GEI Consultants

Consulting
Engineers and
Scientists

March 16, 2020

Brian Sadowski
Project Manager
New York State Department of Environmental Conservation
270 Michigan Avenue
Buffalo, New York 14209-2915

Re: Site Management Periodic Review Report (PRR) and IC/EC Certification Submittal (2019)
NFG - Iroquois Gas/Westwood Pharm Riparian Site: Site # 915141B
Scajaquada Creek, Upstream of West Ave. Bridge – Buffalo, NY

Dear Mr. Sadowski:

On behalf of National Fuel Gas (NFG), GEI Consultants, Inc. P.C. (GEI) is submitting the attached Periodic Review Report and IC/EC Certification Submittal for the Iroquois Gas/Westwood Pharm Riparian Site on Scajaquada Creek via email transmittal. A hardcopy will follow via UPS.

If you have any questions please contact the undersigned or Ms. Katie Hoelscher of NFG at (716) 667-5506.

Sincerely yours,
GEI CONSULTANTS, INC., P.C.

Richard H. Frappa, P.G.
Senior Consultant

Kelly R. McIntosh, Ph.D., P.E.
Senior Consultant

Enclosure
cc: C. Staniszewski, NYSDEC (1 electronic copy - email)
K. Hoelscher (1 hardcopy - UPS,1 electronic copy - email)
T. Alexander (1 electronic copy – email)

GEI Consultants, Inc., P.C.
100 Sylvan Parkway, Suite 400, Amherst, NY 14228
716.204.7154 Fax: 716.408.9015

GEI Consultants

Consulting
Engineers and
Scientists

Site Management Periodic Review Report and IC/EC Certification (2019)

Iroquois Gas/Westwood Pharmaceutical Riparian Site No. 915141B
Buffalo, New York

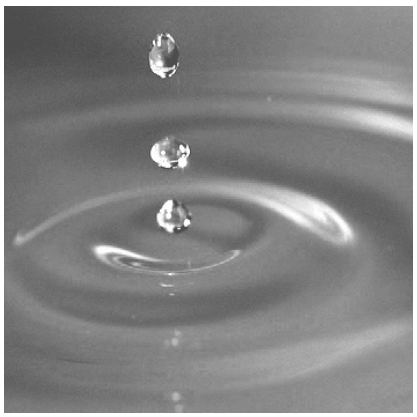
Submitted to:
NYSDEC Region 9

Submitted by:
GEI Consultants, Inc., P.C.
100 Sylvan Pkwy, Suite 400
Amherst, NY 14228

On behalf of:
National Fuel Gas
Williamsville, New York 14221

March 2020

Project 1403480



Richard H. Frappa, P.G.
Senior Consultant

Kelly R. McIntosh, P.E., Ph.D.
Senior Consultant

Table of Contents

Figures

Appendices

1. Executive Summary

GEI Consultants, Inc., P.C. (GEI) was retained to conduct the Site Management Periodic Review Report (PRR) and IC/EC Certification submittal for the Iroquois Gas/Westwood Pharmaceutical Site located in Buffalo, New York. This PRR presents and evaluates the results of operation and maintenance (O&M) activities performed at the site over the past year and since the remedial action was completed in 2002. The O&M activities include visual inspections of the Scajaquada Creek sediment cap, the creek banks and site restoration elements, creek cap repairs with placement of additional armor stone, and maintenance checks on the Northern and Southern DNAPL recovery systems.

In conducting this periodic review, GEI determined the components of the O&M Plan dated February 8, 2005 (serves as the Site Management Plan or {SMP}) and amended frequencies of inspections as agreed to in NYSDEC correspondence dated December 2, 2009 to assess compliance during this reporting period (February 15, 2019 through February 15, 2020):

- ICs/ECs have been in place and effective.
- Inspections were performed as required.

Based upon the inspections and compliance with the O&M Plan, the site remedy continues to meet the remedial objectives for the site.

2. Site Overview

2.1 Site Description

The Scajaquada Creek Site is the riparian portion of the Iroquois Gas/Westwood Pharmaceutical (IG/WP) Site and is situated in a mixed industrial and residential area of Buffalo, New York. The site comprises approximately 2.5 acres along a 1,600-foot long reach of Scajaquada Creek. The Site location and Site layout are shown on Figure 1 and Figure 2, respectively. Manufactured gas plant (MGP) operations were conducted at a former Iroquois Gas facility situated upgradient of the Site on property at 100 Forest Avenue from the 1890s to the 1950s and gas storage continued until 1972. Investigations indicated that soil and groundwater were impacted with chemicals associated with gas manufacturing processes and that constituents were migrating into the creek. Remedial activities (i.e., sheet pile wall installation, sediment excavation, capping, and installation and operation of dense non-aqueous phase liquid (DNAPL) recovery systems) have been performed since 1999 to address these impacts.

2.2 Site Remedial Program Summary

In 1996, National Fuel constructed a sheet pile wall along the eastern bank of the creek, adjacent to the IG/WP property. The sheet pile wall was an initial component of the remedial action which separates the terrestrial remedial action (the responsibility of others) from the riparian remedial action. National Fuel conducted the riparian remedial action in two phases: 1. Sediment/soil removal and capping in Scajaquada Creek; and 2. DNAPL collection and removal from permeable soil below the creek sediment cap. The riparian remedial design was conducted in 1997/1998 and received approval in June 1998. Remedial excavation and capping began in July 1998 and completed in May 1999. Installation and startup of the southern DNAPL recovery system was completed in June 1999. Following completion of property access agreements, installation and startup of the northern DNAPL recovery system was completed in August 2002. In summary, the components of the selected remedy include:

- Installation of a sheet pile barrier wall beneath a 70-foot width of the creek, close to West Avenue.
- Installation of approximately 450 linear feet of a steel sheet pile barrier along the east bank of the creek (bordering property of former MGP operations).
- Excavation of the creek bottom and off-site disposal of 18,976 cubic yards of contaminated sediment and debris. The overall goal of excavation was to remove

sediments with concentrations of PAHs greater than 50 mg/kg within the site boundary, taking into account the physical limitations at the site.

- Capping of the creek bottom resulting in a horizontal barrier (cap) along the 1,600 foot reach of Scajaquada Creek. The cap consists of geosynthetic clay liner (GCL), angular sand, geotextile, and anchoring (armor) stone.

- Installation of two DNAPL recovery systems near the West Avenue Bridge and the Conrail railroad bridge.

- Implementation of an O&M Plan as an institutional control to verify and ensure the performance of the remedial systems.

Excluding O&M activities, no significant changes have been made to the remedy since remedy selection.

Details of the Remedial Action are presented in the Final Engineering Report (FER), prepared by ThermoRetec (August 2000) with a supplemental FER prepared by Retec (November 2001).

2.3 O&M Plan

O&M requirements for the Site are documented in the NYSDEC-approved O&M Plan dated February 8, 2005 (O&M Plan) and a modification of monitoring frequency as described in a correspondence prepared by AECOM dated July 9, 2009 and approved by the NYSDEC by letter dated December 2, 2009. These documents serve as the Site Management Plan (SMP) for the site. Components of the SMP for the Scajaquada Creek Site include:

- inspection of the Scajaquada Creek sediment cap;

- inspection of the DNAPL recovery systems;

- maintenance checks on the operation of the DNAPL recovery systems;

- maintenance and repair of engineering controls; and

- field observations and reporting.

Each of these elements was conducted between February 15, 2019 and February 15, 2020.

3. Remedy Performance Evaluation

The remedial performance is evaluated based on the following:

1. Periodic inspection of the Scajaquada Creek sediment cap.

2. Periodic inspection of the DNAPL recovery systems.

3.1 Scajaquada Creek Sediment Cap

3.1.1 2019 Annual Inspection

The 2019 annual inspection of the Scajaquada Creek Sediment Cap was conducted by Mr. Richard Frappa, P.G. of GEI on May 8, 2019. Photographs of the inspection were discussed with and reviewed by Mr. Kelly McIntosh, P.E. of GEI. The annual visual inspection was performed to evaluate remedy effectiveness in protecting human health and the environment. The inspection also included the assessment of repairs made in 2015 (as shown on attached Figure 2 and in the photograph logs in Appendix A) to determine the continued protectiveness of repairs. Sheen was not observed on Scajaquada Creek surface water nor was NAPL seepage seen along the eastern shoreline. The GEI 2019 inspection noted similar conditions to the prior year's observations and did not identify deficiencies in the capping system nor any incipient problems meriting corrective measures.

3.1.2 2020 Creek Sediment Cap Maintenance

During inspection of the Southern DNAPL Recovery System on January 23, 2020, NFG observed an area of creek bank scour northwest of the Southern DNAPL Recovery System vault. GEI engineering staff accompanied NFG on January 31, 2020 to inspect the scoured area. An area approximately 15 x 10 feet had approximately 6-inches of the gravel/cobble armor layer scoured from the slope of the creek bank. The remaining armor layer thickness was adequate to prevent exposure of the geotextile present above the sand layer and GCL which comprises the cap. Based on the bank height of erosion, ice and surface water likely scoured the surface during an abnormally high creek water level condition. Subsequently, GEI and NFG inspected the east and west sides of the creek bank to the north and identified three other areas where recent scouring occurred. Each of the four areas requiring cap maintenance are shown on Figure 3 and are identified as follows: 2020 Maintenance Area 1; 2020 Maintenance Area 2; 2020 Maintenance Area 3; and 2020 Maintenance Area 4.

Dimensions of areas having reduced creek cap armor layer thicknesses were identified as follows:

- 2020 Maintenance Area 1 – 15 x 12 feet;
- 2020 Maintenance Area 2 – 7 x 5 feet (geotextile above sand and GCL layer visible);
- 2020 Maintenance Area 3 – 7 x 5 feet; and
- 2020 Maintenance Area 4 – 42 x 12 feet.

GEI notified the NYSDEC in correspondence dated February 3, 2020 and developed specifications for creek bank cap repairs consistent with those undertaken in 2015.

On February 10 and 11, 2020, Allied Environmental Services of NY, LLC (Allied) mobilized a T-300 Skidsteer with a Mini Dump Truck to move and place Surge Stone Rip Rap from a staging area to the four maintenance areas. Allied placed an approximate total of 66 tons of 6" to 8" diameter limestone Surge Stone Rip Rap on February 10, 2020 at 2020 Maintenance Area 1 and Maintenance Area 2 and 58 tons of surge stone on February 11, 2020 at 2020 Maintenance Area 3 and Maintenance Area 4. The surge stone was obtained from the New Enterprise Stone and Lime Company - Wehrle Quarry located in Williamsville, NY and delivered to the site by Pariso Logistics, Inc. in six loads during the two-day cap repair. At the 2020 Maintenance Area 2, new Mirafi 500X geotextile was pinned over the area of visible geotextile and extended over existing stone armor covering an approximate 15 X 15 foot area. New surge stone was placed to cover the new geotextile and extended a minimum of five feet beyond the limits of the fabric in all directions. New armor surge stone was placed directly over the existing cap armor stone without placement of new geotextile at the other three maintenance areas.

GEI observed and documented cap repairs as shown in photographs included in Appendix A-2. The 2020 cap maintenance areas will be inspected by GEI in the spring (late April/early May) during the 2020 annual inspection.

3.2 DNAPL Recovery Systems

The Southern and Northern DNAPL recovery systems were checked monthly by National Fuel staff with Allied facilitating closed space entry between February 2019 and February 2020. GEI periodically supported monthly system checks and provided recommended improvements in system function focusing on maximizing DNAPL volume collection while minimizing water volume collection. System operations were augmented periodically to achieve this goal in 2019 and actions taken are summarized below for the Southern and Northern DNAPL recovery systems. Systems information is logged in Appendix B.

3.2.1 Southern DNAPL Recovery System

The southern DNAPL recovery system was observed to function properly during the period of this report. Maintenance activities performed on the southern DNAPL recovery system during this period included: changing flexible tubing near the pump head in each vault, resetting timers to Daylight Savings Time, and pump run time adjustments as necessary.

DNAPL level measurements were recorded periodically from the collection tank of the southern DNAPL recovery system. During monthly inspection events conducted with GEI staff, depth to water and DNAPL, as well as calculated quantities were determined and are reported on the DNAPL recovery system monitoring log presented in Appendix B-1. Volumes were calculated by taking measurements in the tanks with a water level meter and also measuring the length of DNAPL staining on a weighted string lowered to the tank bottom and an electronic water level meter. The DNAPL volume recovered between February 2019 and February 2020 was approximately 481 gallons.

Actions Taken to Monitor System Function and Improve DNAPL Recovery (in addition to monthly checks):

- March 1, 2019 – Inspected system to assess overall DNAPL collection volume improvement and measured DNAPL collected in hanging pail inside tank.

- March 28, 2019 – Inspected system. The system was found to be in good operating condition. The vault air vent line was replaced with a flexible aluminum dryer vent.

- May 23, 2019 – Inspected system to assess overall DNAPL collection volume improvement and measured DNAPL collected in hanging pail inside tank.

- July 18, 2019 – The tubing in the peristaltic pump head was inspected and found to be flattened and no longer functioning. The tubing was replaced, and the pump was operating correctly following the repair. Inspected system to assess overall DNAPL collection volume improvement and recommended close inspection and possible replacement of Tygon tubing.

- November 26, 2019 – Inspected system to assess overall DNAPL collection volume improvement and measured depth to water and DNAPL collected in tank. Observed vacuum extraction of 530 gallons of water and DNAPL from the tank by Environmental Services Group under contract to Allied.

- January 23, 2020 – Inspected system to assess overall DNAPL collection volume improvement. During inspection of the South Vault, it was noted that the NAPL collection tank had shifted away from the wooden platform approximately 4 inches,

obstructing access to the tank for accurate measurements. On January 30, 2020, Allied, NFG and M. Cummings from GEI revisited the Southern Vault to relocate the tank to its previous position. Allied utilized a mini-excavator and chain attached to the lid of the tank and slid the tank several inches back into the correct position.

The south vault DNAPL collection system continues to operate efficiently. Since operation startup in 1999, approximately 3,089 gallons of DNAPL have been collected by the south vault collection system.

3.2.2 Northern DNAPL Recovery System

During the February 2019 inspection event, the peristaltic pump was found to be off and the electrical circuit breaker powering the pump was tripped to the off position. The circuit breaker was subsequently reset, and the pump was observed to function normally. Maintenance activities performed on the northern DNAPL recovery system during this period included: improving methods of obtaining DNAPL volume estimates, changing flexible tubing near the pump head as necessary, resetting timers to Daylight Savings Time, and pump run time adjustments.

DNAPL level measurements were recorded periodically from the collection tank of the northern DNAPL recovery system. During monthly inspection events conducted with GEI staff, depth to water and DNAPL, as well as calculated quantities were determined and reported on the DNAPL recovery system monitoring log presented in Appendix B-2. Volumes were calculated by taking measurements in the tanks with a water level meter and also measuring the length of DNAPL staining on a weighted string lowered to the tank bottom and an electronic water level meter. The DNAPL volume recovered between February 2019 and February 2020 was approximately 112 gallons.

Actions Taken to Monitor System Function and Improve DNAPL Recovery (in addition to monthly checks):

- March 1, 2019 – Inspected system to assess overall DNAPL collection volume improvement and measured DNAPL collected in hanging pail inside tank. Pump malfunction was identified and taken off-site for repair.

- March 28, 2019 – Replaced the peristaltic pump with a temporary rental pump. The original pump was sent to Cole Parmer for the duration of repair.

- May 16 and 23, 2019 – NFG replaced the temporary rented peristaltic pump with the repaired original pump. The following week, GEI reviewed pump speed settings with NFG and recommended an increase in pump setting. Depth to water and DNAPL measurements were recorded.

- July 18, 2019 – Inspected system to assess overall DNAPL collection volume improvement and recorded depth to water and DNAPL volume estimates.

- November 26, 2019 – Inspected system to assess overall DNAPL collection volume improvement and measured depth to water and DNAPL collected in tank. Observed vacuum extraction of approximately 650 gallons of water and DNAPL in tank by Environmental Services Group under contract to Allied.

- January 23, 2020 – Inspected system to assess overall DNAPL collection volume improvement. The Tygon tubing in the peristaltic pump head was observed to be flattened and was replaced.

NAPL recovery rates during the February 2019 to February 2020 period were generally consistent between assessment events. The pumping rate was lowered from previous monitoring periods to maximize DNAPL collection and minimize the amount of water pumped.

Since operation startup in 2001, approximately 677 gallons of DNAPL have been collected by the north vault system.

4. IC/EC Compliance

4.1 IC/EC Requirements

ICs include the following;

- Implementation of Site O&M Plan.
- Monitoring and inspection to assess the performance and effectiveness of the remedy.

The Site is a New York State waterway and property use is limited to its function as a conveyance of surface water in the City of Buffalo.

ECs include the following;

- Sediment cap consisting of GCL overlain by sand, geotextile and anchoring stone.
- Collection of mobile DNAPL below the sediment cap.
- Maintenance of the creek sediment cap and operation and maintenance of the DNAPL collection systems.

4.2 IC/EC Compliance

The NYSDEC-approved O&M Plan is in place. All required inspections were performed during this reporting period in accordance with the plan and as needed maintenance of the creek cap was conducted in February 2020.

4.3 IC/EC Certification

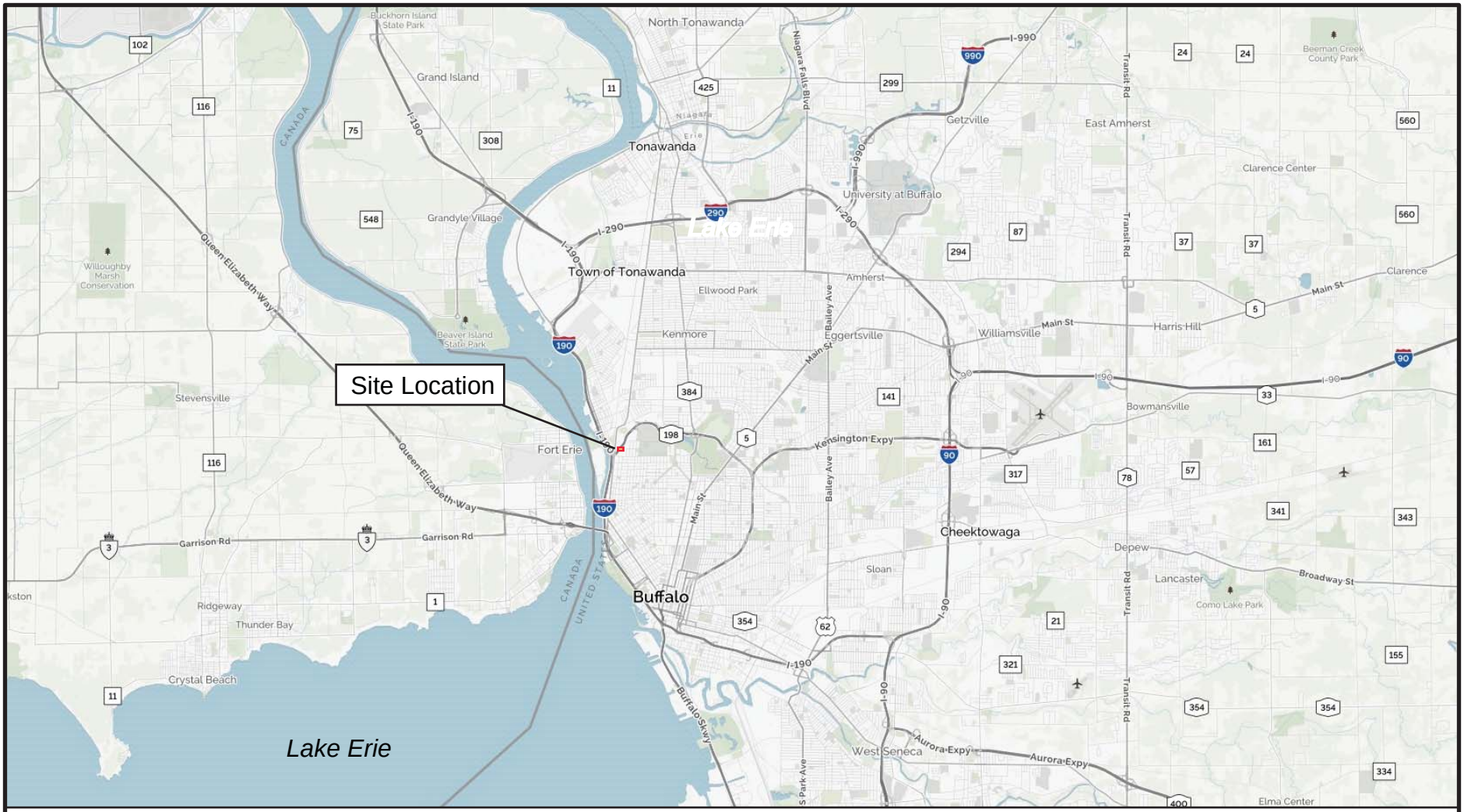
The IC/EC Certification is included in Appendix C.

5. Conclusions and Recommendations

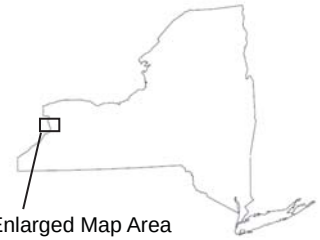
Each component of the O&M Plan dated February 8, 2005 and amended frequencies of inspections as agreed to in NYSDEC correspondence dated December 2, 2009, collectively regarded as the SMP, were in compliance during this reporting period (February 15, 2019 through February 15, 2020). The ICs/ECs have been in place and effective. Inspections and maintenance were performed as required.

Based upon the inspections and compliance with the SMP, the site remedy continues to meet the remedial objectives for the site.

Figures



New York State

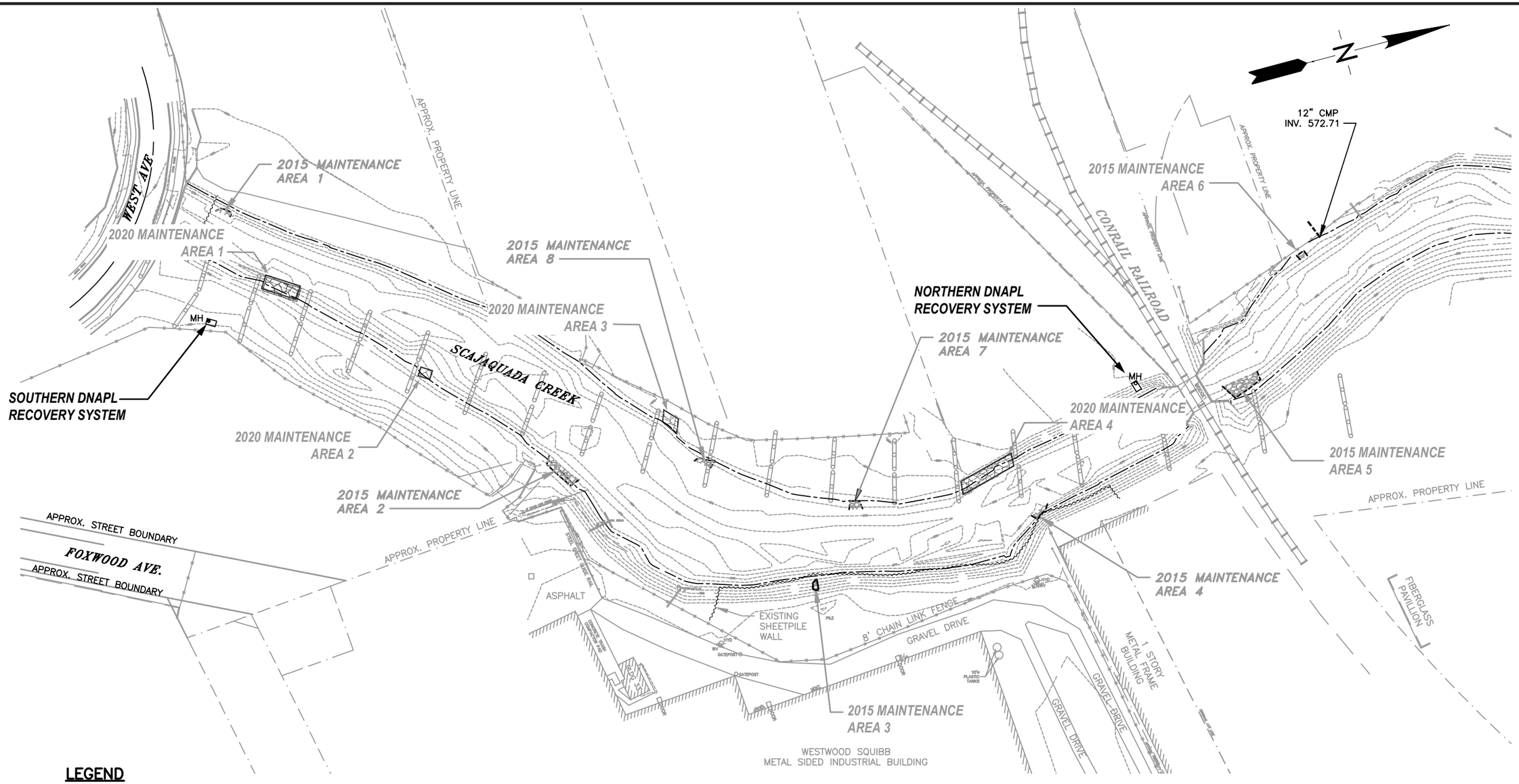


Enlarged Map Area

0 1 4

Scale
(miles, approximate)

National Fuel Gas Corporation	GEI Consultants	SITE LOCATION SCAJAQUADA CREEK SITE
Buffalo, New York	Project 1403480	March 2020 Figure 1



LEGEND

Approximate area of maintenance activities performed Nov. 18-20, 2015 and Feb. 10 and 11, 2020 Upland Boundary Surveyed)

Approximate limits of Dredge Cap. (Approximated from "Sediment Remediation" Drawings, RETEC Engineering, P.C., June 1998)

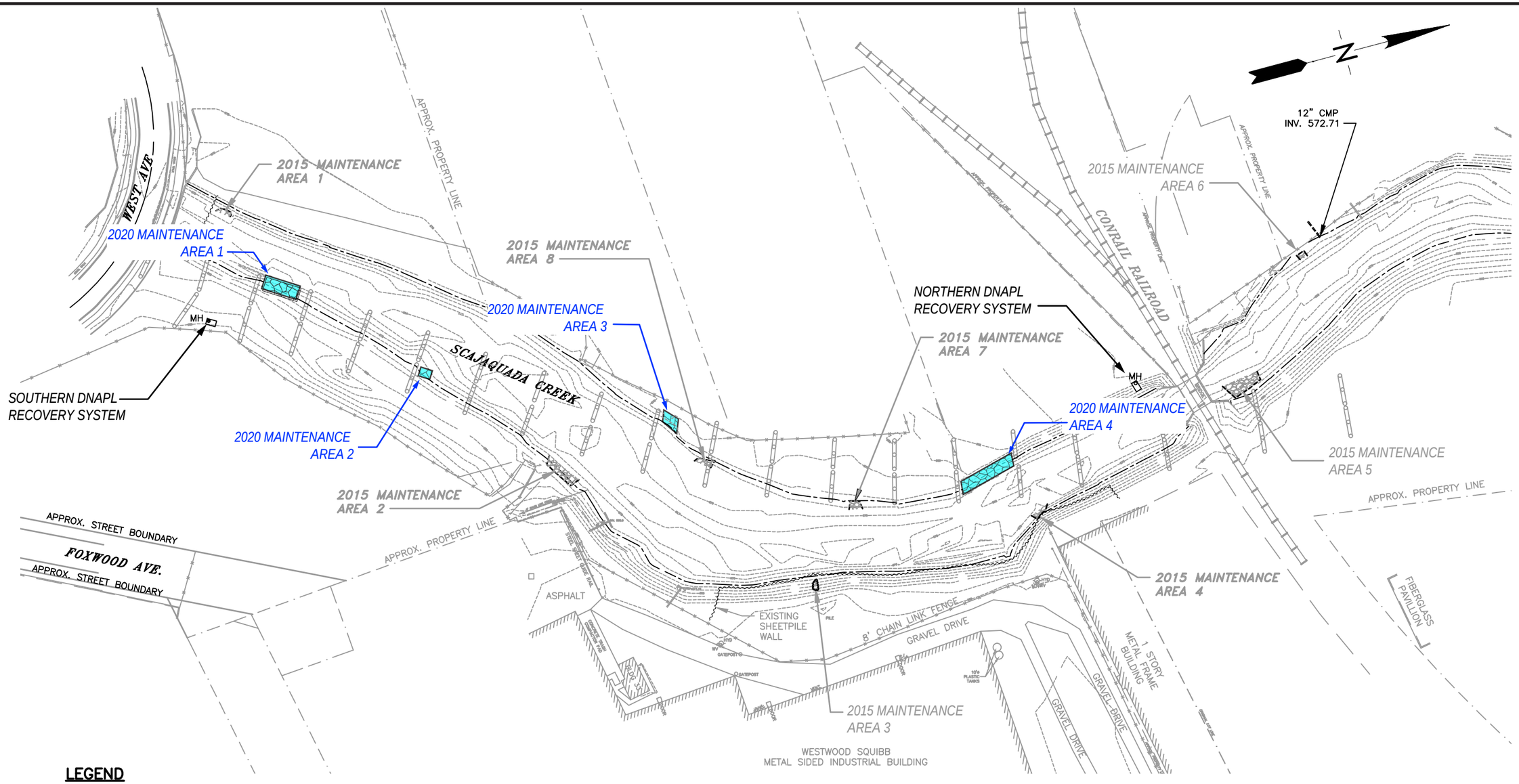
NOTES:
1. Base modified from original figure prepared by Clough, Harbrour & Associates from a September 1995 field survey and presented by AECOM in the Summary of 2016 Site Inspection Activities Report.
2. Property lines shown hereon are for information purposes only, and should not be used for the transfer of property. The property lines shown are depicted from a partial field boundary survey, record deeds and map information.

100' 0 100'
SCALE IN FEET

National Fuel Gas Corporation
Buffalo, New York

GEI Consultants
Project 1403480

SITE LAYOUT-
SCAJAQUADA CREEK SITE
March 2020 Figure 2



LEGEND

Approximate area of maintenance activities performed Nov. 18-20, 2015 and Feb. 10 and 11, 2020 (blue) Upland Boundary Surveyed)

Approximate limits of Dredge Cap. (Approximated from "Sediment Remediation" Drawings, RETEC Engineering, P.C., June 1998)

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Buffalo, New York

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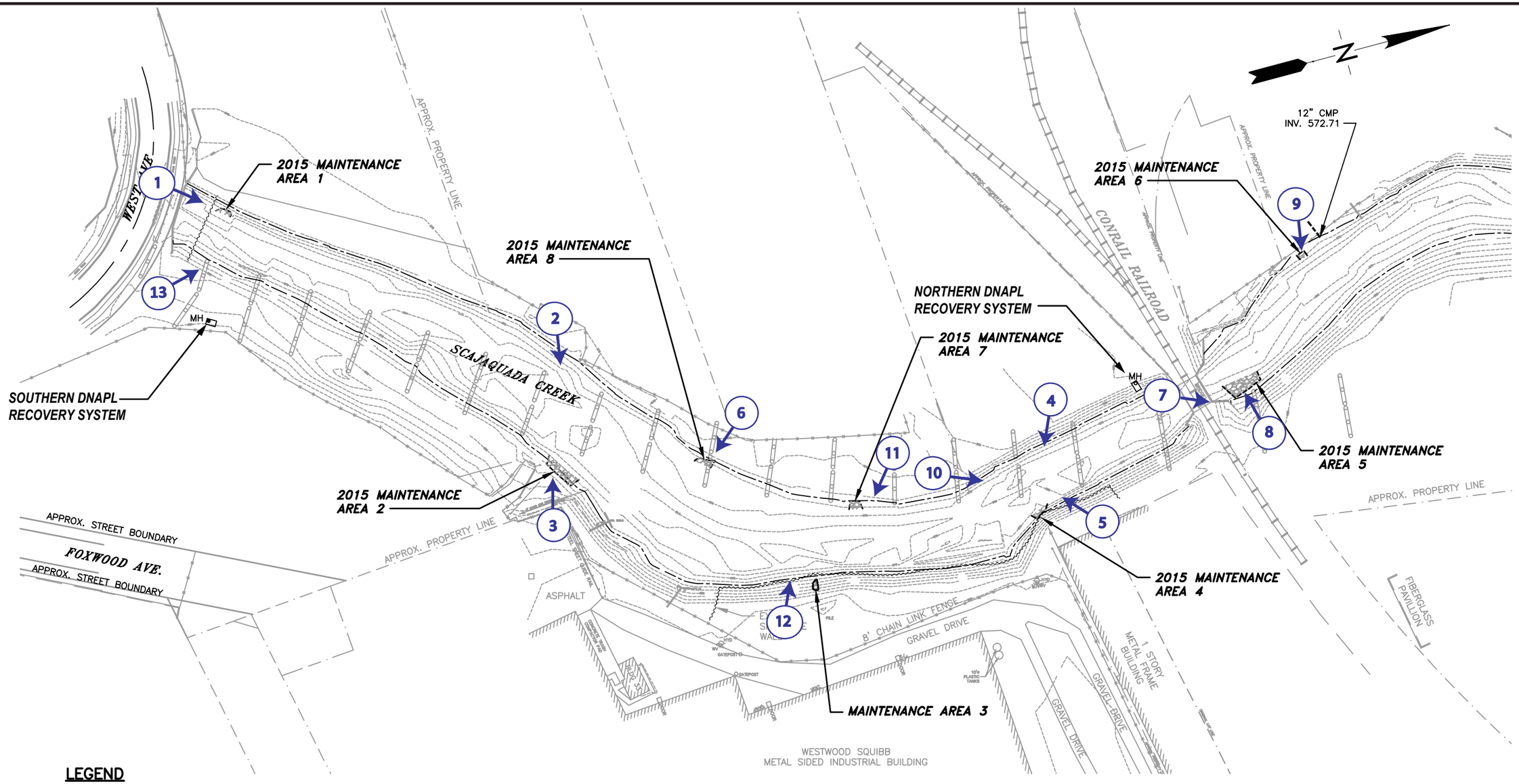
2020 CREEK CAP MAINTENANCE AREAS
March 2020 Figure 3

Appendix A

Scajaquada Creek Cap Inspection Photographs and Observations



LEGEND

APPROXIMATE AREA OF MAINTENANCE ACTIVITIES PERFORMED NOV. 18–20, 2015. (UPLAND BOUNDARY SURVEYED)

APPROXIMATE LIMITS OF DREDGE CAP. (APPROXIMATED FROM "SEDIMENT REMEDIATION" DRAWINGS, RETEC ENGINEERING, P.C., JUNE 1998)

1 LOCATION AND DIRECTION OF MAY 8, 2018 PHOTOGRAPH

NOTES:
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3. Maintenance areas surveyed by AECOM on December 7, 2015.

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National Fuel Gas Corporation
Buffalo, New York

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Project 1403480

FILD OBSERVATION PHOTO LOCATIONS- MAY 8, 2018
SCAJAQUADA CREEK SITE
March 2019 Appendix A-1

Appendix A-1

Creek Cap Inspection (May 2019)

FIELD OBSERVATION PHOTOGRAPHS

Project :	Iroquois Gas/Westwood Pharmaceutical Riparian Site No. 915141B - 2019 Creek Cover System Inspection	**Date: 05/08/19**	
Client :	National Fuel Gas	**Report No. PRR'19**	
Photo by:	R. Frappa, P.G./**Reviewed by:** K. McIntosh, P.E.	**Page:**	1 of 11
		GEI Proj. No.	1403480

Photo 1. View looking northeast of west bank of creek at 2015 Maintenance Area 1. Vegetation and stone armor remain in place.

FIELD OBSERVATION PHOTOGRAPHS

Project :	Iroquois Gas/Westwood Pharmaceutical Riparian Site No. 915141B - 2019 Creek Cover System Inspection	**Date: 05/08/19**	
Client :	National Fuel Gas	**Report No. PRR'19**	
Photo by:	R. Frappa, P.G./**Reviewed by:** K. McIntosh, P.E.	**Page:**	2 of 11
		GEI Proj. No.	1403480

Photo 2. View looking east of east bank of creek at 2015 Maintenance Area 2. Rip rap remains in place.

FIELD OBSERVATION PHOTOGRAPHS

Project :	Iroquois Gas/Westwood Pharmaceutical Riparian Site No. 915141B - 2019 Creek Cover System Inspection	**Date: 05/08/19**	
Client :	National Fuel Gas	**Report No. PRR'19**	
Photo by:	R. Frappa, P.G./**Reviewed by:** K. McIntosh, P.E.	**Page:**	3 of 11
		GEI Proj. No.	1403480

Photo 3. Downslope view on east bank of 2015 Maintenance Area 2.

FIELD OBSERVATION PHOTOGRAPHS

Project :	Iroquois Gas/Westwood Pharmaceutical Riparian Site No. 915141B - 2019 Creek Cover System Inspection	**Date: 05/08/19**	
Client :	National Fuel Gas	**Report No. PRR'19**	
Photo by:	R. Frappa, P.G./**Reviewed by:** K. McIntosh, P.E.	**Page:**	4 of 11
		GEI Proj. No.	1403480

Photo 4. View looking east at east bank of BMS sheet pile near Maintenance Area 4. Sheet pile and rip rap in good condition.

FIELD OBSERVATION PHOTOGRAPHS

Project :	Iroquois Gas/Westwood Pharmaceutical Riparian Site No. 915141B - 2019 Creek Cover System Inspection	**Date: 05/08/19**	
Client :	National Fuel Gas	**Report No. PRR'19**	
Photo by:	R. Frappa, P.G./**Reviewed by:** K. McIntosh, P.E.	**Page:**	5 of 11
		GEI Proj. No.	1403480

Photo 5. Closeup of east bank of BMS sheet pile near Maintenance Area 4. Sheet pile and rip rap in good condition.

FIELD OBSERVATION PHOTOGRAPHS

Project :	Iroquois Gas/Westwood Pharmaceutical Riparian Site No. 915141B - 2019 Creek Cover System Inspection	**Date: 05/08/19**	
Client :	National Fuel Gas	**Report No. PRR'19**	
Photo by:	R. Frappa, P.G./**Reviewed by:** K. McIntosh, P.E.	**Page:**	6 of 11
		GEI Proj. No.	1403480

Photo 6. Southeast view of west bank at Maintenance Area 8, rip rap in good condition, no erosion on down slope of drain spout.

FIELD OBSERVATION PHOTOGRAPHS

Project :	Iroquois Gas/Westwood Pharmaceutical Riparian Site No. 915141B - 2019 Creek Cover System Inspection	**Date: 05/08/19**	
Client :	National Fuel Gas	**Report No. PRR'19**	
Photo by:	R. Frappa, P.G./**Reviewed by:** K. McIntosh, P.E.	**Page:**	7 of 11
		GEI Proj. No.	1403480

Photo 7. North view of Maintenance Area 5. No visible erosion. Rip rap and stone block in place.

FIELD OBSERVATION PHOTOGRAPHS

Project :	Iroquois Gas/Westwood Pharmaceutical Riparian Site No. 915141B - 2019 Creek Cover System Inspection	**Date: 05/08/19**	
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Photo by:	R. Frappa, P.G./**Reviewed by:** K. McIntosh, P.E.	**Page:**	8 of 11
		GEI Proj. No.	1403480

Photo 8. Closeup view of Maintenance Area 6. Rip rap placement intact. No visible erosion.

FIELD OBSERVATION PHOTOGRAPHS

Project :	Iroquois Gas/Westwood Pharmaceutical Riparian Site No. 915141B - 2019 Creek Cover System Inspection	**Date: 05/08/19**	
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Photo by:	R. Frappa, P.G./**Reviewed by:** K. McIntosh, P.E.	**Page:**	9 of 11
		GEI Proj. No.	1403480

Photo 9. North view of west bank toward Conrail Bridge. No visible erosion.

FIELD OBSERVATION PHOTOGRAPHS

Project :	Iroquois Gas/Westwood Pharmaceutical Riparian Site No. 915141B - 2019 Creek Cover System Inspection	**Date: 05/08/19**	
Client :	National Fuel Gas	**Report No. PRR'19**	
Photo by:	R. Frappa, P.G./**Reviewed by:** K. McIntosh, P.E.	**Page:**	10 of 11
		GEI Proj. No.	1403480

Photo 10. View of west bank at BMS outfall with gabion baskets. No visible erosion.

FIELD OBSERVATION PHOTOGRAPHS

Project :	Iroquois Gas/Westwood Pharmaceutical Riparian Site No. 915141B - 2019 Creek Cover System Inspection	**Date: 05/08/19**	
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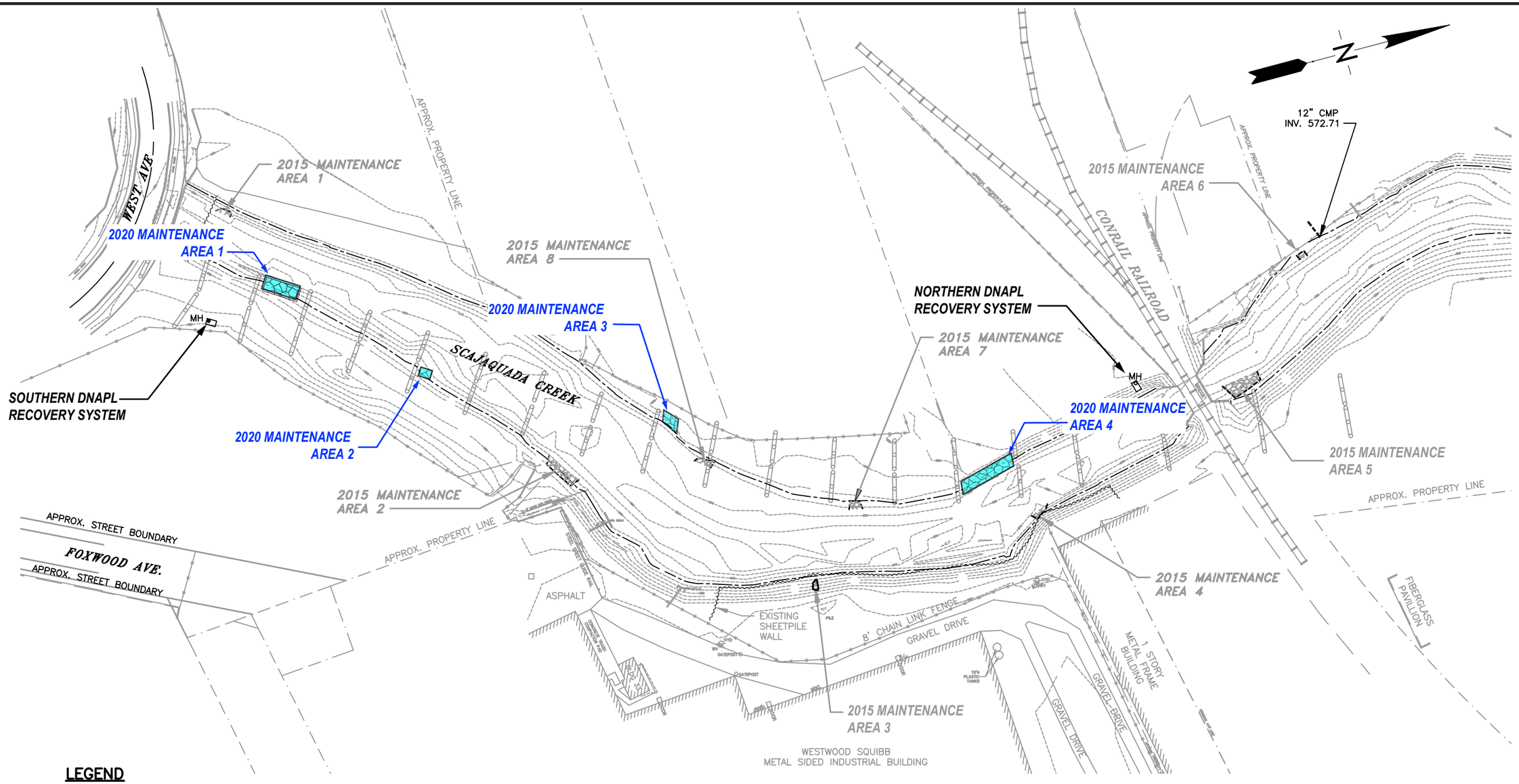
Photo by:	R. Frappa, P.G./**Reviewed by:** K. McIntosh, P.E.	**Page:**	11 of 11
		GEI Proj. No.	1403480

Photo 11. North view of east bank north of South Vault showing rip rap surface water conveyance. No visible erosion above or at creek bank.

Appendix A-2

Creek Cap Repairs (February 2020)



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Approximate area of maintenance activities performed Nov. 18-20, 2015 and Feb. 10 and 11, 2020 (blue) Upland Boundary Surveyed)

Approximate limits of Dredge Cap. (Approximated from "Sediment Remediation" Drawings, RETEC Engineering, P.C., June 1998)

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100' 0 100'
SCALE IN FEET

National Fuel Gas Corporation
Buffalo, New York

GEI Consultants
Project 1403480

2020 CREEK CAP MAINTENANCE AREAS
March 2020 Appendix A-2

FIELD OBSERVATION PHOTOGRAPHS

Project :	Iroquois Gas/Westwood Pharmaceutical Riparian Site No. 915141B - **2020 Creek Cover System Maintenance Documentation – 2020 Maintenance Area 1**	**Date: 02/10/20**	
Client :	National Fuel Gas	**Report No. PRR'19**	
Photo by:	R. Frappa, P.G./M. Cummings, P.G./K. McIntosh, P.E.	**Page:**	1 of 4
		GEI Proj. No.	1403480

Photo 1. View looking east of east creek bank at 2020 Maintenance Area 1 taken on January 31, 2020. Vegetation and stone armor scoured away in January during high water/ice level in creek. Scoured area is identified on the photo.

FIELD OBSERVATION PHOTOGRAPHS

Project :	Iroquois Gas/Westwood Pharmaceutical Riparian Site No. 915141B - **2020 Creek Cover System Maintenance Documentation – 2020 Maintenance Area 1**	**Date: 02/10/20**	
Client :	National Fuel Gas	**Report No. PRR'19**	
Photo by:	R. Frappa, P.G./M. Cummings, P.G./K. McIntosh, P.E.	**Page:**	2 of 4
		GEI Proj. No.	1403480

Photo 2a and 2b. Close-up views of the scoured area. Coarse armor stone missing, compact sand and fine gravel remain in place with no visible geotextile fabric.

Photo 2a – North view

Photo 2b – Down slope view

FIELD OBSERVATION PHOTOGRAPHS

Project :	Iroquois Gas/Westwood Pharmaceutical Riparian Site No. 915141B - **2020 Creek Cover System Maintenance Documentation – 2020 Maintenance Area 1**	**Date: 02/10/20**	
Client :	National Fuel Gas	**Report No. PRR'19**	
Photo by:	R. Frappa, P.G./M. Cummings, P.G./K. McIntosh, P.E.	**Page:**	3 of 4
		GEI Proj. No.	1403480

Photo 3. View looking east of east creek bank at 2020 Maintenance Area 1 taken on February 10, 2020. Two small trees cut and removed. New limestone surge stone being place on slope covering scoured area. Stone extended from north pier to existing armor stone near south pier in photo.

FIELD OBSERVATION PHOTOGRAPHS

Project :	Iroquois Gas/Westwood Pharmaceutical Riparian Site No. 915141B - **2020 Creek Cover System Maintenance Documentation – 2020 Maintenance Area 1**	**Date: 02/10/20**	
Client :	National Fuel Gas	**Report No. PRR'19**	
Photo by:	R. Frappa, P.G./M. Cummings, P.G./K. McIntosh, P.E.	**Page:**	4 of 4
		GEI Proj. No.	1403480

Photo 4. View looking east of east creek bank at 2020 Maintenance Area 1 taken on February 10, 2020 at completion of repair.

FIELD OBSERVATION PHOTOGRAPHS

Project :	Iroquois Gas/Westwood Pharmaceutical Riparian Site No. 915141B - **2020 Creek Cover System Maintenance Documentation – 2020 Maintenance Area 2**	**Date: 02/10/20**	
Client :	National Fuel Gas	**Report No. PRR'19**	
Photo by:	R. Frappa, P.G./M. Cummings, P.G./K. McIntosh, P.E.	**Page:**	1 of 4
		GEI Proj. No.	1403480

Photo 1. Close-up view of east creek bank at 2020 Maintenance Area 2 taken on January 31, 2020. Some vegetation and stone armor scoured away in January during high water/ice level in creek exposing a 2 X 3 foot area of geotextile fabric. Sand bedding and geosynthetic clay liner (GCL) remain below geotextile fabric and are not visible.

FIELD OBSERVATION PHOTOGRAPHS

Project :	Iroquois Gas/Westwood Pharmaceutical Riparian Site No. 915141B - **2020 Creek Cover System Maintenance Documentation – 2020 Maintenance Area 2**	**Date: 02/10/20**	
Client :	National Fuel Gas	**Report No. PRR'19**	
Photo by:	R. Frappa, P.G./M. Cummings, P.G./K. McIntosh, P.E.	**Page:**	2 of 4
		GEI Proj. No.	1403480

Photo 2. Layout of new geotextile fabric pinned to ground surface.

FIELD OBSERVATION PHOTOGRAPHS

Project :	Iroquois Gas/Westwood Pharmaceutical Riparian Site No. 915141B - **2020 Creek Cover System Maintenance Documentation – 2020 Maintenance Area 2**	**Date: 02/10/20**	
Client :	National Fuel Gas	**Report No. PRR'19**	
Photo by:	R. Frappa, P.G./M. Cummings, P.G./K. McIntosh, P.E.	**Page:**	3 of 4
		GEI Proj. No.	1403480

Photo 3. Placement of new armor limestone surge stone on new geotextile on February 10, 2020.

FIELD OBSERVATION PHOTOGRAPHS

Project :	Iroquois Gas/Westwood Pharmaceutical Riparian Site No. 915141B - **2020 Creek Cover System Maintenance Documentation – 2020 Maintenance Area 2**	**Date: 02/10/20**	
Client :	National Fuel Gas	**Report No. PRR'19**	
Photo by:	R. Frappa, P.G./M. Cummings, P.G./K. McIntosh, P.E.	**Page:**	4 of 4
		GEI Proj. No.	1403480

Photo 4. View looking east of east creek bank at 2020 Maintenance Area 2 taken on February 10, 2020 at completion of repair.

FIELD OBSERVATION PHOTOGRAPHS

Project :	Iroquois Gas/Westwood Pharmaceutical Riparian Site No. 915141B - **2020 Creek Cover System Maintenance Documentation – 2020 Maintenance Area 3**	**Date: 02/11/20**	
Client :	National Fuel Gas	**Report No. PRR'19**	
Photo by:	R. Frappa, P.G./M. Cummings, P.G./K. McIntosh, P.E.	**Page:**	1 of 3
		GEI Proj. No.	1403480

Photo 1. Close-up view of west creek bank at 2020 Maintenance Area 3 taken on January 31, 2020. Some vegetation and stone armor scoured away in January during high water/ice level in creek. No geotextile fabric was exposed and sand bedding and geosynthetic clay liner (GCL) remain intact below remaining armor sand and stone.

FIELD OBSERVATION PHOTOGRAPHS

Project :	Iroquois Gas/Westwood Pharmaceutical Riparian Site No. 915141B - **2020 Creek Cover System Maintenance Documentation – 2020 Maintenance Area 3**	**Date: 02/11/20**	
Client :	National Fuel Gas	**Report No. PRR'19**	
Photo by:	R. Frappa, P.G./M. Cummings, P.G./K. McIntosh, P.E.	**Page:**	2 of 3
		GEI Proj. No.	1403480

Photo 2. Placement of new armor limestone surge stone on new geotextile on February 11, 2020.

FIELD OBSERVATION PHOTOGRAPHS

Project :	Iroquois Gas/Westwood Pharmaceutical Riparian Site No. 915141B - **2020 Creek Cover System Maintenance Documentation – 2020 Maintenance Area 3**	**Date: 02/11/20**	
Client :	National Fuel Gas	**Report No. PRR'19**	
Photo by:	R. Frappa, P.G./M. Cummings, P.G./K. McIntosh, P.E.	**Page:**	3 of 3
		GEI Proj. No.	1403480

Photo 3. View looking south along creek bank at 2020 Maintenance Area 3 taken on February 11, 2020 at completion of repair.

FIELD OBSERVATION PHOTOGRAPHS

Project :	Iroquois Gas/Westwood Pharmaceutical Riparian Site No. 915141B - **2020 Creek Cover System Maintenance Documentation – 2020 Maintenance Area 4**	**Date: 02/11/20**	
Client :	National Fuel Gas	**Report No. PRR'19**	
Photo by:	R. Frappa, P.G./M. Cummings, P.G./K. McIntosh, P.E.	**Page:**	1 of 4
		GEI Proj. No.	1403480

Photo 1. Close-up view looking north of west creek bank at 2020 Maintenance Area 4 taken on January 31, 2020. Some vegetation and stone armor scoured away in January during high water/ice level in creek. No geotextile fabric was exposed and sand bedding and geosynthetic clay liner (GCL) remain intact below remaining armor sand and stone.

FIELD OBSERVATION PHOTOGRAPHS

Project :	Iroquois Gas/Westwood Pharmaceutical Riparian Site No. 915141B - **2020 Creek Cover System Maintenance Documentation – 2020 Maintenance Area 4**	**Date: 02/11/20**	
Client :	National Fuel Gas	**Report No. PRR'19**	
Photo by:	R. Frappa, P.G./M. Cummings, P.G./K. McIntosh, P.E.	**Page:**	2 of 4
		GEI Proj. No.	1403480

Photo 2. Placement of new armor limestone surge stone at 2020 Maintenance Area 4 on February 11, 2020.

FIELD OBSERVATION PHOTOGRAPHS

Project :	Iroquois Gas/Westwood Pharmaceutical Riparian Site No. 915141B - **2020 Creek Cover System Maintenance Documentation – 2020 Maintenance Area 4**	**Date: 02/11/20**	
Client :	National Fuel Gas	**Report No. PRR'19**	
Photo by:	R. Frappa, P.G./M. Cummings, P.G./K. McIntosh, P.E.	**Page:**	3 of 4
		GEI Proj. No.	1403480

Photo 3. Placement of new armor surge stone at 2020 Maintenance Area 4 on February 11, 2020.

FIELD OBSERVATION PHOTOGRAPHS

Project :	Iroquois Gas/Westwood Pharmaceutical Riparian Site No. 915141B - **2020 Creek Cover System Maintenance Documentation – 2020 Maintenance Area 4**	**Date: 02/11/20**	
Client :	National Fuel Gas	**Report No. PRR'19**	
Photo by:	R. Frappa, P.G./M. Cummings, P.G./K. McIntosh, P.E.	**Page:**	4 of 4
		GEI Proj. No.	1403480

Photo 4. View looking south along creek bank at 2020 Maintenance Area 4 taken on February 11, 2020 at completion of repair.

Appendix B

DNAPL Recovery System Monitoring Logs

Appendix B-1

Southern DNAPL Recovery System

APPENDIX B-1 - SOUTHERN DNAPL RECOVERY SYSTEM

Date	Initials	Field Measurements (by OWI probe)				Calculations (total tank contents) *				Calculations (this period recovery highlighted)					Operator's Notes
		Manhole rim to top of LNAPL (ft)	Manhole rim to top of Water (ft) (estimated)	Manhole rim to top of DNAPL (ft)	Manhole rim to bottom of Tank (ft)	LNAPL (gal)	Water (gal)	DNAPL (gal)	Total (gal)	Water Increase (gal)	NAPL Increase (gal)	% NAPL	NAPL (gpd)	Ave Recovery in GPD	
24-Jun-99	mrh	9.05	9.05	9.05	9.05	0	0	0	0	0	0	0%		0	90% construction complete, begin initial testing
29-Jun-99	mrh/day	6.80	6.80	9.05	9.05	0	695	0	695	695	0	0%		139	Complete initial system test, PW2003 has silt damage
23-Jul-99	mrh/day	6.80	6.80	9.05	9.05	0	695	0	695	0	0	0%		0	Recommence shakedown with peristaltic pump
30-Jul-99	day	6.34	6.34	8.95	9.05	0	806	31	837	111	31	22%	4.41	20	Shakedown, flow adjustment
26-Aug-99	jhe	5.90	5.90	8.73	9.05	0	874	99	973	68	68	50%	2.52	5	Routine system check, slow drip from tank bung noted (0.5 gpd?)
16-Sep-99	mrh/bdc	5.79	5.80	8.75	9.05	3	911	93	1007	37	-3	---		2	Significant (2 gpd?) DNAPL loss through bung drip, PW2003 reinstalled
28-Sep-99	mrh/cc	3.30	3.32	8.61	9.05	6	1633	136	1775	723	46	6%	3.86	64	Tank emptied (was full, pump off), bung replaced,
28-Sep-99	mrh/cc	9.05	9.05	9.05	9.05	0	0	0	0	0	0	0%		0	vault cleaned, flow setting reduced to 4.5
3-Oct-99	mrh	8.75	8.75	9.03	9.05	0	86	6	93	86	6	7%	1.24	19	Measurements are visual estimates only, flow setting reduced to 3.5
11-Oct-99	cc	8.75	8.75	9.03	9.05	0	86	6	93	0	0	0%		0	No flow observed, flow setting increased to 5.0
29-Oct-99	cc	6.81	6.81	8.98	9.05	0	670	22	692	584	15	3%	0.86	33	Flow setting decreased to 4.0
2-Dec-99	mrh/day	6.09	6.10	8.77	9.05	3	824	86	914	154	68	31%	2.00	7	Flow setting increased to 4.7 (24 gpd), timer installed/set for 1pm to 2pm operation
16-Dec-99	cc	---	---	---	---	---	---	---	---	---	---	---		---	Pump running but no flow, Timer reset for 3 hr per day operation
9-Mar-00	mrh/day	6.09	6.10	8.89	9.05	3	861	49	914	37	-37	---		0	PW2000 running but no flow, Peristaltic installed (2 hr/day), DNAPL thickened over time
11-Apr-00	mrh/day	4.71	4.73	8.82	9.05	6	1263	71	1340	401	25	6%	0.75	13	New peristaltic purchased/installed. Flow setting #7 (for 2 hr/day).
1-May-00	mrh/dms	4.62	4.64	8.80	9.05	6	1284	77	1368	22	6	22%	0.31	1	No flow (tubing collapsed). Repaired.
4-May-00	day/jc	4.62	4.64	8.80	9.05	6	1284	77	1368	0	0	0%		0	No flow (tubing leak). Tank emptied. System turned off.
8-May-00	mrh/jtf	9.05	9.05	9.05	9.05	0	0	0	0	0	0	0%		0	Original tubing replaced with silicon. System restarted at flow setting #3 (for 2 hr/day).
8-Jun-00	mrh/day	8.55	8.56	8.98	9.05	3	130	22	154	130	25	16%	0.80	5	Backfill settled around vault. Total depth shallow; measurements estimated. Tubing adjusted.
10-Jul-00	mrh/dms	8.10	8.11	8.90	9.05	3	244	46	293	114	25	18%	0.77	4	Tubing was worn; adjusted.
25-Aug-00	day	7.30	7.31	8.80	9.05	3	460	77	540	216	31	12%	0.67	5	Tubing adjusted.
20-Oct-00	mrh	6.25	6.26	8.64	9.05	3	735	127	865	275	49	15%	0.88	6	Tubing worn; adjusted.
30-Nov-00	mrh	5.75	5.77	8.55	9.05	6	858	154	1019	124	31	20%	0.75	4	Tubing worn; adjusted. Flow rate setting reduced from 3.0 to 1.5; timer not changed.
18-Jan-01	mrh	5.75	5.77	8.55	9.05	6	858	154	1019	0	0	---		0	Pump starts rough and sounds bad. Pump removed and sent in for repairs.
7-Feb-01	mrh/hs	5.75	5.77	8.55	9.05	6	858	154	1019	0	0	0%		0	Temporary FloJet pump installed but insufficient NPSH due to low creek elevation.
30-Mar-01	mrh	5.75	5.77	8.55	9.05	6	858	154	1019	0	0	0%		0	Peristaltic (geopump) installed, full speed, 600 rpm, system OK. NAPL is hi viscocity/settled.
10-Apr-01	mrh	5.70	5.72	8.51	9.05	6	861	167	1034	3	12	80%	1.12	1.4	3/16" id tubing replaced with 3/8" id tubing. Float switch replaced (plus relay).
18-May-01	dms/jc	5.65	5.68	8.52	9.05	9	877	164	1050	15	0	0%	0.00	0.4	Tubing worn and soft; adjusted.
30-Aug-01	mrh/hs	5.53	5.55	8.39	9.05	6	877	204	1087	0	37	100%	0.36	0.4	NAPL appears to be accumulated in well. Timer set to 3 hrs/day. Original peristaltic re-installed.
3-Oct-01	hs/jc	5.46	5.48	8.35	9.05	6	886	216	1108	9	12	57%	0.36	0.6	NAPL may still be accumulated in well. Timer increased to 4 hrs/day.
6-Nov-01	hs/jc	5.30	5.32	8.27	9.05	6	911	241	1158	25	25	50%	0.73	1.5	Additional NAPL purged from well after readings taken. Timer decreased to 3 hrs/day.
7-Feb-02	hs/jc	3.89	3.91	8.22	9.05	6	1331	256	1593	420	15	4%	0.17	4.7	Adjusted peristaltic tubing.
8-Mar-02	hs/jc	3.81	3.83	8.17	9.05	6	1340	272	1618	9	15	62%	0.53	0.9	Adjusted peristaltic tubing.
10-Apr-02	mrh	3.43	3.45	7.88	9.05	6	1368	361	1735	28	90	76%	2.71	3.6	Adjusted tubing. Installed piston pump for one day test (then removed). Timer increased to 4 hrs.
7-May-02	hs/jc	3.15	3.17	7.82	9.05	6	1436	380	1822	68	19	21%	0.69	3.2	Tank full.
7-May-02		9.05	9.05	9.05	9.05	0	0	0	0	---	---	---	---	---	Tank pumped out.
25-Jun-02	cd	6.00	6.02	9.02	9.05	6	926	9	942	926	15	2%	0.32	19.2	Depth's estimated. Pump set at #4, 3 hrs/day
2-Aug-02	mrh/jc	3.15	3.17	9.00	9.05	6	1800	15	1822	874	6	1%	0.16	23.2	Tank full, mostly water.
6-Sep-02	jc	3.15	3.17	9.00	9.05	6	1800	15	1822	0	0	0%	---	0.0	Tank Emptied.
6-Sep-02		9.05	9.05	9.05	9.05	0	0	0	0	0	0	---	---	---	
8-Oct-02	mrh/jc	8.98	8.98	8.98	9.05	0	0	22	22	0	22	100%	0.68	0.7	Pump removed for repair
18-Nov-02	cd	8.98	8.98	8.98	9.05	0	0	22	22	0	0	0%	---	0.0	Pump reinstalled
4-Feb-03	mrh/jc	4.32	4.32	8.95	9.05	0	1430	31	1460	1430	9	1%	0.12	18.4	Tank again full of mostly water (timer was left on manual?). Tank emptied.
4-Feb-03		9.05	9.05	9.05	9.05	0	0	0	0	---	---	---	---	---	
12-Mar-03	jc	9.00	9.00	9.00	9.05	0	0	15	15	0	15	100%	0.43	0.4	Pump running fast, so removed for evaluation/repair.
10-Apr-03	mrh/jc	9.00	9.00	9.00	9.05	0	0	15	15	0	0	0%		0.0	Pump reinstalled: runs fast/variable with no load, runs OK with flow load. Timer set to 30 min/day, speed 8.
23-Jul-03	mrh/jc	8.78	8.78	8.78	9.05	0	0	83	83	0	68	100%	0.51	0.7	Additional system checks/adjustments made by J Clark on 5/5, 5/20, 6/12, and 6/24.
23-Apr-04	mrh	8.05	8.06	8.55	9.05	3	151	154	309	151	74	33%	0.27	0.8	Additional system checks/adjustments made by NFG on 8/01, 8/06, 9/05, 9/08, 9/11, 9/17, 9/25, 10/30, 11/18.
24-Nov-04	jl,jc	7.31	7.32	8.54	9.05	3	377	157	537	225	3	1%	0.01	1.1	O/W Interface probe not acting precisely, actual DNAPL volume probably greater.
19-Apr-05	mh,jc,jl,sh	7.19	7.20	8.43	9.05	3	380	191	574	3	34	92%	0.23	0.3	Additional system checks/adjustments made by J Clark on 11/24, 1/20/2005, 3/7, 3/11, 4/12, 4/18.
27-Oct-05	mrh, jc	6.96	6.97	8.20	9.05	3	380	262	645	0	71	100%	0.37	0.4	New OWI probe, but readings inconsistent with previous readings. System checks by NFG 5/11, 6/24, 7/28, 8/25, 10/06.
22-Mar-06	mrh, jc	6.78	6.79	8.02	9.05	3	380	318	701	0	56	100%	0.38	0.4	Additional system checks by NFG 10/26/05, 12/14/05, 1/6/06, 2/24/06.
24-Oct-06	mrh, jc	4.90	4.91	7.38	9.05	3	763	516	1281	383	198	34%	0.91	2.7	Depth to NAPL reading is approximate. Additional system checks by NFG 5/11, 6/29, 7/26, 9/07.
2-Mar-07	jc, cb	3.36	3.37	7.15	9.05	3	1167	587	1757	404	71	15%	0.55	3.7	Pump turned off 3/02/07 because tank near full. Readings taken **4/25/07**. Depth to DNAPL reading is approximate.
23-Jun-07		9.05	9.05	9.05	9.05	0	0	0	0	---	---	---	---	---	Tank pumped out.

Scajaquada Creek DNAPL Recovery System Monitoring Log

APPENDIX B-1 - SOUTHERN DNAPL RECOVERY SYSTEM

Date	Initials	Field Measurements (by OWI probe)				Calculations (total tank contents) *				Calculations (this period recovery highlighted)					Operator's Notes
		Manhole rim to top of LNAPL (ft)	Manhole rim to top of Water (ft) (estimated)	Manhole rim to top of DNAPL (ft)	Manhole rim to bottom of Tank (ft)	LNAPL (gal)	Water (gal)	DNAPL (gal)	Total (gal)	Water Increase (gal)	NAPL Increase (gal)	% NAPL	NAPL (gpd)	Ave Recovery in GPD	
30-Oct-07	dms, jc	8.55	8.56	9.01	9.05	3	139	12	154	139	15	10%	0.06	1.2	Depth to DNAPL reading is approximate.
13-May-08	dms, jc	---	---	---	---	---	---	---	---	---	---	---	---	---	Data appears to be invalid.
25-Mar-09	jl, dz	7.90	7.91	8.90	9.05	3	306	46	355	167	34	17%	0.07	0.4	O/W interface probe is working accurately
10-Jul-09	tr, jc	7.73	7.74	8.71	9.05	3	300	105	408	300	108	27%	1.01	0.2	O/W interface probe is working accurately
6-Oct-09	tr, jc	7.23	7.24	9.04	9.05	3	556	3	562	556	6	1%	0.07	0.2	A skim of LNAPL and DNAPL were present, the thickness (not measureable) is estimated to be 0.01 ft.
21-Apr-10	tr, jc	6.30	6.31	8.40	9.05	3	645	201	849	645	188	23%	0.96	0.3	A skim of LNAPL was present, the thickness (not measureable) is estimated to be 0.01 ft.
7-Apr-11	tr, jc	5.40	5.40	8.05	9.05	0	818	309	1127	173	105	38%	0.30	0.8	A skim of LNAPL was present, the thickness (not measureable) is estimated to be 0.01 ft.
16-Jun-11	jc	9.05	9.05	9.05	9.05	0	0	0	0	---	---	---	---	---	Tank pumped out. Water and NAPL shipped offsite for disposal.
18-Apr-12	el	6.60	6.60	8.50	9.05	0	587	170	756	587	170	22%	0.55	2.5	Corrected depth to top of DNAPL and depth to bottom of tank measurements
29-Apr-13	tr, jc	6.12	6.12	8.50	9.05	0	735	170	905	148	0	0%	0	0.4	DNAPL measurement duplicated and accurate. Corrected depth to bottom of tank measurement.
23-May-13	jc	---	---	---	---	0	0	0	0	---	---	---	---	---	Tank pumped out. Water and NAPL shipped offsite for disposal.
23-Apr-14	el, jc	8.38	8.40	8.40	9.10	6	0	216	222	0	222	100%	0.66	0.7	Corrected depth to bottom of tank measurement.
21-May-15	kh	8.28	8.30	8.30	9.06	6	0	235	241	0	19	100%	0.05	0.0	Measurements by Op-Tech
20-Apr-16	kh	6.55	6.55	7.96	9.16	0	435	371	806	435	148	29%	0.20	0.39	Measurements by Op-Tech: weighted rope indicates 1.2 ft of DNAPL in tank. OWI probe did not sense DNAPL
20-Apr-17	kh, rf	6.55	6.55	7.73	9.06	0	364	411	775	435	188	29%	0.17	0.39	Measurements by GEI using weighted cotton string and measured stain height.
16-May-17	mc	---	---	---	---	---	---	---	---	---	---	---	---	---	Removed approximately 90 feet of collection tubing in the recovery with new 0.5 inch diameter PEX tubing . Pumped 4 gallons of water from well.
29-Jun-17	mc	---	---	---	---	---	---	---	---	---	---	---	---	---	High pressure jet cleaning (water lance) used to clean/improve hydraulic communication in well screen. NAPL collection tank emptied by Allied Env. Services, collection piping and vault flooring walls cleaned.
28-Sep-17	mc	8.86	8.86	8.86	9.06	0	0	62	62	0	62	100%	0.12	2.39	Measurements by GEI using weighted cotton string and measured stain height. Differentiation between water and NAPL difficult with this small of a quantity
26-Oct-17	mc	8.86	8.86	8.86		---	---	---	---	---	---	---	---	---	No measurements by GEI. A hole is burned through tubing at pump head. Tubing is replaced, and pumping 100% tar when started back up. Change pump sched to DST.
15-Feb-18	mc	8.86	8.86	8.86	9.06	0	0	62	62	0	trace	100%	trace	0.00	Measurements by GEI using weighted cotton string and measured stain height. Pump malfunction and less than 1/4 gallon DNAPL collected. Pump repaired.
26-Apr-18	mc	5.40	5.40	8.86	9.06	0	1068	67	1130	1	4	100%	trace	15.26	Measurements by GEI using weighted cotton string and measured stain height. 5 gal. liquid in hung bucket, ~4 gal DNAPL. >1000 gal pumped since 3/1. Turn pump rate down by 50%. Will check and re-evaluate.
12-Jul-18	mc	--	--	--	9.06	---	---	5.00	---	trace	5.00	100%	---	---	No measurements by GEI. National Fuel states approximately 5 gallons of NAPL accumulated in bucket hung in tank with bucket overflowing into tank.
16-Aug-18	mc	--	--	--	9.06	---	---	5.00	---	trace	5.00	100%	---	---	No measurements by GEI. National Fuel states approximately 5 gallons of NAPL accumulated in bucket hung in tank with bucket overflowing into tank.
20-Sep-18	mc	9.05	9.05	9.05	9.06	0	0	• 0	3	trace	trace	trace	trace	0.02	Measurements by GEI. No NAPL accumulated in bucket. Pump rate increased from "30" to "60". (NAPL Storage tank pumped May 2018)
25-Oct-18	mc	--	--	--	9.06	0	0	5	--	trace	5.0	trace	--	--	No measurements by GEI. National Fuel states approximately 5 gallons of NAPL accumulated in bucket hung in tank with bucket overflowing into tank.
16-Jan-19	mc	9.05	9	9.05	9.06	0	15	3	3	15	69.0	100%	0.58	0.03	Measurements by GEI. 5gal of NAPL in bucket hung in tank with bucket overflowing into tank. No adjustments to the system are recommended.
28-Feb-19	mc	8.8	8.8	8.85	9.06	0	15	65	80	0	64.8	84%	1.51	1.87	Measurements by GEI. 5gal of NAPL in bucket hung in tank with bucket overflowing into tank. No adjustments to the system are recommended.
28-Mar-19	mc	7.8	7.8	7.9	9.06	0	31	358	389	15	135.9	44%	4.85	13.89	Measurements by GEI. 5gal of NAPL in bucket hung in tank with bucket overflowing into tank. No adjustments to the system are recommended.
23-May-19	mc	7.4	7.4	7.5	9.06	0	31	482	513	0	240.8	100%	4.30	9.15	Measurements by GEI. 5gal of NAPL in bucket hung in tank with bucket overflowing into tank. No adjustments to the system are recommended.
27-Jun-19	mc	--	--	--	--	0	31	482	513	0.0	0.0	--	--	--	No measurements by GEI. National Fuel personel states that 5 gallons of NAPL present in bucket hung in tank.
18-Jul-19	mc	7.5	7.5	7.5	9.06	0	31	482	513	0	0.0	0%	0	9.16	Measurements by GEI. Bucket hung in tank contains ~ 1 gallon NAPL (minimal water). Peristaltic tubing found to be flat and inoperational. Replaced and operating correctly following inspection.
16-Nov-19	mc	7.3	7.3	7.4	9.06	0	31	513	543	0	30.9	101%	0.22	3.83	Measurements by GEI. Bucket hung in tank contains ~4.50 gallons of water and 0.25 gallons of DNAPL. **(NAPL storage tank pumped on this date.)**
23-Jan-20	mc	9	9	9.03	9.06	0	9	9	19	9	9.0	100%	0.05	0.10	Measurements by GEI. Bucket hung in tank contains ~4.50 gallons of water and 0.25 gallons of DNAPL.
							Cumulative gallons :			12,375	3,089				
										Water	NAPL				

Appendix B-2

Northern DNAPL Recovery System

APPENDIX B-2 - NORTHERN DNAPL RECOVERY SYSTEM

Date	Initials	Field Measurements (by OWI probe)				Calculations (total tank contents) *				Calculations (this period recovery highlighted)					Operator's Notes
		Manhole rim to top of LNAPL (ft)	Manhole rim to top of Water (ft) (estimated)	Manhole rim to top of DNAPL (ft)	Manhole rim to bottom of Tank (ft)	LNAPL (gal)	Water (gal)	DNAPL (gal)	Total (gal)	Water Increase (gal)	NAPL Increase (gal)	% NAPL	NAPL (gpd)	Ave. Recovery in GPD	
28-Nov-01	mrh/cd	8.89	8.89	8.89	8.89	0	0	0	0	0	0	0%	0.00	0.0	Develop well with hand operated diaphragm pump. Measurements are approximate.
7-Feb-02	hs/jc	8.62	8.62	8.85	8.89	0	71	12	83	71	12	15%	0.17	1.2	Pump well by hand.
8-Mar-02	hs/jc	8.61	8.61	8.85	8.89	0	74	12	86	3	0	0%	0.00	0.1	Pump well by hand.
10-Apr-02	mrh	8.59	8.59	8.84	8.89	0	77	15	93	3	3	50%	0.09	0.2	Pump well by hand.
7-May-02	hs/jc	8.51	8.51	8.83	8.89	0	99	19	117	22	3	12%	0.11	0.9	Hand pump not working well.
25-Jun-02	cd	8.51	8.51	8.83	8.89	0	99	19	117	0	0	0%	0.00	0.0	Hand pump not working. Discarded.
2-Aug-02	mrh/jc	8.51	8.51	8.83	8.89	0	99	19	117	0	0	0%	0.00	0.0	Begin peristaltic startup. Setting #6.5, 2hr 15 min per day
8-Oct-02	mrh/jc	7.43	7.44	8.55	8.89	3	343	105	451	244	90	27%	1.34	5.0	Additional system checks/adjustments made by J Clark on 8/15, 8/21, 8/27, 9/09, and 9/12.
4-Feb-03	mrh/jc	7.36	7.37	8.52	8.89	3	355	114	472	12	9	43%	0.08	0.2	Numbers approximate. Surface of contents frozen. Turn on heat.
10-Apr-03	mrh/jc	7.28	7.29	8.50	8.89	3	374	120	497	19	6	25%	0.10	0.4	Pumping mostly water, changed timer to 30 min/week.
23-Jul-03	mrh	7.05	7.06	8.49	8.89	3	442	124	568	68	3	4%	0.03	0.7	Additional system checks/adjustments made by J Clark on 5/5, 5/20, 6/12, and 6/24.
23-Apr-04	mrh	6.90	6.91	8.42	8.89	3	466	145	614	25	22	47%	0.08	0.2	Additional system checks/adjustments made by NFG on 8/01, 8/06, 9/05, 9/08, 9/11, 9/17, 9/25, 10/30, 11/18.
24-Nov-04	jl, jc	6.66	6.67	8.41	8.89	3	537	148	689	71	3	4%	0.01	0.3	O/W interface probe not working accurately, depth of DNAPL is estimated.
19-Apr-05	mh,jc,jl,sh	6.45	6.46	8.39	8.89	3	596	154	753	59	6	10%	0.04	0.4	Additional system checks/adjustments made by J Clark on 11/24, 1/20/2005, 3/7, 3/11, 4/12, 4/18.
26-Oct-05	mrh, jc	6.33	6.34	8.30	8.89	3	605	182	790	9	28	75%	0.15	0.2	New OWI probe, but readings inconsistent with previous readings. System checks by NFG 5/11, 6/24, 7/28, 8/25, 10/06.
22-Mar-06	mrh, jc	6.20	6.21	8.23	8.89	3	624	204	831	19	22	54%	0.15	0.3	Additional system checks by NFG 10/26/05, 12/14/05, 1/6/06, 2/24/06.
24-Oct-06	mrh, jc	5.20	5.21	7.89	8.89	3	828	309	1139	204	105	34%	0.49	1.4	Depth to NAPL reading is approximate. Additional system checks by NFG 5/11, 6/29, 7/26, 9/07.
25-Apr-07	mrh, jc	4.90	4.91	7.80	8.89	3	892	337	1232	65	28	30%	0.15	0.5	Depth to NAPL reading is approximate. Additional system checks by NFG 10/31/2006, 11/16/2006, 3/02/2007.
30-Oct-07	dms, jc	4.68	4.69	7.70	8.89	3	929	367	1300	37	31	45%	0.16	0.4	Depth to NAPL reading is approximate. Tubing changed out.
13-May-08	dms, jc	3.46	3.47	7.65	8.89	3	1291	383	1677	361	15	4%	0.08	1.9	Depth of DNAPL is estimated. Additional system checks by NFG on 1/08/08, 3/20/08 and 5/08/08. Tank pumped out.
25-Mar-09	jl, dz	8.75	8.76	8.88	8.89	3	37	3	43	34	9	20%	0.03	0.1	Data for depth to DNAPL changed to prevent table indicating a reduction in NAPL volume. Actual measurement 8.87.
8-Jun-09	jc	---	---	---	8.89	---	---	---	---	---	---	---	---	---	Covered exposed fabric on the bank and on the creek bed with angular stone.
10-Jul-09	tr, jc	8.46	8.47	8.88	8.89	3	127	3	133	90	0	0%	0.00	0.8	O/W interface probe is working accurately
23-Sep-09	jc	---	---	---	8.89	---	---	---	---	---	---	---	---	---	J Clark changed pum run time from 45 minutes to 30 minutes.
6-Oct-09	tr, jc	8.08	8.09	8.88	8.89	3	244	3	250	117	0	0%	0.00	1.3	A skim of LNAPL and DNAPL were present, the thickness (not measureable) is estimated to be 0.01 ft.
14-Jan-10	jc	---	---	---	8.89	---	---	---	---	---	---	---	---	---	J. Clark repaired air vent hose.
24-Feb-10	jc	---	---	---	8.89	---	---	---	---	---	---	---	---	---	Repaired hose.
26-Mar-10	jc	---	---	---	8.89	---	---	---	---	---	---	---	---	---	Fabric visible on east side of creek.
21-Apr-10	tr, jc, tc	8.00	8.01	8.88	8.89	3	269	3	275	25	0	0%	0.00	0.1	A skim of LNAPL and DNAPL were present, the thickness (not measureable) is estimated to be 0.01 ft. Damage to armor stone observed by sheet pile wall.
21-Aug-10	jc	---	---	---	8.89	---	---	---	---	---	---	---	---	---	Changed tubing.
21-Oct-10	jc	---	---	---	8.89	---	---	---	---	---	---	---	---	---	Reset time.
	jc	---	---	---	8.89	---	---	---	---	---	---	---	---	---	Additional checks made by J. Clark on 5/20, 6/24, 7/22, 9/16, 11/18, 12/17, and 1/27/11. No adjustments made.
7-Apr-11	tr, jc	4.27	4.28	8.88	8.89	3	1420	3	1427	1152	0	0%	0.00	3.3	A skim of LNAPL and DNAPL were present, the thickness (not measureable) is estimated to be 0.01 ft.
16-Jun-11	jc	8.89	8.89	8.89	8.89	0	0	0	0	---	---	---	---	---	Tank pumped out. NAPL and water transported to offsite treatment facility.
18-Apr-12	el, jc	8.85	8.85	8.83	8.89	0	-6	19	12	-6	19	150%	0.06	0.0	Measured water and NAPL levels. Corrected depth to top of DNAPL and depth to bottom of tank measurements.
29-Apr-13	tr, jc	2.87	2.87	8.83	8.89	0	1840	19	1859	1846	1	0%	0.00	4.9	Estimate approximately 1/2 inch DNAPL. Corrected depth to bottom of tank measurement.
23-May-13	jc	---	---	---	---	0	0	0	0	---	---	---	---	---	Tank pumped out. NAPL and water transported to offsite treatment facility.
23-Apr-14	el, jc	7.58	7.58	8.82	8.89	0	383	22	404	383	22	5%	0.06	1.2	Estimate approximately 3/4 inch DNAPL. Corrected depth to bottom of tank measurement.
21-May-15	kh	6.95	6.95	8.80	8.88	0	571	25	596	188	3	2%	0.01	0.5	Measurements by Op-Tech
20-Apr-16	kh,rw	6.55	6.55	8.77	8.88	0	685	34	719	114	9	7%	0.03	0.4	Measurements by Op-Tech
20-Apr-17	kh, rf	6.49	6.49	8.71	8.88	0	685	52	738	0	19	100%	0.05	0.1	Measurements by GEI weighted cotton string (stain height). Changed 62 ft of discharge tubing.
29-Jun-17	mc	---	---	---	---	---	---	---	---	---	---	---	---	---	NAPL collection tank emptied by Allied Env. Services,
29-Sep-17	mc	8.60	8.60	8.60	8.88	0	0	86	86	0	86	100	0.93	4	Measurements by GEI using weighted cotton string and measured stain height. Differentiation between water and NAPL difficult with this small of a quantity
26-Oct-17	mc	8.60	8.60	8.60	8.88	0				0	2				Measurements by GEI. Bucket hung in tank contains ~3.5 gallons, approximately 50% of which is NAPL, 50% water. Change pump sched to DST.
15-Feb-18	mc	8.60	8.60	8.60	8.88	0	0	86	86	4.5	0.25	0%	0.00	0.0	Measurements by GEI. Bucket hung in tank contains 4.5 gallons of water and 0.25 gallons of DNAPL.
26-Apr-18	mc	8.20	8.20	8.60	8.88	0	124	86	210	4.5	0.25	5%	0.00	1.2	Measurements by GEI. Bucket hung in tank contains ~4.75 gallons of water and 0.25 gallons of DNAPL.
12-Jul-18	mc	--	--	--	8.88	---	2.00	2	4.00	2.00	2.00	50%	---	---	No measurements by GEI. National Fuel personel states that 3-5 gallons of oil/water (50%/50%) mixture present in bucket hung in tank.
16-Aug-18	mc	--	--	--	8.88	---	2.00	2	4.00	2.00	2.00	50%	---	---	No measurements by GEI. National Fuel personel states that 3-5 gallons of oil/water (50%/50%) mixture present in bucket hung in tank.
20-Sep-18	mc	8.76	8.76	8.76	8.88	0	2	2	4	1.5	2.00	43%	--	--	Measurements by GEI. Bucket hung in tank contains ~1.5 gallons of water and 2 gallons of DNAPL. **(NAPL storage tank pumped May 2018)**
25-Oct-18	mc	--	--	--	--	--	2	2	4	2.00	2.00	50%	--	--	No measurements by GEI. National Fuel personel states that 3-5 gallons of oil/water (50%/50%) mixture present in bucket hung in tank.
16-Jan-19	mc	8.76	8.76	8.76	8.88	0	2	3	3	2.0	2.50	100%	0.02	0.8	Measurements by GEI. Bucket hung in tank contains ~2.5 gallons of NAPL. Pump was not running during inspection, but breaker was reset and was running at the close of the inspection. Consider increasing pump speed.
28-Feb-19	mc	7.80	7.80	8.60	8.88	0	247	86	333	245.0	84	25%	-	0.1	Measurements by GEI. Bucket hung in tank contains 5 gallons of NAPL. Pump was not running during inspection. Relay reset but only works momentarily and runs pump controller at "600" setting. Pump controller removed for inspection/repair.
28-Mar-19	mc	--	--	--	--	--	--	--	--	--	--	--	--	--	No measurments made. Peristaltic pump out for repair. Rental pump acquired and placed in service on this date.
23-May-19	mc	7.80	7.80	8.60	8.88	0	247	86	333	0.0	0	0%	-	0.0	Measurements by GEI. Bucket hung in tank contains ~ 4 gallons NAPL (minimal water). Pump was reparied and placed back in service on May 16 (double check). Increase pump speed from 80 to 100.
27-Jun-19	mc	--	--	--	--	--	--	--	333	--	--	--	-	--	No measurements by GEI. National Fuel personel states that 5 gallons of NAPL present in bucket hung in tank.
18-Jul-19	mc	7.75	7.75	8.55	8.88	0	247	102	349	1.0	15	100%	-	-	Measurements by GEI. Bucket hung in tank contains ~ 5 gallons NAPL (minimal water).
26-Nov-19	mc	7.70	7.70	8.51	8.88	0	250	114	364	3.1	12	100%	-	-	Measurements by GEI. Bucket hung in tank contains ~4.50 gallons of water and 0.25 gallons of DNAPL. **NAPL storage tank pumped on this date.**
23-Jan-20	mc	8.80	8.80	8.80	8.88	0	5	0	5	5.0	0	100%	0.00	-	Measurements by GEI. Bucket hung in tank contains ~4.50 gallons of water and 0.25 gallons of DNAPL.
						Cumulative gallons :				5506	677				

Appendix C

Institutional and Engineering Controls Certification Forms

Enclosure 2
NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
Site Management Periodic Review Report Notice
Institutional and Engineering Controls Certification Form

Site Details **Box 1**

Site No. 915141B

Site Name NFG - Iroquois Gas/Westwood Pharm. Riparian

Site Address: Scajaquada Creek, Upstream of West Ave. Bridge Zip Code: 14213
City/Town: Buffalo
County: Erie
Site Acreage: 2.5

Reporting Period: February 15, 2019 to February 15, 2020

	YES	NO
1. Is the information above correct?	☒	☐
If NO, include handwritten above or on a separate sheet.		
2. Has some or all of the site property been sold, subdivided, merged, or undergone a tax map amendment during this Reporting Period?	☐	☒
3. Has there been any change of use at the site during this Reporting Period (see 6NYCRR 375-1.11(d))?	☐	☒
4. Have any federal, state, and/or local permits (e.g., building, discharge) been issued for or at the property during this Reporting Period?	☐	☒
If you answered YES to questions 2 thru 4, include documentation or evidence that documentation has been previously submitted with this certification form.		
5. Is the site currently undergoing development?	☐	☒

Box 2

	YES	NO
6. Is the current site use consistent with the use(s) listed below? Commercial and Industrial	☒	☐
7. Are all ICs/ECs in place and functioning as designed?	☒	☐

IF THE ANSWER TO EITHER QUESTION 6 OR 7 IS NO, sign and date below and DO NOT COMPLETE THE REST OF THIS FORM. Otherwise continue.

A Corrective Measures Work Plan must be submitted along with this form to address these issues.

_____ _____
Signature of Owner, Remedial Party or Designated Representative Date

SITE NO. 915141B **Box 3**

Description of Institutional Controls

Parcel	Owner	Institutional Control
	No Owner	O&M Plan Monitoring Plan

In March 1994, a Record of Decision (ROD) was issued for this site. The remedial action at this site was completed between 1996 and 2002 and included: (1) installation of the sheet pile wall along the eastern bank of Scajaquada Creek; (2) excavation of contaminated sediment and debris; (3) construction of a cap along a 1,600 foot reach of the creek; and (4) installation of two DNAPL recovery systems. There is no SBL identification for this parcel as it is a New York State waterway.

Box 4

Description of Engineering Controls

Parcel	Engineering Control
	Subsurface Barriers Cover System

Engineering controls for this site include: (1) the stream bed cap that consists of a geosynthetic clay liner overlain by sand, geotextile and anchoring stone; and two DNAPL recovery systems to extract DNAPL from the substrata of the creek. Post-closure maintenance of the cap, creek banks and DNAPL recovery systems are required to ensure long term effectiveness of the remedy.

Box 5

Periodic Review Report (PRR) Certification Statements

1. I certify by checking "YES" below that:

   a) the Periodic Review report and all attachments were prepared under the direction of, and reviewed by, the party making the certification;

   b) to the best of my knowledge and belief, the work and conclusions described in this certification are in accordance with the requirements of the site remedial program, and generally accepted engineering practices; and the information presented is accurate and compete.

YES	NO
X	☐

2. If this site has an IC/EC Plan (or equivalent as required in the Decision Document), for each Institutional or Engineering control listed in Boxes 3 and/or 4, I certify by checking "YES" below that all of the following statements are true:

   (a) the Institutional Control and/or Engineering Control(s) employed at this site is unchanged since the date that the Control was put in-place, or was last approved by the Department;

   (b) nothing has occurred that would impair the ability of such Control, to protect public health and the environment;

   (c) access to the site will continue to be provided to the Department, to evaluate the remedy, including access to evaluate the continued maintenance of this Control;

   (d) nothing has occurred that would constitute a violation or failure to comply with the Site Management Plan for this Control; and

   (e) if a financial assurance mechanism is required by the oversight document for the site, the mechanism remains valid and sufficient for its intended purpose established in the document.

YES	NO
X	☐

IF THE ANSWER TO QUESTION 2 IS NO, sign and date below and DO NOT COMPLETE THE REST OF THIS FORM. Otherwise continue.

A Corrective Measures Work Plan must be submitted along with this form to address these issues.

_____ _____

Signature of Owner, Remedial Party or Designated Representative — Date

IC CERTIFICATIONS
SITE NO. 915141B

Box 6

SITE OWNER OR DESIGNATED REPRESENTATIVE SIGNATURE

I certify that all information and statements in Boxes 1,2, and 3 are true. I understand that a false statement made herein is punishable as a Class "A" misdemeanor, pursuant to Section 210.45 of the Penal Law.

I Jay LESCH at 6363 Main St Williamsville NY 14221
print name print business address

am certifying as Senior Vice President of National Fuel Gas (Owner or Remedial Party)

for the Site named in the Site Details Section of this form.

Signature of Owner, Remedial Party, or Designated Representative Rendering Certification

3/13/20
Date

IC/EC CERTIFICATIONS

Box 7

Professional Engineer Signature

I certify that all information in Boxes 4 and 5 are true. I understand that a false statement made herein is punishable as a Class "A" misdemeanor, pursuant to Section 210.45 of the Penal Law.

I Kelly McIntosh at 100 Sylvan Pkwy, Suite 400, Amherst, NY,
print name print business address

am certifying as a Professional Engineer for the National Fuel Gas
(Owner or Remedial Party)

X

3/13/2020

Signature of Professional Engineer, for the Owner or Remedial Party, Rendering Certification

Stamp (Required for PE)

Date