AECOM

5015 Campuswood Drive, Suite 104
East Syracuse, New York 13057

August 6, 2018

Mr. Joshua P. Cook, P.E.
Environmental Engineer
New York State Department of Environmental Conservation
Division of Environmental Remediation
615 Erie Boulevard West
Syracuse, New York 13204

Subject: Former GE Farrell Road, NYSDEC Site No. 734055
Response to Submittal of Remedial System Optimization Work Plan

Dear Mr. Cook:

On behalf of Lockheed Martin Corporation (Lockheed Martin), AECOM Technical Services, Inc. (AECOM) is re-submitting the enclosed *Remedial System Optimization Work Plan* (work plan). The work plan has been revised to address comments received from the New York State Department of Environmental Conservation (NYSDEC) on July 17, 2018 regarding the document that was provided to NYSDEC on June 28, 2018.

The NYSDEC comments are repeated below in bulleted, italic font and followed by Lockheed Martin's response in regular font.

1. *Section 3.1 – Based on recent conversations, it is understood some of these details may be included in the AECOM's submittal from their injection sub-contractor. Please provide further details regarding dosing and injection point spacing. What is the required dosing of persulfate? What amount of that dose will be provided by each product (sodium persulfate [SP] and potassium persulfate [KP])? What is the anticipated volume of water that could be injected per location? What is the resultant concentration of SP and KP required per injection point assuming a 10-foot radius of influence (ROI) as stated on page 12 of the work plan? How does that compare to the concentrations at which is possible/necessary to delivery each product? How does that affect injection point spacing? What is the intended overlap for the injection point ROIs?*

In-Situ Oxidative Technologies, Inc. (ISOTEC) has been selected as the injection subcontractor for the remedial system optimization event. A total of 135,784 pounds of Klozur® potassium persulfate (KP), Klozur® sodium persulfate (SP), and hydrated lime is recommended for the full-scale injection event. The breakdown of amendments for each permeable reactive barrier (PRB) is provided in the table below.

Permeable Reactive Barrier	Klozur® Potassium Persulfate (lbs)	Klozur® Sodium Persulfate (lbs)	Hydrated Lime (lbs)
#1	28,652	6,612	13,200
#2	24,244	6,612	10,600
#3	28,652	6,612	10,600
Total	81,548	19,836	34,400

The calculated dosage of amendments was provided by PeroxyChem, the chemical manufacturer, and is based on parameters including groundwater concentrations, treatment area dimensions, soil type, groundwater transport characteristics, and geochemical information. The table below provides additional details including an estimated number of injection points for each PRB, the estimated volume of water to create the slurry, and total slurry volume. Please note that the total solids numbers include the Klozur® KP and hydrated lime. The Klozur® SP will dissolve and not remain in suspension as a solid once added to water.

PRB	Total Solids (lbs)	PRB Width (ft)	PRB Vertical Depth (ft)	Injection Points	Slurry Concentration (% solids)	Water Volume (gallons)	Slurry Volume (gallons)
#1	41,852	150	10	40	25	15,100	17,100
#2	34,844	120	10	34	25	12,500	14,200
#3	39,252	97	15	25	25	14,100	16,000
Totals:	115,948	--	--	99	--	41,300	47,300

The ROI determined during pilot test activities is used as a tool to predict the overlap of injected amendments. The injection points will be spaced at approximately 3.5 to 4.5 feet on center. This may vary slightly based on field conditions, but in general should provide 15.5 to 16.5 feet of overlap between the injection points (assuming the 10 ft ROI).

You will note that the width of PRB#1 is now listed as 150 feet instead of 164 feet. This is a more realistic length of barrier based on field conditions and is deemed to provide sufficient treatment coverage. The work plan has been updated to reflect this adjustment.

2. Section 3.2, Final Paragraph – How was it determined that hydrated lime alone, without sodium hydroxide, was sufficient for activation?

PeroxyChem is the manufacturer and supplier of both the Klozur® KP and Klozur® SP products. They were consulted and they recommended the use of solely hydrated lime for the full-scale injection event. PeroxyChem indicated that they have found hydrated lime to be the preferred and recommended activator for Klozur® KP, based on bench-scale testing and full-scale field implementations at other sites. Both Klozur® KP and hydrated lime are solid state and slow release chemicals, which are ideal for ensuring sufficient alkaline conditions are maintained throughout the life-time of the oxidant barrier. Additionally, the hydrated lime is applicable for ensuring activation of the Klozur® SP since the primary function of the Klozur® SP is to treat non-target demand (soil oxidant demand) in soils directly contacting the Klozur® KP as installed, as well as to help minimize the dissolution of Klozur® KP during installation. Therefore we were able to simplify the reagent blend by having a single alkali source.

3. Section 3.2 – Injections should proceed from the downgradient end; so from PRB#3. That will provide a treatment zone for any groundwater which is pushed downgradient by injections at PRB#1 and #2. If LMC/AECOM wish to conduct a limited number of injections closer to the staging area initially, in order to identify any potential concerns, that would be acceptable, but that should be limited to approximately 5 locations.

AECOM is in agreement with the NYSDEC. A limited number of injections closer to the staging area will be initially conducted to work out the logistics, however following that, injections at PRB#3 will be conducted first, followed by injections at PRB#2, followed by injections at PRB#1.

4. Section 3.3 – A spill boom or other containment device must encircle each active injection point. The boom/device should be placed in as small an area as possible to limit the area of impact from any spills or surfacing without inhibiting the work.

This requirement has been included in Section 3.3.

5. Section 3.3 – A shallow drip pan, or other secondary containment, must be placed below or around each hose coupling which is located outside of other secondary containment devices. Note, a bucket is not an acceptable device for this.

This requirement has been included in Section 3.3.

6. Section 3.3 – Secondary containment must be provided around any secondary mixing vessel and any other equipment (pumps, etc.) which are located outside of other secondary containment devices.

As stated in Section 3.3, all mixing, dilution and pumping equipment will be placed or staged in a secondary containment device.

7. Section 3.3 – Include a requirement for notification of spills, including information regarding spills of reportable quantities of hazardous substances.

This requirement has been included in Section 3.3.

8. Section 3.3, 2nd Paragraph, Final Sentence – Depending on the temperatures which would be of concern for the stored product, LMC/AECOM may want to consider using a storage container/office with air conditioning.

The NYSDEC's comment has been considered and discussed. An air conditioned storage unit is not proposed for use. PeroxyChem recommends that the chemicals be stored at temperatures below 45ºC (113ºF). Weather conditions will be monitored throughout the duration of the project and accommodations will be made as required.

9. Section 3 – Include a sub-section for remedial action monitoring, to include, at a minimum, the planned inspections of the Seneca River and groundwater monitoring. Groundwater monitoring must include, at a minimum, monitoring of water quality indicators (WQI). The minimum frequency for monitoring and inspection must be specified.

Section 3 has been updated to include a sub-section to address this requirement.

10. Section 3.5.1 – MW-28, ML-2A and ML-3E will be included in the WQI monitoring. If the WQI indicate the well is being influenced significantly by the injection, then the well will be included in the next quarterly sampling event in order to evaluate if the injection process is pushing contaminated groundwater towards these wells. Sampling of these wells for subsequent quarterly events would be based on the analytical results.

This requirement has been included in Section 3.3. Following collection of water quality indicators during the injection event, the NYSDEC will be consulted to discuss and agree as to whether significant influence as a result of the injection has occurred.

11. Table 2 – The "U" qualifier should be deleted for hexavalent chromium for MW-29, 3-month and 6-month, and MW-30, 3-month and 6-month.

This comment has been addressed.

On July 20, 2018, AECOM exchanged email communication with the United States Army Corp of Engineers (USACE) regarding the number of bore hole locations necessary to complete the RSO scope of work. The USACE permit originally acknowledged 100 bore hole locations, however the number of approved locations has been increased to 150. A copy of the email correspondence is included with the USACE permit in Attachment C**.** Additionally, please note that an updated Figure 15 has been included to show the final preferred staging area layout.

We look forward to receiving approval from the NYSDEC to commence activities associated with the revised *Remedial System Optimization Work Plan*. If you have any additional questions or comments, please do not hesitate to contact me at (315) 928-4331.

Sincerely, AECOM

Carey Letts

Carey Letts
Project Manager

Ec. Margaret Sheen (NYSDEC OGC)
Harry Warner, PE (NYSDEC)
Maureen Schuck (NYSDOH)
Mark Sergott (NYSDOH)
Jill Fonte (Lockheed Martin)
R. Stan Phillips (Lockheed Martin)
Myron Parkolap (Lockheed Martin)
Norm Varney, Esq. (Lockheed Martin)
Robert Pezzimenti, Esq. (Lockheed Martin)
Virginia Robbins (Bond, Schoeneck & King)
Marco Marzocchi (Widewaters Farrell Rd II Co LL)
Nickcole M. Evans, (AECOM)
Mark Distler (O'Brien & Gere)
Eric Alongi (O'Brien & Gere)

Attachments: Remedial System Optimization Work Plan (Revised August 2018)

AECOM

REMEDIAL SYSTEM OPTIMIZATION WORK PLAN

NYSDEC Site Number: 734055

Former GE Farrell Road
Onondaga County
Town of Geddes, Syracuse, New York

Prepared for:
Lockheed Martin Corporation
Building EP6 – Room 100B
Liverpool, NY 13088

Prepared by:
AECOM
5015 Campuswood Drive
East Syracuse, NY 13057

June 2018
Revised August 2018

AECOM

Certification Statement

I, Nickcole M. Evans, certify that I am currently a New York State registered professional engineer as defined in 6 NYCRR Part 375 and that this *Remedial System Optimization Work Plan* was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the Division of Environmental Remediation (DER) Technical Guidance for Site Investigation and Remediation dated 2010.

Nickcole M. Evans, P.E.
License Number 085978

08/06/2018
Date

In accordance with New York State Education Law, it is a violation for any person, unless she or he is acting under the direction of a licensed professional engineer, to alter this document in any way.

AECOM

Table of Contents

1. Introduction *1*

1.1 Purpose 1

1.2 Site Description 1

1.3 Remedial Action Objectives 1

1.4 Previous Feasibility Study and Remedial Alternative 2

1.4.1 Groundwater Extraction and Treatment System Area 2

1.4.2 Area of Concern #5 3

1.4.3 Remedial Alternative 4

1.5 Report Organization 5

2. Background and Current Conditions *5*

2.1 Site Geology and Hydrogeology 5

2.2 Nature and Extent of Contamination 6

2.2.1 The Wetlands 6

2.2.2 Area of Concern #5 6

2.3 Understanding of Current Risk Pathways 6

2.4 Bench Scale Studies 6

2.5 In-Situ Chemical Oxidation Treatment Technology 7

2.6 In-Situ Chemical Oxidation Field Pilot Study 7

2.7 Current Extent of Volatile Organic Compounds and 1,4-Dioxane in Groundwater 9

2.7.1 The Wetlands 9

2.7.2 Area of Concern #5 10

3. The Wetlands – Full-Scale Treatment Implementation *10*

3.1 Basis of Design 11

3.2 General Injection Procedures 12

3.3 Chemical Handling, Storage and Containment 13

3.4 Water Quality Monitoring 14

3.5 Permits 14

3.5.1 United States Environmental Protection Agency – Underground Injection Control 14

3.5.2 United States Army Corp of Engineers Nationwide Permit 14

3.5.3 New York State Department of Environmental Conservation 15

3.6 Post-Injection Monitoring 15

3.6.1 Quarterly Groundwater Sampling Program 15

3.6.2 Post-Injection Monitoring Program 16
3.7 Reporting 17
4. Area of Concern #5 17
4.1 Source Area 17
4.2 Downgradient Area 17
5. Schedule 18
6. References 18

LIST OF TABLES

Table 1 - Baseline, 3-Month and 6-Month Post-ISCO Groundwater Analytical Data (Volatile Organic Compounds - Pilot Test Monitoring Wells)
Table 2 - Baseline, 3-Month and 6-Month Post-ISCO Groundwatwer Analytical Data (Geochemical Parameters - Pilot Test Monitoring Wells)
Table 3 - Soil Analytical Data (The Wetlands - Historical and Current)
Table 4 - Soil Analytical Data (AOC #5 - Historical and Current)
Table 5 - Groundwater Analytical Data (AOC#5 - Historical and Current)

LIST OF FIGURES

Figure 1 – Site Location Map
Figure 2 – Site Map
Figure 3 – Area of Concern #5 Former Soil Vapor Extraction System Area
Figure 4 –Pilot Test Treatment Area #1
Figure 5 - Pilot Test Treatment Area #2
Figure 6 - Soil Analytical Data (The Wetlands - Current)
Figure 7 - Isocontours for Volatile Organic Compounds in the Wetlands (Deep Wells - September 2016)
Figure 8 - Isocontours for Volatile Organic Compounds in the Wetlands (Deep Wells - August/September 2017)
Figure 9 - Isocontours for Volatile Organic Compounds in the Wetlands (Deep Wells - May 2018)
Figure 10 - Isocontours for 1,4-Dioxane in the Wetlands (Deep Wells - September 2016)
Figure 11 - Isocontours for 1,4-Dioxane in the Wetlands (Deep Wells - August/September 2017)
Figure 12 - Isocontours for 1,4-Dioxane in the Wetlands (Deep Wells - May 2018)
Figure 13 - Soil Analytical Data (AOC #5 - Historical and Current)
Figure 14 - Groundwater Analytical Data (AOC #5 - Historical and Current)
Figure 15 - Full-Scale Remedial System Optimization (The Wetlands)

LIST OF ATTACHMENTS

Attachment A – Laboratory Analytical Data (6-Month Post-ISCO Geochemistry)
Attachment B - PeroxyChem Klozur® KP Mixing Guidelines
Attachment C - United States Army Corp of Engineers Nationwide Permit No. 38
Attachment D – New York State Department of Environmental Conservation Protection of Water Permit

Acronyms and Abbreviations

1,1,1-TCA	1,1,1-trichloroethane
1,1-DCA	1,1-dichloroethane
1,1-DCE	1,1-dichloroethene
1,2-DCA	1,2-dichloroethane
µg/kg	micrograms per kilogram
µg/L	micrograms per liter
AHC	Area With the Highest Concentrations
AIW	Air Injection Well
AOC	Areas of Concern
COCs	Contaminants of Concern
Cr6+	Hexavalent chromium
CVOCs	Chlorinated Volatile Organic Compounds
DER-10	Technical Guidance for Site Investigation and Remediation
DNAPL	Dense Non-Aqueous Phase Liquids
DPT	Direct Push Technology
FS	Feasibility Study
ftbg	feet below grade
ft	feet
FRP	Farrell Road Property
GE	General Electric
GWETS	Groundwater Extraction and Treatment System
HASP	Health and Safety Plan
HDPE	High Density Polyethylene
IRM	Interim Remedial Measures
ISCO	In-Situ Chemical Oxidation
ISMP	Interim Site Management Plan
Klozur® KP	Klozur® Potassium Persulfate
Klozur® SP	Klozur® Sodium Persulfate
LNAPL	Light Non-Aqueous Phase Liquids
MIBK	methyl isobutyl ketone
MIP	Membrane Interface Probe
ML	Multi-Level Monitoring Wells
MW	Monitoring Well
NAVD1929	North American Vertical Datum 1929
NWP 38	Nationwide Permit application
NYSDEC	New York State Department of Environmental Conservation)
NYSDOH	New York State Department of Health
OBG	O'Brien & Gere
O&M	Operation and Maintenance
ORP	Oxygen Reduction Potential
Parsons	Parsons Engineering Science, Inc.
PDI	Pre-Design Investigation
PeroxyChem	PeroxyChem Environmental Solutions Laboratory
pH	measure of acidity

PPE	Personal Protective Equipment
ppm	parts per million
PRB	Permeable Reactive Barrier
RAO	Remedial Action Objectives
RI	Remedial investigations
ROD	Record of Decision
ROI	Radius of Influence
RW	Recovery Well
SCG	Standards, Criteria and Guidance
SDS	Safety Data Sheets
SSDS	Sub-Slab Depressurization System
SO_4^{2-}	Sulfate
sq. ft.	square feet
SVE	Soil Vapor Extraction
TCE	trichloroethene
UIC	Underground Injection Control
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
USTs	Underground Storage Tanks
VOCs	Volatile Organic Compounds
VRW	Vapor Recovery Well
ZVI	Zero Valent Iron

1. INTRODUCTION

1.1 PURPOSE

On behalf of Lockheed Martin Corporation (Lockheed Martin), AECOM is pleased to provide this *Remedial System Optimization Work Plan.* This work plan includes historic and recent investigation data, evaluates results from recent bench-scale and pilot study implementations, presents a revised conceptual site model, and makes recommendations for the full-scale remedial approach, for the Former General Electric (GE) Farrell Road site (the site) located in the Town of Geddes, New York.

This work plan builds upon framework for the remedial approach established in the Record of Decision (ROD) issued by the New York State Department of Environmental Conservation (NYSDEC) in 1997 incorporating an optimized approach based on the current conceptual site model.

1.2 SITE DESCRIPTION

The site consists of 16.6 acres located in an industrial setting on Farrell Road in the Town of Geddes, northeast of Routes 690 and 90 and south of the Seneca River (**Figure 1**). The site includes an industrial building (Building #2) that is approximately 310,500 square feet (sq. ft.) in size, a garage that is approximately 8,000 sq. ft. in size and Class I wetlands on the north side of the site (**Figure 2**). Further north of the site, the Class I wetland area continues north to the Seneca River. Currently, the site is classified as Class 4 on the NYSDEC Registry of Inactive Hazardous Waste Disposal Sites (Site #734055).

1.3 REMEDIAL ACTION OBJECTIVES

In accordance with the NYSDEC approved Interim Site Management Plan (ISMP) dated July 25, 2017 (AECOM, 2017), the remedial action objectives (RAOs) are defined as follows:

1. Mitigate the potential threat to the Class I wetland biotic community resulting from the continued migration of contaminated groundwater to the wetland from the developed portion of the property.
2. Protect potential future on-site workers.
3. Achieve groundwater standards, where practicable.
4. Provide for attainment of Standards, Criteria and Guidance (SCGs) for Class I wetlands by eliminating the discharge of contaminated groundwater into the wetland.
5. Protect human health by preventing the migration of contaminants in groundwater towards the Seneca River.

The groundwater SCGs identified for the site are based on NYSDEC Ambient Water Quality Standards and Guidance Values. 1,4-Dioxane was added to the analyte list for groundwater samples for this site in accordance with a request from the NYSDEC dated May 29, 2013. The United States Environmental Protection Agency (USEPA) has stated the level of 1,4-dioxane in drinking water that would correspond to a 1 in one million risk of cancer is 0.35 micrograms per liter (µg/L).

An additional standard for reference is the New York State Department of Health (NYSDOH) drinking water standard of 50 µg/L for Unspecified Organic Contaminants. Currently, NYSDEC does not have a groundwater standard promulgated for 1,4-dioxane. Therefore, until a standard is promulgated, 1,4-dioxane will continue to be monitored and reported to the NYSDEC without direct comparison to a cleanup objective.

1.4 PREVIOUS FEASIBILITY STUDY AND REMEDIAL ALTERNATIVE

Remedial investigations (RIs) conducted in the 1990s identified 16 areas of concern (AOCs) at the site. The current site layout is shown on **Figure 2**, and historical activities associated with each AOC are summarized in the ISMP.

A Feasibility Study (FS) was conducted in 1997 (Parsons ES, 1997) to develop and evaluate remedial options to address site-wide groundwater impacts and soil impacts at several AOCs. The FS concluded that to meet the RAOs, hydraulic containment using groundwater recovery wells and treatment of extracted groundwater through air stripping was the recommended remedy for site-wide groundwater. This remedy became known as the Groundwater Extraction and Treatment System (GWETS) and is discussed further in **Section 1.4.1**.

The FS also concluded that no further remedial action was required at AOC #5, AOC #7, and AOC #16 beyond the previously established interim remedial measures (IRMs). The IRMs would continue to be operated consistent with approved work plans in an effort to address soil impacts in those areas. Closure of AOC #5 was approved by the NYSDEC in December 2002. Closure of AOC #16 was approved in December 2002 and groundwater in this area is monitored on an annual basis. Closure of AOC #7 was approved in October 2015 and groundwater in this area is monitored on an annual basis. The GWETs system continued to operate until October 2014 to manage volatile organic compound (VOC) impacts to groundwater.

1.4.1 Groundwater Extraction and Treatment System Area

Based on the results of the RIs, an area of groundwater containing elevated concentrations of chlorinated and non-chlorinated solvents was identified on the Farrell Road Property (FRP-2) property (ERM, 1994c). The primary source of groundwater impacts was attributed to the contaminated soils at AOC #5. Impacted groundwater flows north from the developed portion of the site and discharges to the Class I wetland.

GWETS was selected by the FS as the remedial strategy to eliminate discharge of groundwater from the developed portion of the site to the Class I wetland. A Phase I Pre-Design Investigation (PDI) was conducted in October 1997 to assess the soil and groundwater characteristics along the northern border of the site where the proposed remedial action was planned for implementation. The Phase I PDI consisted of soil characterization from soil borings and groundwater chemical characterization from temporary and permanent monitoring wells.

A Phase II PDI was conducted in May 1998. The purpose of the Phase II PDI was to estimate groundwater extraction well capture zones, to determine the pumping rate necessary to achieve hydraulic containment and thereby determine the expected resulting flow to the site-wide GWETS, and to collect groundwater samples to verify the groundwater characteristics upon which to base the site-wide GWETS. On December 8, 1998, Parsons Engineering Science, Inc. (Parsons), on behalf of Lockheed Martin, submitted a Remedial Design Report, and the NYSDEC approved it on January 6, 1999 (Parsons, 1999).

Remedial construction of the site-wide GWETS was initiated on January 11, 1999 and completed on February 19, 1999. The site-wide GWETS consisted of four additional groundwater extraction recovery wells (RW) (RW-4, RW-5, RW-6, and RW-7) along the northern edge of the developed portion of the site. These wells were added to the groundwater recovery system already in operation at AOC #16 (RW-1, RW-2, and RW-3) to intercept and remove contaminated groundwater. In November 2001, modifications were made to the site-wide GWETS including installation of four additional recovery wells (RW-8 through RW-11) with associated piping and miscellaneous system upgrades that were intended to enhance groundwater hydraulic control and treatment system operation and maintenance.

The GWETS was operated pursuant to the NYSDEC approved Operation and Maintenance (O&M) Plan prepared by Parsons Engineering dated 1999, a revised O&M Plan prepared by Plumley Engineering in 2013, and in combination with continued operation of the source control IRMs already in place at the site in AOC #5, AOC #7, and AOC #16 until they were shut down in 2002, 2015, and 2002 accordingly.

In May 2013, the NYSDEC first required the inclusion of 1,4-dioxane in analysis of groundwater samples at the site. 1,4-Dioxane was detected at RW-5, RW-9, and RW-10 during the proceeding groundwater sampling event conducted in August 2013. In 2014 a subsurface investigation was conducted to document the soil and groundwater conditions on the north side of the site and included installation of six monitoring well (MW) clusters (PMW-1 through PMW-6). During the investigation, 1,4-dioxane was detected in groundwater at new wells PMW-4I/D, PMW-5I/D, and PMW-6I/D.

Due to asymptotic recovery levels by the GWETS system, a temporary shutdown was pursued and approved by the NYSDEC on September 17, 2014. The system was shut down on October 15, 2014. During the temporary shutdown of the GWETS, all of the interior system equipment was dismantled and removed from the former maintenance garage building. The dismantling of equipment began on October 23, 2014, and was concluded the week of November 10, 2014; however, much of the infrastructure for the groundwater extraction and treatment system remains at the site and is further described in Section 3.3 of the ISMP.

1.4.2 Area of Concern #5

Up to nine 275-gallon underground storage tanks (USTs) containing both chlorinated and non-chlorinated solvents and a paint drippings drywell were located along the west wall of Building #2. The USTs were reportedly removed in 1986, and the drywell was removed in 1992.

In 1992, a soil boring investigation was conducted in the vicinity of the removed tanks and throughout the interior of Building #2 to determine the extent of affected soil and groundwater beneath the building. Light, non-aqueous phase liquids (LNAPL) were observed at the approximate depth of the water table at borings and test pits installed near the location of the former USTs. A soil gas survey indicated the presence of VOCs and was followed by sampling and analysis which identified VOC concentrations, including chlorinated and aromatic hydrocarbons, in the soil. Downgradient of the former USTs, beneath the building, a suite of dissolved VOCs was detected similarly to VOCs detected in the vicinity of the former USTs. Analytes detected at these downgradient locations and in exceedance of NYSDEC cleanup objectives included 1,1-dichloroethene (1,1-DCE), 1,1-dichloroethane (1,1-DCA), 1,1,1-trichloroethane (1,1,1-TCA), 1,2-dichloroethane (1,2-DCA), trichloroethene (TCE), toluene, methyl isobutyl ketone (MIBK), ethylbenzene, benzene, and xylenes.

Various remedial options were evaluated for AOC #5, and soil vapor extraction (SVE) was selected as the appropriate IRM to manage soil impacts. The NYSDEC approved the selection, and the remedial system was installed between October and December 1994.

Following the installation of the SVE system wells in October 1994, free-phase LNAPL was observed at air injection wells (AIW) AIW-201, AIW-204, AIW-206, and vapor recovery well (VRW) VRW-207, and dense-NAPL (DNAPL) was observed at wells VRW-203 and AIW-201 (**Figure 3**). A follow-up investigation assessed the horizontal and vertical extent of LNAPL and DNAPL in AOC #5, and the phases were determined to be chemically similar (i.e., multi-component NAPLs). A NAPL monitoring and removal program was approved by the NYSDEC in October 1995. During the program (September 1995 through August 1996 with periods of monitoring only), approximately 7.76 gallons of DNAPL were removed from well VRW-203, and 1.7 gallons of LNAPL were removed from well VRW-207.

The SVE remedial system was activated on November 13, 1995 and operated until 2002. A confirmatory soil sampling program was conducted at AOC #5 in September 2002. A total of 18 soil samples were collected from a depth of 6 to 8 feet below grade (ftbg), corresponding to the depth at which the most affected pre-remedial samples had been collected. All VOCs in confirmatory samples were below laboratory detections, except 1,1,1-TCA which was detected at CSB-504 at a concentration of 0.269 parts per million (ppm), which was less than its unrestricted use soil cleanup objective of 0.68 ppm. On November 1, 2002, Lockheed Martin requested approval to permanently shut down and decommission the SVE system at AOC #5 (Lockheed Martin, 2002), which was approved by the NYSDEC through correspondence dated December 9, 2002.

1.4.3 Remedial Alternative

Following completion of the remedial work described above, soil and groundwater contaminants continued to persist on site, these contaminants are hereafter referred to as “remaining contamination”. The site has been undergoing remedial system optimization during which alternative remedial technologies have been evaluated in an effort to address remaining contamination.

1.5 REPORT ORGANIZATION

This work plan is organized as follows:

- Section 2 presents a summary of site background, including discussion of alternative remedial technology evaluation,
- Section 3 presents the details of the full-scale treatment design and implementation,
- Section 4 presents current information on AOC #5, and
- Section 5 presents the project schedule.

2. BACKGROUND AND CURRENT CONDITIONS

2.1 SITE GEOLOGY AND HYDROGEOLOGY

Historic and recent site investigations demonstrate the site geology includes soils that are composed of a medium to fine sand and silt with traces of clay. The relative uniformity of the soils is supported by data collected during the 2016 Membrane Interface Probe (MIP) investigation which indicated little variability in conductivity, hydraulic pressure, and flow rates into the formation. Based on the halogen-specific detector, photoionization and flame ionization readings collected by the MIP, it does not appear that there are seams and/or layers of relatively fine grain sediment that have adsorbed and/or concentrated contaminant mass (AECOM, 2017).

The overburden material generally consists of fine sand and silts with traces of clay that coarsens downwards with depth to a fine to medium grain sand with trace fine gravel. This surficial unit transitions to an underlying dense red clay glacial till at depths ranging between approximately 28 and 35 ftbg in the vicinity of the GWETS area and between approximately 12 and 26 ftbg in the vicinity of AOC #5 (AECOM, February 2017). The red clay till unit is at least 104 feet (ft) thick at the south end of the site and 70 ft thick at the north end (ERM, 1995) and is believed to represent a relatively impermeable boundary that restricts downward contaminant migration.

The groundwater elevations measured during the site-wide gauging event in August 2017 ranged from an average of 367.19 ft North American Vertical Datum 1929 (NAVD1929) in the shallow zone to 362.25 ft NAVD1929 in the deep zone for wells located in the paved area north of Building #2. Immediately downgradient of the parking lot, in the vicinity of PMW-4 through PMW-6, the groundwater elevation ranged from an average of 364.76 ft NAVD1929 in the shallow zone to an average of 365.97 ft NAVD1929 in the deep zone. Further downgradient in the wetland, in the vicinity of PMW-9 through PMW-13, the groundwater elevation ranged from an average of 363.69 ft NAVD1929 in the shallow zone to an average of 364.06 ft NAVD1929 in the deep zone. Groundwater in the surficial geologic unit flows to the north towards the Seneca River under a horizontal gradient of approximately 0.01 ft/ft, at an estimated average seepage velocity of 50 ft/year.

2.2 NATURE AND EXTENT OF CONTAMINATION

2.2.1 The Wetlands

The wetlands area has previously been referred to in reports as the "area with the highest concentrations" (AHC) and was defined as the area downgradient of the GWETS. Herein this area will be referred to as "the wetlands". The primary contaminants of concern (COCs) in the wetlands groundwater include chlorinated VOCs (CVOCs), predominantly 1,1,-DCE, 1,1,-DCA, and the solvent stabilizer, 1,4-dioxane.

The wetlands area includes monitoring well clusters PMW-4, PMW-5, PMW-6, PMW-9, PMW-10, PMW-11, PMW-12, PMW-13, multi-level monitoring wells ML-2, ML-3, and single wells MW-18 and MW-28.

2.2.2 Area of Concern #5

AOC #5 is located immediately adjacent to and upgradient of Building #2 (**Figure 2**). The key COCs in AOC #5 soil and groundwater include VOCs, primarily ethylbenzene, toluene, m,p-xylene, and o-xylene. The AOC #5 includes monitoring wells MW-27 and MW-31.

2.3 UNDERSTANDING OF CURRENT RISK PATHWAYS

Existing risk pathways related to contaminated groundwater at the site include:

- Potential impacts to wetlands and surface water (Seneca River), and
- Potential for soil vapor intrusion to Building #2.

Currently, the aquifer on the northern portion of the site, under the wetlands where remaining contamination exists, is not used as a drinking water source and no structures are present; therefore, ingestion and vapor inhalation do not currently pose a health risk in these areas.

Remaining contamination beneath the southwest portion of the site is immediately upgradient and beneath Building #2, where a sub-slab depressurization system (SSDS) is in operation. Plans to expand the coverage of the current SSDSs, as well as add at least one additional system over what is believed to be the remaining source area, are currently being developed by O'Brien & Gere (OBG) on behalf of Lockheed Martin.

2.4 BENCH SCALE STUDIES

Three laboratory bench-scale treatability studies evaluating various in situ remedies including in-situ chemical oxidation (ISCO), aerobic cometabolic bioremediation, and anaerobic bioremediation were initiated in March 2017. Results from the bioremediation treatability studies performed by AECOM's laboratory in Austin, Texas, demonstrated aerobic cometabolic bioremediation was effective for the treatment of 1,4-dioxane, but only if 1,1-DCE and 1,1-DCA were not present, as the presence of 1,1-DCE and/or 1,1-DCA inhibits the cometabolic 1,4-dioxane degradation pathway. Anaerobic bioremediation was shown to be effective at treating 1,1-DCE and 1,1-DCA, however, it resulted in partial but incomplete degradation of 1,4-dioxane.

These results indicate that bioremediation may be a viable treatment technology for 1,1-DCE, 1,1-DCA, and 1,4-dioxane. However, biological treatment would have to be applied in two separate and consecutive phases because the destruction of 1,4-dioxane by way of the cometabolic pathway is inhibited by the presence of 1,1-DCE and 1,1-DCA, meaning the VOCs would have to be treated prior to 1,4-dioxane treatment.

An ISCO bench scale treatability study was completed by PeroxyChem Environmental Solutions (PeroxyChem) laboratory, located in Tonawanda, NY. Using soil and groundwater from the site, bench scale tests were conducted using slow-release, alkaline-activated Klozur® potassium persulfate (KP) in a column study set-up to emulate a potential permeable reactive barrier (PRB), and alkaline-activated, readily soluble Klozur® sodium persulfate (SP) in a batch study set-up to emulate treatment of 1,4-dioxane and other COCs.

The bench-scale studies performed by PeroxyChem demonstrated that Klozur® KP and Klozur® SP can both effectively treat 1,4-dioxane and other VOCs in a lab setting using soil and groundwater from the site. Klozur® KP activated with hydrated lime was more effective at treating the COCs compared to the treatment where the same oxidant was activated using zero valent iron (ZVI). The Klozur® KP slowly dissolved as expected, lasting between 26 and 35 pore volumes. Additionally, Klozur® SP with alkaline activation successfully treated the COCs to below laboratory detection limits. PeroxyChem recommended that this concept be further evaluated using a field pilot study.

An *In Situ Chemical Oxidation Treatability Study Summary Report and Pilot Test Work Plan* was prepared and submitted to the NYSDEC on November 22, 2017. Pilot test activities were conducted in November and December 2017, details are provided in **Section 2.6**.

2.5 IN-SITU CHEMICAL OXIDATION TREATMENT TECHNOLOGY

ISCO is a widely accepted remediation technology used for the treatment of both chlorinated compounds and petroleum based contaminants found in soils and groundwater. Typical ISCO applications include injection of chemical oxidants (i.e., permanganate, persulfate, peroxide, or ozone) into the subsurface using various injection methodologies, targeting contact with the contaminated media. As the oxidants contact the COCs, they are broken down into less harmful byproducts. Oxidant selection is typically based on the type, extent, and location of COCs, lithology, and natural geochemical conditions of the treatment area.

Based on the site-specific contamination type, location, and results from bench scale tests the chosen oxidants includes a combination of alkaline activated Klozur® KP and Klozur® SP. Klozur® KP is a low solubility ISCO reagent, which has to be injected as a slurry and allows for an extended release of the persulfate anion into groundwater, over long periods of time. Klozur® SP is a water soluble oxidant that is commonly used to treat a wide range of COCs and can easily be applied using traditional injection methodologies.

2.6 IN-SITU CHEMICAL OXIDATION FIELD PILOT STUDY

The pilot test was conducted in two areas; the wetlands and AOC #5. Both pilot tests incorporated traditional direct-push injection methods to apply the remedial chemicals.

Details regarding the observations and results from the pilot test are included in the *In Situ Chemical Oxidation Pilot Test Summary Report* prepared by AECOM in April 2018.

The first pilot test was conducted on the northern side of the site in the vicinity of PMW-2 and PMW-3 and is referred to as "Treatment Area #1" (**Figure 4**). The pilot test was designed to simulate a PRB with the application of alkaline activated Klozur® KP and Klozur® SP, the remedial option conceptualized for use in the wetlands.

During the pilot test in Treatment Area #1, injection points were advanced approximately 8 feet apart in a line perpendicular to groundwater flow, so as to form a PRB to intercept groundwater contaminated with CVOCs and 1,4-dioxane. A total volume of 2,120 gallons of combined Klozur® KP, Klozur® SP, and base activators was injected between seven injection locations from a depth of 23 to 33 ftbg. The pilot test PRB was designed to persist for an approximate 6 month time period. Evidence of influence, including an increase in pH and presence of persulfate, was observed at 5 feet and 10 feet downgradient at MW-29 and MW-30, respectively, and at 15 feet upgradient at PMW-2D and PMW-3D.

Observations from the pilot test in Treatment Area #1 indicated that contact was established between groundwater COCs and the injected chemical oxidants. During the 3-month and 6-month post-ISCO monitoring events, a continued presence of persulfate and elevated pH was detected in MW-29, indicative of the persistence of the oxidant in the PRB zone. Concentration reductions for CVOCs and 1,4-dioxane were observed in upgradient wells (PMW-2D, PMW-3D), and downgradient wells (MW-29, MW-30, and MW-26D). Baseline, 3-month and 6-month post-ISCO data for monitoring wells in Treatment Area #1 and the downgradient area, are provided in **Table 1**. The results from field-scale application of oxidants in Treatment Area #1 confirm the findings of the bench-scale laboratory tests: the combined ISCO approach using Klozur® KP and Klozur® SP can successfully degrade the mix of chlorinated and non-chlorinated VOCs and 1,4-dioxane in groundwater at this site (AECOM, 2018).

Hexavalent chromium (Cr^{6+}) monitoring is part of the post-ISCO monitoring program to examine the mobilization of this metal following ISCO injection. The 6-month post-ISCO monitoring event was not originally scheduled to include Cr^{6+}, however it was included based on a request from NYSDEC. Additionally, the NYSDEC asked that PMW-9D also be monitored if groundwater field parameters indicated the possibility that effects of the ISCO pilot study were present in that well. Based on increased oxygen reduction potential (ORP) readings observed at PMW-9D, which can be indicative of oxidant presence, a sample was collected for Cr^{6+} analysis. Baseline data, 3-month and 6-month post-ISCO data for Cr^{6+} is included in **Table 2**. As exhibited by the data, Cr^{6+} has not mobilized as far downgradient as PMW-4D/5D/6D, located approximately 70 ft downgradient of Treatment Area #1. The 6-month post-ISCO geochemistry analytical data is provided in **Attachment A.**

Full-scale treatment of the wetlands is recommended using PRB treatment zones. Full-scale design incorporates results from the pilot study and accounts for site-specific information including: groundwater COC concentrations, seepage velocity, and treatment lifespan.

The second of the pilot tests was conducted on the western side of Building #2 in the vicinity of MW-27 and is referred to as "Treatment Area #2" (**Figure 5**).

The pilot test was designed to distribute chemical amendments across a defined area to target current soil and groundwater impacts with the application of alkaline activated Klozur® SP.

During the pilot test in Treatment Area #2, six direct-push injection points were advanced across an area approximately 33-ft by 58-feet to address remaining contamination in this area following the shutdown of the SVE remedial system in 2002. A total volume of 2,125 gallons of Klozur® SP and base activator was injected/gravity-fed between the six injection locations from a depth of 8 to 14 feet below grade. Evidence of influence, including groundwater mounding, was observed at 10 feet from one of the injection locations, and a 98% decrease in VOC concentrations was observed at MW-27.

Since MW-27 was used to gravity feed chemical amendments, the extent of VOC concentration decrease observed is potentially biased. Additionally, increases of VOC concentrations were observed during the 3-month post injection sampling event at downgradient monitoring well (MW-31), however, with only one baseline data point available for MW-31, it is difficult to draw a decisive conclusion about the change in VOC concentration following the pilot test.

Further evaluation of the Building #2 area is required before full-scale treatment approach for this area can be determined.

2.7 CURRENT EXTENT OF VOLATILE ORGANIC COMPOUNDS AND 1,4-DIOXANE IN GROUNDWATER

2.7.1 The Wetlands

Recent soil and groundwater data has been collected from the wetlands. Soil analytical data collected in August 2014, November/December 2015, and September 2016 are presented in **Table 3** and on **Figure 6**. The only exceedance of soil cleanup objectives in recent soil samples was for 1,4-dioxane, detected in sample MIP-11/SB-11 collected from 11 to 12 ftbg. The most recent groundwater sampling event conducted in May 2018 was documented in the *Second Quarter 2018 Groundwater Monitoring Report* submitted to the NYSDEC on June 22, 2018. Isocontour maps showing the progression of total VOC concentrations in deep wells within the wetlands are shown on **Figures 7, 8**, and **9** for data collected in September 2016, August 2017, and May 2018, respectively. Isocontour maps showing the progression of 1,4-dioxane concentrations in deep wells within the wetlands are shown on **Figures 10**, **11**, and **12** for data collected in September 2016, August 2017, and May 2018, respectively.

Since installation in August 2014, total VOC and 1,4-dioxane concentrations in deep wetland wells PMW-5D and PMW-6D have increased or remained the same, and have decreased at PMW-4D. Since installation in December 2015, total VOC concentrations in deep wetland wells PMW-9D, PMW-10D, and PMW-12D have increased, and have decreased at PMW-11D.

Total VOC and 1,4-dioxane concentrations on the upgradient edge of the plume, in the vicinity of PMW-1D, PMW-2D, and PMW-3D have decreased. Some of these concentration reductions are attributed to pilot test activities conducted in Treatment Area #1 (**Figure 4**).

2.7.2 Area of Concern #5

In August 2016, four MIP borings (MIP-1, MIP-2, MIP-3, and MIP-19) were advanced to assess current soil conditions at the base of the surficial geologic unit and to determine if AOC #5 was potentially acting as a residual source area (**Figure 13**). During MIP investigation activities, a groundwater monitoring well was discovered within AOC #5 (MW-27), and a groundwater sample was collected for analysis. Two soil samples were collected from MIP-1/SB-1. The sample from 9 to 10 ftbg exhibited a total VOC concentration of 66,520 micrograms per kilogram (µg/kg), and analytes in exceedance of the SCGs included ethylbenzene, m,p-xylene and o-xylene. The sample from 13 to 14 ftbg exhibited a total VOC concentration of 2,758 µg/kg, and m,p-xylene was in exceedance of the SCGs.

Groundwater samples collected from MW-27 as part of the quarterly groundwater monitoring program have ranged in VOC concentrations from 1,445 µg/L in June 2017 to 20,236 µg/L in November 2017, and analytes in exceedance of the SCGs have included 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, ethylbenzene, toluene and xylenes. During pilot test activities, monitoring well MW-31 was installed within the footprint of Building #2 (**Figure 2**). Groundwater samples collected from MW-31 have ranged in VOC concentrations from 95,830 µg/L on November 28, 2017 to 117,103 µg/L on March 1, 2018, and analytes in exceedance of the SCGs have included 1,1,1-TCA, 1,1-DCA, 1,2,4-trimethylbenzene, ethylbenzene, toluene, m,p-xylene and o-xylene. Well MW-31 will continue to be sampled as part of the quarterly groundwater monitoring program.

As discussed in Section **1.4.2**, a suite of dissolved VOCs were detected in soil and groundwater beneath Building #2 in the 1990s. Historical soil and groundwater data for boring locations B-44, B-45, B-47, B-47A, B-52, B-63, B-60, B-62, B-65, B-77, and B-84 are shown on **Figures 13** and **14**, respectively. The soil and groundwater laboratory analytical data for AOC #5 are presented in **Tables 4** and **5**, respectively. Current soil and groundwater data in AOC #5 are also shown on **Figures 13** and **14**, for comparison purposes.

During the most recent groundwater sampling event, conducted in May 2018, total concentrations for VOCs were reported to be 25,493 µg/L at MW-27 to 169,490 µg/L at MW-31. Compounds detected above cleanup objectives in these two wells included 1,1,1-TCA, 1,1-DCA, 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, ethylbenzene, toluene, and xylenes.

3. THE WETLANDS – FULL-SCALE TREATMENT IMPLEMENTATION

The full-scale ISCO target treatment area is located in the wetlands. In March 2018, trees were cleared and a wood plank access road was installed to facilitate this optimized remedial approach in accordance with permits referenced in **Section 3.4.2** and **3.4.3**.

Full-scale implementation will include: equipment mobilization and setup, delivery and storage of chemical amendments, chemical batching, injections, process monitoring, post-injection groundwater monitoring, and reporting, as described below.

3.1 BASIS OF DESIGN

Injection borings will be advanced to deliver a combination of Klozur® KP, Klozur® SP, and hydrated lime to the subsurface using direct push technology (DPT). Three PRBs will be installed in the wetlands to intercept the groundwater plume contaminated with CVOCs and 1,4-dioxane (**Figure 15**).

The first will be installed near the upgradient edge of the wetland plume (i.e., PRB #1), the second will be installed in the center of the wetland plume (i.e., PRB #2A and PRB #2B), and the third will be installed downgradient of the PMW-12 well cluster (i.e., PRB #3A and PRB #3B). Each PRB has been designed with an estimated lifespan of 1 year, during which, post-injection performance monitoring will be conducted as described in **Section 3.5.2**.

The PRB treatment depths have been designed to intersect the contaminated groundwater where the highest levels of elevated CVOCs and 1,4-dioxane concentrations persist in the wetlands. It is noted that there are elevated concentrations in some shallow areas in the vicinity of PMW-9 and PMW-10; however, in an effort to minimize contact between elevated pH levels and wetland biota, injections will be targeted at and below 15 ftbg. It is anticipated that some vertical mixing will occur throughout the wetland and have some effect on the shallow groundwater. The approximate dimensions of the barriers, including target depths, are included in the table below.

Permeable Reactive Barrier (PRB)	Total Length (feet)	Target Depth (feet below grade)
PRB#1	150	15-25
PRB#2A	35	15-25
PRB#2B	85	15-25
PRB#3A	50	15-30
PRB#3B	47	15-30

In-Situ Oxidative Technologies, Inc. (ISOTEC) has been selected as the injection subcontractor for the remedial system optimization event. PeroxyChem, the chemical manufacturer, recommended the application of a total of 135,784 pounds of Klozur® KP, Klozur® SP, and hydrated lime for the full-scale injection event. The breakdown of amendments for each PRB is provided in the table below.

Permeable Reactive Barrier	Klozur® Potassium Persulfate (lbs)	Klozur® Sodium Persulfate (lbs)	Hydrated Lime (lbs)
#1	28,652	6,612	13,200
#2	24,244	6,612	10,600
#3	28,652	6,612	10,600
Total	81,548	19,836	34,400

The calculated dosage of amendments was provided by PeroxyChem and is based on parameters including groundwater concentrations, treatment area dimensions, soil type, groundwater transport characteristics, and geochemical information.

The table below provides additional details including an estimated number of injection points, estimated volume of water to create the slurry, and total slurry volume.

The total solids numbers include the Klozur® KP and hydrated lime. The Klozur® SP will dissolve and not remain in suspension as a solid once added to water.

PRB	Total Solids (lbs)	PRB Width (ft)	PRB Vertical Depth (ft)	Injection Points	Slurry Concentration (% solids)	Water Volume (gallons)	Slurry Volume (gallons)
#1	41,852	150	10	40	25	15,100	17,100
#2	34,844	120	10	34	25	12,500	14,200
#3	39,252	97	15	25	25	14,100	16,000
Totals:	115,948	--	--	99	--	41,700	47,300

The ROI determined during pilot test activities is used as a tool to predict the overlap of injected amendments. The injection points will be spaced at approximately 3.5 to 4.5 feet on center. This may vary slightly based on field conditions, but in general should provide 15.5 to 16.5 feet of overlap between the injection points (assuming a 10 ft ROI).

3.2 GENERAL INJECTION PROCEDURES

PeroxyChem provides general application guidelines summarized herein. The complete Klozur® KP application guide prepared by PeroxyChem is included in **Attachment B**. The exact procedure used by an injection subcontractor may differ slightly from the methods indicated in the guidelines; however, the overall principals will be followed.

Klozur® KP is a fine granular product with a low solubility at typical injection temperatures. In most applications it will not be fully soluble in water, and it will need to be prepared as a water-solid slurry. The slurry should be stirred until the entire product is suspended in solution.

Klozur® KP slurries will be prepared in small batches the day of the injection with the intent of immediate injection. Mixing will take place in a chemically compatible tank, such as high density polyethylene (HDPE), with a chemically compatible mechanical mixer composed of a material such as 304 or 316 stainless steel. Klozur® KP will begin to decompose and generate acid if impurities such as metals are present in the make-up water or at elevated temperatures. Klozur® KP slurries will not be held longer than 8 hours at cool temperatures (typically less than 20°C and not exceed 30°C). Higher temperatures can result in decomposition.

Klozur® KP needs to be applied or injected in a manner that will allow for transport and distribution of the solid material/slurry into the subsurface. Klozur® KP is injected at depth through rods which are typically solid (blank) until reaching the intended depth where the reagents can flow through large orifices and out into the targeted interval of the subsurface. The reagents are then distributed into the subsurface for a certain radius of influence (ROI) depending upon the site characteristics and injection volume.

During the pilot study a slurry of Klozur® KP, Klozur® SP, hydrated lime and 25% sodium hydroxide (NaOH) was injected using DPT which utilized screened intervals with openings of approximately 1/8-inch (and open borehole) to apply the chemical amendments to the subsurface. Some clogging was observed in the injection screen during the pilot test. For full-scale injection, a screen with larger openings (approximately 3/8-inch) will be employed. Based on pilot test data, a radius of influence of 10 feet is expected. Approximately 99 injection points

will be advanced to deliver the amendments during the injections within the wetland area. Multiple locations may be injected at simultaneously; however, to minimize the potential of localized groundwater mounding active injection points will be spaced out across the target treatment area to try and mitigate problems associated with saturation and potential surfacing of reagents. At initiation of the injection event, a limited number of injection points closest to the staging area will be advanced first in order to work out the logistics. Following those initial points, injections will be conducted first at PRB#3, followed by injections at PRB#2, followed by injections at PRB#1.

During the injections in the wetland, small batches of Klozur® KP, Klozur® SP, and hydrated lime will be prepared in batch tanks located in the staging area and/or in the wetland. The batched slurry will be pumped from the mixing area to the wetlands using a trunk line. To ensure the Klozur® KP solids are maintained in suspension in the slurry solution a secondary mixing vessel may be used in the wetland area to re-suspend the Klozur® KP reagents prior to injections into the injection points. While a combination of 25% NaOH and hydrated lime was used as the alkali source during the pilot test, it was concluded that hydrated lime alone would be a sufficient alkali source for the full-scale implementation. The 25% NaOH is a more soluble alkali, whereas the hydrated lime has a low solubility that is designed to slowly dissolve over time with the Klozur® KP.

3.3 CHEMICAL HANDLING, STORAGE AND CONTAINMENT

All chemicals used as part of the full-scale ISCO treatment event, will be handled in accordance with recommended personal protective equipment (PPE) on material Safety Data Sheets (SDSs). The chemical SDS will be on-site at all times as part of AECOM's and the injection subcontractor's site specific health and safety plan.

All mixing, dilution and pumping equipment, located in the staging area, in the wetland, or any other location on site, will be placed or staged in a secondary containment device, capable of holding at least 110% of the entire volume of material being staged. All dry chemicals will be stored in 40 ft storage units and protected from weather-related impacts. Storage areas will be marked with appropriate National Fire Protection Association and Department of Transportation signage for the materials being stored. The site is surrounded by a chain link fence topped with barbed wire. All chemicals will be stored within the storage units staged within the fenced area and will have additional security fencing to protect against pedestrian interference. Depending on the forecasted weather, the doors to the storage units may remain open during off-hours to mitigate excessive heat in the containers that can trigger decomposition of the oxidants.

The injection contractor's Spill Prevention and Control Plan will be on-site during all pilot test activities when chemicals are on-site, in addition to AECOM's Health and Safety Plan (HASP) and the injection contractor's HASP and Standard Operating Procedures.

Spills originating from storage or mixing and dilution areas will be contained within secondary containment facilities. Shallow drip pans, or similar, will be placed below or around each hose coupling that is located outside of secondary containment facilities. Daylighting of injection slurry visible at grade within the treatment area during injection in the wetland area is anticipated and will be considered acceptable.

To limit the area of impact from any spills or surfacing, a spill boom or similar containment device will be placed at grade around each active injection point. If chemical daylighting is observed, the flow rate at adjacent injection points will be decreased. If the daylighting continues and/or increases, the injection at the nearest point will be stopped until the daylighting is mitigated.

Any spills that occur outside of the above framework will be managed in accordance with the NYSDEC Spill Guidance Manual, specifically spill reporting and initial notification requirements. A copy of the Spill Guidance Manual will be available on-site during the remedial system optimization event.

3.4 WATER QUALITY MONITORING

During active injection, AECOM personnel will conduct visual inspections along the southern shoreline of the Seneca River downgradient of the site. The shoreline inspections will consist of looking for unusual erosion and visual indications of surfacing of injected slurry along the shoreline (in the form of milky white fluid/slurry). Any observation of injection fluid or slurry surfacing in the Seneca River will result in the immediate shutdown of injection activities and immediate notification to the project team and NYSDEC. In the event unusual erosion is observed along the river edge, grab soil samples will be collected from the eroded area to check for presence of persulfate and pH conditions.

Water quality parameters at the following wells will be measured and recorded at minimum on a weekly basis: ML-2A, ML-3E, MW-28, PMW-4S/I/D, PMW-5S/I/D, PMW-6S/I/D, PMW-9S/I/D, PMW-10S/I/D, PMW-11S/I/D, PMW-12S/I/D, PMW-13S/I/D, and MW-32S/I/D. The frequency of monitoring may be increased subject to results observed in the field. Water quality parameters will include temperature, pH, dissolved oxygen, oxygen reduction potential, and specific conductivity. If pH in the monitoring point is elevated above 10, water quality parameters will not be collected to prevent equipment damage.

3.5 PERMITS

3.5.1 United States Environmental Protection Agency – Underground Injection Control

Injection of remedial substrates falls under the requirements of the USEPA Underground Injection Control (UIC) program. All required notifications will be made to the USEPA prior to execution of the full-scale ISCO remedial event.

3.5.2 United States Army Corp of Engineers Nationwide Permit

A Nationwide Permit application (NWP 38) was granted on March 23, 2018 (**Attachment C**) and is valid until March 18, 2022 unless the NWP is modified, suspended, removed, or the activity complies with any subsequent permit modifications. All well and borehole construction that result in a discharge of fill material into waters of the U.S., including wetlands, may only occur between August 15 and May 15, of any year.

3.5.3 New York State Department of Environmental Conservation

A NYSDEC Protection of Waters permit was granted on March 20, 2018 (**Attachment D**) and is valid until March 19, 2023.

3.6 POST-INJECTION MONITORING

3.6.1 Quarterly Groundwater Sampling Program

In accordance with the ISMP, groundwater sampling and analysis of a pre-determined list of monitoring wells is conducted on a quarterly basis in the first, second, and fourth quarter of each year, and a site-wide sampling event including all monitoring wells is conducted in the third quarter of each year. The quarterly and annual events will conduct analysis for VOCs listed below:

Analyte List	
1,1,1-trichloroethane	1,1,2-trichloroethane
1,1-dichloroethane	1,1-dichloroethene
1,2,4-trimethylbenzene	1,3,5-trimethylbenzene
1,2-dichloroethane	1,4-dioxane
Acetone	Benzene
Chloroethane	Cis-1,2-dichloroethene
M,p-xylene	Ethylbenzene
Naphthalene	o-xylene
Trans-1,2-dichloroethene	Toluene
Trichlorofluoromethane	Trichloroethene
Vinyl chloride	

Based on current groundwater analytical data, the following revisions to the quarterly monitoring program are proposed for review and approval by the NYSDEC.

Current Quarterly Monitoring Wells		**Proposed Quarterly Monitoring Wells**	
MW-26D	PMW-10D	MW-26D	PMW-9D
MW-27	PMW-11S	MW-27	PMW-10S
MW-28	PMW-11D	MW-31	PMW-10I
PMW-1D	PMW-12S	MW-32S	PMW-10D
PMW-2D	PMW-12D	MW-32I	PMW-11S
PMW-3D	PMW-13S	MW-32D	PMW-11D
PMW-4I	PMW-24D	PMW-1D	PMW-12S
PMW-4D	ML-1C	PMW-2D	PMW-12D
PMW-5I	ML-2A	PMW-3D	PMW-13S
PMW-5D	ML-2B	PMW-4I	PMW-24D
PMD-6I	ML-2C	PMW-4D	ML-1C
PMD-6D	ML-2D	PMW-5I	ML-2D
PMW-9S	ML-3A	PMW-5D	ML-3B
PMW-9I	ML-3B	PMW-6I	
PMW-9D	ML-3C	PMW-6D	
PMW-10S	ML-3D	PMW-9S	
PMW-10I	ML-3E	PMW-9I	

VOC concentrations at MW-28 have been consistent over the last five quarters ranging from 14.1 µg/L on June 5, 2017 to 20.7 µg/L on August 28, 2017. The only analyte in exceedance of SCGs at MW-28 is TCE. MW-28 will continue to be included in the annual site-wide groundwater sampling event and is proposed for removal from the quarterly sampling program. As noted in Section 3.4, MW-28 will be subject to water quality monitoring during active injection. If monitoring indicates that the well is being influenced significantly by the injection, MW-28 will be included in the first quarterly event following the full-scale injection. Further inclusion in quarterly monitoring will be based on the analytical results and discussion with NYSDEC.

VOC concentrations at ML-2A and ML-2D have been consistent over the last five quarters ranging from 2.29 µg/L on June 6, 2017 at ML-2D to 46.61 µg/L on February 26, 2018 at ML-2A. Based on an identification error for well channels ML-2B and ML-2C, data for these two intervals are not reliable. The well channels have been verified and field forms have been corrected to ensure correct interval sampling during future events. ML-2A, ML-2B, and ML-2C will continue to be included in the annual site-wide groundwater sampling event and are proposed for removal from the quarterly sampling program. ML-2D will be retained in the quarterly sampling program. As noted in Section 3.4, ML-2A will be subject to water quality monitoring during active injection. If monitoring indicates that the well is being influenced significantly by the injection, ML-2A will be included in the first quarterly event following the full-scale injection. Further inclusion in quarterly monitoring will be based on the analytical results and discussion with NYSDEC.

VOC concentrations at ML-3A, ML-3B, and ML-3C have been consistently above 100 µg/L over the last four quarters and exhibit exceedances of SCGs for 1,1,1-TCA, 1,1-DCA, 1,1-DCE, and TCE. VOC concentrations and analyte exceedances at ML-3D and ML-3E are lower in comparison. ML-3A, ML-3C, ML-3D, and ML-3E will continue to be included in the annual site-wide groundwater sampling event and are proposed for removal from the quarterly sampling program. ML-3B will be retained in the quarterly sampling program. As noted in Section 3.4, ML-3E will be subject to water quality monitoring during active injection. If monitoring indicates that the well is being influenced significantly by the injection, ML-3E will be included in the first quarterly event following the full-scale injection. Further inclusion in quarterly monitoring will be based on the analytical results and discussion with NYSDEC.

Monitoring wells MW-32S/I/D were installed in May 2018 and will be included in the quarterly monitoring program.

3.6.2 Post-Injection Monitoring Program

Post-injection performance monitoring will be conducted on a quarterly basis to coincide with the existing groundwater monitoring. Additional analysis will be conducted on a quarterly basis in accordance with the table below.

Analysis	Monitoring Wells
Hexavalent chromium (Cr^{6+}) – Method 7199	PMW-9S/I/D, PMW-10S/I/D, PMW-11D, PMW-12S/I/D, PMW-13D, MW-32S/I/D
Sulfate (SO_4^{2-}) – Method 9056A	
Dissolved sodium – Method 6010C	
Dissolved potassium – Method 6010C	

It is noted that MW-32S/I/D is approximately 85 feet downgradient of PRB #3 and will serve as the downgradient monitoring location during post-injection monitoring.

3.7 REPORTING

Following full-scale ISCO implementation, a summary report will be prepared and submitted to document completion of the ISCO application. The report will summarize the injection rates, pressures, and total volume at each injection location within the PRBs. Additionally, field observations and process monitoring results will be included in the summary report.

The summary report will be submitted to the NYSDEC within 60 days of the full-scale injection event completion. Quarterly monitoring reports will be submitted within 45-days of the final date of each associated sampling event.

4. AREA OF CONCERN #5

4.1 SOURCE AREA

There are two monitoring wells within what is believed to be the remaining source area, MW-27 and MW-31. These wells will continue to be included in the quarterly monitoring program in an effort to develop a comprehensive baseline set of data.

4.2 DOWNGRADIENT AREA

There are five downgradient monitoring locations to the north of Building #2, including ML-1A/B/C, MW-3S/D, PMW-14S/I/D, PMW-15S/I/D, and PMW-24S/I/D, which are considered far downgradient of AOC #5. Based on the current site well network and historic groundwater contour plots, these wells offer the best reference for downgradient conditions.

Groundwater is monitored on a quarterly basis at ML-1C and PMW-24D and on an annual basis at the remaining wells. Monitoring well ML-1 has three screened intervals of approximately 3-inches each. The approximate mid-point depth of each screen is 12.5 ftbg, 23.5 ftbg, and 26.5 ftbg. Total VOC concentrations at the shallow-most depth have ranged from 14.3 µg/L in August 2017 to 30.1 µg/L in December 2016. At the two deeper screened intervals, total VOC concentrations have ranged from 104.6 µg/L at ML-1C in March 2018 to 499.8 at ML-1C in March 2017. Concentrations at ML-1C have exhibited a general decreasing trend over seven sampling events, and concentrations at ML-1B have exhibited an increasing trend over two sampling events.

Monitoring well cluster PMW-24 has three monitoring intervals with wells screened from approximately 7.8 to 17.8 ftbg (PMW-24S), 18 to 25 ftbg (PMW-24I), and 21.5 to 31.5 ftbg (PMW-24D). In general, total VOC concentrations at PMW-24S and PMW-24I have been below 100 µg/L, except for one sample in March 2016 when the concentration was 328 µg/L at PMW-24I. Total VOC concentrations at PMW-24D have exhibited a general decreasing trend over 11 sampling events, ranging from 42.5 µg/L in March 2017 to 383 µg/L in December 2015.

In general, cross-gradient monitoring well clusters PMW-14, PMW-15, and MW-3 have exhibited total VOC concentrations below 100 µg/L since 2013. One exception is noted during the August 2017 sampling event when the concentration at MW-3D was reported as 476.8 µg/L. Based on field notes and historical analytical data it is suspected that a lab error may have occurred during that event and samples for PMW-3D and MW-3D were switched.

Based on the analytical data from existing wells downgradient of AOC #5, the associated groundwater plume is stable and does not currently present a risk pathway to wetlands and surface water (Seneca River). The potential for soil vapor intrusion to Building #2 is an active risk pathway and is currently being addressed by the operation of three sub-slab depressurization systems (SS-5, SS-06, and SS-08).

SS-05 is centrally located along the easternmost wall, SS-06 is located on the south side of the partitioning wall that separates the high-bay portion of the building, and SS-08 is centrally located along the westernmost wall. At the time of this work plan, OBG and Lockheed Martin are working to expand the coverage of the current systems as well as add at least one additional system over what is believed to be the remaining source area.

5. SCHEDULE

The full-scale treatment implementation in the wetlands is scheduled to begin on August 13, 2018. Preliminary activities beginning on this date will include mobilization to site, receipt and staging of chemical amendments, planning, and work area set-up. In accordance with the USACE LRB 2015-01101 Nationwide Permit 38, well and borehole advancement and injections will not be initiated until August 16, 2018.

In order to further delineate the soil and groundwater impacts within the footprint of Building #2, consultation must be undertaken with the third party property owner and the NYSDEC to clearly define the parameters under which the investigation will be conducted. An investigation work plan for AOC #5 will be submitted to the NYSDEC for review and approval by May 2019.

6. REFERENCES

ERM-Northeast, Inc., May 1995. Remedial Investigation Report.

Parsons Engineering Science, Inc., February 1997. Feasibility Study.

Parsons Engineering Science, Inc., October 1998. Pre-Design Investigation Report.

Parsons Engineering Science, Inc., December 8, 1998. Remedial Design Report.

Parsons Engineering Science, Inc., December 1999. Operation & Maintenance Plan for Site-Wide Groundwater Extraction and Treatment System and IRMs at AOC #5, AOC #7 and AOC #16.

Plumley Engineering, P.C., June 2013. Operation & Maintenance Plan for Site-Wide Groundwater Extraction and Treatment System and IRMs at AOC #7 and AOC #16.

United States Environmental Protection Agency, January 2014. Technical Fact Sheet – 1,4-Dioxane.

AECOM, July 25, 2017. Interim Site Management Report.

AECOM, September 2017 (Revised November 2017). In-Situ Chemical Oxidation Treatability Summary Report and Pilot Test Work Plan.

AECOM, December 12, 2017. Bioremediation Treatability Study Summary Report.

AECOM, January 12, 2018. Fourth Quarter 2017 Groundwater Monitoring Report.

AECOM, April 26, 2018. In Situ Chemical Oxidation Pilot Test Summary Report.

AECOM, April 6, 2018. First Quarter 2018 Groundwater Monitoring Report.

AECOM, June 22, 2018. Second Quarter 2018 Groundwater Monitoring Report.

New York Department of Environmental Conservation. Spill Guidance Manual. http://www.dec.ny.gov/regulations/2634.html.

Tables

TABLE 1

Baseline, 3-Month and 6-Month Post-ISCO Groundwater Analytical Data
(Volatile Organic Compounds - Pilot Test Monitoring Wells)

LOCKHEED MARTIN CORPORATION
Former GE Farrell Road Site
Syracuse, New York

Sample Location		Baseline PMW-2D 11/16/17			3-Month Post-ISCO PMW-2D[a] 2/28/2018			6-Month Post-ISCO PMW-2D 5/21/18			Baseline PMW-3D 11/16/17			3-Month Post-ISCO PMW-3D[a] 2/28/2018			6-Month Post-ISCO PMW-3D 5/21/18		
VOCs by Methods 8260C	*SCGs (µg /L)*	Result	Qualifier	Dilution	Result	Qualifier	Dilution	Result	Qualifier	Dilution	Result	Qualifier	Dilution	Result	Qualifier	Dilution	Result	Qualifier	Dilution
1,1,1-Trichloroethane	5	ND<1.0	U	1	ND<0.3	U	1	0.26	J	1	ND<1.0	U	1	ND<0.3	U	1	ND<1	U	1
1,1,2-Trichloroethane	1	ND<1.0	U	1	ND<0.3	U	1	ND<1	U	1	ND<1.0	U	1	ND<0.3	U	1	ND<1	U	1
1,1-Dichloroethane	5	**27**	--	1	**21**	--	1	**15**	--	1	**45**	--	1	**6.0**	--	1	**18**	--	1
1,1-Dichloroethene	5	**140**	--	1	**61**	--	1	**13**	--	1	**140**	--	1	**27**	--	1	2.8	--	1
1,2,4-Trimethylbenzene	5	ND<1.0	U	1	ND<0.2	U	1	ND<1	U	1	ND<1.0	U	1	ND<0.2	U	1	ND<1	U	1
1,2-Dichloroethane	0.6	**6.0**	--	1	**4.8**	--	1	**4.3**	--	1	**5.6**	--	1	**1.9**	--	1	**3.3**	--	1
1,3,5-Trimethylbenzene	5	ND<1.0	U	1	ND<0.2	U	1	ND<1	U	1	ND<1.0	U	1	ND<0.2	U	1	ND<1	U	1
1,4-dioxane	--	190	--	1	110	--	1	130	--	1	130	--	1	67	--	1	98	--	1
Acetone	50 *	1.4	J	1	30	--	1	5.4	--	1	ND<5.0	U	1	8.4	--	1	2.5	J	1
Benzene	1	**1.2**	--	1	0.56	J	1	0.74	J	1	0.71	J	1	0.30	J	1	0.32	J	1
Chloroethane	5	**25**	--	1	**14**	--	1	**17**	--	1	**21**	--	1	**9.8**	--	1	**18**	--	1
Ethylbenzene	5	0.72	J	1	ND<0.2	U	1	ND<1	U	1	1.1	--	1	0.55	J	1	ND<1	U	1
Naphthalene	10	ND<1.0	U	1	ND<0.2	U	1	ND<1	U	1	ND<1.0	U	1	ND<0.2	U	1	ND<1	U	1
Toluene	5	ND<1.0	U	1	ND<0.2	U	1	ND<1	U	1	ND<1.0	U	1	ND<0.2	U	1	ND<1	U	1
Trichloroethene	5	2.2	--	1	1.1	--	1	1.7	--	1	4.2	--	1	1.5	--	1	2.2	--	1
Trichlorofluoromethane	5	ND<1.0	U	1	ND<0.2	U	1	ND<1	U	1	ND<1.0	U	1	ND<0.2	U	1	ND<1	U	1
Vinyl chloride	2	**13**	--	1	1.3	--	1	0.23	J	1	**9.8**	--	1	ND<0.3	U	1	ND<1	U	1
cis-1,2-dichloroethene	5	1.8	--	1	0.91	J	1	0.86	J	1	1.2	--	1	0.60	J	1	0.28	J	1
m,p-Xylene	5	ND<2.0	U	1	ND<0.3	U	1	ND<2	U	1	ND<2.0	U	1	ND<0.3	U	1	ND<2	U	1
o-Xylene	5	ND<1.0	U	1	ND<0.2	U	1	ND<1	U	1	ND<1.0	U	1	ND<0.2	U	1	ND<1	U	1
trans-1,2-dichloroethene	5	ND<1.0	U	1	ND<0.3	U	1	ND<1	U	1	ND<1.0	U	1	ND<0.3	U	1	ND<1	U	1
Total VOCs	--	408.3	--	--	244.7	--	--	188.5	--	--	358.6	--	--	123.1	--	--	145.4	--	--

Notes:
SCGs - Standards, Criteria and Guidelines (µg/L).
SCGs are provided for New York Department of Environmental Conservation (NYSDEC) Technical & Operational Guidance Series for Ambient Water Quality Standards and Guidance Values 1.1.1 unless otherwise stated.
a - Sample preserved with ascorbic acid.
* Guidance Value (µg/L) New York State Ambient Water Quality Standards and Guidance Values.
ND - Not detected at the Method Reporting Limit (MDL).
-- indicates 'blank cell'.
Bold values represent compound exceedance of the identified SCG.
U - Analyte was analyzed for but not detected. The sample quantitation limit has been corrected for dilution and for percent moisture, unless otherwise noted in the case narrative.
J - Estimated value due to either being a Tentatively Identified Compound or that the concentration is between the MRL and the MDL. Concentrations are not verified within the linear range of the calibration.

TABLE 1

Baseline, 3-Month and 6-Month Post-ISCO Groundwater Analytical Data
(Volatile Organic Compounds - Pilot Test Monitoring Wells)

LOCKHEED MARTIN CORPORATION
Former GE Farrell Road Site
Syracuse, New York

Sample Location		**Baseline MW-26D 11/16/17**			**3-Month Post-ISCO MW-26D 2/28/2018**			**6-Month Post-ISCO MW-26D 5/21/18**			**Baseline MW-29 12/2017**			**3-Month Post-ISCO MW-29 2/28/2018**			**6-Month Post-ISCO MW-29 5/21/18**		
VOCs by Methods 8260C	*SCGs (µg /L)*	Result	Qualifier	Dilution	Result	Qualifier	Dilution	Result	Qualifier	Dilution	Result	Qualifier	Dilution	Result	Qualifier	Dilution	Result	Qualifier	Dilution
1,1,1-Trichloroethane	5	ND<2.0	U	2	0.58	J	1	0.80	J	1	0.40	J	1	ND<1.0	U	1	ND<1	U	1
1,1,2-Trichloroethane	1	ND<2.0	U	2	ND<0.3	U	1	0.32	J	1	ND<1	U	1	ND<1.0	U	1	ND<1	U	1
1,1-Dichloroethane	5	**79**	--	2	**42**	--	1	**57**	--	1	**19**	--	1	0.22	J	1	0.23	J	1
1,1-Dichloroethene	5	**270**	--	2	**82**	--	1	**30**	--	1	**40**	--	1	ND<1.0	U	1	ND<1	U	1
1,2,4-Trimethylbenzene	5	ND<2.0	U	2	ND<0.2	U	1	ND<1	U	1	ND<1	U	1	ND<1.0	U	1	ND<1	U	1
1,2-Dichloroethane	0.6	**10**	--	2	**3.8**	--	1	**6.1**	--	1	**2.0**	--	1	ND<1.0	U	1	ND<1	U	1
1,3,5-Trimethylbenzene	5	ND<2.0	U	2	ND<0.2	U	1	ND<1	U	1	ND<1	U	1	ND<1.0	U	1	ND<1	U	1
1,4-dioxane	--	200	--	2	69	--	1	110	--	1	30	J	1	ND<40	U	1	ND<40	U	1
Acetone	50 *	ND<10	U	2	2.4	J	1	15	--	1	5.2	--	1	**150**	--	1	**55**	--	1
Benzene	1	**1.5**	J	2	0.53	J	1	0.77	J	1	0.29	J	1	ND<1.0	U	1	ND<1	U	1
Chloroethane	5	**29**	--	2	**9.2**	--	1	**17**	--	1	2.1	--	1	ND<1.0	U	1	ND<1	U	1
Ethylbenzene	5	ND<2.0	U	2	ND<0.2	U	1	ND<1	U	1	1.5	--	1	ND<1.0	U	1	ND<1	U	1
Naphthalene	10	ND<2.0	U	2	ND<0.2	U	1	ND<1	U	1	ND<1	U	1	ND<1.0	U	1	ND<1	U	1
Toluene	5	ND<2.0	U	2	ND<0.2	U	1	ND<1	U	1	**7.5**	--	1	ND<1.0	U	1	ND<1	U	1
Trichloroethene	5	**7.0**	--	2	**6.7**	--	1	**5.6**	--	1	1.7	--	1	ND<1.0	U	1	ND<1	U	1
Trichlorofluoromethane	5	0.56	J	2	0.58	J	1	0.68	J	1	ND<1	U	1	ND<1.0	U	1	ND<1	U	1
Vinyl chloride	2	**9.8**	--	2	0.63	J	1	0.33	J	1	0.32	J	1	ND<1.0	U	1	ND<1	U	1
cis-1,2-dichloroethene	5	2.9	--	2	1.4	--	1	1.1	--	1	0.46	J	1	ND<1.0	U	1	ND<1	U	1
m,p-Xylene	5	ND<4.0	U	2	ND<0.3	U	1	ND<2	U	1	6.8	--	1	ND<2.0	U	1	ND<2	U	1
o-Xylene	5	ND<2.0	U	2	ND<0.2	U	1	ND<1	U	1	2.5	--	1	ND<1.0	U	1	ND<1	U	1
trans-1,2-dichloroethene	5	ND<2.0	U	2	ND<0.3	U	1	ND<1	U	1	ND<1	U	1	ND<1.0	U	1	ND<1	U	1
Total VOCs	--	609.8	--	--	218.8	--	--	244.7	--	--	119.8	--	--	150	--	--	55	--	--

Notes:
SCGs - Standards, Criteria and Guidelines (µg/L).
SCGs are provided for New York Department of Environmental Conservation (NYSDEC) Technical & Operational Guidance Series for Ambient Water Quality Standards and Guidance Values 1.1.1 unless otherwise stated.
* Guidance Value (µg/L) New York State Ambient Water Quality Standards and Guidance Values.
ND - Not detected at the Method Reporting Limit (MDL).
-- indicates 'blank cell'.
Bold values represent compound exceedance of the identified SCG.
U - Analyte was analyzed for but not detected. The sample quantitation limit has been corrected for dilution and for percent moisture, unless otherwise noted in the case narrative.
J - Estimated value due to either being a Tentatively Identified Compound or that the concentration is between the MRL and the MDL. Concentrations are not verified within the linear range of the calibration.

TABLE 1

Baseline, 3-Month and 6-Month Post-ISCO Groundwater Analytical Data
(Volatile Organic Compounds - Pilot Test Monitoring Wells)

LOCKHEED MARTIN CORPORATION
Former GE Farrell Road Site
Syracuse, New York

Sample Location		**Baseline MW-30 12/01/2017**			**3-Month Post-ISCO MW-30 2/28/2018**			**6-Month Post-ISCO MW-30 5/21/18**			**Baseline PMW-4D 11/15/17**			**3-Month Post-ISCO PMW-4D 2/27/18**			**6-Month Post-ISCO PMW-4D 5/22/18**		
VOCs by Methods 8260C	*SCGs (µg/L)*	Result	Qualifier	Dilution	Result	Qualifier	Dilution	Result	Qualifier	Dilution	Result	Qualifier	Dilution	Result	Qualifier	Dilution	Result	Qualifier	Dilution
1,1,1-Trichloroethane	5	ND<1	U	1	0.39	J	1	0.27	J	1	ND<5.0	U	5	ND<5.0	U	5	1.5	--	1
1,1,2-Trichloroethane	1	ND<1	U	1	ND<1.0	U	1	ND<1	U	1	ND<5.0	U	5	ND<5.0	U	5	0.43	J	1
1,1-Dichloroethane	5	**40**	--	1	**9.1**	--	1	**15**	--	1	**130**	--	5	**160**	--	5	**99**	--	1
1,1-Dichloroethene	5	**72**	--	1	**11**	--	1	ND<1	U	1	**470**	--	5	**470**	--	5	**180**	D	2.5
1,2,4-Trimethylbenzene	5	ND<1	U	1	ND<1.0	U	1	ND<1	U	1	ND<5.0	U	5	ND<5.0	U	5	ND<1	U	1
1,2-Dichloroethane	0.6	**3.5**	--	1	**0.61**	J	1	1.0	--	1	**18**	--	5	**21**	--	5	**12**	--	1
1,3,5-Trimethylbenzene	5	ND<1	U	1	ND<1.0	U	1	ND<1	U	1	ND<5.0	U	5	ND<5.0	U	5	ND<1	U	1
1,4-dioxane	--	55	--	1	ND<40	U	1	16	J	1	300	--	5	360	--	5	230	--	1
Acetone	50 *	7.1	--	1	31	--	1	31	--	1	ND<25	U	5	ND<25	U	5	6.9	--	1
Benzene	1	0.48	J	1	ND<1.0	U	1	ND<1	U	1	**2.8**	J	5	**3.2**	J	5	**2.0**	--	1
Chloroethane	5	**5.4**	--	1	0.37	J	1	0.49	J	1	**49**	--	5	**50**	--	5	**36**	--	1
Ethylbenzene	5	ND<1	U	1	ND<1.0	U	1	ND<1	U	1	ND<5.0	U	5	ND<5.0	U	5	ND<1	U	1
Naphthalene	10	ND<1	U	1	ND<1.0	U	1	ND<1	U	1	ND<5.0	U	5	ND<5.0	U	5	ND<1	U	1
Toluene	5	0.57	J	1	ND<1.0	U	1	ND<1	U	1	ND<5.0	U	5	ND<5.0	U	5	0.26	J	1
Trichloroethene	5	3.8	--	1	3.5	--	1	0.83	J	1	**13**	--	5	**14**	--	5	**10**	--	1
Trichlorofluoromethane	5	0.48	J	1	0.42	J	1	ND<1	U	1	2.2	J	5	2.7	J	5	2.6	--	1
Vinyl chloride	2	0.44	J	1	ND<1.0	U	1	ND<1	U	1	**2.2**	J	5	**2.2**	J	5	1.7	--	1
cis-1,2-dichloroethene	5	1.4	--	1	0.64	J	1	ND<1	U	1	4.1	J	5	4.6	J	5	2.8	--	1
m,p-Xylene	5	1.1	J	1	ND<2.0	U	1	ND<2	U	1	ND<10	U	5	ND<10	U	5	ND<2	U	1
o-Xylene	5	0.24	J	1	ND<1.0	U	1	ND<1	U	1	ND<5.0	U	5	ND<5.0	U	5	ND<1	U	1
trans-1,2-dichloroethene	5	ND<1	U	1	ND<1.0	U	1	ND<1	U	1	ND<5.0	U	5	ND<5.0	U	5	ND<1	U	1
Total VOCs	--	191.5	--	--	57.0	--	--	64.6	--	--	991.3	--	--	1,088	--	--	585.2	--	--

Notes:
SCGs - Standards, Criteria and Guidelines (µg/L).
SCGs are provided for New York Department of Environmental Conservation (NYSDEC) Technical & Operational Guidance Series for Ambient Water Quality Standards and Guidance Values 1.1.1 unless otherwise stated.
* Guidance Value (µg/L) New York State Ambient Water Quality Standards and Guidance Values.
ND - Not detected at the Method Reporting Limit (MDL).
-- indicates 'blank cell'.
Bold values represent compound exceedance of the identified SCG.
U - Analyte was analyzed for but not detected. The sample quantitation limit has been corrected for dilution and for percent moisture, unless otherwise noted in the case narrative.
J - Estimated value due to either being a Tentatively Identified Compound or that the concentration is between the MRL and the MDL. Concentrations are not verified within the linear range of the calibration.
D - Concentration is a result of a dilution, typically a secondary analysis of the sample due to exceeding the calibration range or that a surrogate has been diluted out of the sample and cannot be assessed.

TABLE 1

Baseline, 3-Month and 6-Month Post-ISCO Groundwater Analytical Data
(Volatile Organic Compounds - Pilot Test Monitoring Wells)

LOCKHEED MARTIN CORPORATION
Former GE Farrell Road Site
Syracuse, New York

Sample Location		**Baseline PMW-5D 11/15/17**			**3-Month Post-ISCO PMW-5D 2/27/18**			**6-Month Post-ISCO PMW-5D 5/22/18**			**Baseline PMW-6D 11/15/17**			**3-Month Post-ISCO PMW-6D 2/27/18**			**6-Month Post-ISCO PMW-6D 5/22/18**		
VOCs by Methods 8260C	*SCGs (µg/L)*	Result	Qualifier	Dilution	Result	Qualifier	Dilution	Result	Qualifier	Dilution	Result	Qualifier	Dilution	Result	Qualifier	Dilution	Result	Qualifier	Dilution
1,1,1-Trichloroethane	5	ND<5.0	U	5	ND<5.0	U	5	2.4	J	5	2.4	J	5	**3.8**	DJ	10	ND<5	U	5
1,1,2-Trichloroethane	1	**2.2**	J	5	**2.7**	J	5	**5.3**	--	5	**4.3**	J	5	**6.2**	DJ	10	**2.2**	J	5
1,1-Dichloroethane	5	**300**	--	5	**390**	--	5	**450**	--	5	**380**	--	5	**640**	D	10	**290**	--	5
1,1-Dichloroethene	5	**630**	--	5	**680**	--	5	**970**	--	5	**900**	--	5	**1,200**	D	10	**450**	--	5
1,2,4-Trimethylbenzene	5	ND<5.0	U	5	ND<5.0	U	5	ND<5	U	5	ND<5.0	U	5	ND<10	U	10	ND<5	U	5
1,2-Dichloroethane	0.6	**21**	--	5	**23**	--	5	**24**	--	5	**25**	--	5	**35**	D	10	**17**	--	5
1,3,5-Trimethylbenzene	5	ND<5.0	U	5	ND<5.0	U	5	ND<5	U	5	ND<5.0	U	5	ND<10	U	10	ND<5	U	5
1,4-dioxane	--	340	--	5	430	--	5	430	--	5	410	--	5	740	D	10	300	--	5
Acetone	50 *	ND<25	U	5	ND<25	U	5	ND<25	U	5	6.4	J	5	ND<50	J	10	ND<25	U	5
Benzene	1	**2.6**	J	5	**3.4**	J	5	**5.3**	--	5	**4.8**	J	5	**7.8**	DJ	10	**2.2**	J	5
Chloroethane	5	**6.1**	--	5	**12**	--	5	2.9	J	5	2.5	J	5	4.1	DJ	10	**7.4**	--	5
Ethylbenzene	5	ND<5.0	U	5	ND<5.0	U	5	ND<5	U	5	ND<5.0	U	5	ND<10	U	10	ND<5	U	5
Naphthalene	10	ND<5.0	U	5	ND<5.0	U	5	ND<5	U	5	ND<5.0	U	5	ND<10	U	10	ND<5	U	5
Toluene	5	ND<5.0	U	5	ND<5.0	U	5	ND<5	U	5	ND<5.0	U	5	ND<10	U	10	ND<5	U	5
Trichloroethene	5	**21**	--	5	**23**	--	5	**29**	--	5	**29**	--	5	**39**	D	10	**18**	--	5
Trichlorofluoromethane	5	3.3	J	5	4.1	J	5	**6.8**	--	5	**8.0**	--	5	**11**	D	10	2.5	J	5
Vinyl chloride	2	ND<5.0	U	5	ND<5.0	U	5	**2.1**	J	5	1.9	J	5	ND<10	U	10	ND<5	U	5
cis-1,2-dichloroethene	5	ND<5.0	U	5	ND<5.0	U	5	5.0	--	5	2.0	J	5	4.5	DJ	10	1.4	J	5
m,p-Xylene	5	ND<10	U	5	ND<10	U	5	ND<10	U	5	ND<10	U	5	ND<20	U	10	ND<10	U	5
o-Xylene	5	ND<5.0	U	5	ND<5.0	U	5	ND<5	U	5	ND<5.0	U	5	ND<10	U	10	ND<5	U	5
trans-1,2-dichloroethene	5	ND<5.0	U	5	ND<5.0	U	5	ND<5	U	5	ND<5.0	U	5	ND<10	U	10	ND<5	U	5
Total VOCs	--	1,326.2	--	--	1,568	--	--	1,932.8	--	--	1,776.3	--	--	2,691	--	--	1,090.7	--	--

Notes:
SCGs - Standards, Criteria and Guidelines (µg/L).
SCGs are provided for New York Department of Environmental Conservation (NYSDEC) Technical & Operational Guidance Series for Ambient Water Quality Standards and Guidance Values 1.1.1 unless otherwise stated.
* Guidance Value (µg/L) New York State Ambient Water Quality Standards and Guidance Values.
ND - Not detected at the Method Reporting Limit (MDL).
-- indicates 'blank cell'.
Bold values represent compound exceedance of the identified SCG.
U - Analyte was analyzed for but not detected. The sample quantitation limit has been corrected for dilution and for percent moisture, unless otherwise noted in the case narrative.
J - Estimated value due to either being a Tentatively Identified Compound or that the concentration is between the MRL and the MDL. Concentrations are not verified within the linear range of the calibration.
D - Concentration is a result of a dilution, typically a secondary analysis of the sample due to exceeding the calibration range or that a surrogate has been diluted out of the sample and cannot be assessed.

TABLE 1

Baseline, 3-Month and 6-Month Post-ISCO Groundwater Analytical Data
(Volatile Organic Compounds - Pilot Test Monitoring Wells)

LOCKHEED MARTIN CORPORATION
Former GE Farrell Road Site
Syracuse, New York

Sample Location		**Baseline PMW-9D 11/15/17**			**3-Month Post-ISCO PMW-9D 2/27/18**			**6-Month Post-ISCO PMW-9D 5/22/18**			**Baseline PMW-10D 11/14/17**			**3-Month Post-ISCO PMW-10D 2/27/18**			**6-Month Post-ISCO PMW-10D 5/23/18**		
VOCs by Methods 8260C	*SCGs (µg /L)*	Result	Qualifier	Dilution	Result	Qualifier	Dilution	Result	Qualifier	Dilution	Result	Qualifier	Diution	Result	Qualifier	Diution	Result	Qualifier	Dilution
1,1,1-Trichloroethane	5	2.5	J	5	**2.9**	J	5	2.4	J	5	4.0	J	5	4.1	J	5	2.8	J	5
1,1,2-Trichloroethane	1	**3.6**	J	5	**5.2**	--	5	4.1	J	5	**2.3**	J	5	**3.0**	J	5	3.0	J	5
1,1-Dichloroethane	5	**330**	--	5	**470**	--	5	**360**	--	5	**280**	--	5	**370**	--	5	**300**	--	5
1,1-Dichloroethene	5	**780**	--	5	**920**	--	5	**840**	--	5	**670**	--	5	**690**	--	5	**720**	--	5
1,2,4-Trimethylbenzene	5	ND<5.0	U	5	ND<5.0	U	5	ND<5	U	5	ND<5.0	U	5	ND<5.0	U	5	ND<5	U	5
1,2-Dichloroethane	0.6	**23**	--	5	**31**	--	5	**21**	--	5	**20**	--	5	**24**	--	5	**17**	--	5
1,3,5-Trimethylbenzene	5	ND<5.0	U	5	ND<5.0	U	5	ND<5	U	5	ND<5.0	U	5	ND<5.0	U	5	ND<5	U	5
1,4-dioxane	--	310	--	5	470	--	5	420	--	5	400	--	5	500	--	5	360	--	5
Acetone	50 *	ND<25	U	5	ND<25	U	5	ND<25	U	5	6.6	J	5	7.3	J	5	ND<25	U	5
Benzene	1	**4.3**	J	5	**5.8**	--	5	**4.3**	J	5	**3.5**	J	5	**4.3**	J	5	**4.1**	J	5
Chloroethane	5	2.6	J	5	**5.5**	--	5	4.1	J	5	2.1	J	5	2.9	J	5	2.4	J	5
Ethylbenzene	5	ND<5.0	U	5	ND<5.0	U	5	ND<5	U	5	ND<5.0	U	5	ND<5.0	U	5	ND<5	U	5
Naphthalene	10	ND<5.0	U	5	ND<5.0	U	5	ND<5	U	5	ND<5.0	U	5	ND<5.0	U	5	ND<5	U	5
Toluene	5	ND<5.0	U	5	ND<5.0	U	5	ND<5	U	5	ND<5.0	U	5	ND<5.0	U	5	ND<5	U	5
Trichloroethene	5	**28**	--	5	**34**	--	5	**30**	--	5	**45**	--	5	**51**	--	5	**39**	--	5
Trichlorofluoromethane	5	**6.1**	--	5	**9.9**	--	5	**6.3**	--	5	**12**	--	5	**13**	--	5	**9.2**	--	5
Vinyl chloride	2	ND<5.0	U	5	**2.3**	J	5	1.8	J	5	ND<5.0	U	5	1.8	J	5	1.5	J	5
cis-1,2-dichloroethene	5	2.4	J	5	2.4	J	5	2.0	J	5	3.3	J	5	3.3	J	5	2.3	J	5
m,p-Xylene	5	ND<10	U	5	ND<10	U	5	ND<10	U	5	ND<10	U	5	ND<10	U	5	ND<10	U	5
o-Xylene	5	ND<5.0	U	5	ND<5.0	U	5	ND<5	U	5	ND<5.0	U	5	ND<5.0	U	5	ND<5	U	5
trans-1,2-dichloroethene	5	ND<5.0	U	5	ND<5.0	U	5	ND<5	U	5	ND<5.0	U	5	ND<5.0	U	5	ND<5	U	5
Total VOCs	--	1,492.5	--	--	1,959.0	--	--	1,696.0	--	--	1,448.8	--	--	1,675	--	--	1,461.3	--	--

Notes:
SCGs - Standards, Criteria and Guidelines (µg/L).
SCGs are provided for New York Department of Environmental Conservation (NYSDEC) Technical & Operational Guidance Series for Ambient Water Quality Standards and Guidance Values 1.1.1 unless otherwise stated.
* Guidance Value (µg/L) New York State Ambient Water Quality Standards and Guidance Values.
ND - Not detected at the Method Reporting Limit (MDL).
-- indicates 'blank cell'.
Bold values represent compound exceedance of the identified SCG.
U - Analyte was analyzed for but not detected. The sample quantitation limit has been corrected for dilution and for percent moisture, unless otherwise noted in the case narrative.
J - Estimated value due to either being a Tentatively Identified Compound or that the concentration is between the MRL and the MDL. Concentrations are not verified within the linear range of the calibration.

TABLE 2

Baseline, 3-Month and 6-Month Post-ISCO Groundwatwer Analytical Data
(Geochemical Parameters - Pilot Test Monitoring Wells)

LOCKHEED MARTIN CORPORATION
Former GE Farrell Road Site
Syracuse, New York

Sample Location	Baseline MW-29 12/01/2017			3-Month Post-ISCO MW-29 2/28/2018			6-Month Post-ISCO MW-29 5/21/2018			Baseline MW-30 12/01/2017			3-Month Post-ISCO MW-30 2/28/2018			6-Month Post-ISCO MW-30 5/21/2018			6-Month Post-ISCO MW-26D* 5/21/2018		
	Result	Qualifier	Dilution	Result	Qualifier	Dilution	Result	Qualifier	Dilution	Result	Qualifier	Dilution	Result	Qualifier	Dilution	Result	Qualifier	Dilution	Result	Qualifier	Dilution
Method 7199 (µg/L)																					
Hexavalent Chromium	ND<10	U	1	212	--	1	66	--	1	ND<10	U	1	82	--	1	101	--	1	17	--	1
Method 9056A (mg/L)																					
Sulfate	56.6	--	10	1,310	--	10	815	--	200	338	--	40	1,000	--	40	1,230	--	200	571	--	200
Method 6010C (mg/L)																					
Potassium (Dissolved)	3.9	--	1	3,950	--	1	1,830	--	50	14.4	--	1	742	--	1	1,020	--	50	45.5	--	1
Sodium (Dissolved)	30.3	--	1	432	--	1	138	--	1	35.3	--	1	492	--	1	567	--	50	191	--	1

Sample Location	Baseline PMW-4D 12/01/2017			3-Month Post-ISCO PMW-4D 2/27/2018			6-Month Post-ISCO PMW-4D 5/22/2018			Baseline PMW-5D 12/01/2017			3-Month Post-ISCO PMW-5D 2/27/2018			6-Month Post-ISCO PMW-5D 5/22/2018		
	Result	Qualifier	Dilution	Result	Qualifier	Dilution	Result	Qualifier	Dilution	Result	Qualifier	Dilution	Result	Qualifier	Dilution	Result	Qualifier	Dilution
Method 7199 (µg/L)																		
Hexavalent Chromium	ND<10	U	1	ND<10	U	1	ND<10	U	1	ND<10	U	1	ND<10	U	1	ND<10	U	1
Method 9056A (mg/L)																		
Sulfate	32.1	--	10	186	--	10	515	--	100	23.2	--	10	146	--	10	23.8	--	10
Method 6010C (mg/L)																		
Potassium (Dissolved)	ND<2	U	1	ND<2	U	1	ND<2	--	1	ND<2	U	1	ND<2	U	1	ND<2	--	1
Sodium (Dissolved)	43.7	--	1	43.5	--	1	160	--	1	31.8	--	1	29.4	--	1	30.7	--	1

Sample Location	Baseline PMW-6D 12/01/2017			3-Month Post-ISCO PMW-6D 2/27/2018			6-Month Post-ISCO PMW-6D 5/22/2018			Baseline PMW-9D 12/01/2017			3-Month Post-ISCO PMW-9D 2/27/2018			6-Month Post-ISCO PMW-9D 5/22/2018		
	Result	Qualifier	Dilution	Result	Qualifier	Dilution	Result	Qualifier	Dilution	Result	Qualifier	Dilution	Result	Qualifier	Dilution	Result	Qualifier	Dilution
Method 7199 (µg/L)																		
Hexavalent Chromium	ND<10	U	1	ND<10	U	1	ND<10	U	1	ND<10	U	1	ND<10	U	1	ND<10	U	1
Method 9056A (mg/L)																		
Sulfate	23	--	10	22.6	--	10	22.1	--	10	21.8	--	10	150	--	10	24.1	--	10
Method 6010C (mg/L)																		
Potassium (Dissolved)	ND<2	U	1	ND<2	U	1	ND<2	U	1	ND<2	U	1	ND<2	U	1	ND<2	U	1
Sodium (Dissolved)	33.9	--	1	31.6	--	1	32.8	--	1	33.2	--	1	29.7	--	1	33	--	1

Notes:
µg/L - Micrograms per liter.
mg/L - Milligrams per liter.
ND - Not detected at the Method Reporting Limit (MDL).
-- indicates 'blank cell'.
U - Analyte was analyzed for but not detected. The sample quantitation limit has been corrected for dilution and for percent moisture, unless otherwise noted in the case narrative.
* Baseline and 3-month post-ISCO data was not collected for MW-26D.

AECOM

TABLE 3

Soil Analytical Data
(The Wetlands - Historical and Current)

LOCKHEED MARTIN CORPORATION
Former GE Farrell Road
Syracuse, New York

Soil Sample ID **(Depth Interval in feet below grade)** **Date**		**PMW-4D** **(10-12)** **8/4/2014**		**PMW-9D** **(22-24)** **12/2/2015**		**PMW-10D** **(24-26)** **11/30/2015**		**PMW-11D** **(2.8-4.0)** **12/2/2015**		**MIP-11/SB-11** **(24-25)** **9/12/2016**		**MIP-11/SB-11** **(28-29)** **9/12/2016**		**MIP-18/SB-18** **(23-24)** **9/12/2016**	
VOCs by Methods 8260C	*Cleanup Objectives * (µg/kg)*	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier
1,1,1-Trichloroethane	680	ND<9.18	U	ND<4.18	U	ND<4.90	U	ND<4.63	U	ND<4.6	U	ND<3.1	U	1.7	J
1,1,2-trichloroethane	--	ND<9.18	--	ND<4.18	--	ND<4.90	--	ND<4.63	--	--	--	--	--	--	--
1,1-dichloroethane	270	ND<9.18	U	ND<4.18	U	4.07	--	29.3	--	18	--	0.57	J	ND<4.4	U
1,1-dichloroethene	330	ND<9.18	U	ND<4.18	U	5.94	--	ND<4.63	U	42	--	1.5	J	ND<4.4	U
1,2,4-trimethylbenzene	3,600	ND<9.18	U	ND<4.18	U	ND<4.90	U	ND<4.63	U	ND<4.6	U	ND<3.1	U	ND<4.4	U
1,2-dichloroethane	20	ND<9.18	U	ND<4.18	U	ND<4.90	U	ND<4.63	U	2.2	J	ND<4.1	U	ND<4.4	F1
1,3,5-trimethylbenzene	8,400	ND<9.18	U	ND<4.18	U	ND<4.90	U	ND<4.63	U	ND<4.6	U	ND<4.1	U	ND<4.4	U
1,4-dioxane	100	ND<91.8	U	93.2	--	ND<49.0	U	ND<46.3	U	ND<92	U	**130**	--	ND<87	U
2-Butanone (MEK)	300	ND<45.9	U	ND<20.9	U	ND<24.5	U	ND<23.1	U	ND<23	U	ND<16	U	ND<22	F1
Acetone	50	ND<45.9	U	ND<20.9	U	ND<24.5	--	12.9	--	7.8	J	ND<16	U	5.4	J
Benzene	60	ND<9.18	U	ND<4.18	U	ND<4.90	U	ND<4.63	U	0.32	J	ND<3.1	U	ND<4.4	U
Chloroethane	--	ND<9.18	--	ND<4.18	--	ND<4.90	--	ND<4.63	--	--	--	--	--	--	--
Ethylbenzene	1,000	ND<9.18	U	ND<4.18	U	ND<4.90	U	ND<4.63	U	ND<4.6	U	ND<3.1	U	ND<4.4	U
Naphthalene	12,000	ND<22.9	U	ND<10.4	U	ND<12.2	U	ND<4.63	U	ND<4.6	U	ND<3.1	U	ND<4.4	U
Toluene	700	ND<9.18	U	ND<4.18	U	ND<4.90	U	ND<4.63	U	ND<4.6	U	ND<3.1	U	ND<4.4	U
Trichloroethene	470	ND<9.18	U	ND<4.18	U	4.96	--	20.5	--	3.6	J	ND<3.1	--	6.6	--
Vinyl chloride	20	ND<9.18	U	ND<4.18	U	ND<4.90	U	ND<4.63	U	ND<4.6	U	ND<3.1	U	ND<4.4	U
cis-1,2-dichloroethene	250	ND<9.18	U	ND<4.18	U	ND<4.90	--	2.57	--	ND<4.6	U	ND<3.1	U	ND<4.4	U
m,p-Xylene	260 **	ND<9.18	U	ND<4.18	U	ND<4.90	U	ND<4.63	U	ND<9.2	U	ND<6.3	U	ND<8.7	U
o-Xylene	260 **	ND<9.18	U	ND<4.18	U	ND<4.90	U	ND<4.63	U	ND<4.6	U	ND<3.1	U	ND<4.4	U
trans-1,2-dichloroethene	190	ND<9.18	U	ND<4.18	U	ND<4.90	U	ND<4.63	U	ND<4.6	U	ND<3.1	U	ND<4.4	U
Total VOCs	--	ND	--	93.2	--	14.97	--	65.27	--	74	--	132	--	13.7	--

Notes:
* 6 NYCRR Part 375 Environmental Remediation Programs, Table 375-6.8(a) Unrestricted Use Soil Cleanup Objectives (µg/kg).
** Cleanup Objective used for Xylenes (Total).
ND - Not detected at the Method Reporting Limit (MDL).
Bold values represent compound exceedance of the identified Cleanup Objective.
U - Analyte was analyzed for but not detected. The sample quantitation limit has been corrected for dilution and for percent moisture, unless otherwise noted in the case narrative.
J - Result is less than the Reporting Limit but greater than or equal to the Method Detection Limit and the concentration is an approximate value.
F1 - MS and/or MSD Recovery is outside acceptance limits.

TABLE 4

Soil Analytical Data
(AOC #5 - Historical and Current)

LOCKHEED MARTIN CORPORATION
Former GE Farrell Road Site
Syracuse, New York

Soil Sample ID Depth Interval in feet below grade Sample Date		Historical										Current				
		B-44 **10** **3/16/1992**	**B-45** **8** **3/12/1992**	**B-47** **9** **3/13/1992**	**B-47A** **9** **3/18/1992**	**B-52** **8** **4/6/1992**	**B-53** **8** **4/25/1992**	**B-60** **7** **4/25/1992**	**B-62** **7** **4/26/1992**	**B-65** **8** **4/27/1992**	**B-77** **8** **4/27/1992**	**MIP-1/SB-1** **9-10** **9/12/2016**	**MIP-1/SB-1** **13-14** **9/12/2016**	**MIP-19/SB-19** **13-14** **9/12/2016**	**MW-31** **10-12** **11/28/2017**	**MW-31** **16-18** **11/28/2017**
VOCs by Methods 8260C	*Cleanup Objectives **															
1,1,1-Trichloroethane	680	1,300	80	12,000	40	ND	ND	ND	ND	8	ND	ND<1200	5.1	1.6 (J)	210 (J)	1.9 (J)
1,1,2-trichloroethane	--	ND	ND	--	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	--
1,1-dichloroethane	270	ND	ND	140	28	42	ND	ND	ND	10	ND	ND<1200	4.9	ND<4.4	ND<530	ND<3.5
1,1-dichloroethene	330	ND	ND	210	25	9	ND	ND	ND	25	ND	ND<1200	8.3	ND<4.4	ND<530	ND<3.5
1,2,4-trimethylbenzene	3,600	--	--	--	--	--	--	--	--	--	--	520 (J)	4.7	ND<4.4	ND<530	ND<3.5
1,2-dichloroethane	20	ND	ND	ND	ND	6	ND	ND	ND	ND	ND	ND<1200	ND<4	ND<4.4	ND<530	ND<3.5
1,3,5-trimethylbenzene	8,400	--	--	--	--	--	--	--	--	--	--	ND<1200	1.2 (J)	ND<4.4	ND<530	ND<3.5
1,4-dioxane	100	--	--	--	--	--	--	--	--	--	--	ND<23000	ND<80	ND<88	ND<1,000	ND<70
Acetone	50	ND	ND	ND	ND	ND	16	ND	ND	ND	ND	ND<6000	4.8 (J)	ND<22	ND<530	2.7 (J)
Benzene	60	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND<1200	ND<4.0	ND<4.4	ND<530	ND<3.5
Chloroethane	--	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	ND<530	--
Ethylbenzene	1,000	ND	ND	3,800	160	ND	ND	ND	ND	ND	ND	**10,000**	98	ND<4.4	**1,600**	7.5
Naphthalene	12,000	--	--	--	--	--	--	--	--	--	--	ND<1200	ND<4	ND<4.4	ND<530	ND<3.5
Toluene	700	ND	ND	5,600	ND	ND	ND	ND	ND	ND	ND	ND<1200	11	ND<4.4	**7,800**	31
Trichloroethene	470	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND<1200	ND<4	ND<4.4	ND<530	ND<3.5
Vinyl chloride	20	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND<1200	ND<4	ND<4.4	ND<530	ND<3.5
cis-1,2-dichloroethene	250	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND<1200	ND<4	ND<4.4	ND<530	ND<3.5
m,p-Xylene	260 **	--	--	--	--	--	--	--	--	--	--	**45,000**	**2,500**	ND<8.8	**8,500**	36
o-Xylene	260 **	--	--	--	--	--	--	--	--	--	--	**11,000**	120	ND<4.4	**2,700**	8.0
Xylenes (total)	--	ND	ND	28,000	670	ND	ND	ND	ND	ND	ND	--	--	--	--	--
trans-1,2-dichloroethene	190	--	--	--	--	--	--	--	--	--	--	ND<1200	ND<4	ND<4.4	ND<530	ND<3.5
1,2-dichloroethene (total)	--	350	ND	ND	ND	ND	6	ND	ND	ND	ND	--	--	--	--	--
Total VOCs	--	1,650	80	49,750	923	57	22	ND	ND	43	ND	66,520	2,758	1.6	20,810	87.1

Notes:
* 6 NYCRR Part 375 Environmental Remediation Programs, Table 375-6.8(a) Unrestricted Use Soil Cleanup Objectives (µg/kg)
** Cleanup Objective used for Xylenes (Total)
Analytical data is presented in micrograms per kilogram (µg/kg)
ND - Not detected at the Method Reporting Limit (MDL).
Bold values represent compound exceedance of the identified Cleanup Objective.
J - Result is less than the Reporting Limit but greater than or equal to the Method Detection Limit and the concentration is an approximate value.

TABLE 5

Groundwater Analytical Data
(AOC #5 - Historical and Current)

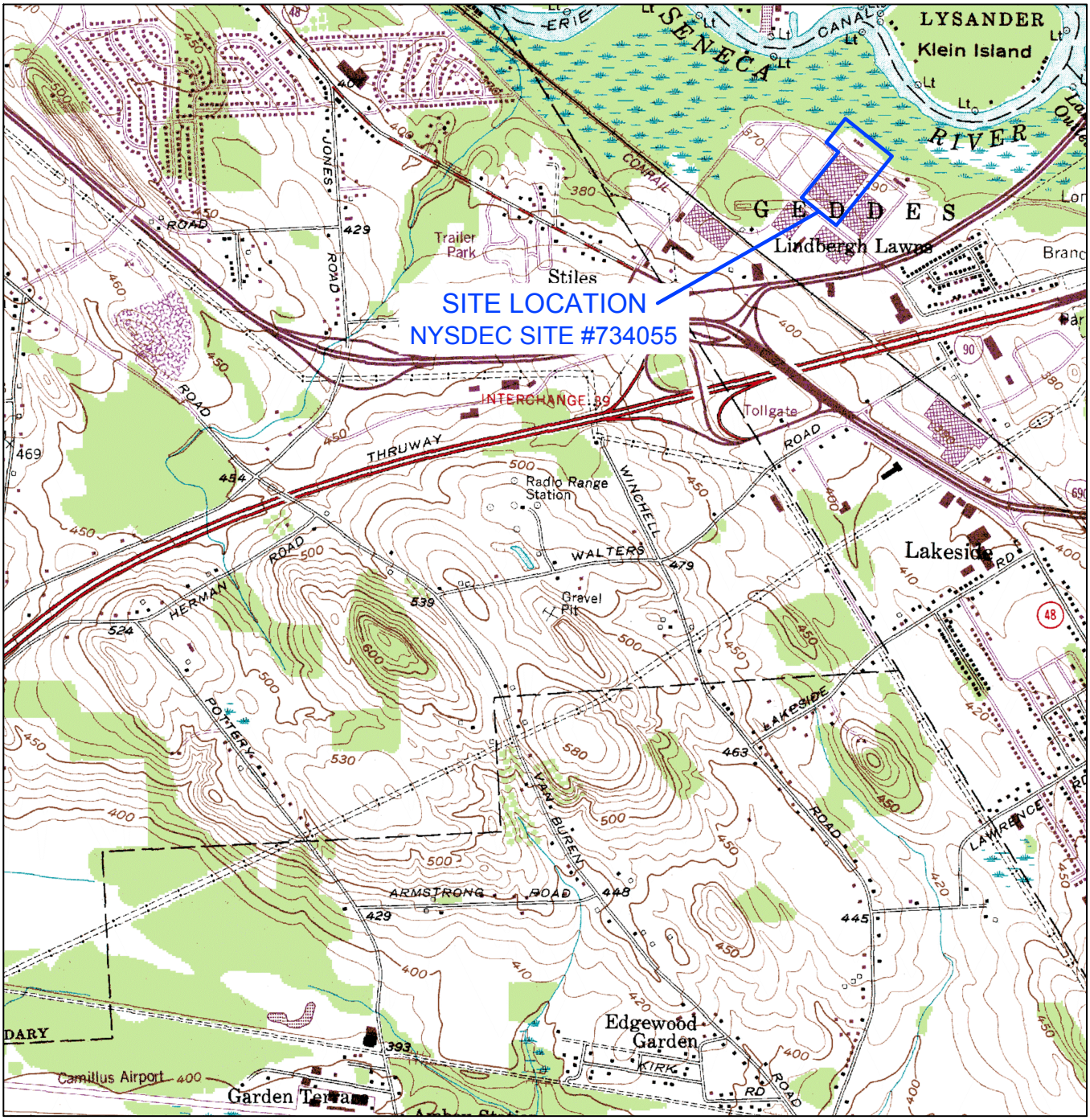
LOCKHEED MARTIN CORPORATION
Former GE Farrell Road Site
Syracuse, New York

Sample Location / Sample Date		Historical										Current	
		B-44 3/16/1992	B-45 3/13/1992	B-47 3/16/1992	B-47A 3/18/1992	B-52 4/6/1992	B-53 4/26/1992	B-60 4/30/1992	B-62 4/27/1992	B-65 4/23/1992	B-77 4/27/1992	B-84 5/5/1992	MW-27 11/15/2017	MW-31 11/28/2017
VOCs by Methods 8260C	*SCGs (µg/L)*													
1,1,1-Trichloroethane	5	**25,000**	**1,200**	**180,000**	**380**	**20,000**	**48,000**	**11**	ND	**6,300**	ND	ND	ND<50	1400.00
1,1,2-Trichloroethane	1	ND	ND	ND	ND	**420**	ND	ND	ND	ND	ND	ND	ND<50	ND<500
1,1-Dichloroethane	5	**5,600**	**30**	**12,000**	**210**	**14,000**	**3,100**	**13**	**260**	**550**	**1,900**	**12**	ND<50	**230**
1,1-Dichloroethene	5	**3,500**	**80**	ND	**330**	**30,000**	**34,000**	**450**	**500**	**18,000**	**10,000**	**82**	ND<50	ND<500
1,2,4-Trimethylbenzene	5	--	--	--	--	--	--	--	--	--	--	--	**110**	ND<500
1,2-Dichloroethane	0.6	ND	ND	ND	ND	**1,100**	**2,400**	**15**	ND	ND	**1,000**	**ND**	ND<50	ND<500
1,3,5-Trimethylbenzene	5	--	--	--	--	--	--	--	--	--	--	--	**26**	ND<500
1,4-dioxane	--	--	--	--	--	--	--	--	--	--	--	--	ND<2000	ND<20,000
Acetone	50 *	ND	ND	ND	ND	**3,000**	ND	ND	ND	ND	**160,000**	ND	ND<250	ND<2,500
Benzene	1	ND	ND	ND	**10**	**280**	ND	ND	ND	ND	ND	ND	ND<50	ND<500
Chloroethane	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND<50	ND<500
Chloroform	--	ND	ND	ND	ND	**270**	**780**	ND	ND	ND	ND	ND	--	--
Ethylbenzene	5	**8,600**	ND	**31,000**	**1,500**	**3,600**	**1,800**	ND	**580**	**600**	**400**	ND	**1,200**	**6,500**
Naphthalene	10	--	--	--	--	--	--	--	--	--	--	--	ND<50	ND<500
Methylene Chloride	--	ND	ND	ND	ND	**2,900**	**7,200**	ND	ND	ND	ND	ND	--	--
Methyl Ethyl Ketone	--	ND	ND	ND	**1,100**	**21,000**	ND	ND	ND	ND	ND	ND	--	--
Methyl-Isobutylketone	--	**450,000**	ND	**4,000,000**	ND	**42,000**	**4,200**	ND	ND	ND	**12,000**	ND	--	--
Toluene	5	**180,000**	**7**	**310,000**	**1,500**	**130,000**	**103,000**	ND	ND	**36,000**	**22,000**	ND	**200**	**46,000**
Trichloroethene	5	ND	ND	ND	ND	**220**	ND	ND	ND	ND	ND	60.0	ND<50	ND<500
Trichlorofluoromethane	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	6.00	ND<50	ND<500
Vinyl chloride	2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND<50	ND<500
cis-1,2-dichloroethene	5	--	--	--	--	--	--	--	--	--	--	--	ND<50	ND<500
m,p-Xylene	5	--	--	--	--	--	--	--	--	--	--	--	**15,000**	**32,000**
o-Xylene	5	--	--	--	--	--	--	--	--	--	--	--	**3,700**	**9,700**
Xylenes (total)	--	**580,000**	ND	**170,000**	ND	**22,000**	**8,300**	ND	**1,600**	**4,200**	**2,300**	ND	--	--
trans-1,2-dichloroethene	5	--	--	--	--	--	--	--	--	--	--	--	ND<50	ND<500
1,2-Dichloroethene (Total)	--	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	--	--
Total VOCs	--	1,252,700	1,317	4,703,000	5,030	290,790	212,780	489	2,940	65,650	209,600	160	20,236	95,830

Notes:
VOCs - Volatile organic compounds.
SCGs - Standards, Criteria and Guidelines (µg/L).
SCGs are provided for New York Department of Environmental Conservation (NYSDEC) Technical & Operational Guidance Series for Ambient Water Quality Standards and Guidance Values 1.1.1 unless otherwise stated.
* Guidance Value (µg/L) New York State Ambient Water Quality Standards and Guidance Values.
ND - Not detected at the Method Reporting Limit (MDL).
-- indicates 'blank cell'.
Bold values represent compound exceedance of the identified SCG.

AECOM

Figures



0 2000' 4000'

NOTE: MAP DERIVED FROM U.S.G.S. 7.5 MINUTE TOPOGRAPHIC QUADRANGLE, CAMILLUS, NY, DATED 1955, PHOTOREVISED 1978.

LOCKHEED MARTIN CORPORATION
FORMER G.E. FARRELL ROAD SITE
TOWN OF GEDDES, ONONDAGA COUNTY, NEW YORK
Project No.: 60518568 Date: NOVEMBER 23, 2016

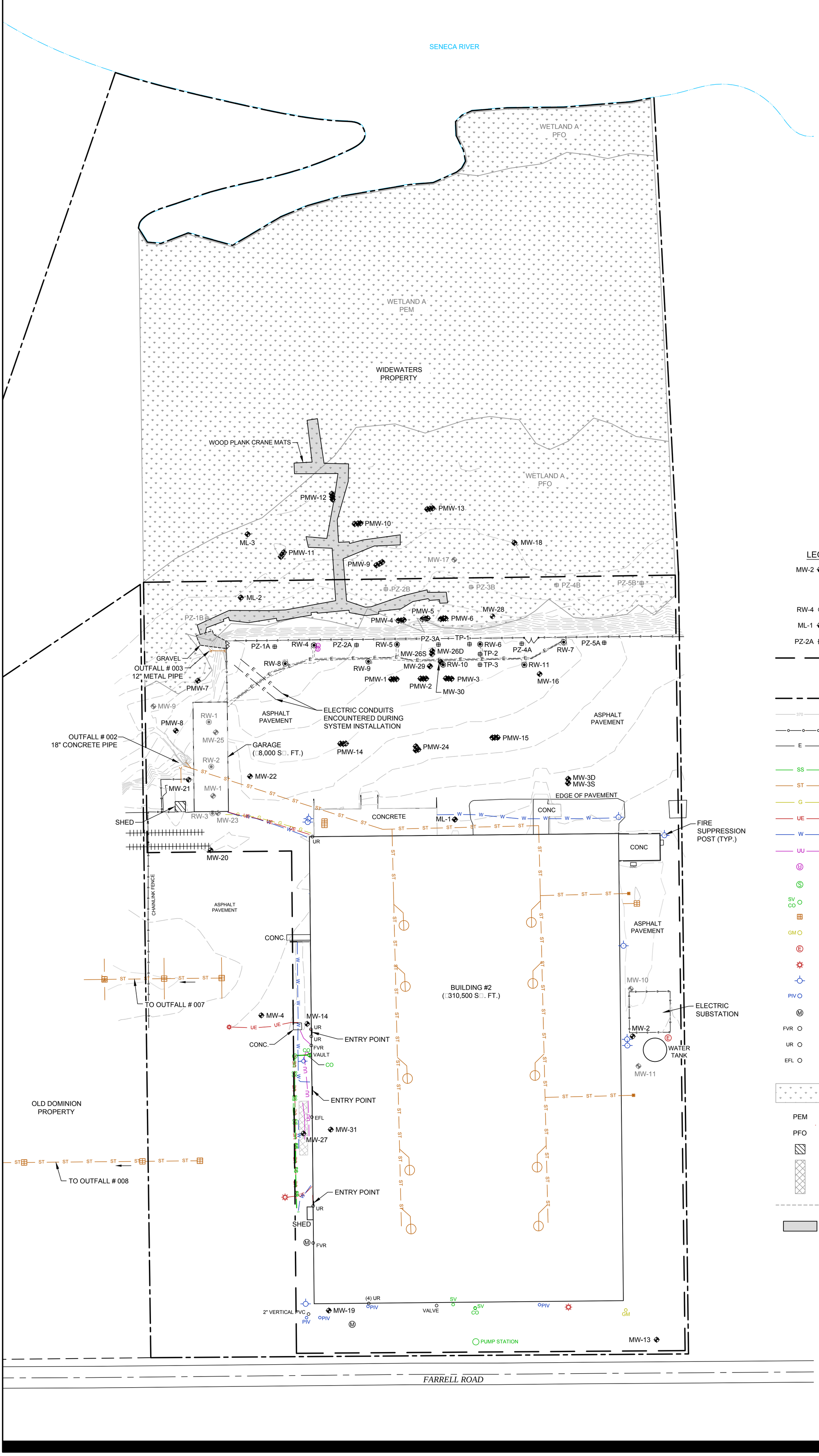
SITE LOCATION MAP

AECOM

Figure: 1

Last saved by: BOOKASR(2018-04-26) Last Plotted: 2018-04-26
Filename: C:\USERS\BOOKASR\DESKTOP\FARRELL ROAD TEMP\FARRELL SITE PLAN STORM WATER_04-26-2018.DWG

Project Management Initials: Designer:_____ Checked:_____ Approved:_____ ANSI D 22" x 34"



LEGEND

- MW-2 — MONITORING WELL LOCATION (PMW-1 THROUGH PMW-6, PMW-9 THROUGH PMW-13, AND PMW24 ARE DEEP, INTERMEDIATE AND SHALLOW-SCREENED SETS OF WELLS.)
- RW-4 — GROUNDWATER EXTRACTION WELL LOCATION
- ML-1 — CONTINUOUS MULTICHAMBER TUBING (CMT) WELLS
- PZ-2A — PIEZOMETER LOCATION
- 241 FARRELL ROAD - 16.6 ACRES SITE BOUNDARY AS DEFINED IN APRIL 26, 2012 NYSDEC CORRESPONDENCE (REFER TO INTERIM SITE MANAGEMENT PLAN, JULY 25, 2017)
- WIDEWATERS PROPERTY
- 370 — TOPOGRAPHIC CONTOUR
- CHAINLINK FENCE
- E — SUBGRADE SYSTEM PIPING FOR THE GROUNDWATER EXTRACTION TREATMENT SYSTEM
- SS — SANITARY SEWER LINE
- ST — STORM SEWER LINE
- G — UNDERGROUND GAS LINE
- UE — UNDERGROUND ELECTRIC LINE
- W — UNDERGROUND WATER LINE
- UU — UNKNOWN UTILITY LINE
- U — UNKNOWN MANHOLE
- S — SANITARY MANHOLE
- SV CO — SEWER VENT □CLEAN OUT
- CATCH BASIN
- GM — GAS MARKER
- E — ELECTRIC MANHOLE
- LIGHT POLE
- FIRE HYDRANT□FIRE SUPPRESSION POST
- PIV — POST INDICATOR VALVE
- M — MANHOLE
- FVR — FORMER VENT RISER
- UR — UTILITY RISER
- EFL — SUB-SLAB DEPRESSURIZATION SYSTEM EXHAUST FAN LOCATION
- WETLAND AREA DELINEATED IN MAY 2017
- PEM — PALUSTRINE EMERGENT
- PFO — PALUSTRINE FORESTED
- LOCKHEED MARTIN STORAGE SHED
- AREA OF CONCERN #5
- TRENCH OUTLINE
- WETLAND CONSTRUCTION MAT ACCESS ROAD LOCATION

NOTE

1. ABANDONED □DECOMMISSIONED WELL LOCATIONS ARE SHOWN IN GRAY. LOCATIONS WERE NOT SURVEYED AND ARE APPROXIMATE.

0' 70' 140'

APPROXIMATE SCALE

REFERENCE:
SITE LAYOUT BASED ON SURVEY INFORMATION PROVIDED BY CNY LAND SURVEYING DRAWING, FARRELL ROAD TOPOGRAPHIC SURVEY AND MONITORING WELL LOCATIONS, DATED APRIL 2, 2016.

LOCKHEED MARTIN CORPORATION
FORMER G.E. FARRELL ROAD SITE
TOWN OF GEDDES, ONONDAGA COUNTY, NEW YORK
Project No.: 60564181 Date: APRIL 26, 2018

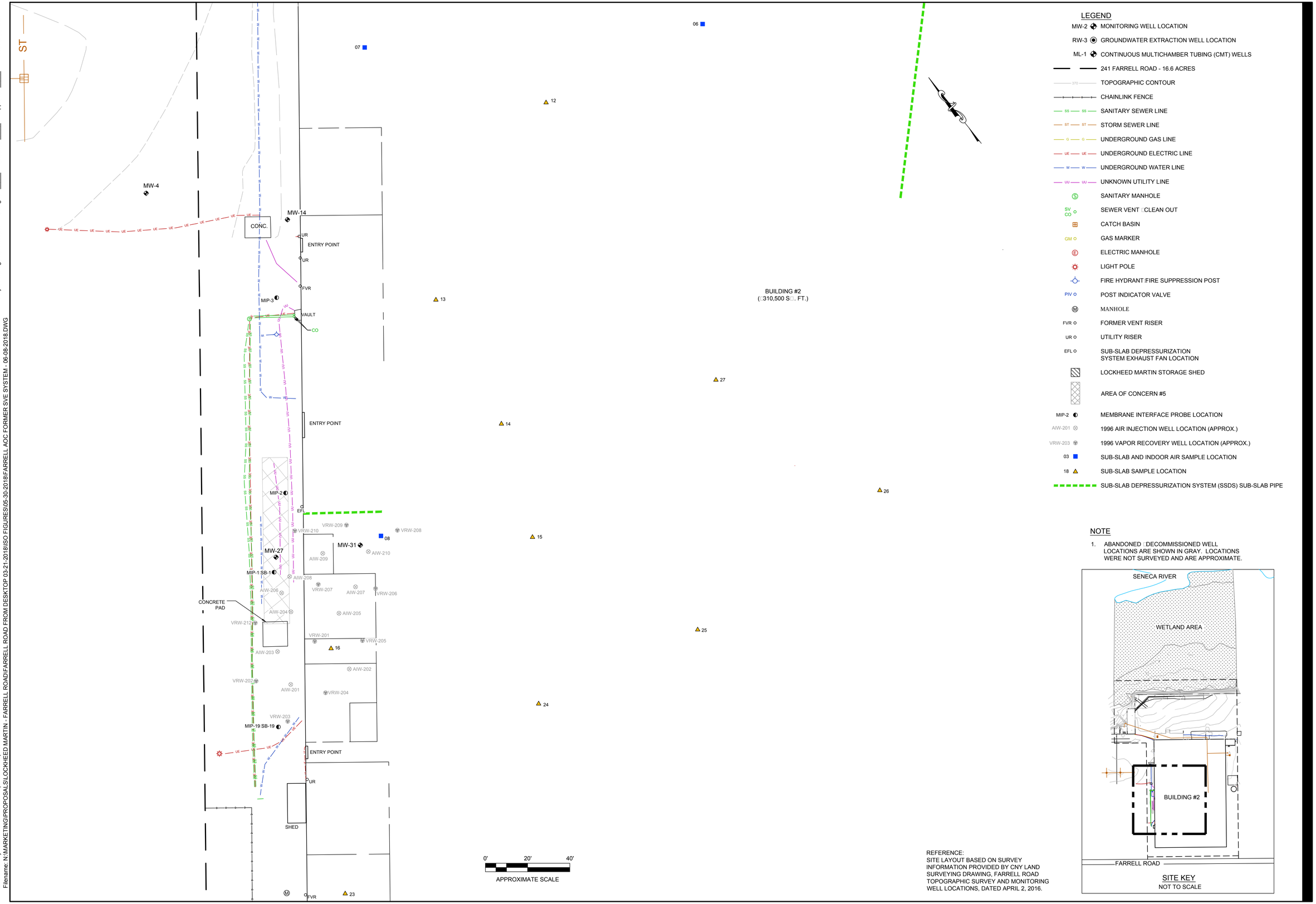
SITE MAP

AECOM

Figure: 2

Last saved by: HEATHER.PRESSING(2018-06-22) Last Plotted: 2018-06-22
Filename: N:\MARKETING\PROPOSALS\LOCKHEED MARTIN - FARRELL ROAD\FARRELL ROAD FROM DESKTOP 03-21-2018\ISO FIGURES\05-30-2018\FARRELL AOC FORMER SVE SYSTEM - 06-08-2018.DWG

Project Management Initials: Designer: Checked: Approved: ANSI D 22" x 34"



LEGEND

- MW-2 MONITORING WELL LOCATION
- RW-3 GROUNDWATER EXTRACTION WELL LOCATION
- ML-1 CONTINUOUS MULTICHAMBER TUBING (CMT) WELLS
- 241 FARRELL ROAD - 16.6 ACRES
- 370 TOPOGRAPHIC CONTOUR
- CHAINLINK FENCE
- SS SANITARY SEWER LINE
- ST STORM SEWER LINE
- G UNDERGROUND GAS LINE
- UE UNDERGROUND ELECTRIC LINE
- W UNDERGROUND WATER LINE
- UU UNKNOWN UTILITY LINE
- SANITARY MANHOLE
- SV SEWER VENT □ CO CLEAN OUT
- CATCH BASIN
- GM GAS MARKER
- ELECTRIC MANHOLE
- LIGHT POLE
- FIRE HYDRANT □ FIRE SUPPRESSION POST
- PIV POST INDICATOR VALVE
- MANHOLE
- FVR FORMER VENT RISER
- UR UTILITY RISER
- EFL SUB-SLAB DEPRESSURIZATION SYSTEM EXHAUST FAN LOCATION
- LOCKHEED MARTIN STORAGE SHED
- AREA OF CONCERN #5
- MIP-2 MEMBRANE INTERFACE PROBE LOCATION
- AIW-201 1996 AIR INJECTION WELL LOCATION (APPROX.)
- VRW-203 1996 VAPOR RECOVERY WELL LOCATION (APPROX.)
- 03 SUB-SLAB AND INDOOR AIR SAMPLE LOCATION
- 18 SUB-SLAB SAMPLE LOCATION
- SUB-SLAB DEPRESSURIZATION SYSTEM (SSDS) SUB-SLAB PIPE

NOTE

1. ABANDONED □DECOMMISSIONED WELL LOCATIONS ARE SHOWN IN GRAY. LOCATIONS WERE NOT SURVEYED AND ARE APPROXIMATE.

REFERENCE:
SITE LAYOUT BASED ON SURVEY INFORMATION PROVIDED BY CNY LAND SURVEYING DRAWING, FARRELL ROAD TOPOGRAPHIC SURVEY AND MONITORING WELL LOCATIONS, DATED APRIL 2, 2016.

SITE KEY
NOT TO SCALE

AECOM

Figure: 3

AREA OF CONCERN #5
FORMER SOIL VAPOR EXTRACTION SYSTEM AREA

LOCKHEED MARTIN CORPORATION
FORMER G.E. FARRELL ROAD SITE
TOWN OF GEDDES, ONONDAGA COUNTY, NEW YORK
Project No.: 60564181 Date: JUNE 8, 2018

PMW-4I
PMW-4D
PMW-4S
PMW-5I
PMW-5D
PMW-5S
PMW-6I
PMW-6D
PMW-6S
RW-5
PZ-3A
TP-1
MW-26D
MW-26S
MW-30
RW-10
DP-01A
MW-29
DP-01
DP-02
DP-03
DP-04
DP-05
DP-06
PMW-1I
PMW-1D
PMW-1S
PMW-2I
PMW-2D
PMW-2S
PMW-3I
PMW-3D
PMW-3S

0' 5' 10'
APPROXIMATE SCALE

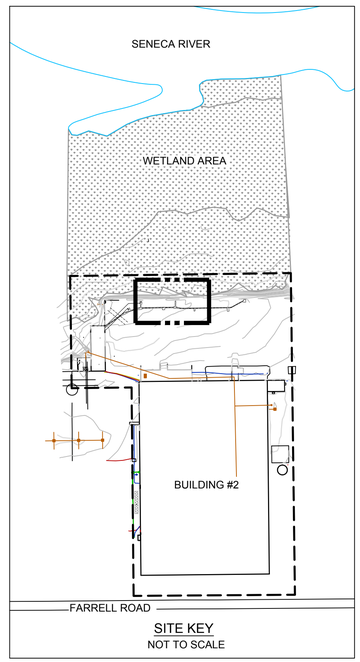
LEGEND

- PMW-2 — MONITORING WELL LOCATION (PMW-1 THROUGH PMW-6, PMW-9 THROUGH PMW-13, AND PMW24 ARE DEEP, INTERMEDIATE AND SHALLOW-SCREENED SETS OF WELLS.)
- RW-4 — GROUNDWATER EXTRACTION WELL LOCATION
- PZ-2A — PIEZOMETER LOCATION
- 241 FARRELL ROAD - 16.6 ACRES
- 370 — TOPOGRAPHIC CONTOUR
- CHAINLINK FENCE
- E — E — SUBGRADE SYSTEM PIPING FOR THE GROUNDWATER EXTRACTION TREATMENT SYSTEM
- TRENCH OUTLINE
- APPROXIMATE WETLAND AREA
- DIRECT PUSH INJECTION LOCATION

NOTE

1. ABANDONED □DECOMMISSIONED WELL LOCATIONS ARE SHOWN IN GRAY. LOCATIONS WERE NOT SURVEYED AND ARE APPROXIMATE.
2. ALL RESULTS ARE IN MICROGRAMS PER LITER (µg□L).
3. a □ SAMPLES WERE PRESERVED WITH ASCORBIC ACID.

REFERENCE:
SITE LAYOUT BASED ON SURVEY INFORMATION PROVIDED BY CNY LAND SURVEYING DRAWING, FARRELL ROAD TOPOGRAPHIC SURVEY AND MONITORING WELL LOCATIONS, DATED APRIL 2, 2016.



SITE KEY
NOT TO SCALE

AECOM

Figure: 4

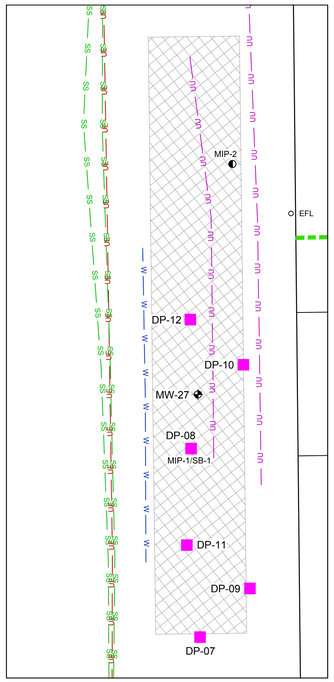
PILOT TEST TREATMENT AREA #1

LOCKHEED MARTIN CORPORATION
FORMER G.E. FARRELL ROAD SITE
TOWN OF GEDDES, ONONDAGA COUNTY, NEW YORK
Project No.: 60564181 Date: JUNE 8, 2018

Project Management Initials: Designer:____ Checked:____ Approved:____ ANSI D 22" x 34"

Last saved by: BOOKASR(2018-04-20) Last Plotted: 2018-06-08
Filename: C:\USERS\BOOKASR\DESKTOP\FARRELL ROAD TEMP\ISO FIGURES\05-30-2018\FARRELL TREATMENT AREA 1 ANALYTICAL 06-2018.DWG

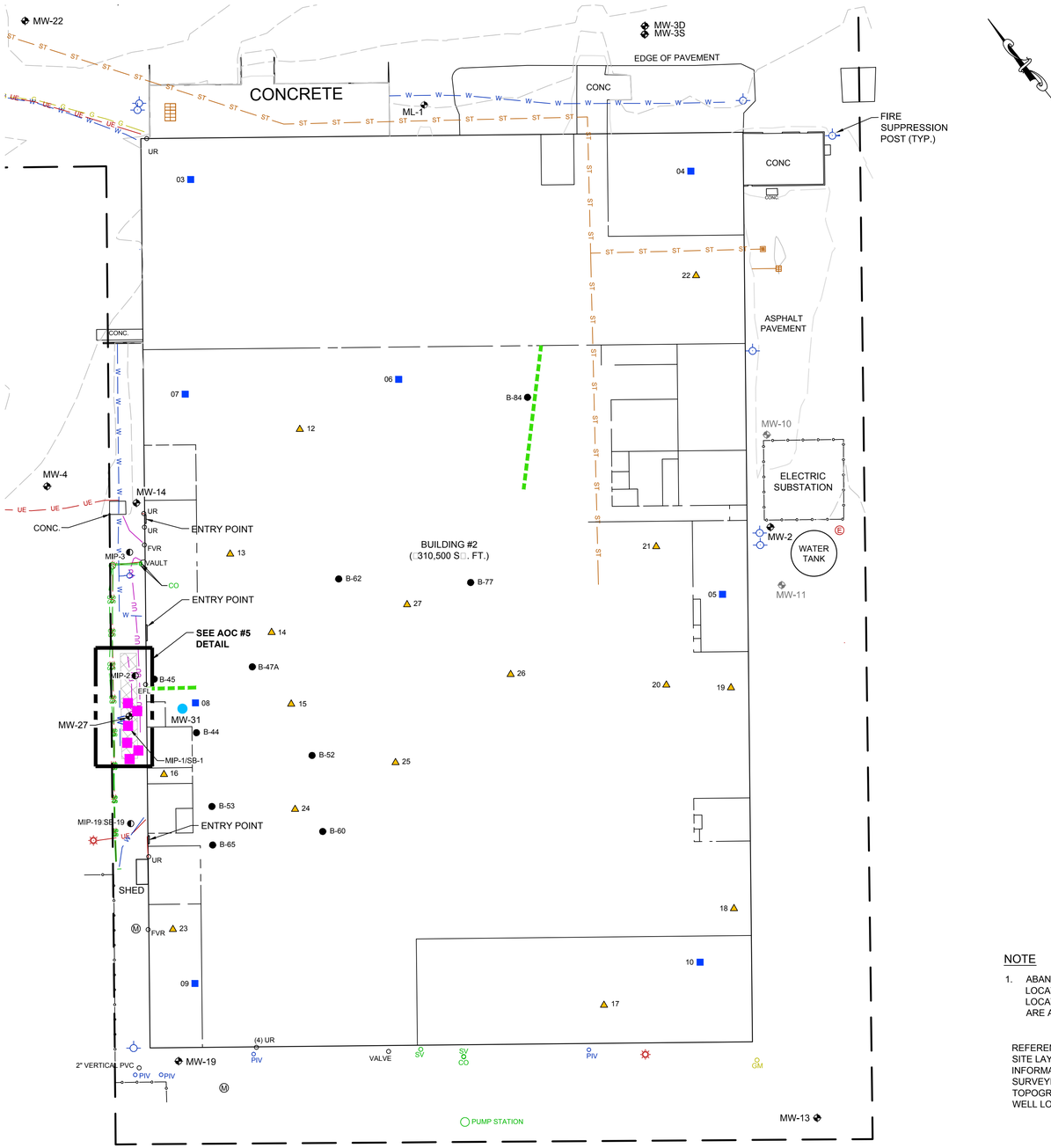
Project Management Initials: Designer:____ Checked:____ Approved:____ ANSI D 22" x 34"
Last saved by: HEATHER.PRESSING(2018-06-22) Last Plotted: 2018-06-22
Filename: N:\MARKETING\PROPOSAL\LOCKHEED MARTIN - FARRELL ROAD\REPORT FIGURES - APRIL 2018\RF_4 - FARRELL TREATMENT AREA 2 04-2018.DWG



AOC #5 DETAIL

0' 10' 20'

APPROXIMATE SCALE



0' 50' 100'

APPROXIMATE SCALE

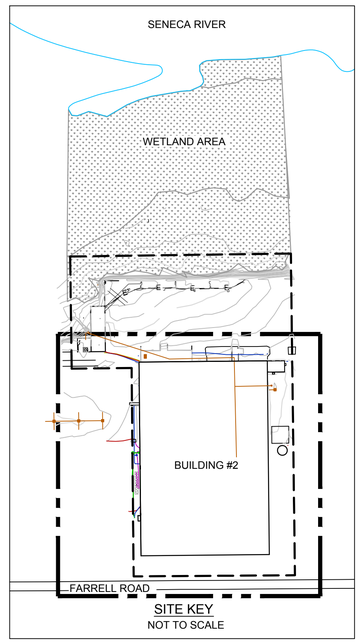
LEGEND

- MW-2 MONITORING WELL LOCATION
- RW-3 GROUNDWATER EXTRACTION WELL LOCATION
- ML-1 CONTINUOUS MULTICHAMBER TUBING (CMT) WELLS
- 241 FARRELL ROAD - 16.6 ACRES
- TOPOGRAPHIC CONTOUR
- CHAINLINK FENCE
- SANITARY SEWER LINE
- STORM SEWER LINE
- UNDERGROUND GAS LINE
- UNDERGROUND ELECTRIC LINE
- UNDERGROUND WATER LINE
- UNKNOWN UTILITY LINE
- SANITARY MANHOLE
- SV CO SEWER VENT / CLEAN OUT
- CATCH BASIN
- GM GAS MARKER
- ELECTRIC MANHOLE
- LIGHT POLE
- FIRE HYDRANT / FIRE SUPPRESSION POST
- PIV POST INDICATOR VALVE
- MANHOLE
- FVR FORMER VENT RISER
- UR UTILITY RISER
- EFL SUB-SLAB DEPRESSURIZATION SYSTEM EXHAUST FAN LOCATION
- LOCKHEED MARTIN STORAGE SHED
- AREA OF CONCERN #5
- NEW MONITORING WELL LOCATION
- DIRECT PUSH INJECTION LOCATION
- MIP-2 MEMBRANE INTERFACE PROBE LOCATION
- B-44 1992 BORING LOCATION
- 03 SUB-SLAB AND INDOOR AIR SAMPLE LOCATION
- 18 SUB-SLAB SAMPLE LOCATION
- SUB-SLAB DEPRESSURIZATION SYSTEM (SSDS) SUB-SLAB PIPE

NOTE

1. ABANDONED / DECOMMISSIONED WELL LOCATIONS ARE SHOWN IN GRAY. LOCATIONS WERE NOT SURVEYED AND ARE APPROXIMATE.

REFERENCE:
SITE LAYOUT BASED ON SURVEY INFORMATION PROVIDED BY CNY LAND SURVEYING DRAWING, FARRELL ROAD TOPOGRAPHIC SURVEY AND MONITORING WELL LOCATIONS, DATED APRIL 2, 2016.



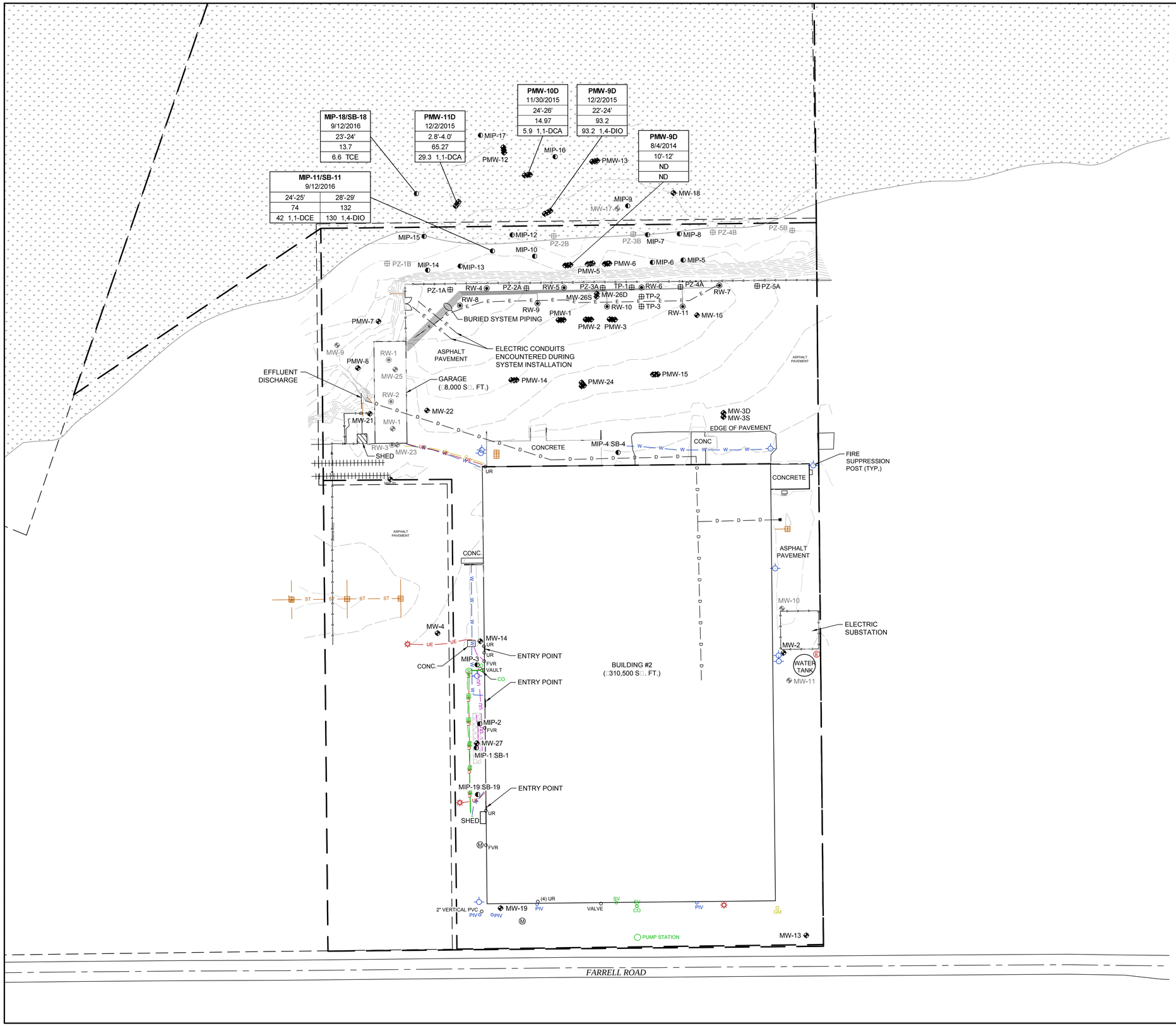
SITE KEY
NOT TO SCALE

AECOM

Figure: 5

PILOT TEST TREATMENT AREA #2

LOCKHEED MARTIN CORPORATION
FORMER G.E. FARRELL ROAD SITE
TOWN OF GEDDES, ONONDAGA COUNTY, NEW YORK
Project No.: 60564181 Date: APRIL 20, 2018



LEGEND

- MW-2 — MONITORING WELL LOCATION (PMW-1 THROUGH PMW-6, PMW-9 THROUGH PMW-13, AND PMW24 ARE DEEP, INTERMEDIATE AND SHALLOW-SCREENED SETS OF WELLS.)
- RW-4 — SITE-WIDE GROUNDWATER EXTRACTION WELL LOCATION
- PZ-2A — PIEZOMETER LOCATION
- MIP-2 — MEMBRANE INTERFACE PROBE LOCATION
- 241 FARRELL ROAD - 16.8 ACRES
- FARRELL ROAD - 49.5 ACRES
- 370 — TOPOGRAPHIC CONTOUR
- CHAINLINK FENCE
- D — EFFLUENT DISCHARGE LINE
- E — SUBGRADE SYSTEM PIPING FOR THE GROUNDWATER EXTRACTION TREATMENT SYSTEM
- SS — SANITARY SEWER LINE
- ST — STORM SEWER LINE
- G — UNDERGROUND GAS LINE
- UE — UNDERGROUND ELECTRIC LINE
- W — UNDERGROUND WATER LINE
- UU — UNKNOWN UTILITY LINE
- SANITARY MANHOLE
- SV CO — SEWER VENT □CLEAN OUT
- CATCH BASIN
- GM — GAS MARKER
- ELECTRIC MANHOLE
- LIGHT POLE
- FIRE HYDRANT/FIRE SUPPRESSION POST
- PIV — POST INDICATOR VALVE
- M — MANHOLE
- FVR — FORMER VENT RISER
- UR — UTILITY RISER
- APPROXIMATE WETLAND AREA
- REMEDIATION E□UIPMENT SHED
- FORMER AREA OF CONCERN #5

PMW-11D
12/2/2015
2.8'-4.0'
65.3
29.3 1,1-DCA

- SAMPLE ID
- SAMPLE DATE
- SAMPLE DEPTH
- TOTAL VOLATILE ORGANICS (µg/kg)
- CONCENTRATION OF MOST ELEVATED ANALYTE (µg/kg)

1,1-DCA	1,1-DICHLOROETHANE
1,1-DCE	1,1-DICHLOROETHENE
1,4-DIO	1,4-DIOXANE
TCE	TRICHLOROETHENE

NOTE

1. ABANDONED □DECOMMISSIONED WELL LOCATIONS ARE SHOWN IN GRAY. LOCATIONS WERE NOT SURVEYED AND ARE APPROXIMATE.

0' 150' 300'

APPROXIMATE SCALE

REFERENCE:
SITE LAYOUT BASED ON SURVEY INFORMATION PROVIDED BY CNY LAND SURVEYING DRAWING, FARRELL ROAD TOPOGRAPHIC SURVEY AND MONITORING WELL LOCATIONS, DATED APRIL 2, 2016.

AECOM

Figure: 6

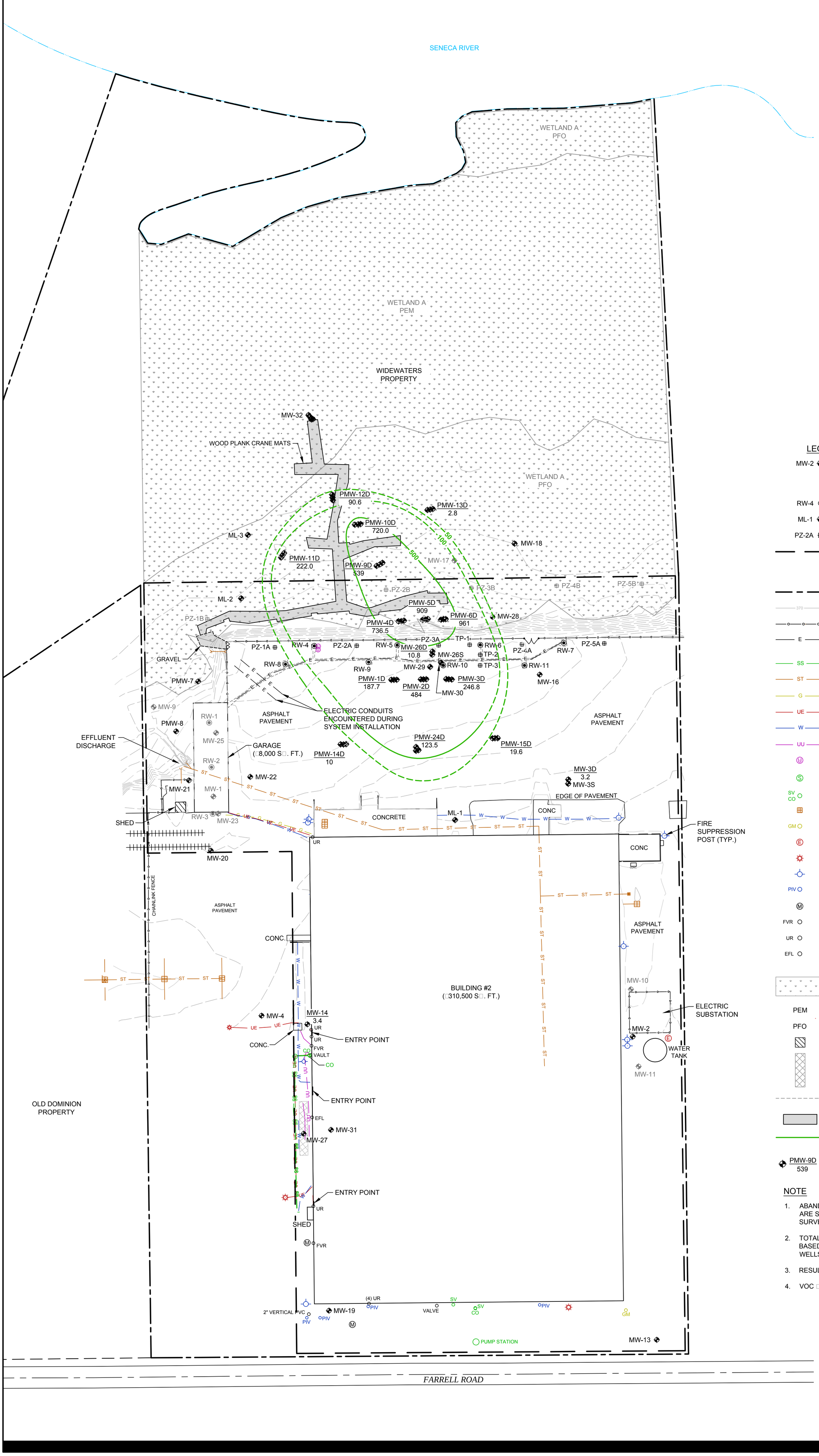
SOIL ANALYTICAL DATA
(THE WETLANDS - CURRENT)

LOCKHEED MARTIN CORPORATION
FORMER G.E. FARRELL ROAD SITE
TOWN OF GEDDES, ONONDAGA COUNTY, NEW YORK
Project No.: 60564181 Date: JUNE 8, 2018

Project Management Initials: Designer:____ Checked:____ Approved:____ ANSI D 22" x 34"

Last saved by: BOOKASR(2018-06-08) Last Plotted: 2018-06-27
Filename: Z:\DEPARTMENTS\MARKETING\PROPOSALS\LOCKHEED MARTIN - FARRELL ROAD\FARRELL ROAD FROM DESKTOP 03-21-2018\ISO FIGURES\05-30-2018\FARRELL SOIL ANALYTICAL DATA UPDATED 06-2018.DWG

Last saved by: HEATHER.PRESSING(2018-06-26) Last Plotted: 2018-06-26
Filename: Z:\DEPARTMENTS\MARKETING\PROPOSALS\LOCKHEED MARTIN - FARRELL ROAD\FARRELL ROAD FROM DESKTOP 03-21-2018\ISO FIGURES\09-2016\FARRELL TOTAL VOC ISO DEEP_09-2016.DWG
Project Management Initials: Designer:____ Checked:____ Approved:____ ANSI D 22" x 34"



LEGEND

- MW-2 — MONITORING WELL LOCATION (PMW-1 THROUGH PMW-6, PMW-9 THROUGH PMW-13, AND PMW24 ARE DEEP, INTERMEDIATE AND SHALLOW-SCREENED SETS OF WELLS.)
- RW-4 — GROUNDWATER EXTRACTION WELL LOCATION
- ML-1 — CONTINUOUS MULTICHAMBER TUBING (CMT) WELLS
- PZ-2A — PIEZOMETER LOCATION
- 241 FARRELL ROAD - 16.6 ACRES SITE BOUNDARY AS DEFINED IN APRIL 26, 2012 NYSDEC CORRESPONDENCE (REFER TO INTERIM SITE MANAGEMENT PLAN, JULY 25, 2017)
- WIDEWATERS PROPERTY
- 370 — TOPOGRAPHIC CONTOUR
- CHAINLINK FENCE
- E — SUBGRADE SYSTEM PIPING FOR THE GROUNDWATER EXTRACTION TREATMENT SYSTEM
- SS — SANITARY SEWER LINE
- ST — STORM SEWER LINE
- G — UNDERGROUND GAS LINE
- UE — UNDERGROUND ELECTRIC LINE
- W — UNDERGROUND WATER LINE
- UU — UNKNOWN UTILITY LINE
- U — UNKNOWN MANHOLE
- S — SANITARY MANHOLE
- SV CO — SEWER VENT □CLEAN OUT
- CATCH BASIN
- GM — GAS MARKER
- E — ELECTRIC MANHOLE
- LIGHT POLE
- FIRE HYDRANT□FIRE SUPPRESSION POST
- PIV — POST INDICATOR VALVE
- M — MANHOLE
- FVR — FORMER VENT RISER
- UR — UTILITY RISER
- EFL — SUB-SLAB DEPRESSURIZATION SYSTEM EXHAUST FAN LOCATION
- WETLAND AREA DELINEATED IN MAY 2017
- PEM — PALUSTRINE EMERGENT
- PFO — PALUSTRINE FORESTED
- LOCKHEED MARTIN STORAGE SHED
- AREA OF CONCERN #5
- TRENCH OUTLINE
- WETLAND CONSTRUCTION MAT ACCESS ROAD LOCATION
- TOTAL VOCs ISOCONCENTRATION CONTOUR (DASHED WHERE INFERRED)
- PMW-9D / 539 — DEEP WELL IDENTIFICATION / TOTAL VOCs CONCENTRATION (µg□L)

NOTE

1. ABANDONED □DECOMMISSIONED WELL LOCATIONS ARE SHOWN IN GRAY. LOCATIONS WERE NOT SURVEYED AND ARE APPROXIMATE.
2. TOTAL VOCs CONCENTRATION CONTOURS WERE BASED ON DATA COLLECTED FROM DEEP MONITORING WELLS SAMPLED SEPTEMBER 19-22, 2016.
3. RESULTS ARE IN MICROGRAMS PER LITER (µg□L).
4. VOC □ VOLATILE ORGANIC COMPOUND

0' 70' 140'
APPROXIMATE SCALE

REFERENCE:
SITE LAYOUT BASED ON SURVEY INFORMATION PROVIDED BY CNY LAND SURVEYING DRAWING, FARRELL ROAD TOPOGRAPHIC SURVEY AND MONITORING WELL LOCATIONS, DATED APRIL 2, 2016.

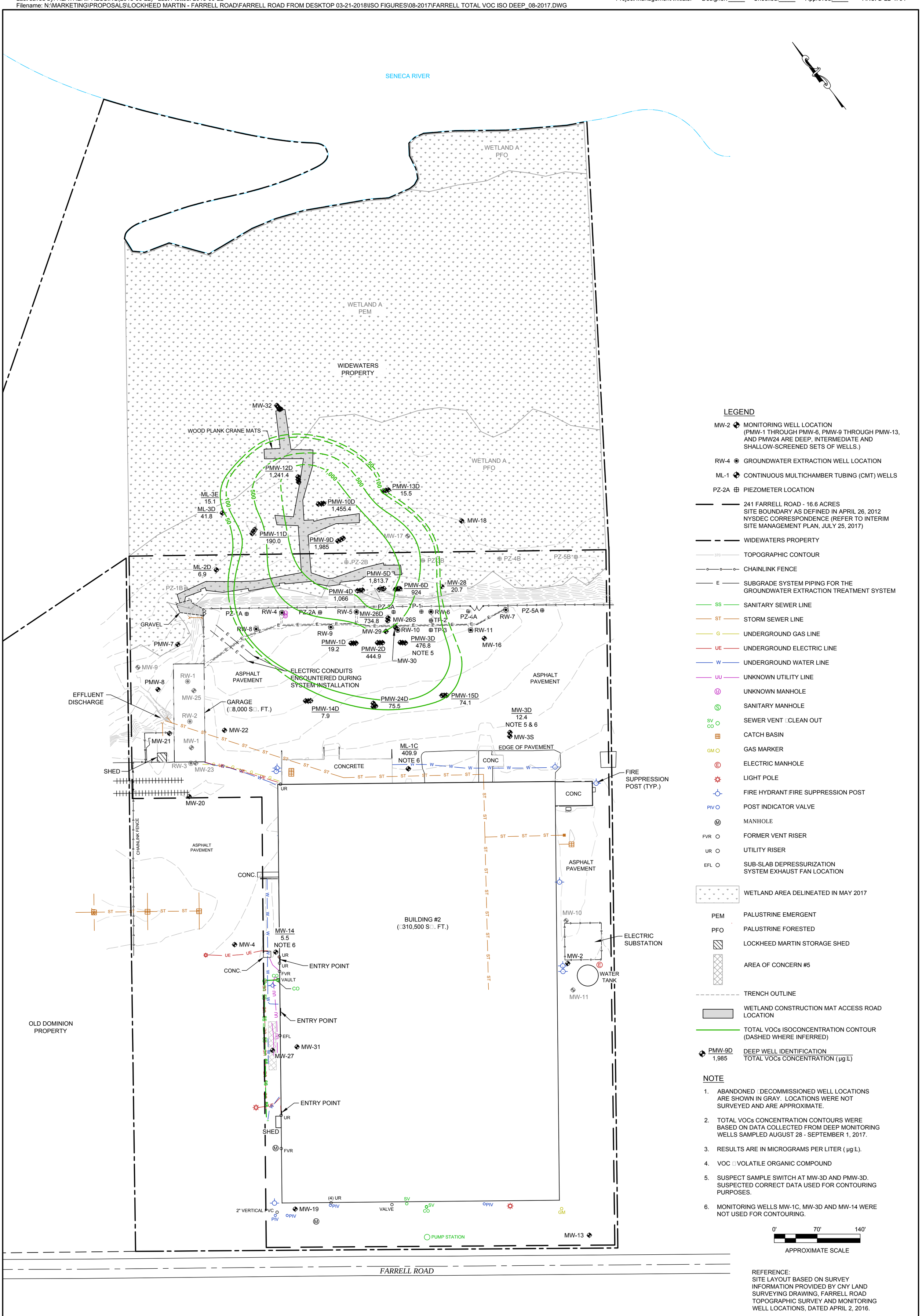
LOCKHEED MARTIN CORPORATION
FORMER G.E. FARRELL ROAD SITE
TOWN OF GEDDES, ONONDAGA COUNTY, NEW YORK
Project No.: 60564181 Date: JUNE 4, 2018

ISOCONTOURS FOR VOLATILE ORGANIC COMPOUNDS IN THE WETLANDS (DEEP WELLS - SEPTEMBER 2016)

AECOM

Figure: 7

Last saved by: HEATHER.PRESSING(2018-06-22) Last Plotted: 2018-06-22
Filename: N:\MARKETING\PROPOSALS\LOCKHEED MARTIN - FARRELL ROAD\FARRELL ROAD FROM DESKTOP 03-21-2018\ISO FIGURES\08-2017\FARRELL TOTAL VOC ISO DEEP_08-2017.DWG
Project Management Initials: Designer:____ Checked:____ Approved:____ ANSI D 22" x 34"



LEGEND

- MW-2 — MONITORING WELL LOCATION (PMW-1 THROUGH PMW-6, PMW-9 THROUGH PMW-13, AND PMW24 ARE DEEP, INTERMEDIATE AND SHALLOW-SCREENED SETS OF WELLS.)
- RW-4 — GROUNDWATER EXTRACTION WELL LOCATION
- ML-1 — CONTINUOUS MULTICHAMBER TUBING (CMT) WELLS
- PZ-2A — PIEZOMETER LOCATION
- 241 FARRELL ROAD - 16.6 ACRES SITE BOUNDARY AS DEFINED IN APRIL 26, 2012 NYSDEC CORRESPONDENCE (REFER TO INTERIM SITE MANAGEMENT PLAN, JULY 25, 2017)
- WIDEWATERS PROPERTY
- 370 — TOPOGRAPHIC CONTOUR
- CHAINLINK FENCE
- E — SUBGRADE SYSTEM PIPING FOR THE GROUNDWATER EXTRACTION TREATMENT SYSTEM
- SS — SANITARY SEWER LINE
- ST — STORM SEWER LINE
- G — UNDERGROUND GAS LINE
- UE — UNDERGROUND ELECTRIC LINE
- W — UNDERGROUND WATER LINE
- UU — UNKNOWN UTILITY LINE
- Ⓤ — UNKNOWN MANHOLE
- Ⓢ — SANITARY MANHOLE
- SV CO — SEWER VENT □CLEAN OUT
- CATCH BASIN
- GM — GAS MARKER
- Ⓔ — ELECTRIC MANHOLE
- LIGHT POLE
- FIRE HYDRANT□FIRE SUPPRESSION POST
- PIV — POST INDICATOR VALVE
- Ⓜ — MANHOLE
- FVR — FORMER VENT RISER
- UR — UTILITY RISER
- EFL — SUB-SLAB DEPRESSURIZATION SYSTEM EXHAUST FAN LOCATION
- WETLAND AREA DELINEATED IN MAY 2017
- PEM — PALUSTRINE EMERGENT
- PFO — PALUSTRINE FORESTED
- LOCKHEED MARTIN STORAGE SHED
- AREA OF CONCERN #5
- TRENCH OUTLINE
- WETLAND CONSTRUCTION MAT ACCESS ROAD LOCATION
- TOTAL VOCs ISOCONCENTRATION CONTOUR (DASHED WHERE INFERRED)
- PMW-9D / 1,985 — DEEP WELL IDENTIFICATION / TOTAL VOCs CONCENTRATION (µg□L)

NOTE

1. ABANDONED □DECOMMISSIONED WELL LOCATIONS ARE SHOWN IN GRAY. LOCATIONS WERE NOT SURVEYED AND ARE APPROXIMATE.
2. TOTAL VOCs CONCENTRATION CONTOURS WERE BASED ON DATA COLLECTED FROM DEEP MONITORING WELLS SAMPLED AUGUST 28 - SEPTEMBER 1, 2017.
3. RESULTS ARE IN MICROGRAMS PER LITER (µg□L).
4. VOC □VOLATILE ORGANIC COMPOUND
5. SUSPECT SAMPLE SWITCH AT MW-3D AND PMW-3D. SUSPECTED CORRECT DATA USED FOR CONTOURING PURPOSES.
6. MONITORING WELLS MW-1C, MW-3D AND MW-14 WERE NOT USED FOR CONTOURING.

0' 70' 140'

APPROXIMATE SCALE

REFERENCE:
SITE LAYOUT BASED ON SURVEY INFORMATION PROVIDED BY CNY LAND SURVEYING DRAWING, FARRELL ROAD TOPOGRAPHIC SURVEY AND MONITORING WELL LOCATIONS, DATED APRIL 2, 2016.

LOCKHEED MARTIN CORPORATION
FORMER G.E. FARRELL ROAD SITE
TOWN OF GEDDES, ONONDAGA COUNTY, NEW YORK
Project No.: 60564181 Date: JUNE 4, 2018

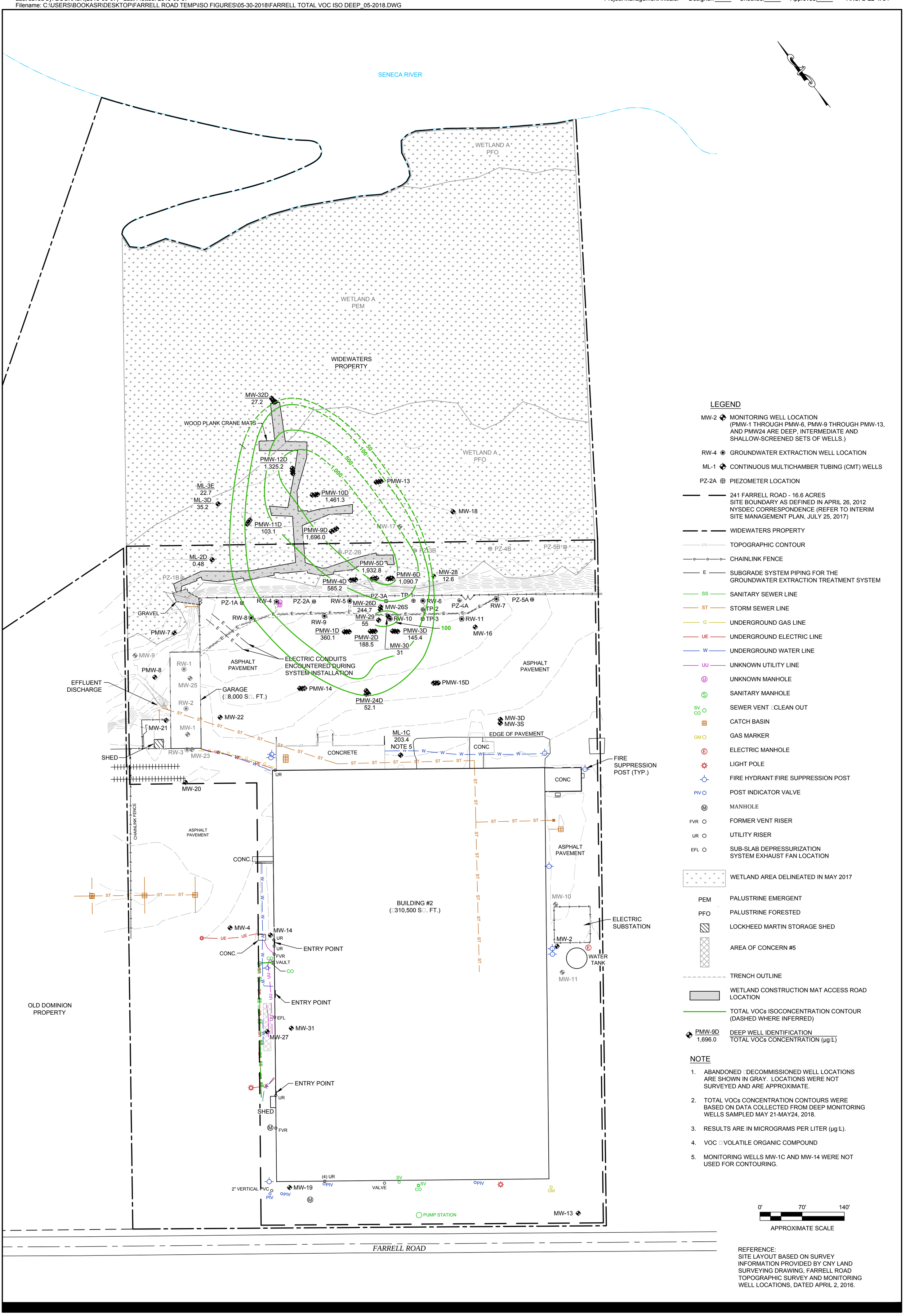
ISOCONTOURS FOR VOLATILE ORGANIC COMPOUNDS IN THE WETLANDS (DEEP WELLS - AUGUST/SEPTEMBER 2017)

AECOM

Figure: 8

Last saved by: BOOKASR(2018-06-07) Last Plotted: 2018-06-07
Filename: C:\USERS\BOOKASR\DESKTOP\FARRELL ROAD TEMP\ISO FIGURES\05-30-2018\FARRELL TOTAL VOC ISO DEEP_05-2018.DWG

Project Management Initials: Designer:_____ Checked:_____ Approved:_____ ANSI D 22" x 34"



LEGEND

- MW-2 — MONITORING WELL LOCATION (PMW-1 THROUGH PMW-6, PMW-9 THROUGH PMW-13, AND PMW24 ARE DEEP, INTERMEDIATE AND SHALLOW-SCREENED SETS OF WELLS.)
- RW-4 — GROUNDWATER EXTRACTION WELL LOCATION
- ML-1 — CONTINUOUS MULTICHAMBER TUBING (CMT) WELLS
- PZ-2A — PIEZOMETER LOCATION
- 241 FARRELL ROAD - 16.6 ACRES SITE BOUNDARY AS DEFINED IN APRIL 26, 2012 NYSDEC CORRESPONDENCE (REFER TO INTERIM SITE MANAGEMENT PLAN, JULY 25, 2017)
- WIDEWATERS PROPERTY
- 370 — TOPOGRAPHIC CONTOUR
- CHAINLINK FENCE
- E — SUBGRADE SYSTEM PIPING FOR THE GROUNDWATER EXTRACTION TREATMENT SYSTEM
- SS — SANITARY SEWER LINE
- ST — STORM SEWER LINE
- G — UNDERGROUND GAS LINE
- UE — UNDERGROUND ELECTRIC LINE
- W — UNDERGROUND WATER LINE
- UU — UNKNOWN UTILITY LINE
- U — UNKNOWN MANHOLE
- S — SANITARY MANHOLE
- SV CO — SEWER VENT □CLEAN OUT
- CATCH BASIN
- GM — GAS MARKER
- E — ELECTRIC MANHOLE
- LIGHT POLE
- FIRE HYDRANT □FIRE SUPPRESSION POST
- PIV — POST INDICATOR VALVE
- M — MANHOLE
- FVR — FORMER VENT RISER
- UR — UTILITY RISER
- EFL — SUB-SLAB DEPRESSURIZATION SYSTEM EXHAUST FAN LOCATION
- WETLAND AREA DELINEATED IN MAY 2017
- PEM — PALUSTRINE EMERGENT
- PFO — PALUSTRINE FORESTED
- LOCKHEED MARTIN STORAGE SHED
- AREA OF CONCERN #5
- TRENCH OUTLINE
- WETLAND CONSTRUCTION MAT ACCESS ROAD LOCATION
- TOTAL VOCs ISOCONCENTRATION CONTOUR (DASHED WHERE INFERRED)
- PMW-9D 1,696.0 — DEEP WELL IDENTIFICATION / TOTAL VOCs CONCENTRATION (µg□L)

NOTE

1. ABANDONED □DECOMMISSIONED WELL LOCATIONS ARE SHOWN IN GRAY. LOCATIONS WERE NOT SURVEYED AND ARE APPROXIMATE.
2. TOTAL VOCs CONCENTRATION CONTOURS WERE BASED ON DATA COLLECTED FROM DEEP MONITORING WELLS SAMPLED MAY 21-MAY24, 2018.
3. RESULTS ARE IN MICROGRAMS PER LITER (µg□L).
4. VOC □VOLATILE ORGANIC COMPOUND
5. MONITORING WELLS MW-1C AND MW-14 WERE NOT USED FOR CONTOURING.

0' 70' 140'

APPROXIMATE SCALE

REFERENCE:
SITE LAYOUT BASED ON SURVEY INFORMATION PROVIDED BY CNY LAND SURVEYING DRAWING, FARRELL ROAD TOPOGRAPHIC SURVEY AND MONITORING WELL LOCATIONS, DATED APRIL 2, 2016.

LOCKHEED MARTIN CORPORATION
FORMER G.E. FARRELL ROAD SITE
TOWN OF GEDDES, ONONDAGA COUNTY, NEW YORK
Project No.: 60564181 Date: JUNE 7, 2018

ISOCONTOURS FOR VOLATILE ORGANIC COMPOUNDS IN THE WETLANDS (DEEP WELLS - MAY 2018)

AECOM

Figure: 9

Last saved by: HEATHER.PRESSING(2018-06-26) Last Plotted: 2018-06-26
Filename: Z:\DEPARTMENTS\MARKETING\PROPOSALS\LOCKHEED MARTIN - FARRELL ROAD\FARRELL ROAD FROM DESKTOP 03-21-2018\ISO FIGURES\09-2016\FARRELL 1,4-DIO ISO DEEP_09-2016.DWG
Project Management Initials: Designer:____ Checked:____ Approved:____ ANSI D 22" x 34"

SENECA RIVER

WETLAND A
PFO

WETLAND A
PEM

WIDEWATERS
PROPERTY

MW-32

WOOD PLANK CRANE MATS

WETLAND A
PFO

PMW-12D
28

PMW-13D
ND 40

50

100

PMW-10D
310

ML-3

MW-18

PMW-11D
94

PMW-9D
ND 320

MW-17

250

PZ-2B

PZ-3B

PZ-4B

PZ-5B

ML-2

PMW-5D
320

PZ-1B

PMW-4D
270

PMW-6D
310

MW-28

PZ-3A

TP-1

RW-6

PZ-1A

RW-4

PZ-2A

RW-5

MW-26D
ND

MW-26S

TP-2

PZ-4A

RW-7

PZ-5A

GRAVEL

RW-8

RW-9

MW-29

RW-10

TP-3

RW-11

PMW-7

PMW-1D
110

PMW-2D
240

PMW-3D
170

MW-30

MW-16

MW-9

ASPHALT
PAVEMENT

ELECTRIC CONDUITS
ENCOUNTERED DURING
SYSTEM INSTALLATION

ASPHALT
PAVEMENT

RW-1

PMW-8

EFFLUENT
DISCHARGE

MW-25

GARAGE
(□8,000 S□. FT.)

PMW-14D
ND□40

PMW-24D
44

PMW-15D
ND□40

MW-3D
ND
NOTE 5
MW-3S

RW-2

MW-22

MW-21

MW-1

EDGE OF PAVEMENT

CONCRETE

ML-1

CONC

FIRE
SUPPRESSION
POST (TYP.)

SHED

RW-3

MW-23

UR

CONC

MW-20

CHAINLINK FENCE

ASPHALT
PAVEMENT

ASPHALT
PAVEMENT

CONC.

BUILDING #2
(□310,500 S□. FT.)

MW-10

MW-14
ND
NOTE 5

MW-4

ELECTRIC
SUBSTATION

UR

ENTRY POINT

CONC.

FVR
VAULT

MW-2

WATER
TANK

MW-11

OLD DOMINION
PROPERTY

ENTRY POINT

EFL

MW-31

MW-27

ENTRY POINT

UR

SHED

FVR

(4) UR

PIV

SV

SV

PIV

2" VERTICAL PVC

MW-19

PIV

PIV

VALVE

GM

PUMP STATION

MW-13

FARRELL ROAD

LEGEND

- MW-2 — MONITORING WELL LOCATION (PMW-1 THROUGH PMW-6, PMW-9 THROUGH PMW-13, AND PMW24 ARE DEEP, INTERMEDIATE AND SHALLOW-SCREENED SETS OF WELLS.)
- RW-4 — GROUNDWATER EXTRACTION WELL LOCATION
- ML-1 — CONTINUOUS MULTICHAMBER TUBING (CMT) WELLS
- PZ-2A — PIEZOMETER LOCATION
- 241 FARRELL ROAD - 16.6 ACRES SITE BOUNDARY AS DEFINED IN APRIL 26, 2012 NYSDEC CORRESPONDENCE (REFER TO INTERIM SITE MANAGEMENT PLAN, JULY 25, 2017)
- WIDEWATERS PROPERTY
- 370 — TOPOGRAPHIC CONTOUR
- CHAINLINK FENCE
- E — SUBGRADE SYSTEM PIPING FOR THE GROUNDWATER EXTRACTION TREATMENT SYSTEM
- SS — SANITARY SEWER LINE
- ST — STORM SEWER LINE
- G — UNDERGROUND GAS LINE
- UE — UNDERGROUND ELECTRIC LINE
- W — UNDERGROUND WATER LINE
- UU — UNKNOWN UTILITY LINE
- U — UNKNOWN MANHOLE
- S — SANITARY MANHOLE
- SV CO — SEWER VENT □CLEAN OUT
- CATCH BASIN
- GM — GAS MARKER
- E — ELECTRIC MANHOLE
- LIGHT POLE
- FIRE HYDRANT□FIRE SUPPRESSION POST
- PIV — POST INDICATOR VALVE
- M — MANHOLE
- FVR — FORMER VENT RISER
- UR — UTILITY RISER
- EFL — SUB-SLAB DEPRESSURIZATION SYSTEM EXHAUST FAN LOCATION
- WETLAND AREA DELINEATED IN MAY 2017
- PEM — PALUSTRINE EMERGENT
- PFO — PALUSTRINE FORESTED
- LOCKHEED MARTIN STORAGE SHED
- AREA OF CONCERN #5
- TRENCH OUTLINE
- WETLAND CONSTRUCTION MAT ACCESS ROAD LOCATION
- 1,4-DIOXANE ISOCONCENTRATION CONTOUR (DASHED WHERE INFERRED)
- PMW-9D / ND□320 — DEEP WELL IDENTIFICATION / 1,4-DIOXANE CONCENTRATION (µg□L)

NOTE

1. ABANDONED □DECOMMISSIONED WELL LOCATIONS ARE SHOWN IN GRAY. LOCATIONS WERE NOT SURVEYED AND ARE APPROXIMATE.
2. 1,4-DIOXANE CONCENTRATION CONTOURS WERE BASED ON DATA COLLECTED FROM DEEP MONITORING WELLS SAMPLED SEPTEMBER 19-22, 2016.
3. RESULTS ARE IN MICROGRAMS PER LITER (µg□L).
4. ND □ NOT DETECTED
5. MONITORING WELLS MW-3D AND MW-14 WERE NOT INCLUDED IN CONTOURING.

0' 70' 140'

APPROXIMATE SCALE

REFERENCE:
SITE LAYOUT BASED ON SURVEY INFORMATION PROVIDED BY CNY LAND SURVEYING DRAWING, FARRELL ROAD TOPOGRAPHIC SURVEY AND MONITORING WELL LOCATIONS, DATED APRIL 2, 2016.

LOCKHEED MARTIN CORPORATION
FORMER G.E. FARRELL ROAD SITE
TOWN OF GEDDES, ONONDAGA COUNTY, NEW YORK
Project No.: 60564181 Date: JUNE 4, 2018

ISOCONTOURS FOR 1,4-DIOXANE IN THE WETLANDS (DEEP WELLS - SEPTEMBER 2016)

AECOM

Figure: 10

Last saved by: HEATHER.PRESSING(2018-06-26) Last Plotted: 2018-06-26
Filename: Z:\DEPARTMENTS\MARKETING\PROPOSALS\LOCKHEED MARTIN - FARRELL ROAD\FARRELL ROAD FROM DESKTOP 03-21-2018\ISO FIGURES\08-2017\FARRELL 14-DIO ISO DEEP_08-2017.DWG
Project Management Initials: Designer:____ Checked:____ Approved:____ ANSI D 22" x 34"

SENECA RIVER

WETLAND A
PFO

WETLAND A
PEM

WIDEWATERS
PROPERTY

WETLAND A
PFO

MW-32
WOOD PLANK CRANE MATS
50
100
250
500
PMW-12D
370
PMW-13D
40
PMW-10D
400
ML-3E
40
ML-3D
40
MW-18
PMW-11D
48
PMW-9D
590
MW-17
PZ-2B
PZ-3B
PZ-4B
PZ-5B
ML-2D
40
PMW-5D
400
PMW-6D
150
MW-28
40
PZ-1B
PMW-4D
360
PZ-3A
TP-1
PZ-1A
RW-4
PZ-2A
RW-5
MW-26D
260
RW-6
PZ-4A
RW-7
PZ-5A
MW-26S
TP-2
GRAVEL
RW-8
RW-9
MW-29
RW-10
TP-3
RW-11
PMW-7
PMW-1D
40
PMW-2D
180
PMW-3D
40
MW-16
MW-30
MW-9
ASPHALT
PAVEMENT
ELECTRIC CONDUITS
ENCOUNTERED DURING
SYSTEM INSTALLATION
ASPHALT
PAVEMENT
RW-1
PMW-8
PMW-15D
40
EFFLUENT
DISCHARGE
MW-25
GARAGE
(□8,000 S□. FT.)
PMW-14D
40
PMW-24D
41
MW-3D
160
RW-2
MW-22
MW-3S
EDGE OF PAVEMENT
MW-21
MW-1
CONCRETE
ML-1C
240
CONC
FIRE
SUPPRESSION
POST (TYP.)
RW-3
MW-23
SHED
UR
CONC
MW-20
CHAINLINK FENCE
ASPHALT
PAVEMENT
ASPHALT
PAVEMENT
CONC.
BUILDING #2
(□310,500 S□. FT.)
MW-10
MW-14
□40
NOTE 5
MW-4
ELECTRIC
SUBSTATION
MW-2
ENTRY POINT
CONC.
UR
UR
FVR
VAULT
WATER
TANK
MW-11
OLD DOMINION
PROPERTY
ENTRY POINT
EFL
MW-31
MW-27
ENTRY POINT
UR
SHED
FVR
(4) UR
SV
PIV
VALVE
SV
CO
PIV
GM
2" VERTICAL PVC
PIV
MW-19
PIV
PUMP STATION
MW-13
FARRELL ROAD

LEGEND

- MW-2 — MONITORING WELL LOCATION (PMW-1 THROUGH PMW-6, PMW-9 THROUGH PMW-13, AND PMW24 ARE DEEP, INTERMEDIATE AND SHALLOW-SCREENED SETS OF WELLS.)
- RW-4 — GROUNDWATER EXTRACTION WELL LOCATION
- ML-1 — CONTINUOUS MULTICHAMBER TUBING (CMT) WELLS
- PZ-2A — PIEZOMETER LOCATION
- 241 FARRELL ROAD - 16.6 ACRES SITE BOUNDARY AS DEFINED IN APRIL 26, 2012 NYSDEC CORRESPONDENCE (REFER TO INTERIM SITE MANAGEMENT PLAN, JULY 25, 2017)
- WIDEWATERS PROPERTY
- 370 — TOPOGRAPHIC CONTOUR
- CHAINLINK FENCE
- E — SUBGRADE SYSTEM PIPING FOR THE GROUNDWATER EXTRACTION TREATMENT SYSTEM
- SS — SANITARY SEWER LINE
- ST — STORM SEWER LINE
- G — UNDERGROUND GAS LINE
- UE — UNDERGROUND ELECTRIC LINE
- W — UNDERGROUND WATER LINE
- UU — UNKNOWN UTILITY LINE
- U — UNKNOWN MANHOLE
- S — SANITARY MANHOLE
- SV CO — SEWER VENT □CLEAN OUT
- CATCH BASIN
- GM — GAS MARKER
- E — ELECTRIC MANHOLE
- LIGHT POLE
- FIRE HYDRANT□FIRE SUPPRESSION POST
- PIV — POST INDICATOR VALVE
- M — MANHOLE
- FVR — FORMER VENT RISER
- UR — UTILITY RISER
- EFL — SUB-SLAB DEPRESSURIZATION SYSTEM EXHAUST FAN LOCATION
- WETLAND AREA DELINEATED IN MAY 2017
- PEM — PALUSTRINE EMERGENT
- PFO — PALUSTRINE FORESTED
- LOCKHEED MARTIN STORAGE SHED
- AREA OF CONCERN #5
- TRENCH OUTLINE
- WETLAND CONSTRUCTION MAT ACCESS ROAD LOCATION
- 1,4-DIOXANE ISOCONCENTRATION CONTOUR (DASHED WHERE INFERRED)
- PMW-9D / 590 — DEEP WELL IDENTIFICATION / 1,4-DIOXANE CONCENTRATION (µg□L)

NOTE

1. ABANDONED □DECOMMISSIONED WELL LOCATIONS ARE SHOWN IN GRAY. LOCATIONS WERE NOT SURVEYED AND ARE APPROXIMATE.
2. 1,4-DIOXANE CONCENTRATION CONTOURS WERE BASED ON DATA COLLECTED FROM DEEP MONITORING WELLS SAMPLED AUGUST 28 - SEPTEMBER 1, 2017.
3. RESULTS ARE IN MICROGRAMS PER LITER (µg□L).
4. MONITORING WELL MW-14 WAS NOT USED FOR CONTOURING.

0' 70' 140'
APPROXIMATE SCALE

REFERENCE:
SITE LAYOUT BASED ON SURVEY INFORMATION PROVIDED BY CNY LAND SURVEYING DRAWING, FARRELL ROAD TOPOGRAPHIC SURVEY AND MONITORING WELL LOCATIONS, DATED APRIL 2, 2016.

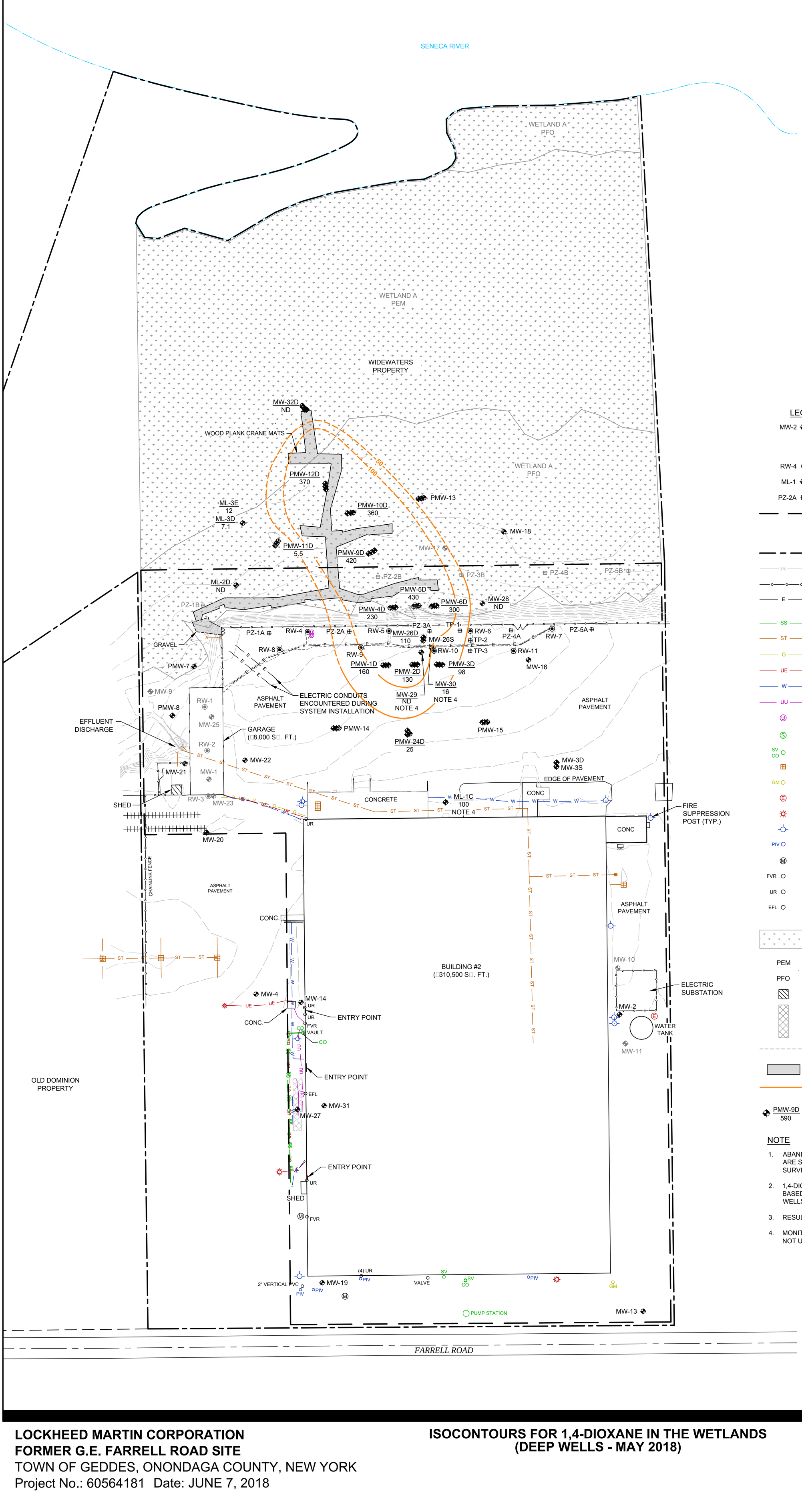
LOCKHEED MARTIN CORPORATION
FORMER G.E. FARRELL ROAD SITE
TOWN OF GEDDES, ONONDAGA COUNTY, NEW YORK
Project No.: 60564181 Date: JUNE 5, 2018

ISOCONTOURS FOR 1,4-DIOXANE IN THE WETLANDS (DEEP WELLS - AUGUST/SEPTEMBER 2017)

AECOM

Figure: 11

Last saved by: HEATHER.PRESSING(2018-06-26) Last Plotted: 2018-06-27
Filename: Z:\DEPARTMENTS\MARKETING\PROPOSALS\LOCKHEED MARTIN - FARRELL ROAD\FARRELL ROAD FROM DESKTOP 03-21-2018\ISO FIGURES\05-30-2018\FARRELL 14-DIO ISO DEEP_05-2018.DWG
Project Management Initials: Designer:____ Checked:____ Approved:____ ANSI D 22" x 34"



LEGEND

- MW-2 — MONITORING WELL LOCATION (PMW-1 THROUGH PMW-6, PMW-9 THROUGH PMW-13, AND PMW24 ARE DEEP, INTERMEDIATE AND SHALLOW-SCREENED SETS OF WELLS.)
- RW-4 — GROUNDWATER EXTRACTION WELL LOCATION
- ML-1 — CONTINUOUS MULTICHAMBER TUBING (CMT) WELLS
- PZ-2A — PIEZOMETER LOCATION
- 241 FARRELL ROAD - 16.6 ACRES SITE BOUNDARY AS DEFINED IN APRIL 26, 2012 NYSDEC CORRESPONDENCE (REFER TO INTERIM SITE MANAGEMENT PLAN, JULY 25, 2017)
- WIDEWATERS PROPERTY
- 370 — TOPOGRAPHIC CONTOUR
- CHAINLINK FENCE
- E — SUBGRADE SYSTEM PIPING FOR THE GROUNDWATER EXTRACTION TREATMENT SYSTEM
- SS — SANITARY SEWER LINE
- ST — STORM SEWER LINE
- G — UNDERGROUND GAS LINE
- UE — UNDERGROUND ELECTRIC LINE
- W — UNDERGROUND WATER LINE
- UU — UNKNOWN UTILITY LINE
- U — UNKNOWN MANHOLE
- S — SANITARY MANHOLE
- SV CO — SEWER VENT □CLEAN OUT
- CATCH BASIN
- GM — GAS MARKER
- E — ELECTRIC MANHOLE
- LIGHT POLE
- FIRE HYDRANT□FIRE SUPPRESSION POST
- PIV — POST INDICATOR VALVE
- M — MANHOLE
- FVR — FORMER VENT RISER
- UR — UTILITY RISER
- EFL — SUB-SLAB DEPRESSURIZATION SYSTEM EXHAUST FAN LOCATION
- WETLAND AREA DELINEATED IN MAY 2017
- PEM — PALUSTRINE EMERGENT
- PFO — PALUSTRINE FORESTED
- LOCKHEED MARTIN STORAGE SHED
- AREA OF CONCERN #5
- TRENCH OUTLINE
- WETLAND CONSTRUCTION MAT ACCESS ROAD LOCATION
- 1,4-DIOXANE ISOCONCENTRATION CONTOUR (DASHED WHERE INFERRED)
- PMW-9D / 590 — DEEP WELL IDENTIFICATION / 1,4-DIOXANE CONCENTRATION (µg□L)

NOTE

1. ABANDONED □DECOMMISSIONED WELL LOCATIONS ARE SHOWN IN GRAY. LOCATIONS WERE NOT SURVEYED AND ARE APPROXIMATE.
2. 1,4-DIOXANE CONCENTRATION CONTOURS WERE BASED ON DATA COLLECTED FROM DEEP MONITORING WELLS SAMPLED MAY 21-24, 2017.
3. RESULTS ARE IN MICROGRAMS PER LITER (µg□L).
4. MONITORING WELLS ML-1C, MW-29, AND MW-30 WERE NOT USED FOR CONTOURING.

0' 70' 140'

APPROXIMATE SCALE

REFERENCE:
SITE LAYOUT BASED ON SURVEY INFORMATION PROVIDED BY CNY LAND SURVEYING DRAWING, FARRELL ROAD TOPOGRAPHIC SURVEY AND MONITORING WELL LOCATIONS, DATED APRIL 2, 2016.

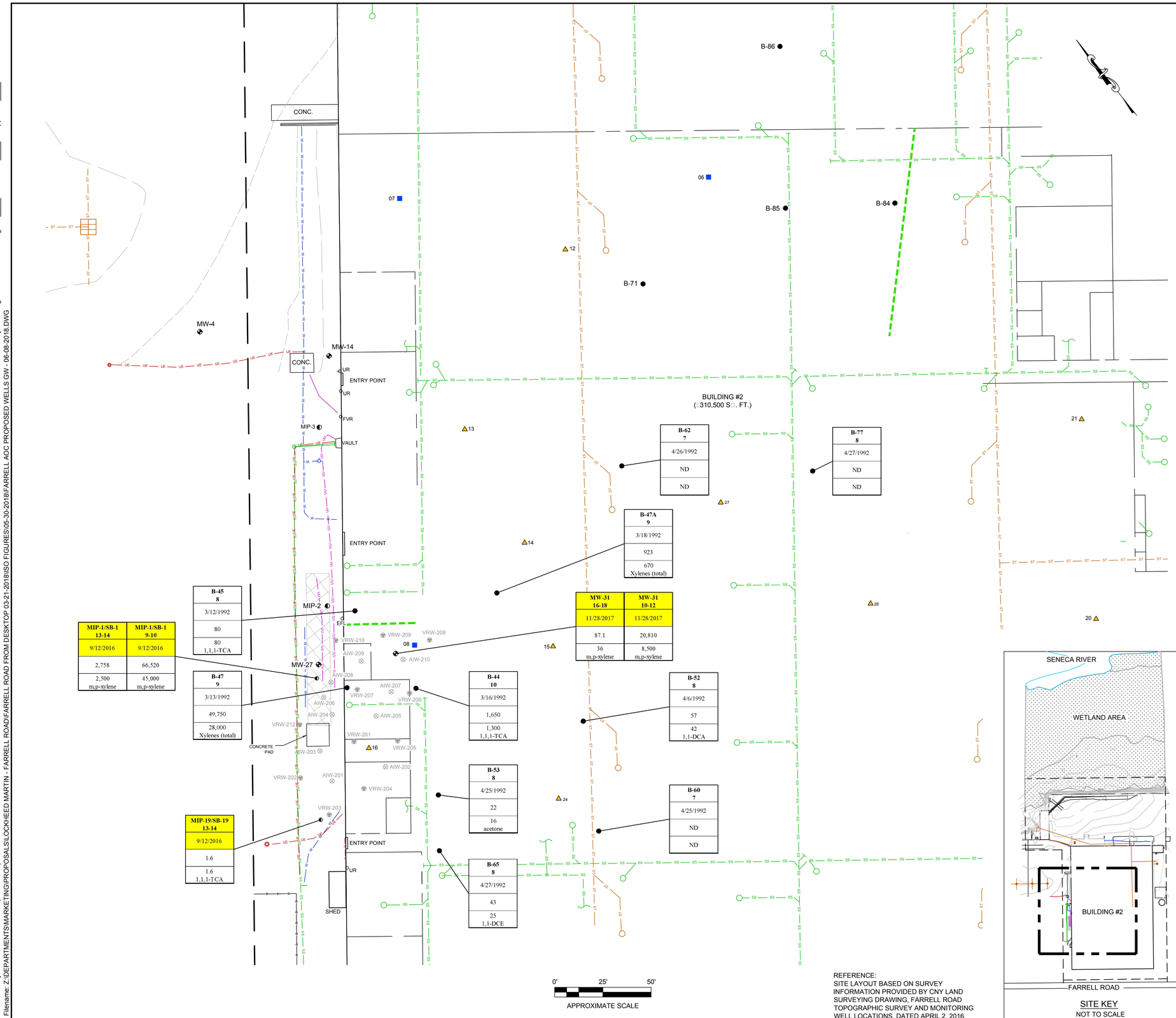
LOCKHEED MARTIN CORPORATION
FORMER G.E. FARRELL ROAD SITE
TOWN OF GEDDES, ONONDAGA COUNTY, NEW YORK
Project No.: 60564181 Date: JUNE 7, 2018

ISOCONTOURS FOR 1,4-DIOXANE IN THE WETLANDS (DEEP WELLS - MAY 2018)

AECOM

Figure: 12

Project Management Initials: Designer:____ Checked:____ Approved:____ ANSI D 22" x 34"
Last saved by: HEATHER.PRESSING (2018-06-27) Last Plotted: 2018-06-27
Filename: Z:\DEPARTMENTS\MARKETING\PROPOSALS\LOCKHEED MARTIN - FARRELL ROAD\FARRELL ROAD FROM DESKTOP 03-21-2018\ISO FIGURES\05-30-2018\FARRELL AOC PROPOSED WELLS GW - 06-08-2018.DWG



REFERENCE:
SITE LAYOUT BASED ON SURVEY INFORMATION PROVIDED BY CNY LAND SURVEYING DRAWING, FARRELL ROAD TOPOGRAPHIC SURVEY AND MONITORING WELL LOCATIONS, DATED APRIL 2, 2016.

SITE KEY
NOT TO SCALE

LEGEND

- MW-2 MONITORING WELL LOCATION
- RW-3 GROUNDWATER EXTRACTION WELL LOCATION
- ML-1 CONTINUOUS MULTICHAMBER TUBING (CMT) WELLS
- 241 FARRELL ROAD - 16.6 ACRES
- 370 TOPOGRAPHIC CONTOUR
- CHAINLINK FENCE
- SS SANITARY SEWER LINE
- ST STORM SEWER LINE
- G G UNDERGROUND GAS LINE
- UE UNDERGROUND ELECTRIC LINE
- W W UNDERGROUND WATER LINE
- UU UNKNOWN UTILITY LINE
- SANITARY MANHOLE
- SEWER VENT □ CLEAN OUT
- CATCH BASIN
- GM GAS MARKER
- ELECTRIC MANHOLE
- LIGHT POLE
- FIRE HYDRANT □ FIRE SUPPRESSION POST
- PIV POST INDICATOR VALVE
- MANHOLE
- FVR FORMER VENT RISER
- UR UTILITY RISER
- EFL SUB-SLAB DEPRESSURIZATION SYSTEM EXHAUST FAN LOCATION
- LOCKHEED MARTIN STORAGE SHED
- AREA OF CONCERN #5
- MIP-2 MEMBRANE INTERFACE PROBE LOCATION
- B-44 1992 BORING LOCATION
- AIW-201 1996 AIR INJECTION WELL LOCATION (APPROX.)
- VRW-203 1996 VAPOR RECOVERY WELL LOCATION (APPROX.)
- 03 SUB-SLAB AND INDOOR AIR SAMPLE LOCATION
- 18 SUB-SLAB SAMPLE LOCATION
- SUB-SLAB DEPRESSURIZATION SYSTEM (SSDS) SUB-SLAB PIPE

B-44	SAMPLE ID
10	DEPTH
3/16/1992	DATE
1,650	TOTAL VOLATILE ORGANICS (µg/kg)
1,300 1,1,1-TCA	CONCENTRATION OF MOST ELEVATED ANALYTE (µg/kg)

1,1,1-TCA	1,1,1-TRICHLOROETHANE
1,1-DCA	1,1-DICHLOROETHANE
1,1-DCE	1,1-DICHLOROETHENE
ND	ALL PARAMETERS NOT DETECTED

NOTE

1. ABANDONED □ DECOMMISSIONED WELL LOCATIONS ARE SHOWN IN GRAY. LOCATIONS WERE NOT SURVEYED AND ARE APPROXIMATE.
2. CURRENT ANALYTICAL DATA IS HIGHLIGHTED IN YELLOW.

AECOM

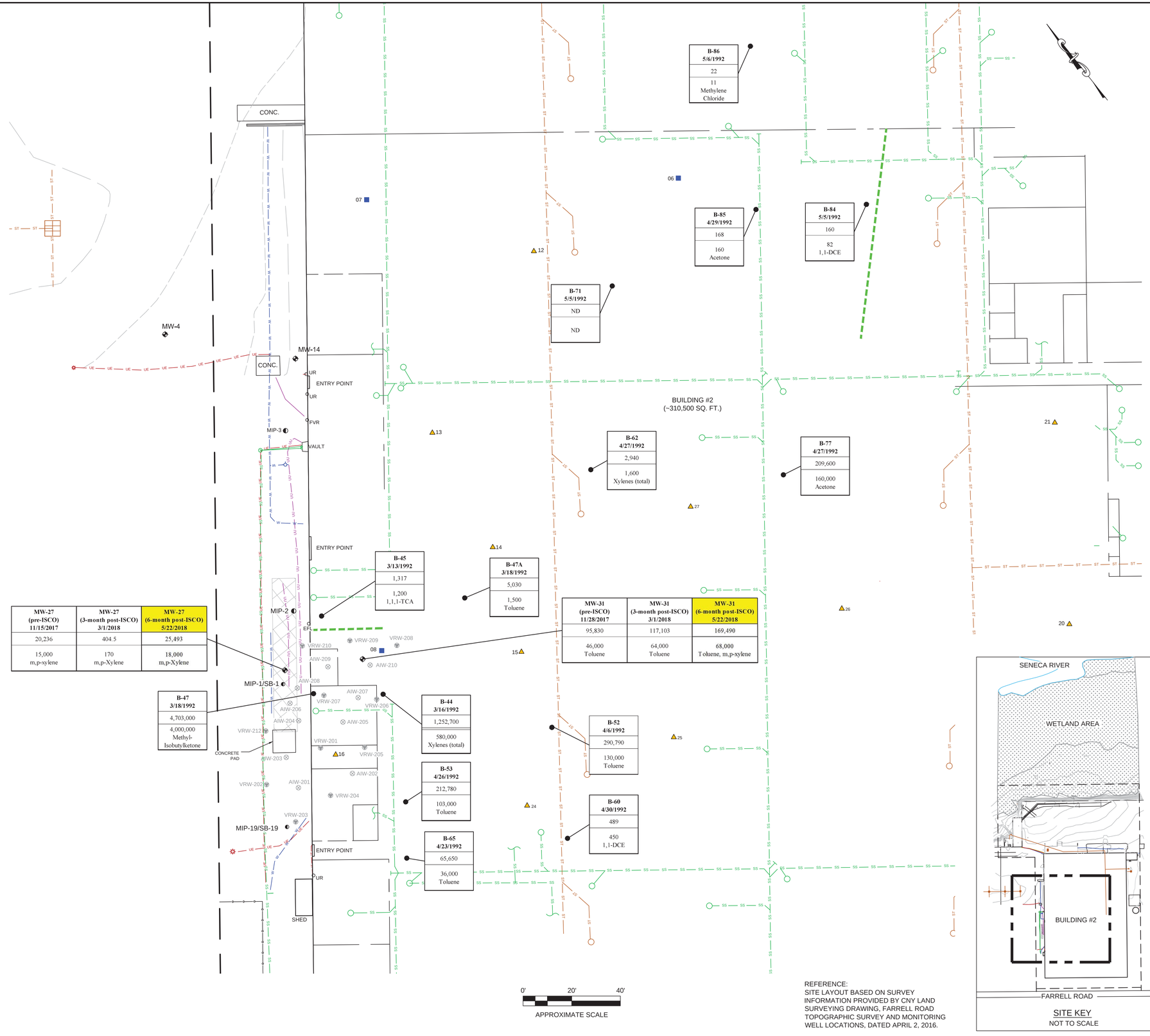
Figure: 13

SOIL ANALYTICAL DATA (AOC #5 - HISTORICAL AND CURRENT)

LOCKHEED MARTIN CORPORATION
FORMER G.E. FARRELL ROAD SITE
TOWN OF GEDDES, ONONDAGA COUNTY, NEW YORK
Project No.: 60564181 Date: JUNE 8, 2018

Last saved by: HEATHER.PRESSING(2018-06-27) Last Plotted: 2018-06-27
Filename: Z:\DEPARTMENTS\MARKETING\PROPOSALS\LOCKHEED MARTIN - FARRELL ROAD\FARRELL ROAD FROM DESKTOP 03-21-2018\ISO FIGURES\05-30-2018\FARRELL AOC PROPOSED WELLS GW - 06-08-2018.DWG

Project Management Initials: Designer: Checked: Approved: ANSI D 22" x 34"



LEGEND

- MW-2 — MONITORING WELL LOCATION
- RW-3 — GROUNDWATER EXTRACTION WELL LOCATION
- ML-1 — CONTINUOUS MULTICHAMBER TUBING (CMT) WELLS
- 241 FARRELL ROAD - 16.6 ACRES
- 370 — TOPOGRAPHIC CONTOUR
- CHAINLINK FENCE
- SS — SANITARY SEWER LINE
- ST — STORM SEWER LINE
- G — G — UNDERGROUND GAS LINE
- UE — UNDERGROUND ELECTRIC LINE
- W — W — UNDERGROUND WATER LINE
- UU — UNKNOWN UTILITY LINE
- S — SANITARY MANHOLE
- SV / CO — SEWER VENT / CLEAN OUT
- CATCH BASIN
- GM — GAS MARKER
- E — ELECTRIC MANHOLE
- LIGHT POLE
- FIRE HYDRANT/FIRE SUPPRESSION POST
- PIV — POST INDICATOR VALVE
- M — MANHOLE
- FVR — FORMER VENT RISER
- UR — UTILITY RISER
- EFL — SUB-SLAB DEPRESSURIZATION SYSTEM EXHAUST FAN LOCATION
- LOCKHEED MARTIN STORAGE SHED
- AREA OF CONCERN #5
- MIP-2 — MEMBRANE INTERFACE PROBE LOCATION
- B-44 — 1992 BORING LOCATION
- AIW-201 — 1996 AIR INJECTION WELL LOCATION (APPROX.)
- VRW-203 — 1996 VAPOR RECOVERY WELL LOCATION (APPROX.)
- 03 — SUB-SLAB AND INDOOR AIR SAMPLE LOCATION
- 18 — SUB-SLAB SAMPLE LOCATION
- SUB-SLAB DEPRESSURIZATION SYSTEM (SSDS) SUB-SLAB PIPE

B-44	SAMPLE ID
3/16/1992	DATE
1,244,100	TOTAL VOLATILE ORGANICS (µg/L)
580,000 Xylenes (total)	CONCENTRATION OF MOST ELEVATED ANALYTE (µg/L)

1,1,1-TCA 1,1,1-TRICHLOROETHANE
1,1-DCE 1,1-DICHLOROETHENE
ND ALL PARAMETERS NOT DETECTED

NOTE

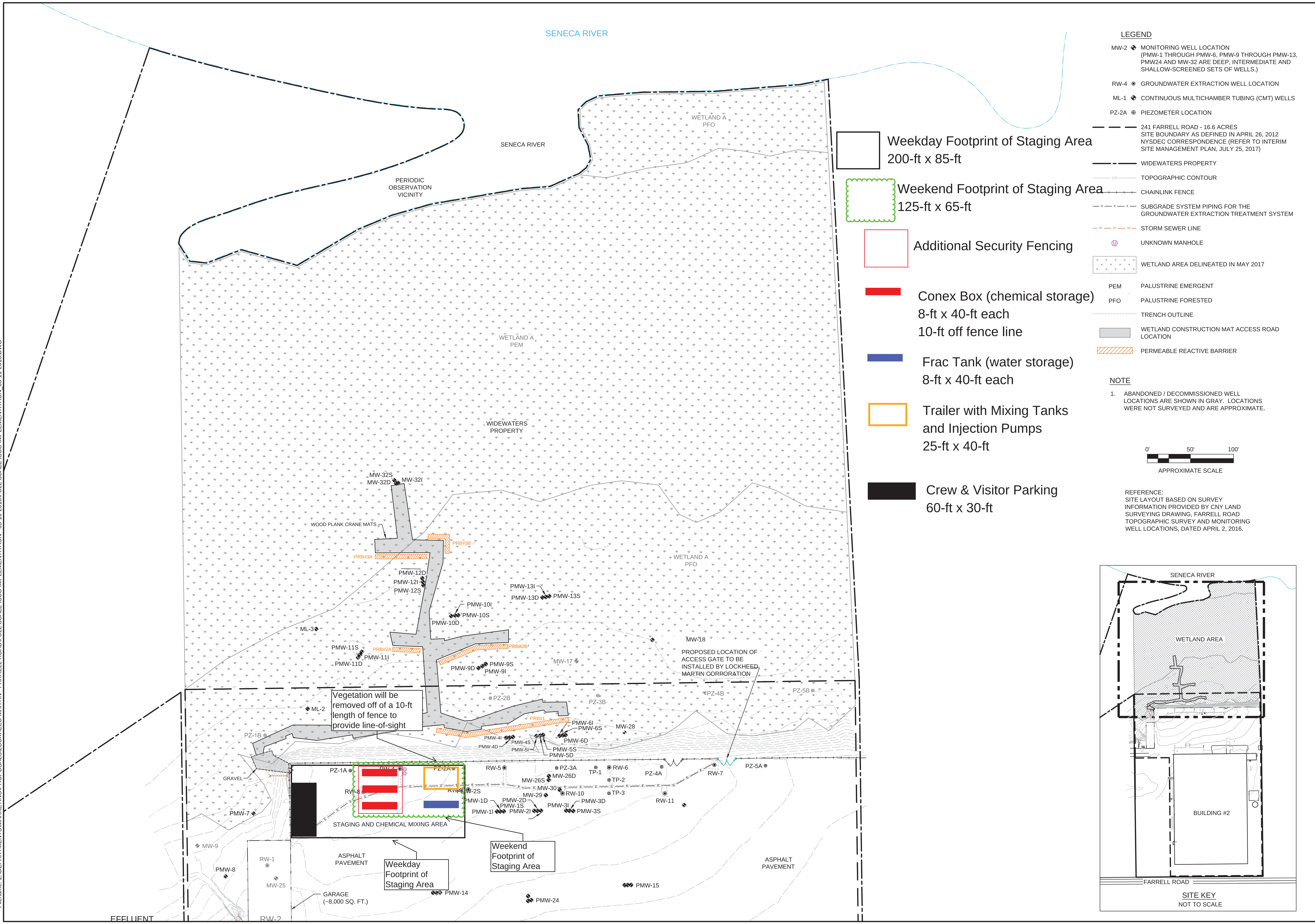
1. ABANDONED / DECOMMISSIONED WELL LOCATIONS ARE SHOWN IN GRAY. LOCATIONS WERE NOT SURVEYED AND ARE APPROXIMATE.
2. CURRENT ANALYTICAL DATA IS HIGHLIGHTED IN YELLOW.

AECOM

Figure: 14

GROUNDWATER ANALYTICAL DATA (AOC #5 - HISTORICAL AND CURRENT)

LOCKHEED MARTIN CORPORATION
FORMER G.E. FARRELL ROAD SITE
TOWN OF GEDDES, ONONDAGA COUNTY, NEW YORK
Project No.: 60564181 Date: JUNE 8, 2018


SENECA RIVER
PERIODIC OBSERVATION VICINITY
WETLAND A PFO
WETLAND A PEM
WIDEWATERS PROPERTY
Weekday Footprint of Staging Area
200-ft x 85-ft
Weekend Footprint of Staging Area
125-ft x 65-ft
Additional Security Fencing
Conex Box (chemical storage)
8-ft x 40-ft each
10-ft off fence line
Frac Tank (water storage)
8-ft x 40-ft each
Trailer with Mixing Tanks
and Injection Pumps
25-ft x 40-ft
Crew & Visitor Parking
60-ft x 30-ft
LEGEND
MONITORING WELL LOCATION (PMW-1 THROUGH PMW-6, PMW-9 THROUGH PMW-13, PMW24 AND MW-32 ARE DEEP, INTERMEDIATE AND SHALLOW-SCREENED SETS OF WELLS.)
GROUNDWATER EXTRACTION WELL LOCATION
CONTINUOUS MULTICHAMBER TUBING (CMT) WELLS
PIEZOMETER LOCATION
241 FARRELL ROAD - 16.6 ACRES SITE BOUNDARY AS DEFINED IN APRIL 26, 2012 NYSDEC CORRESPONDENCE (REFER TO INTERIM SITE MANAGEMENT PLAN, JULY 25, 2017)
WIDEWATERS PROPERTY
TOPOGRAPHIC CONTOUR
CHAINLINK FENCE
SUBGRADE SYSTEM PIPING FOR THE GROUNDWATER EXTRACTION TREATMENT SYSTEM
STORM SEWER LINE
UNKNOWN MANHOLE
WETLAND AREA DELINEATED IN MAY 2017
PEM PALUSTRINE EMERGENT
PFO PALUSTRINE FORESTED
TRENCH OUTLINE
WETLAND CONSTRUCTION MAT ACCESS ROAD LOCATION
PERMEABLE REACTIVE BARRIER
NOTE
1. ABANDONED / DECOMMISSIONED WELL LOCATIONS ARE SHOWN IN GRAY. LOCATIONS WERE NOT SURVEYED AND ARE APPROXIMATE.
0' 50' 100'
APPROXIMATE SCALE
REFERENCE:
SITE LAYOUT BASED ON SURVEY INFORMATION PROVIDED BY CNY LAND SURVEYING DRAWING, FARRELL ROAD TOPOGRAPHIC SURVEY AND MONITORING WELL LOCATIONS, DATED APRIL 2, 2016.
WOOD PLANK CRANE MATS
PROPOSED LOCATION OF ACCESS GATE TO BE INSTALLED BY LOCKHEED MARTIN CORPORATION
Vegetation will be removed off of a 10-ft length of fence to provide line-of-sight
STAGING AND CHEMICAL MIXING AREA
Weekday Footprint of Staging Area
Weekend Footprint of Staging Area
ASPHALT PAVEMENT
GARAGE (~8,000 SQ. FT.)
GRAVEL
EFFLUENT
SITE KEY
NOT TO SCALE
WETLAND AREA
BUILDING #2
FARRELL ROAD

FULL-SCALE REMEDIAL SYSTEM OPTIMIZATION (The Wetlands)

AECOM

Figure: 15

LOCKHEED MARTIN CORPORATION
FORMER G.E. FARRELL ROAD SITE
TOWN OF GEDDES, ONONDAGA COUNTY, NEW YORK
Project No.: 60564181 Date: JUNE 4, 2018

ANSI D 22" x 34"
Approved: Checked: Designer: Project Management Initials:
Last saved by: HEATHER.PRESSING(2018-06-27) Last Plotted: 2018-06-27
Filename: Z:\DEPARTMENTS\MARKETING\PROPOSALS\LOCKHEED MARTIN - FARRELL ROAD\FULL SCALE ISCO IMPLEMENTATION - 05-10-2018\FULL SCALE ISCO IMPLEMENTATION_05-11-2018.DWG

Attachment A

Laboratory Analytical Data
6-Month Post-ISCO Geochemistry

June 05, 2018 Service Request No:R1804641

Carey Letts
AECOM
5015 Campuswood Drive
Suite 104
East Syracuse, NY 13057

Laboratory Results for: 241 Farrell Road LMC

Dear Carey,

Enclosed are the results of the sample(s) submitted to our laboratory May 21, 2018
For your reference, these analyses have been assigned our service request number **R1804641.**

All analyses were performed according to our laboratory's quality assurance program. The test results meet requirements of the NELAP standards except as noted in the case narrative report. All results are intended to be considered in their entirety, and ALS Environmental is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report. The measurement uncertainty of the results included in this report is within that expected when using the prescribed method(s) for analysis of these samples, and represented by Laboratory Control Sample control limits. Any events, such as QC failures, which may add to the uncertainty are explained in the report narrative.

Please contact me if you have any questions. My extension is 7472. You may also contact me via email at Janice.Jaeger@alsglobal.com.

Respectfully submitted,

ALS Group USA, Corp. dba ALS Environmental

Janice Jaeger
Project Manager

ADDRESS 1565 Jefferson Road, Building 300, Suite 360, Rochester, NY 14623
PHONE +1 585 288 5380 | FAX +1 585 288 8475
ALS Group USA, Corp.
dba ALS Environmental

Narrative Documents

ALS Environmental—Rochester Laboratory
1565 Jefferson Road, Building 300, Suite 360, Rochester, NY 14623
Phone (585) 288-5380 Fax (585) 288-8475
www.alsglobal.com

ALS Environmental

Client: AECOM
Project: 241 Farrell Road LMC
Sample Matrix: Water

Service Request: R1804641
Date Received: 05/21/2018 - 05/22/2018

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of ALS Environmental. This report contains analytical results for samples designated for Tier II data deliverables, including results of QC samples analyzed from this delivery group. Analytical procedures performed by the lab are validated in accordance with NELAC standards. Any parameters that are not included in the lab's NELAC accreditation are identified on a "Non-Certified Analytes" report in the Miscellaneous Forms Section of this report. Individual analytical results requiring further explanation are flagged with qualifiers and/or discussed below. The flags are explained in the Report Qualifiers and Definitions page in the Miscellaneous Forms section of this report.

Sample Receipt:

Nine water samples were received for analysis at ALS Environmental on 05/21/2018 - 05/22/2018. Any discrepancies noted upon initial sample inspection are noted on the cooler receipt and preservation form included in this data package. The samples were received in good condition and consistent with the accompanying chain of custody form. Samples are refrigerated at 6°C upon receipt at the lab except for aqueous samples designated for metals analyses, which are stored at room temperature.

Metals:

Method 6010C, 06/04/2018: The control limits for matrix spike recovery of one or more of the spiked analytes are not applicable and have been flagged with a "#". The concentration of the analyte(s) in the parent sample is more than 4x the spike concentration. No further corrective action was required.

General Chemistry:

No significant anomalies were noted with this analysis.

Approved by _____ Date 06/05/2018

SAMPLE DETECTION SUMMARY

CLIENT ID: MW-30-05212018			Lab ID: R1804641-001			
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Chromium, Hexavalent	0.100		0.002	0.010	mg/L	7199
Chromium, Hexavalent	0.101		0.002	0.010	mg/L	7199
Sulfate, Dissolved	1230		4	40	mg/L	9056A
Potassium, Dissolved	1020000		10000	100000	ug/L	6010C
Sodium, Dissolved	567000		9000	50000	ug/L	6010C

CLIENT ID: MW-29-05212018			Lab ID: R1804641-002			
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Chromium, Hexavalent	0.066		0.002	0.010	mg/L	7199
Chromium, Hexavalent	0.064		0.002	0.010	mg/L	7199
Sulfate, Dissolved	815		4	40	mg/L	9056A
Potassium, Dissolved	1830000		10000	100000	ug/L	6010C
Sodium, Dissolved	138000		200	1000	ug/L	6010C

CLIENT ID: DUP-1-05212018			Lab ID: R1804641-003			
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Chromium, Hexavalent	0.069		0.002	0.010	mg/L	7199
Chromium, Hexavalent	0.068		0.002	0.010	mg/L	7199
Sulfate, Dissolved	864		4	40	mg/L	9056A
Potassium, Dissolved	1810000		10000	100000	ug/L	6010C
Sodium, Dissolved	135000		200	1000	ug/L	6010C

CLIENT ID: MW-26D-05212018			Lab ID: R1804641-004			
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Chromium, Hexavalent	0.017		0.002	0.010	mg/L	7199
Chromium, Hexavalent	0.015		0.002	0.010	mg/L	7199
Sulfate, Dissolved	571		4	40	mg/L	9056A
Potassium, Dissolved	45500		200	2000	ug/L	6010C
Sodium, Dissolved	191000		200	1000	ug/L	6010C

CLIENT ID: MW-31-05222018			Lab ID: R1804641-005			
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Sulfate, Dissolved	307		2	20	mg/L	9056A
Sodium, Dissolved	39300		200	1000	ug/L	6010C

CLIENT ID: PMW-6D-05222018			Lab ID: R1804641-006			
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Sulfate, Dissolved	22.1		0.2	2.0	mg/L	9056A
Sodium, Dissolved	32800		200	1000	ug/L	6010C

CLIENT ID: PMW-5D-05222018			Lab ID: R1804641-007			
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Sulfate, Dissolved	23.8		0.2	2.0	mg/L	9056A
Sodium, Dissolved	30700		200	1000	ug/L	6010C

SAMPLE DETECTION SUMMARY

CLIENT ID: PMW-4D-05222018			Lab ID: R1804641-008			
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Sulfate, Dissolved	515		2	20	mg/L	9056A
Sodium, Dissolved	160000		200	1000	ug/L	6010C

CLIENT ID: PMW-9D-05222018			Lab ID: R1804641-009			
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Sulfate, Dissolved	24.1		0.2	2.0	mg/L	9056A
Sodium, Dissolved	33000		200	1000	ug/L	6010C

Sample Receipt Information

ALS Environmental—Rochester Laboratory
1565 Jefferson Road, Building 300, Suite 360, Rochester, NY 14623
Phone (585) 288-5380 Fax (585) 288-8475
www.alsglobal.com

Client: AECOM **Service Request:**R1804641

Project: 241 Farrell Road LMC/60564181

SAMPLE CROSS-REFERENCE

SAMPLE #	CLIENT SAMPLE ID	DATE	TIME
R1804641-001	MW-30-05212018	5/21/2018	1055
R1804641-002	MW-29-05212018	5/21/2018	1230
R1804641-003	DUP-1-05212018	5/21/2018	
R1804641-004	MW-26D-05212018	5/21/2018	1315
R1804641-005	MW-31-05222018	5/22/2018	1000
R1804641-006	PMW-6D-05222018	5/22/2018	1055
R1804641-007	PMW-5D-05222018	5/22/2018	1152
R1804641-008	PMW-4D-05222018	5/22/2018	1250
R1804641-009	PMW-9D-05222018	5/22/2018	1445

CHAIN OF CUSTODY/LABORATORY ANALYSIS REQUEST FORM 51372

1565 Jefferson Road, Building 300, Suite 360 • Rochester, NY 14623 | +1 585 288 5380 +1 585 288 8475 (fax) PAGE 1 OF 1

Project Name: 241 Farrell Road LMC	Project Number: 60564181
Project Manager: Carey Letts	Report CC:
Company/Address: 5015 Campuswood Drive, Suite 104, East Syracuse, NY 13057	
Phone #: (315) 928-4331	Email: carey.letts@aecom.com
Sampler's Signature:	Sampler's Printed Name: Joshua Cesario

ANALYSIS REQUESTED *(Include Method Number and Container Preservative)*

PRESERVATIVE: O O

CLIENT SAMPLE ID	FOR OFFICE USE ONLY LAB ID	SAMPLING DATE	SAMPLING TIME	MATRIX	NUMBER OF CONTAINERS	GC/MS VOAs ○ 8260 ○ 624 ○ CLP	GC/MS SVOAs ○ 8270 ○ 625	GC VOAs ○ 8021 ○ 601/602	PESTICIDES ○ 8081 ○ 608	PCBs ○ 8082 ○ 608	METALS, TOTAL (List in comments below)	METALS, DISSOLVED (List in comments below)	REMARKS/ ALTERNATE DESCRIPTION
MW-30-05212018		5/21/18	10:55	AQ	6						✓	✓	MS/MSD
MW-29-05212018		"	12:30	"	2						✓	✓	
DUP-1-05212018		"	—	"	2						✓	✓	
MW-26D-05212018		"	13:15	"	2						✓	✓	

Preservative Key: 0. NONE; 1. HCL; 2. HNO_3; 3. H_2SO_4; 4. NaOH; 5. Zn. Acetate; 6. MeOH; 7. $NaHSO_4$; 8. Other _____

SPECIAL INSTRUCTIONS/COMMENTS
Metals
Metals Total: Cr+6 7199, SO4
Metals Dissolved: K, Na

See QAPP ☐

TURNAROUND REQUIREMENTS
_____ RUSH (SURCHARGES APPLY)
_____ 1 day _____ 2 day _____ 3 day
_____ 4 day _____ 5 day
_____ Standard (10 business days-No Surcharge)
REQUESTED REPORT DATE _____

REPORT REQUIREMENTS
____ I. Results Only
____ II. Results + QC Summaries (LCS, DUP, MS/MSD as required)
____ III. Results + QC and Calibration Summaries
____ IV. Data Validation Report with Raw Data
Edata ____ Yes ____ No

INVOICE INFORMATION
PO #
BILL TO:

STATE WHERE SAMPLES WERE COLLECTED

RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY
Signature	Signature	Signature	Signature	Signature	Signature
Printed Name: Josh Cesario	Printed Name	Printed Name	Printed Name: Daniel Ward	Printed Name	Printed Name
Firm: AECOM	Firm: ALS	Firm: ALS	Firm: ALS	Firm	Firm
Date/Time: 5/21/18 15:15	Date/Time: 5/21/18 1515	Date/Time: 5/21/18 1725	Date/Time: 5/21/18 1725	Date/Time	Date/Time

R1804641 5
AECOM
241 Farrell Road LMC

Distribution: White - Lab Copy; Yellow - Return to Originator

© 2012 by ALS Group

Cooler Receipt and Preservation Check For

R1804641 5
AECOM
241 Ferrell Road LMC

Project/Client_____ Folder Number_____

Cooler received on 5/21/18 by: dlw

COURIER: (ALS) UPS FEDEX VELOCITY CLIENT

1	Were **Custody seals** on outside of cooler?	Y (N)	5a	**Perchlorate** samples have required headspace?	Y N (NA)
2	**Custody papers** properly completed (ink, signed)?	(Y) N	5b	Did VOA vials, Alk,or Sulfide have sig* **bubbles**?	Y (N) NA
3	Did all bottles arrive in good **condition** (unbroken)?	(Y) N	6	Where did the bottles originate?	(ALS/ROC) CLIENT
4	Circle: ~~Wet Ice~~ **Dry Ice Gel packs** present?	(Y) N	7	Soil VOA received as: Bulk Encore 5035set	~~NA~~

8. Temperature Readings Date: 5/21/18 Time: 1724 ID: IR#7 ~~IR#9~~ From: Temp Blank Sample Bottle

Observed Temp (°C)	1.8°	2.2°					
Correction Factor (°C)	±0.0	±0.0					
Corrected Temp (°C)	1.8	2.2					
Temp from:Type of bottle							
Within 0-6°C?	(Y) N	(Y) N	Y N	Y N	Y N	Y N	Y N
If <0°C, were samples frozen?	Y N	Y N	Y N	Y N	Y N	Y N	Y N

If out of Temperature, note packing/ice condition: _____ Ice melted Poorly Packed (described below) Same Day Rule

&Client Approval to Run Samples: _____ Standing Approval Client aware at drop-off Client notified by: _____

All samples held in storage location: R-07 by dlw on 5/21/18 at 1724
5035 samples placed in storage location: _____ by _____ on _____ at _____

Cooler Breakdown/Preservation Check**: Date: 5/22/18 Time: 1216 by: @

9. Were all bottle labels complete (*i.e.* analysis, preservation, etc.)? (YES) NO
10. Did all bottle labels and tags agree with custody papers? (YES) NO
11. Were correct containers used for the tests indicated? (YES) NO
12. Were 5035 vials acceptable (no extra labels, not leaking)? YES NO (N/A)
13. Air Samples: Cassettes / Tubes Intact with MS? Canisters Pressurized Tedlar® Bags Inflated (N/A)

pH	Lot of test paper	Reagent	Preserved? Yes	Preserved? No	Lot Received	Exp	Sample ID Adjusted	Vol. Added	Lot Added	Final pH
≥12		NaOH								
≤2		HNO_3								
≤2		H_2SO_4								
<4		$NaHSO_4$								
5-9		For 608pest			No=Notify for 3day					
Residual Chlorine (-)		For CN, Phenol, 625, 608pest, 522			If +, contact PM to add $Na_2S_2O_3$ (625, 608, CN), ascorbic (phenol).					
		$Na_2S_2O_3$								
		ZnAcetate	-	-			**VOAs and 1664 Not to be tested before analysis. Otherwise, all bottles of all samples with chemical preservatives are checked (not just representatives).			
		HCl	**	**						

Bottle lot numbers: 122517-01AA0

Explain all Discrepancies/ Other Comments:

CLRES	BULK
DO	FLDT
HPROD	HGFB
HTR	LL3541
PH	SUB
SO3	MARRS
ALS	REV

Labels secondary reviewed by: @

PC Secondary Review: dlw 5/23/18

*significant air bubbles: VOA > 5-6 mm : WC >1 in. diameter

CHAIN OF CUSTODY/LABORATORY ANALYSIS REQUEST FORM 51373

1565 Jefferson Road, Building 300, Suite 360 • Rochester, NY 14623 | +1 585 288 5380 +1 585 288 8475 (fax) PAGE 1 OF 1

Project Name: 241 Farrell Road LMC	Project Number: 60564181
Project Manager: Carey Letts	Report CC:
Company/Address: 5015 Campuswood Drive, Suite 104, East Syracuse, NY 13057	
Phone #: (315) 928-4331	Email: Carey.letts@aecom.com
Sampler's Signature:	Sampler's Printed Name: Joshua Cesario

ANALYSIS REQUESTED (Include Method Number and Container Preservative)

PRESERVATIVE: 0 0

CLIENT SAMPLE ID	FOR OFFICE USE ONLY LAB ID	SAMPLING DATE	SAMPLING TIME	MATRIX	NUMBER OF CONTAINERS	GC/MS VOAs • 8260 • 624 • CLP	GC/MS SVOAs • 8270 • 625	GC VOAs • 8021 • 601/602	PESTICIDES • 8081 • 608	PCBs • 8082 • 608	METALS, TOTAL (List in comments below)	METALS, DISSOLVED (List in comments below)	REMARKS/ ALTERNATE DESCRIPTION
MW-31-05222018		5/22/18	10:00	AQ	2						✓	✓	
PMW-6D-05222018			10:55		2						✓	✓	
PMW-5D-05222018			11:52		2						✓	✓	
PMW-4D-05222018			12:50		2						✓	✓	
PMW-9D-05222018			14:45		2						✓	✓	

Preservative Key: 0. NONE; 1. HCL; 2. HNO_3; 3. H_2SO_4; 4. NaOH; 5. Zn. Acetate; 6. MeOH; 7. $NaHSO_4$; 8. Other _____

SPECIAL INSTRUCTIONS/COMMENTS

Metals

Metals Total: Cr+6 7199, SO4

Metals Dissolved: K, Na

See QAPP ☐

TURNAROUND REQUIREMENTS

____ RUSH (SURCHARGES APPLY)

____ 1 day ____ 2 day ____ 3 day

____ 4 day ____ 5 day

____ Standard (10 business days-No Surcharge)

REQUESTED REPORT DATE _____

REPORT REQUIREMENTS

____ I. Results Only

____ II. Results + QC Summaries (LCS, DUP, MS/MSD as required)

____ III. Results + QC and Calibration Summaries

____ IV. Data Validation Report with Raw Data

Edata ____ Yes ____ No

INVOICE INFORMATION

PO #

BILL TO:

STATE WHERE SAMPLES WERE COLLECTED

RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY
Signature:	Signature: Gary Bohan	Signature: Gary Bohan	Signature:	Signature:	Signature:
Printed Name: Joshua Cesario	Printed Name: Gary Bohan	Printed Name: Gary Bohan	Printed Name: Daniel Ward	Printed Name:	Printed Name:
Firm: AECOM	Firm: ALS	Firm: ALS	Firm: ALS	Firm:	Firm:
Date/Time: 5/22/18 15:16	Date/Time: 5/22/18 1516	Date/Time: 5/23/18 1659	Date/Time: 5/22/18/1650	Date/Time:	Date/Time:

R1804641 5
AECOM
241 Farrell Road LMC

Distribution: White - Lab Copy; Yellow - Return to Originator

© 2012 by ALS Group

Cooler Receipt and Preservation Check Form

R1804641 5
AECOM
241 Farrell Road LMC

Project/Client AECOM Folder Number

Cooler received on 5/22/18 by: DH

COURIER: ALS UPS FEDEX VELOCITY CLIENT

1	Were **Custody seals** on outside of cooler?	Y N
2	**Custody papers** properly completed (ink, signed)?	Y N
3	Did all bottles arrive in good **condition** (unbroken)?	Y N
4	Circle: **Wet Ice Dry Ice Gel packs** present?	Y N

5a	**Perchlorate** samples have required headspace?	Y N NA
5b	Did VOA vials, Alk,or Sulfide have sig* **bubbles**?	Y N NA
6	Where did the bottles originate?	ALS/ROC CLIENT
7	Soil VOA received as: Bulk Encore 5035set	NA

8. Temperature Readings Date: 05/22/18 Time: 1720 ID: IR#7 IR#9 From: Temp Blank Sample Bottle

Observed Temp (°C)	3.3						
Correction Factor (°C)	+0.0						
Corrected Temp (°C)	3.3						
Temp from:Type of bottle							
Within 0-6°C?	Y N	Y N	Y N	Y N	Y N	Y N	Y N
If <0°C, were samples frozen?	Y N	Y N	Y N	Y N	Y N	Y N	Y N

If out of Temperature, note packing/ice condition: Ice melted Poorly Packed (described below) Same Day Rule

&Client Approval to Run Samples: Standing Approval Client aware at drop-off Client notified by:

All samples held in storage location: R-007 by DH on 5/22/18 at 1720
5035 samples placed in storage location: by on at

Cooler Breakdown/Preservation Check**: Date: 5/23/18 Time: 1343 by:

9. Were all bottle labels complete (*i.e.* analysis, preservation, etc.)? YES NO
10. Did all bottle labels and tags agree with custody papers? YES NO
11. Were correct containers used for the tests indicated? YES NO
12. Were 5035 vials acceptable (no extra labels, not leaking)? YES NO N/A
13. Air Samples: Cassettes / Tubes Intact with MS? Canisters Pressurized Tedlar® Bags Inflated N/A

pH	Lot of test paper	Reagent	Preserved? Yes	Preserved? No	Lot Received	Exp	Sample ID Adjusted	Vol. Added	Lot Added	Final pH
≥12		NaOH								
≤2		HNO_3								
≤2		H_2SO_4								
<4		$NaHSO_4$								
5-9		For 608pest			No=Notify for 3day					
Residual Chlorine (-)		For CN, Phenol, 625, 608pest, 522			If +, contact PM to add $Na_2S_2O_3$ (625, 608, CN), ascorbic (phenol).					
		$Na_2S_2O_3$								
		ZnAcetate	-	-						
		HCl	**	**						

**VOAs and 1664 Not to be tested before analysis. Otherwise, all bottles of all samples with chemical preservatives are checked (not just representatives).

Bottle lot numbers: 122517-2AAO
Explain all Discrepancies/ Other Comments:

CLRES	BULK
DO	FLDT
HPROD	HGFB
HTR	LL3541
PH	SUB
SO3	MARRS
ALS	REV

Labels secondary reviewed by:
PC Secondary Review: 5/23/18

*significant air bubbles: VOA > 5-6 mm : WC >1 in. diameter

Miscellaneous Forms

ALS Environmental—Rochester Laboratory
1565 Jefferson Road, Building 300, Suite 360, Rochester, NY 14623
Phone (585) 288-5380 Fax (585) 288-8475
www.alsglobal.com

REPORT QUALIFIERS AND DEFINITIONS

U	Analyte was analyzed for but not detected. The sample quantitation limit has been corrected for dilution and for percent moisture, unless otherwise noted in the case narrative.
J	Estimated value due to either being a Tentatively Identified Compound (TIC) or that the concentration is between the MRL and the MDL. Concentrations are not verified within the linear range of the calibration. For DoD: concentration >40% difference between two GC columns (pesticides/Arclors).
B	Analyte was also detected in the associated method blank at a concentration that may have contributed to the sample result.
E	Inorganics- Concentration is estimated due to the serial dilution was outside control limits.
E	Organics- Concentration has exceeded the calibration range for that specific analysis.
D	Concentration is a result of a dilution, typically a secondary analysis of the sample due to exceeding the calibration range or that a surrogate has been diluted out of the sample and cannot be assessed.
*	Indicates that a quality control parameter has exceeded laboratory limits. Under the ñNotesò column of the Form I, this qualifier denotes analysis was performed out of Holding Time.
H	Analysis was performed out of hold time for tests that have an ñimmediateò hold time criteria.
#	Spike was diluted out.
+	Correlation coefficient for MSA is <0.995.
N	Inorganics- Matrix spike recovery was outside laboratory limits.
N	Organics- Presumptive evidence of a compound (reported as a TIC) based on the MS library search.
S	Concentration has been determined using Method of Standard Additions (MSA).
W	Post-Digestion Spike recovery is outside control limits and the sample absorbance is <50% of the spike absorbance.
P	Concentration >40% difference between the two GC columns.
C	Confirmed by GC/MS
Q	DoD reports: indicates a pesticide/Aroclor is not confirmed (Ó100% Difference between two GC columns).
X	See Case Narrative for discussion.
MRL LOQ	Method Reporting Limit. Also known as: Limit of Quantitation (LOQ) The lowest concentration at which the method analyte may be reliably quantified under the method conditions.
MDL	Method Detection Limit. A statistical value derived from a study designed to provide the lowest concentration that will be detected 99% of the time. Values between the MDL and MRL are estimated (see J qualifier).
LOD	Limit of Detection. A value at or above the MDL which has been verified to be detectable.
ND	Non-Detect. Analyte was not detected at the concentration listed. Same as U qualifier.

Rochester Lab ID # for State Certifications[1]

Connecticut ID # PH0556	Maine ID #NY0032	New Hampshire ID # 294100 A/B
Delaware Approved	New Jersey ID # NY004	
DoD ELAP #65817	New York ID # 10145	Pennsylvania ID# 68-786
Florida ID # E87674	North Carolina #676	Rhode Island ID # 158
		Virginia #460167

[1] Analyses were performed according to our laboratoryôs NELAP-approved quality assurance program and any applicable state or agency requirements. The test results meet requirements of the current NELAP/TNI standards or state or agency requirements, where applicable, except as noted in the case narrative. Since not all analyte/method/matrix combinations are offered for state/NELAC accreditation, this report may contain results which are not accredited. For a specific list of accredited analytes, contact the laboratory or go to https://www.alsglobal.com/locations/americas/north-america/usa/new-york/rochester-environmental

ALS Laboratory Group

Acronyms

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

Client: AECOM **Service Request:** R1804641
Project: 241 Farrell Road LMC/60564181

Sample Name: MW-30-05212018 **Date Collected:** 05/21/18
Lab Code: R1804641-001 **Date Received:** 05/21/18
Sample Matrix: Water

Analysis Method	Extracted/Digested By	Analyzed By
6010C	KMCLAEN	NMANSEN
7199		CWOODS
9056A		AMOSES

Sample Name: MW-29-05212018 **Date Collected:** 05/21/18
Lab Code: R1804641-002 **Date Received:** 05/21/18
Sample Matrix: Water

Analysis Method	Extracted/Digested By	Analyzed By
6010C	KMCLAEN	NMANSEN
7199		CWOODS
9056A		AMOSES

Sample Name: DUP-1-05212018 **Date Collected:** 05/21/18
Lab Code: R1804641-003 **Date Received:** 05/21/18
Sample Matrix: Water

Analysis Method	Extracted/Digested By	Analyzed By
6010C	KMCLAEN	NMANSEN
7199		CWOODS
9056A		AMOSES

Sample Name: MW-26D-05212018 **Date Collected:** 05/21/18
Lab Code: R1804641-004 **Date Received:** 05/21/18
Sample Matrix: Water

Analysis Method	Extracted/Digested By	Analyzed By
6010C	KMCLAEN	NMANSEN
7199		CWOODS
9056A		AMOSES

Client: AECOM **Service Request:** R1804641
Project: 241 Farrell Road LMC/60564181

Sample Name: MW-31-05222018 **Date Collected:** 05/22/18
Lab Code: R1804641-005 **Date Received:** 05/22/18
Sample Matrix: Water

Analysis Method	Extracted/Digested By	Analyzed By
6010C	KMCLAEN	NMANSEN
7199		CWOODS
9056A		AMOSES

Sample Name: PMW-6D-05222018 **Date Collected:** 05/22/18
Lab Code: R1804641-006 **Date Received:** 05/22/18
Sample Matrix: Water

Analysis Method	Extracted/Digested By	Analyzed By
6010C	KMCLAEN	NMANSEN
7199		CWOODS
9056A		AMOSES

Sample Name: PMW-5D-05222018 **Date Collected:** 05/22/18
Lab Code: R1804641-007 **Date Received:** 05/22/18
Sample Matrix: Water

Analysis Method	Extracted/Digested By	Analyzed By
6010C	KMCLAEN	NMANSEN
7199		CWOODS
9056A		AMOSES

Sample Name: PMW-4D-05222018 **Date Collected:** 05/22/18
Lab Code: R1804641-008 **Date Received:** 05/22/18
Sample Matrix: Water

Analysis Method	Extracted/Digested By	Analyzed By
6010C	KMCLAEN	NMANSEN
7199		CWOODS
9056A		AMOSES

Client:	AECOM	**Service Request:**	R1804641
Project:	241 Farrell Road LMC/60564181		

Sample Name:	PMW-9D-05222018	**Date Collected:**	05/22/18
Lab Code:	R1804641-009	**Date Received:**	05/22/18
Sample Matrix:	Water		

Analysis Method	Extracted/Digested By	Analyzed By
6010C	KMCLAEN	NMANSEN
7199		CWOODS
9056A		AMOSES

The preparation methods associated with this report are found in these tables unless discussed in the case narrative.

Water/Liquid Matrix

Analytical Method	Preparation Method
200.7	200.2
200.8	200.2
6010C	3005A/3010A
6020A	ILM05.3
9014 Cyanide Reactivity	SW846 Ch7, 7.3.4.2
9034 Sulfide Reactivity	SW846 Ch7, 7.3.4.2
9034 Sulfide Acid Soluble	9030B
9056A Bomb (Halogens)	5050A
9066 Manual Distillation	9065
SM 4500-CN-E Residual Cyanide	SM 4500-CN-G
SM 4500-CN-E WAD Cyanide	SM 4500-CN-I

Solid/Soil/Non-Aqueous Matrix

Analytical Method	Preparation Method
6010C	3050B
6020A	3050B
6010C TCLP (1311) extract	3005A/3010A
6010 SPLP (1312) extract	3005A/3010A
7196A	3060A
7199	3060A
9056A Halogens/Halides	5050
300.0 Anions/ 350.1/ 353.2/ SM 2320B/ SM 5210B/ 9056A Anions	DI extraction

For analytical methods not listed, the preparation method is the same as the analytical method reference.

Sample Results

ALS Environmental—Rochester Laboratory
1565 Jefferson Road, Building 300, Suite 360, Rochester, NY 14623
Phone (585) 288-5380 Fax (585) 288-8475
www.alsglobal.com

Metals

ALS Environmental—Rochester Laboratory
1565 Jefferson Road, Building 300, Suite 360, Rochester, NY 14623
Phone (585) 288-5380 Fax (585) 288-8475
www.alsglobal.com

Analytical Report

Client:	AECOM	**Service Request:**	R1804641
Project:	241 Farrell Road LMC/60564181	**Date Collected:**	05/21/18 10:55
Sample Matrix:	Water	**Date Received:**	05/21/18 17:25
Sample Name:	MW-30-05212018	**Basis:**	NA
Lab Code:	R1804641-001		

Inorganic Parameters

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Date Extracted	Q
Potassium, Dissolved	6010C	**1020000**	ug/L	100000	50	06/04/18 13:49	05/29/18	
Sodium, Dissolved	6010C	**567000**	ug/L	50000	50	06/04/18 13:49	05/29/18	

Analytical Report

Client:	AECOM	**Service Request:**	R1804641
Project:	241 Farrell Road LMC/60564181	**Date Collected:**	05/21/18 12:30
Sample Matrix:	Water	**Date Received:**	05/21/18 17:25
Sample Name:	MW-29-05212018	**Basis:**	NA
Lab Code:	R1804641-002		

Inorganic Parameters

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Date Extracted	Q
Potassium, Dissolved	6010C	**1830000**	ug/L	100000	50	06/04/18 14:06	05/29/18	
Sodium, Dissolved	6010C	**138000**	ug/L	1000	1	05/31/18 20:22	05/29/18	

Client:	AECOM	**Service Request:**	R1804641
Project:	241 Farrell Road LMC/60564181	**Date Collected:**	05/21/18
Sample Matrix:	Water	**Date Received:**	05/21/18 17:25
Sample Name:	DUP-1-05212018	**Basis:**	NA
Lab Code:	R1804641-003		

Inorganic Parameters

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Date Extracted	Q
Potassium, Dissolved	6010C	**1810000**	ug/L	100000	50	06/04/18 14:09	05/29/18	
Sodium, Dissolved	6010C	**135000**	ug/L	1000	1	05/31/18 20:26	05/29/18	

Analytical Report

Client:	AECOM	**Service Request:**	R1804641
Project:	241 Farrell Road LMC/60564181	**Date Collected:**	05/21/18 13:15
Sample Matrix:	Water	**Date Received:**	05/21/18 17:25
Sample Name:	MW-26D-05212018	**Basis:**	NA
Lab Code:	R1804641-004		

Inorganic Parameters

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Date Extracted	Q
Potassium, Dissolved	6010C	**45500**	ug/L	2000	1	05/31/18 20:36	05/29/18	
Sodium, Dissolved	6010C	**191000**	ug/L	1000	1	05/31/18 20:36	05/29/18	

Client:	AECOM	**Service Request:**	R1804641
Project:	241 Farrell Road LMC/60564181	**Date Collected:**	05/22/18 10:00
Sample Matrix:	Water	**Date Received:**	05/22/18 16:50
Sample Name:	MW-31-05222018	**Basis:**	NA
Lab Code:	R1804641-005		

Inorganic Parameters

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Date Extracted	Q
Potassium, Dissolved	6010C	2000 U	ug/L	2000	1	05/31/18 20:39	05/29/18	
Sodium, Dissolved	6010C	**39300**	ug/L	1000	1	05/31/18 20:39	05/29/18	

Analytical Report

Client:	AECOM	**Service Request:**	R1804641
Project:	241 Farrell Road LMC/60564181	**Date Collected:**	05/22/18 10:55
Sample Matrix:	Water	**Date Received:**	05/22/18 16:50
Sample Name:	PMW-6D-05222018	**Basis:**	NA
Lab Code:	R1804641-006		

Inorganic Parameters

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Date Extracted	Q
Potassium, Dissolved	6010C	2000 U	ug/L	2000	1	05/31/18 20:42	05/29/18	
Sodium, Dissolved	6010C	**32800**	ug/L	1000	1	05/31/18 20:42	05/29/18	

Analytical Report

Client:	AECOM	**Service Request:**	R1804641
Project:	241 Farrell Road LMC/60564181	**Date Collected:**	05/22/18 11:52
Sample Matrix:	Water	**Date Received:**	05/22/18 16:50
Sample Name:	PMW-5D-05222018	**Basis:**	NA
Lab Code:	R1804641-007		

Inorganic Parameters

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Date Extracted	Q
Potassium, Dissolved	6010C	2000 U	ug/L	2000	1	05/31/18 20:46	05/29/18	
Sodium, Dissolved	6010C	**30700**	ug/L	1000	1	05/31/18 20:46	05/29/18	

Analytical Report

Client:	AECOM	**Service Request:**	R1804641
Project:	241 Farrell Road LMC/60564181	**Date Collected:**	05/22/18 12:50
Sample Matrix:	Water	**Date Received:**	05/22/18 16:50
Sample Name:	PMW-4D-05222018	**Basis:**	NA
Lab Code:	R1804641-008		

Inorganic Parameters

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Date Extracted	Q
Potassium, Dissolved	6010C	2000 U	ug/L	2000	1	05/31/18 20:49	05/29/18	
Sodium, Dissolved	6010C	**160000**	ug/L	1000	1	05/31/18 20:49	05/29/18	

Client:	AECOM	**Service Request:**	R1804641
Project:	241 Farrell Road LMC/60564181	**Date Collected:**	05/22/18 14:45
Sample Matrix:	Water	**Date Received:**	05/22/18 16:50
Sample Name:	PMW-9D-05222018	**Basis:**	NA
Lab Code:	R1804641-009		

Inorganic Parameters

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Date Extracted	Q
Potassium, Dissolved	6010C	2000 U	ug/L	2000	1	05/31/18 20:52	05/29/18	
Sodium, Dissolved	6010C	**33000**	ug/L	1000	1	05/31/18 20:52	05/29/18	

General Chemistry

ALS Environmental—Rochester Laboratory
1565 Jefferson Road, Building 300, Suite 360, Rochester, NY 14623
Phone (585) 288-5380 Fax (585) 288-8475
www.alsglobal.com

Analytical Report

Client:	AECOM	**Service Request:**	R1804641
Project:	241 Farrell Road LMC/60564181	**Date Collected:**	05/21/18 10:55
Sample Matrix:	Water	**Date Received:**	05/21/18 17:25
Sample Name:	MW-30-05212018	**Basis:**	NA
Lab Code:	R1804641-001		

Inorganic Parameters

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Q
Chromium, Hexavalent	7199	**0.100**	mg/L	0.010	1	05/22/18 10:01	
Chromium, Hexavalent	7199	**0.101**	mg/L	0.010	1	05/22/18 09:54	
Sulfate, Dissolved	9056A	**1230**	mg/L	40	200	05/25/18 17:19	

Analytical Report

Client:	AECOM	**Service Request:**	R1804641
Project:	241 Farrell Road LMC/60564181	**Date Collected:**	05/21/18 12:30
Sample Matrix:	Water	**Date Received:**	05/21/18 17:25
Sample Name:	MW-29-05212018	**Basis:**	NA
Lab Code:	R1804641-002		

Inorganic Parameters

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Q
Chromium, Hexavalent	7199	**0.066**	mg/L	0.010	1	05/22/18 10:40	
Chromium, Hexavalent	7199	**0.064**	mg/L	0.010	1	05/22/18 10:33	
Sulfate, Dissolved	9056A	**815**	mg/L	40	200	05/24/18 12:57	

Analytical Report

Client:	AECOM	**Service Request:**	R1804641
Project:	241 Farrell Road LMC/60564181	**Date Collected:**	05/21/18
Sample Matrix:	Water	**Date Received:**	05/21/18 17:25
Sample Name:	DUP-1-05212018	**Basis:**	NA
Lab Code:	R1804641-003		

Inorganic Parameters

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Q
Chromium, Hexavalent	7199	**0.069**	mg/L	0.010	1	05/22/18 11:09	
Chromium, Hexavalent	7199	**0.068**	mg/L	0.010	1	05/22/18 11:02	
Sulfate, Dissolved	9056A	**864**	mg/L	40	200	05/24/18 13:03	

Analytical Report

Client:	AECOM	**Service Request:**	R1804641
Project:	241 Farrell Road LMC/60564181	**Date Collected:**	05/21/18 13:15
Sample Matrix:	Water	**Date Received:**	05/21/18 17:25
Sample Name:	MW-26D-05212018	**Basis:**	NA
Lab Code:	R1804641-004		

Inorganic Parameters

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Q
Chromium, Hexavalent	7199	**0.017**	mg/L	0.010	1	05/22/18 11:22	
Chromium, Hexavalent	7199	**0.015**	mg/L	0.010	1	05/22/18 11:15	
Sulfate, Dissolved	9056A	**571**	mg/L	40	200	05/24/18 13:09	

Analytical Report

Client:	AECOM	**Service Request:**	R1804641
Project:	241 Farrell Road LMC/60564181	**Date Collected:**	05/22/18 10:00
Sample Matrix:	Water	**Date Received:**	05/22/18 16:50
Sample Name:	MW-31-05222018	**Basis:**	NA
Lab Code:	R1804641-005		

Inorganic Parameters

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Q
Chromium, Hexavalent	7199	0.010 U	mg/L	0.010	1	05/23/18 09:49	
Chromium, Hexavalent	7199	0.010 U	mg/L	0.010	1	05/23/18 09:42	
Sulfate, Dissolved	9056A	**307**	mg/L	20	100	05/24/18 13:16	

Analytical Report

Client:	AECOM	**Service Request:**	R1804641
Project:	241 Farrell Road LMC/60564181	**Date Collected:**	05/22/18 10:55
Sample Matrix:	Water	**Date Received:**	05/22/18 16:50
Sample Name:	PMW-6D-05222018	**Basis:**	NA
Lab Code:	R1804641-006		

Inorganic Parameters

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Q
Chromium, Hexavalent	7199	0.010 U	mg/L	0.010	1	05/23/18 09:55	
Chromium, Hexavalent	7199	0.010 U	mg/L	0.010	1	05/23/18 10:02	
Sulfate, Dissolved	9056A	**22.1**	mg/L	2.0	10	05/24/18 13:22	

Analytical Report

Client:	AECOM	**Service Request:**	R1804641
Project:	241 Farrell Road LMC/60564181	**Date Collected:**	05/22/18 11:52
Sample Matrix:	Water	**Date Received:**	05/22/18 16:50
Sample Name:	PMW-5D-05222018	**Basis:**	NA
Lab Code:	R1804641-007		

Inorganic Parameters

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Q
Chromium, Hexavalent	7199	0.010 U	mg/L	0.010	1	05/23/18 10:15	
Chromium, Hexavalent	7199	0.010 U	mg/L	0.010	1	05/23/18 10:08	
Sulfate, Dissolved	9056A	**23.8**	mg/L	2.0	10	05/24/18 13:28	

Analytical Report

Client:	AECOM	**Service Request:**	R1804641
Project:	241 Farrell Road LMC/60564181	**Date Collected:**	05/22/18 12:50
Sample Matrix:	Water	**Date Received:**	05/22/18 16:50
Sample Name:	PMW-4D-05222018	**Basis:**	NA
Lab Code:	R1804641-008		

Inorganic Parameters

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Q
Chromium, Hexavalent	7199	0.010 U	mg/L	0.010	1	05/23/18 10:28	
Chromium, Hexavalent	7199	0.010 U	mg/L	0.010	1	05/23/18 10:21	
Sulfate, Dissolved	9056A	**515**	mg/L	20	100	05/24/18 13:47	

Client:	AECOM	**Service Request:**	R1804641
Project:	241 Farrell Road LMC/60564181	**Date Collected:**	05/22/18 14:45
Sample Matrix:	Water	**Date Received:**	05/22/18 16:50
Sample Name:	PMW-9D-05222018	**Basis:**	NA
Lab Code:	R1804641-009		

Inorganic Parameters

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Q
Chromium, Hexavalent	7199	0.010 U	mg/L	0.010	1	05/23/18 10:49	
Chromium, Hexavalent	7199	0.010 U	mg/L	0.010	1	05/23/18 10:56	
Sulfate, Dissolved	9056A	**24.1**	mg/L	2.0	10	05/24/18 13:53	

QC Summary Forms

ALS Environmental—Rochester Laboratory
1565 Jefferson Road, Building 300, Suite 360, Rochester, NY 14623
Phone (585) 288-5380 Fax (585) 288-8475
www.alsglobal.com

Metals

ALS Environmental—Rochester Laboratory
1565 Jefferson Road, Building 300, Suite 360, Rochester, NY 14623
Phone (585) 288-5380 Fax (585) 288-8475
www.alsglobal.com

Analytical Report

Client:	AECOM	**Service Request:**	R1804641
Project:	241 Farrell Road LMC/60564181	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
Sample Name:	Method Blank	**Basis:**	NA
Lab Code:	R1804641-MB1		

Inorganic Parameters

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Date Extracted	Q
Potassium, Dissolved	6010C	2000 U	ug/L	2000	1	05/31/18 19:55	05/29/18	
Sodium, Dissolved	6010C	1000 U	ug/L	1000	1	05/31/18 19:55	05/29/18	

Analytical Report

Client:	AECOM	**Service Request:**	R1804641
Project:	241 Farrell Road LMC/60564181	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
Sample Name:	Method Blank	**Basis:**	NA
Lab Code:	R1804641-MB2		

Inorganic Parameters

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Date Extracted	Q
Potassium, Dissolved	6010C	2000 U	ug/L	2000	1	05/31/18 19:59	05/29/18	
Sodium, Dissolved	6010C	1000 U	ug/L	1000	1	05/31/18 19:59	05/29/18	

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client: AECOM
Project: 241 Farrell Road LMC/60564181
Sample Matrix: Water

Service Request:R1804641
Date Collected:05/21/18
Date Received:05/21/18
Date Analyzed:6/4/18

Duplicate Matrix Spike Summary
Inorganic Parameters

Sample Name: MW-30-05212018
Lab Code: R1804641-001

Units:ug/L
Basis:NA

			Matrix Spike R1804641-001MS			Duplicate Matrix Spike R1804641-001DMS					
Analyte Name	**Method**	**Sample Result**	**Result**	**Spike Amount**	**% Rec**	**Result**	**Spike Amount**	**% Rec**	**% Rec Limits**	**RPD**	**RPD Limit**
Potassium, Dissolved	6010C	1020000	1030000	20000	38 #	1040000	20000	131 #	75-125	2	20
Sodium, Dissolved	6010C	567000	575000	20000	39 #	588000	20000	103 #	75-125	2	20

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client: AECOM
Project: 241 Farrell Road LMC/60564181
Sample Matrix: Water

Service Request: R1804641
Date Analyzed: 05/31/18

Lab Control Sample Summary
Inorganic Parameters

Units:ug/L
Basis:NA

Lab Control Sample
R1804641-LCS

Analyte Name	Analytical Method	Result	Spike Amount	% Rec	% Rec Limits
Potassium, Dissolved	6010C	19600	20000	98	80-120
Sodium, Dissolved	6010C	20300	20000	102	80-120

General Chemistry

ALS Environmental—Rochester Laboratory
1565 Jefferson Road, Building 300, Suite 360, Rochester, NY 14623
Phone (585) 288-5380 Fax (585) 288-8475
www.alsglobal.com

Analytical Report

Client:	AECOM	**Service Request:**	R1804641
Project:	241 Farrell Road LMC/60564181	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
Sample Name:	Method Blank	**Basis:**	NA
Lab Code:	R1804641-MB1		

Inorganic Parameters

Analyte Name	Analysis Method	Result		Units	MRL	Dil.	Date Analyzed	Q
Chromium, Hexavalent	7199	0.010	U	mg/L	0.010	1	05/22/18 09:34	
Chromium, Hexavalent	7199	0.010	U	mg/L	0.010	1	05/22/18 09:34	
Sulfate, Dissolved	9056A	0.20	U	mg/L	0.20	1	05/24/18 12:25	

Analytical Report

Client:	AECOM	**Service Request:**	R1804641
Project:	241 Farrell Road LMC/60564181	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
Sample Name:	Method Blank	**Basis:**	NA
Lab Code:	R1804641-MB2		

Inorganic Parameters

Analyte Name	Analysis Method	Result		Units	MRL	Dil.	Date Analyzed	Q
Chromium, Hexavalent	7199	0.010	U	mg/L	0.010	1	05/23/18 08:59	
Chromium, Hexavalent	7199	0.010	U	mg/L	0.010	1	05/23/18 08:59	
Sulfate, Dissolved	9056A	0.20	U	mg/L	0.20	1	05/24/18 12:25	

Analytical Report

Client:	AECOM	**Service Request:**	R1804641
Project:	241 Farrell Road LMC/60564181	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
Sample Name:	Method Blank	**Basis:**	NA
Lab Code:	R1804641-MB3		

Inorganic Parameters

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Q
Sulfate, Dissolved	9056A	0.20 U	mg/L	0.20	1	05/25/18 15:09	

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client: AECOM
Project: 241 Farrell Road LMC/60564181
Sample Matrix: Water

Service Request:R1804641
Date Collected:05/21/18
Date Received:05/21/18
Date Analyzed:05/22/18 - 05/25/18

Duplicate Matrix Spike Summary
General Chemistry Parameters

Sample Name: MW-30-05212018
Lab Code: R1804641-001

Units:mg/L
Basis:NA

			Matrix Spike R1804641-001MS			Duplicate Matrix Spike R1804641-001DMS					
Analyte Name	**Method**	**Sample Result**	**Result**	**Spike Amount**	**% Rec**	**Result**	**Spike Amount**	**% Rec**	**% Rec Limits**	**RPD**	**RPD Limit**
Chromium, Hexavalent	7199	0.100	0.292	0.200	96	0.292	0.200	96	10-170	<1	20
Chromium, Hexavalent	7199	0.101	0.292	0.200	96	0.293	0.200	96	10-170	<1	20
Sulfate, Dissolved	9056A	1230	1620	400	96	1610	400	95	80-120	<1	15

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client:	AECOM	**Service Request:**	R1804641
Project:	241 Farrell Road LMC/60564181	**Date Collected:**	05/22/18
Sample Matrix:	Water	**Date Received:**	05/22/18
		Date Analyzed:	05/23/18

Duplicate Matrix Spike Summary
Chromium, Hexavalent

Sample Name:	PMW-9D-05222018	**Units:**	mg/L
Lab Code:	R1804641-009	**Basis:**	NA
Analysis Method:	7199		

		Matrix Spike R1804641-009MS			Duplicate Matrix Spike R1804641-009DMS					
Analyte Name	**Sample Result**	**Result**	**Spike Amount**	**% Rec**	**Result**	**Spike Amount**	**% Rec**	**% Rec Limits**	**RPD**	**RPD Limit**
Chromium, Hexavalent	0.010 U	0.207	0.200	103	0.205	0.200	102	10-170	1	20
Chromium, Hexavalent	0.010 U	0.206	0.200	103	0.204	0.200	102	10-170	<1	20

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client: AECOM
Project: 241 Farrell Road LMC/60564181
Sample Matrix: Water

Service Request: R1804641
Date Analyzed: 05/22/18 - 05/24/18

Lab Control Sample Summary
General Chemistry Parameters

Units:mg/L
Basis:NA

Lab Control Sample
R1804641-LCS1

Analyte Name	Analytical Method	Result	Spike Amount	% Rec	% Rec Limits
Chromium, Hexavalent	7199	0.201	0.200	101	85-115
Chromium, Hexavalent	7199	0.200	0.200	100	85-115
Sulfate, Dissolved	9056A	2.04	2.00	102	80-120

Client: AECOM
Project: 241 Farrell Road LMC/60564181
Sample Matrix: Water

Service Request: R1804641
Date Analyzed: 05/23/18 - 05/24/18

Lab Control Sample Summary
General Chemistry Parameters

Units:mg/L
Basis:NA

Lab Control Sample
R1804641-LCS2

Analyte Name	Analytical Method	Result	Spike Amount	% Rec	% Rec Limits
Chromium, Hexavalent	7199	0.211	0.200	105	85-115
Chromium, Hexavalent	7199	0.212	0.200	106	85-115
Sulfate, Dissolved	9056A	2.04	2.00	102	80-120

Client: AECOM
Project: 241 Farrell Road LMC/60564181
Sample Matrix: Water

Service Request: R1804641
Date Analyzed: 05/25/18

Lab Control Sample Summary
General Chemistry Parameters

Units:mg/L
Basis:NA

Lab Control Sample
R1804641-LCS3

Analyte Name	Analytical Method	Result	Spike Amount	% Rec	% Rec Limits
Sulfate, Dissolved	9056A	2.02	2.00	101	80-120

Attachment B

PeroxyChem Klozur® KP Mixing Guidelines

Klozur® KP Application Guidelines

Klozur® KP is a high purity extended release grade of potassium persulfate. Klozur KP will persist in the subsurface for an extended period of time when applied at concentrations greater than its theoretical solubility. Klozur KP can be activated using PeroxyChem's patented technologies[1] to form powerful oxidative and reductive radicals that aggressively treat a wide array of targeted contaminants. PeroxyChem's persulfate activation technology is well established having been successfully applied in thousands of field applications and scientifically validated in hundreds of independent peer-reviewed journal articles and conference presentations.

Klozur KP is part of PeroxyChem's portfolio of persulfate-based oxidants includes Klozur SP, Klozur One, and Klozur CR. Klozur products are typically applied using an injection, soil mixing, or backfill strategies to establish contact between the activated persulfate and the contaminants of concern. This document will provide general application guidelines for Klozur KP. For more information on Klozur KP or other products in PeroxyChem's Klozur Portfolio, please visit www.klozur.com.

FIELD APPLICATIONS

Klozur KP is typically injected into the target zone as a solid-slurry mixture or applied directly as a solid amendment to an excavation, trench or with backfill. Klozur KP in the solid state will slowly dissolve maintaining a concentration of persulfate in groundwater over time. The solid state extended release Klozur KP is typically paired with a solid state extended release activator such as hydrated lime [$Ca(OH)_2$] or zero valent iron (ZVI). Hydrated lime can be added either directly with the Klozur KP or placed close by but downgradient. ZVI must be placed downgradient from Klozur KP as it cannot be safely mixed with the Klozur KP. In applications where aqueous phase activators are not expected to migrate with groundwater flow other activators can be used. For more information on each activation chemistry, please visit www.klozur.com or consult with your regional PeroxyChem representative.

SLURRY PREPARATION

Klozur KP is a fine granular product with a low solubility at typical injection temperatures (Table 1). In most applications it will not be fully soluble in water, and it will need to be prepared as a water-solid slurry. The slurry should be stirred until the entire product is suspended in solution. When batching any Klozur product, it is important to ensure that the tank, water, mixing equipment and any other parts that will contact the reagent solution are clean and devoid of impurities that might react with the oxidant. Klozur KP should be batched in systems where all wetted parts or parts that could become wetted are chemically compatible. Please refer to PeroxyChem's Technical Bulletin: *Corrosion and Material Compatibility with Klozur Persulfate*, which can be found at peroxychem.com/remediation, for a list of chemically compatible materials. A chemically compatible secondary containment is also recommended beneath the batching system.

Klozur KP slurries are typically prepared in small batches the day of the injection event for immediate use. PeroxyChem does not recommend making a Klozur KP slurry prior to the day of use or storing a Klozur KP slurry overnight (*See Tank and Pump Safety Note below). Mixing should take place in a chemically compatible tank, such as high-density polyethylene (HDPE), with a chemically compatible mechanical mixer composed of a material such as 304 or 316 stainless steel. Klozur KP will begin to decompose and generate acid if impurities such as metals are present in the make-up water or at elevated temperatures. PeroxyChem recommends that Klozur KP slurries be held no longer than 8 hours at cool temperatures (typically less than 20°C) and not exceed 30°C. Higher temperatures will result in decomposition.

Temperature	Klozur® KP	
(◦C)	(wt%)	(g/L)
0	1.6	17
10	2.6	29
20	4.5	47
25	5.7	59

Table 1: Solubility of Klozur KP in Water at Various Temperatures

TANK AND PUMP RECOMMENDATIONS

A Klozur KP slurry is typically prepared in a chemically compatible, vented tank. A tank with a conical bottom and bottom drain can aide in the removal of the slurry. The slurry within the tank should be under constant agitation until emptied. In addition to the main line to the injection network, a small recycle loop from the pump back into the tank will help prevent the accumulation of slurry contents that may be too high in solids or if the slurry begins to settle out at levels below the mechanical mixer. Near the very end of the tank cycle, the pump recycle line should be shut-off entirely to allow full flow forward via the pump to the injection point. All wetted parts in the injection system, including the tank, valves, flanges, gaskets, check valves, pumps, pipes, and gauges should be chemically compatible with Klozur KP and, as necessary, the activation chemistry.

Air-operated, positive displacement, self-priming double diaphragm pumps have been successfully used for the injection of 10 to 35 wt% Klozur KP. It is recommended that the double diaphragm pump with a minimum of 1 ½ inch inlet and outlet be used. A variety of these types of pumps are manufactured by Wilden® and Sandpiper®. All wetted parts of the pump and all parts in contact with Klozur KP must be constructed of or coated with materials compatible with oxidizers such as 304L or 316L stainless steel, polyethylene, polyvinylidene fluoride (PVDF) or polytetrafluoroethylene (PTFE or Teflon®).

TANK AND PUMP SAFETY NOTE*

Klozur KP may undergo decomposition if stored or handled improperly or if it comes into contact with impurities. Please refer to the Klozur KP Safety Data Sheet (SDS) and the Klozur Persulfate Safety and Handling Technical Bulletin available on PeroxyChem's website. Klozur persulfate slurries/solutions decompose auto-catalytically. Decomposition is a function of temperature, time, the presence of activators including transition metals, and exposure to incompatible materials.

All equipment, such as pumps, tanks, and hoses, MUST be cleaned out with a water flush at the end of every work day. This is to avoid potential pressure buildup due to decomposition and to reduce potential corrosion on equipment.

INJECTION OF KLOZUR KP

Klozur KP needs to be applied or injected in a manner that will allow for transport and distribution of the solid material into the subsurface. Klozur KP is injected at depth through rods are typically solid (blank) until reaching the intended depth where the reagents can flow through large orifices and out into the targeted interval of the subsurface. The reagents are then distributed into the subsurface for a certain radius of influence (ROI) depending upon the site characteristics and injection volume. As a solid-slurry, Klozur KP is typically applied through large orifice tooling at pressures sufficient to create fractures that aide distribution. Several contractors utilize specialized tooling for the injection of solid-slurries. The most common method used are based on Direct Push Technology (DPT).

If using DPT tooling, at each injection point the rods are initially advanced to the top (or bottom) of the targeted depth interval and a specified volume of slurry is injected before proceeding to the next depth. Using DPT tooling allows for targeting vertical injection intervals of approximately 1 to 3 ft (0.3 to 1.0 m). The preferred approach for the injections is often in the top-down direction using an injection tip that directs the slurry horizontally. However, different contractors may prefer to start at the bottom of the target interval (bottom-up approach) based on their specific tooling or an evaluation of site conditions.

Since carbon steel is the common material for DPT rods, most practitioners prefer to use alkaline activated Klozur persulfate to help minimize possible corrosion. Other steps to mitigate corrosion that are commonly taken include taping or otherwise protecting the rod threads with materials compatible with Klozur KP, and rinsing the rods after use and prior to storage. The rinse solution often includes a pH buffer, such as sodium bicarbonate, and a reactant such as a dilute alcohol or sodium ascorbate. PeroxyChem recommends coordinating with your DPT contractor to make sure they are using a chemically compatible system to inject Klozur KP.

Depending on the injection objectives, other common components that may be necessary in an injection system include flow meters, pressure gauges, pressure relief valves, temperature gauges, valves to open and close portions of the system (i.e. ball valves or equivalent), and valves to help moderate injection rates (i.e. gate valves or equivalent). If injecting into multiple locations simultaneously, multiple injection lines can be split off down gradient of the injection pump with each line typically having its own set of valves, gauges, and flow meters. All components of the injection system must be chemically compatible with Klozur KP and the activator chemistry.

Injection Spacing

Activated Klozur KP needs to be adequately distributed within the subsurface in order to establish sufficient contact with the contamination. The volume of reagents injected can be critical in terms of the distance from each injection point the reagents are distributed. This distance is commonly referred to as the radius of influence, or ROI.

There are typically three ROIs:

- Design ROI. The design ROI is the radius intended to be treated by each injection point. This can include the injection ROI, as well as additional distribution of the reagent due to diffusion and advection with groundwater flow after the injection event. Injection point spacing is often set so that the design ROIs overlap,

typically by 15 to 20 percent, which minimizes untreated areas and results in additional treatment of soils the furthest away from the injection points.

- Injection ROI. The injection ROI is a design parameter estimating the distance the injection volume will distribute the reagents from the injection point. For injection of solid-slurries, the injection ROI is often a result of injection pressure, flowrate, and the formation.

- Observed ROI. This is the actual ROI from an injection point confirmed in field optimization studies or field pilot tests. The observed ROI may vary vertically with different soil types and preferential flow paths even from the same injection point.

It is recommended that these parameters be evaluated during a pilot-scale test injection and that a flexible approach be used during a field installation as site conditions can vary. Based on experience from a range of sites for DPT, a design ROI of approximately 5 ft (1.5 m) to 6 ft (1.8 m) for each injection location and spacing injection locations 8 ft (2.4 m) to 12 ft (3.7 m) apart (on center) are typical. Specialized injection tooling has been observed to have ROIs of up to 20 ft (6 m), which would include spacing each injection location 30 (9 m) to 36 ft (11 m) apart (on center). Injection locations tend to be located in staggered rows with overlapping ROIs. PeroxyChem recommends discussing injection spacing with your selected contractor and confirming the observed ROI during a field application.

Soil acceptance may also vary greatly depending on the Klozur KP slurry concentration, site lithology and heterogeneity, ability to fracture the soil, and injection depth. As a general guideline the amount of Klozur KP accepted by soils in more permeable formations is approximately 100 lbs solids per vertical foot (150 kg/m). For less permeable formations, soil acceptance is approximately 50 lbs per vertical foot (75 kg/m). Another general rule that is often applied to estimating the mass of solids that can be added to a subsurface is to fill 10 percent of the pore volume with solids (v/v). The actual soil acceptance can be tested and confirmed in field pilot scale tests. If greater amounts of Klozur KP are required, a closer spacing of the injection locations, or smaller ROI, may need to be used or the slurry concentration can be increased, if possible.

Note: Significantly greater ROIs have been observed with certain fracturing techniques. Please contact PeroxyChem for further information regarding ROI monitoring and site observations.

Soil Mixing

Soil mixing is a common method of establishing contact between activated Klozur KP and contamination in the subsurface. A soil mixing strategy typically involves the mechanical agitation of subsurface soils blending in both Klozur KP and the necessary activator reagents. The mechanical agitation breaks apart the natural soil structure and helps to establish contact between activated Klozur persulfate and the contamination found in the soils. Since good contact is key for successful remediation and soil mixing can be particularly useful in treating source zones and lower permeable soils such as silts or clays. Klozur KP is typically applied at 1% to 5% w/w with the soil.

Soil mixing has been used to target:

- Source areas as the primary method of treatment

- To treat residual contamination after excavation as a secondary method of treatment
- Combined with *in situ* stabilization (ISS) and other technologies

Soil mixing equipment often contains carbon steel. Klozur KP, by itself, is corrosive to carbon steel. Most practitioners prefer alkaline activated persulfate for soil mixing as it helps protect the carbon steel mixing equipment. If interested in a soil mixing application, please contact your PeroxyChem Technical Representative or email remediation@peroxychem.com to discuss how to decrease the potential corrosion of the mixing equipment.

For more information, please refer to the *Klozur Persulfate Soil Mixing Recommendations and Applications Guidelines* document, which can be found at peroxychem.com/remediation.

Trench Application

Klozur KP can also be applied to a site in a trench. This method would be used to create a permeable reactive barrier and treat aqueous phase contamination. Trenches can be constructed using excavator tools or specialized trench tools that insert the reagent mixture into the subsurface as the trench is being created. The depth of a trench is limited by the tool used to create the trench. To maintain permeability, Klozur KP is typically blended with a highly conductive material such as sand. If the activator is added to the same trench as Klozur KP, the activator must be compatible. In the event that the activator and Klozur KP are not compatible, such as ZVI, then it is recommended that the Klozur KP be installed in a trench up gradient of a second trench containing the activator. In this case, the Klozur KP will dissolve and flow down gradient to be activated in the second trench.

Backfill Application

Absent any specific site information, a range of 1 to 4 lbs Klozur KP per square foot of the pit surface area, or approximately 5 to 20 Kg per square meter, is recommended during mixing as a polishing treatment for residual contamination. If the Klozur KP is to be blended with soil in the bottom of the excavation, 1 to 4 lbs Klozur KP per cubic foot or approximately 16 to 64 Kg per cubic meter, is recommended and should be combined with appropriate amounts of activator (see activation guides at www.klozur.com). Higher dosage rates are typically applied at sites with more extensive contaminant impacts, to offset uncertainty or variability in contaminant distribution, with higher groundwater flow velocities, or as otherwise desired. Lower dosage rates tend to be used for less contaminated sites.

Klozur KP can be applied as a backfill amendment in a variety of modes, including: 1) Directly applying the dry reagents to the base of the excavation and backfilling on top; 2) Applying directly to the base of the excavation and then using a device such as a mixing tool or excavator to blend the Klozur KP with the soil or soil slurry; or, 3) Blending Klozur KP and activator with additional backfill material and applying the combined material to the bottom of the excavation. When applying dry phase reagents, it is recommended that Klozur KP and activator be applied very close to or directly on the base of the excavation to minimize dusting and that all personnel be wearing proper personal protective equipment (PPE) as specified in the Klozur KP and selected activator SDS(s).

Klozur KP and activator are intended to be in hydrated conditions they rely on a sufficient amount of water to facilitate the treatment mechanism. Because of this, Klozur KP is intended to be applied as a backfill amendment in the saturated zone or in zones that will be saturated with water very shortly after the application. If Klozur KP is applied

as a dry reagent it should be wetted down and the area should be saturated with water so that the conditions will remain saturated for a sustained period of time.

OPTIMIZATION STUDIES: BENCH AND PILOT SCALE TESTS

Projects often include a series of tests to help develop and confirm a variety of design parameters and assumptions prior to the full-scale application of Klozur KP. PeroxyChem recommends performing bench scale tests to estimate the non-target demand associated with the soil and, if desired, to confirm the treatment effectiveness of different concentrations of Klozur KP with contaminated site soils and groundwater. The non-target demand test is a critical design element for Klozur KP. PeroxyChem refers to our non-target demand, or soil oxidant demand (SOD), test as the Klozur Demand Test (KDT). PeroxyChem has a full-service treatability laboratory to conduct bench scale studies using Klozur KP. More information on these lab tests is available from your PeroxyChem Technical Representative or by emailing remediation@peroxychem.com.

Field optimization studies or field pilot tests can be used to further assess the application of Klozur KP prior to a full-scale application. In addition to confirming treatment effectiveness, common objectives of these field evaluations include assessing injection pressures, flow rates, reagent distribution, and using the observed ROI to confirm the assumptions made in determining both the design and injection ROI.

STORAGE AND HANDLING

Klozur KP is a UN Class 5.1 oxidizer. It should be stored in a secure, cool and dry location. The temperature of Klozur KP should not exceed 45°C (113°F). PeroxyChem does not recommend storing Klozur KP in field conditions for extended periods of time. Do not store liquid solutions of Klozur KP. For more information on storage and handling, please see guidelines for persulfate at www.peroxychem.com/chemistries/persulfates/safe-storage-handling.

MATERIALS OF COMPATIBILITY

As specified by the safety data sheet (SDS), Klozur KP is a DOT class 5.1 oxidizer and a corrosive material. All materials contacting Klozur KP should be chemically compatible including tanks, pumps, injection rods, seals, gaskets, tubing, hoses, and mixing equipment.

Compatible materials include: stainless steel (304L and 316L), polyethylene (PE), polyvinylchloride (PVC), polytetrafluoroethylene (PTFE), Viton®, polyvinylidene fluoride (PVDF), and butyl rubber. Materials NOT compatible include, nitrile rubber, carbon steel, aluminum, brass, galvanized steel, or any other metal susceptible to corrosion. Compatibility may change based upon the combination of Klozur KP with its activator solution. Please refer to PeroxyChem's Corrosion and Material Compatibility of Klozur Persulfate Technical Bulletin for more detailed information, available at www.peroxychem.com/remediation.

HEALTH AND SAFETY

Klozur persulfate has been applied safely and effectively at thousands of sites. However, as with any chemical, proper procedures should be followed and recommended equipment used. When working with Klozur persulfate, ensure adequate ventilation and use the appropriate personal protective equipment, including safety glasses, suitable protective clothing, boots (steel toed or equivalent), chemical resistant gloves, hard hat, and hearing protection. For dust, splash, mist, or spray exposures wear a filtering dust mask and chemical protective goggles. A face shield can also be used in addition to goggles.

Please consult the appropriate safety data sheets (SDS) for guidelines regarding proper handling procedures. Klozur persulfate SDS's can be found at www.peroxychem.com/remediation. Additional safety equipment may be required for mechanical and site operations.

Please contact PeroxyChem for additional guidance.

Notes

1. A limited use license is included with the purchase of Klozur® Persulfate for PeroxyChem's suite of national and international patents for the activation of persulfate to remediate environmental contaminants of concern including US 6019548, US 6474908, US 7524141, US 7576254B2, US 7785038, and US 9375768B2.

Klozur is a registered trademark of PeroxyChem. © 2018 PeroxyChem. All rights reserved. Document 119-01-ESD-18 The information contained herein is presented to the best of our knowledge, PeroxyChem makes no representations or warranties regarding the accuracy, quality, or reliability of this information and shall under no circumstances be liable with respect to such information. Viton is a registered trademark of The Chemours Company. Sandpiper is a registered trademark of Warren Rupp, Inc. Wilden is a registered trademark of Wilden Pump & Engineering, Company, LLC.

Attachment C

United States Army Corp of Engineers
Nationwide Permit No. 38

DEPARTMENT OF THE ARMY
BUFFALO DISTRICT, CORPS OF ENGINEERS
1776 NIAGARA STREET
BUFFALO, NEW YORK 14207-3199

March 23, 2018

Regulatory Branch

SUBJECT: Application No. LRB-2015-01101, Nationwide Permit No. 38 as Published in the Federal Register, Volume 82, No. 4, on Friday, January 6, 2017, New York State Department of Environmental Conservation No. 7-3132-00135.

Ms. Jill Fonte
Lockheed Martin
Building EP-6, Room 100B
497 Electronic Parkway
Liverpool, New York 13088

Dear Ms. Fonte:

This pertains to your application for a Department of the Army (DA) permit to place a total of 3.8 cubic yards of bentonite and backfill into 100, 2.5-inch diameter bore holes within the forested wetland for the purposes of ground water remediation, resulting in 3.4 square feet of temporary wetland impacts, located at 241 Farrell Road, in the Town of Geddes, Onondaga County, New York.

I have evaluated the impacts associated with your proposal, and have concluded that they are authorized by the enclosed Nationwide Permit (NWP) provided that the attached conditions are satisfied.

Verification of the applicability of this NWP is valid until March 18, 2022 unless the NWP is modified, suspended, revoked, or the activity complies with any subsequent permit modification. Please note in accordance with 33 CFR part 330.6(b), that if you commence or are under contract to commence an activity in reliance of the permit prior to the date this NWP expires, is suspended or revoked, or is modified such that the activity no longer complies with the terms and conditions, you have twelve months from the date of permit modification, expiration, or revocation to complete the activity under the present terms and conditions of the permit, unless the permit has been subject to the provisions of discretionary authority.

It is your responsibility to remain informed of changes to the NWP program. A public notice announcing any changes will be issued when they occur and will be available for viewing at our website: http://www.lrb.usace.army.mil/Missions/Regulatory.aspx. Finally, note that if your activity is not undertaken within the defined period or the project specifications have changed, you must immediately notify this office to determine the need for further approval or reverification.

Regulatory Branch

SUBJECT: Application No. LRB-2015-01101, Nationwide Permit No. 38 as Published in the Federal Register, Volume 82, No. 4, on Friday, January 6, 2017, New York State Department of Environmental Conservation No. 7-3132-00135.

Your initiation of work as authorized by the enclosed Nationwide Permit acknowledges your acceptance of the general and special conditions contained therein. This affirmation is limited to the attached NWP and associated Water Quality Certification, and does not obviate the need to obtain any other project specific Federal, state, or local authorization. Specifically, you may need to obtain Article 15 (Protection of Water), Article 24 (Freshwater Wetland), and/or Article 34 (Coastal Erosion Management) authorization from the New York State DEC.

In addition to the general conditions attached to the NWP, your attention is directed to the following Special Conditions, which are hereby appended to the NWP:

1. To avoid any potential for direct effects to the Northern long-eared and Indiana bats from tree removal, clearing of trees ≥3 inches dbh is limited to the attached plans, and must only occur from October 1 to March 31 of any year.

2. Well and bore hole construction activities that result in a discharge of fill material into waters of the U.S., including wetlands, must only occur between August 15 and May 15, of any year.

Questions pertaining to this matter should be directed to me at 716-879-4308, by writing to the following address: U.S. Army Corps of Engineers, 1776 Niagara Street, Buffalo, New York 14207, or by e-mail at: Heather.L.Adams@usace.army.mil

Sincerely,

Heather Adams
Biologist

Enclosures

COMPLETION FORM / COMPLIANCE CERTIFICATION

Each permittee who receives a Nationwide Permit (NWP) verification letter from the Corps must provide a signed certification documenting completion of the authorized activity and any compensatory mitigation.

APPLICANT:	POINT OF CONTACT:	File No.: LRB-2015-01101
Lockheed Martin	Aecom	File Closed: 3/23/2018
Building EP-6, Room 100B	Suite 104	NWP No.: 38
497 Electronic Parkway	5015 Campuswood Drive	
Liverpool, NY 13088	East Syracuse, NY 13057	

Upon completion of the activity authorized by this permit and any required compensatory mitigation sign this certification and return it to the address listed below within 30 days of project completion.

Please note that your permitted activity is subject to a compliance inspection by a U.S. Army Corps of Engineers representative. If you fail to comply with this permit you are subject to permit suspension, modification, revocation, and/or assessment of administrative penalties.

The permittee shall certify the completion of the authorized work and mitigation:

a. The authorized work was done in accordance with the NWP authorization, including any general, regional, or activity specific conditions.

b. The implementation of any required compensatory mitigation was completed in accordance with the permit conditions. If credits from a mitigation bank or in-lieu fee program are used to satisfy the compensatory mitigation requirements, this certification must include the documentation required by 33 CFR 332.3(1)(3) to confirm that the permittee secured the appropriate number and resource type of credits.

_____ _____

APPLICANTS NAME Date

Permittee Telephone Number: _____

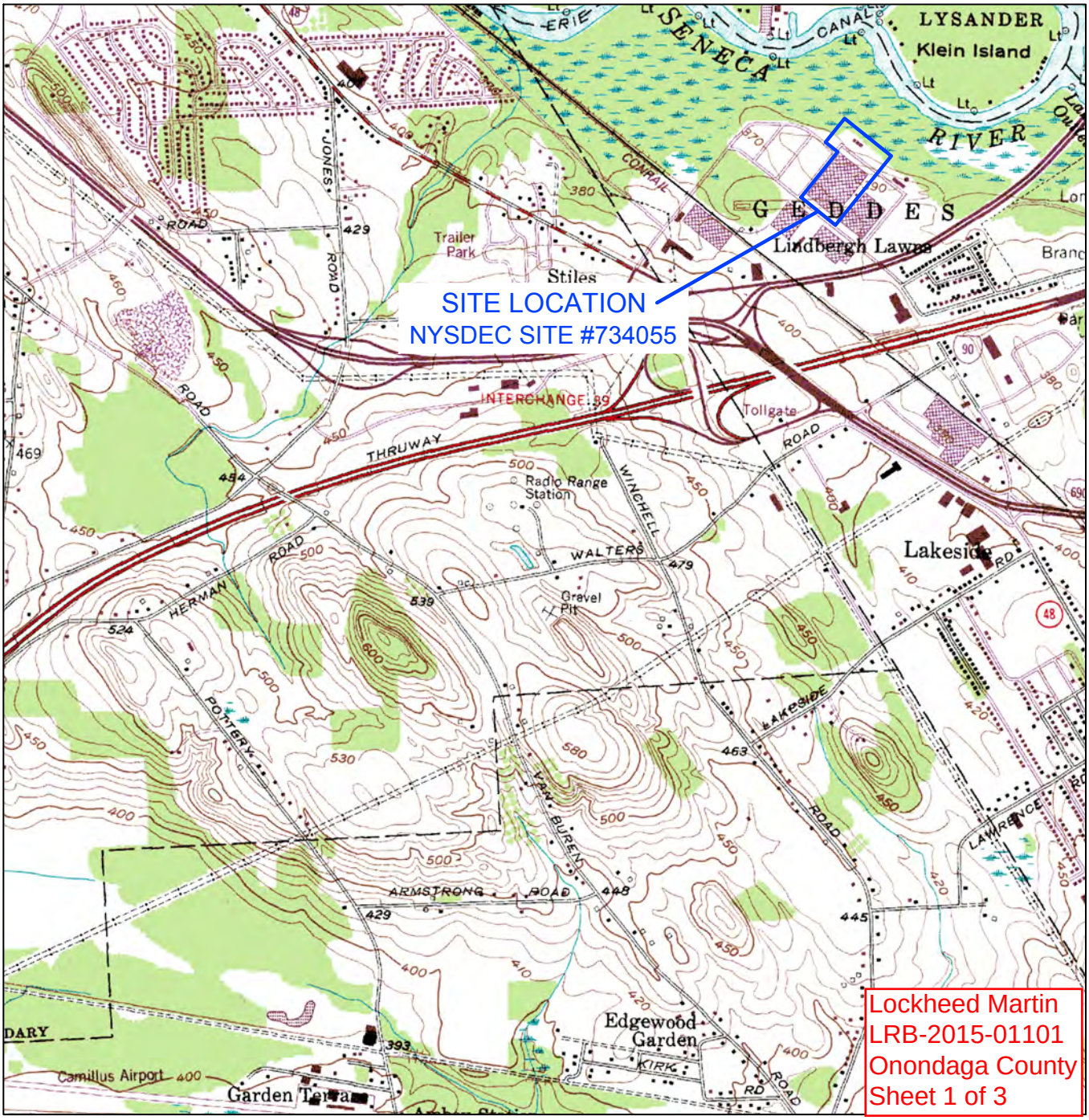
Project location: 241 Farrell Road, in the Town of Geddes, Onondaga County, New York

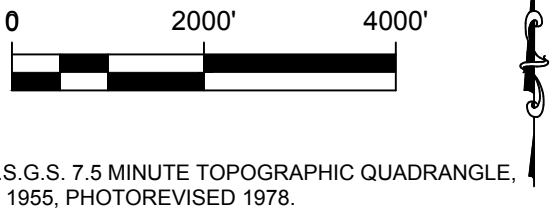
Project Description: to place a total of 3.8 cubic yards of bentonite and backfill into 100, 2.5-inch diameter bore holes within the forested wetland for the purposes of ground water remediation

Authorized Impacts (Waters of the U.S. Impacted by Project): 3.4-square feet of forested wetland

Waterway and/or Project Setting: unnamed forested wetlands along the Seneca River

Return completed form to:
Mr. David Leput
Regulatory Branch
U.S. Army Corps of Engineers
1776 Niagara Street
Buffalo, NY 14207





NOTE: MAP DERIVED FROM U.S.G.S. 7.5 MINUTE TOPOGRAPHIC QUADRANGLE, CAMILLUS, NY, DATED 1955, PHOTOREVISED 1978.

LOCKHEED MARTIN CORPORATION
FORMER G.E. FARRELL ROAD SITE
TOWN OF GEDDES, ONONDAGA COUNTY, NEW YORK
Project No.: 60518568 Date: DECEMBER 13, 2017

SITE LOCATION MAP

AECOM

Figure: 1

Project Management Initials: Designer: Checked: Approved: ANSI D 22" x 34"

Last saved by: BOOKASR(2018-03-15) Last Plotted: 2018-03-15
Filename: N:\MARKETING\PROPOSALS\LOCKHEED MARTIN - FARRELL ROAD\PROPOSED BORE HOLE LOCATIONS - 03-15-2018\FARRELL TREE PLAN WITH BORE HOLES_03-15-2018.DWG

DRAFT

WETLAND A
PEM

WETLAND A
PFO

PMW-1 PMW-2 PMW-3 PMW-4 PMW-5 PMW-6 PMW-7 PMW-9 PMW-10 PMW-11 PMW-12 PMW-13

MW-17 MW-18 MW-26D MW-26S MW-28 MW-29 MW-30

ML-1 ML-2 ML-3

PZ-1A PZ-1B PZ-2A PZ-2B PZ-3A PZ-3B PZ-4A

RW-4 RW-5 RW-6 RW-8 RW-9 RW-10 RW-11

TP-1 TP-2 TP-3

STAGING AREA

ELECTRIC CONDUITS
ENCOUNTERED DURING
SYSTEM INSTALLATION

0' 20' 40'
APPROXIMATE SCALE

REFERENCE:
SITE LAYOUT BASED ON SURVEY INFORMATION PROVIDED BY CNY LAND SURVEYING DRAWING, FARRELL ROAD TOPOGRAPHIC SURVEY AND MONITORING WELL LOCATIONS, DATED APRIL 2, 2016.

LEGEND

- MW-2 — MONITORING WELL LOCATION (PMW-1 THROUGH PMW-6, PMW-9 THROUGH PMW-13, AND PMW24 ARE DEEP, INTERMEDIATE AND SHALLOW-SCREENED SETS OF WELLS.)
- RW-4 — GROUNDWATER EXTRACTION WELL LOCATION
- ML-1 — CONTINUOUS MULTICHAMBER TUBING (CMT) WELLS
- PZ-2A — PIEZOMETER LOCATION
- 241 FARRELL ROAD - 16.6 ACRES SITE BOUNDARY AS DEFINED IN APRIL 26, 2012 NYSDEC CORRESPONDENCE (REFER TO INTERIM SITE MANAGEMENT PLAN, JULY 25, 2017)
- WIDEWATERS PROPERTY
- 370 — TOPOGRAPHIC CONTOUR
- CHAINLINK FENCE
- E — SUBGRADE SYSTEM PIPING FOR THE GROUNDWATER EXTRACTION TREATMENT SYSTEM
- ST — STORM SEWER LINE
- TRENCH OUTLINE
- WETLAND AREA DELINEATED IN MAY 2017
- PEM — PALUSTRINE EMERGENT
- PFO — PALUSTRINE FORESTED
- T600 — TREE
- T608 — PROPOSED WETLAND TREES FOR TENTATIVE REMOVAL
- PROPOSED WORK AREA
- PROPOSED WETLAND CONSTRUCTION MAT ACCESS ROAD LOCATION
- PROPOSED BORE HOLE LOCATION

PROPOSED TOTAL: 100 BORE HOLES
ESTIMATED DEPTH: 30 FEET
ESTIMATED DIAMETER: 2.5 INCHES
ESTIMATED SQUARE FOOTAGE OF BORE HOLES AT SURFACE: 3.4 FT2
ESTIMATED ACREAGE OF BORE HOLES AT SURFACE: 0.000078 ACRES

NOTES:

1. HORIZONTAL DATUM IS BASED ON NEW YORK STATE PLANE COORDINATES (CENTRAL ZONE).
2. VERTICAL INFORMATION SHOWN IS BASED ON NAVD1929 DATUM.
3. PROPERTY LINES SHOWN ARE BASED ON A MAP ENTITLED RESUBDIVISION OF LOT 1 & 2 - WIDEWATERS-SYROCO SUBDIVISION INTO LOTS 1A &2A - WIDEWATERS-SYROCO SUBDIVISION, PART OF LOTS 2, 3, 4 &5 - TOWN OF GEDDES, ONONDAGA COUNTY, NEW YORK, PREPARED BY D. W. HANNIG L.S., P.C. DATED JANUARY 6, 2016.

Lockheed Martin
LRB-2015-01101
Onondaga County
Sheet 2 of 3

AECOM

Figure: 5

PROPOSED BORE HOLE LOCATION MAP

LOCKHEED MARTIN CORPORATION
FORMER G.E. FARRELL ROAD SITE
TOWN OF GEDDES, ONONDAGA COUNTY, NEW YORK
Project No.: 60518568 MARCH 15, 2018

Project Management Initials: Designer: Checked: Approved: ANSI D 22" x 34"

Last saved by: BOOKASR(2018-03-20) Last Plotted: 2018-03-20
Filename: N:\MARKETING\PROPOSALS\LOCKHEED MARTIN - FARRELL ROAD\PROPOSED BORE HOLE LOCATIONS - 03-15-2018\FARRELL TREE PLAN WITH BORE HOLES_03-20-2018.DWG

WETLAND A
PEM

WETLAND A
PFO

PMW-1 PMW-2 PMW-3 PMW-4 PMW-5 PMW-6 PMW-7 PMW-9 PMW-10 PMW-11 PMW-12 PMW-13

MW-17 MW-18 MW-26D MW-26S MW-28 MW-29 MW-30

ML-1 ML-2 ML-3

PZ-1A PZ-1B PZ-2A PZ-2B PZ-3A PZ-3B PZ-4A

RW-4 RW-5 RW-6 RW-8 RW-9 RW-10 RW-11

TP-1 TP-2 TP-3

STAGING AREA

ELECTRIC CONDUITS
ENCOUNTERED DURING
SYSTEM INSTALLATION

0' 20' 40'
APPROXIMATE SCALE

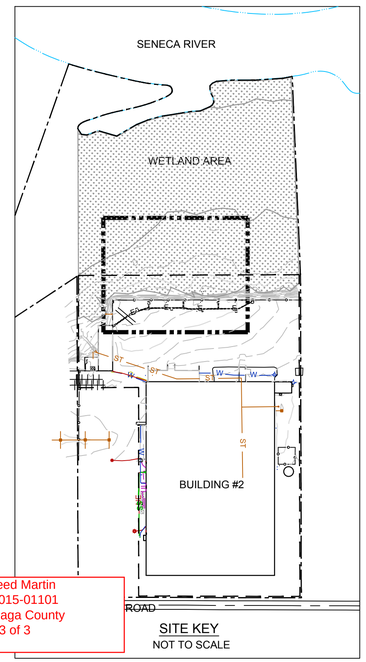
REFERENCE:
SITE LAYOUT BASED ON SURVEY INFORMATION PROVIDED BY CNY LAND SURVEYING DRAWING, FARRELL ROAD TOPOGRAPHIC SURVEY AND MONITORING WELL LOCATIONS, DATED APRIL 2, 2016.

LEGEND

- MW-2 — MONITORING WELL LOCATION (PMW-1 THROUGH PMW-6, PMW-9 THROUGH PMW-13, AND PMW24 ARE DEEP, INTERMEDIATE AND SHALLOW-SCREENED SETS OF WELLS.)
- RW-4 — GROUNDWATER EXTRACTION WELL LOCATION
- ML-1 — CONTINUOUS MULTICHAMBER TUBING (CMT) WELLS
- PZ-2A — PIEZOMETER LOCATION
- 241 FARRELL ROAD - 16.6 ACRES SITE BOUNDARY AS DEFINED IN APRIL 26, 2012 NYSDEC CORRESPONDENCE (REFER TO INTERIM SITE MANAGEMENT PLAN, JULY 25, 2017)
- WIDEWATERS PROPERTY
- 370 — TOPOGRAPHIC CONTOUR
- CHAINLINK FENCE
- E — SUBGRADE SYSTEM PIPING FOR THE GROUNDWATER EXTRACTION TREATMENT SYSTEM
- ST — STORM SEWER LINE
- TRENCH OUTLINE
- WETLAND AREA DELINEATED IN MAY 2017
- PEM — PALUSTRINE EMERGENT
- PFO — PALUSTRINE FORESTED
- T600 — TREE
- T608 — PROPOSED WETLAND TREES FOR TENTATIVE REMOVAL
- T464 — POTENTIAL PRIMARY ROOSTING TREE - NO REMOVAL
- PROPOSED WORK AREA
- PROPOSED WETLAND CONSTRUCTION MAT ACCESS ROAD LOCATION

NOTES:

1. HORIZONTAL DATUM IS BASED ON NEW YORK STATE PLANE COORDINATES (CENTRAL ZONE).
2. VERTICAL INFORMATION SHOWN IS BASED ON NAVD1929 DATUM.
3. PROPERTY LINES SHOWN ARE BASED ON A MAP ENTITLED RESUBDIVISION OF LOT 1 & 2 - WIDEWATERS-SYROCO SUBDIVISION INTO LOTS 1A &2A - WIDEWATERS-SYROCO SUBDIVISION, PART OF LOTS 2, 3, 4 &5 - TOWN OF GEDDES, ONONDAGA COUNTY, NEW YORK. PREPARED BY D. W. HANNIG L.S., P.C. DATED JANUARY 6, 2016.



Lockheed Martin
LRB-2015-01101
Onondaga County
Sheet 3 of 3

AECOM

Figure: 1

PROPOSED WETLAND ACCESS ROAD AND TREES FOR REMOVAL

LOCKHEED MARTIN CORPORATION
FORMER G.E. FARRELL ROAD SITE
TOWN OF GEDDES, ONONDAGA COUNTY, NEW YORK
Project No.: 60518568 MARCH 20, 2018

ACTIVITIES AUTHORIZED BY 2017 NATIONWIDE PERMIT
WITHIN THE STATE OF NEW YORK
Expiration March 18, 2022

B. Nationwide Permits

38. Cleanup of Hazardous and Toxic Waste. Specific activities required to effect the containment, stabilization, or removal of hazardous or toxic waste materials that are performed, ordered, or sponsored by a government agency with established legal or regulatory authority. Court ordered remedial action plans or related settlements are also authorized by this NWP. This NWP does not authorize the establishment of new disposal sites or the expansion of existing sites used for the disposal of hazardous or toxic waste.

Notification: The permittee must submit a pre-construction notification to the district engineer prior to commencing the activity. (See general condition 32.) (Authorities: Sections 10 and 404)

Note: Activities undertaken entirely on a Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) site by authority of CERCLA as approved or required by EPA, are not required to obtain permits under Section 404 of the Clean Water Act or Section 10 of the Rivers and Harbors Act.

Buffalo District Only Permit-specific Regional Conditions: None

Section 401 Water Quality Certification:
The New York State Department of Environmental Conservation (NYSDEC) has denied Section 401 Water Quality Certification in New York State for this Nationwide Permit. Any party conducting the activities authorized by this NWP must apply for and obtain an individual Section 401 Water Quality Certification from the New York State Department of Environmental Conservation.

New York State Department of State Coastal Zone Management Consistency Determination:
Pursuant to 15 CFR Part 930.41 and 930.43, the New York State Department of State (NYSDOS) concurs with the USACE consistency determination for this NWP where the activities would occur outside of the New York City Waterfront Revitalization Program.

For activities that are proposed within the New York City Waterfront Revitalization Program, the NYSDOS objects to the USACE' consistency determination and therefore, an individual consistency concurrence determination from NYSDOS is required for this NWP to be valid. See Section I below for further information.

C. Nationwide Permit General Conditions

Note: To qualify for NWP authorization, the prospective permittee must comply with the following general conditions, as applicable, in addition to any regional or case-specific conditions imposed by the division engineer or district engineer. Prospective permittees should contact the appropriate Corps district office to determine if regional conditions have been imposed on an NWP. Prospective permittees should also contact the appropriate Corps district

office to determine the status of Clean Water Act Section 401 water quality certification and/or Coastal Zone Management Act consistency for an NWP. Every person who may wish to obtain permit authorization under one or more NWPs, or who is currently relying on an existing or prior permit authorization under one or more NWPs, has been and is on notice that all of the provisions of 33 CFR 330.1 through 330.6 apply to every NWP authorization. Note especially 33 CFR 330.5 relating to the modification, suspension, or revocation of any NWP authorization.

1. Navigation. (a) No activity may cause more than a minimal adverse effect on navigation.

(b) Any safety lights and signals prescribed by the U.S. Coast Guard, through regulations or otherwise, must be installed and maintained at the permittee's expense on authorized facilities in navigable waters of the United States.

(c) The permittee understands and agrees that, if future operations by the United States require the removal, relocation, or other alteration, of the structure or work herein authorized, or if, in the opinion of the Secretary of the Army or his authorized representative, said structure or work shall cause unreasonable obstruction to the free navigation of the navigable waters, the permittee will be required, upon due notice from the Corps of Engineers, to remove, relocate, or alter the structural work or obstructions caused thereby, without expense to the United States. No claim shall be made against the United States on account of any such removal or alteration.

2. Aquatic Life Movements. No activity may substantially disrupt the necessary life cycle movements of those species of aquatic life indigenous to the waterbody, including those species that normally migrate through the area, unless the activity's primary purpose is to impound water. All permanent and temporary crossings of waterbodies shall be suitably culverted, bridged, or otherwise designed and constructed to maintain low flows to sustain the movement of those aquatic species. If a bottomless culvert cannot be used, then the crossing should be designed and constructed to minimize adverse effects to aquatic life movements.

3. Spawning Areas. Activities in spawning areas during spawning seasons must be avoided to the maximum extent practicable. Activities that result in the physical destruction (e.g., through excavation, fill, or downstream smothering by substantial turbidity) of an important spawning area are not authorized.

4. Migratory Bird Breeding Areas. Activities in waters of the United States that serve as breeding areas for migratory birds must be avoided to the maximum extent practicable.

5. Shellfish Beds. No activity may occur in areas of concentrated shellfish populations, unless the activity is directly related to a shellfish harvesting activity authorized by NWPs 4 and 48, or is a shellfish seeding or habitat restoration activity authorized by NWP 27.

6. Suitable Material. No activity may use unsuitable material (e.g., trash, debris, car bodies, asphalt, etc.). Material used for construction or discharged must be free from toxic pollutants in toxic amounts (see section 307 of the Clean Water Act).

7. Water Supply Intakes. No activity may occur in the proximity of a public water supply intake, except where the activity is for the repair or improvement of public water supply intake structures or adjacent bank stabilization.

8. Adverse Effects From Impoundments. If the activity creates an impoundment of water, adverse effects to the aquatic system due to accelerating the passage of water, and/or restricting its flow must be minimized to the maximum extent practicable.

9. Management of Water Flows. To the maximum extent practicable, the pre-construction course, condition, capacity, and location of open waters must be maintained for each activity, including stream channelization, storm water management activities, and temporary and permanent road crossings, except as provided below. The activity must be constructed to withstand expected high flows. The activity must not restrict or impede the passage of normal or high flows, unless the primary purpose of the activity is to impound water or manage high flows. The activity may alter the pre-construction course, condition, capacity, and location of open waters if it benefits the aquatic environment (e.g., stream restoration or relocation activities).

10. Fills Within 100-Year Floodplains. The activity must comply with applicable FEMA-approved state or local floodplain management requirements.

11. Equipment. Heavy equipment working in wetlands or mudflats must be placed on mats, or other measures must be taken to minimize soil disturbance.

12. Soil Erosion and Sediment Controls. Appropriate soil erosion and sediment controls must be used and maintained in effective operating condition during construction, and all exposed soil and other fills, as well as any work below the ordinary high water mark or high tide line, must be permanently stabilized at the earliest practicable date. Permittees are encouraged to perform work within waters of the United States during periods of low-flow or no-flow, or during low tides.

13. Removal of Temporary Fills. Temporary fills must be removed in their entirety and the affected areas returned to pre-construction elevations. The affected areas must be revegetated, as appropriate.

14. Proper Maintenance. Any authorized structure or fill shall be properly maintained, including maintenance to ensure public safety and compliance with applicable NWP general conditions, as well as any activity-specific conditions added by the district engineer to an NWP authorization.

15. Single and Complete Project. The activity must be a single and complete project. The same NWP cannot be used more than once for the same single and complete project.

16. Wild and Scenic Rivers. (a) No NWP activity may occur in a component of the National Wild and Scenic River System, or in a river officially designated by Congress as a "study river" for possible inclusion in the system while the river is in an official study status, unless the appropriate Federal agency with direct management responsibility for such river, has determined in writing that the proposed activity will not adversely affect the Wild and Scenic River designation or study status.

(b) If a proposed NWP activity will occur in a component of the National Wild and Scenic River System, or in a river officially designated by Congress as a "study river" for possible inclusion in the system while the river is in an official study status, the permittee must submit a pre-construction notification (see general condition 32). The district engineer will coordinate the PCN with the Federal agency with direct management responsibility for that river. The permittee shall not begin the NWP activity until notified by the district engineer that the Federal agency with direct management responsibility for that river has determined in writing that the proposed NWP activity will not adversely affect the Wild and Scenic River designation or study status.

(c) Information on Wild and Scenic Rivers may be obtained from the appropriate Federal land management agency responsible for the designated Wild and Scenic River or study river (e.g., National Park Service, U.S. Forest Service, Bureau of Land Management, U.S. Fish and Wildlife Service). Information on these rivers is also available at: http://www.rivers.gov/.

17. Tribal Rights. No NWP activity may cause more than minimal adverse effects on tribal rights (including treaty rights), protected tribal resources, or tribal lands.

18. Endangered Species. (a) No activity is authorized under any NWP which is likely to directly or indirectly jeopardize the continued existence of a threatened or endangered species or a species proposed for such designation, as identified under the Federal Endangered Species Act (ESA), or which will directly or indirectly destroy or adversely modify the critical habitat of such species. No activity is authorized under any NWP which "may affect" a listed species or critical habitat, unless ESA section 7 consultation addressing the effects of the proposed activity has been completed. Direct effects are the immediate effects on listed species and critical habitat caused by the NWP activity. Indirect effects are those effects on listed species and critical habitat that are caused by the NWP activity and are later in time, but still are reasonably certain to occur.

(b) Federal agencies should follow their own procedures for complying with the requirements of the ESA. If pre-construction notification is required for the proposed activity, the Federal permittee must provide the district engineer with the appropriate documentation to demonstrate compliance with those requirements. The district

engineer will verify that the appropriate documentation has been submitted. If the appropriate documentation has not been submitted, additional ESA section 7 consultation may be necessary for the activity and the respective federal agency would be responsible for fulfilling its obligation under section 7 of the ESA.

(c) Non-federal permittees must submit a pre-construction notification to the district engineer if any listed species or designated critical habitat might be affected or is in the vicinity of the activity, or if the activity is located in designated critical habitat, and shall not begin work on the activity until notified by the district engineer that the requirements of the ESA have been satisfied and that the activity is authorized. For activities that might affect Federally-listed endangered or threatened species or designated critical habitat, the pre-construction notification must include the name(s) of the endangered or threatened species that might be affected by the proposed activity or that utilize the designated critical habitat that might be affected by the proposed activity. The district engineer will determine whether the proposed activity "may affect" or will have "no effect" to listed species and designated critical habitat and will notify the non-Federal applicant of the Corps' determination within 45 days of receipt of a complete pre-construction notification. In cases where the non-Federal applicant has identified listed species or critical habitat that might be affected or is in the vicinity of the activity, and has so notified the Corps, the applicant shall not begin work until the Corps has provided notification that the proposed activity will have "no effect" on listed species or critical habitat, or until ESA section 7 consultation has been completed. If the non-Federal applicant has not heard back from the Corps within 45 days, the applicant must still wait for notification from the Corps.

(d) As a result of formal or informal consultation with the FWS or NMFS the district engineer may add species-specific permit conditions to the NWPs.

(e) Authorization of an activity by an NWP does not authorize the "take" of a threatened or endangered species as defined under the ESA. In the absence of separate authorization (e.g., an ESA Section 10 Permit, a Biological Opinion with "incidental take" provisions, etc.) from the FWS or the NMFS, the Endangered Species Act prohibits any person subject to the jurisdiction of the United States to take a listed species, where "take" means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. The word "harm" in the definition of "take" means an act which actually kills or injures wildlife. Such an act may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding or sheltering.

(f) If the non-federal permittee has a valid ESA section 10(a)(1)(B) incidental take permit with an approved Habitat Conservation Plan for a project or a group of projects that includes the proposed NWP activity, the non-federal applicant should provide a copy of that ESA section 10(a)(1)(B) permit with the PCN required by paragraph (c) of this general condition. The district engineer will coordinate with the agency that issued the ESA section 10(a)(1)(B) permit to determine whether the proposed NWP activity and the associated incidental take were considered in the internal ESA section 7 consultation conducted for the ESA section 10(a)(1)(B) permit. If that coordination results in concurrence from the agency that the proposed NWP activity and the associated incidental take were considered in the internal ESA section 7 consultation for the ESA section 10(a)(1)(B) permit, the district engineer does not need to conduct a separate ESA section 7 consultation for the proposed NWP activity. The district engineer will notify the non-federal applicant within 45 days of receipt of a complete pre-construction notification whether the ESA section 10(a)(1)(B) permit covers the proposed NWP activity or whether additional ESA section 7 consultation is required.

(g) Information on the location of threatened and endangered species and their critical habitat can be obtained directly from the offices of the FWS and NMFS or their world wide web pages at http://www.fws.gov/ or http://www.fws.gov/ipac and http://www.nmfs.noaa.gov/pr/species/esa/ respectively.

19. Migratory Birds and Bald and Golden Eagles. The permittee is responsible for ensuring their action complies with the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act. The permittee is responsible for contacting appropriate local office of the U.S. Fish and Wildlife Service to determine applicable measures to reduce impacts to migratory birds or eagles, including whether "incidental take" permits are necessary and available under the Migratory Bird Treaty Act or Bald and Golden Eagle Protection Act for a particular activity.

20. Historic Properties. (a) In cases where the district engineer determines that the activity may have the potential to cause effects to properties listed, or eligible for listing, in the National Register of Historic Places, the

activity is not authorized, until the requirements of Section 106 of the National Historic Preservation Act (NHPA) have been satisfied.

(b) Federal permittees should follow their own procedures for complying with the requirements of section 106 of the National Historic Preservation Act. If pre-construction notification is required for the proposed NWP activity, the Federal permittee must provide the district engineer with the appropriate documentation to demonstrate compliance with those requirements. The district engineer will verify that the appropriate documentation has been submitted. If the appropriate documentation is not submitted, then additional consultation under section 106 may be necessary. The respective federal agency is responsible for fulfilling its obligation to comply with section 106.

(c) Non-federal permittees must submit a pre-construction notification to the district engineer if the NWP activity might have the potential to cause effects to any historic properties listed on, determined to be eligible for listing on, or potentially eligible for listing on the National Register of Historic Places, including previously unidentified properties. For such activities, the pre-construction notification must state which historic properties might have the potential to be affected by the proposed NWP activity or include a vicinity map indicating the location of the historic properties or the potential for the presence of historic properties. Assistance regarding information on the location of, or potential for, the presence of historic properties can be sought from the State Historic Preservation Officer, Tribal Historic Preservation Officer, or designated tribal representative, as appropriate, and the National Register of Historic Places (see 33 CFR 330.4(g)). When reviewing pre-construction notifications, district engineers will comply with the current procedures for addressing the requirements of section 106 of the National Historic Preservation Act. The district engineer shall make a reasonable and good faith effort to carry out appropriate identification efforts, which may include background research, consultation, oral history interviews, sample field investigation, and field survey. Based on the information submitted in the PCN and these identification efforts, the district engineer shall determine whether the proposed NWP activity has the potential to cause effects on the historic properties. Section 106 consultation is not required when the district engineer determines that the activity does not have the potential to cause effects on historic properties (see 36 CFR 800.3(a)). Section 106 consultation is required when the district engineer determines that the activity has the potential to cause effects on historic properties. The district engineer will conduct consultation with consulting parties identified under 36 CFR 800.2(c) when he or she makes any of the following effect determinations for the purposes of section 106 of the NHPA: no historic properties affected, no adverse effect, or adverse effect. Where the non-Federal applicant has identified historic properties on which the activity might have the potential to cause effects and so notified the Corps, the non-Federal applicant shall not begin the activity until notified by the district engineer either that the activity has no potential to cause effects to historic properties or that NHPA section 106 consultation has been completed.

(d) For non-federal permittees, the district engineer will notify the prospective permittee within 45 days of receipt of a complete pre-construction notification whether NHPA section 106 consultation is required. If NHPA section 106 consultation is required, the district engineer will notify the non-Federal applicant that he or she cannot begin the activity until section 106 consultation is completed. If the non-Federal applicant has not heard back from the Corps within 45 days, the applicant must still wait for notification from the Corps.

(e) Prospective permittees should be aware that section 110k of the NHPA (54 U.S.C. 306113) prevents the Corps from granting a permit or other assistance to an applicant who, with intent to avoid the requirements of section 106 of the NHPA, has intentionally significantly adversely affected a historic property to which the permit would relate, or having legal power to prevent it, allowed such significant adverse effect to occur, unless the Corps, after consultation with the Advisory Council on Historic Preservation (ACHP), determines that circumstances justify granting such assistance despite the adverse effect created or permitted by the applicant. If circumstances justify granting the assistance, the Corps is required to notify the ACHP and provide documentation specifying the circumstances, the degree of damage to the integrity of any historic properties affected, and proposed mitigation. This documentation must include any views obtained from the applicant, SHPO/THPO, appropriate Indian tribes if the undertaking occurs on or affects historic properties on tribal lands or affects properties of interest to those tribes, and other parties known to have a legitimate interest in the impacts to the permitted activity on historic properties.

21. Discovery of Previously Unknown Remains and Artifacts. If you discover any previously unknown historic, cultural or archeological remains and artifacts while accomplishing the activity authorized by this permit, you must immediately notify the district engineer of what you have found, and to the maximum extent practicable,

avoid construction activities that may affect the remains and artifacts until the required coordination has been completed. The district engineer will initiate the Federal, Tribal, and state coordination required to determine if the items or remains warrant a recovery effort or if the site is eligible for listing in the National Register of Historic Places.

22. Designated Critical Resource Waters. Critical resource waters include, NOAA-managed marine sanctuaries and marine monuments, and National Estuarine Research Reserves. The district engineer may designate, after notice and opportunity for public comment, additional waters officially designated by a state as having particular environmental or ecological significance, such as outstanding national resource waters or state natural heritage sites. The district engineer may also designate additional critical resource waters after notice and opportunity for public comment.

(a) Discharges of dredged or fill material into waters of the United States are not authorized by NWPs 7, 12, 14, 16, 17, 21, 29, 31, 35, 39, 40, 42, 43, 44, 49, 50, 51, and 52 for any activity within, or directly affecting, critical resource waters, including wetlands adjacent to such waters.

(b) For NWPs 3, 8, 10, 13, 15, 18, 19, 22, 23, 25, 27, 28, 30, 33, 34, 36, 37, 38, and 54, notification is required in accordance with general condition 32, for any activity proposed in the designated critical resource waters including wetlands adjacent to those waters. The district engineer may authorize activities under these NWPs only after it is determined that the impacts to the critical resource waters will be no more than minimal.

23. Mitigation. The district engineer will consider the following factors when determining appropriate and practicable mitigation necessary to ensure that the individual and cumulative adverse environmental effects are no more than minimal:

(a) The activity must be designed and constructed to avoid and minimize adverse effects, both temporary and permanent, to waters of the United States to the maximum extent practicable at the project site (i.e., on site).

(b) Mitigation in all its forms (avoiding, minimizing, rectifying, reducing, or compensating for resource losses) will be required to the extent necessary to ensure that the individual and cumulative adverse environmental effects are no more than minimal.

(c) Compensatory mitigation at a minimum one-for-one ratio will be required for all wetland losses that exceed 1/10-acre and require pre-construction notification, unless the district engineer determines in writing that either some other form of mitigation would be more environmentally appropriate or the adverse environmental effects of the proposed activity are no more than minimal, and provides an activity-specific waiver of this requirement. For wetland losses of 1/10-acre or less that require pre-construction notification, the district engineer may determine on a case-by-case basis that compensatory mitigation is required to ensure that the activity results in only minimal adverse environmental effects.

(d) For losses of streams or other open waters that require pre-construction notification, the district engineer may require compensatory mitigation to ensure that the activity results in no more than minimal adverse environmental effects. Compensatory mitigation for losses of streams should be provided, if practicable, through stream rehabilitation, enhancement, or preservation, since streams are difficult-to-replace resources (see 33 CFR 332.3(e)(3)).

(e) Compensatory mitigation plans for NWP activities in or near streams or other open waters will normally include a requirement for the restoration or enhancement, maintenance, and legal protection (e.g., conservation easements) of riparian areas next to open waters. In some cases, the restoration or maintenance/protection of riparian areas may be the only compensatory mitigation required. Restored riparian areas should consist of native species. The width of the required riparian area will address documented water quality or aquatic habitat loss concerns. Normally, the riparian area will be 25 to 50 feet wide on each side of the stream, but the district engineer may require slightly wider riparian areas to address documented water quality or habitat loss concerns. If it is not possible to restore or maintain/protect a riparian area on both sides of a stream, or if the waterbody is a lake or coastal waters, then restoring or maintaining/protecting a riparian area along a single bank or shoreline may be sufficient. Where both wetlands and open waters exist on the project site, the district engineer will determine the appropriate

compensatory mitigation (e.g., riparian areas and/or wetlands compensation) based on what is best for the aquatic environment on a watershed basis. In cases where riparian areas are determined to be the most appropriate form of minimization or compensatory mitigation, the district engineer may waive or reduce the requirement to provide wetland compensatory mitigation for wetland losses.

(f) Compensatory mitigation projects provided to offset losses of aquatic resources must comply with the applicable provisions of 33 CFR part 332.

(1) The prospective permittee is responsible for proposing an appropriate compensatory mitigation option if compensatory mitigation is necessary to ensure that the activity results in no more than minimal adverse environmental effects. For the NWPs, the preferred mechanism for providing compensatory mitigation is mitigation bank credits or in-lieu fee program credits (see 33 CFR 332.3(b)(2) and (3)). However, if an appropriate number and type of mitigation bank or in-lieu credits are not available at the time the PCN is submitted to the district engineer, the district engineer may approve the use of permittee-responsible mitigation.

(2) The amount of compensatory mitigation required by the district engineer must be sufficient to ensure that the authorized activity results in no more than minimal individual and cumulative adverse environmental effects (see 33 CFR 330.1(e)(3)). (See also 33 CFR 332.3(f)).

(3) Since the likelihood of success is greater and the impacts to potentially valuable uplands are reduced, aquatic resource restoration should be the first compensatory mitigation option considered for permittee-responsible mitigation.

(4) If permittee-responsible mitigation is the proposed option, the prospective permittee is responsible for submitting a mitigation plan. A conceptual or detailed mitigation plan may be used by the district engineer to make the decision on the NWP verification request, but a final mitigation plan that addresses the applicable requirements of 33 CFR 332.4(c)(2) through (14) must be approved by the district engineer before the permittee begins work in waters of the United States, unless the district engineer determines that prior approval of the final mitigation plan is not practicable or not necessary to ensure timely completion of the required compensatory mitigation (see 33 CFR 332.3(k)(3)).

(5) If mitigation bank or in-lieu fee program credits are the proposed option, the mitigation plan only needs to address the baseline conditions at the impact site and the number of credits to be provided.

(6) Compensatory mitigation requirements (e.g., resource type and amount to be provided as compensatory mitigation, site protection, ecological performance standards, monitoring requirements) may be addressed through conditions added to the NWP authorization, instead of components of a compensatory mitigation plan (see 33 CFR 332.4(c)(1)(ii)).

(g) Compensatory mitigation will not be used to increase the acreage losses allowed by the acreage limits of the NWPs. For example, if an NWP has an acreage limit of 1/2-acre, it cannot be used to authorize any NWP activity resulting in the loss of greater than 1/2-acre of waters of the United States, even if compensatory mitigation is provided that replaces or restores some of the lost waters. However, compensatory mitigation can and should be used, as necessary, to ensure that an NWP activity already meeting the established acreage limits also satisfies the no more than minimal impact requirement for the NWPs.

(h) Permittees may propose the use of mitigation banks, in-lieu fee programs, or permittee-responsible mitigation. When developing a compensatory mitigation proposal, the permittee must consider appropriate and practicable options consistent with the framework at 33 CFR 332.3(b). For activities resulting in the loss of marine or estuarine resources, permittee-responsible mitigation may be environmentally preferable if there are no mitigation banks or in-lieu fee programs in the area that have marine or estuarine credits available for sale or transfer to the permittee. For permittee-responsible mitigation, the special conditions of the NWP verification must clearly indicate the party or parties responsible for the implementation and performance of the compensatory mitigation project, and, if required, its long-term management.

(i) Where certain functions and services of waters of the United States are permanently adversely affected by a regulated activity, such as discharges of dredged or fill material into waters of the United States that will convert a forested or scrub-shrub wetland to a herbaceous wetland in a permanently maintained utility line right-of-way, mitigation may be required to reduce the adverse environmental effects of the activity to the no more than minimal level.

24. Safety of Impoundment Structures. To ensure that all impoundment structures are safely designed, the district engineer may require non-Federal applicants to demonstrate that the structures comply with established state dam safety criteria or have been designed by qualified persons. The district engineer may also require documentation that the design has been independently reviewed by similarly qualified persons, and appropriate modifications made to ensure safety.

25. Water Quality. Where States and authorized Tribes, or EPA where applicable, have not previously certified compliance of an NWP with CWA section 401, individual 401 Water Quality Certification must be obtained or waived (see 33 CFR 330.4(c)). The district engineer or State or Tribe may require additional water quality management measures to ensure that the authorized activity does not result in more than minimal degradation of water quality.

26. Coastal Zone Management. In coastal states where an NWP has not previously received a state coastal zone management consistency concurrence, an individual state coastal zone management consistency concurrence must be obtained, or a presumption of concurrence must occur (see 33 CFR 330.4(d)). The district engineer or a State may require additional measures to ensure that the authorized activity is consistent with state coastal zone management requirements.

27. Regional and Case-By-Case Conditions. The activity must comply with any regional conditions that may have been added by the Division Engineer (see 33 CFR 330.4(e)) and with any case specific conditions added by the Corps or by the state, Indian Tribe, or U.S. EPA in its section 401 Water Quality Certification, or by the state in its Coastal Zone Management Act consistency determination.

28. Use of Multiple Nationwide Permits. The use of more than one NWP for a single and complete project is prohibited, except when the acreage loss of waters of the United States authorized by the NWPs does not exceed the acreage limit of the NWP with the highest specified acreage limit. For example, if a road crossing over tidal waters is constructed under NWP 14, with associated bank stabilization authorized by NWP 13, the maximum acreage loss of waters of the United States for the total project cannot exceed 1/3-acre.

29. Transfer of Nationwide Permit Verifications. If the permittee sells the property associated with a nationwide permit verification, the permittee may transfer the nationwide permit verification to the new owner by submitting a letter to the appropriate Corps district office to validate the transfer. A copy of the nationwide permit verification must be attached to the letter, and the letter must contain the following statement and signature:

"When the structures or work authorized by this nationwide permit are still in existence at the time the property is transferred, the terms and conditions of this nationwide permit, including any special conditions, will continue to be binding on the new owner(s) of the property. To validate the transfer of this nationwide permit and the associated liabilities associated with compliance with its terms and conditions, have the transferee sign and date below."

_____

(Transferee)

_____

(Date)

30. Compliance Certification. Each permittee who receives an NWP verification letter from the Corps must provide a signed certification documenting completion of the authorized activity and implementation of any required compensatory mitigation. The success of any required permittee-responsible mitigation, including the achievement of ecological performance standards, will be addressed separately by the district engineer. The Corps will provide the permittee the certification document with the NWP verification letter. The certification document will include:

(a) A statement that the authorized activity was done in accordance with the NWP authorization, including any general, regional, or activity-specific conditions;

(b) A statement that the implementation of any required compensatory mitigation was completed in accordance with the permit conditions. If credits from a mitigation bank or in-lieu fee program are used to satisfy the compensatory mitigation requirements, the certification must include the documentation required by 33 CFR 332.3(l)(3) to confirm that the permittee secured the appropriate number and resource type of credits; and

(c) The signature of the permittee certifying the completion of the activity and mitigation.

The completed certification document must be submitted to the district engineer within 30 days of completion of the authorized activity or the implementation of any required compensatory mitigation, whichever occurs later.

31. Activities Affecting Structures or Works Built by the United States. If an NWP activity also requires permission from the Corps pursuant to 33 U.S.C. 408 because it will alter or temporarily or permanently occupy or use a U.S. Army Corps of Engineers (USACE) federally authorized Civil Works project (a "USACE project"), the prospective permittee must submit a pre-construction notification. See paragraph (b)(10) of general condition 32. An activity that requires section 408 permission is not authorized by NWP until the appropriate Corps office issues the section 408 permission to alter, occupy, or use the USACE project, and the district engineer issues a written NWP verification.

32. Pre-Construction Notification. (a) Timing. Where required by the terms of the NWP, the prospective permittee must notify the district engineer by submitting a pre-construction notification (PCN) as early as possible. The district engineer must determine if the PCN is complete within 30 calendar days of the date of receipt and, if the PCN is determined to be incomplete, notify the prospective permittee within that 30 day period to request the additional information necessary to make the PCN complete. The request must specify the information needed to make the PCN complete. As a general rule, district engineers will request additional information necessary to make the PCN complete only once. However, if the prospective permittee does not provide all of the requested information, then the district engineer will notify the prospective permittee that the PCN is still incomplete and the PCN review process will not commence until all of the requested information has been received by the district engineer. The prospective permittee shall not begin the activity until either:

(1) He or she is notified in writing by the district engineer that the activity may proceed under the NWP with any special conditions imposed by the district or division engineer; or

(2) 45 calendar days have passed from the district engineer's receipt of the complete PCN and the prospective permittee has not received written notice from the district or division engineer. However, if the permittee was required to notify the Corps pursuant to general condition 18 that listed species or critical habitat might be affected or are in the vicinity of the activity, or to notify the Corps pursuant to general condition 20 that the activity might have the potential to cause effects to historic properties, the permittee cannot begin the activity until receiving written notification from the Corps that there is "no effect" on listed species or "no potential to cause effects" on historic properties, or that any consultation required under Section 7 of the Endangered Species Act (see 33 CFR 330.4(f)) and/or section 106 of the National Historic Preservation Act (see 33 CFR 330.4(g)) has been completed. Also, work cannot begin under NWPs 21, 49, or 50 until the permittee has received written approval from the Corps. If the proposed activity requires a written waiver to exceed specified limits of an NWP, the permittee may not begin the activity until the district engineer issues the waiver. If the district or division engineer notifies the permittee in writing that an individual permit is required within 45 calendar days of receipt of a complete PCN, the permittee cannot begin the activity until an individual permit has been obtained. Subsequently, the

permittee's right to proceed under the NWP may be modified, suspended, or revoked only in accordance with the procedure set forth in 33 CFR 330.5(d)(2).

(b) Contents of Pre-Construction Notification: The PCN must be in writing and include the following information:

(1) Name, address and telephone numbers of the prospective permittee;

(2) Location of the proposed activity;

(3) Identify the specific NWP or NWP(s) the prospective permittee wants to use to authorize the proposed activity;

(4) A description of the proposed activity; the activity's purpose; direct and indirect adverse environmental effects the activity would cause, including the anticipated amount of loss of wetlands, other special aquatic sites, and other waters expected to result from the NWP activity, in acres, linear feet, or other appropriate unit of measure; a description of any proposed mitigation measures intended to reduce the adverse environmental effects caused by the proposed activity; and any other NWP(s), regional general permit(s), or individual permit(s) used or intended to be used to authorize any part of the proposed project or any related activity, including other separate and distant crossings for linear projects that require Department of the Army authorization but do not require pre-construction notification. The description of the proposed activity and any proposed mitigation measures should be sufficiently detailed to allow the district engineer to determine that the adverse environmental effects of the activity will be no more than minimal and to determine the need for compensatory mitigation or other mitigation measures. For single and complete linear projects, the PCN must include the quantity of anticipated losses of wetlands, other special aquatic sites, and other waters for each single and complete crossing of those wetlands, other special aquatic sites, and other waters. Sketches should be provided when necessary to show that the activity complies with the terms of the NWP. (Sketches usually clarify the activity and when provided results in a quicker decision. Sketches should contain sufficient detail to provide an illustrative description of the proposed activity (e.g., a conceptual plan), but do not need to be detailed engineering plans);

(5) The PCN must include a delineation of wetlands, other special aquatic sites, and other waters, such as lakes and ponds, and perennial, intermittent, and ephemeral streams, on the project site. Wetland delineations must be prepared in accordance with the current method required by the Corps. The permittee may ask the Corps to delineate the special aquatic sites and other waters on the project site, but there may be a delay if the Corps does the delineation, especially if the project site is large or contains many wetlands, other special aquatic sites, and other waters. Furthermore, the 45 day period will not start until the delineation has been submitted to or completed by the Corps, as appropriate;

(6) If the proposed activity will result in the loss of greater than 1/10-acre of wetlands and a PCN is required, the prospective permittee must submit a statement describing how the mitigation requirement will be satisfied, or explaining why the adverse environmental effects are no more than minimal and why compensatory mitigation should not be required. As an alternative, the prospective permittee may submit a conceptual or detailed mitigation plan.

(7) For non-Federal permittees, if any listed species or designated critical habitat might be affected or is in the vicinity of the activity, or if the activity is located in designated critical habitat, the PCN must include the name(s) of those endangered or threatened species that might be affected by the proposed activity or utilize the designated critical habitat that might be affected by the proposed activity. For NWP activities that require pre-construction notification, Federal permittees must provide documentation demonstrating compliance with the Endangered Species Act;

(8) For non-Federal permittees, if the NWP activity might have the potential to cause effects to a historic property listed on, determined to be eligible for listing on, or potentially eligible for listing on, the National Register of Historic Places, the PCN must state which historic property might have the potential to be affected by the proposed activity or include a vicinity map indicating the location of the historic property. For NWP activities that

require pre-construction notification, Federal permittees must provide documentation demonstrating compliance with section 106 of the National Historic Preservation Act;

(9) For an activity that will occur in a component of the National Wild and Scenic River System, or in a river officially designated by Congress as a "study river" for possible inclusion in the system while the river is in an official study status, the PCN must identify the Wild and Scenic River or the "study river" (see general condition 16); and

(10) For an activity that requires permission from the Corps pursuant to 33 U.S.C. 408 because it will alter or temporarily or permanently occupy or use a U.S. Army Corps of Engineers federally authorized civil works project, the pre-construction notification must include a statement confirming that the project proponent has submitted a written request for section 408 permission from the Corps office having jurisdiction over that USACE project.

(c) Form of Pre-Construction Notification: The standard individual permit application form (Form ENG 4345) may be used, but the completed application form must clearly indicate that it is an NWP PCN and must include all of the applicable information required in paragraphs (b)(1) through (10) of this general condition. A letter containing the required information may also be used. Applicants may provide electronic files of PCNs and supporting materials if the district engineer has established tools and procedures for electronic submittals.

(d) Agency Coordination: (1) The district engineer will consider any comments from Federal and state agencies concerning the proposed activity's compliance with the terms and conditions of the NWPs and the need for mitigation to reduce the activity's adverse environmental effects so that they are no more than minimal.

(2) Agency coordination is required for: (i) all NWP activities that require pre-construction notification and result in the loss of greater than 1/2-acre of waters of the United States; (ii) NWP 21, 29, 39, 40, 42, 43, 44, 50, 51, and 52 activities that require pre-construction notification and will result in the loss of greater than 300 linear feet of stream bed; (iii) NWP 13 activities in excess of 500 linear feet, fills greater than one cubic yard per running foot, or involve discharges of dredged or fill material into special aquatic sites; and (iv) NWP 54 activities in excess of 500 linear feet, or that extend into the waterbody more than 30 feet from the mean low water line in tidal waters or the ordinary high water mark in the Great Lakes.

(3) When agency coordination is required, the district engineer will immediately provide (e.g., via e-mail, facsimile transmission, overnight mail, or other expeditious manner) a copy of the complete PCN to the appropriate Federal or state offices (FWS, state natural resource or water quality agency, EPA, and, if appropriate, the NMFS). With the exception of NWP 37, these agencies will have 10 calendar days from the date the material is transmitted to notify the district engineer via telephone, facsimile transmission, or e-mail that they intend to provide substantive, site-specific comments. The comments must explain why the agency believes the adverse environmental effects will be more than minimal. If so contacted by an agency, the district engineer will wait an additional 15 calendar days before making a decision on the pre-construction notification. The district engineer will fully consider agency comments received within the specified time frame concerning the proposed activity's compliance with the terms and conditions of the NWPs, including the need for mitigation to ensure the net adverse environmental effects of the proposed activity are no more than minimal. The district engineer will provide no response to the resource agency, except as provided below. The district engineer will indicate in the administrative record associated with each pre-construction notification that the resource agencies' concerns were considered. For NWP 37, the emergency watershed protection and rehabilitation activity may proceed immediately in cases where there is an unacceptable hazard to life or a significant loss of property or economic hardship will occur. The district engineer will consider any comments received to decide whether the NWP 37 authorization should be modified, suspended, or revoked in accordance with the procedures at 33 CFR 330.5.

(4) In cases of where the prospective permittee is not a Federal agency, the district engineer will provide a response to NMFS within 30 calendar days of receipt of any Essential Fish Habitat conservation recommendations, as required by section 305(b)(4)(B) of the Magnuson-Stevens Fishery Conservation and Management Act.

(5) Applicants are encouraged to provide the Corps with either electronic files or multiple copies of pre-construction notifications to expedite agency coordination.

D. District Engineer's Decision

1. In reviewing the PCN for the proposed activity, the district engineer will determine whether the activity authorized by the NWP will result in more than minimal individual or cumulative adverse environmental effects or may be contrary to the public interest. If a project proponent requests authorization by a specific NWP, the district engineer should issue the NWP verification for that activity if it meets the terms and conditions of that NWP, unless he or she determines, after considering mitigation, that the proposed activity will result in more than minimal individual and cumulative adverse effects on the aquatic environment and other aspects of the public interest and exercises discretionary authority to require an individual permit for the proposed activity. For a linear project, this determination will include an evaluation of the individual crossings of waters of the United States to determine whether they individually satisfy the terms and conditions of the NWP(s), as well as the cumulative effects caused by all of the crossings authorized by NWP. If an applicant requests a waiver of the 300 linear foot limit on impacts to streams or of an otherwise applicable limit, as provided for in NWPs 13, 21, 29, 36, 39, 40, 42, 43, 44, 50, 51, 52, or 54, the district engineer will only grant the waiver upon a written determination that the NWP activity will result in only minimal individual and cumulative adverse environmental effects. For those NWPs that have a waivable 300 linear foot limit for losses of intermittent and ephemeral stream bed and a 1/2-acre limit (i.e., NWPs 21, 29, 39, 40, 42, 43, 44, 50, 51, and 52), the loss of intermittent and ephemeral stream bed, plus any other losses of jurisdictional waters and wetlands, cannot exceed 1/2-acre.

2. When making minimal adverse environmental effects determinations the district engineer will consider the direct and indirect effects caused by the NWP activity. He or she will also consider the cumulative adverse environmental effects caused by activities authorized by NWP and whether those cumulative adverse environmental effects are no more than minimal. The district engineer will also consider site specific factors, such as the environmental setting in the vicinity of the NWP activity, the type of resource that will be affected by the NWP activity, the functions provided by the aquatic resources that will be affected by the NWP activity, the degree or magnitude to which the aquatic resources perform those functions, the extent that aquatic resource functions will be lost as a result of the NWP activity (e.g., partial or complete loss), the duration of the adverse effects (temporary or permanent), the importance of the aquatic resource functions to the region (e.g., watershed or ecoregion), and mitigation required by the district engineer. If an appropriate functional or condition assessment method is available and practicable to use, that assessment method may be used by the district engineer to assist in the minimal adverse environmental effects determination. The district engineer may add case-specific special conditions to the NWP authorization to address site-specific environmental concerns.

3. If the proposed activity requires a PCN and will result in a loss of greater than 1/10-acre of wetlands, the prospective permittee should submit a mitigation proposal with the PCN. Applicants may also propose compensatory mitigation for NWP activities with smaller impacts, or for impacts to other types of waters (e.g., streams). The district engineer will consider any proposed compensatory mitigation or other mitigation measures the applicant has included in the proposal in determining whether the net adverse environmental effects of the proposed activity are no more than minimal. The compensatory mitigation proposal may be either conceptual or detailed. If the district engineer determines that the activity complies with the terms and conditions of the NWP and that the adverse environmental effects are no more than minimal, after considering mitigation, the district engineer will notify the permittee and include any activity-specific conditions in the NWP verification the district engineer deems necessary. Conditions for compensatory mitigation requirements must comply with the appropriate provisions at 33 CFR 332.3(k). The district engineer must approve the final mitigation plan before the permittee commences work in waters of the United States, unless the district engineer determines that prior approval of the final mitigation plan is not practicable or not necessary to ensure timely completion of the required compensatory mitigation. If the prospective permittee elects to submit a compensatory mitigation plan with the PCN, the district engineer will expeditiously review the proposed compensatory mitigation plan. The district engineer must review the proposed compensatory mitigation plan within 45 calendar days of receiving a complete PCN and determine whether the proposed mitigation would ensure the NWP activity results in no more than minimal adverse environmental effects. If the net adverse environmental effects of the NWP activity (after consideration of the mitigation proposal) are determined by the district engineer to be no more than minimal, the district engineer will provide a timely written response to the applicant. The response will state that the NWP activity can proceed under the terms and conditions of the NWP, including any activity-specific conditions added to the NWP authorization by the district engineer.

4. If the district engineer determines that the adverse environmental effects of the proposed activity are more than minimal, then the district engineer will notify the applicant either: (a) that the activity does not qualify for authorization under the NWP and instruct the applicant on the procedures to seek authorization under an individual permit; (b) that the activity is authorized under the NWP subject to the applicant's submission of a mitigation plan that would reduce the adverse environmental effects so that they are no more than minimal; or (c) that the activity is authorized under the NWP with specific modifications or conditions. Where the district engineer determines that mitigation is required to ensure no more than minimal adverse environmental effects, the activity will be authorized within the 45-day PCN period (unless additional time is required to comply with general conditions 18, 20, and/or 31, or to evaluate PCNs for activities authorized by NWPs 21, 49, and 50), with activity-specific conditions that state the mitigation requirements. The authorization will include the necessary conceptual or detailed mitigation plan or a requirement that the applicant submit a mitigation plan that would reduce the adverse environmental effects so that they are no more than minimal. When compensatory mitigation is required, no work in waters of the United States may occur until the district engineer has approved a specific mitigation plan or has determined that prior approval of a final mitigation plan is not practicable or not necessary to ensure timely completion of the required compensatory mitigation.

E. Further Information

1. District Engineers have authority to determine if an activity complies with the terms and conditions of an NWP.

2. NWPs do not obviate the need to obtain other federal, state, or local permits, approvals, or authorizations required by law.

3. NWPs do not grant any property rights or exclusive privileges.

4. NWPs do not authorize any injury to the property or rights of others.

5. NWPs do not authorize interference with any existing or proposed Federal project (see general condition 31).

F. Definitions

Best management practices (BMPs): Policies, practices, procedures, or structures implemented to mitigate the adverse environmental effects on surface water quality resulting from development. BMPs are categorized as structural or non-structural.

Compensatory mitigation: The restoration (re-establishment or rehabilitation), establishment (creation), enhancement, and/or in certain circumstances preservation of aquatic resources for the purposes of offsetting unavoidable adverse impacts which remain after all appropriate and practicable avoidance and minimization has been achieved.

Currently serviceable: Useable as is or with some maintenance, but not so degraded as to essentially require reconstruction.

Direct effects: Effects that are caused by the activity and occur at the same time and place.

Discharge: The term "discharge" means any discharge of dredged or fill material into waters of the United States.

Ecological reference: A model used to plan and design an aquatic habitat and riparian area restoration, enhancement, or establishment activity under NWP 27. An ecological reference may be based on the structure, functions, and dynamics of an aquatic habitat type or a riparian area type that currently exists in the region where the proposed NWP 27 activity is located. Alternatively, an ecological reference may be based on a conceptual model for the aquatic habitat type or riparian area type to be restored, enhanced, or established as a result of the proposed NWP 27 activity. An ecological reference takes into account the range of variation of the aquatic habitat type or riparian area type in the region.

Enhancement: The manipulation of the physical, chemical, or biological characteristics of an aquatic resource to heighten, intensify, or improve a specific aquatic resource function(s). Enhancement results in the gain of selected aquatic resource function(s), but may also lead to a decline in other aquatic resource function(s). Enhancement does not result in a gain in aquatic resource area.

Ephemeral stream: An ephemeral stream has flowing water only during, and for a short duration after, precipitation events in a typical year. Ephemeral stream beds are located above the water table year-round. Groundwater is not a source of water for the stream. Runoff from rainfall is the primary source of water for stream flow.

Establishment (creation): The manipulation of the physical, chemical, or biological characteristics present to develop an aquatic resource that did not previously exist at an upland site. Establishment results in a gain in aquatic resource area.

High Tide Line: The line of intersection of the land with the water's surface at the maximum height reached by a rising tide. The high tide line may be determined, in the absence of actual data, by a line of oil or scum along shore objects, a more or less continuous deposit of fine shell or debris on the foreshore or berm, other physical markings or characteristics, vegetation lines, tidal gages, or other suitable means that delineate the general height reached by a rising tide. The line encompasses spring high tides and other high tides that occur with periodic frequency but does not include storm surges in which there is a departure from the normal or predicted reach of the tide due to the piling up of water against a coast by strong winds such as those accompanying a hurricane or other intense storm.

Historic Property: Any prehistoric or historic district, site (including archaeological site), building, structure, or other object included in, or eligible for inclusion in, the National Register of Historic Places maintained by the Secretary of the Interior. This term includes artifacts, records, and remains that are related to and located within such properties. The term includes properties of traditional religious and cultural importance to an Indian tribe or Native Hawaiian organization and that meet the National Register criteria (36 CFR part 60).

Independent utility: A test to determine what constitutes a single and complete non-linear project in the Corps Regulatory Program. A project is considered to have independent utility if it would be constructed absent the construction of other projects in the project area. Portions of a multi-phase project that depend upon other phases of the project do not have independent utility. Phases of a project that would be constructed even if the other phases were not built can be considered as separate single and complete projects with independent utility.

Indirect effects: Effects that are caused by the activity and are later in time or farther removed in distance, but are still reasonably foreseeable.

Intermittent stream: An intermittent stream has flowing water during certain times of the year, when groundwater provides water for stream flow. During dry periods, intermittent streams may not have flowing water. Runoff from rainfall is a supplemental source of water for stream flow.

Loss of waters of the United States: Waters of the United States that are permanently adversely affected by filling, flooding, excavation, or drainage because of the regulated activity. Permanent adverse effects include permanent discharges of dredged or fill material that change an aquatic area to dry land, increase the bottom elevation of a waterbody, or change the use of a waterbody. The acreage of loss of waters of the United States is a threshold measurement of the impact to jurisdictional waters for determining whether a project may qualify for an NWP; it is not a net threshold that is calculated after considering compensatory mitigation that may be used to offset losses of aquatic functions and services. The loss of stream bed includes the acres or linear feet of stream bed that are filled or excavated as a result of the regulated activity. Waters of the United States temporarily filled, flooded, excavated, or drained, but restored to pre-construction contours and elevations after construction, are not included in the measurement of loss of waters of the United States. Impacts resulting from activities that do not require Department of the Army authorization, such as activities eligible for exemptions under section 404(f) of the Clean Water Act, are not considered when calculating the loss of waters of the United States.

Navigable waters: Waters subject to section 10 of the Rivers and Harbors Act of 1899. These waters are defined at 33 CFR part 329.

Non-tidal wetland: A non-tidal wetland is a wetland that is not subject to the ebb and flow of tidal waters. Non-tidal wetlands contiguous to tidal waters are located landward of the high tide line (i.e., spring high tide line).

Open water: For purposes of the NWPs, an open water is any area that in a year with normal patterns of precipitation has water flowing or standing above ground to the extent that an ordinary high water mark can be determined. Aquatic vegetation within the area of flowing or standing water is either non-emergent, sparse, or absent. Vegetated shallows are considered to be open waters. Examples of "open waters" include rivers, streams, lakes, and ponds.

Ordinary High Water Mark: An ordinary high water mark is a line on the shore established by the fluctuations of water and indicated by physical characteristics, or by other appropriate means that consider the characteristics of the surrounding areas.

Perennial stream: A perennial stream has flowing water year-round during a typical year. The water table is located above the stream bed for most of the year. Groundwater is the primary source of water for stream flow. Runoff from rainfall is a supplemental source of water for stream flow.

Practicable: Available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes.

Pre-construction notification: A request submitted by the project proponent to the Corps for confirmation that a particular activity is authorized by nationwide permit. The request may be a permit application, letter, or similar document that includes information about the proposed work and its anticipated environmental effects. Pre-construction notification may be required by the terms and conditions of a nationwide permit, or by regional conditions. A pre-construction notification may be voluntarily submitted in cases where pre-construction notification is not required and the project proponent wants confirmation that the activity is authorized by nationwide permit.

Preservation: The removal of a threat to, or preventing the decline of, aquatic resources by an action in or near those aquatic resources. This term includes activities commonly associated with the protection and maintenance of aquatic resources through the implementation of appropriate legal and physical mechanisms. Preservation does not result in a gain of aquatic resource area or functions.

Protected tribal resources: Those natural resources and properties of traditional or customary religious or cultural importance, either on or off Indian lands, retained by, or reserved by or for, Indian tribes through treaties, statutes, judicial decisions, or executive orders, including tribal trust resources.

Re-establishment: The manipulation of the physical, chemical, or biological characteristics of a site with the goal of returning natural/historic functions to a former aquatic resource. Re-establishment results in rebuilding a former aquatic resource and results in a gain in aquatic resource area and functions.

Rehabilitation: The manipulation of the physical, chemical, or biological characteristics of a site with the goal of repairing natural/historic functions to a degraded aquatic resource. Rehabilitation results in a gain in aquatic resource function, but does not result in a gain in aquatic resource area.

Restoration: The manipulation of the physical, chemical, or biological characteristics of a site with the goal of returning natural/historic functions to a former or degraded aquatic resource. For the purpose of tracking net gains in aquatic resource area, restoration is divided into two categories: re-establishment and rehabilitation.

Riffle and pool complex: Riffle and pool complexes are special aquatic sites under the 404(b)(1) Guidelines. Riffle and pool complexes sometimes characterize steep gradient sections of streams. Such stream sections are recognizable by their hydraulic characteristics. The rapid movement of water over a course substrate in riffles results in a rough flow, a turbulent surface, and high dissolved oxygen levels in the water. Pools are deeper

areas associated with riffles. A slower stream velocity, a streaming flow, a smooth surface, and a finer substrate characterize pools.

Riparian areas: Riparian areas are lands next to streams, lakes, and estuarine-marine shorelines. Riparian areas are transitional between terrestrial and aquatic ecosystems, through which surface and subsurface hydrology connects riverine, lacustrine, estuarine, and marine waters with their adjacent wetlands, non-wetland waters, or uplands. Riparian areas provide a variety of ecological functions and services and help improve or maintain local water quality. (See general condition 23.)

Shellfish seeding: The placement of shellfish seed and/or suitable substrate to increase shellfish production. Shellfish seed consists of immature individual shellfish or individual shellfish attached to shells or shell fragments (i.e., spat on shell). Suitable substrate may consist of shellfish shells, shell fragments, or other appropriate materials placed into waters for shellfish habitat.

Single and complete linear project: A linear project is a project constructed for the purpose of getting people, goods, or services from a point of origin to a terminal point, which often involves multiple crossings of one or more waterbodies at separate and distant locations. The term "single and complete project" is defined as that portion of the total linear project proposed or accomplished by one owner/developer or partnership or other association of owners/developers that includes all crossings of a single water of the United States (i.e., a single waterbody) at a specific location. For linear projects crossing a single or multiple waterbodies several times at separate and distant locations, each crossing is considered a single and complete project for purposes of NWP authorization. However, individual channels in a braided stream or river, or individual arms of a large, irregularly shaped wetland or lake, etc., are not separate waterbodies, and crossings of such features cannot be considered separately.

Single and complete non-linear project: For non-linear projects, the term "single and complete project" is defined at 33 CFR 330.2(i) as the total project proposed or accomplished by one owner/developer or partnership or other association of owners/developers. A single and complete non-linear project must have independent utility (see definition of "independent utility"). Single and complete non-linear projects may not be "piecemealed" to avoid the limits in an NWP authorization.

Stormwater management: Stormwater management is the mechanism for controlling stormwater runoff for the purposes of reducing downstream erosion, water quality degradation, and flooding and mitigating the adverse effects of changes in land use on the aquatic environment.

Stormwater management facilities: Stormwater management facilities are those facilities, including but not limited to, stormwater retention and detention ponds and best management practices, which retain water for a period of time to control runoff and/or improve the quality (i.e., by reducing the concentration of nutrients, sediments, hazardous substances and other pollutants) of stormwater runoff.

Stream bed: The substrate of the stream channel between the ordinary high water marks. The substrate may be bedrock or inorganic particles that range in size from clay to boulders. Wetlands contiguous to the stream bed, but outside of the ordinary high water marks, are not considered part of the stream bed.

Stream channelization: The manipulation of a stream's course, condition, capacity, or location that causes more than minimal interruption of normal stream processes. A channelized stream remains a water of the United States.

Structure: An object that is arranged in a definite pattern of organization. Examples of structures include, without limitation, any pier, boat dock, boat ramp, wharf, dolphin, weir, boom, breakwater, bulkhead, revetment, riprap, jetty, artificial island, artificial reef, permanent mooring structure, power transmission line, permanently moored floating vessel, piling, aid to navigation, or any other manmade obstacle or obstruction.

Tidal wetland: A tidal wetland is a jurisdictional wetland that is inundated by tidal waters. Tidal waters rise and fall in a predictable and measurable rhythm or cycle due to the gravitational pulls of the moon and sun. Tidal

waters end where the rise and fall of the water surface can no longer be practically measured in a predictable rhythm due to masking by other waters, wind, or other effects. Tidal wetlands are located channelward of the high tide line.

Tribal lands: Any lands title to which is either: 1) held in trust by the United States for the benefit of any Indian tribe or individual; or 2) held by any Indian tribe or individual subject to restrictions by the United States against alienation.

Tribal rights: Those rights legally accruing to a tribe or tribes by virtue of inherent sovereign authority, unextinguished aboriginal title, treaty, statute, judicial decisions, executive order or agreement, and that give rise to legally enforceable remedies.

Vegetated shallows: Vegetated shallows are special aquatic sites under the 404(b)(1) Guidelines. They are areas that are permanently inundated and under normal circumstances have rooted aquatic vegetation, such as seagrasses in marine and estuarine systems and a variety of vascular rooted plants in freshwater systems.

Waterbody: For purposes of the NWPs, a waterbody is a jurisdictional water of the United States. If a wetland is adjacent to a waterbody determined to be a water of the United States, that waterbody and any adjacent wetlands are considered together as a single aquatic unit (see 33 CFR 328.4(c)(2)). Examples of "waterbodies" include streams, rivers, lakes, ponds, and wetlands.

G. Buffalo and New York District General Regional Conditions
These conditions apply to ALL Nationwide Permits.

G-A. Construction Best Management Practices (BMP's): Unless specifically approved otherwise through issuance of a variance by the District Engineer, the following BMP's must be implemented to the maximum degree practicable, to minimize erosion, migration of sediments, and adverse environmental impacts. Note that at a minimum, all erosion and sediment control and stormwater management practices must be designed, installed and maintained throughout the entire construction project in accordance with the latest version of the *"New York Standards and Specifications for Erosion and Sediment Control"* and the *"New York State Stormwater Management Design Manual"*. These documents are available at: http://www.dec.ny.gov/chemical/29066.html and http://www.dec.ny.gov/chemical/29072.html , respectively. Prior to the discharge of any dredged or fill material into waters of the United States, including wetlands, authorized by NWP, the permittee must install and maintain erosion and sedimentation controls in and/or adjacent to wetlands or other waters of the United States.

1. All synthetic erosion control features (e.g., silt fencing, netting, mats), which are intended for temporary use during construction, shall be completely removed and properly disposed of after their initial purpose has been served. Only natural fiber materials, which will degrade over time, may be abandoned in place.

2. Materials resulting from trench excavation for utility line installation or ditch reshaping activities which are temporarily sidecast or stockpiled into waters of the United States must be backfilled or removed to an upland area within 30 days of the date of deposition. Note: upland options shall be utilized prior to temporary placement within waters of the U.S., unless it can be demonstrated that it would not be practicable or if the impacts of complying with this upland option requirement would result in more adverse impacts to the aquatic environment.

3. For trenching activities in wetlands the applicant shall install impermeable trench dams or trench breakers at the wetland boundaries and every 100 feet within wetland areas to prevent inadvertent drainage of wetlands or other waters of the United States.

4. Dry stream crossing methods (e.g., diversion, dam and pump, flume, bore) shall be utilized for culvert or other pipe, or utility installations to reduce downstream impacts from turbidity and sedimentation. This may require piping or pumping the stream flow around the work area and the use of cofferdams.

5. No in-stream work shall occur during periods of high flow, except for work that occurs in dewatered areas behind temporary diversions, cofferdams or causeways.

6. Construction access and staging areas shall be by means that avoid or minimize impacts to aquatic sites (e.g. use of upland areas for access & staging, floating barges, mats, etc.). Discharges of fill material associated with the construction of temporary access roads, staging areas and work pads in wetlands shall be placed on filter fabric. All temporary fills shall be removed upon completion of the work and the disturbed area restored to pre-construction contours, elevations and wetland conditions, including cover type. All vegetation utilized in the restoration activity shall consist of native species.

7. All return flow from dredged material disposal areas shall not result in an increase in turbidity in the receiving water body that will cause a substantial visible contrast to natural conditions. (See NWP #16)

8. For activities involving the placement of concrete into waters of the U.S., the permittee must employ watertight forms. The forms shall be dewatered prior to the placement of the concrete. The use of tremie concrete is allowed, provided that it complies with New York State water quality standards.

9. New stormwater management facilities shall be located outside of waters of the U.S. A variance of this requirement may be requested with the submission of a PCN. The PCN must include justification which demonstrates that avoidance and minimization efforts have been met.

10. To the maximum extent practicable, the placement of fill in wetlands must be designed to maintain pre-construction surface water flows/conditions between remaining on or off-site waters and to prevent draining of the wetland or permanent hydrologic alteration. This may require the use of culverts and/or other measures. Furthermore, the activity must not restrict or impede the passage of normal or expected high flows (unless the primary purpose of the fill is to impound waters). The activity may alter the pre-construction flows/conditions if it can be shown that it benefits the aquatic environment (i.e. wetland restoration and/or enhancement).

G-B. CULVERTS

1. **ALL NEW OR REPLACEMENT CULVERTS** in streams shall be constructed/installed in accordance with the following, in order to ensure compliance with NWP General Condition #2 – Aquatic Life Movement and #9 Management of Water Flows:

a. Size: Bank-full flows shall be accommodated through maintenance of the existing bank-full channel cross sectional dimensions within one culvert. Bank-full width is generally considered to be the top width at the stage where a stream begins to overtop its banks and spread into the floodplain. Either a bottomless culvert or bridge must be used where practicable. If the stream cannot be spanned, the culvert width shall be minimum of 1.25 times width of the stream channel at the ordinary high water, or a 2 year design storm.

b. Depth: To maintain low flow and aquatic life movement within culverts with a bottom, the culvert invert must be embedded. Specifically, the culvert must be installed with its bottom buried below the grade of the stream bed, as measured at the average low point, to a depth of a minimum of 20 percent of the culvert vertical rise (height) throughout the length of the culvert. (Note: When not practicable to do so due to small culvert size, it is acceptable to allow natural deposition to cover the interior of the culvert bed following placement of the culvert invert to the 20% depth.)

c. The dimension, pattern, and profile of the stream above and below the stream crossing shall not be permanently modified by changing the width or depth of the stream channel.

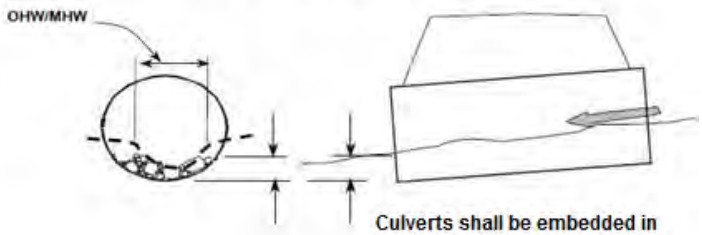
d. The culvert bed slope shall remain consistent with the slope of the adjacent stream channel.

e. Stone aprons and scour protection placed in streams shall not extend higher than the stream bed in order to create a uniform grade and shall be filled with native stream bed material and supplemented with similarly sized material, if needed, to fill interstitial spaces to maintain water flow on the surface of the stream bed.

Note 1: Use of the requirements alone will not satisfy the need for proper engineering and design. In particular, appropriate engineering is required to ensure structures are sized and designed to provide adequate capacity (to pass various flood flows) and stability (bed, bed forms, footings and abutments, both upstream and downstream). It is the permittee's responsibility to ensure the structure is appropriately designed.

Note 2: This condition does not apply to temporary culverts used for construction access that are in place for less than one construction season. However, compliance with General Conditions #2 and #9 still applies.

The diameter of the culvert shall accommodate bankfull flows by sizing the culvert 1.25 times the stream width at ordinary high water/mean high water (OHW/MHW) mark, or a 2-year design storm.



Culverts shall be embedded in the stream bed at least 20% of total culvert height and culverts shall be installed in line with the slope of the natural channel.

Preconstruction Notification (PCN) Requirements:
A PCN is required for projects that do not meet all of the above requirements. In addition to the PCN requirements of General Condition #32, the PCN must include the following information:

i. A statement indicating which of the above requirements will not be met by the proposed project;

ii. Information as to why the use of such structures or measures would not be practicable;

iii. A brief description of the stream discussing:

- Site specific information (i.e. stream bed slope, type and size of stream bed material, stream type, existing natural or manmade barriers, etc.) assessed to determine appropriate culvert design and to ensure management of water flows and aquatic life movement.

- Evaluation of the replacement for its impacts on: downstream flooding, upstream and downstream habitat (in-stream habitat, wetlands), potential for erosion and headcutting, and stream stability.

- Flow/storm event the proposed culvert is designed to pass (2 year, 50 year, etc.)

iv. Cross sections of the stream used to calculate the stream bed low point and ordinary high water width, consisting of:

- Stream channel cross sections shall be taken at proximal locations to the crossing location to determine the average of the lowest points in elevation of the stream bed and the average width at ordinary high water.

    - For new crossing locations, the average values from at least three measurements (project location and straight sections of the stream upstream and downstream) shall be used.

- For replacement of an existing structure, the average values from at least two cross sections (straight sections of the stream upstream and downstream from the existing structure representative of the natural channel) shall be used.

- This average low point shall be used to ensure low flow is maintained through the culvert and from which all embedment depths are measured.

- If the above cross section method was not practicable to use, an alternative method may be utilized. The PCN shall include justification for the method used including the data used and an explanation as to how it provides an equivalent measure.

v. An evaluation of the effects the crossing would have on aquatic life movement and/or water flows; and

vi. Mitigation measures that will be employed to minimize these effects. Mitigation measures may include, but are not limited to baffles, weirs, roughened channels, and grade control structures

A variance of the requirement(s) will be issued by the Corps if it can be demonstrated that the proposal would meet General Conditions #2 & #9 and would result in the least environmentally damaging practicable alternative (e.g. compliance with any of the requirement(s) would result in detrimental impacts to the aquatic system).

2. **ALL CULVERT REHABILITATION PROJECTS** in streams, not including culvert replacement projects, shall be constructed in accordance with the following, in order to ensure compliance with NWP General Condition #2 – Aquatic Life Movement and #9 Management of Water Flows:

a. An evaluation of the existing culvert shall be conducted prior to the proposed culvert rehabilitation to determine if the existing culvert is in compliance with NWP GC #2 and #9. Specifically, the culvert shall be evaluated regarding its effect upon aquatic life movements and low/ high water flow. If the above requirements in General Regional Condition B. 1 (a)-(e) are met then the culvert is considered in compliance with NWP General Conditions #2 & # 9. (Potential evaluation methods to consider include: North Atlantic Aquatic Connectivity Collaborative (NAACC), US Forest Service Aquatic Organism Passage FishXing, etc.)

b. A PCN is not required for projects that utilize cured-in-place pipe lining or other repair activities that do not raise the existing invert elevation such that it causes an impediment to the passage of either aquatic life movement or water flow unless there is an existing impediment.

c. A PCN is required for any culvert rehabilitation project that includes a culvert which is not in compliance with GC #2 and/or #9 (i.e. impedes aquatic life movement or water flow) and which will not be corrected by the proposed repair.

d. A PCN is required for culvert rehabilitation projects which will involve pipe slip lining or other activities, including concrete invert paving and concrete lining that raise the existing invert elevation such that it causes an impediment to the passage of low flow or aquatic life movement. Slip lining is defined as the insertion of a smaller diameter pipe into an existing pipe by pulling pushing, or spiral winding.

Preconstruction Notification (PCN) Requirements:
In addition to the PCN requirements of General Condition #32, the PCN must include the following information:

i. A summary of the evaluation required in Item a. above including a discussion of the impediment(s) to aquatic life movement and/or water flow.

ii. Information as to how the proposal will mitigate for the impediment. Mitigation measures may include, but are not limited to baffles, weirs, roughened channels, and grade control structures.

G-C. No regulated activity authorized by a Nationwide Permit can cause the loss of areas classified as a bog or fen in the State of New York, as determined by the Buffalo or the New York District Corps of Engineers, due to the

scarcity of this habitat in New York State and the difficulty with in-kind mitigation. The Districts will utilize the following document in the classification:

> Reschke, C. 1990. *Ecological Communities of New York State*. New York Natural Heritage Program. New York State Department of Environmental Conservation. Latham, N.Y. 96p. This document is available at the following location: http://www.dec.ny.gov/animals/29389.html

G-D. National Wild and Scenic Rivers (NWSR): The Upper Delaware River has been designated as a National Wild and Scenic River from the confluence of the East and West Branches below Hancock, New York, to the existing railroad bridge immediately downstream of Cherry Island in the vicinity of Sparrow Bush, New York. Also, the portion of the Genesee River located within Letchworth Gorge State Park, beginning at the southern boundary of the park and extending downstream to the Mt. Morris Dam, was designated by Congress as a permanent Study River in the Genesee River Protection Act of 1989. In accordance with General Condition #16, no activity may occur within a NWSR, including Study Rivers, unless the National Park Service (NPS) has determined in writing that the
proposed work will not adversely affect the NWSR designation or study status**.** Therefore, a PCN is required for any NWP which would impact the designated portions of the Genesee River or the Upper Delaware River, unless NPS has previously indicated the project will not adversely affect the waterway. (Note: the applicant may not commence work under any NWP until the NPS determines in writing that the project will not adversely affect the NWSR even if 45-days have passed since receipt of the PCN package.) Information regarding NWSR may be found at**:** https://www.rivers.gov/new-york.php

G-E. For all proposals requiring a pre-construction notification (PCN), in addition to the requirements in General Condition 32, the applicant shall also include: (Note: the application will not be considered complete until all of the applicable information is received).

1. New York State/USACE Joint Application Form: The application form shall be completed and signed and shall clearly indicate that the submission is a PCN. (http://www.lrb.usace.army.mil/Missions/Regulatory/Application-Forms/)

2. Drawings: The PCN must include legible, black and white project drawings on 8.5" x 11" paper. Full size drawings may be submitted in addition to the 8.5" x 11" plans to aid in the application review. Three types of illustrations are needed to properly depict the work to be undertaken. These illustrations or drawings are a Vicinity Map (i.e. a location map such as a USGS topographical map), a Plan View and a Cross-Section Map. Each illustration should identify the project, the applicant, and the type of illustration (vicinity map, plan view or cross section). The Vicinity Map shall provide the location of the entire project site. In addition, each illustration should be identified with a figure or attachment number. The location map shall include the Latitude and Longitude or UTM coordinates of the project. For linear projects, the PCN shall include a map of the entire project including a delineation of all waters of the U.S. within the corridor. Aquatic resource information shall be submitted using the Cowardin Classification System mapping conventions (e.g. PFO, PEM, etc.)

3. Color photographs: The photos should be sufficient to accurately portray the project site, keyed to a location map and not taken when snow cover is present.

4. Avoidance and Minimization: The PCN must include a written narrative explaining how avoidance and minimization of temporary impacts and permanent losses of waters of the U.S. were achieved on the project site (i.e. site redesign, reduction in scope, alternate methods, etc.). It should include a description of the proposed construction practices that would be implemented to perform the proposed work and a description of the reasonably foreseeable direct and indirect effects to waters of the U.S. from the proposed construction practices.

5. Mitigation (See General Conditions 23 & 32(b)(6)):The PCN must include at least a conceptual compensatory mitigation plan for all projects resulting in the loss of greater than 1/10th of an acre of waters of the United States; or for which a waiver of the 300 linear foot limit on intermittent and ephemeral

streams is being requested. Mitigation conceptual plans submitted with the PCN must include the following information at a minimum: proposed compensation type (bank or in-lieu fee credit, restoration, creation, preservation, etc.), location and brief discussion on factors considered for site selection (i.e. soils, water source, potential for invasive species, etc.), amount proposed per resource type and a discussion of how the proposal will compensate for aquatic resource functions and services lost as a result of the project.

Note 1: All mitigation projects must comply with the Federal Regulations on compensatory mitigation (33 CFR 332) entitled "Compensatory Mitigation for Losses of Aquatic Resources: Final Rule", dated April 10, 2008, which is available at:
http://www.lrb.usace.army.mil/Portals/45/docs/regulatory/MitandMon/FinalMitigaitonRuleApril2008.pdf
and any applicable District Guidelines.

Note 2: Although a conceptual mitigation plan may be sufficient for the purposes of a PCN submission, a detailed mitigation plan must be approved by the Corps before any jurisdictional work may occur on the project site.

Note 3: If more than 0.10 acres of designated EFH habitat (as discussed in Section G-E.8. below) would be impacted such that habitat would be lost, compensatory mitigation at a minimum ratio of 1:1 is required. A ratio of more than 1:1 may be required depending upon the ecological value of the habitat to be lost or degraded and the form of compensatory mitigation proposed to be provided.

6. Nationwide Rivers Inventory: The PCN shall indicate if a river segment listed within the National Park Service Nationwide Rivers Inventory (NRI) is located within the proposed project area. For project areas containing a listed NRI segment, the PCN shall also include a statement as to how adverse effects to the river have been avoided or mitigated. The list is available at:
http://www.nps.gov/ncrc/programs/rtca/nri/states/ny.html.

7. Historic or Cultural Resources: In accordance with General Condition 20, a PCN is required for any non-federal activity which may have the potential to cause effects to any historic properties* listed, determined to be eligible for listing on, or potentially eligible for listing on the National Register of Historic Places (NR). Please refer to General Condition 20 for submission requirements. In addition, all PCNs must include:

- A written statement indicating if any such properties may be affected by the proposed project.
- A copy of any completed archaeology or building/structure survey reports. If a survey has not been performed, the statement shall include a list of resources checked in the determination.
- Copies of any available correspondence from the New York State Office of Parks, Recreation, and Historic Preservation State Historic Preservation Officer (SHPO) regarding historic properties.
- Copies of any available correspondence from federally recognized Indian Nations regarding historic properties that may be affected by the project.
- Projects with ground disturbance may have the potential to cause effects to buried historic properties, regardless of occurring outside SHPO designated archaeological sensitive areas. Therefore, the PCN shall indicate if the ground disturbance will occur in any areas of previously undisturbed soil. For areas with prior disturbance, the PCN shall include a brief narrative describing the disturbance and its limit (i.e. type of disturbance, size of area with current undisturbed soil, size of area with existing disturbed soils, when the disturbance occurred, an estimate on how deep the soil disturbance extends, etc.) as well as photos of the existing ground disturbance.
- Above ground buildings/structures that are over 50 years old and potentially affected by the project will need to be assessed to determine if they are eligible for the NR. The PCN shall: identify any structures present in the project area, which have not already been subject to SHPO review, include photos of the structures, and describe how the project would/would not affect them.

* - see NWP definition section for further clarification

NOTE 1**:** Information regarding historic properties may be found at: https://cris.parks.ny.gov. In addition, assistance regarding the determination of the presence of historic or cultural resources at or near the project site should be directed to SHPO.

NOTE 2**:** as stated in General Condition 20, if any listed, eligible or potentially eligible properties are present, the applicant shall not begin the activity until notified by the district engineer in writing either that the activity has no potential to cause effects or that consultation under Section 106 of the NHPA has been completed.

8. Endangered Species and Essential Fish Habitat: In accordance with General Condition 18, non-federal applicants must submit a PCN if any listed species or designated critical habitat might be affected or is in the vicinity of the activity, or if the activity is located in designated critical habitat. Please refer to General Condition 18 for submission requirements. In addition, all PCNs must include:

- a written statement and documentation concerning any Essential Fish Habitat (EFH) and any federally listed or proposed Threatened, Endangered, or Candidate (TE&C) species or designated and/or proposed critical habitat that might be affected or located in the vicinity of the project.
- a copy of any correspondence from the U.S. Fish and Wildlife Service (USFWS) and/or National Oceanic and Atmospheric Administration Fisheries Service (NOAA-Fisheries), regarding the potential presence of TE&C species on the project site. USFWS TE&C website: http://www.fws.gov/northeast/nyfo/es/section7.htm . Information on NOAA-Fisheries (NMFS) species (both TE&C and EFH) can be found at: https://www.greateratlantic.fisheries.noaa.gov/]
- an official TE&C species list printed within 90 days of the PCN submission from the USFWS Website.

- For projects where TE&C species are listed, a discussion of potential TE&C species habitat within the project site (See USFWS T&E website for species habitat information).
- If there is potential habitat for any TE&C species within the project site the following, as applicable, shall be submitted:

  a. The results of any habitat surveys and presence/absence surveys. Note: all surveys should be coordinated with the USFWS and/or NOAA-Fisheries (NMFS) prior to initiation.

  b. A detailed description of the proposed project, including secondary impacts and approximate proposed project construction schedule of project activities (e.g. land clearing, utilities, stormwater management).

  c. A description of the natural characteristics of the property and surrounding area (e.g. forested areas, freshwater wetlands, open waters, and soils) and a description of surrounding land use (residential, agricultural, or commercial).

  d. A description of the area to be impacted by the proposed project, including the species, typical sizes (d.b.h.) and number or acres of trees to be removed.

  e. The location of the above referenced property and extent of any project related activities or discharges clearly indicated on a copy of a USGS 7.5 minute topographic quadrangle (quad) with the name of the quad(s) and latitude/longitude clearly labeled.

  f. A description of conservation measures to avoid, minimize and/or mitigate impacts to listed species.

NOTE 1**:** There are no known TE&C species or EFH species under the jurisdiction of the NOAA-Fisheries (NMFS) within the Buffalo District. Therefore, all Buffalo District requests for information regarding the presence of TE&C species should be directed to the USFWS. In addition, no EFH review is necessary within the following New York District counties: Clinton, Essex, Franklin, Fulton, Hamilton, Montgomery, Otsego, Schenectady, Schoharie and Warren.

NOTE 2**:** Please refer to the following website for further guidance and information relating to regulatory permits & TE&C species in New York:
http://www.lrb.usace.army.mil/Missions/Regulatory/Endangered-Species/Endangered-Species-New-York/

NOTE 3**:** General Condition #18 is emphasized, …"In cases where the non-Federal applicant has identified listed species or critical habitat that might be affected or is in the vicinity of the project, and has so notified

the Corps, the applicant shall not begin work until the Corps has provided notification the proposed work will have "no effect" on listed species or critical habitat, or until Section 7 consultation has been completed."

9. 100 Year Floodplain: For permanent fills within waters of the United States within the 100 year floodplain, documentation of compliance with FEMA-approved state or local floodplain management requirements.

10. Submission of Multiple Copies of PCN:

a) One (1) additional copy of the application drawings shall be provided to USACE for coordination with National Oceanic and Atmospheric Administration (NOAA) for utility lines to be constructed or installed in navigable waters of the U.S. proposed under NWP #12, (See Note 1 of NWP #12)

b) One (1) additional copy of the PCN package shall be provided to USACE for coordination with Department of Defense Siting Clearinghouse (See NWP #12, 39, 51 & 52 Notes) for:
   i. overhead utility lines proposed under NWP #12 and
   ii. any activity that involves the construction of a wind energy generating structure, solar tower, or overhead transmission lines proposed under NWP #39, 51 or 52

c) Two (2) additional copies of the PCN package shall be provided to USACE when the project is located within the New York City Watershed, for coordination with the New York City Department of Environmental Protection.

d) Five (5) additional copies of the PCN package shall be submitted to USACE for agency coordination in accordance with General Condition # 32(d)(2) for:
   i. All NWP activities that result in the loss of greater than 1/2-acre of waters of the United States,
   ii. NWP 21, 29, 39, 40, 42, 43, 44, 50, 51, and 52 activities that will result in the loss of greater than 300 linear feet of intermittent & ephemeral stream bed,
   iii. NWP 13 activities in excess of 500 linear feet, fills greater than one cubic yard per running foot, or involve discharges of dredged or fill material into special aquatic sites;
   iv. NWP 54 activities in excess of 500 linear feet or that extend into the waterbody more than 30 feet from the mean low water line in tidal waters or the ordinary high water mark in the Great Lakes.

G-F. CRITICAL RESOURCE WATERS

In accordance with NWP General Condition (GC) #22, certain activities in Critical Resource Waters cannot be authorized under the NWP program or would require a PCN (see GC #22 for a list of the NWP activities that are either excluded or require a PCN).

Critical Resource Waters in New York State include the following:

1. **East-of-Hudson portion of the New York City Water Supply:** This area includes portions of Dutchess, Putnam and Westchester Counties as delineated on Enclosure 2.

2. **Hudson River National Estuarine Research Reserves (NERR):** The Hudson River NERR consists of four components: Piermont Marsh, Iona Island, Tivoli Bay, and Stockport Flats.

H. NYSDEC General Water Quality Certification (WQC) Conditions applicable to all NWPs for which WQC has been provided are as follows:

1. Non-contamination of Waters
   • All necessary precautions shall be taken to preclude contamination of any wetland or waterway by suspended solids, resins, sediments, fuels, solvents, lubricants, epoxy coatings, paints, concrete, leachate,

inadvertent returns of drilling muds (frac-outs) or any other environmentally deleterious materials associated with the project.

2. Installation and Replacement of Culverts

To be covered under this blanket Water Quality Certification, all of the following criteria must be met:

- Culvert pipes shall be designed to safely pass a 2% annual chance storm event.
- This certification does not authorize the installation of any culverts that are not embedded beneath the existing grade of the stream channel.
- Width of the structure must be a minimum of 1.25 times (1.25X) width of the Mean (Ordinary) High Water Channel.
- The culvert bed slope shall remain consistent with the slope of the adjacent stream channel. For slopes greater than 3%, an open bottom culvert must be used.
- This certification does not authorize work on culverts that provide sole access to "Critical Facilities": An individual WQC must be obtained for work on these culverts.
- This certification does not authorize culvert rehabilitation projects that involve slip lining, or similar treatments.
- This certification does authorize the rehabilitation of culverts utilizing Cure in Place Pipe Lining (CIPP) or concrete spray lining for culverts which currently meet Nationwide Permit General Condition # 2 - Aquatic Life Movements.

3. Discharge and Disturbance Limits of the Blanket WQC

- For Nationwide Permits # 5, 7,12, 13, 14, 15, 18, 19, 23, 25, 29, 31, 32, 34, 36, 37, 39, 40, 42, 45, 46, 48, 51, utility line replacement projects under Nationwide Permit #3 and non-maintenance activities under Nationwide Permit #43.
- The following discharge limits apply:
  a) Temporary or permanent discharges of dredged or fill material into wetlands and other waters of the U.S. must not exceed ¼ acre;
  b) Temporary or permanent impacts (i.e., loss) to stream beds must not exceed 300 linear feet.
  c) The discharge area limit under paragraph (a) plus the equivalent stream impact area limit under paragraph (b) must not exceed ¼ acre total.

•For Nationwide Permits # 3, 4, 6, 20, 22, 27, 30, 33, 41 and maintenance activities under Nationwide Permit # 43, this certification authorizes discharges and disturbances up to the limit of the respective Nationwide Permit or regional conditions, whichever is most restrictive.

•If a project requiring coverage under two or more Nationwide Permits results in a temporary or permanent discharge or disturbance, the most restrictive threshold applies to the project.

4. Bulkheads

- This certification does not authorize the construction of new bulkheads or vertical walls.
- This certification does not authorize the waterward extension of existing bulkheads.
- New toe-stone protection may not extend more than 36 inches waterward from the existing bulkhead face.

5. Maintenance of Water Levels

- This certification does not authorize any activity that results in a permanent water level alteration in waterbodies, such as draining or impounding, with the exception of activities authorized by Nationwide Permit #27.

6. Dewatering

- Authorized dewatering is limited to immediate work areas that are within coffer dams or otherwise isolated from the larger waterbody or waters of the United States.
- Dewatering must be localized and must not drain extensive areas of a waterbody or reduce the water level such that fish and other aquatic organisms are killed, or their eggs and nests are exposed to desiccation, freezing or depredation in areas outside of the immediate work site.
- Cofferdams or diversions shall not be constructed in a manner that causes or exacerbates erosion of the bed or banks of a waterbody.

• All dewatering structures must be permanently removed and disturbed areas must be graded and stabilized immediately following completion of work. Return flows from the dewatering structure shall be as visibly clear as the receiving waterbody.

7. Endangered or Threatened Species

• This certification does not authorize projects likely to result in the take or taking of any species listed as endangered or threatened species listed in 6 NYCRR Part 182.5 (a), (b) or projects likely to destroy or adversely modify the habitat of such species. Applicants must either verify that the activity is outside of the occupied habitat of such species or, if located within the habitat of such species, obtain a determination from the NYS Department of Conservation Regional Office that the proposed activity will not be likely to result in the take or taking of any species listed as endangered or threatened species listed in 6 NYCRR Part 182. Information on New York State endangered or threatened species may be obtained from the NYS Department of Environmental regional offices, the New York Natural Heritage Program in Albany, New York or on the DEC website at http://www.dec.ny.gov/animals/29338.html

If it is determined that the project is likely to result in the take of (or modify the habitat of such species) a New York listed endangered or threatened species , then this blanket water quality certification is not applicable, and the applicant will need an individual water quality certification from the department.

8. Rare Mollusks

• This Certification may not be issued for and does not authorize disturbances or discharges to waters of the state listed as supporting mollusks S-1 or S-2 on the New York State Natural Heritage database. http://www.dec.ny.gov/animals/29338.html

9. Prohibition Period for In-water Work

In-water work is prohibited during the following time period:

• in cold water trout fisheries (waterbodies classified under Article 15 of New York State Environmental Conservation Law with a "t" or "ts" designation), beginning October 1 and ending May 31.

To determine if the prohibition period is in effect for a particular water, contact the Regional Natural Resources Supervisor in the appropriate New York State Department of Environmental Conservation regional office. Water Classification values can be determined on the DEC's Environmental Resource Mapper available on the Departments Website @ http://www.dec.ny.gov/gis/erm/ Work windows may be extended by the Regional Natural Resources Supervisor or their designee.

10. Significant Coastal Fish and Wildlife Habitat

• This certification does not authorize any discharge occurring in a designated Significant Coastal Fish and Wildlife Habitat area pursuant to 19 NYCRR Part 602; Title 19 Chapter 13, Waterfront Revitalization and Coastal Resources. https://www.dos.ny.gov/opd/programs/consistency/scfwhabitats.html

11. Coastal Erosion Hazard Areas

• This certification does not authorize projects in Coastal Erosion Hazard Areas, as identified in New York State Environmental Conservation Law Article 34, and its implementing regulations, 6 NYCRR Part 505. http://www.dec.ny.gov/lands/86541.html

12. State-owned Underwater Lands

Prior to undertaking any Nationwide Permit activity that will involve or occupy state-owned lands now or formerly under the waters of New York State, the party proposing the activity must first obtain all necessary approvals from:

New York State Office of General Services
Division of Real Estate Development
Corning Tower Building, 26th Floor
Empire State Plaza
Albany, NY 12242
Tel. (518) 474-2195

13. Tidal Wetlands

• This certification does not authorize any activities in tidal wetlands as defined in Article 25 of New York State Environmental Conservation Law, with the exception of activities authorized by Nationwide Permits # 4, 20 and 48. http://www.dec.ny.gov/lands/4940.html

14. Wild, Scenic and Recreational Rivers

• This certification does not authorize activities in any Wild, Scenic or Recreational River pursuant to 6 NYCRR Part 666 or state designated Wild, Scenic or Recreational River corridors. http://www.dec.ny.gov/permits/6033.html

15. Floodplains

• Authorized projects subject to this certification must first be in compliance with State and Local Floodplain Regulations prior to commencement of construction.

16. Public Service Commission

• This certification does not authorize activities regulated pursuant to Article VII or Article 10 of the New York State Public Service Law. For such projects, Section 401 Water Quality Certification is obtained from the New York State Public Service Commission.

17. Utility Projects

• This certification does not authorize maintenance or other activities associated with hydroelectric power generation projects.

• This certification does not authorize the construction of substation facilities or permanent access roads in wetlands.

• Excess materials resulting from trench excavation must be permanently removed from the waters of the United States and contained so that they do not re-enter any waters of the United States.

18. Preventing the Spread of Terrestrial and Aquatic Invasive Species

• To prevent the unintentional introduction or spread of invasive species, the permittee must ensure that all construction equipment be cleaned of mud, seeds, vegetation and other debris before entering any approved construction areas within waters of the U.S. When using construction equipment projects authorized under this Certification shall take reasonable precautions to prevent the spread of aquatic invasive species as required under the provisions in ECL § 9-1710.

I. New York State Department of State (NYSDOS) Coastal Zone Management Consistency Determination Additional Information (applicable to all NWPs located within or affecting the NYS Coastal Zone):

Where NYSDOS has objected to the USACE consistency determination or where the project will not comply with the NYSDOS NWP specific condition(s), as outlined in the specific NWP listing in Section B above, the applicant must submit a request for an individual consistency determination to NYSDOS. See Section K for NYSDOS contact information.

Further Information:

- Unless NYSDOS issues consistency concurrence or USACE has determined that NYSDOS concurrence is presumed, NWPs are not valid within the Coastal Zone.

- All consistency concurrence determination requests must be submitted directly to NYSDOS with a copy provided to USACE with any required Preconstruction Notification submissions.

- Limits of the coastal zone and details regarding NYSDOS submission requirements, including application forms can be obtained at: https://www.dos.ny.gov/opd/programs/consistency/index.html

J. INFORMATION ON NATIONWIDE PERMIT VERIFICATION

Verification of the applicability of these Nationwide Permits is valid until March 18, 2022 unless the Nationwide Permit is modified, suspended revoked, or the activity complies with any subsequent permit modification.

It is the applicant's responsibility to remain informed of changes to the Nationwide Permit program. A public notice announcing any changes will be issued when they occur and will be available for viewing at our website: http://www.lrb.usace.army.mil/Missions/Regulatory.aspx.

Please note in accordance with 33 CFR part 330.6(b), that if you commence or are under contract to commence an activity in reliance of the permit prior to the date this Nationwide permit expires, is suspended or revoked, or is modified such that the activity no longer complies with the terms and conditions, you have twelve months from the date of permit modification, expiration, or revocation to complete the activity under the present terms and conditions of the permit, unless the permit has been subject to the provisions of discretionary authority.

Possession of this permit does not obviate you of the need to contact all appropriate state and/or local governmental officials to insure that the project complies with their requirements.

K. AGENCY CONTACT INFORMATION

NYS Department of Environmental Conservation

www.dec.ny.gov

NYS DEC REGION 1
Regional Permit Administrator
SUNY @ Stony Brook
50 Circle Road
Stony Brook, NY 11790-3409
(631) 444-0365

NYS DEC REGION 2
Regional Permit Administrator
1 Hunter's Point Plaza
47-40 21st Street
Long Island City, NY 11101-5407
(718) 482-4997

NYS DEC REGION 3
Regional Permit Administrator
21 South Putt Corners Road
New Paltz, NY 12561-1620
(845) 256-3054

NYS DEC REGION 4
Regional Permit Administrator
1130 North Westcott Road
Schenectady, NY 12306-2014
(518) 357-2069

NYS DEC REGION 4 Sub-Office
Deputy Regional Permit Administrator
65561 State Hwy 10
Stamford, NY 12167-9503
(607) 652-7741

NYS DEC REGION 5
Regional Permit Administrator
PO Box 296
1115 Route 86
Ray Brook, NY 12977-0296
(518)897-1234

NYS DEC REGION 5 Sub-Office
Deputy Regional Permit Administrator
PO Box 220
232 Golf Course Rd
Warrensburg, NY 12885-0220
(518) 623-1281

NYS DEC REGION 6
Regional Permit Administrator
317 Washington Street
Watertown, NY 13601-3787
(315) 785-2245

NYS DEC REGION 6 Sub-Office
Deputy Regional Permit Administrator
207 Genesee Street
Utica, NY 13501-2885
(315) 793-2555

NYS DEC REGION 7
Regional Permit Administrator
615 Erie Blvd. West
Syracuse, NY 13204-2400
(315)426-7438

NYS DEC REGION 7 Sub-Office
Deputy Regional Permit Administrator
1285 Fisher Avenue
Cortland, NY 13045-1090
(607) 753-3095

NYS DEC REGION 8
Regional Permit Administrator
6274 E. Avon - Lima Road
Avon, NY 14414-9519
(585) 226-2466

NYS DEC REGION 9
Regional Permit Administrator
270 Michigan Avenue
Buffalo, NY 14203-2915
(716) 851-7165

NYS DEC REGION 9 Sub-Office
Deputy Regional Permit Administrator
182 East Union Street
Allegany, NY 14706-1328
(716) 372-0645

NYS Department of State

Division of Coastal Resources
Consistency Review Unit
One Commerce Plaza
99 Washington Avenue, Suite 1010
Albany, NY 12231-00001
(518) 474-6000
https://www.dos.ny.gov/opd/programs/consistency/index.html

US Army Corps of Engineers

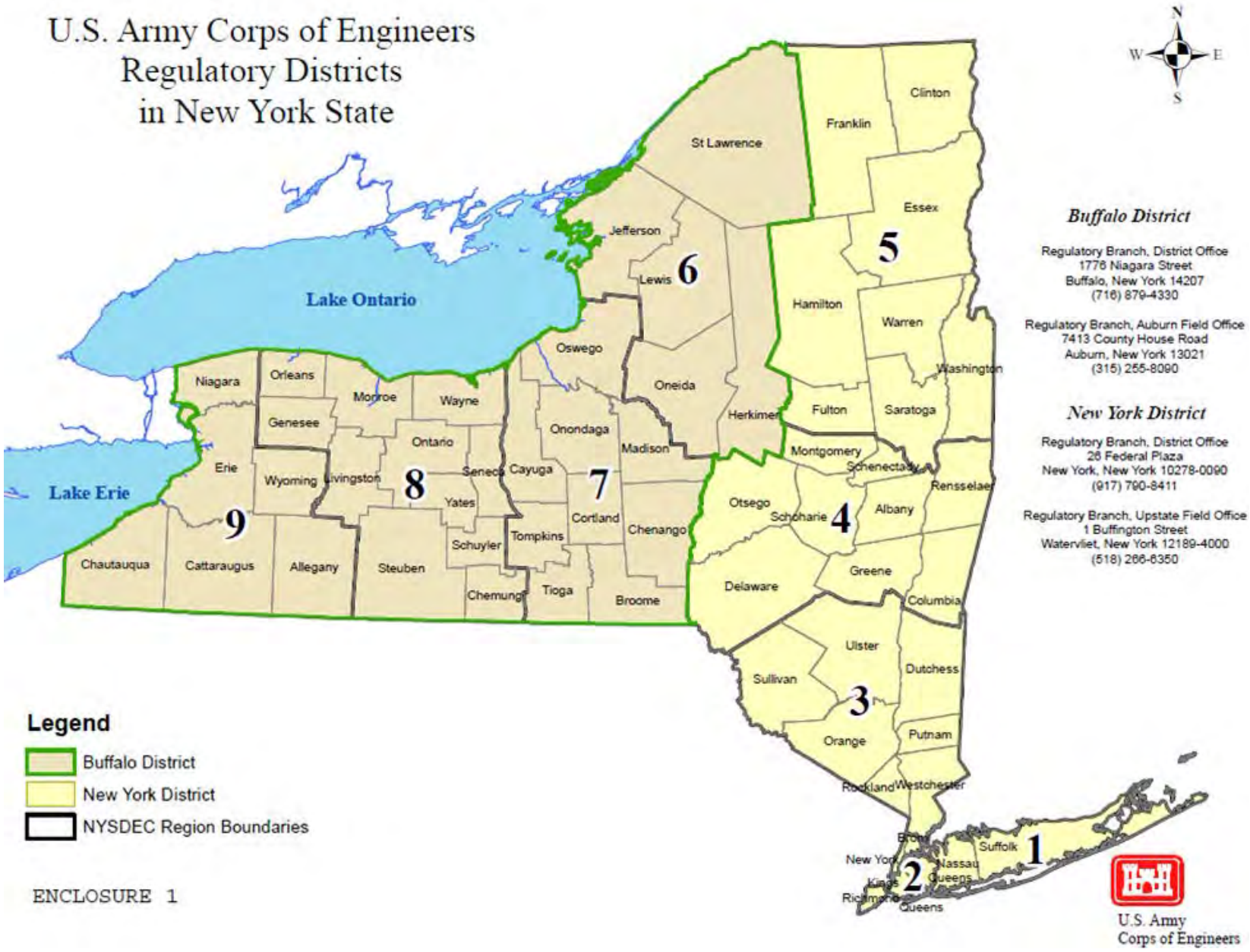
http://www.nan.usace.army.mil

(For DEC Regions 1, 2 and 3)
US Army Corps of Engineers NY District
ATTN: Regulatory Branch
26 Federal Plaza, Room 1937
New York, NY 10278-0090
Email: CENAN.PublicNotice@usace.army.mil
For DEC Regions 1, 2, Westchester County
and Rockland County (917) 790-8511
For the other counties of DEC Region 3 -
(917) 790-8411

(For DEC Regions 4, 5)
Department of the Army
ATTN: CENAN-OP-R
NY District, Corps of Engineers
1 Buffington Street
Building 10, 3rd Floor
Watervliet, NY 12189-4000
(518) 266-6350 - Permits team
(518) 266-6360 - Compliance Team

Email: cenan.rfo@usace.army.mil

(For DEC Regions 6, 7, 8, 9)
US Army Corps of Engineers
Buffalo District
ATTN: Regulatory Branch
1776 Niagara Street
Buffalo, NY 14207-3199
(716) 879-4330
Email: LRB.Regulatory@usace.army.mil
www.lrb.usace.army.mil


U.S. Army Corps of Engineers
Regulatory Districts
in New York State
N
W
E
S
Lake Ontario
Lake Erie
St Lawrence
Franklin
Clinton
Essex
Jefferson
Lewis
Hamilton
Warren
Washington
Oswego
Oneida
Herkimer
Fulton
Saratoga
Niagara
Orleans
Monroe
Wayne
Genesee
Onondaga
Madison
Montgomery
Schenectady
Rensselaer
Erie
Wyoming
Livingston
Ontario
Seneca
Cayuga
Otsego
Schoharie
Albany
Yates
Cortland
Chenango
Tompkins
Schuyler
Delaware
Greene
Columbia
Chautauqua
Cattaraugus
Allegany
Steuben
Chemung
Tioga
Broome
Ulster
Sullivan
Dutchess
Orange
Putnam
Rockland
Westchester
Bronx
New York
Kings
Richmond
Queens
Nassau
Suffolk
1
2
3
4
5
6
7
8
9
Legend
Buffalo District
New York District
NYSDEC Region Boundaries
ENCLOSURE 1
Buffalo District
Regulatory Branch, District Office
1776 Niagara Street
Buffalo, New York 14207
(716) 879-4330
Regulatory Branch, Auburn Field Office
7413 County House Road
Auburn, New York 13021
(315) 255-8090
New York District
Regulatory Branch, District Office
26 Federal Plaza
New York, New York 10278-0090
(917) 790-8411
Regulatory Branch, Upstate Field Office
1 Buffington Street
Watervliet, New York 12189-4000
(518) 266-6350
U.S. Army
Corps of Engineers

Letts, Carey

From: Adams, Heather L CIV USARMY CELRB (US) <Heather.L.Adams@usace.army.mil>
Sent: Friday, July 20, 2018 11:57 AM
To: Letts, Carey
Subject: RE: [Non-DoD Source] Re: [EXTERNAL] RE: LRB-2015-01101 NWP 38

Hi Carey,
This is not a significant enough change to warrant another verification of NWP 38, as it would still meet the terms and conditions of that permit. I will put your email in the administrative record and make a note about the change.

I will be out of the office until July 25, so if you have further questions I can get back to you then.

Thanks,
Heather

-----Original Message-----
From: Letts, Carey [mailto:Carey.Letts@aecom.com]
Sent: Friday, July 20, 2018 7:58 AM
To: Adams, Heather L CIV USARMY CELRB (US) <Heather.L.Adams@usace.army.mil>
Subject: RE: [Non-DoD Source] Re: [EXTERNAL] RE: LRB-2015-01101 NWP 38

Good morning Heather,

Do you have time to have a brief phone conversation this morning regarding LRB-2015-01101 NWP 38?

We are finalizing the chemical dosing for injections that are scheduled to begin at the site on August 16, 2018, and I would like to understand what would be involved for the USACE if we wanted to increase the number of injection points, resulting in a minor increase to the discharge of fill material associated with bore hole construction activities.

Currently the permit acknowledges 100 injection points resulting in an estimated square footage of boreholes at surface to be 3.4 ft2 (0.000078 acres). We may need flexibility in the field based on the thickness of the injected material, so I would like to have approval to utilize up to 150 injection points. This would bring the square footage of boreholes at surface to 5.1 ft2 (0.000117 acres).

Thank you,

Carey

Attachment D

NYSDEC Protection of Water Permit

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Division of Environmental Permits, Region 7
615 Erie Boulevard West, Syracuse, NY 13204-2400
P: (315) 426-7438 | F: (315) 426-7425
www.dec.ny.gov

March 20, 2018

Lockheed Martin Corporation
6801 Rockledge Dr.
Bethesda, MD 20817-0836

Dear Permittee,

Enclosed is your NYSDEC Protection of Waters permit as requested. Please take some time to review the permit and note:

1. The permit is valid for only that activity specifically represented in your permit application and authorized in writing in the permit itself. Any deviation from the activity authorized in the permit or described in your application may require additional approval(s) or corrective action;
2. Review the General and Special Conditions carefully. If you are unsure of your obligations under the permit, please bring your questions to our attention;
3. If, for any reason, you believe you will be unable to comply or remain in compliance with the terms of your permit, please contact us;
4. Please check the expiration date and any requirements for renewal or modification of your permit;
5. Please keep the permit in a safe place for reference and a copy at the work site and have your contractor read and abide by its conditions;
6. The identification numbers help us communicate with you. Please reference them in any subsequent communications;
7. **Caution: Your project may be subject to the jurisdiction of the US Army Corps of Engineers, and need additional permitting. Contact them in the Auburn Field Office at 315-255-8090 with any questions.**
8. Be advised, the Uniform Procedures Regulations (6NYCRR Part 621) provide that an applicant may request a public hearing if a permit is denied or contains conditions which are unacceptable to them. Any such request must be made in writing within 30 calendar days of the date of permit issuance and must be addressed to the Regional Permit Administrator at the letterhead address.

If you have any questions, please contact me at 315-426-7445. Thank you.

Sincerely,

Trendon Choe
Environmental Analyst
trendon.choe@dec.ny.gov

Enc. Permit 7-3132-00135
cc: Tiffany Toukatly, DEC BOH
Joshua Cook, DEC Remediation
Margaret Sheen, DEC General Counsel
Heather Adams, US Army Corps of Engineers
The Widewaters Group, Inc.
Carey Letts, AECOM
File

PERMIT

Under the Environmental Conservation Law (ECL)

Permittee and Facility Information

Permit Issued To:
LOCKHEED MARTIN CORPORATION
6801 ROCKLEDGE DR
BETHESDA, MD 20817-1836
(817) 763-7629

Facility:
Lockheed Martin Remediation Site #734055
Farrell Rd (within FWW CAM-6)
Geddes, NY 13209

Facility Application Contact:
AECOM ENVIRONMENT
5015 CAMPUSWOOD DR STE 104
EAST SYRACUSE, NY 13057-4232
(315) 432-0506

Facility Location: in GEDDES in ONONDAGA COUNTY
Facility Principal Reference Point: NYTM-E: 397.303 NYTM-N: 4775
Latitude: 43°07'14.8" Longitude: 76°15'44.7"
Authorized Activity: Remediation of groundwater impacts to NYS Freshwater Wetland CAM-6, to include tree cutting, temporary placement of wetland matting, boring, amendment delivery, and capping, all in accordance with approved plans [Project No:60518568, Dated: February 20, 2018] and permit conditions herein.

Permit Authorizations

Water Quality Certification - Under Section 401 - Clean Water Act
Permit ID 7-3132-00135/00001
New Permit Effective Date: 3/20/2018 Expiration Date: 3/19/2023

NYSDEC Approval

By acceptance of this permit, the permittee agrees that the permit is contingent upon strict compliance with the ECL, all applicable regulations, and all conditions included as part of this permit.

Permit Administrator: ELIZABETH A TRACY, Deputy Regional Permit Administrator
Address: NYSDEC Region 7 Headquarters
615 Erie Boulevard W
Syracuse, NY 13204 -2400

Authorized Signature: Elizabeth Tracy Date 3/20/18

Distribution List

AECOM ENVIRONMENT

Permit Components

NATURAL RESOURCE PERMIT CONDITIONS

WATER QUALITY CERTIFICATION SPECIFIC CONDITION

GENERAL CONDITIONS, APPLY TO ALL AUTHORIZED PERMITS

NOTIFICATION OF OTHER PERMITTEE OBLIGATIONS

NATURAL RESOURCE PERMIT CONDITIONS - Apply to the Following Permits: WATER QUALITY CERTIFICATION

1. **Conformance With Plans** All activities authorized by this permit must be in strict conformance with the approved plans submitted by the applicant or applicant's agent as part of the permit application. Such approved plans were prepared by Carey Letts, AECOM.

2. **Minimize Adverse Impacts to Wetlands, Wildlife, Water** All work must be performed in a manner which minimizes adverse impacts to wetlands, wildlife, water quality and natural resources.

3. **Timing of Wetland Work** Work may occur in wetland and regulated adjacent areas when soils are dry enough to support equipment without forming ruts, or wetland matting is used. Low ground pressure equipment is preferred. No equipment crossing or operating in standing water.

4. **Timing of Tree Cutting Work** Work must be completed by March 31st due to Indiana and Northern Long Eared Bat.

5. **Limits on Wetland Work** Work must be done with equipment located on wetland mats where work area can be reached from these mats. No equipment is to be placed or worked from off of the wetland mats.

6. **Wetland Matting** Contractor to identify all poorly drained soils where matting should be used. This includes not only wetland areas, but for any areas outside of the wetland where the soil is poorly drained and rutting can occur over high traffic areas. In deep or open water wetland areas, headers and stringers must be installed. If "pumping" effect is observed from matting in inundated areas, matting will need to be re-installed. Any turbidity or siltation created from this will be a violation of the wetland permit and restoration measures must be put into place.

7. **Access Roadway and Wetland Mats** Temporary wetland mats must be used to prevent rutting of soils. Wetland mats must be laid on top of existing wetland vegetation. Vegetation may be cut to facilitate mat placement, but must not be destroyed. No other fill will be allowed for access road construction. Wetland mats must be completely removed as soon as site access for the project is no longer necessary or before the permit expires, whichever comes first. Immediately following project completion and mat removal, all access roads constructed in the wetland must be made impassable to vehicles, including off-road vehicles.

8. **No Extra Material in Wetland or Adjacent Area** Any debris, fill, excavated material or excess material from construction of this project shall not be disposed of outside of the work area within the wetland and adjacent area. Once the project is complete, all extra material must be removed from the site.

9. **Prevent Introduction of Invasive Plant Species** To prevent the unintentional introduction or spread of invasive species, the permittee must ensure that all construction equipment is cleaned of mud, seeds, vegetation and other debris before entering and before leaving any approved construction areas. Materials removed during the cleaning process will be collected, contained in plastic bags or put into a covered conveyance vehicle and disposed at a Regulated Landfill, or the materials must be otherwise rendered incapable of any growth or reproduction. Any fill materials must come from a source that is free of invasive plant species.

10. **Equipment Fluid Leak Prevention** All equipment that must enter the wetland is to be inspected for leaks of petroleum, other fluids, or contaminates and may only enter if found to be free of any leakage. All petroleum deposits must be cleaned off of equipment. A spill kit must be on site to contain and clean up any leaks that may occur during work. Any reportable leakage must be reported as per regulations. Follow NYSDEC spills reporting procedure by contacting the NYS Spill Hotline: 1-800-457-7362. Any leakage not meeting reportable threshold must be immediately cleaned up and disposed of in a legal manner.

11. **Equipment and Materials Storage** Equipment must be stored in a location and manner that will prevent any leakage of deleterious substances from reaching the wetland. Erodible materials, if not used in the same day as delivery, will be contained by properly installed silt fence or strawbales.

12. **Fueling Equipment** All equipment, including pumps, must be fueled in a location at least 100 feet from the wetland. If any pump is operated closer than 100 feet from the wetland, it must be on an impervious surface with absorbents capable of containing any leakage of petroleum products. Any reportable leakage must be reported as per regulations. A spill kit must be on site to contain and clean up any leaks that may occur during work. Follow NYSDEC spills reporting procedure by contacting the NYS Spill Hotline: 1-800-457-7362. Any leakage not meeting reportable threshold must be immediately cleaned up and disposed of properly.

13. **Precautions Against Contamination of Waters** All necessary precautions shall be taken to preclude contamination of any wetland or waterway by suspended solids, sediments, fuels, solvents, lubricants, epoxy coatings, paints, concrete, leachate or any other environmentally deleterious materials associated with the project.

14. **State May Order Removal or Alteration of Work** If future operations by the State of New York require an alteration in the position of the structure or work herein authorized, or if, in the opinion of the Department of Environmental Conservation it shall cause unreasonable obstruction to the free navigation of said waters or flood flows or endanger the health, safety or welfare of the people of the State, or cause loss or destruction of the natural resources of the State, the owner may be ordered by the Department to remove or alter the structural work, obstructions, or hazards caused thereby without expense to the State, and if, upon the expiration or revocation of this permit, the structure, fill, excavation, or other modification of the watercourse hereby authorized shall not be completed, the owners, shall, without expense to the State, and to such extent and in such time and manner as the Department of Environmental Conservation may require, remove all or any portion of the uncompleted structure or fill and restore to its former condition the navigable and flood capacity of the watercourse. No claim shall be made against the State of New York on account of any such removal or alteration.

15. **State May Require Site Restoration** If upon the expiration or revocation of this permit, the project hereby authorized has not been completed, the applicant shall, without expense to the State, and to such extent and in such time and manner as the Department of Environmental Conservation may lawfully require, remove all or any portion of the uncompleted structure or fill and restore the site to its former condition. No claim shall be made against the State of New York on account of any such removal or alteration.

16. **State Not Liable for Damage** The State of New York shall in no case be liable for any damage or injury to the structure or work herein authorized which may be caused by or result from future operations undertaken by the State for the conservation or improvement of navigation, or for other purposes, and no claim or right to compensation shall accrue from any such damage.

WATER QUALITY CERTIFICATION SPECIFIC CONDITIONS

1. **Water Quality Certification** The authorized project, as conditioned pursuant to the Certificate, complies with Section 301, 302, 303, 306, and 307 of the Federal Water Pollution Control Act, as amended and as implemented by the limitations, standards, and criteria of state statutory and regulatory requirements set forth in 6 NYCRR Section 608.9(a). The authorized project, as conditioned, will also comply with applicable New York State water quality standards, including but not limited to effluent limitations, best usages and thermal discharge criteria, as applicable, as set forth in 6 NYCRR Parts 701, 702, 703, and 704.

GENERAL CONDITIONS - Apply to ALL Authorized Permits:

1. **Facility Inspection by The Department** The permitted site or facility, including relevant records, is subject to inspection at reasonable hours and intervals by an authorized representative of the Department of Environmental Conservation (the Department) to determine whether the permittee is complying with this permit and the ECL. Such representative may order the work suspended pursuant to ECL 71- 0301 and SAPA 401(3).

The permittee shall provide a person to accompany the Department's representative during an inspection to the permit area when requested by the Department.

A copy of this permit, including all referenced maps, drawings and special conditions, must be available for inspection by the Department at all times at the project site or facility. Failure to produce a copy of the permit upon request by a Department representative is a violation of this permit.

2. **Relationship of this Permit to Other Department Orders and Determinations** Unless expressly provided for by the Department, issuance of this permit does not modify, supersede or rescind any order or determination previously issued by the Department or any of the terms, conditions or requirements contained in such order or determination.

3. **Applications For Permit Renewals, Modifications or Transfers** The permittee must submit a separate written application to the Department for permit renewal, modification or transfer of this permit. Such application must include any forms or supplemental information the Department requires. Any renewal, modification or transfer granted by the Department must be in writing. Submission of applications for permit renewal, modification or transfer are to be submitted to:

Regional Permit Administrator
NYSDEC Region 7 Headquarters
615 Erie Boulevard W
Syracuse, NY13204 -2400

4. **Submission of Renewal Application** The permittee must submit a renewal application at least 30 days before permit expiration for the following permit authorizations: Water Quality Certification.

5. **Permit Modifications, Suspensions and Revocations by the Department** The Department reserves the right to exercise all available authority to modify, suspend or revoke this permit. The grounds for modification, suspension or revocation include:

a. materially false or inaccurate statements in the permit application or supporting papers;

b. failure by the permittee to comply with any terms or conditions of the permit;

c. exceeding the scope of the project as described in the permit application;

d. newly discovered material information or a material change in environmental conditions, relevant technology or applicable law or regulations since the issuance of the existing permit;

e. noncompliance with previously issued permit conditions, orders of the commissioner, any provisions of the Environmental Conservation Law or regulations of the Department related to the permitted activity.

6. **Permit Transfer** Permits are transferrable unless specifically prohibited by statute, regulation or another permit condition. Applications for permit transfer should be submitted prior to actual transfer of ownership.

NOTIFICATION OF OTHER PERMITTEE OBLIGATIONS

Item A: Permittee Accepts Legal Responsibility and Agrees to Indemnification
The permittee, excepting state or federal agencies, expressly agrees to indemnify and hold harmless the Department of Environmental Conservation of the State of New York, its representatives, employees, and agents ("DEC") for all claims, suits, actions, and damages, to the extent attributable to the permittee's acts or omissions in connection with the permittee's undertaking of activities in connection with, or operation and maintenance of, the facility or facilities authorized by the permit whether in compliance or not in compliance with the terms and conditions of the permit. This indemnification does not extend to any claims, suits, actions, or damages to the extent attributable to DEC's own negligent or intentional acts or omissions, or to any claims, suits, or actions naming the DEC and arising under Article 78 of the New York Civil Practice Laws and Rules or any citizen suit or civil rights provision under federal or state laws.

Item B: Permittee's Contractors to Comply with Permit
The permittee is responsible for informing its independent contractors, employees, agents and assigns of their responsibility to comply with this permit, including all special conditions while acting as the permittee's agent with respect to the permitted activities, and such persons shall be subject to the same sanctions for violations of the Environmental Conservation Law as those prescribed for the permittee.

Item C: Permittee Responsible for Obtaining Other Required Permits
The permittee is responsible for obtaining any other permits, approvals, lands, easements and rights-of-way that may be required to carry out the activities that are authorized by this permit.

Item D: No Right to Trespass or Interfere with Riparian Rights
This permit does not convey to the permittee any right to trespass upon the lands or interfere with the riparian rights of others in order to perform the permitted work nor does it authorize the impairment of any rights, title, or interest in real or personal property held or vested in a person not a party to the permit.