiers | Batch | Extracted | Samp Size | Analyzed | Dilution |
|---|---|---|---|---|---|---|---|---|---|
| PFOA | 0.00305 | 3.05 ng/L | 0.00190 | | B23I081 | 13-Sep-23 | 0.526 L | 14-Sep-23 14:31 | 1 |
| PFHxS | ND | | 0.00139 | | B23I081 | 13-Sep-23 | 0.526 L | 14-Sep-23 14:31 | 1 |
| PFNA | ND | | 0.00152 | | B23I081 | 13-Sep-23 | 0.526 L | 14-Sep-23 14:31 | 1 |
| PFOS | ND | | 0.00142 | | B23I081 | 13-Sep-23 | 0.526 L | 14-Sep-23 14:31 | 1 |

| Labeled Standards | Type | % Recovery | Limits | Qualifiers | Batch | Extracted | Samp Size | Analyzed | Dilution |
|---|---|---|---|---|---|---|---|---|---|
| 13C8-PFOA | IS | 101 | 20 - 150 | | B23I081 | 13-Sep-23 | 0.526 L | 14-Sep-23 14:31 | 1 |
| 13C3-PFHxS | IS | 90.8 | 20 - 150 | | B23I081 | 13-Sep-23 | 0.526 L | 14-Sep-23 14:31 | 1 |
| 13C9-PFNA | IS | 96.1 | 20 - 150 | | B23I081 | 13-Sep-23 | 0.526 L | 14-Sep-23 14:31 | 1 |
| 13C8-PFOS | IS | 92.5 | 20 - 150 | | B23I081 | 13-Sep-23 | 0.526 L | 14-Sep-23 14:31 | 1 |

RL - Reporting limit

Results reported to RL.