Ford Motor Company

Interim Remedial Measure Remedial Action Design Report

Ramapo Paint Sludge Site – Operable Unit 3 (OU-3)
Ramapo Rockland County, New York, Site No. 344064

July 2024

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Ramapo Paint Sludge Site – OU-3, Rockland County, New York

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Prepared By:
Arcadis of New York, Inc.
44 S Broadway 12th Floor
White Plains
New York 10601
Phone: 914 694 2100
Fax: 914 328 3384

Prepared For:
Ford Motor Company

James McLaughlin
Project Manager

Certification in Accordance with DER-10

*I, **Krista Hankins Mastrocola**, certify that I am currently a **NYS registered professional engineer** as defined in 6 NYCRR Part 375 and that this **Interim Remedial Measure Design** was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation (DER-10) and DER Green Remediation (DER-31) and that all activities were performed in full accordance with the DER-approved work plan and any DER-approved modifications.*

Krista Mastrocola, P.E.
Senior Civil Engineer, P.E-NY#092498

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Acronyms and Abbreviations

Arcadis	Arcadis of N.Y., Inc.
Cadena	Cadena Incorporated
CAMP	Community Air Monitoring Plan
CCR	Construction Completion Report
COC	Constituents of concern
Davey	Davey Resource Group, Inc.
DER-10	NYSDEC Technical Guidance for Site Investigation and Remediation
DER-31	NYSDEC Green Remediation
DOT	Department of Transportation
EDD	Electronic Data Deliverable
ERM	Environmental Resource Mapper
feet bgs	feet below ground surface
FEMA	Federal Emergency Management Agency
Ford	Ford Motor Company
FWRIA	Fishing and Wildlife Resource Impact Analysis
HASP	Site Specific Health and Safety Plan
H&S	Health and Safety
IPaC	Information for Planning and Consultation
IRM-RA	Interim Remedial Measure – Remedial Action
MSA	Material staging area
NYCRR	New York Codes, Rules, and Regulations
NYNHP	New York Natural Heritage Program
NYS	New York State
NYSDEC	New York State Department of Environmental Conservation
NWP	Nationwide Permit
OC/AS	Order on Consent and Administrative Settlement
OSHA	Occupational Safety and Health Administration
OU	Operable Unit
PCB	polychlorinated biphenyls

PDI	Pre-Design Investigation
ppm	Parts per million
QAPP	Quality Assurance Project Plan
QC	Quality Control
QA	Quality Assurance
QBTS	Qualified Bog Turtle Surveyor
RD	Remedial Design
RO	Remedial Objective
SCO	Soil Cleanup Objective
SESC	Soil erosion and sediment control
sf	square feet
SVOC	Seim-Volatile Organic Carbon
SWPPP	Stormwater Pollution Prevention Plan
TCL	target compound list
TCLP	Toxicity Characteristic Leaching Procedure
Tectonic	Tectonic Engineering Company LLC
Terranova	Terranova Contracting Corporation
TNW	Traditional Navigable Water
TOR	Town of Ramapo
USACE	United States Army Corps of Engineers
USFWS	United States Fish and Wildlife Service
UT	Unnamed tributary
VOC	Volatile Organic Carbon

1 Introduction

Arcadis of New York, Inc. (Arcadis), on behalf of Ford Motor Company (Ford), has prepared the Interim Remedial Measure-Remedial Action (IRM-RA) Design for Operable Unit 3 (OU-3) of the Ramapo Paint Sludge Site, located in Ramapo, New York (the Site, **Figure 1**). OU-3 consists of approximately 2.5 acres of land located on the eastern portion of a residential property (9 Lea Court, Pomona, New York) and adjacent to the east of a stormwater retention basin measuring approximately 200-foot wide by 400-foot long (**Figure 2**).

1.1 Project Overview

The IRM-RA consists of removal and disposal of paint sludge and impacted soil within an earthen berm on the east side of the stormwater retention basin. The earthen berm has been classified by the New York State Department of Environmental Conservation (NYSDEC) as a Class A dam, referred to henceforth as "Dunham Dam", in accordance with 6 New York Codes, Rules and Regulations (NYCRR) Part 673. This IRM-RA has been prepared in accordance with the following:

- Order on Consent and Administrative Settlement (OC/AS) entered into between the NYSDEC and Ford dated March 2006 (**Appendix A, Exhibit 1**);
- Interim Remedial Measure Conceptual Design for the Site approved on July 18, 2019 (**Appendix A, Exhibit 2**);
- NYSDEC Technical Guidance for Site Investigation and Remediation (DER-10) dated May 2010; and,
- NYSDEC Green Remediation (DER-31) dated January 2011.

1.2 Report Organization

This report presents details associated with the IRM-RA in the following eight subsections:

- Section 2 – Site Background: outlines the setting, history, and geologic conditions at the Site.
- Section 3 – Historical Investigations: outlines information regarding previous investigations conducted at the Site.
- Section 4 - Proposed Remedial Objectives (ROs): outlines the objectives for the IRM-RA as defined by the NYSDEC DER-10 dated May 2010.
- Section 5 – Pre-Design Investigation (PDI): outlines the PDI that was performed to gather more information to design the IRM-RA.
- Section 6 – Proposed IRM-RA Scope: outlines the detailed scope of work associated with the IRM-RA.
- Section 7 – Regulations, Permits and Other Authorizations: outlines the required federal, state, and local regulations, permit/permit equivalencies and authorizations for the IRM-RA.
- Section 8 – Project Schedule: outlines the schedule for implementation of the IRM-RA.
- Section 9 – References: outlines the references utilized in preparation of the IRM-RA Remedial Design (RD).

2 Site Background

OU-3 is located at 9 Lea Court, Town of Ramapo, Rockland County, New York. OU-3 is bounded to the north by a small creek and commercial property, to the east by Mt. Ivy County Park, and to the south and west by residential properties (**Figure 2**).

2.1 Site Access

OU-3 is situated on Block 2, Lots 18 (9 Lea Court) and 35 (Mount Ivy Swamp) which are owned by Mr. Dunham and Rockland County, respectively. Mr. Dunham and Rockland County entered into Access Agreements with Ford to implement the IRM-RA in July 2013 and on July 18, 2019, respectively.

For access to OU-3, Ford also requires access to a private driveway associated with Block 2, Lots 17.1 (76 Camp Hill Road) and 17.2 (86 Camp Hill Road), respectively. Access Agreements for 76 Camp Hill LLC and Mrs. Markowitz were entered into with Ford on March 31, 2022 and September 20, 2022, respectively.

A copy of each Access Agreement is provided in **Appendix B, Attachment 1**.

2.2 Drainage Easement

A drainage easement to the Town of Ramapo (TOR) exists on the Dunham property stormwater retention basin and associated stormwater appurtenances (i.e., inlet/headwall and outlet structure). The drainage easement is illustrated on **Figure 2**. Prior to performing work within the drainage easement, Ford will provide notification to the TOR.

2.3 Geology and Hydrogeology

Rockland County is in the southeast corner of New York State and forms a portion of the state border with New Jersey (**Figure 1**).

2.3.1 Topography and Geomorphology

Rockland County is in two parts of the New England Province. The eastern two-thirds are in the Triassic Lowlands, and the western third is in the Reading Prong. The county is characterized by ridge and valley topography with a complex covering of moraines, terraces, outwash plains, lakes, and marshes. Elevation within the OU-3 Study Area generally slopes to the east, ranging from 397 to 423 feet. The OU-3 layout included as **Figure 2** contains topographic and bathymetric survey based on a field survey by Borbas Mapping & Surveying, LLC, dated December 7, 2023.

2.3.2 Hydrology

OU-3 is located within the Minisceongo Creek Watershed (HUC 020301010104), which is approximately 19 square miles. The unnamed tributary (UT) on-site connects to the South Branch Minisceongo Creek and is the major hydrologic feature associated with the Study Area. A large wetland complex, Mount Ivy Swamp (NYSDEC

ID TH-16), is located within the southeastern portion of the Study Area. All wetlands and waters within the Study Area flow west to east into Mount Ivy Swamp.

Minisceongo Creek is the primary hydrologic feature within the watershed and is listed by the NYSDEC as a Class C river/stream. The creek flows northeast into the Hudson River, a Traditional Navigable Water.

2.3.3 Floodplain

OU-3 is included within the Federal Emergency Management Agency's (FEMA) Flood Insurance Map as map numbers 36087C0091G effective March 3, 2014 (**Appendix B, Attachment 2**). The entire Study Area falls within Zone A (without base flood elevation) or Zone X (areas determined to be outside the 0.2% annual chance floodplain).

3 Historical Investigations and Proposed IRM-RA

Site characterization and remedial investigation activities were conducted at OU-3 to identify, investigate, and delineate the extent of paint sludge and impacted soil. Analytical data collected as part of these activities is discussed below.

3.1 Waste Characterization of Paint Sludge

Visible paint sludge was collected by hand as part of the 2006 Site Characterization. A sample of the paint sludge was analyzed for volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs), total metals, and toxicity characteristic leaching procedure metals.

The paint sludge was characterized as hazardous for lead leachability and transported off-site for disposal at the Environmental Quality Company disposal facility located in Belleville, Michigan (Arcadis 2007). A summary of waste characterization results is provided in **Table 1**.

3.2 Surface Water Investigation

Three surface water samples (SW-P-01 through SW-P-03) were collected from the retention basin during the 2006 Site Characterization. Surface water sample locations are shown on **Figure 3**. Surface water samples were collected and analyzed for VOCs, SVOCs, and target compound list (TCL) metals.

With the exception of iron, metals, VOCs, and SVOCs were not detected in surface water samples at concentrations greater than the Class C[1] NYSDEC surface water criteria. A summary of surface water analytical results is provided in **Table 2**.

3.3 Sediment Investigation

Three sediment samples (SED-P-01 through SED-P-03) were collected from the retention basin during the 2006 Site Characterization. Sediment sample locations are shown on **Figure 4**. Sediment samples were collected and analyzed for VOCs, SVOCs, and TCL metals. One sediment sample (SED-P-01) could not be analyzed because of the coarse nature of the sample material (gravel) (Arcadis 2007). VOCs and SVOCs were not detected at concentrations greater than the NYSDEC sediment criteria. With the exception of lead, metals were not detected in the sediment samples at concentrations greater than the NYSDEC severe effect level sediment criteria. A summary of sediment analytical results is provided in **Table 3**.

Three additional sediment samples were collected from within the retention basin (OU3-SED-BS-T2-F, OU3-SED-BS-T3-B, and OU3-SED-BS-T4-C) in 2008. These sediment samples were analyzed for VOCs and metals. No VOCs or metals were detected in the sediment samples at concentrations greater than the NYSDEC severe effect level sediment criteria (Arcadis 2010a). A summary of sediment analytical results is provided in Table 3.

[1] "Class C" waters *shall be suitable for fish, shellfish and wildlife propagation and survival. The water quality shall be suitable for primary and secondary contact recreation, although other factors may limit the use for these purposes* (6 CRR-NY 701.8).

3.4 Groundwater Investigation

Two monitoring wells (MW-OB-1 and MW-OB-2) were installed in 2008 by a driller licensed in the State of New York utilizing direct-push technology. The well locations are shown on **Figure 3**. Groundwater samples were collected from the wells on March 20, 2008 using low flow methods and were analyzed for VOCs, SVOCs, and TAL metal analysis (Arcadis 2010).

VOCs were not detected in any of the ground water samples. SVOCs were not detected at concentrations greater than the NYSDEC groundwater quality standards (GWQS). With the exception of iron, manganese, and sodium, metals were not detected at concentrations greater than the Groundwater Effluent Limitations provided in NYSDEC Division of Water Technical and Operation Guidance Series 1.1.1 dated June 1998. A summary of groundwater analytical results is provided in **Table 4**.

3.5 Soil Investigation

Six test pits (P-TP-01 through P-TP-06) were excavated within OU-3 in November 2006 to identify the extent of paint sludge. Test pit locations are shown on **Figure 4**. The numbers and locations of the test pits were determined by the NYSDEC, New York State Department of Health (NYSDOH), and Ford based on the evaluation of the 2006 Site Characterization (Arcadis 2010b).

Paint sludge was observed in four of the six test pits (P-TP-02, 03, 05 and 06). Paint sludge observed in three of the four test pits (P-TP-02, 03, and 05) ranged in size from small pieces to cobble-sized chunks. The paint sludge was intermixed with the soil and was not a continuous flow suggesting that the paint sludge/soil was reworked or moved since the time of original deposition.

A continuous flow was observed in one of the test pits (P-TP-06). This test pit was located at the toe of the Dunham Dam that forms the down gradient edge of the pond. The paint sludge flow emerged from the berm and extended beneath the berm suggesting that the paint sludge was deposited at this location prior to the construction of the berm.

Detailed descriptions can be found in the test pit logs provided in **Appendix C**.

3.5.1 Soil Investigation

A soil boring investigation was conducted in January and February of 2012 to delineate the limits of paint sludge as part of a Supplemental Investigation. Thirty-five soil borings (SB-01 through SB-35) were advanced using direct push technology. The borings were started at the top of the berm (directly west of the known paint sludge deposit) and continued in a step-out approach until the extent of paint sludge was delineated (**Figure 4**). A total of six soil samples were collected from borings containing paint sludge at depth and analyzed for VOCs, SVOCs, pesticides, PCBs, and total metals (Arcadis 2019).

With the exception of arsenic, barium, and lead, no additional metals or VOCs were detected at concentrations greater than the NYSDEC Soil Cleanup Objectives (SCOs) for Residential Use. A summary of soil analytical results is provided in **Table 5**.

Detailed descriptions of the soil borings are provided in **Appendix C**.

3.5.2 Supplemental Soil Investigation

A total of 10 direct push borings (SB-1-2014 through SB-10-2014) were advanced within Dunham Dam at OU-3 as part of the 2014 Supplemental Site Investigation. Three of the 10 borings (SB-1-2014 through SB-3-2014) were advanced to a maximum depth of 10 feet below ground surface (feet bgs) as no paint sludge was encountered. The remaining borings (SB-4-2014 through SB-10-2014) were advanced to refusal and/or the observance of paint sludge. Locations of all borings are shown on **Figure 4**. Samples were collected and analyzed for VOCs, SVOCs, PCBs, pesticides, and total metals to determine if the overburden material could be reused as backfill on-site (Arcadis 2019).

Samples were screened against the NYSDEC SCOs for Residential Use. VOCs and SVOCs were not detected at concentrations greater than the NYSDEC SCOs for Residential Use. Inorganics and pesticides did not exceed the NYSDEC SCOs for Residential Use. PCBs were detected at SB-8-2014 (1.5 to 8.0 feet bgs) at a concentration of 10.39 parts per million (ppm), which is greater than the NYSDEC SCOs for Residential Use (1.0 ppm, respectively). The source of PCBs has not been identified or delineated and is not a known constituent of paint sludge. A summary of soil analytical results is provided in **Table 6**. Detailed descriptions of the soil borings are provided in **Appendix C**.

3.6 Geotechnical Results

In October 2014, two geotechnical borings (GT-1 and GT-2) were advanced into the Dunham Dam via a hollow stem auger and split spoon sampler to a depth of 15 feet bgs. Sample locations are shown on **Figure 4**. Samples were collected from the split spoons for analysis of grain size distribution/sieve analysis (ASTM D422), grain size distribution for finer fraction (ASTM D1140), Atterberg limits measured in percentage (ASTM D4318), and water content measured in percentage (ASTM D2216).

Site soils within the Dunham Dam consist of a silty sand with gravel with blow counts ranging from 9 (loose) to 32 (medium dense). Moisture contents ranged from 4.3% to 13%, with one anomaly at 41.3%. The moisture content anomaly is a result of the soil sample being collected in close proximity to the water table (Arcadis 2019).

Soil boring logs are provided in **Appendix C**. Geotechnical laboratory reports are provided as **Appendix D**.

3.7 Fish and Wildlife Resource Impact Analysis

A Fishing and Wildlife Resource Impact Analysis (FWRIA) was conducted in 2008 to 2010 to identify the fish and wildlife resources that exist on and in the vicinity of the Site, and to evaluate the potential for exposure of these resources to site-related constituents in environmental media. The FWRIA included a toxicity assessment to identify the effects, if any, of site-related constituents on fish and wildlife resources. This impact assessment included a pathway analysis, which determined if there are complete or potentially complete ecological exposure pathways to site-related constituents, and a criteria-specific analysis, which compared site data to Standards, Criteria, and Guidelines.

Since surface water and sediment sampling results showed low concentrations of constituents of concern compared to ecological SCOs, there is limited potential for adverse effects on ecological receptors. Additionally, the forested wetland habitat area of OU-3 underwent removal of visible paint sludge, so potential exposure of wildlife to remaining deposits is expected to be limited. In the terrestrial environment, direct contact with larger chunks of solid paint sludge would not likely yield appreciable levels of exposure because larger fragments would

likely not be ingested, would not adhere to the skin, and would be too large to be inhaled by wildlife. As a result, wildlife encounters with paint sludge on the ground surface are expected to be limited and this scenario should be considered an incomplete exposure pathway leading to limited potential for ecological risk at the Site. As a result of incomplete ecological exposure pathways, constituent concentrations not expected to cause adverse effects, and low potential for ecological risk at on-site habitat areas, additional evaluation of potential ecological exposures at the Site is unwarranted (Arcadis 2010a).

For remediation and restoration purposes, the NYSDEC Residential and/or Protection of Groundwater Soil SCOs will be applied. The NYSDEC Ecological SCOs are not being applied as potential ecological exposures are unwarranted as presented in the FWRIA dated August 2010 and approved by the NYSDEC on August 13 2010 (**Appendix A, Exhibit 3**).

4 Interim Remedial Measure – Remedial Action Objectives

The IRM-RA will consist of paint sludge and impacted soil excavation and off-site disposal from within the Dunham dam**,** followed by restoration. OU-3 consists of undeveloped land which is partially on a residential property and partially within freshwater wetlands identified as Mount Ivy Swamp.

4.1 Remedial Objectives

No site-related groundwater or surface water contamination of concern was identified during site investigations; therefore, the proposed IRM-RA is associated with soil and sediment. The proposed IRM-RA for addressing soil and sediment will meet the following ROs presented below.

ROs for Public Health Protection – Soil

- Prevent ingestions/direct contact with impacted soil.
- Prevent inhalation of or exposure from contaminants volatilizing from impacted soil.

ROs for Environmental Protection – Soil

- 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 impacts from bioaccumulation through the terrestrial food chain.

ROs for Public Health Protection – Sediment

- Prevent direct contact with impacted sediments.

ROs for Environmental Protection – Sediment

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

4.2 Constituents of Concern

Constituents of concern (COCs) were previously identified for paint sludge associated with previous IRM and RA at Operable Unit 1 and Operable Unit 2 associated with the Ford Ramapo Paint Sludge Sites (and under the same OC/AC), respectively. These COCs were established in the Ford Ramapo Operable Unit 2 Site's Record of Decisions (NYSDEC 2014) and referenced for confirmatory sidewall sampling associated with the OU-3 Pre-Design Investigation Work Plan Addendum dated November 2022. The Pre-Design Investigation Work Plan Addendum for OU-3 was approved by the NYSDEC on December 14, 2022; therefore, the following COCs are targeted for remediation (**Table 7**).

Table 7. COCs and Applicable NYSDEC SCOs

Constituents of Concern	Analytical Method	Units	375-6.8(b) NYS Residential Use	375-6.8(b) NYS Protection of Groundwater	Maximum Detected Value at OU-3
VOCs					
Acetone	SW8468260B	mg/kg	100	0.05	0.096
Benzene	SW8468260B	mg/kg	2.9	0.06	18
Ethylbenzene	SW8468260B	mg/kg	30	1	2,000
Toluene	SW8468260B	mg/kg	100	0.7	1,900
Xylene (total)	SW8468260B	mg/kg	100	1.6	15,000
SVOCs					
Naphthalene	SW8468270D	mg/kg	100	12	32
Metals					
Barium	SW8466010C	mg/kg	350	820	3730
Cadmium	SW8466010C	mg/kg	2.5	7.5	2.4
Copper	SW8466010C	mg/kg	270	1720	134
Lead	SW8466010C	mg/kg	400	450	3740
Mercury	SW8467471B	mg/kg	0.81	0.73	0.15
Nickel	SW8466010C	mg/kg	140	130	25.9
Zinc	SW8466010C	mg/kg	2200	2480	643

For remediation and restoration purposes, the NYSDEC Residential and/or Protection of Groundwater Soil SCOs will be applied. The NYSDEC Ecological SCOs are not being applied as potential ecological exposures are unwarranted (**Section 3.7**).

5 Pre-Design Investigation

An investigation of emerging groundwater contaminants was undertaken for OU-3 as directed by the NYSDEC and a PDI was initiated in an effort to define the limits of paint sludge excavation, confirm the wetland extents, and characterize the waste prior to implementing the IRM-RA. These efforts are discussed below.

5.1 Groundwater Sampling for Emerging Contaminants

Monitoring well MW-OB-2 was sampled for emerging contaminants in groundwater in January 2022 (**Figure 4**). While both MW-OB-1 and MW-OB-2 were included in the scope for sampling, only MW-OB-2 was accessible at the time. Based on communication with NYSDEC (March 9, 2022), data from MW-OB-2 was sufficient for characterization of the Site (**Appendix A, Exhibit 4**).

No emerging contaminants of concern were identified in the sample. Analytical results for the sample from MW-OB-2 are provided in **Table 8**. A copy of the analytical report and data verification report are included in **Appendix E** and **F**, respectively. The electronic data deliverable (EDD) was submitted to and accepted by NYSDEC on November 8, 2023 (**Appendix G**).

5.2 Wetland Delineation

Amy S. Greene Environmental Consultants, Inc., now Davey Resource Group, Inc. (Davey), under the direction of Arcadis, conducted a wetlands delineation survey in September 2014 to define the wetlands or open water features present within the Site. Arcadis confirmed this delineation in November 2021. The wetland limits are presented on **Figure 2** and the details are presented in Jurisdictional Wetlands Determination dated January 2022 (Arcadis 2022).

Additional details are presented in the Joint Permit Application (**Appendix B**).

5.3 Confirmatory Soil Sampling

In November and December of 2023, Arcadis performed a test pit investigation to confirm the proposed limits of excavation. In August and September 2023, prior to test pitting, Arcadis retained Davey to clear the Site of large trees within 4-inches of grade to conduct a PDI and prepare for the proposed IRM-RA. Logs were chipped and removed from the Site. Stumps and rootballs will be removed and managed during the proposed IRM-RA. By preparing the Site for the IRM-RA, the PDI test pitting could more easily be implemented.

A total of 17 test pits (CS-1 through CS-17) were installed in the locations depicted on **Figure 5**. To meet frequency requirements for confirmatory sidewall sampling (1 per 50 linear feet of proposed excavation sidewall). Paint sludge was visualized on interior walls of test pits CS-01 and CS-12, but the exterior walls, where confirmatory samples were collected, showed no signs of paint sludge. Test pits CS-04A and CS-05A did not have samples taken as paint chips were observed throughout the test pit. These two test pits were not used to define the limits of excavation.

Confirmatory samples were collected from the 15 test pit locations where the exterior sidewall was identified as visually clean. Confirmatory samples were analyzed for the COCs referenced in **Table 7.** Results showed no exceedances of the Residential and Protection of Groundwater SCOs; therefore, horizontal delineation and

confirmatory sampling is complete. Analytical data is presented in **Table 9** and lab reports and Data Usability Summary Report (are included in **Appendix E** and **F**, respectively. The EDD was submitted to and accepted by NYSDEC on July 24, 2023 (**Appendix G**). Test pit logs are provided in **Appendix C.**

5.4 Quality Assurance/Quality Control

Field protocols, sampling and analytical methods, and quality assurance measures were conducted in accordance with the Site-Specific Quality Assurance Project Plan (QAPP) submitted with the PDI Workplan Addendum dated November 2022. An updated QAPP is provided as **Appendix H**.

5.4.1 Data Quality

Analytical data was validated by Cadena Incorporated (Cadena). Data quality and validation was performed on emerging contaminant samples and confirmation samples to evaluate laboratory method compliance and identify potentially irregular data results.

5.4.2 Data Verification

The data validation process addresses data quality and completeness for site samples and quality control (QC) samples (associated field and laboratory samples). Data impacted by noted excursions from the quality assurance (QA)/QC criteria were qualified based on professional judgment and guidance provided in the following documents: EPA National Functional Guidelines for Inorganic Superfund Methods Data Review (USEPA 2020a); and EPA National Functional Guidelines for Organic Superfund Methods Data Review (USEPA 2020b).

Data validation resulted in a number of detect/non-detect sample results being qualified as estimated (J/UJ) due to minor QC deviations and qualified as non-detect (UB) due to associated QA blanks (i.e., method, trip, and field blanks) contamination.

No data were rejected based on verification. All laboratory data was reviewed and validated by Cadena as being acceptable for the intended purpose with comments and observations being noted in the Data Validation Data Usability Summary Reports (**Appendix F**).

5.5 Pre-Design Investigation Results

Based on the confirmatory soil sampling, the IRM-RA will consist of excavation and disposal of paint sludge impacted soil within an 26,450 square-foot (0.6 acres) area to a maximum depth of 14 feet bgs within Dunham Dam (approximately 8,800 cubic yards).

The proposed limits of remedial excavation are presented on **Figure 5.** The horizontal limits are defined by the confirmatory sidewall samples collected as part of the PDI (**Section 5.3**). The vertical limits will be confirmed through confirmatory base samples collected at a frequency of 1 sample per 1,000 square feet during the waste characterization sampling event planned prior to mobilization for the IRM-RA. Confirmatory base sample locations and results will be submitted as part of the Construction Completion Report (CCR) following implementation of the IRM-RA.

6 Interim Remedial Measure-Remedial Action

This section describes the engineering design process including major design assumptions and rationale used to prepare and implement the RD. Final means and methods of construction will be determined by the contractor in accordance with the Contract Drawings (**Appendix B, Attachment 7**) and Technical Specifications (**Appendix I**).

6.1 Health and Safety

A site-specific health and safety plan (HASP) has been prepared by Arcadis. The selected contractor will be required to prepare a separate site-specific HASP that follows all the health and safety (H&S) requirements outlined by the remedial contractor, as well as any additional H&S requirements determined on the jobsite.

A copy of the Arcadis HASP is located in **Appendix J**.

6.2 Mobilization and Site Preparation

NYSDEC, Ford, Arcadis, the dam design consultant [Tectonic Engineering Company LLC (Tectonic)] contracted by the property owner (Mr. Douglas Dunham), and the remedial contractor(s) will have a remote pre-construction meeting to establish protocols prior to commencing the IRM-RA. Following the pre-construction meeting, the remedial contractor(s) will mobilize to the Site and prepare for implementation of the IRM.

6.2.1 Utility Clearance

Prior to the performance of any intrusive activities, three lines of evidence will be utilized to determine the presence of underground and overhead utilities. The remedial contractor will notify the New York State (NYS) 811 of the planned excavation activities, conduct a geophysical survey of the proposed limits of excavation, and compare the results to historical figures associated with the Site. The NYS 811 notification will be updated monthly for the duration of intrusive activities.

Approximate location of intrusive activities is shown on the Contract Drawings (**Appendix B**, **Attachment 7**).

6.2.2 Soil Erosion and Sediment Controls

The overall limit of disturbance for paint sludge removal including access and supporting infrastructure is approximately 141,600 square feet (SF) (3.3 acres). As such, soil erosion and sediment controls (SESCs) will be implemented prior to commencing excavation activities in accordance with a Stormwater Pollution Prevention Plan (SWPPP; **Appendix B, Attachment 8**). The SWPPP provides installation and maintenance protocol associated with the following SESCs in accordance with the substantive requirements:

- Tree protection limits will be established to protect vegetation outside of the limits of excavation.
- Silt fence or equivalent will be installed to prevent sediment migration from stormwater runoff.
- Stabilized construction entrances will be installed to control construction traffic and site security.
- A material staging area (MSA) will be established for staging materials prior to off-site disposal.
- Decontamination pads will be established for vehicle and equipment decontamination prior to leaving the Site.
- Water spray will be used within work zones and in support zones to suppress dust.

- Seed and mulch will be used to vegetate disturbed areas within 14 days of completion and final grading of an area.
- Erosion matting (biodegradable) will be installed on slopes greater than 25% and within the wetlands, following the placement of seed and mulch.

Imported material to be used for SESCs will meet the requirements established by the DER-10 Section 5.4(e)(5)(i). In addition to traditional SESCs, sediment controls will be implemented for work being conducted within the stormwater retention basin. At a minimum, the following sediment controls will be implemented in accordance with the SWPPP:

- An impoundment structure will be placed within the stormwater retention basin to facilitate excavation to the proposed limits.

The locations of the proposed SESCs are presented on Contract Drawings (**Appendix B, Attachment 7**).

6.2.3 Traffic Control

The remedial contractor will utilize the existing driveway associated with 76 Camp Hill Road for access to the Site (**Appendix B, Attachment 7**). In order to utilize this access, Terra Nova Solutions (Terra Nova) was contracted to replace an existing bridge (driveway crossing).

In August 2023, Terra Nova mobilized to the Site and installed a concrete slab bridge deck set on helical piles. The bridge was designed to accommodate HL-93 loads (fully loaded triaxles). Prior to mobilization, applicable permits were obtained from the Town of Ramapo and the NYSDEC. Following installation, the Town of Ramapo issued a Certificate of Compliance on December 11, 2023. The NYSDEC's GP-02-002 Stream Activities General Permit remains open as the wetlands will be restored as part of this IRM-RA.

6.2.4 Bog Turtle Mitigation

Best management practices for protection of threatened and endangered species will need to be implemented within the wetlands. The best management practices will include installation of a double row of silt fence to prevent adverse impacts to bog turtles or their habitat. The double fence must be installed by hand (no machine use) and the fences set parallel to each other at 3' apart. Once the protective double fence is installed, no machine work may occur outside of the fenced and isolated work area.

For installation of the silt fence and other work within the wetlands, a United States Fish and Wildlife Service (USFWS) recognized Qualified Bog Turtle Surveyor (QBTS) will be present. In the event a bog turtle is identified, work will immediately stop and the QBTS will determine next steps in consultation with the USFWS and NYSDEC as presented in the Threatened and Endangered Species Mitigation Plan (**Appendix B, Attachment 6**).

6.2.5 Supplemental Clearing and Grubbing

Grubbing and additional tree removal deemed necessary for operations will be conducted by the remedial contractor. Stumps and brush will be mulched/grinded for reuse on-site or off-site recycling. Rootballs from previous tree removal and the supplemental clearing and grubbing will be removed and disposed with like soil to facilitate the IRM-RA and restoration. Rootballs located within the extent of dam will be excavated and restored in accordance with the Design Report Dunham Dam prepared by Tectonic under a separate cover.

6.3 Excavation

The remedial contractor will utilize traditional construction equipment to excavate and remove paint sludge and impacted soil to the limits established during the PDI (**Section 5.5**). Excavation of paint sludge may expand beyond the limits of established during the PDI if visible paint sludge is observed.

Currently, it is estimated that 8,000 cubic yards of paint sludge and associated soil within OU-3 will be removed and disposed of off-site during the implementation of the IRM-RA. Additional non-impacted soil will also be removed from outside the remediation area to facilitate the Dunham Dam restoration.

6.3.1 Post-Excavation Sampling

If excavation extends beyond the limits established during the PDI due to observation of paint sludge, a post-excavation sample will be collected to replace the confirmatory sample removed. Post-excavation confirmatory soil samples will be collected in accordance with 6NYCRR Part 375, and with the DER-10. Confirmatory and post-excavation sampling are conducted at a frequency of:

- One sample for every 50 linear feet of sidewall; and,
- One sample from the excavation floor for every 1,000 square feet of bottom.

Samples will be analyzed for the parameters outlined for confirmatory samples within the PDI Work Plan Addendum approved by the NYSDEC on December 14, 2022 (**Appendix A**, **Exhibit 5**).

6.3.2 Air Monitoring

A Community Air Monitoring Plan (CAMP) is required to ensure that the public living and working near the Site, as well as the employees or visitors to the Site, are protected from exposure to airborne impacts during the implementation of the IRM-RA. A copy of the CAMP is included in **Appendix K.**

6.3.3 Impoundment Structure and Water Management

The majority of the excavation is located within the Dunham dam; therefore, an impoundment structure will be constructed within the retention basin to manage standing water. The impoundment structure will be installed approximately 20-30 feet from the shoreline and run parallel to the dam in the vicinity of the excavation (**Appendix B, Attachment 7**). The purpose of the impoundment structure is to minimize surface water entering the open excavation.

6.3.3.1 Surface Water Management and Discharge

Surface water within the impoundment structure will need to be drained to facilitate excavation and placement of backfill during implementation of the IRM-RA. Pumps will draw down the water level within the impoundment structure and hoses and/or pipes will transfer the water to the existing retention basin outlet structure. The existing outlet structure discharges to the wetland via an existing rock lined channel . Sediment from management of surface water will not be washed back into the pond and will be captured by the rip-rap apron. Sediment collected by the rip-rap apron will be containerized and disposed of with the impacted soil and paint sludge. Details regarding construction water management are included in the Construction Water Management and Discharge Plan (**Appendix B, Attachment 9**).

6.3.3.2 Construction Water Management and Discharge

Dewatering will be required to facilitate excavation and placement of backfill during implementation of the IRM-RA. Sumps will be installed within or adjacent to the limits of excavation and water will be extracted via hoses and pumped to totes or a vacuum truck. To minimize the amount of extracted water staged on-site, a wastewater sample will be collected from the initial sump prior to excavation and sampled for waste characterization to establish a waste profile.

If water is extracted via a pump during excavation, the wastewater will be contained in a tote that will be transferred to the proposed MSA when full or at the completion of the workday using traditional construction equipment. If water is extracted by vacuum truck, it will be transferred to a frac tank located in the proposed staging area or directly disposed off-site. No sediments will be allowed to wash back into the pond.

Details regarding construction water management are included in the Construction Water Management and Discharge Plan (**Appendix B, Attachment 9**).

6.3.3.3 Material Handling and Waste Management

Excavation of OU-3 will include all visible paint sludge and soils exceeding residential or groundwater SCOs. Waste characterization samples will be collected prior to mobilization to allow for direct loadout to the extent practical. Waste characterization sampling was outlined in the PDI Work Plan Addendum approved by the NYSDEC on December 14, 2022.

Details regarding material handling and waste management are included in the Soil Management Plan (**Appendix B, Attachment 10**).

6.3.3.4 Impacted Soil and Paint Sludge Working Platform

Traditional construction equipment (i.e., excavators) will be utilized to excavate paint sludge and impacted soils to the required depths. The remedial contractor may elect to establish a working platform within the excavation footprint to facilitate in-situ solidification of saturated materials. To establish the working platform, the remedial contractor will excavate and direct load paint sludge and impacted soil to an established elevation of approximately 402 feet mean sea level (msl) in accordance with the Contract Drawings (**Appendix B, Attachment 7**).

This working platform can then be used to either segment the excavation for saturated soil removal or treat soil in-situ prior to load out. By following this protocol, the goal is to minimize dewatering, minimize the double handling of material, and minimize the need to utilize the material staging area.

6.3.3.5 Saturated Material Removal

Paint sludge and impacted soil will need to meet the paint filter test for transport; therefore, impacted soil and paint sludge beneath the water table will either require dewatering or be solidified for disposal. The remedial contractor will determine in the field the preferred method to allow for the continuation of direct load out. Dewatering will be done in accordance with the Construction Water Management and Discharge Plan (**Appendix B, Attachment 10**).

If the remedial contractor elects to solidify the material to pass the paint filter test, Portland cement or alternate shall be added at a 5% minimum based on the wet bulked weight of material via solid state mixing to ensure

material meets the paint filter test for transport, when necessary. Soil conditioning shall be performed in-situ using either a rotary head, mixing head, or bucket mixing. Soil conditioning shall be to the lines, grades, and cross sections indicated on the Contract Drawings (**Appendix B, Attachment 7**).

6.3.3.6 Proposed Material Staging Area

The proposed MSA will be utilized in instances where paint sludge and impacted soil require additional time to dry to meet the paint filter test or in instances where soil does not visually align the previously established waste characterization results and requires additional sampling. The proposed MSA location was selected based on site logistics and layout (**Appendix B**, **Attachment 7**).

Additional details pertaining to material management and the proposed MSA are presented in the soil management plan (**Appendix B, Attachment 10**).

6.4 Site Restoration

The excavation will be backfilled with certified clean fill and topsoil approved by the NYSDEC. Certified clean fill will be natural mineral soil, void of debris, and have sufficient quality to maintain a vegetation layer, with the upper six inches being high quality topsoil. Clean fill will have an organic content not less than 5%, and topsoil will have an organic content not less than 10% to support the proposed restoration plan.

Documentation regarding analytical organic soil content will be provided to the NYSDEC prior to the importation of clean fill and topsoil. All imported clean fill and topsoil must meet the most stringent of the NYSDEC Residential or Protection of Groundwater Use SCOs.

6.4.1 Dam Restoration

The IRM-RA removal is within the Class A “Dunham Dam.” Classification of the berm as a dam which was assigned after a visual inspection was conducted by the Division of Water, Bureau of Flood Protection and Dam Safety on September 3, 2015. The visual inspection noted several deficiencies (lack of maintenance, dense brush, mature trees, etc.) that needed to be corrected by the property owner in order for the dam to come into compliance with NYS Dam Regulations (**Appendix A, Exhibit 6**).

The property owner, Mr. Dunham, is responsible to address dam deficiencies, design and oversee dam restoration, and for long-term maintenance of the dam. To support these responsibilities, Mr. Dunham contracted Tectonic which has developed a Dunham Dam Design Report submitted under a separate cover as part of the Joint Permit Application (**Appendix B**).

6.4.1.1 Brush and Tree Management

Brush, trees and rootballs located within Dunham Dam will be managed in accordance with the Dunham Dam Design Report as referenced above.

6.4.1.2 Emergency Spillway and New Outlet Structure

Tectonic performed a conduit investigation of the existing outlet structure for the dam and noted additional deficiencies beyond the findings in the inspection conducted by Dam Safety. Based on these deficiencies, Mr.

Dunham opts to abandon this outlet structure in-place and install a new outlet structure and emergency spillway within the limits of excavation associated with the IRM-RA.

The footprint associated with the IRM-RA will therefore not be brought back to existing grade but modified to bring the dam into compliance. As such the proposed final grade contours were presented to the property owners for concurrence and acceptance as required by the Access Agreements (**Appendix B, Attachment 1**). A copy of the concurrence from Rockland County where the dam contours tie into existing grade is provided as **Appendix A, Exhibit 7.** Placement of the certified clean fill and topsoil within the dam limits will be in accordance with the Dunham Dam Design Report.

6.4.1.3 Abandonment of Existing Outlet Structure

The existing outlet structure will be utilized for management of surface water during the IRM-RA. Once an emergency spillway and new outlet structure have been installed within the limits of excavation, the existing outlet structure will be abandoned. Details pertaining to the abandonment of the existing outlet structure and appurtenances are presented in the Design Report Dunham Dam prepared by Tectonic and provided under a separate cover.

6.4.2 Wetland and Upland Restoration

Imported certified clean fill and approximately six to twelve inches of topsoil will be installed within the disturbed upland and wetland areas located outside of the dam extent, respectively. Topsoil will provide a suitable layer for establishment of vegetation.

These surfaces, along with all other disturbed surfaces within the limit of disturbance but outside of the dam extent, will be hydro-seeded and planted in accordance with the Site Restoration Plan prepared by Davey (**Appendix B, Attachment 11)**.

The other surfaces to be restored include an area previously disturbed for bridge replacement and culvert installation at the access driveway on 76 Camp Hill Road. The bridge replacement and culvert installation were performed under a NYSDEC approved GP-0-20-002 dated April 12, 2023 (**Appendix A, Exhibit 8**).

6.5 Demobilization

The remedial contractor will remove all material, waste, and equipment from the Site following stabilization. This includes removal of support zone infrastructure and temporary fencing; however, all erosion control features such as silt fence or equivalent will be maintained, as necessary, until vegetation has been re-established within the limits of disturbance (approximately 85% vegetative cover).

6.6 Green and Sustainable Remediation

Various technical best practices and opportunities have been identified for incorporation into this work. This section summarizes the best practices incorporated to avoid and minimize impacts and comply with the statutory regulations associated with the DER-31:

- Pre-Design Confirmatory Samples – Confirmation sampling was completed prior to the start of the remediation work to pre-determine the limits of excavation. This results in a design that minimizes disturbance

to the wetlands and allows for excavations to be backfilled immediately, reducing the health and safety risk, minimizing the amount of dewatering required and reducing the schedule to allow for restoration sooner and reducing the overall impacts to the environment.

- Pre-Mobilization Waste Characterization – Waste characterization will be completed prior to mobilization. This allows for direct load out of soils and minimizes disturbance to the wetlands as a smaller MSA is required. It also reduces health and safety risks and impact to environment by minimizing material handling and expediting the removal impacted material following generation.
- Transportation and Disposal of Soil – Based on waste characterization results, the contractor will identify the best alternative for shipment of material off-site. It is highly recommended that the contractor dispose of the non-hazardous soils for beneficial reuse as landfill cover, if appropriate and identify a nearby disposal facility that will accept this waste stream. If the material is not acceptable for beneficial reuse, the contractor will consider disposal facilities that may consider processing the waste stream (i.e., thermal treatment) prior to beneficial reuse.
- Reduced Vehicle Idling – Contractor will minimize and/or eliminate idling of on- and off- road vehicles (including equipment) when on-site in accordance with 6 NYCRR Part 217 Motor Vehicle Emissions, Subpart 217-3 Idling Prohibition for Heavy Duty Vehicles.
- Wetland and Upland Restoration – Wetland and upland restoration area will improve the Site to allow for recreation, require minimal maintenance, and allow for infiltration of stormwater.

6.7 Meetings, Facilities, and Reporting

The remedial contractor will establish and maintain support facilities necessary for implementation of the IRM-RA. At a minimum, the remedial contractor will install a field trailer for use by the NYSDEC, Ford, Arcadis, and Tectonic within one week of site mobilization. The field trailer will include electricity and internet for completion of daily tasks.

Furthermore, the remedial contractor will provide potable water and restrooms in accordance with Occupational Health & Safety Administration (OSHA) regulations for all site personnel. Infrastructure will remain in place for the duration of the IRM.

6.7.1 Weekly Progress Meetings

The remedial contractor will also be responsible for hosting a weekly progress meeting for NYSDEC, Ford, Arcadis, Tectonic, and applicable property owners to attend. An agenda will be prepared and distributed before each weekly meeting. In general, the agenda will include the following:

- Overall Progress of the IRM-RA;
- Request for Information Update;
- Contractor Submittals Update/Review Status;
- Review of Health and Safety;
- Review of the Air Monitoring Data; and,
- Schedule Updates.

6.7.2 Construction Completion Report

Removal activities will be documented through the collection of daily field notes, construction reports, and photo logs. At the conclusion of work, a construction completion report (CCR) meeting the requirements outlined in the DER-10 will be prepared to document the completion of the remedial measure and the results of the post excavation confirmatory soil samples. The CCR will include figures identifying the limits of excavation, locations of confirmatory samples, and the extent of the restored area, photographs, tables for the confirmation sampling results, etc.

7 Regulations, Permits, and Other Authorizations

The IRM will comply with applicable federal, state, and local government regulations. Activities will be limited to weekdays (Monday through Friday) and daylight hours (8:00 AM to 5:00 PM). The key regulatory programs to be considered during the design of the IRM include the following:

Federal Codes, Standards and Regulations

- OSHA Standards
- National Institute for Occupational Safety and Health (NIOSH)
- Code of Federal Regulations (CFR)
- Section 404 Clean Water Act

State Codes, Standards and Regulations

- NYSDEC DER-10
- New York Standards and Specifications for Erosion and Sediment Controls
- NYSDEC State Pollutant Discharge Elimination System General Permit for Stormwater Discharge (GP-0-20-001)
- Section 375 Determination of Safety and Sufficiency of Dam or Reservoir
- Section 401 Clean Water Act

Local Codes, Standards and Regulations

- Noise Ordinance for the Town of Ramapo
- Local construction permits: Town of Ramapo

7.1 Permits/Permit Equivalencies

Federal, state, and local permits/permit equivalencies will be obtained for this IRM-RA. A Joint Permit Application has been prepared and will be submitted concurrent with this IRM-RA RD to cover the following regulations (**Appendix B**):

- Nationwide Permit (NWP)-3: Maintenance
- NWP-38: Cleanup of Hazardous and Toxic Waste
- Section 401: Water Quality Certification
- Section 404: Jurisdictional Determination

To facilitate the Joint Permit Application (**Appendix B**), the actions referenced were implemented and documented.

7.1.1 Wetlands Jurisdictional Determination

Wetland descriptions and details were provided in the Water and Wetlands Delineation Report submitted to the United States Army Corps of Engineers (USACE) and NYSDEC in January 2022 and jurisdictional status is further outlined below (Arcadis 2022).

7.1.2 Threatened and Endangered Species

A May 10, 2024 query of the USFWS Information for Planning and Consultation (IPaC) (**Appendix B, Attachment 3**) identified two threatened or endangered species within the Study Area:

- Northern long-eared bat (*Myotis septentrionalis*) – Endangered
- Bog turtle (*Clemmys muhlenbergii)* – Threatened

7.1.2.1 Northern Long-Eared Bat

A review of the USFWS Northern long-eared bat range wide determination key was conducted and a determination of "no effect" was reached for the proposed project. A copy of the Northern long-eared bat "no effect" determination letter is included in the Joint Permit Application (**Appendix B, Attachment 4**).

7.1.2.2 Bog Turtle

On July 22, 2022, Davey completed a bog turtle habitat assessment. One of three wetlands was found to meet the vegetation, hydrological, and soil criteria for bog turtle habitat; however, the suitable habitat would be considered low quality based on the minimum depth of the suitable muck observed and closed canopy cover. Two other wetlands lacked one more of these criteria. Findings were presented in a Phase 1 Bog Turtle Habitat Survey consultation which was submitted to the USFWS on October 23, 2023 (**Appendix B, Attachment 5**).

In an email dated May 16, 2024 from Andrew B. Gordon, USFWS requested either a Phase 2 Bog Turtle Habitat Survey or mitigation measures. Based on the timeline for implementation, mitigation measures for the bog turtle will be implemented in lieu of conducting the seasonal Phase 2 Survey. Mitigation measures are presented within the Threatened and Endangered Species Mitigation Plan associated with the Joint Permit Application (**Appendix B, Attachment 6**).

7.1.2.3 Natural Communities

Additionally, a review of the NYSDEC Environmental Resource Mapper (ERM) did not identify any significant natural communities or rare plants or animals within the Study Area; therefore, a query with the New York Natural Heritage Program (NYNHP) was not necessary.

7.1.3 NYS Office of Parks Recreation and Historic Properties

The New York State Parks, Recreation and Historic Preservation Office determined that no historic properties, including archeological and/or historic resourced will be affected by the undertaking of this work (**Appendix B, Attachment 12**).

7.1.4 NYSDEC Pollutant Discharge Elimination System

A NYSDEC State Pollutant Discharge Elimination System General Permit for Stormwater Discharges from Construction Activity 0-20-001 will be obtained (**Appendix B, Section 6**).

8 Project Schedule

Upon award of the Contract, the remedial contractor will prepare a schedule for the IRM-RA activities in accordance with this document, the Contract Drawings (**Appendix B, Attachment 7**) and Technical Specifications (**Appendix I**). The schedule will be reviewed and revised by Arcadis to include project documentation and deliverables prior to being provided to the NYSDEC.

A conceptual schedule outlining the current timeframes for obtaining the necessary documentation, acquiring the remedial contractor, and implementing the remedial action is provided as **Appendix L**.

9 References

Arcadis. 2007. Site Characterization Report, Ramapo Paint Sludge Site, Town of Ramapo, Rockland County, New York, Site #344064. June

Arcadis 2010a. Fish and Wildlife Resource Impact Analysis, Ramapo Paint Sludge Site, Rockland County, New York. August 2010.

Arcadis 2010b. Remedial Investigation Report, Ramapo Paint Sludge Site, Town of Ramapo, Rockland County, New York, Operable Unit 3. Site #344064, September 1, 2010.

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USACE. 2022. Cleanup of Hazardous and Toxic Waste (NWP-38), February

USEPA. 2023. Clean Water Act Section 401 Water Quality Certification, November

USEPA 2020a. National Functional Guidelines for Inorganic Superfund Methods Data Review. November 2020.

USEPA 2020b. National Functional Guidelines for Organic Superfund Methods Data Review. November 2020.

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Figures

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Regulatory Correspondence

Appendix B

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Appendix C

Soil Boring Logs and Test Pit Logs

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Health and Safety Plan

Appendix K

Community Air Monitoring Plan

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Project Schedule

Arcadis of New York, Inc.
50 Fountain Plaza, Suite 600
Buffalo
New York 14202
Phone: 716 667 0900
Fax: 716 842 2612
www.arcadis.com