FINAL ENGINEERING REPORT
SARANAC LAKE GAS COMPANY, INC.
OU02 & OU03 REMEDIAL ACTION
SITE NUMBER: 516008

(T) SARANAC LAKE (C) ESSEX
REMEDIAL ACTION CONTRACT NUMBER: D010663

Prepared For:

New York State Department of Environmental Conservation

Division of Environmental Remediation
Remedial Bureau E, Section A
Albany, New York

Prepared By:

MACTEC Engineering and Geology, PC
Portland, Maine

MACTEC Project Number: 3617207500

NOVEMBER 2020

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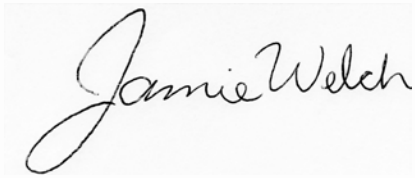
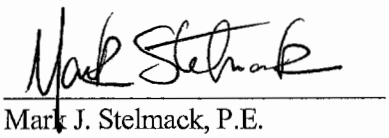
Submitted by:



Jamie Welch
Project Manager

Approved by:



Mark J. Stelmack, P.E.
Associate Engineer

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GLOSSARY OF ACRONYMS AND ABBREVIATIONS

AWQC	Ambient Water Quality Criteria
bgs	below ground surface
BOD	biological oxygen demand
BTEX	Benzene, Toluene, Ethylbenzene and Xylene
CAMP	Community Air Monitoring Program
cfm	cubic feet per meter
CFR	Code of Federal Regulations
CICS	Corbett Industrial Cleaning Services
CO	Change Order
ConTest	ConTest Analytical Laboratory
CQAP	Construction Quality Assurance Plan
CQC	Construction Quality Control
cy	cubic yards
DER	Division of Environmental Remediation
DOT	Federal Department of Transportation
DTM	Digital Terrain Model
DUSR	Data Usability Summary Report
EC	Engineering Control
ESD	Explanation of Significant Differences
FER	Final Engineering Report
FO	Field Order
FS	Feasibility Study
ft	feet
GIS	Geographic Information System
GPS	Global Positioning System
HASP	Health and Safety Plan
HDPE	high density polyethylene

hp	horsepower
HSO	Health and Safety Officer
IC	Institutional Control
ISMP	Interim Site Management Plan
ISS	In-Situ Solidification
lb	pound
LLDPE	Linear Low Density Polyethylene
LRI	Land Remediation, Inc.
MACTEC	MACTEC Engineering and Consulting, P.C.
MGP	manufactured gas plant
NAPL	non-aqueous phase liquids
NTU	Nephelometric Turbidity Unit
NYCRR	New York Code, Rules and Regulations
NYS	New York State
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
NYSDOT	New York State Department of Transportation
OSHA	Occupational Safety and Health Administration
OU	Operable Unit
PCO	Proposed Change Order
PDI	pre-design investigation
PES	Precision Environmental Services
PID	photoionization detector
QAPP	Quality Assurance Project Plan
QA/QC	Quality Assurance / Quality Control
RA	Remedial Action
RAO	Remedial Action Objectives
RCRA	Resource Conservation and Recovery Act

RCM™	Reactive Core Mat™
RD	Remedial Design
RFI	Request for Information
RI	Remedial Investigation
ROD	Record of Decision
RTK	real time kinematic
SC	Site Characterization
SCG	Standards, Criteria and Guidance
SCO	Soil Cleanup Objective
sf	Square Feet
SGV	Sediment Guidance Values
Site	Saranac Lake Gas Company, Inc. Site
SPDES	State Pollutant Discharge Elimination System
SVOC	semivolatile organic compound
SWPPP	Stormwater Pollution Prevention Plan
TDS	total dissolved solids
TFS	temporary fabric structure
Trudeau	Trudeau Sand and Gravel
$\mu g/m^3$	microgram(s) per cubic meter
USCOE	US Army Corps of Engineers
UST	underground storage tank
VOC	volatile organic compound
VSL	Village of Saranac Lake
WTS	Water Treatment System

CERTIFICATIONS

I, Mark Stelmack, am currently a professional engineer licensed by the State of New York, I had primary direct responsibility for implementation of the remedial program activities, and I certify that the Remedial Design was implemented and that all construction activities were completed in substantial conformance with the Department-approved Remedial Design.

I certify that all documents generated in support of this report have been submitted in accordance with the Division of Environmental Remediation's electronic submission protocols and have been accepted by the Department.

I certify that all data generated in support of this report have been submitted in accordance with the Department's electronic data deliverable and have been accepted by the Department.

I certify that all information and statements in this certification form 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.

NYS Professional Engineer #

November 30, 2020
Date

Mark Stelmack
Signature

1.0 BACKGROUND AND SITE DESCRIPTION

MACTEC Engineering and Consulting, P.C. (MACTEC), under contract to the New York State (NYS) Department of Environmental Conservation (NYSDEC), is submitting this Final Engineering Report (FER) to document the soil and sediment removal remedial action (RA) implemented in 2018 and 2019 at Operable Unit (OU) 02 and at OU03 at the Saranac Lake Gas Company, Inc. Site (the Site), in the Village of Saranac Lake, Essex County, New York. The RA was conducted in accordance with the OU02 Record of Decision (ROD) (NYSDEC, 2016) and with the OU03 ROD (NYSDEC, 2015).

This report has been prepared by MACTEC in accordance with the NYSDEC requirements in work assignment No. D007619-46 outlined in the Superfund Standby Contract between MACTEC and the NYSDEC; and with Division of Environmental Remediation (DER)-10/Technical Guidance (NYSDEC, 2010).

The properties were generally remediated to Class A Sediment Guidance Values (SGV) and Residential and Protection of Ecological Resources Soil Cleanup Objective (SCOs) for OU02 and to Class A SGVs for OU03, and both OUs will be used recreationally.

The Saranac Lake Gas Company Site is located at 24 Payeville Road in the Village of Saranac Lake, Essex County, New York and is comprised of three OUs (Figure 1.1):

- OU01, the former manufactured gas plant (MGP) property
- OU02, a 0.75 mile stretch of Brandy Brook situated adjacent to the northern boundary of OU01 flowing generally northwestward to Pontiac Bay of Lake Flower
- OU03, the Pontiac Bay portion of Lake Flower.

OU02 is located immediately north of OU01 and is bordered by the Adirondack Scenic Railroad to the west and residential properties to the east. After turning westward at the corner of Pine Street, OU02 is bordered by Brandy Brook Road to the north and residential properties to the south. OU03, Pontiac Bay, is bordered by public recreation/greenspace areas the north and commercial business property to the east; Lake Flower extends to the south and west from the bay. Figure 1.2 shows the extent of OU01, OU02 and OU03 and the adjacent parcels.

The Saranac Lake Gas Company manufactured lighting gas (coal gasification) for the Village of Saranac Lake from the late 1800s to approximately the 1940s (MACTEC, 2015). Based on the operational age of this MGP site, the most likely method of gas manufacturing was via the Carbureted Water Gas process. In general, this method involved:

- Coal heated in closed retorts in which the coal was prevented from combusting by limiting the oxygen.
- During the heating process steam was injected into the retort and a chemical reaction occurred that produced a flammable gas mixture.
- Liquid petroleum hydrocarbons were sprayed into the hot gas mixture creating additional methane.
- The gas was collected, cooled, and purified before being used
- Condensed tar (coal-tar) was produced as a by-product

While the former MGP-plant was operating, releases of MGP-waste to the environment occurred within OU01. It appears direct surface discharge of waste occurred to Brandy Brook (OU02) and migrated to Pontiac Bay of Lake Flower (OU03). Non-aqueous phase liquids (NAPL) and residual product are currently present within OU01.

Remedial Investigation (RI) field investigations (MACTEC, 2015c) were completed at the Site between August 2013 and October 2014 to evaluate the nature and extent of contamination present in the environment related to historical activities at the former MGP. The RI included an evaluation of visual impacts to soil, groundwater, surface water, and sediment, as well as in comparison to applicable NYS Standards, Criteria, and Guidance values (SCGs). The RI was implemented predominately based on visual observations to identify MGP-impacted soils and sediment. RI field observations (visual, olfactory and photoionization detector field scan) were supported by a sub-set of analytical sampling results. In areas where MGP-like product or staining was observed, analytical results exceeded SCGs; where no observable impacts of MGP-like wastes were noted, analytical concentrations were generally below applicable SCGs.

The RI concluded:

- OU01 - Soil and groundwater are impacted with MGP waste. Volatile organic compounds (VOCs) and Semi-volatile organic compounds (SVOC) were detected in soils at concentrations exceeding the NYS Part 375 Soil Cleanup Objectives for residential, commercial, and industrial use scenarios. Groundwater concentrations within and downgradient from OU01 exceed the NYS Part 703 GA Standards. The extent of groundwater contamination downgradient of OU01 has not been fully delineated.
- OU02 - Sediment in Brandy Brook is impacted with MGP waste at concentrations exceeding both Class A and B SGVs and therefore meets the definition of a Class C sediment which has a high potential to be toxic to aquatic life. Contaminants were not detected in surface water at concentrations exceeding SCGs.
- OU03 - Sediment in Pontiac Bay of Lake Flower was found to be visually impacted with MGP waste at concentrations exceeding both Class A and B SGVs and therefore meets the definition of a Class C sediment which has a high potential to be toxic to aquatic life. Contaminants were not detected in surface water at concentrations exceeding SCGs.

Feasibility Studies (FS) for OU02 (MACTEC, 2015a), for OU03 (MACTEC, 2015b) and for OU01 (MACTEC, 2016) were completed by the NYSDEC under the state Superfund program. RA alternatives for the OUs were evaluated in the FS reports.

Following completion of the RI/FS program, RODs outlining the approved RA approach for OU02 (NYSDEC, 2016) and OU03 (NYSDEC, 2015) were issued by the NYSDEC. A ROD was also prepared for OU01 (NYSDEC, 2017), however, the design and remedy implementation has yet to take place at OU01 and therefore is not incorporated in this FER.

SITE CHARACTERIZATION

Extensive sampling of various environmental media has been conducted since 1989 to determine the nature and extent of contamination found at the Site. Previous investigations determined that the following conditions existed prior to the RA:

OU02 Brandy Brook Sediment. Visual impacts from MGP waste was documented in Brandy Brook sediments along the stretch beginning at OU01 to the culvert where the brook discharges to Pontiac Bay in Lake Flower. Sediments in OU02 exceeds both Class A and B SGVs and therefore meets the definition of a Class C sediment which has a high potential to be toxic to aquatic life based on VOC and

SVOC concentrations. Contaminated sediments are generally associated with the stream channel and are observed deeper at depositional areas.

OU02 Brandy Brook Surface Water. Contaminants were not detected in surface water in OU02 exceeding the Class A Surface Water Criteria.

OU03 – Pontiac Bay of Lake Flower Sediment. Visual impacts from MGP waste were documented in Pontiac Bay sediments. Sediments in OU03 exceeds both Class A and B SGVs and therefore meets the definition of a Class C sediment which has a high potential to be toxic to aquatic life based on VOC and SVOC concentrations.

The following list summarizes investigations and actions conducted at or related to the Site, and ultimately lead to the characterization of the Site and its listing as a Class 2 site on the State of New York Registry of Inactive Hazardous Waste Disposal Sites. Items related solely to OU01 are not included in the following list, which is provided in chronological order.

- 1989 NYSDEC Spill Report (NYSDEC, 1989). This report indicated stratified layers and pockets of coal tar-like material were observed at depths of six to eight feet during the excavation of a residential sewer line located adjacent to Brandy Brook, just upstream of the intersection of River Street and Slater Avenue.
- 2001 Hazardous Substance Waste Disposal Site Nomination Form. This report documents that samples collected in 1992 and 1993 in Brandy Brook and Pontiac Bay of Lake Flower were impacted with MGP-related wastes.
- 2007 Site Characterization (SC) Report. The SC report documented investigation activities performed at the Site (MACTEC, 2007). MGP-related wastes were identified in soil, groundwater and sediments (Brandy Brook, and Pontiac Bay) at concentrations above standards, SCGs. Data collected in 2007 is used and presented in the RI report.
- 2015 RI Report. The RI for OU01, OU02 and OU03 was completed under the state Superfund program in 2014 (MACTEC, 2015c).
- 2015 Focused FS Reports. Focused FS reported were completed in August 2015 for OU02 (MACTEC, 2015a) and in January 2015 for OU03 (MACTEC, 2015b).
- 2015 and 2016 RODs. Following completion of the OU02 and OU03 FS reports, RODs outlining the approved remedial approach for the Site was issued by the NYSDEC for OU02 in March 2016 (NYSDEC, 2016) and for OU03 in March 2015 (NYSDEC, 2015).

- 2017 Pre-Design Investigation (PDI) Report. The PDI for OU02 and OU03 was completed under the state Superfund program in 2017 (MACTEC, 2017).
- 2018 Explanation of Significant Difference (ESD). An ESD for OU03 was issued (NYSDEC, 2018) in April 2018 to document the decision to not dewater Pontiac Bay prior to sediment excavation.

2.0 SUMMARY OF SITE REMEDY

2.1 REMEDIAL ACTION OBJECTIVES

Based on the results of the Remedial Investigation, the following Remedial Action Objectives (RAOs) were identified for this Site.

2.1.1 OU02 Remedial Action Objectives

The RAOs for OU02 as listed in the ROD dated March 2016 (NYSDEC, 2016) include:

Groundwater RAOs for Environmental Protection:

- Prevent the discharge of contaminants to surface water
- Remove the source of ground or surface water contamination.

Soil RAOs for Public Health Protection:

- Prevent ingestion/direct contact with contaminated soil
- Prevent inhalation of or exposure from contaminants volatilizing from contaminants in soil.

Soil RAOs for Environmental Protection:

- Prevent migration of contaminants that would result in groundwater or surface water contamination
- Prevent impacts to biota from ingestion/direct contact with soil causing toxicity or impacts from bioaccumulation through the terrestrial food chain.

Sediment RAOs for Public Health Protection:

- Prevent direct contact with contaminated sediments
- Prevent surface water contamination which may result in fish advisories.

Sediment RAOs for Environmental Protection:

- Prevent releases of contaminant(s) from sediments that would result in surface water levels in excess of ambient water quality criteria (AWQC)

- Prevent impacts to biota from ingestion/direct contact with sediments causing toxicity or impacts from bioaccumulation through the marine or aquatic food chain
- Restore sediments to pre-release/background conditions to the extent feasible.

2.1.2 OU03 Remedial Action Objectives

The RAOs for OU03 as listed in the ROD dated March 2015 (NYSDEC, 2015) include:

Sediment RAOs for Public Health Protection:

- Prevent direct contact with contaminated sediments
- Prevent surface water contamination which may result in fish advisories.

Sediment RAOs for Environmental Protection:

- Prevent releases of contaminant(s) from sediments that would result in surface water levels in excess of AWQC
- Prevent impacts to biota from ingestion/direct contact with sediments causing toxicity or impacts from bioaccumulation through the marine or aquatic food chain
- Restore sediments to pre-release/background conditions to the extent feasible.

2.2 DESCRIPTION OF SELECTED REMEDY

The Site was remediated in general accordance with the remedy selected by the NYSDEC in the OU02 ROD dated March 2016 and in the OU03 ROD dated March 2015. An ESD for OU03 (NYSDEC, 2018) dated April 2018 documented the decision to not dewater Pontiac Bay prior to sediment excavation.

The factors considered during the selection of the remedy are those listed in New York Codes, Rules in Regulations (NYCRR) 375-1.8. The following are the components of the selected remedy for OU02 and OU03:

OU02

- Temporary diversion of Brandy Brook surface water (approximately 2,000 linear feet [ft]) around active work zones within the remediation area
- Excavation of approximately 5,800 cubic yards (cy) of MGP-impacted soil and sediment to depths up to 9.5 feet below ground surface (bgs)

- Removal of sediment accumulated in twin 24-inch drainpipes for the culverted section of Brandy Brook located under Slater Avenue and Lake Flower Avenue discharging into Pontiac Bay
- Dewatering of the excavated soil and sediment
- Transportation and offsite disposal of MGP-impacted soil and sediment at an approved disposal facility
- Treatment of dewatering water removed from the excavation area and from excavated soil and sediment, with discharge of treated water to the Village of Saranac Lake Wastewater Treatment Plant and to Lake Flower in accordance with established criteria
- Backfill of the excavations
- Site restoration in accordance with an approved restoration plan.

OU03

- Mechanical dredging of approximately 16,900 cy of MGP-impacted lake sediment to a depth up to 7.5 feet below lake bottom
- Dewatering and stabilization of excavated sediment
- Transportation and offsite disposal of MGP-impacted sediment at an approved disposal facility
- Treatment of dewatering water removed from the dredged sediment, with discharge of treated water to the Village of Saranac Lake Wastewater Treatment Plant and to Lake Flower in accordance with established criteria
- Backfill of the dredged sediment area
- Treatment of approximately 1,200 cy of MGP-impacted upland soil using in-situ solidification (ISS)
- Site restoration in accordance with an approved restoration plan.

Additional Components Applicable to OU02 and OU03

1. Primary engineering controls including:
    - Installation of Reactive Core Mat™ (RCM) in OU02 locations where visually impacted soil or sediment remained or laboratory results indicated that SCOs or SGVs were not achieved but additional soil or sediment could not be reached, or remediation was logistically impractical. See Figure 2.1 for location.
    - Installation of Aquablok®, an impermeable barrier, at OU03 locations where sediments containing contaminant concentrations exceeding SGVs could not be dredged due to concerns with structural stability of adjacent upland soil. See Figure 2.2 for location.

2. Institutional controls as described in Subsection 4.8 of this report.
3. Development and implementation of an Interim Site Management Plan for long term management of remaining contamination which includes plans for:
    - Institutional and Engineering Controls
    - monitoring
    - operation and maintenance
    - reporting.
4. Periodic certification of the institutional and engineering controls listed above.

3.0 INTERIM REMEDIAL MEASURES, OPERABLE UNITS AND REMEDIAL CONTRACTS

The remedy for OU02 and OU03 was performed as a single project, and no interim remedial measures, operable units or separate construction contracts were performed. The remedy for OU01 will be conducted at a separate date.

4.0 DESCRIPTION OF REMEDIAL ACTIONS PERFORMED

Remedial activities completed at the Site were conducted in accordance with the NYSDEC-approved Remedial Design (RD) for the Saranac Lake Gas Company, Inc. Site, (November 2017). All deviations from the RD are noted below in Section 4.10.

4.1 GOVERNING DOCUMENTS

4.1.1 Site Specific Health & Safety Plan

All remedial work performed under this RA was in full compliance with governmental requirements, including Site and worker safety requirements mandated by Federal Occupational Safety and Health Administration (OSHA).

The Contractor's Health and Safety Plan (HASP) (Submittal 005, Appendix A) was complied with for all remedial and invasive work performed at the Site.

4.1.2 Quality Assurance Project Plan

The Quality Assurance Project Plan (QAPP) approved by the NYSDEC was incorporated into the Contractor's Field Sampling/Quality Assurance Plan (Submittal 006, Appendix A). The QAPP describes the specific policies, objectives, organization, functional activities and quality assurance/ quality control activities designed to achieve the project data quality objectives.

4.1.3 Construction Quality Assurance Plan

The Construction Quality Assurance Plan(s) (CQAPs) included in Contractor Submittal 002, Appendix A managed performance of the RA tasks through designed and documented Quality Assurance / Quality Control (QA/QC) methodologies applied in the field and in the lab. The CQAP provided a detailed description of the observation and testing activities that were used to monitor construction quality and confirm that remedial construction was in conformance with the remediation objectives and specifications.

Responsibilities and authorities of the Contractor and its key personnel involved in the construction of the remedy are described in Appendix A, Contractor Submittal 002.

A description of the observations and tests that were used to monitor construction and the frequency of performance of such activities are provided in the Engineer's Daily Reports included in Appendix B.

Sampling activities, sample size, sample locations, frequency of testing, acceptance, and rejection criteria, and plans for implementing corrective measures as addressed in the plans and specifications are described in Contractor Submittal 006, Appendix A.

Project coordination meetings between NYSDEC, MACTEC, Land Remediation, Inc. (LRI) and its subcontractors, and other involved parties are documented in the meeting minutes provided in Appendix C.

Quality assurance activities including such items as daily summary reports, schedule of data submissions, inspection data sheets, problem identification and corrective measures reports, evaluation reports, acceptance reports, and final documentation are documented in the Engineer's Daily reports included in Appendix B.

Remedial action permits are included in Appendix D.

A description of the final documentation retention provisions is provided in Contract Section XI (Supplemental Specification 01 78 00), Appendix E.

4.1.4 Soil/Materials Management Plan

Contractor plans for managing soil and sediment disturbed at the site, including excavation, handling, storage, transport and disposal, and the controls applied to these efforts to assure effective, nuisance free performance in compliance with applicable Federal, State, and local laws and regulations are provided in Section 3 of Contractor Submittal 002, Appendix A.

4.1.5 Storm-Water Pollution Prevention Plan

The erosion and sediment controls for all remedial construction were performed in conformance with requirements presented in the New York State Guidelines for Urban Erosion and Sediment Control and the site-specific Storm Water Pollution Prevention Plan (SWPPP) provided in Contractor Submittal 005, Appendix A.

4.1.6 Community Air Monitoring Plan

LRI provided a Community Air Monitoring Program (CAMP) as part of their HASP Submittal 004B (Appendix A). Particulates and VOCs were continuously monitored at one upwind and three downwind locations at the perimeter of each of the two sites OU02 and OU03 during working hours. Particulates were monitored via total dust aerosol meter as well as visual inspection; VOCs were monitored using a Photoionization Detector (PID). Readings were documented though electronic logs to ensure accuracy. A summary of the CAMP monitoring approach, instruments, action levels, and response measures is provided in Section 10 of the Contractor HASP (Submittal 004, Appendix A).

4.1.7 Contractor's Site Operations Plans

The Remediation Engineer (MACTEC) reviewed all plans and submittals for this remedial project (i.e. those listed above plus contractor and subcontractor submittals) and confirmed that they were in compliance with the RD. The submittal tracking log and contractor submittals are provided as Appendix A. All remedial documents were submitted to NYSDEC and New York State Department of Health (NYSDOH) in a timely manner and prior to the start of work.

4.1.8 Community Participation Plan

Prior to implementing the RA, NYSDEC conducted a Public Availability Session on March 13, 2018 in Saranac Lake Village. During the session, NYSDEC provided a multi-media presentation of the planned remedial measures to acquaint the invited public with the expected activities and schedule for the RA. Contact information for those who desired additional information was provided.

During the RA, NYSDEC conducted two separate presentations at the Site to acquaint groups of local high school and college students with various aspects of the project. The presentations provided the attendees with a description of the cleanup and how it relates to the State Superfund Program, as well as an opportunity for students to consider a career in environmental engineering or a related field. Each presentation included a guided site tour of the ongoing activities at OU02 and OU03.

In November 2018, NYSDEC distributed a Fact Sheet to the public documenting the near completion of the project. The Fact Sheet included the location of the public repository where project-related documents could be accessed for review.

4.2 REMEDIAL PROGRAM ELEMENTS

4.2.1 Contractors and Consultants

A listing of subcontractors who performed work and their associated tasks is provided in Contractor Submittal 024 in Appendix A.

The identity of the certifying Engineer of Record responsible for inspection of the work is provided in the Certifications section of this FER.

4.2.2 Site Preparation

Project Permit Acquisition. Documentation of agency approvals required by the RD is discussed in this subsection. All State Environmental Quality Review Act requirements and all substantive compliance requirements for attainment of applicable natural resource or other permits were achieved during this RA.

The following permits were issued prior to and during implementation of the RA:

1. A permit to conduct remediation activities under Nationwide Permit No. 38 for Cleanup of Hazardous and Toxic Waste was processed by the US Army Corps of Engineers (USCOE) – Upstate New York Section. The Joint Permit Application dated August 23, 2017 and USCOE's Preliminary Jurisdictional Determination dated January 25, 2018 are included in Appendix D. The permit includes provisions for restoration of the Site including the impacted length of Brandy Brook and its bordering wetland and upland riparian areas, and

the impacted portion of Pontiac Bay and its banks subsequent to soil/sediment excavation activities.

2. A Water Quality Certification was issued pursuant to Section 401(a)(1) of the Clean Water Act by NYSDEC Division of Environmental Permits, Region 5. The permit, effective January 30, 2018, authorizes RA at impacted areas within OU02 Brandy Brook and OU03 Pontiac Bay. A copy of the certification is included in Appendix D.
3. A State Pollutant Discharge Elimination System (SPDES) Permit Equivalent was obtained for the treatment and discharge of water at OU03 and OU02. Revisions of the SPDES Permit Equivalent were provided to increase discharge limits for total dissolved solids (TDS) and 5-day biological oxygen demand (BOD). Copies of the SPDES permit equivalent and associated modifications are included in Appendix D.
4. The New York State Department of Transportation (NYSDOT), Watertown, NY, issued two permits for work conducted within NYSDOT jurisdictional right of way as follows and included in Appendix D:
    a. A permit for the tree removal action conducted in February and March 2018 prior to mobilization of the RA contractor was issued to the NYSDEC-DER on February 16, 2018; the permit authorized tree removal activities within the Adirondack Scenic Railroad right of way and within the NYS Route 86 right of way in Saranac Lake Village
    b. A permit to conduct RA activities within the Adirondack Scenic Railroad right of way was issued to the NYSDEC-DER on March 23, 2018

Project Bidding Information and Contract Award. A mandatory pre-bid meeting was held by the NYSDEC and the Engineer (MACTEC) at the Site on December 13, 2017 for potential bidders to review the existing site conditions. The pre-bid meeting was conducted to discuss the requirements for bidding the project, technical requirements of the Contract Documents, and administrative protocols to be followed during performance of the work. Minutes of the pre-bid meeting are included in Addendum No. 1 to the Contract Documents.

Three addenda to the Contract Documents were issued:

- Addendum No. 1 was issued on January 2, 2018
- Addendum No. 2 was issued on January 10, 2018
- Addendum No. 3 was issued on January 12, 2018

The Contract Documents, including the three addenda, are included in Appendix E.

Bids were opened on January 17, 2018. NYSDEC received bids from seven responsive bidders. A summary of the bids is in Appendix E. The apparent low bidder was LRI of Waterford, New York with

a total bid of $8,347,265.00. LRI's Bid Breakdown is included with the contractor submittals discussed in Subsection 2.2 of this report.

Subsequent to its bid review, NYSDEC issued the following correspondence (attached in Appendix F) to LRI:

- Notice of Apparent Low Bidder was issued on January 23, 2018
- Notice of Intent to Award was issued on February 2, 2018
- Notice to Proceed letter was issued on March 23, 2018.

Preliminary Tree Removal Conducted by NYSDEC. Prior to the RA, NYSDEC's callout contractor Precision Environmental Services (PES), under its callout contract with the NYSDEC, removed trees having a three-inch or greater diameter breast height located inside the proposed work limits of the RA within OU01 (to be used as staging area by LRI), OU02, and OU03. Removal of trees of this size are allowed only during the period between November 1st and March 31st in accordance with the US Department of the Interior, Fish and Wildlife Service to protect the habitat of the threatened Northern Long-eared Bat. Tree stumps were not removed during this effort.

PES and its subcontractor Kravitz Landscaping conducted the tree removal effort during the period February 13, 2018 to March 27, 2018. Some of the removed trees were chipped, with chips transported to the Fish Creek Campground located in Saranac Lake for use there at the direction of NYSDEC. Other chips and whole trees were stockpiled at OU01 for intended use during the proposed Brandy Brook restoration. The preliminary tree removal effort was inspected by MACTEC and by NYSDEC. Daily inspection reports are attached in Appendix B.1.

Remedial Action Contractor Scope of Work. The project generally consisted of the following major work elements to be conducted by the RA contractor:

- preparation of work plans and other required submittals
- procurement of obtain local permits not otherwise obtained prior the work
- implementation of erosion and sedimentation controls
- excavation and dredging of contaminated soil and sediment at OU02 and at OU03
- stabilization of excavated soil and sediment at designated areas
- dewatering of excavations at OU02 and treatment/discharge of construction water

- collection and laboratory analyses of soil and sediment confirmation samples
- restoration of disturbed areas in accordance with site restoration requirements
- offsite disposal of contaminated soil/sediment waste generated during the remediation.

Project Schedule Summary. A pre-construction meeting was held with NYSDEC and all contractors on April 3, 2018 at NYSDEC's central office located in Albany, New York. The preconstruction meeting minutes are provided in Appendix F. The objective of the meeting was to explain the roles and responsibilities of all parties involved with the project, discuss administrative and technical specifications, and provide a project schedule. Representatives from NYSDEC, MACTEC, and LRI attended the meeting. LRI was given Notice to Proceed on March 23, 2018 (see Appendix F).

Work progressed continuously from the date of initial mobilization (April 2, 2018) until the date of Substantial Completion, achieved by LRI on December 18, 2018. Following a winter hiatus during which LRI conducted weekly site inspections, site restoration activities resumed on May 20, 2019. Final Completion was achieved on June 14, 2019.

A NYSDEC-approved project sign was erected at the project entrance and remained in place during all phases of the RA.

During execution of the work, MACTEC issued responses to LRI Requests for Information (RFI). RFIs generated during the RA to clarify the intent of the RD are included in Appendix G.

Project Plan Submittals. LRI submitted a Construction Work Plan and Contractor Quality Control Plan (Submittal 002D, Appendix A), Progress Schedule (Submittal 003A, Appendix A), HASP (Submittal 004B, Appendix A), Sampling and Analysis Plan (Submittal 006B, Appendix A), and Bid Breakdown (Submittal 015, Appendix A) for review in response to the five day after notification of apparent low bid requirement in Section III, Article 5 of the Contract Documents. The submittals were reviewed by MACTEC to verify conformance with the Contract Documents. The final submittals approved by the Engineer and the submittal log are attached in Appendix A.

Construction Work Plan. The Construction Work Plan provided descriptions of methods, procedures, and equipment to be used during completion of the project. The plan described major work items including:

- pre-mobilization activities
- mobilization
- implementation of sediment and erosion control measures
- clearing and grubbing
- temporary access road construction including crane mat installation at OU02 railroad
- site facilities installation including temporary fabric structure assembly
- work zone establishment
- equipment decontamination procedure
- protection of adjacent properties and utilities
- construction water management
- Brandy Brook culvert cleaning
- excavation dewatering procedures (OU02)
- temporary Brandy Brook by-pass system
- material staging area(s)
- excavation support system(s)
- Brandy Brook excavation plan
- Pontiac Bay dredging plan
- marine resuspension controls
- dredge material management and processing
- OU02 and OU03 backfill plan
- transportation and disposal of materials
- ISS work plan - OU03 ISS area
- winter inspection plan
- site restoration
- demobilization
- air monitoring procedure identified in the HASP
- project schedule

Additional details of specific tasks were provided in subsequent submittals. MACTEC's review comments on LRI's Construction Work Plan were provided within its iterative submittal responses; the work plan was approved by MACTEC on June 4, 2018.

Contractor Quality Assurance/Quality Control Plan. LRI designated Mr. Matt Warren as its Construction Quality Control (CQC) Officer for the duration of the project. Mr. Warren met the CQC qualifications and performed the duties described in Part 3 of Supplementary Specification 01 45 00 in the Contract Documents. MACTEC's review comments on LRI's CQC Plan are provided within the submittal responses dated June 4, 2018 for the Contractor Quality Control Plan (Submittal 002D, Appendix A).

Progress Schedule. LRI submitted a Progress Schedule (Submittal 003A, Appendix A) with estimated durations for significant project items. The schedule followed the requirements of Contract Standard Specification Section 00001. MACTEC's review comments regarding the schedule are provided within its submittal response dated May 1, 2018.

Health and Safety Overview. LRI's HASP (Submittal 004B, Appendix A) was reviewed by MACTEC to confirm that the plan conformed to the requirements in Part 1.05 of Contract Standard Specification 00003. The HASP contained specific requirements for personnel working on the Site. LRI was responsible and liable for the health and safety of its onsite personnel. MACTEC's review comments are provided within its submittal response dated March 26, 2018.

Three safety zones were designated within the Site: the Exclusion Zone (remedial operations area), the Contamination Reduction Zone (buffer zone located between "clean" areas and the Exclusion Zone), and the Support Zone ("clean" area containing the Site office trailer and equipment storage). Contractor personnel entering the Contamination Reduction Zone and Exclusion Zone were required to provide documentation of successful completion of OSHA 40-hour Hazardous Waste Operations and Emergency Response course.

The Health and Safety Officer (HSO) was designated by LRI to initially be Mr. Ken Rhodes representing LRI subcontractor Partners Environmental. Mr. Rhodes was replaced as HSO early in the project by Mr. Tony SantaMaria and then by Mr. William Carpenter, both of LRI. As the Site HSO, Mr. Rhodes and then Mr. SantaMaria and Mr. Carpenter conducted daily safety meetings prior to initiating activities. These meetings addressed job specific hazards that would be encountered during tasks conducted that day. A daily sign-in sheet for site workers and visitors was maintained by the HSO.

Decontamination of Vehicles and Equipment. LRI constructed the vehicle decontamination pad described in its approved work plan. Vehicles and equipment that were in contact with contaminated materials were decontaminated prior to leaving the site. Decontamination water was collected via sump and transferred to the on-site WTS for treatment and discharge. When allowed by the offsite disposal facility, trucks were fitted with a sheet of polyethylene lining during loading to prevent contact with waste soil.

Perimeter Fence Installation at OU03. Prior to conducting work at OU03, a temporary six-foot high chain link fence with wind screening was installed beginning at the Pontiac Bay boat launch entrance along the sidewalk adjacent to River Road, terminating at the property owned by the Lake Flower Inn.

Utility Marker Layout. Prior to construction activities, Dig Safely New York was notified to mark underground utilities in the work area. Underground and above ground utilities that could affect or be affected by construction activities were identified prior to the initiation of intrusive soil activities. LRI consulted with the utility owner when the utility was determined to be in conflict with the proposed excavation limits with further discussion with MACTEC and NYSDEC to resolve the conflict.

4.2.3 General Site Contols

Site Security. A former restaurant, Nonna Fina, located directly across River Street from OU03 was utilized for the primary communication center for the contractor and engineer team. A field trailer was also located at OU01 for secondary office space closer to OU02 activity. National Grid was contacted to establish power to a new utility pole (installed by National Grid). A separate electrical contractor then supplied a power drop from the pole into a meter and local panel. The power was pulled from the electrical panel to the trailer. Primary means of communication onsite was maintained using two-way site radios with cell phones as a secondary communication method.

Existing fencing surrounding OU1 was utilized as the primary means of staging area security. Gates at construction entrances were closed and locked during non-working hours and utilized to prevent unauthorized access to the construction work area during working hours. In addition to locking gates and construction entrances, LRI worked with the Saranac Lake Police Department to make them aware of the construction activities and to provide them LRI's contact information should suspicious activities be observed.

Security measures were implemented at OU02 and OU03 as needed depending on the location and type of work activity. Security measures consisted of temporary fencing with visual barriers, concrete barriers, locked gates, signage, warning tape, sign in / sign out sheets, and practicing safe work procedures.

Job site record keeping. Work progress was recorded continuously by LRI and by MACTEC throughout the project as described throughout this report. Progress was recorded electronically (e.g., using global position system (GPS) for dredging and geographic information system (GIS) for land survey) and manually (e.g., waste manifest processing). MACTEC prepared daily inspection summary reports documenting progress including OU02 soil/sediment excavation and OU03 sediment dredging; daily reports were distributed to NYSDEC and to NYSDOH.

Erosion and Sedimentation Controls. Erosion control measures were implemented in accordance with approved submittals (Submittals 002 and 83 in Appendix A). Details associated with erosion and sedimentation controls are provided in the SWPPP (Submittal 005, Appendix A). Erosion controls included the use of silt fence, filter socks, turbidity curtains, mulch, hay bales, check dams, erosion control matting, temporary protective sheeting, and temporary seeding.

Erosion control measures were installed and in place prior to construction activities commencing to prevent soil erosion and transport of impacted materials caused by the construction activities and transport to or from the Site by a storm event. Site-disturbing activities were carefully conducted to minimize the exposure of unprotected soils. LRI conducted site activities to minimize the extent of unprotected soil and to protect as much of the natural vegetation as possible. In addition, LRI minimized the time that soil was left unprotected. Erosion control and soil excavation activities followed the planned construction sequencing to maximize the effectiveness of the erosion control strategy.

Erosion and sediment controls were installed at the locations shown on the drawings and were inspected and maintained at regular intervals. Repairs were made in a timely manner if damage was observed. Routine inspections and repaired were conducted until a final vegetated surface cover was established in all areas.

Equipment Decontamination and Residual Waste Management. Vehicle and equipment decontamination was conducted as described in Subsection 3.28 of Submittal 002, Appendix A.

Equipment and vehicles coming into contact with site contamination were pressure-washed on the temporary decontamination pad. Residual wash water was collected and treated at the onsite water treatment system (WTS).

Soil and Sediment Stockpiling. OU02 soil and sediment was stockpiled within the material staging area located in OU01. Once in the stockpiles, the material was left to dewater for a period of at least 24 hours prior to transport and disposal. The material mixing and staging area was constructed to prevent transfer of contamination to the underlying ground surface by placing 40-mil Linear Low-Density Polyethylene (LLDPE) liner between non-woven geotextile. The area was graded toward a sump to pump any water that accumulated from the area to the onsite WTS. Stockpiled material was periodically mixed to further facilitate dewatering by blending the wetter material from the inside of the stockpile with the dryer material from the exterior of the stockpile. Stockpiles were covered with tarpaulin when not being actively managed.

OU03 sediment was off-loaded at OU03, dewatered, and mixed with reagents. It was then placed in one of two staging areas for loading to off-site transport vehicles. Sediment was stockpiled for 24 to 48 hours until no free liquids were present, and material passed a paint filter test. Upon passing paint filter testing, sediment was inspected to determine if additional cure time was required before loading into trucks and sending off site for disposal. The loading area within the temporary fabric structure (TFS) was bracketed by the structure's two roll-up doors. An empty pre-lined truck would enter the TFS, and the entrance door would close behind the truck. The driver stayed inside the truck cab at the while the truck was loaded. The sediment inside the loaded truck was then tarped, and the exit door would open on the opposite side of the TFS. The truck would then exit the TFS; sufficiently dewatered and cured sediment was transported directly to the disposal facility. Sediment not sufficiently dewatered and cured was trucked to the staging area located at OU1, where it was stockpiled for additional drying. This allowed for dredging and offloading operations to continue at maximum production while providing enough dewatering and curing time to produce a waste product satisfying the disposal facility requirements.

Identified Issues. Issues encountered during the work are documented in the Items of Concern section of the Daily Inspection Reports included in Appendix B. Issues identified included LRI adherence to the project schedule and turbidity observed in Pontiac Bay. These and other encountered problems are discussed in Subsection 4.9 of this report.

4.2.4 Nuisance Controls

Stabilized Construction Entrances/Exits. A stabilized construction entrance/exit to and from the Site was constructed per the construction details indicated on the design drawings. The stabilized construction entrance/exit was constructed with non-woven geotextile placed on the existing ground surface, covered with six inches of 2-inch stone. The stabilized entrance/exit was approximately 20 feet wide and 50 feet long. The stabilized construction entrance was inspected periodically to be kept clean of dirt. Additional 2-inch stone was placed as needed.

Dust control. Measures to control dust during the work was conducted as described in Subsection 4.1.1 of Submittal 002, Appendix A. Implemented measures included watering haul access roads, restricting vehicle speed, and covering stockpiled soil and sediment.

Odor control. Odor suppressing measures implemented during the work included the use of a TFS for offloading and processing dredged OU03 sediment prior to offsite shipment, and tarping of stockpiles and use of Bio-Solve® to control odors when odorous soil or sediment was encountered.

Truck routing. During the work, trucks were routed for travel on State highways where possible to mitigate impacts to the community. At the request of Saranac Lake Village, trucks were restricted from travelling on specifically identified local roads.

Responding to complaints. Response to **c**omplaints from the community fielded during the work was primarily conducted by NYSDEC, with assistance from LRI and MACTEC when appropriate. Complaints received and responses provided are documented in the daily inspection reports in Appendix B.

4.2.5 CAMP Results

CAMP results were below the New York State action levels of: (1) 100 microgram per cubic meter ($\mu g/m^3$) above background for a 15-minute average for particulate matter (2) and 5 parts per million above background for a 15-minute average for VOC's for work related activities except for 3 days at

OU03. Detections above action levels from the instrumentation warranted an inspection of the area and equipment by LRI and Engineer. Exceedances were checked with handheld equipment and resulted in a change in operating procedures or confirmed to be anomalies due to various environmental conditions (i.e., precipitation and humidity) or equipment malfunctions (i.e., kinked air intake line). Exceedances are described below.

On June 5, 2018, an elevation in the PM_{10} 15-minute average was noted at 270 $\mu g/m^3$ while receiving a cement delivery. The cement line of the delivery truck was being cleaned out at that time and the exceedance was localized to the area of the monitoring location. The exceedance was reported by LRI to the Engineer with no further action taken for that occurrence.

On June 11, 2018, an elevated dust reading of 176 $\mu g/m^3$ was recorded at DW2. Upon inspection it was noted to be from the CAMP station in proximity to the cement silo. Dust was created when the silo was filled. This dust was localized to the general work area.

On June 26, 2018 LRI began adding quicklime directly to a scow located at southern entrance of TFS at approximately 1400. At approximately 1415, DW1 CAMP concentrations reached 125 $\mu g/m^3$ for a 15-minute average. The daily action level per the NYSDEC CAMP Guidance document was 105 $\mu g/m^3$ (Action Level 100 $\mu g/m^3$ plus background of 5 $\mu g/m^3$ taken from the UW CAMP location.) Because the Action Level was met, LRI suspended work operations within the TFS and made modifications to the quicklime addition. At approximately 1430 DW1 CAMP reached a maximum 15-minute average of 157 $\mu g/m^3$. The daily reporting level per the NYSDEC CAMP Guidance document was 155 $\mu g/m^3$ (Reporting Level 150 $\mu g/m^3$ plus background of 5 $\mu g/m^3$ taken from the UW CAMP location). Upon modification of quicklime addition and processing, dust concentrations returned to normal.

Copies of all field data sheets and weekly summaries relating to the CAMP are provided in electronic format in Submittal 021, Appendix A. Weekly CAMP summaries include notes for all exceedances.

4.2.6 Reporting

RA activities were completed during the time period (April 2, 2018 to June 14, 2019) outlined in the initial progress schedule submitted by LRI (Submittal 003A, Appendix A); the progress schedule was

updated every two weeks as documented in the progress meeting minutes. Activities were inspected by a MACTEC resident engineer; inspection reports were prepared at the end of each day and provided to the NYSDEC via email the following working day. All daily inspection reports for the OU02 RA are included in electronic format in Appendix B.2; all daily inspection reports for the OU03 RA are included in electronic format in Appendix B.3; all daily inspection reports for the final restoration are included in electronic format in Appendix B.4. A digital photo log recording the day's activities is included in electronic format in each daily inspection report.

Progress meetings were attended by LRI, NYSDEC, and MACTEC every two weeks during the project. Progress meeting minutes are attached in Appendix C.

Updates to the RA schedule and daily health and safety summaries provided by LRI concurrent with the progress meetings are included as attachments to the minutes.

4.3 CONTAMINATED MATERIALS REMOVAL

A list of the SCOs and SGVs for the contaminants of concern for this project is provided in Tables 4.1, 4.2 and 4.3. Table 4.1 provides SCOs and SGVs for OU02 respectively, and Table 4.3 provides SGVs for OU03. The SCOs and SGVs identified in the tables are in accordance with the OU02 and OU03 RODs.

The plan view location of original sources and areas where excavations were performed is shown in Record Drawings C-201 and C-202 (OU02) and in C-205 (OU03) in Appendix H.

4.3.1 OU02 REMEDIAL ACTION

This subsection presents a description of the soil and sediment removed from Brandy Brook in OU02.

4.3.1.1 OU02 Site Preparation and Mobilization

Several general site preparation and mobilization activities were performed prior to intrusive activities. As part of site preparation and prior to mobilization, LRI prepared a preconstruction topographic survey to provide a general site layout and to verify and stake out the excavation limits. LRI's surveyor recorded elevations at the existing control points shown on the Contract Drawings as initial and interim checks

throughout the project. Survey tolerance was maintained with a vertical tolerance of 0.01 foot for general excavation and 0.01 foot for horizontal control. In addition to general site elevations, the survey included structures encountered that were left in place, piping that remained or was capped in place, and other structures and components. After collection of this survey data, a 3D surface model of the Site was generated to incorporate existing grades and features prior to construction.

Upon completion of the preconstruction survey, initial site prep and mobilization began. As part of the mobilization activities, limited tree clearing and various Site set-up activities including the following items were initiated:

- staging area layout (the OU01 site was used as a staging area for OU02 RA)
- mobilization and assembly of the temporary WTS
- installation of a temporary office trailer and sanitary facilities
- placement of perimeter fencing and modification to existing fencing
- installation of sediment and erosion control measures
- installation of Site anti-tracking pad (a stoned egress pad intended to remove residual soils from site vehicles prior to leaving the site)
- installation of vehicle and equipment decontamination area.

In addition to general site preparation and layout activities, heavy equipment was mobilized as necessary to perform site preparation activities and to perform the construction activities for execution of the Work.

Decontamination Pad. The equipment decontamination pad was constructed at OU01 at the exit of the perimeter trucking road installed around the OU01 stockpile area. The pad was constructed by placing a non-woven geotextile layer, 40 mil LLDPE liner, and non-woven geotextile followed by stone and crane mats on the prepared surface. A sump was then placed in one end to provide a point to pump water from the decontamination pad.

Tree Clearing and Protection. In preparation for the RA, the NYSDEC had cleared trees greater than three inches in diameter from the active work areas prior to Contractor mobilization. Upon mobilization to the Site, the contractor cleared trees and brush smaller than three inches in diameter that would impact the Work. To facilitate construction activities, existing trees and vegetation inside the work area were removed and other trees that fell within the work zone or support zone were cut and chipped during

initial mobilization activities. Select trees with straight uniform trunks of six inches or greater were salvaged and stockpiled onsite for re-use during restoration activities. Grubbed material was managed at the location the material was removed from the ground and classified based on the surficial soil in the area the grubbed material was located. Remaining trees and shrubs were cut and/or chipped and material was removed by TDI Septic Service for reuse at their facility. Stumps were left in place until erosion control measures were installed.

Clean Support Zones. To maintain access to impacted areas, support zones and roads were established at various locations outside of the exclusion zone to move equipment, load soils, and accept material deliveries. Stone access roads were established as work progressed to prevent trucks from traveling on impacted material. Orange construction fence was utilized to demarcate the exclusion and clean zones at specific locations of the Site. Truck wheels and equipment tracks were inspected for visual impacts prior to leaving the support zone.

Crane Mat Access Road. The OU02 RA required excavators, dump trucks, and other heavy equipment to work alongside and near the existing railroad. Crane mats were installed over the rail ties and rails to provide this access. The crane mats provided a means to stage and move equipment and transport contaminated soils and sediment to the OU-1 area for stockpiling and load-out. The crane mat access road was also utilized to haul clean fill to the excavated areas for backfilling and topsoil placement. Use of the crane mats were approved in the NYSDOT permit allowing work within the railroad corridor.

Project Identification and Signage. A four-foot by eight-foot project sign was created and mounted on the fence at the entrance to OU01. Additional signage including warning signs were posted along the perimeter of the Site warning of construction activities.

4.3.1.2 OU02 Construction Water Management

This subsection describes the wellpoint dewatering system, the brook bypass system, and the installation of the treatment plant to manage construction water encountered during the OU02 RA.

Wellpoint Dewatering System. Prior to initiating the soil and sediment excavation activities at OU02, LRI installed a wellpoint dewatering system along the length of Brandy Brook upstream from the railroad culvert. Individual wellpoints were installed approximately ten feet on-center to a depth of nine to 14 feet bgs depending on the designed removal depth. Wellpoint system pumping was conducted in

approximately 200-linear feet sections at a time to limit the amount of water removed and to coincide with the area of the brook being excavated. As excavations by section were completed and operations moved downstream, earthen berms were placed across the channel in upstream sections of the brook to isolate water generated from precipitation and surface runoff.

Brook Bypass System. As described in LRI's Construction Work Plan (Submittal 002, Appendix A) LRI constructed a bypass system to collect and divert clean water flow in Brandy Brook from a location upstream of the brook remediation activities to discharge into the twin 24-inch diameter culverts transporting brook flow to Pontiac Bay. The upstream interceptor portion of the bypass system incorporated installation of a prefabricated concrete pumping station. Water was pumped into fused 18-inch diameter high density polyethylene (HDPE) piping placed on the ground surface for gravity flow around the brook during construction. During the portion of the brook excavations upstream from the railroad culvert, diverted water was discharged into a surface energy-diffusing system installed downstream of the railroad culvert to reduce flow velocity prior to entering the section of the brook having a shallower slope bottom. Prior to RA excavation in the portion of the brook downstream from the railroad culvert, the energy-diffusion system was removed, and the HDPE pipe extended along the ground surface to the entrance to the twin 24-inch culverts. During its operation, LRI inspected the bypass system daily to ensure that it was in good working order and that no leaks or other failures had occurred.

4.3.1.3 Construction Water Management (Treatment, Disposal, Permit Modifications)

Prior to the initiation of excavation activities, a 250 gpm WTS was constructed to collect, treat, and discharge water associated with OU02 excavation activities including, but not limited to water collected from the well point system, sumps in excavation areas, decontamination water, and liquids accumulated in the OU01 sediment processing area. The WTS system consisted of the following primary treatment components:

- Settling and oil/water separation
- Bag filters
- Activated carbon
- Effluent storage.

Collected water was treated, sampled, and discharged in accordance with the New York State Pollutant SPDES Permit Equivalent dated May 15, 2018 and revisions to the discharge criteria dated July 18, 2019 and August 27, 2019 provided in Appendix D. A total of 21 effluent samples were collected and analyzed for OU02 water starting on 7/26/2018 and ending on 11/15/2018. A total of 1,584,940 gallons of water associated with OU02 activities were treated and discharged during the RA. A total of 207,000 gallons of water was treated but did not meet the effluent water discharge requirements due to exceedances of total dissolved solids, chromium, pH, and lead at various times throughout the Work. If exceedances occurred, the WTS was backwashed with clean water generated from the local fire hydrant and resampled. Laboratory data for the effluent sample analyses and reports were prepared by ConTest Analytical Laboratory (ConTest) and is provided as Appendix I. The water not meeting discharge criteria was transferred and disposed of by TDI Septic Service under non-hazardous waste manifests not regulated by Resource Conservation and Recovery Act (non-RCRA), or by the federal Department of Transportation (non-DOT) Water at the Saranac Lake Wastewater Treatment Plant. Waste manifests for the non-hazardous water are provided in Appendix J.

4.3.1.4 Well Abandonment

LRI performed the abandonment of one monitoring well (MW-20) at approximate Station Number 4+00 identified on Drawing C-103 in the Design Drawings. LRI abandoned the well by using a Type 1 cement/bentonite grout mixture.

4.3.1.5 Stormdrain and Culvert Cleaning

Corbett Industrial Cleaning Services (CICS), a specialty contractor, was subcontracted by LRI to clean the two 24-inch diameter reinforced concrete culverts carrying Brandy Brook into Pontiac Bay below Slater Avenue, the NBT Bank parking lot, and Lake Flower Avenue. The work was conducted on August 2 and August 3, 2018. Jet flushing of water was conducted within approximately 225 linear foot sections of the two culverts and two drainage manholes servicing the pavement above located on the pipeline. The pipe sections were jetted by directing a stream of water under high pressure into the upstream end of the culverts. Accumulated sediment was removed from the two manhole sumps by a vacuum truck. The flushed water was discharged into Pontiac Bay adjacent at the concrete headwall. Two turbidity curtains installed approximately 30 feet from the end of the culverts prior to culvert cleaning were maintained throughout the duration of cleaning activities. The flushing commenced at the upstream

section of the culverts and was directed downstream. Culvert sediment waste flushed into the bay was dredged during the OU03 dredging operation and removed to the sediment processing stockpile to be disposed with the dredged sediment. The culverts and manholes were deemed clean by visual inspection of the flow of the discharged water. Once visually clean water was observed exiting the culverts and no visual accumulation was present, the piping and manholes were determined to be clean. The determination of visually clean was made with concurrence from onsite MACTEC and NYSDEC representatives.

4.3.1.6 Sanitary Sewer Replacement

During excavation activities at OU02, a temporary bypass and replacement of the Village of Saranac Lake's (VSL) sanitary sewer line along Brandy Brook was required to facilitate excavation. The sanitary sewer line was replaced in-kind using 8-inch PVC pipe and associated connections to the existing manholes. The pipe was supported on peastone and installed at the same elevation as the previous piping system. The replaced section of sewer line in approximately located from Station 4+75 to 6+10 as shown in the Record Drawings in Appendix H.

4.3.1.7 OU02 Soil and Sediment Excavation Activities

This subsection describes the soil and sediment excavation activities conducted at OU02.

Excavation and Dewatering. Excavation of Brandy Brook began at Station 1+00 on August 3, 2018 moving downstream toward Pontiac Bay. Excavations began in sections approximately 200 linear feet in length to accommodate the control of groundwater using the wellpoint system. Submersible utility pumps and localized sumps were installed to facilitate dewatering in areas requiring excavation beyond design grade, below the effective installation depth of the wellpoint system, and in areas along Brandy Brook Ave where wellpoints were not installed. Dewatered effluent was pumped to the OU02 WTS and treated prior to discharge.

Excavations generally did not require structural sidewall support except for the area located between Station 10+75 and 11+25. In this area, a slide rail system (Submittal 77A, Appendix A) was utilized to assure achievement of contaminant removal to 9 feet deep with no impacts to adjacent embankment slopes. Excavations throughout the Brook were conducted by a Link-Belt 350 Excavator equipped with

GPS grade control by placing the excavator on the temporary crane mat access road located above the railroad tracks on the west side of the brook.

In addition to excavation from the tracks, a Link Belt 350 Long Reach excavator and CAT 299D Mini Loader were used for wider excavations in and around station 5+00 to 7+00. The long reach excavator with approximately 60 feet of reach allowed for access to contaminated soil and sediment in the target areas, while the mini loader was used to complete the excavations to design grade. Additional crane mats were placed temporarily to allow the excavator to reach the entire width of the creek. Excavated material was loaded into off-road dump trucks for transport to the staging area. The off-road dump trucks were equipped with watertight gates to prevent leakage or spillage during transport to staging area at OU1. Material was excavated and loaded into the off-road truck directly from the excavation or from a stockpile created inside the excavation area, depending on the soil/sediment conditions. If visually impacted material remained in the bottom or sidewalls of the excavation, these areas were excavated beyond designed limits until no visual impacts remained or until the excavation was no longer feasible based on physical site constraints such as proximity to steep embankments on either side of the brook or potential for structural damage to the railroad embankment. When no visual impacts remained or further excavation was deemed infeasible confirmation soil samples were collected, as further discussed in Section 4.4. A total of approximately 6,400 cy of material was removed from OU02.

Soil and Sediment Stockpiling. Once excavated soil and sediment were loaded into the off-road dump trucks, loaded trucks traveled along the temporary crane mat access road or along Brandy Brook Ave., Pine Street, and then to Payeville Road to transfer the soil/sediment to the OU1 staging pad. Soil and sediment from OU02 were generally dry enough for off-site disposal but the stockpiles were left to further dewater by gravity on the staging pad for at least a few days prior to off-site transportation and disposal.

4.3.1.8 Site Restoration, Winter Inspection, and Contract Completion

Initial Site Restoration. OU02 site restoration activities commenced on November 13, 2018, upon completion of backfilling Brandy Brook and its associated banks with subgrade fill. Restoration of the streambed and surrounding area began with shaping of the stream channel and banks in accordance with the contract documents. The brook channel was cut, and banks were shaped using a Link Belt 350 Long Reach excavator, which was positioned on the temporary crane mat access road in the area located

upstream from the railroad culvert. Streambed material was placed in a 12-inch lift inside the stream bed followed by hand installation of the coir logs. Once coir logs were installed and secured, the remaining 6-inch lift of stream bed material was placed within the channel followed by the placement of 6-inches of topsoil on each side of the channel along the slopes. Topsoil was then seeded by hand and biodegradable fiber rolls were rolled out over the top of exposed, seeded topsoil areas to serve as erosion and sediment control. Upon completion of initial restoration, armor stone, check dams, log drops, and log deflectors were installed in accordance with the contract documents at appropriate locations. Two-log drop structures and log deflectors were constructed using logs from trees that had been stockpiled following initial site clearing activities.

As part of the Brandy Brook restoration activities, the four driveway culverts serving private residents along Brandy Brook Avenue were restored using 6-foot by 4-foot open bottom box culverts. The culverts and bottom footers were pre-cast and shipped to the site. The concrete culverts were constructed using 5,000 psi concrete designed for HS-20 loading. Prior to installing the box culverts, stone bedding material was placed beneath the concrete footers. Unsuitable or unstable materials below the footers and rocks encountered within six inches of the bottom of the footers were removed providing a level solid base for construction of the box culverts. The surface and subsurface water was removed from the work area, and culvert installation was performed in dry conditions. After the initial excavation and bedding placement was performed, the subgrade was proof rolled and the box culvert footer was laid on compacted granular backfill. The sections of the box culvert were lifted off the truck, placed onto the pre-cast footings, and a one-inch butyl gasket installed in each joint. Each end section had two rows of #5 dowel bars 12-inches on center for the cast-in-place concrete curb. Once the four culverts were installed, curb forms were constructed and a cast in place 12-inch high by 6-inch wide curb was poured on the end of each driveway.

Contract Substantial Completion. A substantial completion inspection was conducted at OU02 and OU03 on November 29, 2018. Attending the inspection were MACTEC, NYSDEC, LRI, and stakeholder representatives including the Village of Saranac Lake and NYSDOT. Substantial Completion was achieved by LRI on December 18, 2018. The Substantial Completion Certification is included in Appendix K.

Winter Inspection. During the winter period January 16, 2019 to May 3 2019, LRI conducted weekly onsite inspections at OU02 and OU03 for the purpose of protecting and maintaining the site areas

disturbed during the RA. Weekly inspection reports are included in Submittal 53A, Appendix A. For most of the inspection period the site surface was observed to be frozen and below snow cover, offering protection from erosion. Evidence of disturbance outside of the project limits was not observed. The final winter inspection was conducted on May 3, 2019.

Final Site Restoration. Final site restoration was conducted during the period May 20, 2019 through June 14, 2019. Final restoration included grading of various areas of OU01 and OU02 adjacent to the Brook, placement of topsoil along the edges of the Brook as needed, seeding, planting of shrubs and trees, and paving the residential driveways on Brandy Brook Ave. All seeded areas were covered with biodegradable straw to serve as erosion protection and establish seed growth. All restoration was performed in accordance with the RD and approved workplans. In addition to the major restoration components, final restoration included repair of the railroad culvert that was damaged during the RA and placement of additional stone around the corners of the residential driveway culverts.

Contract Final Completion. Final Completion was achieved on June 14, 2019, followed by two site walk throughs. The first site walkthrough was to review substantial completion punch list items on November 7, 2019. The second was to inspect trees and vegetation at the one-year warrantee period on June 24, 2020. LRI's Contractor Applications for Payment and certified payrolls generated during the RA are included in Appendix L.

4.3.1.8 Surveying and Survey Documentation

The OU02 RA included conventional survey techniques using GPS equipment to document pre-construction conditions, work progress, and final site conditions. The first step was to calibrate to the horizontal and vertical control. LRI's subcontracted surveyor, New York State-licensed S.Y. Kim Land Surveyor, P.C. (S.Y. Kim), recorded and mapped the pre-construction site to document features such as topography, structures, above ground utilities, and other features that could affect construction operations. The survey equipment used for this project consisted of a Trimble SPS 930 Robotic Total Station using SCS900 Data Collection Software, a Trimble 985 GPS Base and Rover using SCS900 Data Collection Software, and a Trimble GCS Machine Control Software. Mapping was completed in Autodesk Civil 3D 2018 with data processing completed in Trimble Business Center. Data and field conditions were stored within SCS900 Data Collection Software.

The initial survey performed onsite was the pre-excavation survey to provide general Site layout, verify existing conditions, and verify and stake out the excavation limits. The surveyor recorded existing elevations at the control points provided on the Contract Drawings. The survey was also used to build a site model that was programmed into the equipment for excavation and backfilling to control and maintain grades. Following the pre-excavation survey, an excavation layout survey was prepared with individual grids across the excavation area to track excavation depths. The surveyors maintained a vertical tolerance of 0.01-foot for general excavation and 0.01-foot horizontal control. After excavation in a specific area was completed, post-excavation surveys were performed by LRI personnel using Trimble GPS system working in conjunction with S.Y. Kim to periodically confirm excavation depths. The survey also included structures encountered that were left in place, piping that remained or was capped in place, and other structures or components. A tabular summary of the pre- and post-excavation elevations was prepared in according to the grid point system to ensure that the excavation design depths have been achieved. Prior to backfilling, samples were collected in accordance with LRI's Sampling and Analysis Plan. Sample locations were surveyed during sample collection utilizing the Trimble GPS system to document sample IDs and sample locations. As part of the post-backfill survey, areas encountered that required the installation of a demarcation barrier of RCM were surveyed independently. The corners of the demarcation area and major inflections were surveyed using the GPS. At the completion of the project, electronic, and hard copies of the record surveys were submitted to MACTEC; the submittal included the information from the excavation survey as well as slopes, backfill subgrades, demarcation areas, final grade, cross sections of the Brook's newly installed subgrade and above grade features. Record surveys are provided in Submittal 51, Appendix A.

4.3.1.9 Demobilization

Demobilization at the Site corresponded with the Work as it progressed. Suspension of work during the winter marked the initial demobilization. The second and final demobilization occurred after achievement of Final Completion.

Initial Demobilization. Initial demobilization began after achievement of Substantial Completion on December 18, 2018. As part of this first demobilization activity, heavy equipment was decontaminated and demobilized off-site. Heavy equipment included all excavators, front end loaders, and cranes. Small equipment such as generators, ground thaw machines, concrete blocks, pumps, houses, piping, and connections were also demobilized as flatbed trailers and trucks became available. During

demobilization of heavy equipment, the OU02 WTS was decontaminated and demobilized. Subcontractor CICS performed decontamination of the WTS tanks prior to demobilization. The final step of the initial demobilization was to decontaminate, disassemble, and demobilize crane mats from the access road along the railroad. All equipment was inspected by MACTEC after decontamination and prior to demobilization from the Site. The initial demobilization was completed on January 11, 2019.

Final Demobilization. Final demobilization included removal of all equipment, facilities, and other material brought to the Site by LRI or its subcontractors. Final demobilization began on May 20, 2019 upon completion of site restoration activities and once all punch list items were addressed. Demobilization was completed on June 14, 2019.

4.3.1.10 Waste Disposal

LRI conducted representative waste characterization sampling of Brandy Brook soil and sediment on July 31, 2018 prior to OU02 excavation activities. Sample analyses reports prepared by ConTest, attached with Submittal 035 in Appendix A, were submitted to prospective waste disposal facilities to initiate the waste disposal approval process. Waste generated during the RA was determined to be non-hazardous; excavated OU02 sediment and soil, following onsite processing by LRI when needed, was re-used as daily cover at the two landfills where disposal occurred.

Once stabilized and stockpiled, processed soil and sediment waste materials were loaded into off-site transportation vehicles for disposal. Each transportation vehicle had a transporter permit pursuant to the provisions set forth in 6 NYCRR Part 364 and other applicable state regulations. Manifesting was conducted in accordance with 6 NYCRR Part 372 and Code of Federal Regulations (CFR) 40 CFR Part 263. Transportation of non-hazardous regulated waste was in accordance with DOT regulations 49 CFR 172 and transported under a standard non-hazardous manifest. A completed manifest accompanied shipment of waste while in transit.

Trucks arriving onsite traveled on temporary stone access roads located on-site to minimize the vehicles contact with potentially impacted material. All trucks were checked for appropriate placards and possession of NYSDEC hauler permits prior to loading. MACTEC inspectors, sometimes assisted by NYSDEC representatives, checked containers prior to and during loading and prior to leaving the Site

for leaks and to ensure proper decontamination, if required, before leaving the Site for transport to the disposal facility.

Once loaded, off-site transportation vehicles were covered with tarps prior to leaving the Site. Shortly after leaving the Site, loaded transport vehicles were weighed at one of two offsite scales: Trudeau Sand and Gravel (Trudeau), Saranac Lake (see Submittal 40A, Appendix A), and Wilton, NY Travel Center (see Submittal 40B, Appendix A) and again at the disposal facility to track the tonnage of soil and sediment removed from the Site. Processed soil and sediment was handled, transported, and disposed of as non-hazardous material to be re-used as landfill cover at two disposal facilities, Green Ridge RDF in Gansevoort, NY and Clinton County Landfill in Morrisonville, NY. All material was disposed of as non-hazardous soil to be re-used as landfill cover except for 830 tons which was disposed of as non-hazardous landfill waste due to its high moisture content. A total of 29,407 tons of non-hazardous material (OU02 and OU03 combined) were disposed. No material was disposed as hazardous material. Waste profiles, waste manifests, truck tickets, and offsite scale receipts are included in Appendix J.

4.3.2 OU03 REMEDIAL ACTION

This subsection presents a description of the sediment removed from Pontiac Bay of Lake Flower in OU03.

4.3.2.1 OU03 Site Preparation and Mobilization

Temporary Bulkhead and Sediment Off-Loading Area. In preparation for the dredging of Pontiac Bay, a temporary steel sheet pile bulkhead and off-loading area was constructed. The structure was constructed along the shoreline of Lake Flower by driving 15 pair of 30-foot long PZC-26 steel sheet piles. This wall created the bulkhead for the off-loading excavator to sit to off-load sediment from the hopper barges. The steel sheet piles were driven with a Link Belt 330 excavator with a Movax SP-100 Sonic Side grip pile driver attachment. In addition to the temporary bulkhead, a temporary dock structure was installed to facilitate barge docking and initial sediment barge dewatering. The temporary docking structure was installed after installation of the temporary bulkhead sheeting using the same equipment. 30-foot PZC-26 steel sheet piles were driven from the shoreline to make an enclosed area extending approximately 15-feet into the lake and 30-feet long. The area behind the sheets was filled with 3-inch angular rip rap to make a level surface flush with the existing shoreline. Marine docking cleats were

welded to the steel sheeting to allow for secure docking of sediment barges and other water-based equipment.

Sediment Staging Area and Temporary Fabric Structure Construction. Once the temporary bulkhead and temporary dock structure were in place, the Site was graded to provide a level working surface and area to support a TFS over the water.

Upon completion of grading, the sediment staging areas were constructed. The staging areas were constructed by first clearing the area of existing rocks and debris. Concrete bin blocks were then laid out to create two, 32-foot by 90-foot areas parallel to each other and adjacent to the bulkhead within the footprint of the TFS. Next, a three-inch layer of clean sand was placed within the two areas followed by the placement of a 40-mil HDPE liner sandwiched between non-woven geotextiles. The liner was folded up and over the edges of the concrete blocks and secured to the blocks. Once the liner was secured, a six-inch layer of clean sand was place over the liner followed by a layer of orange safety fence and another three-inch layer of sand. The staging pads were each equipped with a sump to pump accumulated water draining from the sediment during staging.

After installation of bulkhead and staging area, the TFS was constructed to control odors generated by the MGP sediment, including those generated from inherent Benzene, Toluene, Ethylbenzene and Xylene (BTEX) compounds as well as Naphthalene, contained within the sediment. Odor and vapor control were managed using the temporary clear span TFS placed over the sediment off-loading, processing, and re-loading area. The TFS was used in conjunction with an air handling and treatment system. All-Site Structures was subcontracted by LRI to mobilize and install the TFS. The structure dimensions were approximately 96-feet wide by 148-feet long for 14,200 square feet (sf) with a maximum height of 40-feet and an average height of 20-feet. The structure had a total air space of approximately 284,000 cubic feet. The TFS included two tracked freight doors approximately 14-feet wide by 14-feet tall, interior lighting, and two steel man doors. The supplied air handling equipment was designed to manage six air exchanges per hour for a total of 1,704,000 cubic feet of air per hour. The air handling system included two TIGG, NB20 air purification systems, each with 16,000 pounds of TIGG 5CR reactivated vapor phase carbon, two 20,000 cubic feet per minute (cfm) air handlers with two-stage particulate filters, a 460-volt control panel, supporting blower skids, and 20-inch stacks. The air handling units were placed outside the western edge of the TFS. The units were capable of handling 20,000 cfm each. The exhausters or 20,000 cfm blowers had combined horse power (hp) rating of 200 hp. Along

with the air handling system, controls were implemented within the TFS to limit emissions to the air handling system and extend the life of the carbon. The controls included tarping of stockpiles and use of Bio-Solve® to control odors when odorous sediment was encountered.

Breakthrough of carbon was monitored by sampling the gas stream within the carbon bed at intermediate sample points. Samples were collected with a handheld PID; positive results on the PID indicated that breakthrough was starting to occur.

As part of the TFS, a series of 25-foot long H-Piles were driven into the lake. The H-Piles were attached to the TFS arches and gable leg ends during TFS construction. The legs were bolted to steel beams welded to the top of the H-Piles to accommodate the hopper barges. Because the barge platforms were pulled into the structure for offloading, the TFS barge entrance was approximately 35 feet wide. To accommodate this, the gable end of the building was modified to raise a few of the gable legs and build a steel truss system for the structure support, while providing an opening to allow the hopper barge platforms to be pushed into and be under the TFS for off-loading. Six wood piles were driven to act as guides or bumpers for directing the hopper barge to the off-loading area. Once the TFS was constructed, a drip apron was assembled. The drip apron covered the swing radius of the hopper barge off-loading area and was designed to collect and drain for pumping material to the on-site WTS. The drip apron was constructed of steel plates and included a steel drip edge to keep material contained within the apron.

Preparation for sediment offloading required navigational dredging of approximately 400 cubic yards of lake bottom sediment outside the targeted dredge area using a land-based Link Belt 800 excavator with clamshell attachment. The navigation dredging, conducted to create draft for the hopper barges and push boats for navigation to and from the TFS, is documented in the April 30, 2018 OU03 Engineer Daily Inspection Report included in Appendix B.3.

Equipment Mobilization. During construction of the TFS and sediment staging areas, the dredge equipment was simultaneously being mobilized. Dredge equipment was mobilized from Waterford, NY to the Site. Dredge platforms consisted of Flexifloat Series S70 modular barges with dimensions of 10-feet by 40-feet by 7-feet. Modular barges were delivered on flatbed trucks, offloaded with a crane and placed in the water. During loading and unloading of the Flexi-floats, the floats were inspected to ensure that the floats integrity was not been compromised or damaged in transit. The Flexifloat modular barges were used for the dredge platform and hopper barge platforms. The dredge platform was approximately

60-feet by 80-feet and comprised of 12 modular barges. The hopper barges were constructed of two S70 Flexifloats welded to each 40-foot side of a 10-foot by 40-foot by 10-foot watertight intermodal container to create hopper barges that were 30-feet x 40-feet. A total of three hopper barges were assembled and used onsite. The dredge platform was assembled in the water using tag lines, pry bars, and sledgehammers. The dredge platform was equipped with spud wells, spuds and a hydraulic power pack to lift the spuds for moving the platform and anchoring the platform. The hopper barge platforms were assembled on land and placed in the water using a crane to lift and place.

The dredge was a Link Belt 800 excavator equipped with a 4.5 cy Anvil environmental level cut clamshell bucket. The excavator was equipped with a Trimble real time kinematic (RTK) GPS for controlling dredging depths and backfill placement. The onboard RTK GPS and a Trimble-based dredge positioning system uploaded with the dredge model displayed the clamshell, design depths, and color-coded Digital Terrain Model (DTM). The DTM highlighted the high and low spots relative to grade and was updated in real time. This RTK GPS and DTM was the primary means of technology to check and control dredge depths throughout the project by providing real time views of the dredge in plan and profile view. The system also showed the open/close status of the bucket. Interim and final checks were performed using single beam bathymetric surveys to confirm final contours were achieved. The quality control included periodic checking of the GPS system with the Trimble Base and Rover to confirm accuracy of the dredge bucket and corrections needed to maintain the equipment accuracy.

In addition to the primary dredge equipment two push boats, a carpenter barge, and a jon boat were mobilizing to assist in maneuvering barges, transferring personnel, and miscellaneous in-water tasks. Sediment offloading and processing equipment was also mobilized to the Site and stored until needed for use. The offloading and processing equipment consisted of a Link Belt 600 for offloading, a Link Belt 350 for blending and loading, and a 30 ton Low-Pro Silo for storage of reagents during processing activities.

Turbidity Curtains. Resuspension control for the Site was conducted by means of turbidity curtain deployed around the outer limits of the dredge area to protect Lake Flower from migration of sediments in the water column. A turbidity curtain was also deployed approximately 30 ft beyond the discharge location of the two 24-inch diameter Brandy Brook culverts, offering additional protection of the completed OU03 dredging areas from re-contamination during OU02 RA. In addition to turbidity

curtains, three buoy-based turbidity monitors were installed outside the turbidity curtain limits. There were two downgradient monitors and a background monitor.

The primary turbidity curtain used onsite was a Type II – Heavy Duty Permeable Turbidity Curtain with a 12-inch highly visible continuous yellow closed cell flotation boom. The turbidity curtain was weighted with double 5/16-inch galvanized ballast chains. The installation of the turbidity curtain involved connecting, deploying, and anchoring the curtain around the dredge work area. The curtains were 50 and 100 feet in length and varied in depth depending on water depth at the installation area. The curtains used on site were designed to have a three-foot change in water depth with the curtain resting on the bay bottom. Once the curtain was delivered, it was laid out in sections corresponding to water depth. Curtain sections were laced together using cable ties through steel grommets sewn into the curtain. Once connected, the curtain was towed into the bay using a small carpenter barge. The curtain was first anchored to the eastern shoreline, followed by anchoring using 22-lb Danforth anchors at 50-foot spacing to secure the curtain into position approximately 10 feet from the edge of the dredge limits at the outer perimeter. The anchors were shackled to the bottom of the curtain and then attached to a buoy to allow easy access to the anchor location. Once the curtain was in place, the reefing lines were untied, and the curtain was unfurled to depth based on the water depth. The turbidity curtain was inspected daily, after storm events, and after other events that could cause damage or disturbance to the turbidity curtain or its intended location.

Turbidity Monitoring. Throughout silt-producing work, turbidity was monitored using three real-time turbidity monitoring buoy systems. Monitors were NexSens CB-450 Data Buoys with data loggers, with attached YSI 6-Series water quality sondes having temperature, conductance and turbidity sensors. The monitors were powered with solar power and equipped with cellular telemetry, spare battery, and light emitting diode beacon light. Each data buoy was equipped with two sondes set to read turbidity approximately 1-foot below the water surface and approximately 1-foot above the bay bottom. The systems were anchored with a 70 lb anchor and moored to an 18.5-inch red mooring/marker buoy.

The remote monitoring system was set up to notify personnel if a turbidity increase was detected at the monitors. The initial pre-defined notification limit was established at 25 Nephelometric Turbidity Units (NTU) over the background levels. The turbidity action level was established at 50 NTU over background. The baseline for upstream and downstream turbidity was established by conducting an

initial 24-hour monitoring prior to the start of work. The data loggers were programmed to capture turbidity readings at 15-minute intervals, averaged hourly for comparison to the 50 NTU standard.

If the one-hour average downstream turbidity exceeded the performance standard, the exceedance was evaluated to understand if it was attributed to work area operations or an unrelated event (e.g., propeller wash from a passing boat). If a turbidity exceedance was determined not to be an anomaly and directly associated with remedial activities, contingency measures were implemented, including evaluation and modification of dredging or sediment backfilling operations, and installation of additional turbidity curtains to enhance control. LRI's Daily Turbidity Monitoring Reports are attached to OU03 Engineer Daily Inspection Reports prepared during silt producing activities for the project included in Appendix B.3.

To ensure proper functionality of the turbidity monitoring equipment, turbidity monitors were cleaned and calibrated monthly by removing each buoy's sonde from the water and thoroughly cleaning with a brush, cloth, and lake water prior to re-deployment. In additional to data-based turbidity monitoring, the lake was checked for visual signs of turbidity and the presence of NAPL/sheens on the water surface or the presence of a saturated oil boom inside the containment area.

4.3.2.2 Construction Water Management

Prior to the initiation of dredging activities, a 100 gpm WTS was constructed to collect, treat, and discharge water associated with OU03 dredging and dewatering activities including, but not limited to surficial water collected from decanting barges, water generated during the processing operations within the TFS, and decontamination water. The WTS system consisted of the following primary treatment components:

- 5,000-gallon watertight roll-off container with a geotextile tube inside to remove debris and large particle solids
- 18,000-gallon baffle tank for oil/water separation and further settling of solids
- three series of two bag filters
- series of two granular activated carbon vessels
- effluent storage.

Collected water was treated and sampled in accordance with the SPDES Permit Equivalent dated May 15, 2018 and revisions to the discharge criteria dated August 27, 2019 provided in Appendix D. A total of eight effluent samples were collected and analyzed for OU03 water starting on 5/25/2018 and ending on 7/18/2018. A total of 75,291 gallons of water associated with OU03 activities were treated and discharged during the RA. A total of 198,000 gallons of treated water did not meet the discharge criteria for either TDS, total suspended solids, lead, and BOD at various times throughout the Work, even after receiving modifications for TDS and BOD. As a result, the treated water was transferred and disposed of by TDI Septic Service under non-hazardous waste manifests as non-RCRA, non-DOT Water at the Saranac Lake Wastewater Treatment Plant. Laboratory data for the effluent sample analyses and reports were prepared by ConTest and is provided in Appendix I. Waste manifests for the non-hazardous water are provided in Appendix J.

4.3.2.3 Dredging Activities

This subsection describes the dredging activities in Pontiac Bay of Lake Flower.

Start-up Operations. Prior to commencement of dredging operations, a pre-dredge single beam bathymetric survey was conducted. The hydrographic survey was converted to a surface file that was entered into the GPS system of the Link Belt 800 excavator used for dredging. As part of the initial bathymetric survey, a diver conducted a debris survey of the area. Surficial debris that could interfere with dredging operations were marked with a GPS to be targeted and removed during the dredging. The GPS system was checked using the Trimble Base and Rover to compare accuracy of the dredge bucket as it relates to the surface on shore. This was performed on a regular basis to ensure the accuracy of the dredging operation. Barges were inspected to ensure that tag lines were secured and that equipment was properly anchored to the dredge platform and secured with chains. Inspections included checking of safety equipment to ensure that spill control supplies, personal flotation devices, and floatation rings were in place on boats and the dredge platform. The dredge platform was equipped with a portable toilet for the dredge crew as well as other ancillary equipment for dredging operations. All boats were serviced and inspected prior to delivery to the site.

Sediment Removal. Dredging began on May 22, 2018 working within the 4-foot dredge cut. The dredge barge was pushed into position using the excavator GPS and spuds were deployed to hold the barge into position. Push boats then maneuvered one of the three hopper barges adjacent to the dredge barge and

docked the hopper barge to the side of the dredge barge. Buckets of sediment were removed using the 4.5 cy Anvil environmental level cut clamshell bucket and placed into the hopper barges. Depending on the location and removal depth, the dredge barge and hopper barge were repositioned until the hopper barge was filled to capacity. At that point, the full hopper was towed to the temporary docking area while another empty barge was pushed into position to begin receiving dredged sediment. Based on results of post dredging surveys, a total of approximately 13,500 cy of sediment was removed from Pontiac Bay.

Dredged Material Transport and Offloading. Once a hopper barge was full and docked at the temporary docking area, initial dewatering occurred by decanting surficial water on the surface of the sediment within the hopper barges. Initial dewatering times ranged from a few minutes to a few days depending on the sediment consistency and dredge production rate. Upon completion of initial dewatering, the hopper barge was ready for offloading and pushed into the TFS. Once within the TFS, the barge was moored to the timber piles. Dredged sediment was off-loaded from the hopper barges using a Link Belt 600 material handler. The material handler had an elevated cab to allow the operator to see inside the hopper barges. The Link Belt 600 was equipped with a 3-cubic yard bucket for off-loading the sediment. The off-loading of the sediment took place over a drip apron constructed off the bulkhead. The drip apron was used to catch errant water or sediment during off-loading. Material collected on the drip pad drained into the sumps installed inside the staging areas and was pumped to LRI's onsite water treatment unit. The offloaded sediment was then stockpiled within the staging areas and allowed to dewater by gravity to allow collection of readily drained water prior to stabilization with reagents.

Dewatering and Stabilization of Sediment. Once the sediment was stockpiled and allowed to dewater, it was actively stabilized with reagents. Various reagents such as Calciment, Lime Kiln Dust, and Portland Cement were used in dosages ranging from 1% to 20% by weight. LRI's initial stabilization activities indicated that Type III Portland Cement was the most effective. The percentage of reagent added to the material varied based on the variability of the material being removed. Granular material dewatered readily and often no reagents agents were used, while finer organic silts required higher percentages and more dewatering effort. Reagents were delivered to the Site as needed and stored in the onsite 30-ton silo. To minimize dust generation, the reagent was augured and discharged through a discharge hose that discharged to a rock box within the TFS. The mixing of the stabilizing agent and the sediment was performed with the offloading Link Belt 600 and the Link Belt 350. The reagent was introduced into the sediment and folded into the wet material for assisting in drying and making the

material suitable for offsite transport and disposal. To allow additional time for soil to dewater and/or for reagents to activate, some soil was transported to OU01 for temporary staging prior to off-site disposal.

4.3.2.4 Site Restoration, Winter Inspection, and Contract Completion

Initial Site Restoration. Initial site restoration activities at OU3 occurred in late 2018. In-water restoration included removal of temporary facilities and bulkheads, installation of fish cribs, placement of rounded rock at the perimeter of the disturbed area of the bay, and installation of live stakes along the shoreline.

Fish cribs were assembled in accordance with the design with the exception that assembly occurred on the dredge platform rather than on shore. Once assembled, the cribs were installed by placing them in the water by hand and marking the locations with a GPS.

While assembly of the fish cribs was occurring on the dredge platform, the contractor was also installing the 3-inch to 24-inch rounded rock layer along the shoreline of the lake. Rounded stone was sourced from Trudeau. Trudeau delivered the materials to the Site using clean dump trailers and tri-axle dump trucks and was handled as described for backfilling. Most of this material was placed from the water using the dredge barge and hopper barges. Due to draft restrictions, a few small areas around the road culverts and within the 7.5-foot dredge area required placement of the rounded rock from the shoreline using a small mini excavator. Prior to final approval of the installed rounded rock, the contractor removed all temporary bulkheads, barge support piles, and the sheet piling using the same equipment used to install these features. The exposed areas were then graded using excavators followed by placement of rounded stone to make for a unified shoreline. After installation of the rounded stone, a topographic survey was performed to record the placement for approval. Once all rounded rock along the shoreline was installed and the survey was approved, LRI subcontractor Clover Leaf Nursery installed the live stakes along the shoreline and water's edge in accordance with the contract drawings.

Initial site restoration activities that occurred at OU3 in 2018 included regrading the adjacent upland area in accordance to the lines and grades agreed upon with the Village of Saranac Lake (VSL), and re-installment of the electrical panel previously removed for remediation. Conversations involving MACTEC, NYSDEC, LRI, and the Village of Saranac Lake were held to coordinate a grading plan to

support the Village's needs for winter use of its two parcels adjacent to Pontiac Bay used by LRI during the RA. Following an onsite meeting on October 18, 2018, a Village-approved interim grading plan was provided to LRI. Site grading occurred using a low ground pressure dozer fitted with a Trimble GPS controlled bucket to furnish the lines and grades described in the grading plan. Upon completion of the grading, the VSL indicated that the grading had been conducted to its satisfaction.

Contract Substantial Completion. A substantial completion inspection was conducted at OU02 and OU03 on November 29, 2018. Attending the inspection were MACTEC, NYSDEC, LRI, and stakeholder representatives including the Village of Saranac Lake and NYSDOT. Substantial Completion was achieved by LRI on December 18, 2018. The Substantial Completion Certification is included in Appendix K.

Winter Inspection. Winter inspection for the Site is described in Subsection 4.3.1.7

Final site restoration. Final site restoration for OU03 was conducted during the period May 20, 2019 through June 14, 2019. Final restoration included final grading of Prescott Park, seeding, tree planting, paving and painting of the boat launch parking lot, and installation of all remaining signs, fencing, and kiosks required by the RD. All seeded areas were covered with biodegradable straw to serve as erosion protection and establish seed growth. All restoration was performed in accordance with the RD and approved workplans.

Contract Final Completion. Final Completion was achieved on June 14, 2019, followed by two site walk throughs. The first site walkthrough was to review substantial completion punch list items on November 7, 2019. The second was to inspect trees and vegetation at the one-year warrantee period on June 24, 2020. LRI's Contractor Applications for Payment and certified payrolls generated during the RA are included in Appendix L.

4.3.2.5 Surveying and Survey Documentation

Conventional topographic survey and single beam survey techniques using GPS equipment were used to document pre-construction conditions, work progress, and final site conditions. The initial step included calibration to the horizontal and vertical control. Subcontracted surveyor S.Y. Kim, recorded and mapped the pre-construction site to document features such as topography, structures, above ground

utilities and other features that could potentially affect construction operations. Survey equipment consisted of a Trimble SPS 930 Robotic Total Station using SCS900 Data Collection Software, a Trimble 985 GPS Base and Rover using SCS900 Data Collection Software, and a Trimble GCS Machine Control Software. In additional to traditional topographic survey equipment, a Seafloor HydroLite-TM single beam echosounder was used to collect bathymetric survey points. Contract bathymetric survey data density was 5-foot by 5-foot transect spacing with points collected every foot. Slight variations from this density were accepted by MACTEC and NYSDEC. Mapping was completed in Autodesk Civil 3D 2018 with data processing completed in Trimble Business Center. All data and field conditions were stored with in SCS900 Data Collection Software.

The initial survey performed was the pre-dredge survey to verify existing mudline elevations and the pre-construction survey to provide general site layout and verify existing conditions. The surveyor recorded existing elevations at the control points provided on the Contract Drawings. The survey was also used to build a site model that was programmed into the equipment for dredging and backfilling to control and maintain elevations. In addition to a pre-dredge bathymetric survey, LRI's diver performed an underwater debris survey to identify the presence of debris within the work area that could interfere with the dredge. Debris identified were marked with buoys and targeted for removal prior to the start of dredging.

Once dredging was underway, S.Y. Kim performed weekly interim bathymetric surveys to track and record the dredging progress. The interim surveys were compared to the dredge excavator recorded bucket files to verify the accuracy of the dredge GPS system, with recalibration as necessary. Following determination that the interim surveys and dredge bucket files were in agreement (i.e., dredge areas within the tracking system were at grade and complete), S.Y. Kim performed a post-dredge survey that was submitted to MACTEC for approval. If a review of the submittal concluded that the areas did not meet grade, LRI was required to go back to the subject area(s), re-dredge the identified high spots, and resurvey prior to final approval. This process continued until dredging in all targeted dredge areas met required grades. When targeted dredge areas met required grades confirmation samples were collected as further detailed in Section 4.4. These final surveys collectively comprise the post-dredge and pre-backfill as-built surface. The final as-built survey was performed after backfill placement. A similar process occurred during backfilling with interim surveys collected during active backfilling operations, followed by final survey collection. The final approved post-backfill as-built survey is provided in Submittal 51 in Appendix A.

4.3.2.6 Demobilization

Periodic interim demobilization of, equipment, vehicles, and materials from the Site corresponded with the Work as it progressed. As OU03 activities were completed, equipment was either demobilized from the Site or relocated to assist in completion of the RA at OU02. The first significant demobilization occurred following the completion of dredging activities. The second and final demobilization occurred after achievement of Final Completion.

Initial Demobilization. Initial demobilization began after completion of dredging activities. This demobilization consisted of decontamination and dismantling of the TFS. LRI performed the decontamination of the TFS using manlifts and pressure washers. Subcontractor Allsite Structure Rentals returned to the Site to perform the dismantling. The TFS was stockpiled and loaded on to flatbed trailers for final demobilization.

Following completion of backfill placement and placement of rounded stone along the shoreline for restoration, in-water equipment was sequentially lifted from the water at the temporary bulkheads and staged on land in preparation for demobilization from the Site. Water-borne vessels, in-water equipment, and Flexifloat platforms were removed and dismantled. Once in-water equipment was removed temporary bulk heads, piles, and sheeting were removed and demobilized from the Site. The only items remaining were the turbidity curtain and water quality monitors. The turbidity curtain and water quality monitors remained in place and were functional until completion of the ISS work on November 9, 2018.

Final Demobilization. Final demobilization included removal of all equipment, facilities, and other material brought to the by LRI or its subcontractors. Final demobilization occurred as described in Subsection 4.3.1.7.

4.3.2.7 Disposal Details

LRI conducted representative waste characterization sampling of OU03 Pontiac Bay sediment from May 8, 2018 to July 16, 2018 during the dredging operations. Sample analyses reports prepared by ConTest, attached with Submittal 035 in Appendix A, were submitted to prospective waste disposal facilities to initiate the waste disposal approval process. Waste generated during the RA was determined to be non-

hazardous; excavated OU03 sediment, following onsite processing by LRI when needed, was re-used as daily cover at the two landfills where disposal occurred.

Each transportation vehicle contained a transporter permit pursuant to the provisions set forth in 6 NYCRR Part 364 and all other applicable state regulations. Manifesting was in accordance with 6 NYCRR Part 372 and 40 CFR Part 263. Transportation of non-hazardous regulated waste was in accordance with DOT regulations 49 CFR 172 and transported under a standard non-hazardous manifest. Completed manifests accompanied shipments of waste while in transit.

Trucks arriving onsite were staged in the former Nonna Fina restaurant parking lot located directly across River Street from the Site. All trucks were checked for appropriate placards and possession of NYSDEC hauler permits prior to loading. Once loaded, off-site transportation vehicles were covered with tarps prior to leaving the Site. MACTEC inspectors, sometimes assisted by NYSDEC representatives, checked containers prior to and during loading and prior to leaving the Site for leaks and to ensure proper decontamination, if required, before leaving the Site for transport to the disposal facility.

Once loaded, off-site transportation and disposal took place as describe for OU02 in section 4.3.1.10.

Tables 4.4 and 4.5 show the total quantities of solid and liquid waste removed from the Site and the associated disposal locations. Letters from Applicants to disposal facility owners and acceptance letters from disposal facility owners are attached in Appendix J. Manifests are also included in electronic format in Appendix J.

Table – 4.4
Off-site Disposal of Solid Waste

Disposal Facility	Waste Type	OU03	OU02	Total
Green Ridge RDF (Tons)	Non-hazardous soil	5,041 Tons	2,789 Tons	7,830 Tons
Clinton County Landfill (Tons)	Non-hazardous soil	12,606 Tons	8,141 Tons	20,747 Tons
Clinton County Landfill (Tons)	Non-hazardous landfill waste	830 Tons	0 Tons	830 Tons
				29,407 Tons

Table – 4.5
Off-site Disposal of Liquid Waste

Disposal Facility	Saranac Lake Wastewater Treatment Plant
OU02	207,000 Gallons
OU03	198,000 Gallons
Total	405,000 Gallons

4.3.3 In-Situ Stabilization

This subsection describes the ISS activities conducted at the targeted upland area at OU03.

4.3.3.1 Site Preparation

ISS activities were initiated on October 10, 2018. Prior to the ISS implementation, LRI conducted limited site clearing on the hotel property for heavy equipment access. Site clearing activities included the removal of shrubs, pruning of trees, removal of a small wooden shed, and contacting the electrical utility National Grid to relocate wires attached to a utility pole on the property. Following these activities, a five-foot offset from the OU03 dredge limits and the ISS cell layout was painted on the ground surface. A total of 35 cells were established.

4.3.3.2 Pilot Test Summary

Prior to full-scale ISS mixing, a pilot test was conducted in accordance with contract requirements to demonstrate that the mix design will meet the project goals of 40 PSI unconfined compressive strength (UCS) at 28 days as measured by American Society for Testing Materials standards D1633-00. The pilot test began on October 15, 2018. A 5-foot precut was made using a Linkbelt 145x excavator. This soil was loaded into an articulated truck and stockpiled in the former hotel parking lot and covered with a tarpaulin to be reused as backfill after ISS. The precut soil had been characterized as being unaffected by MGP-related contamination during the pre-design investigation (MACTEC, 2017). Once the precut was made, the contractor used a Komatsu PC360 excavator with a skeleton bucket and Trimble GPS system to mix 2000-lb bags of Portland cement to begin the ISS process. Some makeup water was required to adequately mix the cement with the soil. Water was delivered to the ISS area by filling a

500-gallon tote with water from the public hydrant near OU02. A hose bib installed in the bottom of the tote was periodically opened and closed to supply water as needed during mixing. During the pilot test, the earthen bank along the lake began to heave when mixing. It was determined that the five-foot offset may not be enough to protect against break-through. MACTEC and NYSDEC subsequently approved a 10-foot offset between the Pontiac Bay water's edge and the ISS treatment limits. ISS Cells C-12, C-13, and C-23 were the first to be mixed during this pilot test. Adequate mixing was determined when there was no visual color difference in the mixture, and the excavator reached the ISS target depth of 15 feet bgs. Following mixing in each cell, a grout sampler was used to collect samples at mid-depth. Samples were stored onsite under the appropriate chain of custody, and sent to the laboratory for 4-day, 7-day, 14-day, and 28-day UCS testing. The pilot test soils achieved a break of 35 psi after 4 days and 55-psi after 7 days, allowing for the start of full-scale ISS on October 22, 2018 after the receipt of the passing 7-day UCS test.

4.3.3.3 ISS Mixing

Full scale ISS mixing was conducted in 21 cells for a total of 24 mixed cells including the three cells mixed during pilot testing. 11 of the originally targeted 35 cells were removed from treatment because the 10-foot buffer was determined to be necessary to avoid break-through at the lake shoreline. Full scale mixing occurred using the same means and methods described for the pilot test. Sampling was conducted in each cell after mixing. Laboratory reporting indicated that the minimum 40 psi UCS testing requirement was achieved in all cells. Following receipt of all testing results indicating successful treatment, soil stockpiled from the precut was returned to the ISS area to bring the disturbed area to pre-construction grade, then seeded. Remaining stockpiled soil was transported to OU01 for offsite disposal. A full ISS UCS test results summary and treatment cell layout figure is provided in Submittal 87, Appendix A. The underground storage tank (UST) shown on the contract drawings in the ISS treatment area was not encountered during the work.

4.4 REMEDIAL PERFORMANCE/DOCUMENTATION SAMPLING

End-point sampling was conducted to demonstrate that SCOs were achieved and to document what levels of contamination remain and will be managed under the Site Management Plan.

OU02 Post-Excavation Confirmation Sampling. Confirmation samples were collected every 900 sf at the bottom of the excavation and at 30-foot intervals from the base of each side wall, in accordance with the approved work plan (Submittal 002, Appendix A). Samples were generally collected by hand unless the excavation was too deep in which case they were collected using the excavator bucket. Sediment samples were submitted for BTEX, PAH, pesticides and PCB analysis and soil samples were submitted for Xylenes, PAH, chromium and pesticides. Upon receipt of the analytical results from the laboratory and confirmation that the samples met criteria, excavations were backfilled prior to moving downstream to commence excavations at the next section. If analytical data indicated sampling criteria was not met, additional excavation was performed, and new confirmation samples were collected prior to backfilling.

OU03 Post-Dredging Confirmation Sampling. Once dredged areas were confirmed to be complete via bathymetric survey, LRI conducted post-dredging confirmation sampling. Sample locations were provided to LRI in Field Order (FO) No. 1 (see Appendix M). Samples were collected from the flat deck push boat using a 2-foot, 2.25-inch push corer with clear Lexan liners. Once in the approximate sample location, vessel anchors were deployed, and a Trimble GPS used to mark the sampling location. The water depth was recorded, and a core was collected. Cores were driven a minimum of 1-foot to a maximum of 2-feet. A recovery of 75% was required for the core to be accepted. The representative surficial 6-inch to 12-inch interval was collected from the core and used as the sample. Depending on the drive depth and recovery, multiple cores were collected at some locations to make up the required sample volume. Samples were homogenized using plastic spoons and buckets, then transferred into the appropriate bottle wear and sent to the laboratory to be analyzed as described in the contract documents. The push corer and liners were decontaminated or replaced between sample locations with Alconox detergent and fresh water. The decontamination water was collected and treated at the onsite CWTU.

Tables summarizing all OU02 and OU03 end-point sampling results are included in Tables 4.6, 4.7, and 4.8 and all exceedances of SCOs and SGVs are highlighted. A table summarizing the horizontal and vertical locations of the end-point sampling is provided on the "Bottom of Excavation Topographic Survey" (Sheet 2 of 3) in Submittal 051B in Appendix A, and the location of samples left in place that exceed SCOs and SGVs is included in Figures 2.1 and 2.2.

Data Usability Summary Reports (DUSRs) were prepared for all data generated in this remedial performance evaluation program. These DUSRs are included in Submittal 036A in Appendix A, and associated raw is provided electronically in Appendix N.

4.5 IMPORTED BACKFILL

Brandy Brook and its associated banks were backfilled with subgrade fill material upon confirmation that post-excavation samples demonstrated achievement of soil and sediment cleanup objectives, including areas where additional excavation was conducted because initial confirmation sampling did not demonstrate achievement of SCOs. Subgrade fill material was placed in one-foot lifts using an excavator equipped with GPS machine control and compacted with a Dynapack vibratory roller. Where confirmation sample results were reported above SCOs after additional excavation passes or if visible NAPL was present, a 6-inch to 24-inch lift of subgrade fill was placed and compacted followed by a single layer of Reactive Core Mat™ (RCM) containing PM-199 Organoclay. RCM locations were surveyed immediately after installation and prior to placement of additional subgrade fill.

Barrier/Demarcation Layer. Backfilling of the dredged area began on September 4, 2018. Prior to backfilling, an AquaBlok™ demarcation layer was installed along a section of the bay bank where sediments left in place exceeded the associated SGVs. In this area additional dredging of the banks was not conducted to ensure that the stability of the bank was not impacted, and instead AquaBlok™ was placed over the remaining impacted sediment to prevent migration of remaining contaminants of concern. The Contractor used the main dredge platform for placement. The existing 4.5 cy dredging bucket was replaced with a 1.5 cy clamshell bucket with a chain and hook system installed to control the buckets ability to open and ensure for even and uniform distribution of the AquaBlok™. The placement concept was based on volume over area. The dredger "sprinkled" the calculated placement volume over the cell area using the GPS screen as the guide for bucket movement. Aquablok™ placement was verified using sediment push cores to visually verify that the required 4-inch hydrated barrier/demarcation layer was installed. The location where AquaBlok™ was placed is depicted in Figure 2.2.

Backfill. Once the demarcation layer was installed and verified, the 1.5 cy bucket was removed and replaced with the decontaminated 4.5 cy bucket used for dredging. Equipment used during dredging operations was decontaminated in accordance with the contract required decontamination procedures

prior to use for clean material handling. The backfill materials for OU3 backfill were produced and provided by Trudeau.

Trudeau delivered backfill materials to the project Site using clean dump trailers and tri-axle dump trucks. A temporary stockpile was created east of the TFS adjacent to the temporary bulkhead to allow for the TFS to be dismantled during backfill. The stockpile was covered with tarp to control wind-blown dust when not in active use. Stockpiles were also wetted if visible dust became present during active use.

The backfill operation followed the same procedures as the dredging, only in reverse. Material was loaded onto the hopper barges from the temporary bulkhead using a Linkbelt 145x excavator, and barges were pushed to the backfill locations. Backfill material was dug out of the hopper barges using the Link Belt 800 with the 4.5 cy clamshell bucket. Material was lowered into the water column and placed close to the bottom to minimize disturbance of the existing sediment while also minimizing turbidity.

Each dredged area was GPS modeled to the dredged depth and the final sediment elevation of the clean fill. The operator set the bucket on the bottom and check elevations to ensure backfilling occurred in lifts no greater than 6-inches. Once the area was filled to grade, the dredge platform moved to the next area. During backfilling, turbidity resulting from the colloidal component of the backfill material caused visual impacts to the lake resulting in cessation of backfilling operations to allow evaluation of the impact. Samples of the backfill and lake water were sent to MACTEC's Laboratory for treatability testing to determine and various polymers and settling times that could be applied to the water to encourage flocculation and settling. Test results concluded that Aluminum Sulfate (Alum), a commonly used chemical in drinking water treatment, was a safe alternative to encourage flocculation of the colloidal particles and rapidly increase the settling velocity. An Alum delivery system was discussed with NYSDEC, who subsequently approved mobilization of a treatment system which was mobilized, tested, and operated until the turbidity dissipated. The treatment system was demobilized, and elevated turbidity was not observed thereafter.

Due to concerns that an observable turbidity condition would re-occur because of the colloidal content of the approved backfill, NYSDEC requested that FO No. 05 be issued instructing LRI to cease backfilling activities. A total of 2,210 cy of bay backfill material was placed in the Pontiac Bay work area. Final backfill elevations were confirmed by bathymetric survey.

A table of all sources of imported backfill with quantities for each source is shown in Table 4.9. Chemical analytical results for backfill are provided in the respective material submittals in Appendix A. Areas where backfill was used at the Site are shown on the as-built drawings (Submittal 51 in Appendix A).

Table 4.9
Summary of Imported Backfill Material

Material Type	**QTY**	**Unit**	**Material Source**
#2 Stone	259	Tons	Upstone Materials
#3 Stone	790	Tons	Upstone Materials
#4 Stone	64	Tons	Upstone Materials
1a Stone	41	Tons	Upstone Materials
Bank Run Gravel	1758	Tons	Trudeau
Cobble Stone	21	Tons	Trudeau
Crusher Run	1133	Tons	Upstone Materials
Fine Crusher Run	233	Tons	Upstone Materials
HFS #1	42	Tons	Upstone Materials
HFS #2	356	Tons	Upstone Materials
Light Stone Fill	106	Tons	Upstone Materials
Mixed Stone	79	Tons	Trudeau
OU3 Backfill Material	5908	Tons	Trudeau
Riprap	1275	Tons	Upstone Materials
Rounded Stone	38	Tons	Trudeau
Select Stone Fill	63	Tons	Upstone Materials
Shot Rock Stone Fill	82	Tons	Upstone Materials
Stone Mix	332	Tons	Trudeau
Topsoil	749	Tons	Trudeau
Unprocessed Stone	1030	Tons	Trudeau
Unscreened Soil	170	Tons	Trudeau
Unscreened Topsoil	858	Tons	Trudeau

4.6 CONTAMINATION REMAINING AT THE SITE

There are areas of residual sediment/soil contamination remaining in OU02 and OU03 (Figures 2.1 and 2.2). Tables 4.10 and 4.11 present the sediment and soil sample results that exceed the SCGs after completion of the RA for OU02. Table 4.12 presents the sediment results that exceed the SCGs after completion of the RA for OU03.

Since residual contaminated soil and sediment remain beneath the Site after completion of the RA, Institutional and Engineering Controls are required to protect human health and the environment. These Engineering and Institutional Controls (ECs/ICs) are described in the following sections. Long-term management of these EC/ICs and residual contamination will be performed under the Interim Site Management Plan (ISMP) (MACTEC, 2019) approved by the NYSDEC.

4.7 COVER (OR CAP)

OU02, Brandy Brook, was remediated by excavating soil and sediments to achieve SCOs with the exception of areas shown on Figure 2.1. In locations where visually impacted soil or sediment remained or laboratory results indicated that SCOs were not achieved but additional soil or sediment could not be reached or remediation was logistically impractical, RCM was installed to prevent migration of remaining NAPL from soils/groundwater to the sediment/surface water. In some instances, the extent of contamination could not be remediated because the impacts extended too close to structures (i.e. beneath the railroad tracks) or too deep to maintain an open excavation. In an area adjacent to OU01, seeps were identified within the brook bank with visual contamination flowing into Brandy Brook. Extending the excavation towards OU01 did not occur as OU01 will be remediated at a later date. Therefore, RCM was placed over the seep area to prevent migration of NAPL from the seeps to the brook. The RCM was covered by 12 inches of clean soil.

OU03, Pontiac Bay of Lake Flower, was remediated by dredging sediments to achieve SCOs except for an area along the sidewall of the Bay to avoid cave-in of adjacent land. Samples of the soil left in place along these triangular wedges were collected, and based on results of sampling Aquablok®, an impermeable barrier, was installed over a section of the wedge to prevent migration of contamination. The Aquablok® was covered with clean backfill. The location of the Aquablok® is depicted on Figure 2.2.

Locations of clean backfill and riprap used to restore the bay is shown in the as-built drawing Submittal 51, Appendix A.

An Excavation Work Plan, which outlines the procedures required in the event the synthetic cover system and/or underlying residual contamination are disturbed, is provided in Appendix D of the ISMP.

4.8 OTHER ENGINEERING CONTROLS

The remedy for the Site did not require the construction of any other engineering control systems.

Procedures for monitoring the cover system are provided in the ISMP. Inspection and monitoring of the cover system are described in the ISMP.

4.9 DEVIATONS FROM THE REMEDIAL ACTION WORK PLAN

This section describes deviations from the approved RD during the RA.

4.9.1 Project Schedule

Changes to the completion dates contained in LRI's Preliminary Schedule (Submittal 003, Appendix A) were provided during the bi-weekly progress calls; minutes for the bi-weekly meetings are included in Appendix C. Documentation for changes in contract time are included in the PCO and Change Orders (CO) discussed in Subsections 4.10.3 and 4.10.4, respectively, of this report.

4.9.2 Field Orders

Fifteen FOs were issued by MACTEC during the RA. FOs are included in Appendix M.

- FO 01 provided direction to LRI for collection and laboratory analysis of composite and discrete sediment confirmation samples at OU03.
- FO 02 specified the use of Aquablok as the demarcation/barrier layer at OU03.

- FO 03 approved the erosion control measure proposed by LRI for installation in Brandy Brook prior to cleaning of the twin 24-inch culverts under Lake Flower Avenue.
- FO 04 reiterated the survey submittal requirements for completed OU03 dredged areas prior to collection of confirmation samples. Dredge areas 5 through 8 were approved for sampling.
- FO 05 directed LRI to provide a corrective action plan to address issue of turbidity observed beyond the limits of the turbidity barrier.
- FO 06 provided details for restoration of the area occupied by the TFS and barge pier bulkhead.
- FO 07 provided direction for re-grading of riprap of an area at OU03 where over-placement of the material had occurred.
- FO 08 reiterated requirements for proper soil dewatering operations at OU02 during excavation activities.
- FO 09 provided instructions for scheduling the re-grading and topsoil placement on the Village ice palace property at OU03.
- FO 10 provided instructions for deployment of measures to protect excavations at OU02 during cold weather.
- FO 11 provided details for modification of driveway culvert installation at OU02 to avoid conflict with the existing residential sanitary sewer lateral.
- FO 12 provided instructions for installation of rock check dams at OU02 for erosion control during winter weather.
- FO 13 provided details for modification to site restoration at the boat launch parking area at OU03.
- FO 14 provided direction for replacing guard rails along the installed curbing on the new driveway culverts crossing OU02 Brandy Brook serving the residences at 38 and 42 Brandy Brook Avenue.
- FO 15 described details for site restoration (tree planting and grading) at OU03 in accordance with the Prescott Park Landscaping Plan.

4.9.3 Proposed Change Orders

Twelve Proposed Change Orders (PCOs) were submitted by LRI during the RA. The PCOs were reviewed by the NYSDEC and, except for PCO 08, were subsequently incorporated into Change Order (CO) No. 1. The PCOs are included in Appendix O.

- PCO 01 includes a proposed increase in contract cost associated with lease of the private property located at 151 River Street by LRI for the duration of the project, plus time and materials for required utility usage, traffic control measures required for the management of public vehicles, and parking lot restoration. PCO 02 was processed as Item I.A of CO No. 1.

- PCO 02 includes a proposed increase in contract cost to accommodate LRI's use of an alternate offsite landfill facility for soil and sediment waste disposal. PCO 02 was processed as Item I.B of CO No. 1.
- PCO 03 includes a proposed increase in contract cost and contract time related to replacement of existing residential water and sewer laterals at OU02 along Brandy Brook Avenue. PCO 03 was processed as Item I.C of CO No. 1.
- PCO 04 includes a proposed increase in contract cost related to replacement of final grades in the RD with those provided by the Village due to the impacts to its upland property at OU03 from the RA. PCO 04 was processed as Item I.D of CO No. 1.
- PCO 05 includes a proposed increase in contract cost and contract time related to replacement of a portion of an active municipal sanitary sewer line located within the OU02 Brandy Brook corridor. PCO 05 was processed as Item I.E of CO No. 1.
- PCO 06 includes a proposed increase in contract cost associated placement of riprap along the banks of OU03 Pontiac Bay, below and above the water line. PCO 06 was processed as Item I.F of CO No. 1.
- PCO 07 includes a proposed increase in contract cost and contract time associated with placement of RCM as a reactive demarcation barrier within areas along Brandy Brook. PCO 07 was processed as Item I.G of CO No. 1.
- PCO 08 includes a proposed increase in contract cost associated with use of a slide rail system in lieu of sheet pile installation for structural support at a deep cut excavation along OU02 Brandy Brook. PCO 08 was not processed in CO No. 1.
- PCO 09 includes a proposed increase in contract cost associated with pumping and treating water from OU03 Pontiac Bay that remained turbid after placement of backfill material. PCO 09 was processed as Item I.H of CO No. 1.
- PCO 10 includes a proposed increase in contract cost associated with providing and installing unprocessed stone as an using alternate for Type 1 and Type 2 Streambed Material specified in the RD. PCO 10 was processed as Item I.I of CO No. 1.
- PCO 11 includes a proposed increase in contract cost associated with modification of the concrete footing to an OU02 driveway culvert to accommodate the existing residential sewer and water laterals. PCO 11 was processed as Item I.J of CO No. 1.
- PCO 12 includes a proposed increase in contract cost associated with modification of the RD specification for re-paving the parking area at the NYSDEC boat launch at OU03 Pontiac Bay for increased durability. PCO 12 was processed as Item I.K of CO No. 1.

4.9.4 Change Order No. 1

In addition to the PCOs described in Subsection 4.10.3, two new pay items were incorporated into CO No. 1 included in Appendix O:

Item LS-22 – Stabilization Agents and OU01 Offsite Staging. This change order item is associated with requiring a different type and higher quantity of soil/sediment stabilization agent than originally anticipated, as well as additional time for stabilization agents to activate which required transport of the generated material to OU01. This item was processed as Item I.L of CO No. 1. There was no change in contract time associated with this item.

Item LS-23 – Disposal of Soil as Waste. This change order item is associated with the disposal facility charging a higher tipping rate for select loads of sediment from OU03 that did not meet the requirements for cover material. This item was processed as Item I.M of CO No. 1. There was no change in contract time associated with this item.

PCOs and the two new pay items were processed into CO No. 1 for a net increase in contract price of $1,484,400 and a 14-day increase in Substantial Completion contract time. The CO was executed by the Office of the New York State Comptroller. The resulting contract amount was $9,831,665; the contract time for Final Completion was unchanged.

5.0 REFERENCES

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FIGURES

TABLES

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CONTRACTOR SUBMITTAL AND SUBMITTAL LOG

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SUBSTANTIAL COMPLETION CERTIFICATION
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ANALYTICAL RESULTS – SOIL AND SEDIMENT CONFIRMATION SAMPLES

APPENDIX O

CHANGE ORDER AND ASSOCIATED PROPOSED CHANGE ORDERS